

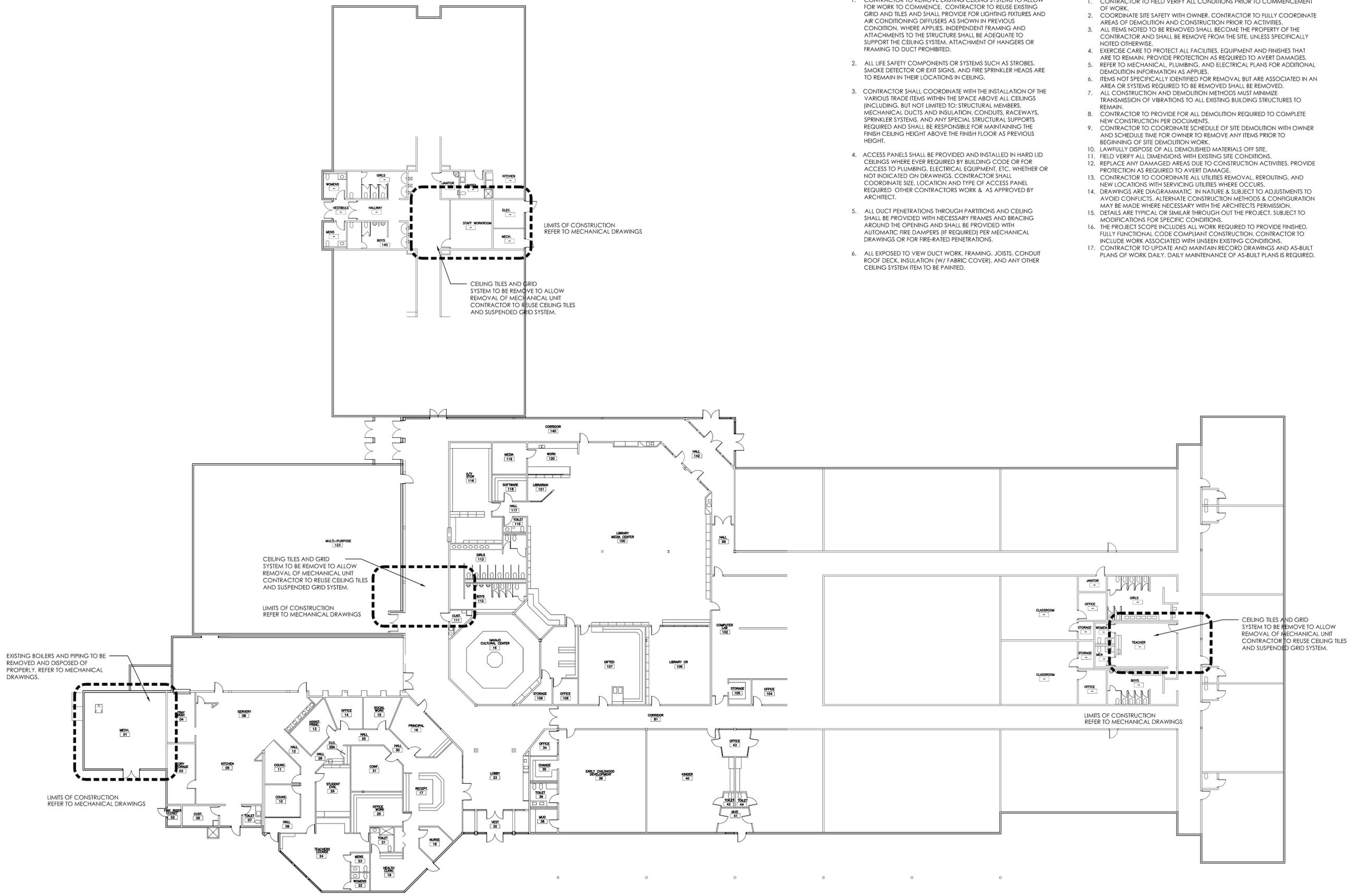


**CEILING NOTES**

1. CONTRACTOR TO REMOVE EXISTING CEILING SYSTEMS TO ALLOW FOR WORK TO COMMENCE. CONTRACTOR TO REUSE EXISTING GRID AND TILES AND SHALL PROVIDE FOR LIGHTING FIXTURES AND AIR CONDITIONING DIFFUSERS AS SHOWN IN PREVIOUS CONDITION. WHERE APPLIES, INDEPENDENT FRAMING AND ATTACHMENTS TO THE STRUCTURE SHALL BE ADEQUATE TO SUPPORT THE CEILING SYSTEM. ATTACHMENT OF HANGERS OR FRAMING TO DUCT PROHIBITED.
2. ALL LIFE SAFETY COMPONENTS OR SYSTEMS SUCH AS STROBES, SMOKE DETECTOR OR EXIT SIGNS, AND FIRE SPRINKLER HEADS ARE TO REMAIN IN THEIR LOCATIONS IN CEILING.
3. CONTRACTOR SHALL COORDINATE WITH THE INSTALLATION OF THE VARIOUS TRADE ITEMS WITHIN THE SPACE ABOVE ALL CEILINGS (INCLUDING, BUT NOT LIMITED TO: STRUCTURAL MEMBERS, MECHANICAL DUCTS AND INSULATION, CONDUITS, RACEWAYS, SPRINKLER SYSTEMS, AND ANY SPECIAL STRUCTURAL SUPPORTS REQUIRED AND SHALL BE RESPONSIBLE FOR MAINTAINING THE FINISH CEILING HEIGHT ABOVE THE FINISH FLOOR AS PREVIOUS HEIGHT.
4. ACCESS PANELS SHALL BE PROVIDED AND INSTALLED IN HARD LID CEILINGS WHERE EVER REQUIRED BY BUILDING CODE OR FOR ACCESS TO PLUMBING, ELECTRICAL EQUIPMENT, ETC. WHETHER OR NOT INDICATED ON DRAWINGS. CONTRACTOR SHALL COORDINATE SIZE, LOCATION AND TYPE OF ACCESS PANEL REQUIRED. OTHER CONTRACTORS WORK & AS APPROVED BY ARCHITECT.
5. ALL DUCT PENETRATIONS THROUGH PARTITIONS AND CEILING SHALL BE PROVIDED WITH NECESSARY FRAMES AND BRACING AROUND THE OPENING AND SHALL BE PROVIDED WITH AUTOMATIC FIRE DAMPERS (IF REQUIRED) PER MECHANICAL DRAWINGS OR FOR FIRE-RATED PENETRATIONS.
6. ALL EXPOSED TO VIEW DUCT WORK, FRAMING, JOISTS, CONDUIT ROOF DECK, INSULATION (W/ FABRIC COVER), AND ANY OTHER CEILING SYSTEM ITEM TO BE PAINTED.

**GENERAL NOTES**

1. CONTRACTOR TO FIELD VERIFY ALL CONDITIONS PRIOR TO COMMENCEMENT OF WORK.
2. COORDINATE SITE SAFETY WITH OWNER, CONTRACTOR TO FULLY COORDINATE AREAS OF DEMOLITION AND CONSTRUCTION PRIOR TO ACTIVITIES.
3. ALL ITEMS NOTED TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVE FROM THE SITE, UNLESS SPECIFICALLY NOTED OTHERWISE.
4. EXERCISE CARE TO PROTECT ALL FACILITIES, EQUIPMENT AND FINISHES THAT ARE TO REMAIN. PROVIDE PROTECTION AS REQUIRED TO AVERT DAMAGES.
5. REFER TO MECHANICAL, PLUMBING, AND ELECTRICAL PLANS FOR ADDITIONAL DEMOLITION INFORMATION AS APPLIES.
6. ITEMS NOT SPECIFICALLY IDENTIFIED FOR REMOVAL BUT ARE ASSOCIATED IN AN AREA OR SYSTEMS REQUIRED TO BE REMOVED SHALL BE REMOVED.
7. ALL CONSTRUCTION AND DEMOLITION METHODS MUST MINIMIZE TRANSMISSION OF VIBRATIONS TO ALL EXISTING BUILDING STRUCTURES TO REMAIN.
8. CONTRACTOR TO PROVIDE FOR ALL DEMOLITION REQUIRED TO COMPLETE NEW CONSTRUCTION PER DOCUMENTS.
9. CONTRACTOR TO COORDINATE SCHEDULE OF SITE DEMOLITION WITH OWNER AND SCHEDULE TIME FOR OWNER TO REMOVE ANY ITEMS PRIOR TO BEGINNING OF SITE DEMOLITION WORK.
10. LAWFULLY DISPOSE OF ALL DEMOLISHED MATERIALS OFF SITE.
11. FIELD VERIFY ALL DIMENSIONS WITH EXISTING SITE CONDITIONS.
12. REPLACE ANY DAMAGED AREAS DUE TO CONSTRUCTION ACTIVITIES. PROVIDE PROTECTION AS REQUIRED TO AVERT DAMAGE.
13. CONTRACTOR TO COORDINATE ALL UTILITIES REMOVAL, REROUTING, AND NEW LOCATIONS WITH SERVICING UTILITIES WHERE OCCURS.
14. DRAWINGS ARE DIAGRAMMATIC IN NATURE & SUBJECT TO ADJUSTMENTS TO AVOID CONFLICTS. ALTERNATE CONSTRUCTION METHODS & CONFIGURATION MAY BE MADE WHERE NECESSARY WITH THE ARCHITECTS PERMISSION.
15. DETAILS ARE TYPICAL OR SIMILAR THROUGH OUT THE PROJECT. SUBJECT TO MODIFICATIONS FOR SPECIFIC CONDITIONS.
16. THE PROJECT SCOPE INCLUDES ALL WORK REQUIRED TO PROVIDE FINISHED, FULLY FUNCTIONAL CODE COMPLIANT CONSTRUCTION. CONTRACTOR TO INCLUDE WORK ASSOCIATED WITH UNSEEN EXISTING CONDITIONS.
17. CONTRACTOR TO UPDATE AND MAINTAIN RECORD DRAWINGS AND AS-BUILT PLANS OF WORK DAILY. DAILY MAINTENANCE OF AS-BUILT PLANS IS REQUIRED.



**FLOOR PLAN**  
 SCALE: 1/16" = 1'-0"

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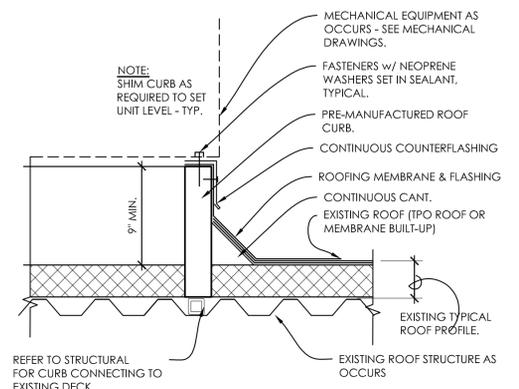
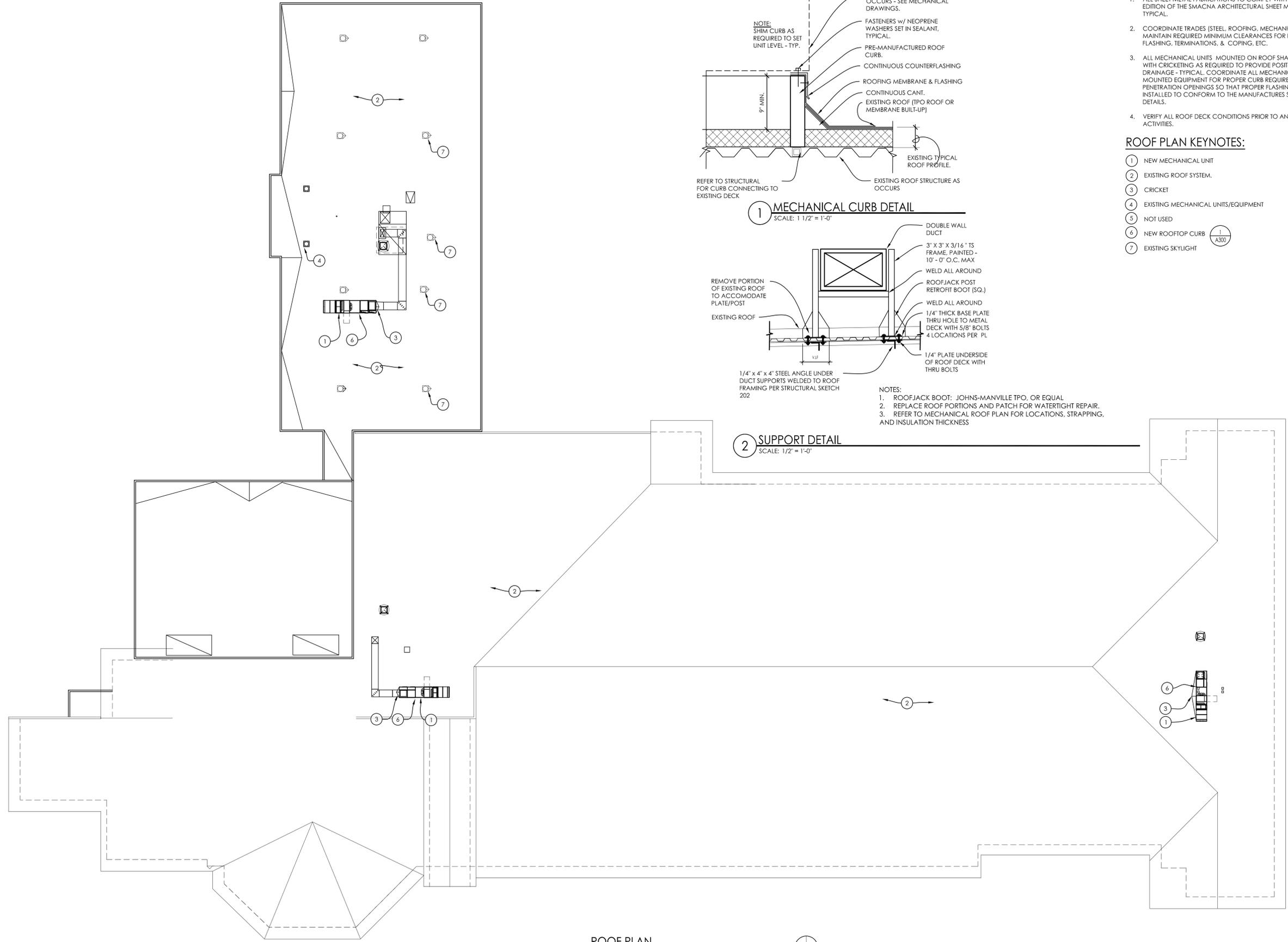
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JOB NO: 19101

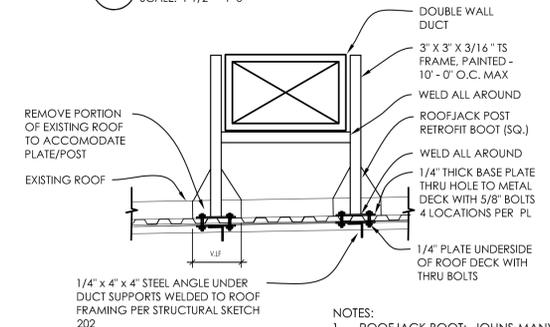
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**A100**

SEQUENCE #:



**1 MECHANICAL CURB DETAIL**  
 SCALE: 1 1/2" = 1'-0"



**2 SUPPORT DETAIL**  
 SCALE: 1/2" = 1'-0"

- NOTES:  
 1. ROOFJACK BOOT: JOHNS-MANVILLE TPO, OR EQUAL  
 2. REPLACE ROOF PORTIONS AND PATCH FOR WATERTIGHT REPAIR.  
 3. REFER TO MECHANICAL ROOF PLAN FOR LOCATIONS, STRAPPING, AND INSULATION THICKNESS

- GENERAL ROOF NOTES:**
- ALL SHEET METAL FABRICATIONS TO COMPLY WITH THE LATEST EDITION OF THE SMACNA ARCHITECTURAL SHEET METAL MANUAL - TYPICAL.
  - COORDINATE TRADES (STEEL, ROOFING, MECHANICAL, ETC.) AND MAINTAIN REQUIRED MINIMUM CLEARANCES FOR ROOF FLASHING, TERMINATIONS, & COPING, ETC.
  - ALL MECHANICAL UNITS MOUNTED ON ROOF SHALL BE PROVIDED WITH CRICKETING AS REQUIRED TO PROVIDE POSITIVE ROOF DRAINAGE - TYPICAL. COORDINATE ALL MECHANICAL ROOF MOUNTED EQUIPMENT FOR PROPER CURB REQUIREMENTS AND PENETRATION OPENINGS SO THAT PROPER FLASHING MAY BE INSTALLED TO CONFORM TO THE MANUFACTURERS STANDARD DETAILS.
  - VERIFY ALL ROOF DECK CONDITIONS PRIOR TO ANY ROOFING ACTIVITIES.

- ROOF PLAN KEYNOTES:**
- NEW MECHANICAL UNIT
  - EXISTING ROOF SYSTEM.
  - CRICKET
  - EXISTING MECHANICAL UNITS/EQUIPMENT
  - NOT USED
  - NEW ROOFTOP CURB 1  
A300
  - EXISTING SKYLIGHT

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 DATE: 1-15-2020

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**A300**

SEQUENCE #:

**ROOF PLAN**  
 SCALE: 1/16" = 1'-0"

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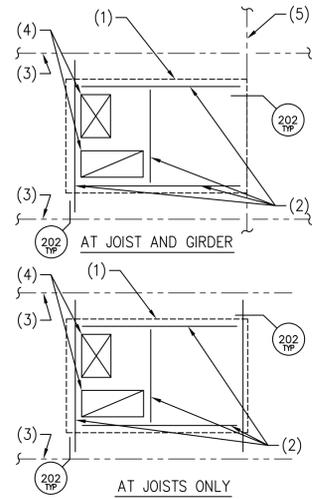
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 DATE: 1-15-2020

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SHEET:

**SSK1-4**

SEQUENCE #:



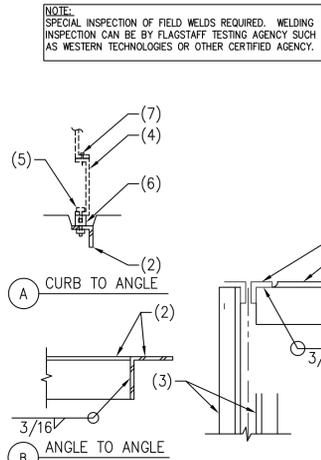
**NOTES:**

1. NEW MECH'L UNIT 2558 LBS MAXIMUM.
2. 6"x4"x5/16"(LLV) STEEL ANGLE - TYP.
3. EXISTING STEEL JOIST AT 6'-0" MAX.
4. NEW DUCT OPENINGS - AS OCCURS.
5. EXISTING BEAM/STEEL JOIST GIRDER.

**NOTE:**

- A. IF MECH'L UNIT IS ROTATED 90 DEGREES, INSTALL SIMILAR TO THIS DETAIL WITH MORE STEEL ANGLE SUPPORTS, AS NEEDED.
- B. ALL STEEL TO BE ASTM A36 (FY=36 KSI)

**201** PLAN VIEW MUA 19-1762 NO SCALE



**NOTES:**

1. EXISTING STEEL JOIST OR STEEL JOIST GIRDER.
2. NEW ANGLE - 6"x4"x5/16" (LLV) SEE PLAN FOR LOCATION.
3. SEE 203 FOR ADDITIONAL WEB INFORMATION.
4. CURB BY OTHERS.
5. 1/2" DIA BOLT AT 10" O.C. USE 1" DIA WASHERS.
6. 1 1/2"x1 1/2"x12 GAGE TUBE STEEL.
7. #12 SCREWS AT 7" O.C. PER SCHEDULE ALL AROUND UNIT.

**NOTE:**

- A. EXISTING ROOF NOT SHOWN FOR CLARITY
- B. ALL STEEL TO BE ASTM A36 (FY=36 KSI)

**202** ANGLE CONNECTION UNDER A/C UNIT 19-1762 NO SCALE

	CARUSO ■ TURLEY ■ SCOTT ■ INC. CONSULTING STRUCTURAL ENGINEERS 1215 WEST RIO SALADO PARKWAY SUITE 200 TEMPE, ARIZONA 85281 Ph: (480)774-1700 Fax: (480)774-1701 www.ctsoz.com		JOB NUMBER 19-1762	DRAWN ELG
	TITLE WRUSD ROOF MECHANICAL TSE HOOTSOOI' ELEMENTARY SCHOOL PO BOX 559 FORD DEFIANCE, AZ 86504		DATE 01.02.2020	ENGR TKH
THESE DRAWINGS/CALCULATIONS ARE CONSIDERED PRELIMINARY - NOT FOR CONSTRUCTION OR RECORDING UNLESS THE STRUCTURAL ENGINEER OF RECORD'S SEAL IS AFFIXED WITH WRITTEN SIGNATURE.			SSK1	

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**NOTE:**  
 SPECIAL INSPECTION OF FIELD WELDS REQUIRED. WELDING INSPECTION CAN BE BY FLAGSTAFF TESTING AGENCY SUCH AS WESTERN TECHNOLOGIES OR OTHER CERTIFIED AGENCY.

**NOTES:**

1. ADDITIONAL MEMBER REQUIRED WHEN LOAD IS MORE THAN 3" FROM PANEL POINT.
2. STEEL JOIST OR STEEL JOIST GIRDER.
3. STEEL ANGLE 2"x2"x3/16" EACH SIDE FROM TOP CHORD TO NEAREST BOTTOM CHORD PANEL POINT.
4. STEEL ANGLE 2"x2"x3/16" EACH SIDE FROM BOTTOM CHORD TO NEAREST TOP CHORD PANEL POINT.
5. TYP EACH ANGLE EACH END.

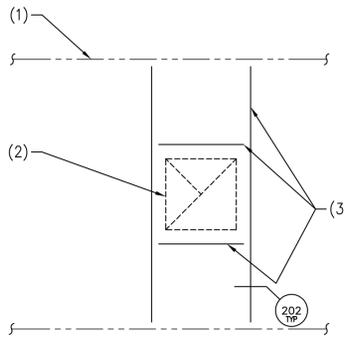
- NOTE:**
- A. PROVIDE THIS DETAIL WHEN CONCENTRATED LOAD EXCEEDS 100 LBS. - NOTIFY ENGINEER WHEN LOAD EXCEEDS 400 LBS.
- B. ALL STEEL TO BE A36 (FY=36 KSI)

**203** ADDITIONAL WEB MEMBERS FOR CONCENTRATED LOAD OCCURRING AWAY FROM JOIST PANEL POINT 19-1762 NO SCALE

**NOTE:**  
 SPECIAL INSPECTION OF FIELD WELDS REQUIRED. WELDING INSPECTION CAN BE BY FLAGSTAFF TESTING AGENCY SUCH AS WESTERN TECHNOLOGIES OR OTHER CERTIFIED AGENCY.

**NOTES:**

1. EXISTING JOIST.
2. NEW OPENING.
3. 3"x3"x1/4" STEEL ANGLE U.N.O.



- NOTE:**  
 ALL STEEL TO BE ASTM 36 (FY=36 KSI).

**204** PLAN - NEW OPENING IN EXISTING ROOF - FOR EXHAUST FANS MAX 250 LBS 19-1762 NO SCALE

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	TITLE WRUSD ROOF MECHANICAL TSE HOOTSOOI' ELEMENTARY SCHOOL PO BOX 559 FORD DEFIANCE, AZ 86504		DATE 01.02.2020	ENGR TKH
THESE DRAWINGS/CALCULATIONS ARE CONSIDERED PRELIMINARY - NOT FOR CONSTRUCTION OR RECORDING UNLESS THE STRUCTURAL ENGINEER OF RECORD'S SEAL IS AFFIXED WITH WRITTEN SIGNATURE.			SSK3	

	CARUSO ■ TURLEY ■ SCOTT ■ INC. CONSULTING STRUCTURAL ENGINEERS 1215 WEST RIO SALADO PARKWAY SUITE 200 TEMPE, ARIZONA 85281 Ph: (480)774-1700 Fax: (480)774-1701 www.ctsoz.com		JOB NUMBER 19-1762	DRAWN ELG
	TITLE WRUSD ROOF MECHANICAL TSE HOOTSOOI' ELEMENTARY SCHOOL PO BOX 559 FORD DEFIANCE, AZ 86504		DATE 01.02.2020	ENGR TKH
THESE DRAWINGS/CALCULATIONS ARE CONSIDERED PRELIMINARY - NOT FOR CONSTRUCTION OR RECORDING UNLESS THE STRUCTURAL ENGINEER OF RECORD'S SEAL IS AFFIXED WITH WRITTEN SIGNATURE.			SSK4	

**MECHANICAL SPECIFICATIONS:**

- ALL WORK SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES, LAWS, ACTS AND ALL AUTHORITIES HAVING JURISDICTION INCLUDING, BUT NOT LIMITED TO THE 2015 IMC, 2015 IECC AND 2015 IBC AS ADOPTED BY FORT DEFIANE, AZ.
  - WORK SHALL INCLUDE ALL MATERIALS, LABOR, SERVICES AND EQUIPMENT NECESSARY TO PROVIDE AN OPERATING SYSTEM AS SHOWN ON THE PLANS. PLANS ARE SCHEMATIC AND ARE NOT INTENDED TO SPECIFY ALL INCIDENTAL HARDWARE OR IDENTIFY ALL OFFSETS OR DIFFICULTIES WHICH MAY BE ENCOUNTERED IN THE COURSE OF COMPLETING THE PROJECT. DO NOT SCALE THE PLANS. CONTRACTORS SHALL FIELD MEASURE AND CREATE SHOP DRAWINGS FOR DUCT FABRICATION.
  - FIELD VERIFY ALL CLEARANCES PRIOR TO FABRICATION OR ORDERING DUCTWORK. CONTRACTOR SHALL NOT CHARGE OWNER, ARCHITECT, GENERAL CONTRACTOR, ENGINEER OR OTHERS FOR ADJUSTMENT DUE TO FIELD CONDITIONS. CONTRACTOR MUST INCLUDE IN FEE TO COMPLETE PROJECT MISCELLANEOUS DUCT FITTINGS TO/FROM AIR HANDLERS, EXHAUST FANS, DRYERS, DUCTS REQUIRING OFFSETS, SPECIAL FITTINGS AROUND BEAMS, COLUMNS, TRUSSES, OR STRUCTURAL BRACES. FIELD VERIFICATION AND INSTALLATION SHALL BE CONSIDERED INCLUDED IN BASE SCOPE OF WORK WITHOUT ADDITIONAL COMPENSATION FEES. MECHANICAL CONTRACTOR SHALL OBTAIN ARCHITECTURAL PLANS AND VERIFY INTENDED CLEARANCE LOCATIONS, SOFFIT LOCATIONS, AND OTHER ARCHITECTURAL FEATURE LOCATIONS AND SHALL ROUTE DUCTWORK ACCORDINGLY TO ALLOW CONSTRUCTION OF ELEMENTS OF BUILDING TO BE CONSTRUCTED AFTER MECHANICAL INSTALLATION PHASE. PRIOR TO TRUSS FABRICATION COORDINATE WITH TRUSS MANUFACTURER FOR ANY REQUIRED KNOCKOUTS OR POSITIONS OF ANY BLOCKING PLATES. LOCATE ALL DUCTS TO PROVIDE SUFFICIENT CLEARANCE FOR CEILING HARDWARE, ALL LIGHTS, AND ANY ARCHITECTURAL FEATURES IN CEILINGS. DUCT ROUTING MAY NEED TO BE FIELD ADJUSTED FROM PLANS FOR FIELD CONDITIONS AND FITTINGS PROVIDED TO SUIT. AIR FLOW TOTAL CROSS SECTIONAL AREA SHALL BE MAINTAINED THROUGH ALL SUCH FITTINGS. CONTRACTOR MAY ADJUST DUCT DIMENSIONS AND LOCATIONS TO SUIT AVAILABLE SPACE PROVIDED CROSS SECTIONAL FLOW AREA IS MAINTAINED.
  - DISCREPANCIES ON MECHANICAL PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER FOR CLARIFICATION PRIOR TO SUBMISSION OF BID TO CONSTRUCT MECHANICAL SYSTEM. DISCREPANCIES BROUGHT TO ENGINEER'S ATTENTION AFTER SUBMISSION OF BID SHALL NOT BE BILLABLE TO ENGINEER, ARCHITECT, CLIENT OR OTHERS AND SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REMEDY PER CODE AND WITH THE ASSISTANCE OF THE ENGINEER. ENGINEER WILL ASSIST CONTRACTOR IN DETERMINING REMEDY AND SHALL STRIVE IN GOOD FAITH TO FIND A LEAST COST AND CODE COMPLIANT SOLUTION TO SUCH DISCREPANCIES. CONTRACTOR'S SUBMISSION OF BID TO CONSTRUCT MECHANICAL SYSTEM IS SEEN AS AGREEMENT TO THESE TERMS.
  - DUCTWORK: SEE DUCT CONSTRUCTION REQUIREMENTS ON THIS SHEET.
  - PROVIDE EACH DUCT SUPPLY BRANCH WITH OWNER ADJUSTABLE VOLUME CONTROL USING A LOCKING BRANCH DAMPER 18" FROM MAIN TAKEOFF OR OB IN DEVICE IF BRANCH IS INACCESSIBLE. PROVIDE AUTOMATIC SHUT OFF DAMPERS ON EXHAUST SYSTEMS & SUPPLY SYSTEMS WITH AIRFLOW > 3,000 CFM. OUTSIDE AIR SYSTEM SHALL BE CAPABLE OF REDUCING OUTSIDE AIR TO REQUIRED MINIMUM.
  - BALANCING DAMPERS: ALL BALANCING DAMPERS SHALL BE FIELD LOCATED IN ACCESSIBLE LOCATIONS OR SHALL BE FURNISHED WITH ACCESS DOORS OR YOUNG REGULATOR WITH ADJUSTMENT AT THE DEVICE. ALL PLATE DAMPERS WITH A DIMENSION GREATER THAN 12" SHALL HAVE A CONTINUOUS SQUARE STEEL PIVOT ROD. FOR DAMPERS WITH THE LARGEST DIMENSION LESS THAN 12", A NON-CONTINUOUS SQUARE STEEL PIVOT ROD IS ACCEPTABLE. MINIMUM PIVOT RODS SIZE 3/8". DAMPER BLADES TO BE CONSTRUCTED OF AT LEAST 2 GAUGES HEAVIER THAN THE DUCT IN WHICH THEY ARE INSTALLED AND NO LIGHTER THAN 22 GAUGE. DAMPERS SHALL FEATURE TIGHT FITTING SYNTHETIC BUSHINGS AND BEARINGS AT PIVOT ROD TO HOUSING CONTACT. DAMPERS SHALL BE MANUAL QUADRANT LOCKING TYPE WITH A STANDOFF TO ALLOW ROOM FOR INSULATION. "JEFFY" DAMPERS RELYING UPON A WING-NUT ON THE PIVOT ROD AXIS ARE NOT ACCEPTABLE. DAMPER INSTALLATIONS SHALL BE FREE OF OBSTRUCTION FROM VIBRATION AND NOISE. PROVIDE EACH DUCT SUPPLY BRANCH WITH OWNER ADJUSTABLE VOLUME CONTROL USING A LOCKING BRANCH DAMPER PER PLANS, OR 18" FROM MAIN TAKEOFF OR OB IN DEVICE IF BRANCH IS INACCESSIBLE. PROVIDE AUTOMATIC SHUT OFF DAMPERS ON EXHAUST SYSTEMS & SUPPLY SYSTEMS WITH AIRFLOW > 3,000 CFM. PROVIDE OBD'S IN DEVICES WHEN BRANCH DAMPERS ARE INACCESSIBLE.
  - FIELD VERIFY EXACT LOCATIONS OF STRUCTURE AND INSTALL NEW EQUIPMENT ACCORDINGLY. FIELD VERIFY AND PROVIDE 10' MINIMUM CLEARANCE BETWEEN ALL BUILDING AIR INTAKES AND BUILDING AIR EXHAUSTS, MECHANICAL VENTS, AND PLUMBING VENTS PER CODE.
  - PROVIDE AS-BUILT DRAWINGS AND NEW EQUIPMENT INSTALLATION AND OPERATION MANUALS (OM'S) TO OWNER FOLLOWING PROJECT COMPLETION.
  - SEE STRUCTURAL PLANS FOR ROOF TOP EQUIPMENT SUPPORTS AND BRACING IF REQUIRED. DO NOT CUT STRUCTURAL MEMBERS.
  - PROVIDE EACH EXHAUST FAN AND ROOF PENETRATION WITH INSULATED STEEL CURB(S). INSTALL WITH MINIMUM 8" ABOVE ROOF OR ROOF CRICKETS. DO NOT CUT STRUCTURAL MEMBERS TO INSTALL CURBS OR DUCTS.
  - ALL HVAC EQUIPMENT SHALL BE UL LISTED AND INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
  - PROVIDE PERMANENT PHENOLIC ID LABEL FOR EACH PIECE OF HVAC EQUIPMENT. LABEL SHALL IDENTIFY EACH PIECE OF EQUIPMENT PER PLAN IDENTIFICATION NUMBER. HANDWRITTEN LABELS OR STICKERS SHALL NOT BE ALLOWED.
  - COORDINATE WITH ELECTRICAL CONTRACTOR TO PROVIDE COURTESY 120V OUTLET IN WEATHERPROOF ENCLOSURE FOR A/C SERVICE. HARDWARE AND INSTALLATION BY ELECTRICAL CONTRACTOR. PROVIDE 1 RECEPTACLE WITHIN 25' OF EACH CONDENSING UNIT OR AIR HANDLER.
  - PROVIDE CONTROL SYSTEMS IN ACCORDANCE WITH CONTROL REQUIREMENTS AND SEQUENCE OF OPERATIONS ON THIS SHEET.
  - BOILER CONDENSATE DRAINS SHALL BE CPVC AND INSULATED.
  - ALL CONTROLS AND ACTUATORS LOCATED OUTDOORS SHALL BE RATED FOR OUTDOOR LOCATIONS. ALL CONTROL AND THERMOSTAT WIRING LOCATED OUTDOORS SHALL BE INSTALLED IN A RIGID STEEL CONDUIT.
  - PROVIDE ASHRAE 90.1 AND IECC COMPLIANT CONTROLS AND ZONE SENSORS/THERMOSTATS, FURNISH INSULATED SUB-BASE WITH MOUNTING THERMOSTATS ON EXTERIOR WALLS. TEMPERATURE CONTROL MUST BE CAPABLE OF THE FOLLOWING: SETBACK TEMP TO 55°F DURING UNOCCUPIED HEATING AND SETUP TEMP TO 85°F DURING UNOCCUPIED COOLING. AUTOMATIC SHUT OFF DURING UNOCCUPIED HOURS USING 7 DIFFERENT DAY SCHEDULES. ACCESSIBLE 2-HOUR OCCUPANT OVERRIDE. BATTERY BACKUP CAPABLE OF MAINTAINING PROGRAMMED SETTINGS FOR AT LEAST 10 HOURS WITHOUT LINE POWER. CAPABLE OF AUTOMATIC START AND SHUTTING OSA DAMPERS DURING UNOCCUPIED HOURS PER IECC REQUIREMENTS. MOUNT ALL THERMOSTATS AT 48" A.F.F. SEE CONTROL SPECIFICATIONS FOR CONTROL REQUIREMENTS.
  - CONTRACTOR TO PROVIDE SIGNED AND SEALED TEST AND BALANCE REPORT TO ENGINEER AND OWNER. TEST AND BALANCE OF SYSTEM TO BE PERFORMED BY AN AACB OR NEBB CONTRACTOR CERTIFIED IN THE STATE OF ARIZONA. PRIOR TO FINAL INSPECTION, PROVIDE A COPY OF THE SIGNED AND SEALED WATER-BALANCE REPORT TO THE MECHANICAL INSPECTOR FOR FINAL APPROVAL. SEE SPECIFICATION THIS SHEET.
- DEFINITIONS:**  
 PROVIDE: FURNISH AND INSTALL.  
 FURNISH: DELIVER EQUIPMENT AND/OR MATERIALS TO SITE.  
 INSTALL: PLACE IN POSITION AND PUT INTO OPERATION.

**MECHANICAL SYMBOLS LEGEND**

SINGLE LINE DUCTWORK	DOUBLE LINE DUCTWORK	DESCRIPTION
		MECHANICAL EQUIPMENT TAG
		MECHANICAL SECTION TAG.
		GRILLES REGISTERS AND DIFFUSERS.
		RECTANGULAR AND ROUND DUCT. DUCT SIZES ARE IN INCHES. DUCT SIZES REPRESENT INSIDE DIMENSIONS OF DUCTWORK.
		45° TAP USED AT BRANCH DUCTS ONLY.
		CONICAL TAP USED AT ROUND BRANCH DUCTS.
		90° ELBOW WITH SINGLE RADIUS TURNING VANES CURVED ELBOW (MIN. RADIUS R = 1.5 WIDTH)
		FLEXIBLE DUCT CONNECTION
		SPIN-IN FLEX DUCT TAKE-OFF WITH MANUAL BALANCE DAMPER. FLEX DUCT NOT TO EXCEED 6'-0"
		BALANCING DAMPER (USE OBD IN RECTANGULAR DUCTS AND PLATE DAMPER IN ROUND DUCTS UNLESS OTHERWISE NOTED)
		MOTORIZED DAMPER.
		BACKDRAFT DAMPER / MANUAL VOLUME DAMPER.
		ACCESS PANEL.
		SMOKE DAMPER, FIRE DAMPER, AND COMBINATION FIRE SMOKE DAMPER WITH ACCESS PANEL.
		DUCT SMOKE DETECTOR / DUCT CO2 SENSOR.
		DUCTWORK DOWN.
		DUCTWORK UP.
		ROUND DUCTWORK.
		DUCT TRANSITION.
		SAIL SWITCH, PROGRAMMABLE THERMOSTAT, TEMPERATURE SENSOR, DUCT SMOKE DETECTOR, EVAP CONTROLS (SEE SEQUENCE OF OPERATIONS), CO2 SENSOR
		POINT OF CONNECTION.
		EXISTING TO REMAIN.
		EXISTING TO BE DEMOLISHED.
		EXISTING TO BE DEMOLISHED, EXISTING TO BE RELOCATED, EXISTING TO REMAIN, NEW - EQUIPMENT AND DUCTS SHOWN ARE NEW UNLESS OTHERWISE NOTED

\*\*\* NOT ALL SYMBOLS ARE APPLICABLE FOR THIS PROJECT \*\*\*

**MECHANICAL ABBREVIATIONS**

ABBV	DESCRIPTION	ABBV	DESCRIPTION
ABVV	DESCRIPTION	ABBV	DESCRIPTION
AFF	ABOVE FINISHED FLOOR	KW	KILOWATT
AP	ACCESS PANEL	LAT	LEAVING AIR TEMPERATURE
AC	AIR CONDITIONING UNIT	LWT	LEAVING WATER TEMPERATURE
AHU	AIR HANDLING UNIT	LTG	LIGHTING
ALT	ALTERNATE	MFR	MANUFACTURER
AP	ACCESS PANEL	MAX	MAXIMUM
BDD	BACKDRAFT DAMPER	MECH	MECHANICAL
BG	BLAST GATE	MC	MECHANICAL CONTRACTOR
BS	BIRDSCREEN	MBH	THOUSAND BTU / HOUR
BC	BOOSTER COIL	MIN	MINIMUM
BOT	BOTTOM	MAT	MIXED AIR TEMPERATURE
BOD	BOTTOM OF DUCT	MCC	MOTOR CONTROL CENTER
BOP	BOTTOM OF PIPE	NEG	NEGATIVE
BHP	BRAKE HORSEPOWER	NEUT	NEUTRAL
BLDG	BUILDING	NC	NORMALLY CLOSED
CH	CABINET HEATER	NO	NORMALLY OPEN
CAP	CAPACITY	NA	APPLICABLE
CLG	CEILING	NIC	NOT IN CONTRACT
CCT	CIRCUIT	NTS	NOT TO SCALE
CW	COLD WATER	OAI	OUTSIDE AIR INTAKE
CAI	COMBUSTION AIR INTAKE	OAT	OUTSIDE AIR TEMPERATURE
CONN	CONNECTION	OPD	OPPOSED BLADE DAMPER
CONT	CONTINUED	PBD	PARALLEL BLADE DAMPER
CC	COOLING COIL	POS	POSITIVE
CT	COOLING TOWER	PSI	POUNDS PER SQUARE INCH
CPR	COPPER	PHC	PREHEAT COIL
CFM	CUBIC FEET PER MINUTE	PRESS	PRESSURE
DET	DETAIL	PD	PRESSURE DROP
DIA.Ø	DIAMETER	PRV	PRESSURE REDUCING VALVE
DIF	DIFFUSER	P	PUMP
DIM	DIMENSION	QTY	QUANTITY
DAT	DIS. AIR TEMPERATURE	RA	RETURN AIR
DG	DOOR GRILLE	RAF	RETURN AIR TEMPERATURE
DRG	DRAWING	RF	RETURN FAN
DX	DIRECT EXPANSION	R/E	RETURN/EXHAUST
EA	EACH	REF	REFERENCE
EC	ELECTRICAL CONTRACTOR	REG	REGISTER
EL	ELEVATION	RHC	REHEAT COIL
EMER	EMERGENCY	REQD	REQUIRED
EAT	ENTERING AIR TEMPERATURE	REV	REVISION
EW	ENT. WATER TEMPERATURE	RM	ROOM
EQUIP	EQUIPMENT	SCH	SCHEDULE
EXH	EXHAUST	SECT	SECTION
EXIST	EXISTING	SHT	SHEET
FC	FAN COIL	SA	SOUND ATTENUATOR
FPM	PER MINUTE	SPEC	SPECIFICATION
FD	DAMPER	SS	STAINLESS STEEL
FOB	FD FLAT ON BOTTOM	STD	STANDARD
FOT	FLAT ON TOP	STM	STEAM
FLEX	FLEXIBLE	STL	STEEL
FLR	FLOOR	SF	SUPPLY FAN
FLD	FLOOR DRAIN	SOFT	SQUARE FEET
FUT	FUTURE	SUSP	SUSPENDED
GPM	GALLONS PER MINUTE	SW	SWITCH
GALV	GALVANIZED	SWGR	SWITCHGEAR
GRD	GRADE	TEMP	TEMPERATURE
GR	GRILLE	TAG	TRANSFER AIR GRILLE
HC	HEATING COIL	TYP	TYPICAL
HV	HEATING/VENTILATING UNIT	UL	UNDERWRITER'S LABORATORY
HVAC	HEATING/VENTILATING/AC	UH	UNIT HEATER
HT	HEIGHT	VAV	VARIABLE AIR VOLUME
HOR	HORIZONTAL	VFD	VARIABLE FREQUENCY DRIVE
HP	HORSEPOWER	VENT	VENTILATION
HW	HOT WATER	VERT	VERTICAL
H	HUMIDIFIER	VD	VOLUME DAMPER
IN	INCH	WG	WATER GAGE

\*\*\* NOT ALL ABBREVIATIONS ARE APPLICABLE FOR THIS PROJECT \*\*\*

**CONTROL SPECIFICATIONS & SEQUENCE OF OPERATIONS:**

**GENERAL WORK INCLUDED:**  
 MECHANICAL CONTRACTOR SCOPE SHALL INCLUDE AN HVAC CONTROL SYSTEM AND INCLUDE ALL LABOR, MATERIALS, EQUIPMENT, AND SERVICE NECESSARY FOR A COMPLETE AND OPERABLE HVAC CONTROL SYSTEM PER PLANS AND SEQUENCE OF OPERATIONS.

CONTROL SYSTEM "BAS" SHALL BE A BACTALK SYSTEM FROM ALERTON PROVIDED THROUGH CLIMATEC OR EQUAL VENDOR. THE BAS SHALL BE INSTALLED BY THE MANUFACTURER OR A MANUFACTURER CERTIFIED CONTRACTOR. CONTACT: COLLEEN TURSKI (602) 686-5070, COLLEEN@CLIMATEC.COM.

CONTROL SYSTEM AND COMPONENTS SHALL BE ALL-INCLUSIVE AND AS NOTED BELOW. SYSTEM SHALL INCLUDE ALL BUS, SENSOR WIRING (SHIELDED CABLES), SENSORS, ACTUATORS, CONTROL VALVES (INSTALLED BY M.C.), CONTROLLERS, CONTROL PANELS, TRANSFORMERS, CONNECTIONS, WORKSTATION, PROGRAMMING, SECURITY PROTECTION, SCHEDULING, ALARM FUNCTIONS, TRENDS, TRAINING, WARRANTIES, AND PERFORMANCE TESTING COMPLETE. ADDITIONALLY, PROVIDE RIGID METAL CONDUIT FOR ALL CONTROL WIRING LOCATED OUTDOORS AND EMT CONDUIT FOR ALL CONDUIT IN BUILDING INTERIOR IN WALLS. CABLE RUNS ABOVE ACCESSIBLE CEILING SPACES IS ALLOWED WHEN SUPPORTED WITH APPROVED HANGERS. PROVIDE PLENUM RATED CABLE AND DEVICES AS REQUIRED IN PLENUM AREAS.

IN ADDITION TO NEW EQUIPMENT SPECIFIED IN THESE PLANS, CONTROLS CONTRACTOR SHALL INCLUDE IN BID NEW SPACE TEMPERATURE SENSORS, DUCT TEMPERATURE SENSORS, FIELD CONTROLLERS, AND RELATED EQUIPMENT, INSTALLATION, AND PROGRAMMING FOR INTEGRATION OF EXISTING (39) WATER SOURCE HEAT PUMPS INTO BAS. HEAT PUMP OPERATION INCLUDING UNOCCUPIED SETBACK SHALL BE PROGRAMMED TO MATCH EXISTING. POINTS SHALL INCLUDE START, STOP, STATUS, AND ROOM TEMPERATURE.

**GRAPHICS, SCHEDULES, ALARMS AND TRENDS:**  
 UPDATE THE WEB BASED SYSTEM GRAPHIC SCREEN TO INCLUDE COMPLETE FLOOR PLAN, ZONING, NAMING, AND EQUIPMENT MONITORING POINTS AND NEW ACTIVE DATA POINTS WITH OVERRIDE CAPABILITY OF ALL OUTPUTS AND RESET CAPABILITY OF ALL SET-POINTS. PROVIDE SCHEDULE SCREEN FOR SETTING AND CHANGING UNIT OCCUPIED AND UNOCCUPIED SCHEDULES. PROVIDE ACTIVE ALARMS FOR FAN FAILURE AND OVER-TEMPERATURE FROM SET-POINTS. PROVIDE CONTINUOUS TRENDS FOR ALL CONTROL PUMP POINTS AT A 5 MINUTE INTERVAL. THE CONTROLS CONTRACTOR SHALL ADJUST THE ALARM SETTINGS AND TIME DELAYS TO REMOVE ANY NUISANCE AND FALSE ALARMS.

**CONTROL SUBMITTAL PACKAGE SHALL INCLUDE THE FOLLOWING:**  
 INCLUDE PROJECT SPECIFIC POINTS LISTS, PROJECT SPECIFIC CONTROL DIAGRAMS, PROJECT SPECIFIC SEQUENCES OF OPERATION, AND PROJECT SPECIFIC CONTROL COMPONENTS, SENSORS, CONTROLLERS, AND DEVICES.

**TRAINING:**  
 PROVIDE FIELD TECHNICIAN AND TRAINING TO OWNER'S REPRESENTATIVE.

**MECHANICAL ROOM GENERAL OPERATION SPECIFICATION:**  
 SUPPLY WATER FOR HEAT PUMPS SHALL BE MAINTAINED BETWEEN 60°F AND 85°F DURING OCCUPIED HOURS. BOILER OPERATION OR COOLING TOWER/HEAT EXCHANGER OPERATION SHALL SWITCH AUTOMATICALLY AS REQUIRED TO MAINTAIN THE SUPPLY WATER TEMPERATURE WITHIN THIS RANGE. SIMULTANEOUS HEATING AND COOLING SHALL NOT BE PERMITTED. EXISTING CONTROL VALVE "BOILER 3-WAY VALVE" SHALL BE ACTUATED TO SUPPLY WATER TO THE BOILERS ON A SYSTEM CALL FOR HEATING AND TO PREVENT FLOW TO THE BOILERS ON A SYSTEM CALL FOR COOLING. EXISTING COOLING TOWER PUMPS ARE SET TO OPERATE CONTINUOUSLY WHEN HVAC SUPPLY WATER TEMPS EXCEED 75°F [ADJ]. EXISTING BOILER 3-WAY VALVE SHALL DIRECT FLOW TO BOILERS AND BOILERS SHALL ACTIVATE WHEN HVAC SUPPLY WATER TEMPS FALL BELOW 70°F [ADJ].

THE ENTIRE SYSTEM INCLUDING BOILERS, COOLING TOWERS, AND ALL PUMPS SHALL BE SHUT DOWN DURING UNOCCUPIED MODE WHEN SYSTEM ACTIVATION IS NOT REQUIRED FOR FREEZE PROTECTION PER EXISTING SEQUENCE OF OPERATIONS. SYSTEM WILL ENERGIZE IF ANY ROOM TEMPERATURE SENSOR RECORDS A TEMPERATURE BELOW 64°F [ADJ] OR IF OSA TEMPERATURE SENSOR RECORDS AMBIENT TEMPERATURE BELOW 35°F [ADJ].

**EXISTING CONTROLS AND EQUIPMENT FOR HVAC WATER LOOP:**  
 PREVIOUSLY PERMITTED PLANS SHOW EXISTING CONTROLS FOR GT-1 (FAN-1 & FAN-2), GT-2 (FAN-1 & FAN-2), P-1, P-2, P-3, P-4, B-1, B-2, AND AUTOMATIC CONTROL VALVE (CALLED "BOILER 3-WAY VALVE" ON ORIGINAL DRAWINGS). CONTROLS CONTRACTOR SHALL MAKE PROVISIONS TO CONNECT ALL EXISTING CONTROL POINTS IN THE MECHANICAL ROOM TO THE NEW BAS ALONG WITH ALL NEW CONTROL POINTS INCLUDED BELOW. EXISTING EQUIPMENT SHALL BE CONTROLLED AS PREVIOUSLY DESIGNED AND PERMITTED BY OTHERS.

**NEW EQUIPMENT IN MECHANICAL ROOM:**  
 • B-1 & B-2: NEW BOILERS FOR HVAC WATER LOOP SERVING EXISTING WATER SOURCE HEAT PUMPS.  
 • P-3 & P-4: HVAC WATER LOOP PUMPS.  
 • P-5 & P-6: BOILER CIRCULATOR PUMPS. (OPERATE BASED ON SIGNAL FROM BOILER ONLY, NOT CONNECTED TO BAS).

**B-1 & B-2 - NEW HIGH EFFICIENCY BOILER CONTROL:**  
 CONFIGURE AND INTEGRATE BOILER OPERATION TO PROVIDE HOT WATER SUPPLY TEMPERATURE TO MEET OWNER'S REQUIREMENTS (70°F DELIVERY TEMPERATURE). PROVIDE SIGNAGE ON THE EQUIPMENT THAT SHOWS OWNER'S REQUIREMENTS FOR SYSTEM TEMPERATURE SETPOINT.

PROVIDE START, STOP, AND STATUS POINTS FOR EACH NEW BOILER. BOILER SHALL BE CONNECTED TO THE BAS THROUGH THE BOILER'S FACTORY SUPPLIED "NURO" CONTROLLER. CONTROLS CONTRACTOR SHALL PROVIDE CONVERTER TO CONVERT FROM MODBUS PROTOCOL TO BACNET PROTOCOL FOR INTEGRATION OF BOILER CONTROL INTO THE BAS. BOILERS SHALL OPERATE PER FACTORY ON-BOARD CONTROLS IN A CASCADE ARRANGEMENT (BOTH BOILERS OPERATE IN A MASTER / SLAVE ARRANGEMENT TO MODULATE BOTH BOILERS WHEN REQUIRED TO MEET THE PLANT HEATING LOAD) IN ACCORDANCE WITH THE BOILER MANUFACTURER'S NURO CONTROL INSTRUCTIONS. PROVIDE AND INSTALL ALL CONTROL DEVICES REQUIRED FOR CASCADE BOILER OPERATION INCLUDING: HEADER TEMPERATURE SENSOR KIT.

PROVIDE INTERLOCK TO NEW EMERGENCY SHUT-DOWN SWITCH (ESD-1) TO SHUT-DOWN BOILERS AND ALL BOILER ROOM COMBUSTION EQUIPMENT UPON ACTIVATION OF ESD PER CSD-1 REQUIREMENTS. EQUIPMENT INTERLOCKED TO ESD-1 SHALL BE (2) NEW BOILERS, (2) EXISTING WATER HEATERS, AND (1) EXISTING UNIT HEATER.

**P-3 & P-4 - NEW SECONDARY LOOP (BUILDING HVAC WATER SUPPLY) PUMP CONTROL:**  
 PROVIDE START/STOP, AND STATUS POINTS FOR EACH PUMP. CONFIGURE PUMPS TO OPERATE IN A LEAD / LAG SEQUENCE WHERE ONE PUMP IS ACTIVE (DUTY) AND THE OTHER IS INACTIVE (STANDBY). THE LEAD/LAG SEQUENCE SHALL BE SELECTED MANUALLY BY AN AUTHORIZED OPERATOR OR SHALL BE SWITCHED BI-WEEKLY DURING OCCUPIED HOURS SO MAINTENANCE IS AVAILABLE (BOTH OPTIONS PROVIDED).

**P-5 & P-6 - NEW BOILER PRIMARY LOOP PUMP CONTROL:**  
 BOILER PRIMARY PUMPS SHALL BE INTERLOCKED TO THEIR RESPECTIVE BOILERS TO OPERATE ON AN ACTIVATION SIGNAL FROM THE BOILER. PROVIDE INTERLOCK PER BOILER MANUFACTURER INSTRUCTIONS.

**NEW EQUIPMENT OUTSIDE OF MECHANICAL ROOM:**  
 • MUA'S: NEW GAS-FIRED MAKE-UP AIR UNITS. UNITS SHALL BE ROOF-MOUNTED.  
 • EF'S: NEW EXHAUST FANS FOR BUILDING MECHANICAL RELIEF. FANS SHALL BE ROOF-MOUNTED.

**MUA-1, MUA-2, & MUA-3 - NEW ROOFTOP MAKE-UP AIR UNIT CONTROL:**  
 UNIT CONTROLLER: PROVIDE UNIT WITH FACTORY DDC CONTROLLER WITH BACNET CONNECTION FOR COMMUNICATION WITH THE BAS. INTERLOCK UNIT TO ALLOW FOR DATA TRACKING AND TEMPERATURE SET-POINT CONTROL. UNITS ARE HEATING ONLY. DURING OCCUPIED HOURS CONFIGURE UNIT TO SUPPLY AIR AT 70°F [ADJ] IN HEATING MODE, OR AT AMBIENT OUTDOOR TEMPERATURE IN COOLING MODE.

MAKE-UP AIR UNITS SHALL OPERATE CONTINUOUSLY DURING OCCUPIED HOURS AND SHALL BE OFF DURING UNOCCUPIED HOURS. SUPPLY AIR TEMPERATURE SENSOR SHALL BE ABLE TO COMMUNICATE BACK TO THE BAS AND SUPPLY AIR TEMPERATURE SET POINT SHALL SHOW UP AS A NEW CONTROL POINT FOR THE FACILITIES OPERATORS.

**EF-1, EF-2, & EF-3 - ROOFTOP EXHAUST FAN CONTROL:**  
 ROOF TOP-BLAST EXHAUST FANS: PROVIDE START/STOP, AND STATUS POINTS FOR EACH FAN. FANS SHALL OPERATE CONTINUOUSLY DURING OCCUPIED HOURS AND SHALL BE OFF DURING UNOCCUPIED HOURS. ANNUNCIATE AN ALARM UPON FAN FAILURE.

**WATER BALANCING REQUIREMENTS FOR EXISTING WATER SOURCE HEAT PUMPS**

EXISTING HVAC WATER LOOP SHALL BE RE-BALANCED TO PROVIDE PROPER FLOW TO EACH EXISTING WATER SOURCE HEAT PUMP UNIT AS SPECIFIED BY THE MANUFACTURER AND PER MECHANICAL PLANS ISSUED MAY, 1995 AND JUNE 11, 1998. TEST AND BALANCE CONTRACTOR SHALL INCLUDE IN PRICE THE BALANCING OF (57) EXISTING WATER SOURCE HEAT PUMP UNITS AND (2) NEW BOILERS. EXISTING UNITS ARE EQUIPPED WITH BELL & GOSSETT CIRCUIT SETTER MANUAL BALANCING VALVES OR SIMILAR PRODUCT.

**DUCT CONSTRUCTION AND DUCT INSULATION REQUIREMENTS**

DUCT TYPE	INSULATION TYPE	INSULATION MINIMUM R VALUE	NOTES
CONCEALED SUPPLY AND EXHAUST MAINS AND BRANCHES IN UNCONDITIONED SPACES AND PLENUMS BELOW ROOF AND DUCTS INSIDE THE BUILDING ENVELOPE	EXTERNALLY WRAPPED WITH FOIL BACKED INSULATION	R-6	1-9
OSA SUPPLY MAINS LOCATED ON THE ROOF EXPOSED TO WEATHER	DOUBLE WALL INSULATED, EXTERIOR DUCTS MUST BE WEATHER SEALED AND WATER TIGHT	R-12	1-9

**NOTES:**

- ALL DUCT DIMENSIONS SHOWN ON PLANS ARE NET INSIDE DIMENSIONS. CONTRACTOR SHALL INCREASE DUCT DIMENSIONS FOR INTERNALLY LINED DUCT TO ACCOUNT FOR THE THICKNESS OF INSULATION LINER WHEN REQUIRED.
- ALL DUCTWORK SHALL BE LOCK FORMED QUALITY STEEL WITH EXCEPTION OF FLEXIBLE DUCT. BRANCH ENDS ONLY. ALL DUCTS WITH A DIMENSION OVER 16" SHALL BE FLANGED TYPE CONNECTIONS. CONCEALED DUCT BRANCHES SHALL BE ROUND STEEL. ALL DUCTS SHALL BE SUSPENDED FROM STRUCTURE OF BUILDING PER CODE.
- DUCT SEAMS AND FLANGES SHALL BE TIGHT AND WITHOUT VISIBLE GAPS.
- DUCT CONSTRUCTION SHALL BE SMACNA CLASS A: ALL TRANSVERSE JOINTS, LONGITUDINAL SEAMS, AND DUCT WALL PENETRATIONS SHALL BE SEALED. ALL SEAMS ON HIDDEN RIGID DUCTS SHALL BE SEALED USING UL 181A OR 181B MASTICS. EXCEPTION: CONTINUOUSLY WELDED AND LOCKING-TYPE LONGITUDINAL JOINTS.
- FLEXIBLE DUCTS SHALL BE UL 181 LISTED, CLASS 1, WITH AN INNER CORE OF STEEL WIRE HELIX WRAPPED IN FIBERGLASS AND SHEATHED IN A DOUBLE LAMINATION OF POLYESTER. FLEX DUCT SHALL HAVE A MINIMUM R VALUE OF 6.0 AND SHALL BE RATED FOR 4" WG POSITIVE AND 0.75" WG NEGATIVE PRESSURES (MINIMUM). UP TO 8 FEET MAXIMUM UL LISTED INSULATED FLEXIBLE DUCT IS PERMISSIBLE AT BRANCH ENDS IN CONCEALED LOCATIONS ONLY. ALL FLEXIBLE DUCTWORK SHALL BE INSTALLED PER CODE FULLY EXTENDED WITHOUT CRIMPING OR RESTRICTIVE SHORT RADIUS BENDS.
- PROVIDE TURNING VANES AT ALL RECTANGULAR ELLS AND TEES PER DETAILS ON PLANS.
- ALL DUCTS AND FITTINGS SHALL BE FABRICATED PER LATEST EDITION SMACNA.
- ALL MATERIALS EXPOSED WITHIN DUCTS OR AS INSULATION AROUND DUCTS SHALL HAVE A FLAME SPREAD INDEX OF NOT MORE THAN 25 AND A SMOKE DEVELOPMENT RATING OF NOT MORE THAN 50. UL LISTING REQUIRED. ALL INSULATION CONTAINING FIBROUS MATERIALS EXPOSED TO AIR FLOW SHALL BE RATED FOR THAT EXPOSURE OR SHALL BE ENCAPSULATED. INSULATING PROPERTIES FOR ALL MATERIALS SHALL MEET OR EXCEED CODE REQUIREMENTS. POLYSTYRENE PRODUCTS SHALL MEET AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) C578 91. ALL INSULATION SHALL BE LOW EMITTING WITH NOT GREATER THAN .05 PPM FORMALDEHYDE EMISSIONS, THE MAXIMUM FLAME SPREAD AND SMOKE DEVELOPED INDEX FOR INSULATION SHALL MEET THE REQUIREMENTS OF THE APPLICABLE LOCAL CODES AND ORDINANCES ADOPTED BY THE JURISDICTION IN WHICH THE BUILDING IS LOCATED.
- EXTERIOR DUCTS SHALL BE FREE OF DENTS, STICKERS, AND TAGS AND SHALL BE PAINTED - COLOR PER ARCHITECT.

**ADOSH BOILER SAFETY SECTION - INSPECTION CERTIFICATE**

CONTRACTOR SHALL PROVIDE AN INITIAL CERTIFICATE INSPECTION OF NEW WATER HEATERS TO CONFIRM COMPLIANCE WITH THE ARIZONA BOILER RULES AND THE ARIZONA BOILER ACT AS ADOPTED BY THE ARIZONA DIVISION OF OCCUPATIONAL SAFETY AND HEALTH BOILER SAFETY SECTION. INSPECTION SHALL BE PERFORMED BY AN AUTHORIZED 3RD PARTY AGENCY AS DETERMINED BY THE ARIZONA DIVISION OF OCCUPATIONAL SAFETY AND HEALTH BOILER SAFETY SECTION. CONTRACTOR SHALL PROVIDE CERTIFICATE AND SHALL REMEDY ANY DISCREPANCIES FOUND DURING THE COURSE OF INSPECTION. PROJECT SHALL NOT BE CLOSED OUT UNTIL ALL DISCREPANCIES HAVE BEEN REMEDIED.

**OUTDOOR COMBUSTION AIR CALCULATION PER IFGC 2015 304.6**

EQUIPMENT	TOTAL APPLIANCE INPUT RATING (BTU/H)	MINIMUM SIZE REQUIRED FOR EACH OPENING (1 SQ.IN. PER 4000 BTU/H)
B-1, B-2	4,000,000	
EXISTING WATER HEATERS AND UNIT HEATER TO REMAIN	500,000	500,000 / 4,000 = 125 SQ-IN = 0.87 SQ-FT

THE EXISTING BUILDING UTILIZES PERMANENT OPENINGS TO THE BOILER ROOM INCLUDING (1) WITHIN 12" OF THE TOP OF THE ENCLOSURE AND (1) WITHIN 12" OF THE BOTTOM OF THE ENCLOSURE THAT WERE DESIGNED, INSTALLED, AND PERMITTED BY OTHERS. THE EXISTING OPENINGS ARE APPROXIMATELY 7 SQ-FT FOR THE LOWER AND 7 SQ-FT FOR THE UPPER. EXISTING COMBUSTION AIR OPENINGS EXCEED CODE REQUIREMENTS.

**WATER TREATMENT REQUIREMENTS**

COMPLETELY FLUSH, FILL, TREAT, AND TEST THE HVAC WATER SYSTEM. CLEAR ALL STRAINERS OF DEBRIS (MAIN SYSTEM STRAINERS AND INDIVIDUAL STRAINERS AT EACH HEAT PUMP). REPLACE ALL NON-OPERABLE OR CORRODED CIRCUIT-SETTERS WITH NEW. THE HVAC WATER QUALITY SHALL MEET OR EXCEED THE WATER SOURCE HEAT PUMP OR BOILER MANUFACTURER'S REQUIREMENTS FOR PH, TDS, CORROSION AND SCALE INHIBITORS (WHICHEVER IS MORE STRINGENT). SUBMIT TREATMENT DATA TO OWNER AND ENGINEER FOR REVIEW PRIOR TO EQUIPMENT START-UP.

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REV#	DATE	DESCRIPTION

REVIEWED BY: GSP  
 DRAWN BY: GAW



ORIGINAL ISSUE DATE: 01-14-2020

JOB No: 19101

SHEET: M001

SEQUENCE #: 19-061

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REV#	DATE	DESCRIPTION

REVIEWED BY: GSP  
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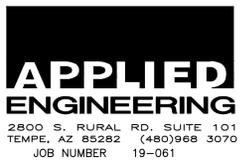


ORIGINAL ISSUE  
 DATE: 01-14-2020

JOB No: 19101

SHEET: M002

SEQUENCE #:  



MARK	SERVICE	MANUFACTURER	MODEL	UNIT TYPE	FUEL TYPE	INPUT (MBH)	MINIMUM OUTPUT (MBH)	FLOW @ TEMP RISE	FULL FIRE EFFICIENCY	EWT (°F)	LWT (°F)	ELECTRICAL		NOTES
												VOLT/PH/AMPS	WEIGHT (LBS)	
1-2	HVAC	PATTERSON-KELLY	C-2000H	CONDENSING	DIRECT FIRED NATURAL GAS	2,000	384,000	192 @ 20°F	96% AT 80°F EWT	50	70	120/1/15	1,600	1-28

NOTES:  
 1. INSTALL PER MANUFACTURER'S INSTALLATION & OPERATION INSTRUCTIONS AND ARIZONA BOILER REQUIREMENTS INCLUDING CSD-1 REQUIREMENTS.  
 2. PROVIDE UNIT FOR OPERATION AT 6,830 FEET ELEVATION FORT DEFIANCE, ARIZONA.  
 3. PROVIDE EQUIPPED FOR USE WITH NATURAL GAS.  
 4. PROVIDE UNIT FOR INDOOR OPERATION.  
 5. PROVIDE UNIT WITH SINGLE POINT POWER CONNECTION.  
 6. PROVIDE UNIT BUILT IN ACCORDANCE WITH THE REQUIREMENTS OF THE ASME BOILER AND PRESSURE VESSEL CODE. DEVICE SHALL BE LISTED AND LABELED PER NFPA 70, ARTICLE 100, RATED PER ASHRAE 118.1 FOR CONDENSING BOILERS. UNIT MUST BE UL LISTED AND LABELED. UNIT MUST BE ASHRAE/IESNA 90.1 2015 COMPLIANT.  
 7. PROVIDE EACH UNIT WITH FACTORY STANDARD MODULATING GAS CONTROL WITH 10:1 TURNDOWN MINIMUM.  
 8. PROVIDE WITH FACTORY STANDARD VFD CONTROLLED PRE-MIX BLOWER.  
 9. BOILER SHALL CONTAIN AN ASME SECTION IV HEAT EXCHANGER WITH A MAXIMUM ALLOWABLE WORKING TEMPERATURE OF 220°F AND A MAXIMUM ALLOWABLE WORKING PRESSURE OF 125 PSIG. THE HEAT EXCHANGER SHALL BE CAST FROM AN ALUMINUM ALLOY (AC43000 / EN ALSi10Mg OR APPROVED EQUAL). HEAT EXCHANGER SHALL CONSIST OF SEVERAL ALUMINUM CASTINGS ASSEMBLED TOGETHER WITH HYDRONIC WATER SUPPLY MANIFOLD, HYDRONIC WATER RETURN MANIFOLD, SEALANT, GASKETS, O-RINGS, CONDENSATE PAN/COLLECTOR, CONDENSATE DRAIN, REMOVABLE FIRESIDE INSPECTION COVERS, REMOVABLE CONDENSATE PAN ACCESS COVER, INLET TEMPERATURE SENSOR, OUTLET TEMPERATURE SENSOR, FLUE GAS TEMPERATURE SENSOR, HEAT EXCHANGER TEMPERATURE SENSOR, LOW WATER CUTOFF PROBE, THERMOWELL FOR HIGH TEMPERATURE LIMIT CAPILLARY, AND ALL NECESSARY ASSEMBLY HARDWARE. THE BOILER'S COMPLETED HEAT EXCHANGER SHALL BE OF THE WATER TUBE STYLE.  
 10. THE BOILER SHALL BE CSA CERTIFIED FOR AT LEAST 92% EFFICIENCY BASED ON OPERATING CONDITIONS SPECIFIED FOR TESTING UNDER ANSI 221.13 / CSA 4.9.  
 11. BOILER SHALL BE AHRI LISTED AND CERTIFIED IN ACCORDANCE WITH THE COMMERCIAL BOILER PROGRAM AND THE BTS-2000 TESTING STANDARD.  
 12. PROVIDE UNIT WITH NEW GAS TRAIN INCLUDING ALL APPLICABLE GAS VALVES, SOVs, REGULATORS, VENTS, AND SENSORS. BOILER TO INCLUDE AN ELECTRIC SINGLE-SEATED COMBINATION SAFETY SHUTOFF VALVE/REGULATOR WITH PROOF OF CLOSURE SWITCH IN ITS GAS TRAIN. BOILER SHALL INCLUDE DUAL OVER-TEMPERATURE PROTECTION WITH MANUAL RESET PER ASME SECTION IV AND CSD-1.  
 13. PROVIDE WITH ELECTRONIC SPARK IGNITION WITH 100% MAIN-VALVE SHUTOFF AND ELECTRONIC FLAME SUPERVISION.  
 14. PROVIDE WITH FACTORY STANDARD CONTROLS THAT INCLUDE NURCO CONTROL INTERFACE, LED DISPLAY, TOUCHSCREEN CONTROLLER, FLOW SWITCH, MANUAL RESET FUNCTIONS, IGNITION CONTROLS, HEADER TEMPERATURE SENSOR KIT FOR BOILER CASCADE OPERATION (SEE CONTROL SPECIFICATIONS AND S.O.O.).  
 15. PROVIDE UNIT WITH LOW WATER CUTOFF.  
 16. INCLUDE THE FOLLOWING SELF-GOVERNING FEATURES: SETPOINT HIGH LIMIT, LOW LIMIT, AND FAILSAFE MODE.  
 17. PROVIDE WITH THE FOLLOWING CONTROLS: SYSTEM START TEMPERATURE, PUMP DELAY TIMER, AUXILIARY START DELAY TIMER, AUXILIARY TEMPERATURE SENSOR, ANALOG TEMPERATURE SETPOINT OUTPUT, REMOTE INTERLOCK CIRCUIT, DELAYED INTERLOCK CIRCUIT, FAULT RELAY AND FAULT ALARM. PROVIDE WITH BOILER MANAGEMENT FOR MULTI-UNIT SEQUENCING TO INCLUDE: SEQUENCING FOR 2 BOILERS IN PARALLEL, FEED FORWARD TEMPERATURE CONTROL LOGIC, SEQUENCING MOTORIZED VALVE CONTROL, LEAD-LAG SEQUENCING AND TRANSFER.  
 18. PROVIDE BOILER WITH FACTORY CONDENSATE TRAP.  
 19. INSTALL FACTORY STANDARD ASME PRESSURE RELIEF VALVE WITH A SETTING OF 125 PSIG.  
 20. PROVIDE UNIT WITH FREEZE PROTECTION CONTROL - SUPPLY FACTORY AIR TEMPERATURE SENSOR AND COORDINATE PROGRAMMING AT STARTUP.  
 21. PROVIDE BOILER WITH CONDENSATE NEUTRALIZATION KIT.  
 22. PROVIDE WITH CATEGORY IV VENT INSTALLATION WITH OPTIONAL NORMALLY-CLOSED MOTORIZED AIR INTAKE DAMPER.  
 23. PROVIDE START-UP BY A FACTORY AUTHORIZED SERVICE TECHNICIAN.  
 24. REFER TO ELECTRICAL PLANS AND ENSURE THAT A MANUALLY OPERATED REMOTE SHUT-DOWN SWITCH IS LOCATED INSIDE BOILER ROOM ENTRY DOORS IN ACCORDANCE WITH CSD-1 REQUIREMENTS.  
 25. ALL NEW PIPING SHALL BE PROPERLY LABELED TO MEET PIPING IDENTIFICATION SPECIFICATIONS PER IBC. THE LABELING SHALL IDENTIFY FLUIDS AND FLOW DIRECTION.  
 26. PROVIDE SIGNAGE NEAR BOILER TEMPERATURE CONTROL THAT READS, "DO NOT EXCEED 70°F SETPOINT".  
 27. PROVIDE MANUALLY OPERATED TAMPER-PROOF REMOTE EMERGENCY SHUT-DOWN SWITCH (ESD-1) LOCATED PER CSD-1 REQUIREMENTS. SEE KEYED NOTE 10 SHEET M300 FOR LOCATION AND CONTROL SPECIFICATION AND SEQUENCE OF OPERATIONS FOR CONTROLS.  
 28. CONTRACTOR SHALL OBTAIN FROM THE MANUFACTURER A REPORT SIGNED BY AN AUTHORIZED MANUFACTURER'S REPRESENTATIVE FOR INSTALLED BOILERS THAT LISTS THE FOLLOWING: (1) EACH CONTROL AND SAFETY DEVICE (INCLUDING EMERGENCY SHUTDOWN SWITCHES) INSTALLED IN ACCORDANCE WITH ASME CSD-1 (2) NAME OF THE MANUFACTURER AND MODEL NUMBER OF EACH CONTROL AND SAFETY DEVICE (3) DOCUMENTATION OF TEST VERIFYING OPERATION OF ALL SAFETY DEVICES PERFORMED PER ASME CSD-1 REQUIREMENTS. THIS REPORT SHALL BE MADE AVAILABLE TO THE PLUMBING/MECHANICAL INSPECTOR AT FINAL INSPECTION PER ASME CSD-1 SECTION CG-510 SUB-SECTION (b).

MARK	MATERIAL OF CONSTRUCTION	VENT SIZE	NOTES

NOTES:  
 1. PROVIDE CPVC VENT PIPING THAT IS MANUFACTURED IN ACCORDANCE WITH ASTM F441 AND BOILER MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS. FITTINGS SHALL BE SCHEDULE 80 CONFORMING TO ASTM F439. JOINTS SHALL BE SEALED WITH SOLVENT CONFORMING TO ASTM 493. VENT PIPING THAT DOES NOT MEET ALL LISTED CRITERIA WILL NOT BE ACCEPTABLE FOR VENTING THIS APPLIANCE.  
 2. THE CPVC VENT OPTION REQUIRES A 200°F MANUAL RESET HIGH TEMP. THE SYSTEM SETPOINT SHALL ADHERE TO TEMPERATURE SETTINGS SPECIFIED IN BOILER SCHEDULES AND UNDER NO CIRCUMSTANCES SHALL SYSTEM SETPOINT EXCEED MANUFACTURER'S LIMIT OF 180°F.  
 3. PAINT EXTERIOR VENT WITH UV RESISTANT HIGH TEMP PAINT TO MATCH EXISTING BUILDING.  
 4. ADHERE TO MAXIMUM LENGTH RESTRICTIONS PUBLISHED BY BOILER MANUFACTURER.  
 5. VENT TO BE INSTALLED TO MAINTAIN PROPER CLEARANCE FROM COMBUSTIBLE MATERIALS. USE INSULATED VENT PIPE SPACERS WHERE THE VENT PASSES THROUGH COMBUSTIBLE ROOFS.  
 6. ALL HORIZONTAL RUNS OF VENT SHALL SLOPE UPWARDS NOT LESS THAN 1/8 INCH PER FOOT FROM THE HEATER TO THE VENT TERMINATION.  
 7. RIGIDLY SUPPORT VENT PIPE EVERY 5 FEET AND AT ALL ELBOWS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.  
 8. PROVIDE WITH BOOT TEE WITH DRAIN (BTD), ROOF THIMBLE, FLASHING CAP, GUY RING, EXHAUST TERMINATION, GUY RING AND 3 GUY WIRES. CONTRACTOR SHALL PROVIDE ALL SUPPORTS, FASTENERS, AND CONNECTORS COMPLETE.  
 9. PROVIDE 3/4"ø CPVC DRAIN AND INSULATE WITH RATED CERAMIC PIPE INSULATION. SEE MANUFACTURER'S INSTRUCTIONS FOR SPECIFIC REQUIREMENTS.

MARK	MATERIAL OF CONSTRUCTION	VENT SIZE	NOTES

NOTES:  
 1. INSTALL AND SEAL IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.  
 2. INSTALL WITH MOTORIZED INTAKE DAMPER. SEE BOILER SCHEDULE FOR REQUIREMENTS.  
 3. PROVIDE WITH INTAKE TERMINATION. CONTRACTOR SHALL PROVIDE ALL SUPPORTS, FASTENERS, AND CONNECTORS COMPLETE.  
 4. PAINT EXTERIOR INTAKE VENTS WITH PAINT TO MATCH EXISTING BUILDING.

MARK	MANUFACTURER	MODEL	CFM	ESP	ELECTRICAL					HEATING			SOUND	DISCHARGE	WT (LBS.)	NOTES	
					VOLTS	PHASE	MCA	MOCP	HP	OPERATING RPM	INPUT (MBH)	OUTPUT (MBH)					TEMP RISE - HIGH HEAT (°F)
1	GREENHECK	IGX-P116-H22-MF-N	4,000	1	460	3	5.2	15	2	1,784	383.5	306.8	90	72	END	1,550	1-24
2	GREENHECK	IGX-P116-H22-MF-N	4,000	1	460	3	5.2	15	2	1,784	383.5	306.8	90	72	BOTTOM	1,550	1-24
3	GREENHECK	IGX-P120-H32-MF-P	6,600	1.5	460	3	10.5	15	5	1,649	536.9	429.5	76	81	END	2,500	1-24

NOTES:  
 1. PROVIDE AND INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.  
 2. PROVIDE UNIT WITH NATURAL GAS INDIRECT FIRED HEAT FOR OPERATION AT 6,830 FT ELEVATION, FORT DEFIANCE, ARIZONA.  
 3. PROVIDE 100% OUTSIDE AIR MAKE-UP UNIT WITH END INTAKE. UNIT DISCHARGE SHALL BE PER TABLE ABOVE.  
 4. PROVIDE UNIT FOR INSTALLATION OUTDOORS WITH INSULATED DOUBLE WALL GALVANIZED STEEL HOUSING. UNIT SHALL BE INSTALLED ON INSULATED, ADJUSTABLE ROOF CURB WITH A MINIMUM HEIGHT OF 9" ABOVE EXISTING ROOFING MATERIAL ON EACH SIDE. CONTRACTOR SHALL FIELD VERIFY AS-BUILT ROOF SLOPE AND ORDER ROOF CURB TO MATCH SLOPE. UNIT SHALL BE INSTALLED TRUE AND LEVEL.  
 5. HEATING CAPACITY AND CFM AT ESP ARE MINIMUM CAPACITIES REQUIRED. ALL UNITS SHALL HAVE NO LESS THAN THESE CAPACITIES. MCA, MOCP, SOUND PERFORMANCE AND WEIGHT ARE MAXIMUM CAPACITIES ALLOWED.  
 6. EXTERNAL STATIC PRESSURE SHALL INCLUDE DUCT AND DUCT-MOUNTED COMPONENTS SHOWN ON DRAWINGS ONLY. VENDOR SHALL CALCULATE INTERNAL STATIC PRESSURES FOR SUCH ACCESSORIES AS FILTERS, DAMPERS, COILS, HORIZONTAL DISCHARGE/RETURN, PLENUMS, ETC.  
 7. PROVIDE SINGLE POINT POWER CONNECTION TO UNIT. AN ADDITIONAL 120V/1PH SERVICE OUTLET SHALL BE PROVIDED WITH THE UNIT AND SHALL BE FIELD POWERED SEPARATELY.  
 8. PROVIDE UNIT WITH STAINLESS STEEL HEAT EXCHANGER OPTION WITH 10 YEAR WARRANTY.  
 9. PROVIDE FURNACE WITH 8:1 ELECTRONIC MODULATION CONTROL, AND POWER VENTING.  
 10. PROVIDE UNIT WITH ELECTRONIC IGNITION SYSTEM FOR GAS HEATER.  
 11. PROVIDE UNIT WITH FLAME SENSING.  
 12. PROVIDE UNIT WITH LOW LEAKAGE INLET AIR DAMPER.  
 13. PROVIDE WITH ALUMINUM MESH INTAKE WEATHER HOOD.  
 14. PROVIDE WITH DIRECT DRIVE, MIXED FLOW PLENUM SUPPLY FAN WITH FACTORY SUPPLIED VFD.  
 15. FAN ASSEMBLY SHALL BE FACTORY MOUNTED ON VIBRATION ISOLATORS.  
 16. PROVIDE FAN WITH EXTENDED LUBE LINES FOR FAN BEARINGS.  
 17. PROVIDE WITH CORROSION RESISTANT FASTENERS.  
 18. PROVIDE UNIT WITH DISCHARGE AIR TEMPERATURE SENSOR, DIRTY FILTER SENSOR, HEATING INLET AIR SENSOR.  
 19. PROVIDE WITH 2 SETS OF 2" MERV 8 PLEATED FILTERS.  
 20. COORDINATE ELECTRICAL CONNECTION WITH ELECTRICAL CONTRACTOR. MOTOR STARTER AND DISCONNECT SHALL BE PROVIDED WITH THIS EQUIPMENT.  
 21. PROVIDE FACTORY DDC CONTROLLER WITH BACNET CONNECTION. SEE CONTROL REQUIREMENTS FOR REQUIRED INTERLOCKS AND FOR EQUIPMENT CONTROL.  
 22. PROVIDE WITH ALL VENT DUCTS AND MATERIALS FOR EXTERIOR INSTALLATION.  
 23. PROVIDE UNIT WITH HINGED ACCESS DOORS.  
 24. PROVIDE UNIT WITH PERMATECTOR FINISH COLORED CONCRETE GRAY.

MARK	AREA SERVED	MANUFACTURER	MODEL	CFM	ESP	VOLTS	PHASE	WATTS / (HP)	RPM	MAXIMUM INLET SONES	WT (LBS.)	NOTES
3	WEST WING	GREENHECK	CUBE-300HP-VGD-50	6,000	1.5	460	3	(5)	899	22	325	1-6

NOTES:  
 1. CFM AT S.P. IS MINIMUM CAPACITIES REQUIRED. SONES, HP, AND WEIGHT ARE MAXIMUM ALLOWED. ALL UNITS SHALL MEET THESE REQUIREMENTS.  
 2. PROVIDE UNIT FOR OPERATION AT 6,830 FEET ELEVATION FORT DEFIANCE, ARIZONA.  
 3. UNIT FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR. INSTALL EXHAUST FAN PER MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS AND RECOMMENDATIONS.  
 4. UPBLAST ROOF MOUNTED FANS. PROVIDE UL LISTED AND AMCA CERTIFIED PERFORMANCE BELT DRIVE UPBLAST EXHAUST FAN. PROVIDE WITH BACKWARD INCLINED ALUMINUM WHEEL STATICALLY AND DYNAMICALLY BALANCED, FAN HOUSING CONSTRUCTED OF HEAVY GAUGE ALUMINUM WITH DRAIN TROUGH, FAN AND ASSEMBLY COATED WITH PERMATECTOR COLORED CONCRETE GRAY, CORROSION-RESISTANT FASTENERS, DUAL BELTS, NOTCHED STATIC-RESISTANT BELTS (WITH 1 SET OF SPARE BELTS SUPPLIED TO OWNER), AUTOMATIC BELT TENSIONER, MOTOR AND DRIVES ISOLATED ON SHOCK MOUNTS, NEMA PREMIUM EFFICIENT VFD TESTED TEFC MOTOR WITH SHAFT GROUNDING, EXTENDED LUBE LINES, L10 LIFE BEARINGS, CLEAN-OUT PORT, AND GALVANIZED BIRD SCREEN. FAN SPEED ADJUSTMENT SHALL BE BY THE TEST AND BALANCE CONTRACTOR, PROVIDE SHEAVES AND BELTS TO MEET BALANCED AIRFLOW REQUIREMENTS. PROVIDE WITH WD-100-PB SPRING ASSISTED BACK-DRAFT DAMPER WITH ALUMINUM BLADES, BLADE SEALS, STAINLESS STEEL AXES AND SYNTHETIC AXLE BEARINGS. BACKDRAFT DAMPER MUST OPERATE IN THE RANGE OF 0.01"W.G. (START OPEN) TO 0.1"W.G. (FULL OPEN). DAMPERS THAT DO NOT MEET THIS REQUIREMENT ARE NOT ACCEPTABLE. SEE CONTROL REQUIREMENTS AND SEQUENCE OF OPERATIONS FOR CONTROL.  
 5. PROVIDE FAN MOTOR WITH FACTORY-MOUNTED VARI-GREEN DRIVE 100+ WITH 4-20mA INPUT SIGNAL WITH BACNET COMMUNICATION CAPABILITIES. DRIVE SHALL BE ENCLOSED IN A NEMA-3R ENCLOSURE.  
 6. PROVIDE CUSTOM FABRICATED ADAPTER CURB TO MOUNT FAN TO EXISTING ROOF CURB.

MARK	AREA SERVED	MANUFACTURER	MODEL	FLOW RATE (GAL/MIN)	TOTAL HEAD TDH (FT)	MINIMUM EFFICIENCY	EWT	MOTOR DATA			NOTES
								HP	RPM	VOLTS / PH	
3-4	SECONDARY LOOP (BLDG SUPPLY)	WEINMAN	3KH 3X4X11.75	450	105	76%	60T-85T	20	1,800	460 / 3	1-4
5-6	BOILER PRIMARY LOOP	THRUSH	TV2q 3X3X7	180	20	64%	50T-70T	1.5	1,750	460 / 3	1-3, 5, 6

NOTES:  
 1. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS AND DETAILS ON PLANS.  
 2. PROVIDE WITH NEMA PREMIUM EFFICIENCY ODP MOTOR WITH 1.15 SF. MOTOR SHALL BE SELECTED FOR NON OVERLOADING OPERATION AT 1,800 MAX RPM.  
 3. PUMPS WILL EACH REQUIRE SEPARATE POWER AND STARTER. REFER TO ELECTRICAL PLANS FOR ELECTRICAL CONNECTIONS.  
 4. BASE MOUNT END SUCTION PUMPS: PUMP SHALL BE A FRAME MOUNTED, BALL BEARING, GREASE LUBRICATED, CENTRIFUGAL PUMP. PUMP SHALL BE BRONZE FITTED WITH CARTRIDGE SEAL ASSEMBLY WITH STAINLESS SHAFT, INTERNAL FLUSH LINE, BACK PULL-OUT DESIGN, CAST IRON BEARING FRAME WITH INTERNAL FOOT SUPPORT AND COUPLING GUARD. PUMP SHALL HAVE SUCTION AND DISCHARGE GAUGE TAPPINGS.  
 5. INLINE PUMPS: PUMP SHALL BE A CLOSE-COUPLED, CENTRIFUGAL PUMP SUITABLE FOR INSTALLATION IN THE HORIZONTAL POSITION. PUMP SHALL BE BRONZE FITTED WITH JM SHAFT MOTOR, INTERNAL FLUSH LINE, BACK PULL-OUT DESIGN, CARTRIDGE SEAL ASSEMBLY WITH BRASS SHAFT SLEEVE AND NI-RESIST SEAT. PUMP SHALL HAVE SUCTION AND DISCHARGE GAUGE TAPPINGS.  
 6. INSTALL MOTOR IN THE HORIZONTAL POSITION WITH MOTOR CIRCUMFERENTIAL COOLING VENTS FACING DOWN. COORDINATE PUMP ORIENTATION WITH EQUIPMENT SUPPLIER SO THAT MOTOR VENTS ARE NOT FACING UP AFTER FINAL INSTALLATION. MOTORS INSTALLED WITH VENTS IN THE UPWARD POSITION OR WITH VENT SHROUDS OR COVERS WILL NOT BE ACCEPTED.

**SUBMITTAL PROCESS REQUIREMENTS**

ALL PARTIES ON THE PROJECT BENEFIT FROM PROMPT AND ACCURATE REVIEWS OF COMPLETE AND WELL ORGANIZED SUBMITTAL PACKAGES.

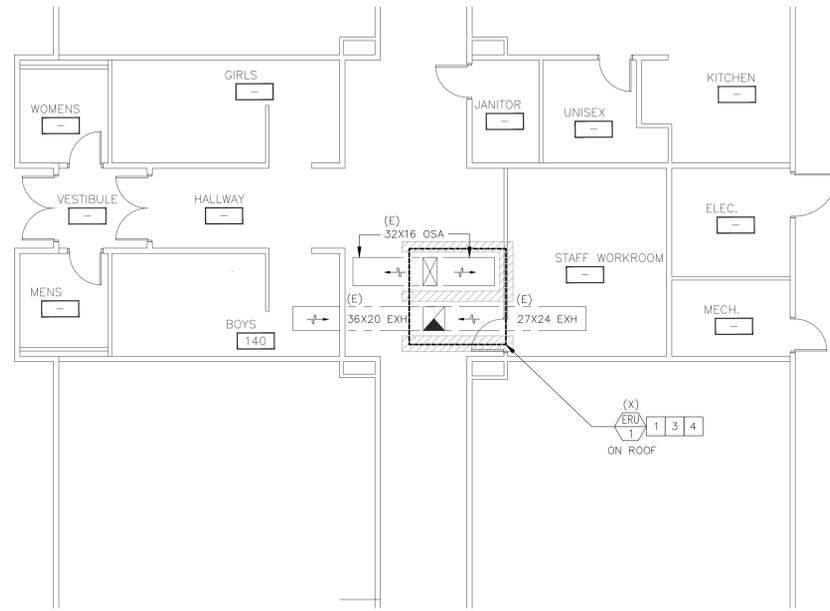
PRIOR TO ORDERING, SUBMITTALS REVIEWED BY THE ENGINEER ARE REQUIRED FOR ALL ITEMS LISTED ON THE MECHANICAL SCHEDULE.

ALL FIRST SUBMITTALS SHALL USE THE FOLLOWING FORMAT OR SHALL BE RETURNED FOR CORRECTIONS UNTIL FORMATTED AS FOLLOWS:

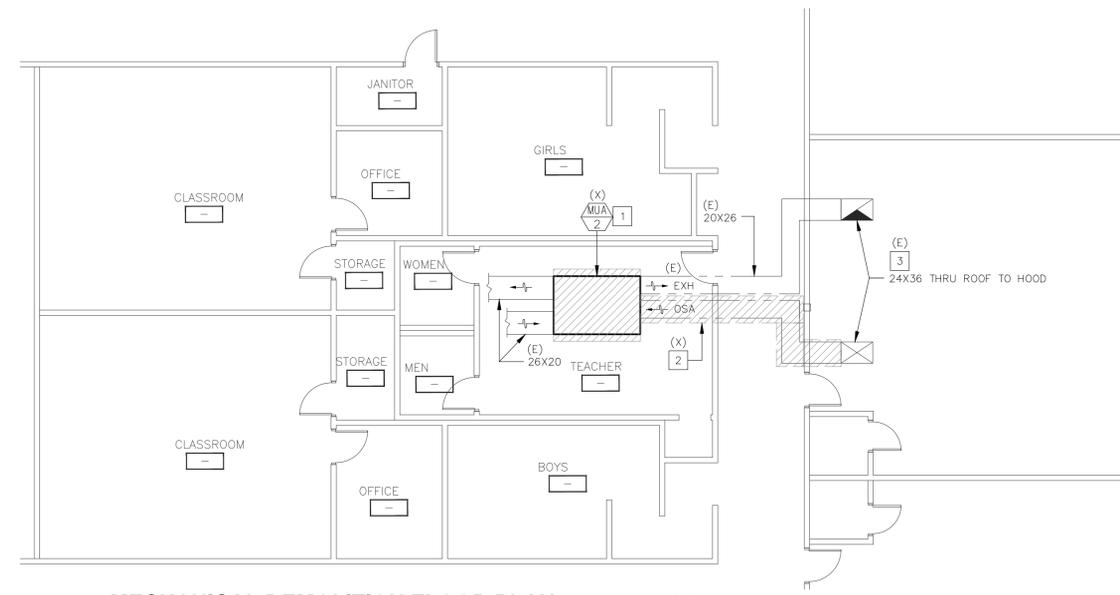
- SUBMITTED AS A SINGLE ELECTRONIC PDF FILE IDENTIFIED AS A FIRST SUBMITTAL.
- ALL EQUIPMENT ON THE MECHANICAL SCHEDULE SHALL BE SUBMITTED COMBINED INTO A SINGLE PDF FILE (PARTIAL SUBMITTALS MISSING EQUIPMENT WILL BE RETURNED).
- SUBMITTAL CUT SHEETS SHALL BE PRESENTED IN THE SAME ORDER AS THE SCHEDULE (DISORGANIZED SUBMITTALS WILL BE RETURNED).
- SUBMITTAL CUT SHEETS SHALL BE LABELED IN RED, BOLDFACE TEXT IN THE TOP RIGHT HAND CORNER OF THE FIRST PAGE WITH THE EQUIPMENT TAG AS LABELED ON PLANS SUCH AS AH-1, EF-3, CD1, ETC. (UNIDENTIFIED CUT SHEETS WILL BE RETURNED).
- OPTIONS NOTED BY THE ENGINEER ON THE CONSTRUCTION DOCUMENT SCHEDULE SHALL BE CLEARLY IDENTIFIED AS BEING PROVIDED BY THE SUPPLIER/CONTRACTOR WITH EACH OPTION ON THE SUBMITTAL MARKED WITH A RED BOX, CIRCLE, CHECK, OR OTHER SIMILAR CONSPICUOUS INDICATION THAT THE SUBMITTED DEVICE'S OPTIONS ACTUALLY MATCH THE PLAN SCHEDULE NOTES (GENERIC EQUIPMENT SHEETS WITH MULTIPLE UNIDENTIFIED OPTIONS WILL BE RETURNED).
- CONTRACTOR/SUPPLIER SUBMITTAL IS A PRESENTATION TO THE ENGINEER BY THE CONTRACTOR/SUPPLIER THAT THE EQUIPMENT SUBMITTED IS EQUIVALENT TO THAT SPECIFIED ON THE CONSTRUCTION DOCUMENTS. EQUIPMENT SUBSTITUTIONS WHICH INCLUDE OR REQUIRE DEVIATIONS FROM THE CONSTRUCTION DOCUMENTS REQUIREMENTS SHALL BE CLEARLY IDENTIFIED BY THE CONTRACTOR/SUPPLIER DIRECTLY ON THE FIRST PAGE OF THE CUT SHEET WITH A CLEAR EXPLANATION OF THE REASON(S) FOR NON-COMPLIANCE OR EQUIVALENCE WITH EQUIPMENT SCHEDULES. FAILURE OF SUBSTITUTED EQUIPMENT TO PERFORM TO THE LEVEL SPECIFIED IN THE EQUIPMENT SCHEDULE MAY REQUIRE REPLACEMENT OF SUBSTITUTED EQUIPMENT IF DEVIATIONS ARE NOT CLEARLY IDENTIFIED ON THE SUBSTITUTION.

ALL RESUBMITTALS OF EQUIPMENT OR MATERIALS PREVIOUSLY REJECTED BY THE ENGINEER SHALL BE RESUBMITTED WITH THE FOLLOWING FORMAT:

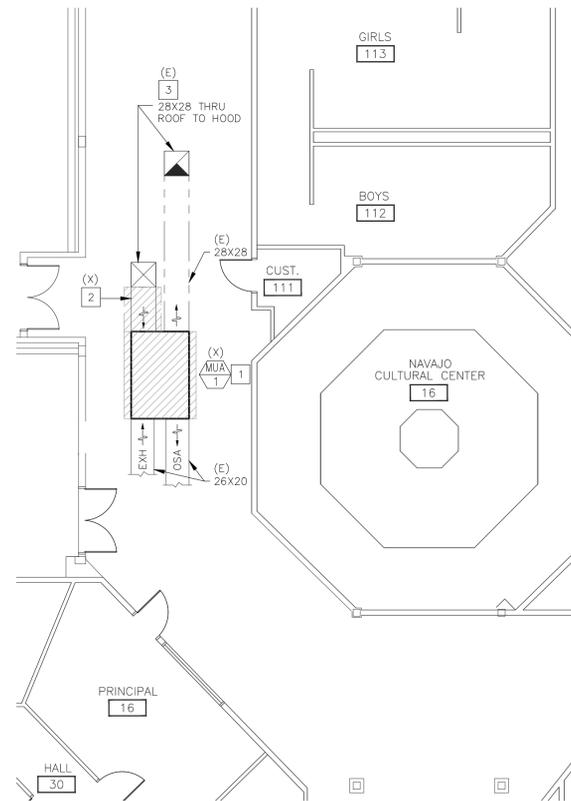
- SUBMITTED AS A SINGLE ELECTRONIC PDF FILE IDENTIFIED AS "RESUBMITTAL #"; BEGINNING WITH "RESUBMITTAL 1" AND CONTINUING WITH SEQUENTIAL NUMBERING ON RESUBMITTALS THAT MAY FOLLOW.
- INCLUDE CUT SHEETS OF ONLY THE ITEMS THAT HAVE BEEN RETURNED/REJECTED BY THE ENGINEER ON THE FIRST SUBMITTAL (COMPLETE RESUBMITTALS OF ALL PROJECT EQUIPMENT WILL BE RETURNED TO BE REDUCED DOWN TO RESUBMITTAL ITEMS ONLY).
- ALL EQUIPMENT RETURNED OR REJECTED IN THE FIRST REVIEW SHALL BE RESUBMITTED IN ONE RESUBMITTAL (PARTIAL RESUBMITTALS MISSING PREVIOUSLY REJECTED OR RETURNED EQUIPMENT WILL BE RETURNED UNTIL COMPLETE).
- RESUBMITTAL CUT SHEETS SHALL BE PRESENTED IN THE SAME ORDER AS THE SCHEDULE (DISORGANIZED RESUBMITTALS WILL BE RETURNED).
- RESUBMITTAL CUT SHEETS SHALL BE LABELED IN RED, BOLDFACE TEXT IN THE TOP RIGHT HAND CORNER OF THE FIRST PAGE WITH THE EQUIPMENT TAG AS LABELED ON PLANS SUCH AS AH-1, EF-3, CD1, ETC. (UNIDENTIFIED CUT SHEETS WILL BE RETURNED).
- OPTIONS NOTED BY THE ENGINEER ON THE CONSTRUCTION DOCUMENT SCHEDULE SHALL BE CLEARLY IDENTIFIED AS BEING PROVIDED BY THE SUPPLIER/CONTRACTOR WITH EACH OPTION ON THE SUBMITTAL MARKED WITH A RED BOX, CIRCLE, CHECK, OR OTHER SIMILAR CONSPICUOUS INDICATION THAT THE SUBMITTED DEVICE'S OPTIONS ACTUALLY MATCH THE PLAN SCHEDULE NOTES (GENERIC EQUIPMENT SHEETS WITH MULTIPLE UNIDENTIFIED OPTIONS WILL BE RETURNED).
- INCLUDE CUT SHEET UPDATES TO CONFORM TO THE REQUIREMENTS AS PREVIOUSLY INDICATED AND REQUIRED BY THE ENGINEER IN THE FIRST SUBMITTAL.
- IDENTIFY ANY CHANGES MADE OTHER THAN THOSE REQUESTED BY THE ENGINEER IN THE PREVIOUSLY RETURNED/REJECTED SUBMITTAL. PROVIDE A STATEMENT EXPLAINING ANY CHANGES WHICH WERE NOT PROMPTED BY THE ENGINEER'S PREVIOUS REVIEW.



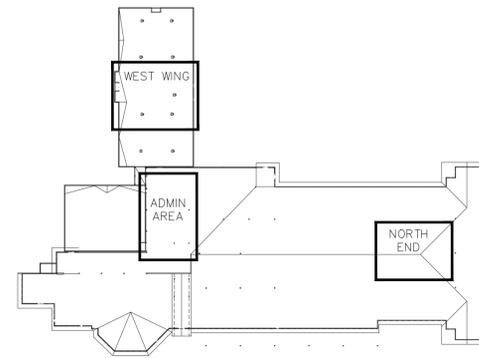
**MECHANICAL DEMOLITION FLOOR PLAN**  
**WEST WING**  
 SCALE: 1/8"=1'-0"



**MECHANICAL DEMOLITION FLOOR PLAN**  
**NORTH END**  
 SCALE: 1/8"=1'-0"



**MECHANICAL DEMOLITION FLOOR PLAN**  
**ADMIN AREA**  
 SCALE: 1/8"=1'-0"



**BUILDING AREA KEY PLAN**  
 SCALE: NTS

**LEGEND**

- (E) EXISTING EQUIPMENT TO REMAIN
- (X) EXISTING EQUIPMENT TO BE DEMOLISHED
- (N) NEW EQUIPMENT
- POINT OF CONNECTION TO EXISTING PIPING
- ▨ AREA OF DEMOLITION

**KEYED NOTES: DEMOLITION**

1. DEMOLISH AND REMOVE EXISTING MECHANICAL UNIT. DISCONNECT EXISTING OSA AND EA DUCTWORK SERVING EACH UNIT AND LEAVE IN PLACE FOR REUSE DURING NEW WORK. ALL DUCTS SHOWN AS EXISTING SHALL BE REUSED DURING NEW WORK.
2. DEMOLISH AND REMOVE DUCTWORK WHERE INDICATED ON PLANS.
3. PENETRATIONS AND DUCT DROPS THROUGH ROOF FOR OSA AND EA SHALL REMAIN AND BE REUSED DURING NEW WORK.
4. EXISTING ROOF CURB FOR MECHANICAL UNIT, ERU-1, TO REMAIN AND SHALL BE REUSED DURING NEW WORK.

**GENERAL NOTES:**

- A. EXISTING DUCTS AND AIR DEVICES SHOWN ON PLANS ARE SCHEMATIC BASED ON FIELD OBSERVATION AND PREVIOUS PLAN DATA PROVIDED TO THE TEAM DURING DESIGN. NOT ALL AREAS WERE ACCESSIBLE DURING FIELD OBSERVATION, AND ACTUAL DUCT AND DEVICE LOCATIONS MAY VARY FROM THESE PLANS. FIELD VERIFY EXISTING CONDITIONS AND CREATE SHOP DRAWINGS OF NEW DUCTS AS REQUIRED TO SUIT.
- B. EXISTING MECHANICAL SYSTEM INCLUDING DUCTWORK, DAMPERS, AIR DEVICES, HEAT PUMPS, FANS, ETC. TO BE REUSED EXCEPT WHERE INDICATED ON PLANS. COORDINATE NEW DEVICE AND DUCT LOCATIONS WITH EXISTING EQUIPMENT, STRUCTURE, AND OTHER TRADES TO AVOID CONFLICTS.
- C. COVER OPEN ENDS OF DUCTS TO BE RE-USED DURING DEMOLITION TO PREVENT DUST AND DEBRIS FROM ENTERING DUCTS.

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REV#	DATE	DESCRIPTION

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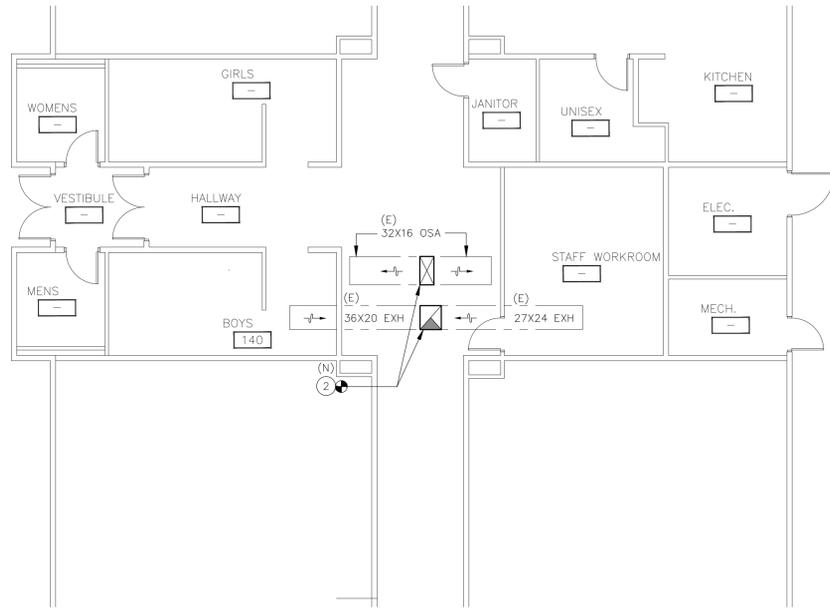
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JOB No: 19101

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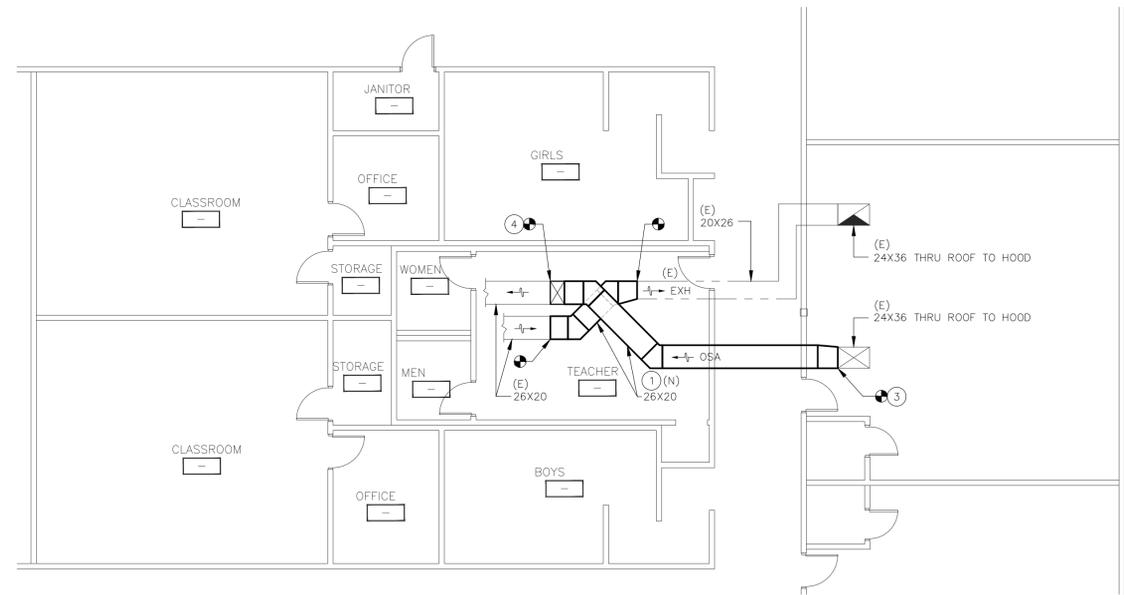
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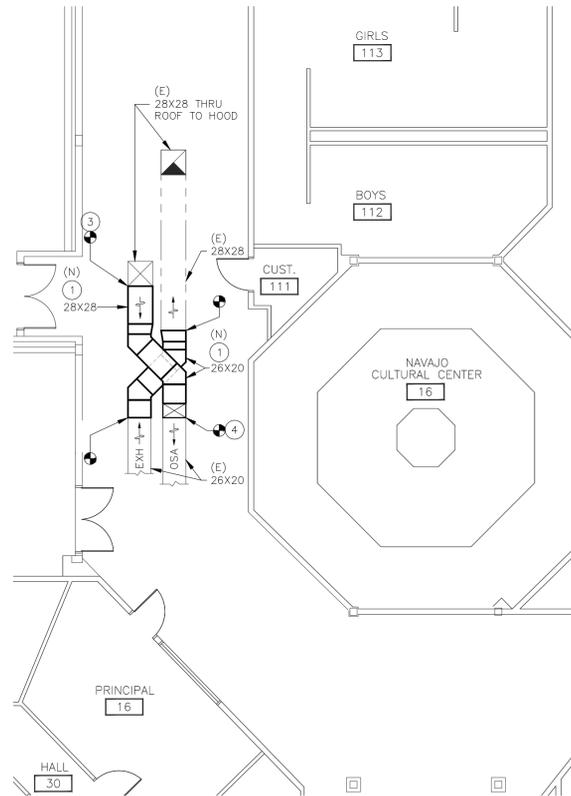
**MECHANICAL FLOOR PLAN**  
**WEST WING**

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



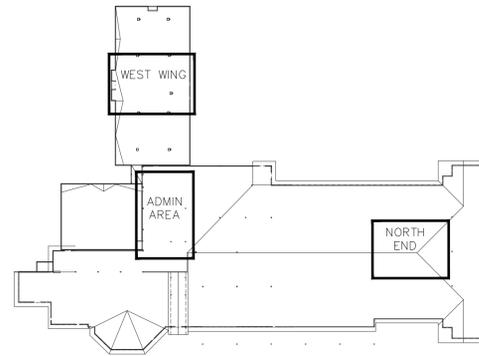
**MECHANICAL FLOOR PLAN**  
**NORTH END**

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



**MECHANICAL FLOOR PLAN**  
**ADMIN AREA**

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



**BUILDING AREA KEY PLAN**

SCALE: NTS



LEGEND	
(E)	EXISTING EQUIPMENT TO REMAIN
(X)	EXISTING EQUIPMENT TO BE DEMOLISHED
(N)	NEW EQUIPMENT
●	POINT OF CONNECTION TO EXISTING PIPING
▨	AREA OF DEMOLITION

KEYED NOTES: NEW CONSTRUCTION	
1.	PROVIDE NEW DUCTWORK AT SIZES AND LOCATIONS INDICATED ON PLANS. SEE "DUCT CONSTRUCTION AND DUCT INSULATION REQUIREMENTS" SHEET M001.
2.	CONNECT NEW DUCTWORK AT SIZE OF EXISTING DUCT DROPS AND RISE DUCTWORK UP THROUGH EXISTING PENETRATIONS.
3.	CONNECT NEW OSA DUCT TO EXISTING OSA DROP. LOCATE DUCT AS HIGH AS POSSIBLE IN PLENUM.
4.	DROP DUCT IN PLENUM TO ELEVATION OF EXISTING OSA DUCT.

GENERAL NOTES:	
A.	EXISTING DUCTS AND AIR DEVICES SHOWN ON PLANS ARE SCHEMATIC BASED ON FIELD OBSERVATION AND PREVIOUS PLAN DATA PROVIDED TO THE TEAM DURING DESIGN. NOT ALL AREAS WERE ACCESSIBLE DURING FIELD OBSERVATION, AND ACTUAL DUCT AND DEVICE LOCATIONS MAY VARY FROM THESE PLANS. FIELD VERIFY EXISTING CONDITIONS AND CREATE SHOP DRAWINGS OF NEW DUCTS AS REQUIRED TO SUIT.
B.	EXISTING MECHANICAL SYSTEM INCLUDING DUCTWORK, DAMPERS, AIR DEVICES, HEAT PUMPS, FANS, ETC. TO BE REUSED EXCEPT WHERE INDICATED ON PLANS. COORDINATE NEW DEVICE AND DUCT LOCATIONS WITH EXISTING EQUIPMENT, STRUCTURE, AND OTHER TRADES TO AVOID CONFLICTS.

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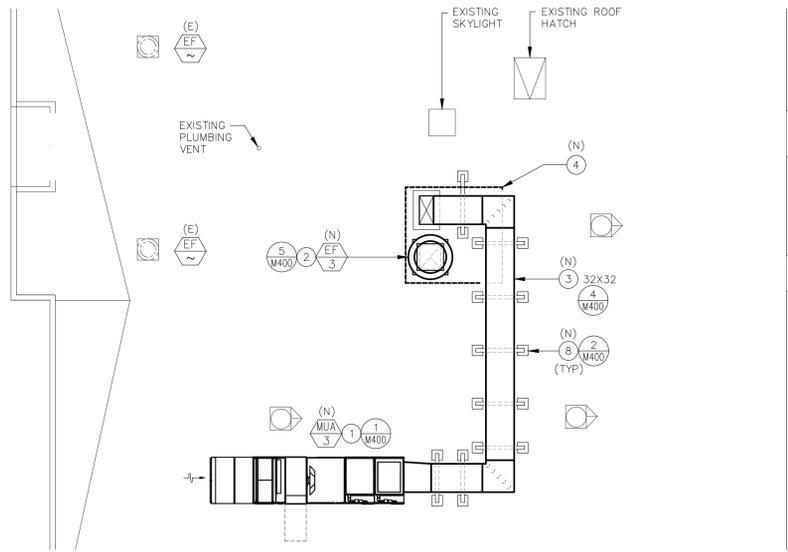
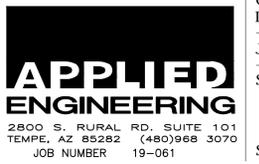
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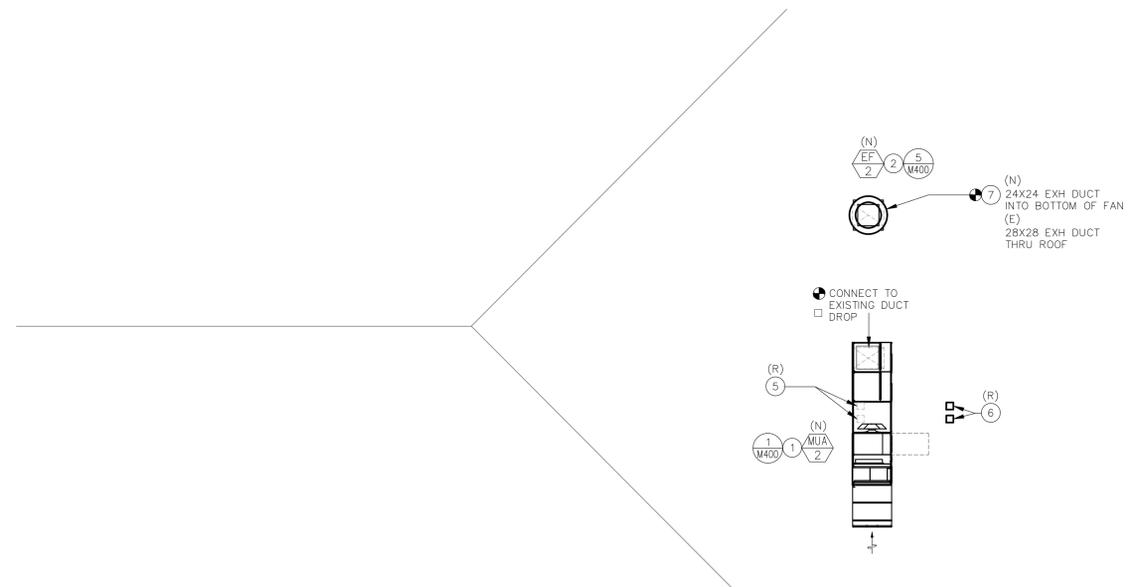
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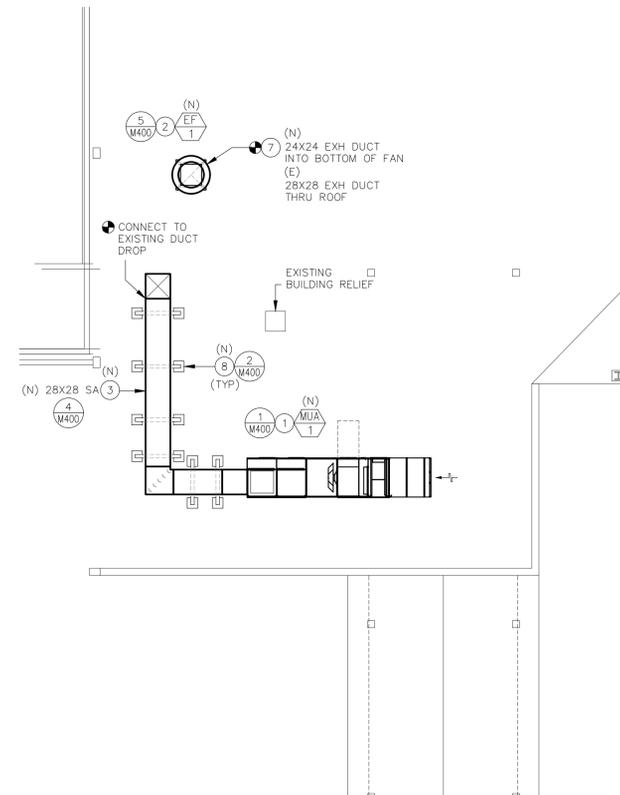
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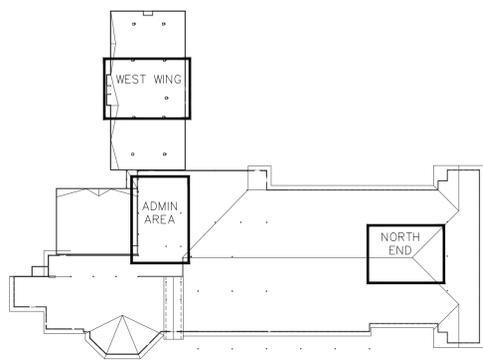
**MECHANICAL ROOF PLAN**  
**WEST WING**  
 SCALE: 1/8"=1'-0"



**MECHANICAL ROOF PLAN**  
**NORTH END**  
 SCALE: 1/8"=1'-0"



**MECHANICAL ROOF PLAN**  
**ADMIN AREA**  
 SCALE: 1/8"=1'-0"



**BUILDING AREA KEY PLAN**  
 SCALE: NTS

**LEGEND**

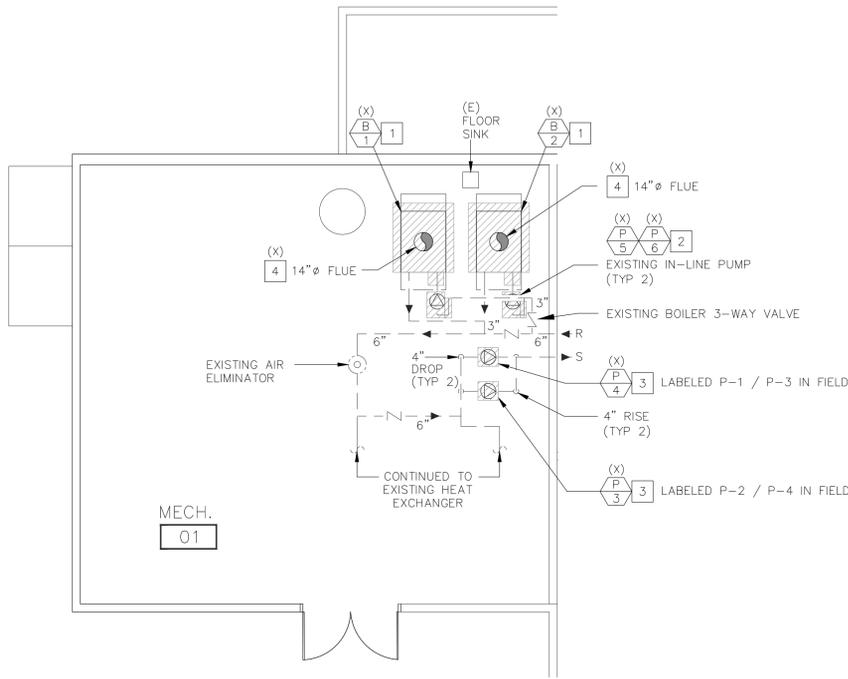
- (E) EXISTING EQUIPMENT TO REMAIN
- (X) EXISTING EQUIPMENT TO BE DEMOLISHED
- (N) NEW EQUIPMENT
- POINT OF CONNECTION TO EXISTING PIPING
- ▨ AREA OF DEMOLITION

**KEYED NOTES: NEW CONSTRUCTION**

- PROVIDE NEW MECHANICAL UNIT ON NEW ROOF CURB AS SCHEDULED. LOCATE UNIT AIR INTAKE A MINIMUM DISTANCE OF 10' FROM ALL BUILDING EXHAUSTS AND RELIEFS.
- PROVIDE NEW EXHAUST FAN AS SCHEDULED. DO NOT LOCATE WITHIN 10' OF ANY BUILDING AIR INTAKES. PROVIDE NEW CUSTOM FABRICATED ADAPTER CURB AS SCHEDULED TO MOUNT NEW EXHAUST FAN TO EXISTING CURB.
- PROVIDE NEW DOUBLE-WALL ROOFTOP DUCTWORK. SEE "DUCT CONSTRUCTION AND DUCT INSULATION REQUIREMENTS" SHEET M001.
- PROVIDE NEW CURB CAP OVER EXISTING ROOF CURB FOR DEMOLISHED MECHANICAL UNIT, ERU-1. CURB CAP SHALL BE CUSTOM FABRICATED AND SHALL PROVIDE MOUNTING LOCATION FOR NEW UPBLAST EXHAUST FAN, EF-3, AND NEW OSA DUCT PENETRATION. ALL SEAMS AND JOINTS OF CUSTOM CURB SHALL BE SEALED WEATHER TIGHT.
- RELOCATE EXISTING EXHAUST TERMINATIONS. PROVIDE NEW EXHAUST DUCTWORK TO MATCH EXISTING AND EXTEND BELOW ROOF TO NEW TERMINATION LOCATION. SEE NOTE 6.
- DENOTES NEW LOCATION FOR EXHAUST TERMINATIONS.
- TRANSITION FROM EXISTING EXHAUST RISER INTO NEW EXHAUST FAN INLET.
- SUPPORT DUCTS WITH UNISTRUT PER DETAIL INDICATED ON PLANS. SECURE UNISTRUT DUCT SUPPORTS TO EXISTING ROOF STRUCTURE PER STRUCTURAL PLANS. SEAL AROUND FASTENERS PER ARCHITECT.

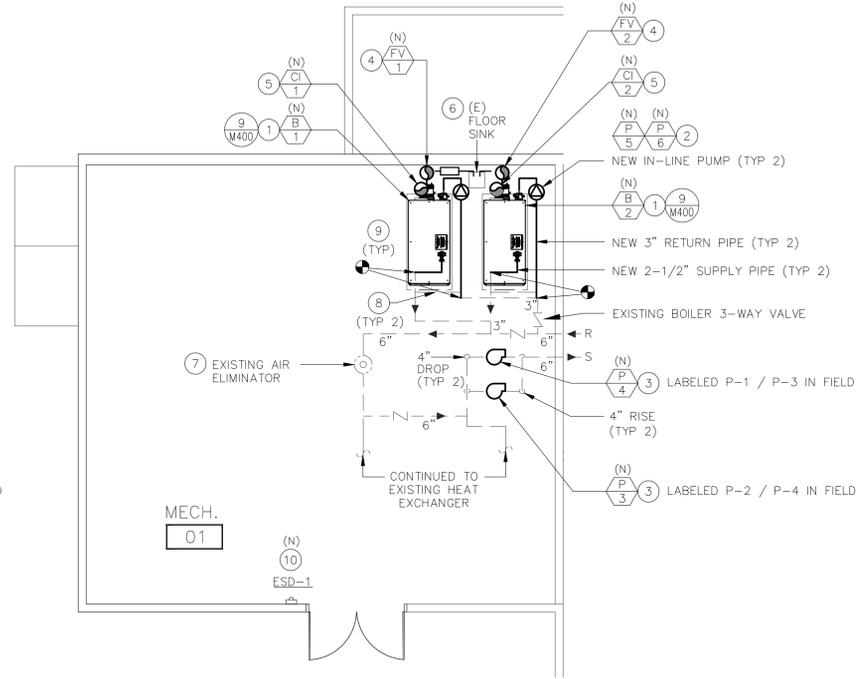
**GENERAL NOTES:**

- EXISTING DUCTS AND AIR DEVICES SHOWN ON PLANS ARE SCHEMATIC BASED ON FIELD OBSERVATION AND PREVIOUS PLAN DATA PROVIDED TO THE TEAM DURING DESIGN. NOT ALL AREAS WERE ACCESSIBLE DURING FIELD OBSERVATION, AND ACTUAL DUCT AND DEVICE LOCATIONS MAY VARY FROM THESE PLANS. FIELD VERIFY EXISTING CONDITIONS AND CREATE SHOP DRAWINGS OF NEW DUCTS AS REQUIRED TO SUIT.
- EXISTING MECHANICAL SYSTEM INCLUDING DUCTWORK, DAMPERS, AIR DEVICES, HEAT PUMPS, FANS, ETC. TO BE REUSED EXCEPT WHERE INDICATED ON PLANS. COORDINATE NEW DEVICE AND DUCT LOCATIONS WITH EXISTING EQUIPMENT, STRUCTURE, AND OTHER TRADES TO AVOID CONFLICTS.



**BOILER ROOM DEMOLITION FLOOR PLAN**

SCALE: 3/16"=1'-0"



**BOILER ROOM FLOOR PLAN**

SCALE: 3/16"=1'-0"



**LEGEND**

(E)	EXISTING EQUIPMENT TO REMAIN
(X)	EXISTING EQUIPMENT TO BE DEMOLISHED
(N)	NEW EQUIPMENT
EQ	EQUIPMENT TYPE UNIT DESIGNATION
●	POINT OF CONNECTION TO EXISTING PIPING
○	IN-LINE PUMP
⊕	BASE MOUNTED PUMP
---	FLANGE
---	EXISTING HVAC PIPING
---	NEW HVAC PIPING
▨	AREA OF DEMOLITION

**GENERAL NOTES:**

A. EXISTING PIPING AND EQUIPMENT SHOWN ON PLANS ARE SCHEMATIC BASED ON FIELD OBSERVATION AND PREVIOUS PLAN DATA PROVIDED TO THE TEAM DURING DESIGN. NOT ALL AREAS WERE ACCESSIBLE DURING FIELD OBSERVATION, AND ACTUAL PIPING AND EQUIPMENT LOCATIONS MAY VARY FROM THESE PLANS. FIELD VERIFY EXISTING CONDITIONS AND CREATE SHOP DRAWINGS OF NEW PIPING AS REQUIRED TO SUIT.

B. EXISTING MECHANICAL SYSTEM INCLUDING PIPING, FITTINGS, VALVES, ETC. TO BE REUSED EXCEPT WHERE INDICATED ON PLANS. COORDINATE NEW PIPING AND EQUIPMENT LOCATIONS WITH EXISTING EQUIPMENT, STRUCTURE, AND OTHER TRADES TO AVOID CONFLICTS.

C. INSTALL NEW PIPING, FITTINGS, AND VALVES IN THE BOILER ROOM PER THE PIPING DIAGRAM AT LEFT AND PER SPECIFICATIONS BELOW.

D. PIPING CONTRACTOR SHALL PRE-COORDINATE INSTALLATION OF NEW BOILERS AND BOILER CONTROL SENSORS WITH THE BOILER CONTRACTOR AND HVAC CONTROLS CONTRACTOR AND PROVIDE AND INSTALL REQUIRED THERMO-WELLS, TEMPERATURE SENSORS, AND FLOW SENSORS AS REQUIRED FOR BOILER CONTROL.

**KEYED NOTES: DEMOLITION**

- DEMOLISH EXISTING BOILER.
- DEMOLISH EXISTING CIRCULATOR PUMP. EXISTING BYPASS PIPING BETWEEN SUPPLY AND RETURN PIPING SHALL REMAIN.
- DEMOLISH EXISTING BUILDING SUPPLY PUMP.
- DEMOLISH EXISTING EXHAUST FLUE. FLUE PENETRATION THROUGH ROOF SHALL REMAIN FOR REUSE DURING NEW WORK.

**KEYED NOTES: NEW CONSTRUCTION**

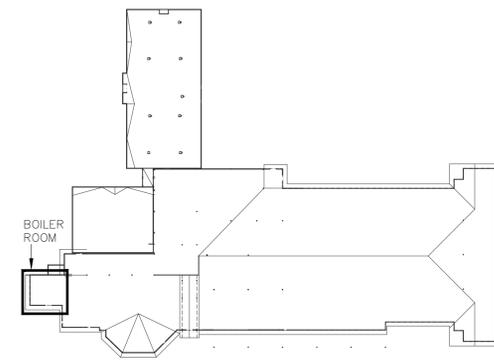
- PROVIDE NEW BOILER COMPLETE AS SCHEDULED. INSTALL CENTERED ON EXISTING CONCRETE PAD AND PER MANUFACTURER'S INSTRUCTIONS. PROVIDE PIPING AND GAS CONNECTIONS FULL SIZE PER BOILER MANUFACTURER'S INSTRUCTIONS. SEE PLUMBING PLANS FOR GAS CONNECTION AND ELECTRICAL PLANS FOR ELECTRICAL CONNECTIONS.
- PROVIDE NEW CIRCULATOR PUMP. INSTALL IN THE "HORIZONTAL INLINE" POSITION WITH VENTS ON ODP MOTOR FACING DOWN. VENTS FACING UP OR VENT SHROUDS OR COVERS ARE NOT ACCEPTABLE.
- PROVIDE NEW BUILDING SUPPLY PUMPS. PROVIDE NEW SUPPLY AND RETURN PIPING AND ALL FITTINGS AS REQUIRED TO INSTALL NEW PUMPS. ADJUST PIPING TO ACCOUNT FOR NEW BASE MOUNTED END SUCTION PUMPS - PROVIDE NEW PIPING LENGTHS, FITTINGS, AND OFFSETS AS NECESSARY.
- PROVIDE A 10" CPVC VERTICAL VENT SYSTEM CERTIFIED TO ASTM F441, AND ROUTE THROUGH ROOF IN ACCORDANCE WITH BOILER MANUFACTURER REQUIREMENTS. PROVIDE NEW ROOF PENETRATION AND PROVIDE OFFSETS IN FLUE PIPE TO ROUTE NEW FLUE THROUGH EXISTING ROOF PENETRATION. REPAIR, FLASH, AND SEAL ROOF PENETRATION WEATHER TIGHT. SEE BOILER DETAIL INDICATED ON PLANS.
- PROVIDE NEW 10" CPVC COMBUSTION AIR INTAKE AND ROUTE THROUGH ROOF IN ACCORDANCE WITH BOILER MANUFACTURER REQUIREMENTS. PROVIDE NEW ROOF PENETRATION AND PROVIDE OFFSETS TO ROUTE NEW VENT THROUGH PENETRATION. FLASH AND SEAL ROOF PENETRATION WEATHER TIGHT. SEE BOILER DETAIL INDICATED ON PLANS.
- PROVIDE CONDENSATE NEUTRALIZATION TANK AND FIELD ROUTE 3/4" CPVC BOILER CONDENSATE DRAIN THROUGH NEUTRALIZATION TANK AND DRAIN WITH 2" AIR GAP TO EXISTING FLOOR SINK (2 TYPICAL).
- FLUSH OUT EXISTING AIR ELIMINATOR PRIOR TO START-UP.
- EXISTING BYPASS BETWEEN SUPPLY AND RETURN PIPING SHALL REMAIN.
- ALL NEW BOILER PRIMARY LOOP PIPING SHALL BE INSULATED AND JACKETED TO MATCH EXISTING BOILER PRIMARY LOOP PIPING. SEE SPECIFICATIONS.
- PROVIDE AND INSTALL NEW MANUALLY OPERATED, TAMPER-PROOF REMOTE SHUT DOWN SWITCH (ESD-1) NEAR ENTRY DOOR. CLEARLY MARK SWITCH WITH 1" RED PHENOLIC LETTERING STATING "BOILER ROOM GAS-FIRED EQUIPMENT EMERGENCY SHUTDOWN". ACTIVATION OF THE SWITCH SHALL IMMEDIATELY SHUT DOWN POWER SUPPLY TO ALL COMBUSTION UNITS LOCATED IN BOILER ROOM. SEE ELECTRICAL PLANS FOR ELECTRICAL WIRING AND INSTALLATION.

**BOILER PIPING SPECIFICATIONS**

- HOT WATER PIPING
- WORK SPECIFIED HEREIN
- PROVIDE ALL LABOR, MATERIALS, EQUIPMENT, AND SERVICES NECESSARY TO FURNISH AND INSTALL ALL HOT WATER PIPING AS INDICATED OR SPECIFIED.
- SCHEDULE 40 BLACK STEEL, ASTM A53, ASTM A106, BEADED 150 PSI SWP MALLEABLE IRON. 2" PIPE AND SMALLER SHALL BE THREADED. 2-1/2" PIPE AND LARGER SHALL BE WELDED, WITH LONG RADIUS ELBOWS, AND FLANGED CONNECTIONS. VICTAULIC/GRUVLOK GROOVED FITTINGS ARE ACCEPTABLE IN PLACE OF WELDED FITTINGS.
- FITTINGS AND ACCESSORIES
- UNIONS: 250 PSI SWP BLACK MALLEABLE IRON, GROUND IRON TO BRONZE SEAT, SCREWED 2" AND SMALLER.
- GATE & GLOBE VALVES: ALL BRONZE SCREWED, 2" AND SMALLER, FLANGED 2-1/2" AND LARGER RISING STEM, UNION BONNET 125 PSI SWP.
- CHECK VALVES: 125 PSI SWP 2" AND SMALLER BRONZE BODY AND CAP, SCREWED HORIZONTAL LIFT CHECK WITH COMPOSITION DISK, 2-1/2" AND LARGER FLANGED IRON BODY ALUMINUM BRONZE PLATES, 316 STAINLESS STEEL SHAFT AND SPRING BUTTERFLY TYPE NORDEL SEATS.
- STRAINER: "Y" TYPE, 125 PSI SWP, GRAY CAST IRON, BRONZE MONEL OR STAINLESS STEEL PERFORATIONS AS RECOMMENDED BY MANUFACTURER FOR SIZE AND SERVICE INTENDED, 3/4" BLOW-OFF GATE VALVE AND HOSE CONNECTION, 2" AND SMALLER SCREWED, 2-1/2" LARGER FLANGED.
- AUTOMATIC AIR VENTS: CAST IRON, 125 PSI ACCESSIBLE WITH MANUAL VENT.
- THERMOMETERS: 4" ROUND BI-METALLIC ELEMENT DIAL TYPE THERMOMETER; 1% ± ACCURACY, INDUSTRIAL UNIVERSAL JOINT, TEMPERATURE RANGE: 30 DEGREES TO 180 DEGREES- USE THERMOWELLS AND THERMAL GREASE.
- PRESSURE GAUGES: 4" ROUND, CAST CASE, 1/2% ACCURACY, PROVIDE GAUGE RANGE WITH OPERATING POINT IN MIDDLE HALF OF SCALE AND COMPOUND RANGE FOR GAUGES SUBJECT TO SUB-ATMOSPHERIC PRESSURES. PROVIDE ISOLATION VALVE AT PRESSURE GAUGES.
- INSTALL DIELECTRIC UNION AT DISSIMILAR METAL CONNECTIONS OR PROVIDE INSULATED FLANGE KITS.
- INSTALLATION
- RUN PARALLEL TO BUILDING LINES. "COCKING" NOT PERMITTED.
- CLEAN PIPE AND FITTINGS OF SCALE AND DIRT, REAM ENDS OF THREADED PIPE, CUT THREADS TO FULL DEPTH OF DIE, APPLY DOPE TO MALE THREADS ONLY IMMEDIATELY BEFORE CONNECTION.
- ASME SECTION 9 CERTIFIED WELDERS ONLY. MINIMUM TWO FULL BEADS TO OVERALL THICKNESS GREATER THAN PIPE THICKNESS. WELDS WILL BE VISUALLY INSPECTED BY ENGINEER. POOR WELDS WILL BE REJECTED.
- PITCH PIPE TO DRAIN FREE OF SAGS, PROVIDE 3/4" DRAIN GATE VALVE AT ALL LOW POINTS WITH HOSE END OR PIPE TO FLOOR SINK.
- PROVIDE OFFSETS, ANCHORS, AND SWING JOINTS AS NECESSARY TO PERMIT EXPANSION AND CONTRACTION WITHOUT DAMAGE TO PIPING OR EQUIPMENT
- HANGERS AND SUPPORTS
- SUPPORT WITH STEEL CLEVIS HANGERS ADJUSTABLE HEIGHT, MAXIMUM 10' O.C., 3/8" ROD FOR UP TO 3" PIPE. WHERE EXTRA HANGER SUPPORTS ARE REQUIRED, THEY SHALL BE PROVIDED BY THIS CONTRACTOR.
- PROVIDE RISER CLAMPS AT FLOOR LINE ON ALL RISERS.
- TRAPEZE HANGERS WITH ROLLERS MAY BE USED FOR MULTIPLE LINES OR WHERE SPACE IS LIMITED.

**BOILER PIPING SPECIFICATIONS CONTINUED**

- INSPECTION AND TESTS
- MAKE TESTS BEFORE THE ROUGH WORK IS COVERED. THE SYSTEM MAY BE TESTED IN PARTS IF APPROVED.
- WHEN TESTS OR INSPECTIONS SHOW THE WORK IS IN ANY WAY DEFECTIVE, REMOVE MATERIAL OR EQUIPMENT FROM THE PREMISES.
- MAKE THE WATER PIPING TESTS ON ALL PIPING AS REQUIRED WITH A 125 PSI HYDROSTATIC PRESSURE TEST FOR 4 HOURS OR A GREATER PRESSURE IF REQUIRED BY CODE. FLUSH ALL LINES BY ADDING 9 GALLONS OF NALCO 2567 OR EQUAL PIPE CLEANING SOLUTION PER 1000 GALLONS OF SYSTEM CAPACITY TO THE FILLED SYSTEM. CIRCULATE CONTINUOUSLY FOR 24 HOURS. DRAIN SYSTEM AND FILL WITH FRESH WATER. FLUSH FOR 4 HOURS, THEN DRAIN AND REFILL. CONTRACTOR SHALL NOTIFY ARCHITECT ONE WEEK IN ADVANCE OF SYSTEM FLUSH SO THAT PROCEDURE CAN BE WITNESSED.
- ALL WATER PIPING SHALL BE PRESSURE TESTED PER LOCAL CODES.
- HOT WATER PIPE COVERING SPECIFICATIONS
- WORK SPECIFIED HEREIN
- PROVIDE ALL LABOR, MATERIALS, EQUIPMENT AND SERVICES NECESSARY TO INSULATE ALL CHILLED WATER AND HOT WATER PIPING COMPLETE AS INDICATED OR SPECIFIED. ALL INSULATION SHALL BE FURNISHED AND INSTALLED BY A LICENSED, APPROVED INSULATION CONTRACTOR.
- PIPE INSULATION SHALL CONFORM TO THE REQUIREMENTS OF THE INTERNATIONAL ENERGY CONSERVATION CODE, SHALL BE TESTED IN ACCORDANCE WITH ASTM 84 AND SHALL HAVE A MAXIMUM FLAME SPREAD INDEX OF 25 AND A SMOKE-DEVELOPED INDEX NOT EXCEEDING 50.
- THICKNESS
- INSULATION SHALL HAVE THERMAL CHARACTERISTICS EQUIVALENT TO THE FOLLOWING:  
 PIPING 3/4" TO 1-1/2" - 1" THICK  
 PIPING 2" TO 6" - 1-1/2" THICK  
 BASED ON HAVING A CONDUCTIVITY (K) NOT EXCEEDING 0.27 BTU / INCH / HOUR - S.F. - °F
- ABOVE GROUND
- FIBERGLASS: DUAL TEMPERATURE PRE-MOLDED FIBERGLASS INSULATION MAXIMUM K = 0.24 AT 75 F, MINIMUM 3.5 POUND DENSITY
- APPLICATION
- FIBERGLASS: COAT UNDERSIDE OF LONGITUDINAL LAPS AND 4" WIDE TRANSVERSE STRIPPING TAPE WITH VAPOR BARRIER ADHESIVE AND STAPLE THROUGH ADHESIVE 3" O.C. CONCEALED FITTINGS, VALVES, ETC., SHALL BE COVERED WITH ZESTON OR EQUAL FITTING COVERS WITH ALL SEAMS SEALED WITH ADHESIVE - NO STAPLES. ALL ZESTON FITTING COVERS SHALL BE PACKED FULL OF FIBERGLASS INSULATION, MAXIMUM K = 0.33. COVER EXPOSED FITTINGS, VALVES, ETC. WITH INSULATION AND 1/4" HARD FINISH PLASTIC CEMENT, COVERING MATERIAL, AND LAGGING ADHESIVE. PROVIDE HARD SECTIONS AT ALL HANGERS, MINIMUM 12" LONG.
- CELLULAR PLASTIC: INSTALL INSULATION BY SLITTING TUBULAR SECTIONS AND APPLYING OVER PIPING OR SLIDING THE TUBING, UNSLIT, OVER THE END OF THE PIPING. FABRICATE MITER CUT COVERS FOR FITTINGS FROM INSULATION IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS. SEAL JOINTS AND BUTT ENDS WITH FIRE RETARDANT, WATERPROOF ADHESIVE EQUAL TO ARMSTRONG 520. (TAPED JOINTS WILL NOT BE ACCEPTED.)
- HANGERS AND ROLLERS: 180 DEGREE, 20-GAUGE GALVANIZED STEEL SHIELD BANDED IN PLACE WITH TWO 1/4" BANDS, 6" LONG TO 1-1/2" PIPE, 12" LONG 2" AND OVER. INSTALL 180 DEGREE HARD SECTIONS SAME LENGTH AS SHIELD AT EACH HANGER. PROVIDE HARD SECTION BETWEEN SHIELD AND PIPE.
- HARD SECTIONS: HYDROUS CALCIUM SILICATE SHALL BE PROVIDED BETWEEN SHIELD AND PIPE. MAXIMUM K FACTOR = .24 (REFERENCE DETAIL 4 SHEET M8.3).
- JACKETING: PROVIDE ASJ JACKETING FOR STRAIGHT LENGTHS AND PVC JACKETING FOR ELBOWS.



**BUILDING AREA KEY PLAN**

SCALE: NTS



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REVISIONS		
REV#	DATE	DESCRIPTION

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 DRAWN BY: GAW



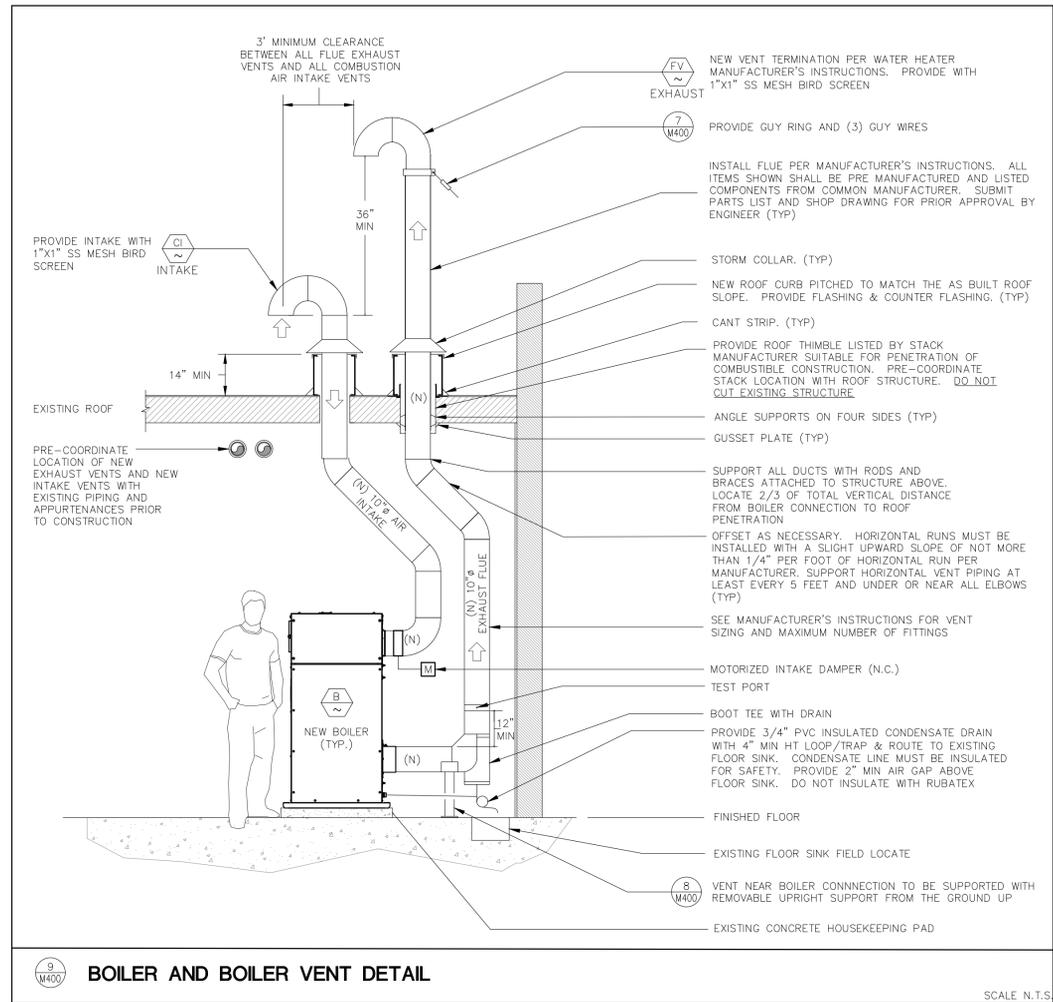
ORIGINAL ISSUE  
 DATE: 01-14-2020

JOB No: 19101

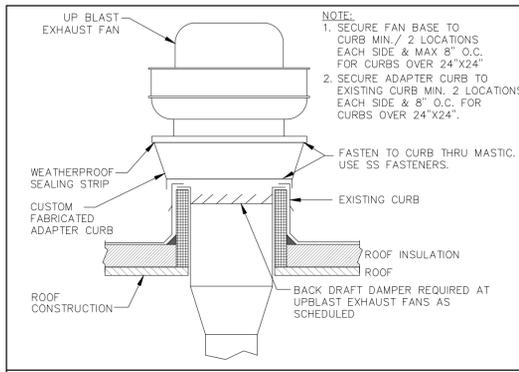
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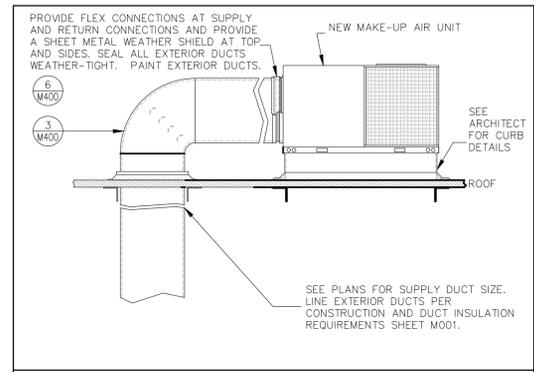
**APPLIED ENGINEERING**  
 2800 S. RURAL RD., SUITE 101  
 TEMPE, AZ 85282 (480)968 3070  
 JOB NUMBER 19-061



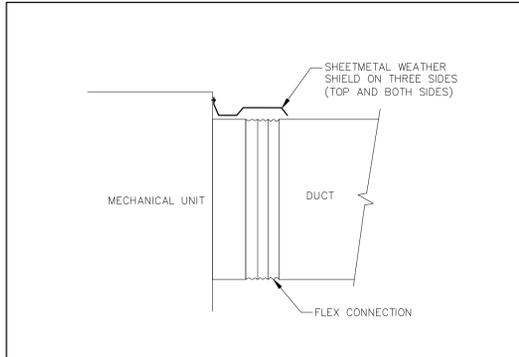
**9 M400 BOILER AND BOILER VENT DETAIL** SCALE N.T.S.



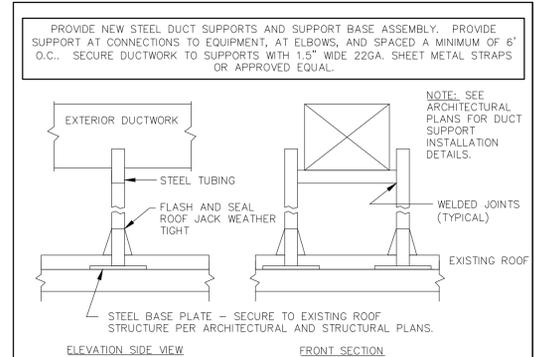
**5 M400 UPBLAST EXHAUST FAN DETAIL** SCALE N.T.S.



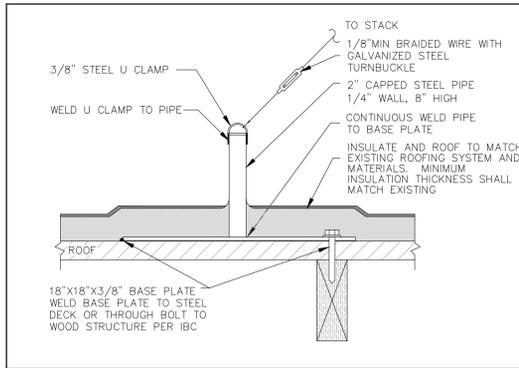
**1 M400 ROOFTOP AIR CONDITIONING UNIT DETAIL** SCALE N.T.S.



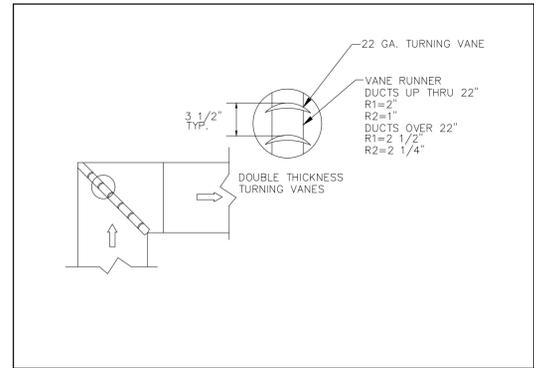
**6 M400 FLEX DUCT CONNECTION AT UNIT** SCALE N.T.S.



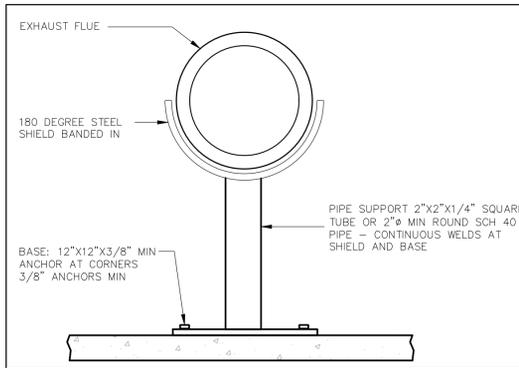
**2 M400 DUCT SUPPORT DETAIL** SCALE N.T.S.



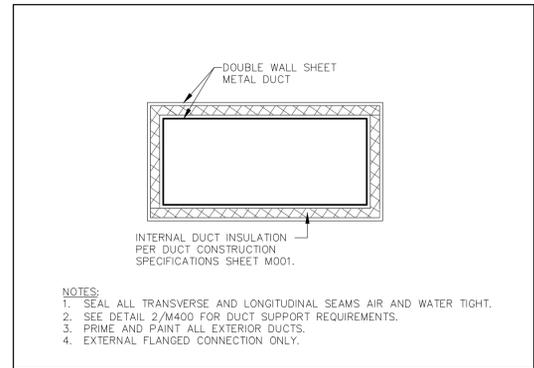
**7 M400 GUY WIRE MOUNT TO ROOF (3 EA FLUE)** SCALE N.T.S.



**3 M400 TYPICAL DUCT TURN DETAIL** SCALE N.T.S.



**8 M400 VENT SUPPORT DETAIL** SCALE N.T.S.



**4 M400 ROOFTOP DUCTWORK DETAIL** SCALE N.T.S.

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ORIGINAL ISSUE DATE: 01-14-2020

JOB No: 19101

SHEET: M400

SEQUENCE #:



COMcheck Software Version 4.1.1.0  
**Mechanical Compliance Certificate**

**Project Information**

Energy Code: 2018 IECC  
 Project Title: WRUSD Elementary School  
 Location: Fort Defiance, Arizona  
 Climate Zone: 5b  
 Project Type: Alteration

Construction Site: \_\_\_\_\_ Owner/Agent: \_\_\_\_\_ Designer/Contractor: \_\_\_\_\_

**Mechanical Systems List**

Quantity	System Type & Description
2	Boilers 1 & 2: Heating: Hot Water Boiler, Capacity 2000 kBtu/h, Gas, with Waterloop Heat Pump Proposed Efficiency: 96.00 % Et, Required Efficiency: 80.00 % Et

**Mechanical Compliance Statement**

*Compliance Statement:* The proposed mechanical alteration project represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2018 IECC requirements in COMcheck Version 4.1.1.0 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Gregory Wirth - EIT \_\_\_\_\_ Date 01/13/2020  
 Name - Title Signature

Project Title: WRUSD Elementary School Report date: 01/13/20  
 Data filename: C:\Users\GregW\Documents\COMcheck\19-061 WRUSD ES.cck Page 1 of 10



**BOILER & MUA REPLACEMENT**  
 WINDOW ROCK UNIFIED SCHOOL DISTRICT  
 TSF HOOT SOOT ELEMENTARY SCHOOL  
**MECHANICAL COMCHECK**

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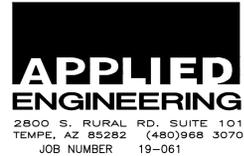
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ORIGINAL ISSUE  
 DATE: 01-14-2020

JOB No: 19101

SHEET: **M500**  
 SEQUENCE #:



2800 S. RURAL RD., SUITE 101  
 TEMPE, AZ 85282 (480)968 3070  
 JOB NUMBER 19-061

**PLUMBING SPECIFICATIONS**

- ALL WORK SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES, LAWS, ACTS AND ALL AUTHORITIES HAVING JURISDICTION INCLUDING, BUT NOT LIMITED TO THE 2015 INTERNATIONAL PLUMBING CODE, 2015 INTERNATIONAL FUEL GAS CODE, AND ADOPTED CODE PER FORT DEFIANCE, AZ. OBTAIN PERMIT PRIOR TO CONSTRUCTION. WORK SHALL INCLUDE ALL MATERIALS, LABOR, SERVICES AND EQUIPMENT NECESSARY TO PROVIDE AN OPERATING SYSTEM AS SHOWN ON THE PLANS. PLANS ARE SCHEMATIC AND ARE NOT INTENDED TO SPECIFY ALL INCIDENTAL HARDWARE OR IDENTIFY ALL OFFSETS OR DIFFICULTIES WHICH MAY BE ENCOUNTERED IN THE COURSE OF COMPLETING THE PROJECT. DO NOT SCALE THE PLANS. CONTRACTORS SHALL FIELD MEASURE AND COORDINATE WITH OTHER TRADES PRIOR TO ORDERING HARDWARE. PLANS SHALL NOT BE SCALED OR USED FOR FABRICATION WITHOUT FIELD ADJUSTMENTS. WORK AND MATERIALS SHALL BE SUBJECT TO ACCEPTANCE BY OWNER'S REPRESENTATIVE.
- WORK SHALL INCLUDE ALL MATERIALS, LABOR, AND EQUIPMENT NECESSARY TO PROVIDE AN OPERATING SYSTEM AS SHOWN ON THE PLANS. PLANS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO SPECIFY ALL INCIDENTAL HARDWARE NECESSARY TO COMPLETE THE PROJECT.
- PLUMBING CONTRACTOR SHALL FIELD VERIFY ALL CLEARANCES, DUCT, AND EQUIPMENT LOCATIONS PRIOR TO COMMENCING PROJECT. PLUMBING CONTRACTOR SHALL SCHEDULE COORDINATION MEETINGS WITH THE MECHANICAL CONTRACTOR, ELECTRICAL CONTRACTOR, AND ANY CONTRACTORS FRAMING OR INSTALLING STRUCTURE SO AS TO SET EQUIPMENT, PIPE ELEVATIONS AND FINAL PIPE ROUTING TO ACCOMMODATE ALL TRADES AND ALL EXISTING BUILDING ELEMENTS AND RESTRICTIONS. TRADES SHALL ESTABLISH A RIGHT-OF-WAY PLAN PRIOR TO CONSTRUCTION. THESE COORDINATION MEETINGS WILL BE HELD ON SITE WITH ALL PARTIES IN ATTENDANCE IN ADVANCE OF ANY PIPE INSTALLATION. CONTRACTOR SHALL NOT CHARGE OWNER, ARCHITECT, GENERAL CONTRACTOR, ENGINEER OR OTHERS FOR FIELD ADJUSTMENT DUE TO FIELD CONDITIONS. CONTRACTOR MUST INCLUDE IN FEE TO COMPLETE PROJECT MISCELLANEOUS PIPES REQUIRING OFFSETS AROUND BEAMS, COLUMNS, DUCTS, CONDUIT OR STRUCTURAL ELEMENTS OR BRACES. FIELD VERIFICATION AND INSTALLATION SHALL BE CONSIDERED INCLUDED IN BASE SCOPE OF WORK WITHOUT ADDITIONAL COMPENSATION FEES. PLUMBING CONTRACTOR SHALL OBTAIN ARCHITECTURAL PLANS, STRUCTURAL PLANS, MECHANICAL PLANS, AND ELECTRICAL PLANS AND VERIFY INTENDED CEILING HEIGHTS, SOFFIT LOCATIONS, AND OTHER ARCHITECTURAL FEATURE LOCATIONS AND SHALL ROUTE PIPING ACCORDINGLY TO ALLOW CONSTRUCTION OF OTHER ELEMENTS OF THE BUILDING TO BE CONSTRUCTED. PIPING ROUTING WILL NEED TO BE FIELD ADJUSTED FROM PLANS FOR FIELD CONDITIONS AND NUMEROUS FITTINGS PROVIDED TO SUIT.
- WORK AND MATERIALS SHALL BE SUBJECT TO ACCEPTANCE BY OWNER'S REPRESENTATIVE.
- CONTRACTOR SHALL FIELD VERIFY ALL EQUIPMENT AND LOCATIONS PRIOR TO COMMENCING PROJECT. DISCREPANCIES TO DRAWINGS SHALL BE BROUGHT TO ENGINEER'S ATTENTION IMMEDIATELY AND PRIOR TO CONSTRUCTION OF NEW.
- WASTE, VENT AND ROOF DRAIN PIPES SHALL BE SCHEDULE 40 PVC SOLID CORE PLASTIC. ACCEPTABLE PIPE MANUFACTURERS ARE CHARLOTTE PIPE AND FOUNDRY COMPANY, TYLER SOIL PIPE, OR EQUAL DOMESTIC MANUFACTURERS.
- INSTALL DIELECTRIC UNION AT DISSIMILAR METAL CONNECTIONS.
- SLOPE WASTE LINES 1/4"/FT AND SLOPE VENT LINES 1/8"/FT UNLESS SPECIFIED OTHERWISE ON THE PLANS.
- ALL PIPE PENETRATING SMOKE PARTITIONS, SMOKE OR FIRE RATED WALLS SHALL BE SEALED WITH UL LISTED FIRE CAULK AND INSTALLED PER APPROPRIATE UL LISTED PENETRATION DESIGNS.

**PLUMBING LEGEND**

SYMBOLS	DESCRIPTION
	SANITARY WASTE ABOVE FLOOR (SW)
	SANITARY WASTE BELOW FLOOR/GRADE (SW)
	GREASE WASTE (GW)
	VENT (V)
	COLD WATER (CW), INDUSTRIAL COLD WATER (ICW)
	HOT WATER (HW)
	HOT WATER RETURN (HWR)
	STORM DRAIN (SD)
	OVERFLOW DRAIN (OD)
	GAS PIPING (GAS)
	FLOOR CLEAN OUT (FCO)
	WALL CLEAN OUT (WCO)
	PIPE UP
	PIPE DOWN
	LOW HIGH
	DROP OR RISE
	TOP CONNECTION
	BOTTOM CONNECTION
	UNION
	GATE VALVE/SHUT-OFF VALVE (SOV)
	BALL VALVE
	BACK WATER VALVE
	PLUG VALVE, GAS COCK (GC)
	GLOBE VALVE
	CHECK VALVE
	PRESSURE REDUCING VALVE
	TEMPERATURE PRESSURE RELIEF VALVE (T&P)
	PRESSURE GAUGE W/VALVE
	DIFFERENTIAL PRESSURE INDICATOR W/VALVES
	GAS COCK
	FLEXIBLE CONNECTION
	HOSE OUTLET
	CW HOSE BIBB
	PIPE CAP
	P-TRAP
	PRESSURE REDUCING VALVE (PRV)
	BALANCE VALVE
	ROOF OR OVERFLOW DRAIN
	FLOOR DRAIN (FD)
	FLOOR SINK (FS)
	HOSE BIBB (HB)
	VALVE AND CAPPED OUTLET
	TRAP PRIMER (TP)
	SHOCK ABSORBER (WHA)
	STRAINER
	VENT THROUGH ROOF (VTR)
	DIAMETER (DIA)
	SQUARE FEET (SQ FT)
	CLEANOUT TO GRADE
	2-WAY FLOOR CLEANOUT

\*\*\* NOT ALL SYMBOLS ARE APPLICABLE FOR THIS PROJECT \*\*\*

**NATURAL GAS PIPING SPECIFICATIONS**

- ALL WORK SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL CODES, LAWS, ACTS AND ALL AUTHORITIES HAVING JURISDICTION INCLUDING, BUT NOT LIMITED TO THE 2015 INTERNATIONAL PLUMBING CODE, 2015 INTERNATIONAL FUEL GAS CODE, 2015 INTERNATIONAL MECHANICAL CODE, AND CODES AND AMENDMENTS ADOPTED BY FORT DEFIANCE, AZ. OBTAIN PERMIT PRIOR TO CONSTRUCTION.
- WORK SHALL INCLUDE ALL MATERIALS, LABOR, SERVICES AND EQUIPMENT NECESSARY TO PROVIDE AN OPERATING NATURAL GAS SYSTEM AS SHOWN ON THE PLANS AND PER THE MANUFACTURER'S INSTRUCTIONS. DO NOT SCALE THE PLANS. CONTRACTORS SHALL FIELD MEASURE AND COORDINATE WITH OTHER TRADES PRIOR TO ORDERING HARDWARE. PLANS SHALL NOT BE SCALED OR USED FOR FABRICATION WITHOUT FIELD MEASUREMENTS AND ADJUSTMENTS.
- WORK SHALL INCLUDE ALL MATERIALS, LABOR, AND EQUIPMENT NECESSARY TO PROVIDE AN OPERATING NATURAL GAS INSTALLATION AS SHOWN ON THE PLANS. PLANS ARE DIAGRAMMATIC AND ARE NOT INTENDED TO SPECIFY ALL INCIDENTAL HARDWARE NECESSARY TO COMPLETE THE PROJECT.
- PLUMBING CONTRACTOR SHALL OBSERVE AND FIELD VERIFY ALL CLEARANCES, EQUIPMENT LOCATIONS AND CONDITIONS PRIOR TO COMMENCING PROJECT. CONTRACTOR MUST INCLUDE IN FEE TO COMPLETE PROJECT MISCELLANEOUS PIPES REQUIRING OFFSETS AROUND BEAMS, COLUMNS, DUCTS, CONDUIT OR STRUCTURAL ELEMENTS OR BRACES. FIELD OBSERVATIONS, PRE-VERIFICATION AND SOUND INSTALLATION PRACTICE SHALL BE CONSIDERED INCLUDED IN BASE SCOPE OF WORK WITHOUT ADDITIONAL COMPENSATION FEES.
- INCONSISTENCIES, DISCREPANCIES, OR ANY ITEMS REQUIRING CLARIFICATION ON DRAWINGS SHALL BE BROUGHT TO ENGINEER'S ATTENTION DURING BID PROCESS USING A WRITTEN REQUEST FOR INFORMATION. SUBMISSION OF BID IS SEEN AS CLEAR UNDERSTANDING OF ALL PLANS, TERMS AND CONDITIONS ON THE PLANS.
- ALL NEW GAS PIPES SHALL IDENTIFIED WITH NEW YELLOW "NATURAL GAS" STICKER LABELS WITH ARROWS TO MEET PLUMBING CODE. THE LABELING SHALL IDENTIFY GAS AND FLOW DIRECTION.
- ALL NEW GAS PIPING SHALL BE PRESSURE TESTED PER THE 2015 INTERNATIONAL FUEL GAS CODE. SEE SECTIONS 406.4.1 AND 406.4.2 OF THE 2015 IFGC.
- ALL NEW GAS PIPING OVER 2 PSIG WORKING PRESSURE SHALL BE NITROGEN PURGED PRIOR TO SERVICE PER THE 2015 IFGC CODE. REFER TO SECTION 406.7 OF THE 2015 IFGC.

**NATURAL GAS GENERAL SPECIFICATIONS**

- INSTALL NEW GAS PIPING PER PLUMBING SPECIFICATIONS AND PLANS. INCLUDE ALL MISCELLANEOUS HARDWARE TO PROVIDE FUNCTIONAL, CODE COMPLIANT SYSTEM.
- ALL ABOVE GROUND PIPE SHALL BE SCHEDULE 40 STEEL AND SHALL COMPLY WITH ONE OF THE FOLLOWING STANDARDS: ASME B36.10 10M, ASTM A53/A53M OR 'B', ASTM A106. ALL PIPING  $\leq$  2" SHALL BE THREADED AND ALL FITTINGS SHALL BE THREADED WROUGHT STEEL.
- NO BELOW GROUND PIPING SHALL BE INSTALLED ON THIS PROJECT.
- PROVIDE DIRT LEG ON EACH DROP TO EQUIPMENT BURNERS.
- PROVIDE GAS VALVE AND FIELD CONNECT TO EACH PIECE OF EQUIPMENT PER PLANS. FIELD LOCATE GAS CONNECTION ON EQUIPMENT.
- SUPPORT ALL STEEL PIPE PER PLANS AND SPECIFICATIONS.
- ALL REGULATOR VENTS ARE TO TERMINATE OUTDOORS PER PLUMBING CODE, UNLESS THE REGULATOR IS LISTED FOR INTERNAL VENTING. ALL REGULATOR VENTS SHALL BE FULL SIZE FROM THE REGULATOR VENT, 3/4" PIPE SIZE MINIMUM. VENTS MAY BE STEEL OR COPPER. PVC OR PLASTIC VENTS ARE NOT ACCEPTABLE.
- PAINT ALL ABOVE GROUND OUTDOOR GAS PIPE WITH PRIMER AND PAINT TO MATCH BUILDING. WHEN ON WALLS PAINT PIPE AND CLAMPS TO MATCH THE BUILDING COLOR. WHEN ON ROOF PAINT PER ARCHITECT.

**NATURAL GAS PIPING SUPPORT SPECIFICATIONS**

**VERTICAL:**  
SUPPORT VERTICAL SECTIONS OF PIPING DIRECTLY TO WALLS USING STEEL CLAMPS.

HORIZONTAL:	PIPE	SUPPORT SPACING
	1/2"	6'
	3/4" OR 1"	8'
	1 1/4" OR LARGER	10'

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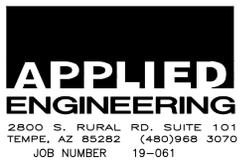
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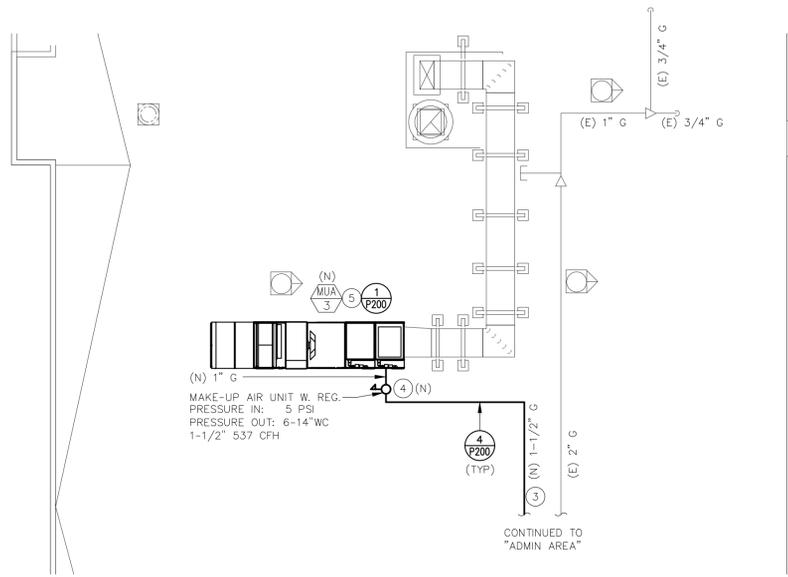


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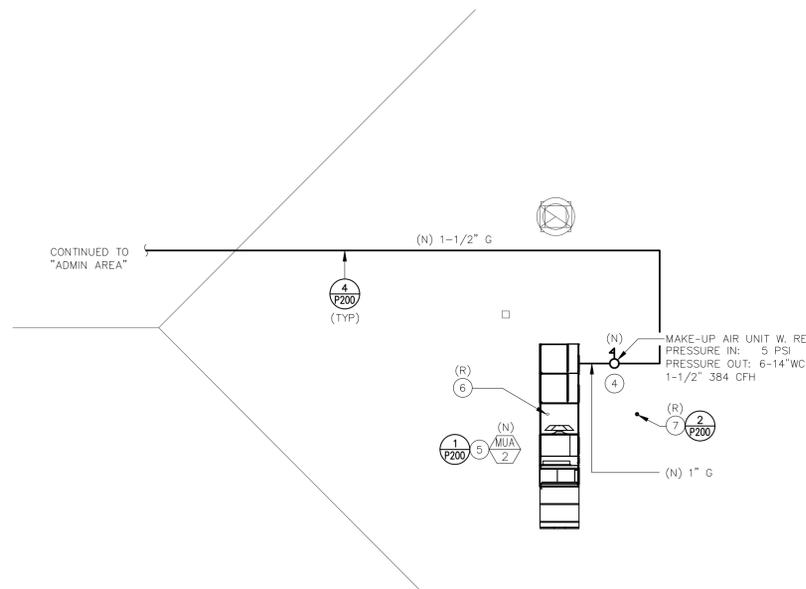
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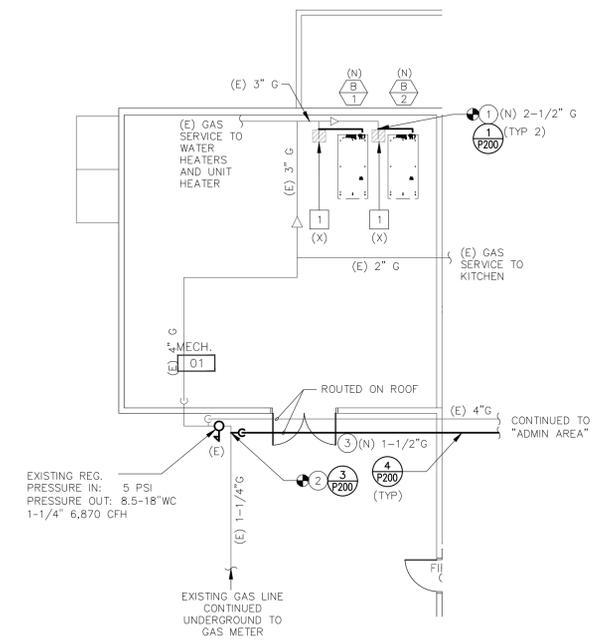
**PLUMBING ROOF PLAN  
WEST WING**

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



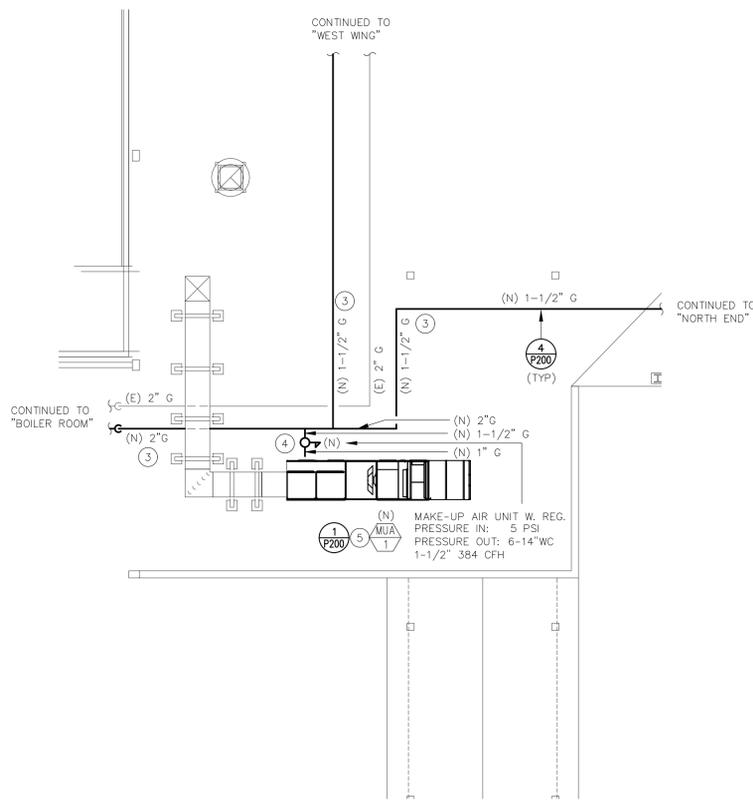
**PLUMBING ROOF PLAN  
NORTH END**

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



**PLUMBING FLOOR PLAN  
BOILER ROOM**

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



**PLUMBING ROOF PLAN  
ADMIN AREA**

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



**LEGEND**

- (E) EXISTING EQUIPMENT TO REMAIN
- (X) EXISTING EQUIPMENT TO BE DEMOLISHED
- (N) NEW EQUIPMENT
- POINT OF CONNECTION TO EXISTING PIPING
- ▨ AREA OF DEMOLITION

**KEYED NOTES: DEMOLITION**

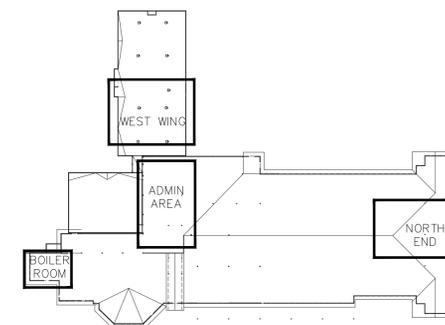
1. DEMOLISH EXISTING GAS DROP TO EXISTING BOILER BACK TO 2-1/2" PIPE. EXISTING 2-1/2" PIPE SHALL BE EXTENDED TO NEW BOILERS WITH NEW 2-1/2" PIPING DURING NEW WORK.

**KEYED NOTES: NEW CONSTRUCTION**

1. CONNECT TO EXISTING 2-1/2" GAS DROP AND EXTEND GAS LINE WITH NEW 2-1/2" PIPE TO NEW BOILERS. CONNECT TO NEW BOILERS PER DETAIL INDICATED.
2. CONNECT NEW 2" GAS PIPING TO EXISTING GAS MAIN AT EXTERIOR 1-1/4" GAS RISER. PROVIDE TEE FOR NEW CONNECTION AND RISE NEW 2" GAS LINE UP WALL TO ROOF.
3. ROUTE NEW 2" GAS LINE ACROSS ROOF PARALLEL TO EXISTING ROOFTOP GAS LINE FOR UNIFORM APPEARANCE WHEN ROUTING ACROSS ROOF. EXTEND NEW GAS SERVICE TO NEW MAKE-UP AIR UNITS ON ROOF.
4. PROVIDE NEW GAS REGULATOR AT NEW MAKE-UP AIR UNIT. SEE PLAN FOR REGULATOR DATA. LOCATE REGULATOR VENT A MINIMUM OF 10' AWAY FROM ANY BUILDING AIR INTAKES.
5. CONNECT NEW GAS LINE TO NEW MAKE-UP AIR UNIT PER DETAIL INDICATED.
6. RELOCATE PLUMBING VENT OUT FROM UNDER NEW MAKE-UP AIR UNIT AND 10' AWAY FROM MAKE-UP AIR UNIT INTAKE.
7. DENOTES NEW LOCATION FOR RELOCATED PLUMBING VENT.

**GENERAL NOTES:**

- A. EXISTING GAS LINES AND EQUIPMENT SHOWN ON PLANS ARE SCHEMATIC BASED ON FIELD OBSERVATION AND PREVIOUS PLAN DATA PROVIDED TO THE TEAM DURING DESIGN. NOT ALL AREAS WERE ACCESSIBLE DURING FIELD OBSERVATION, AND ACTUAL LOCATIONS MAY VARY FROM THESE PLANS. FIELD VERIFY EXISTING CONDITIONS AND CREATE SHOP DRAWINGS AS REQUIRED TO SUIT.
- B. SUPPORT PIPE PER SPECIFICATIONS SHEET P001 AND PER DETAILS INDICATED.



**BUILDING AREA KEY PLAN**

SCALE: NTS



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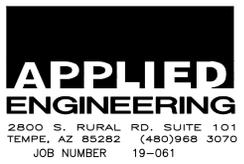
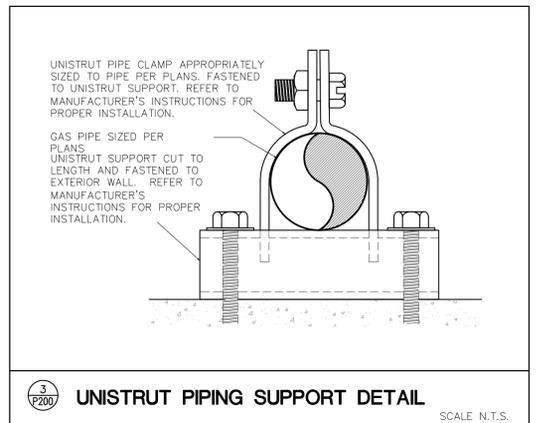
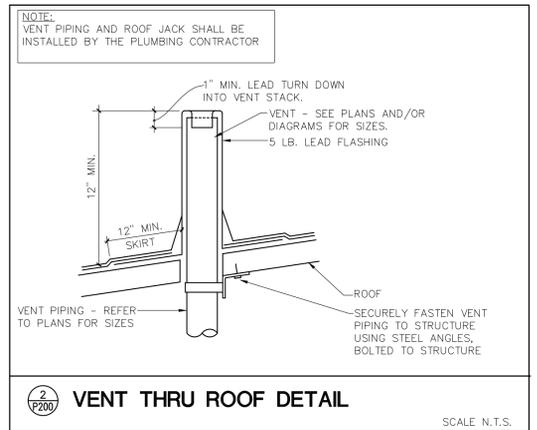
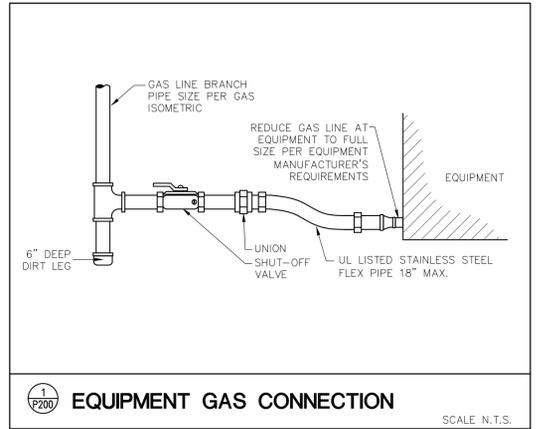
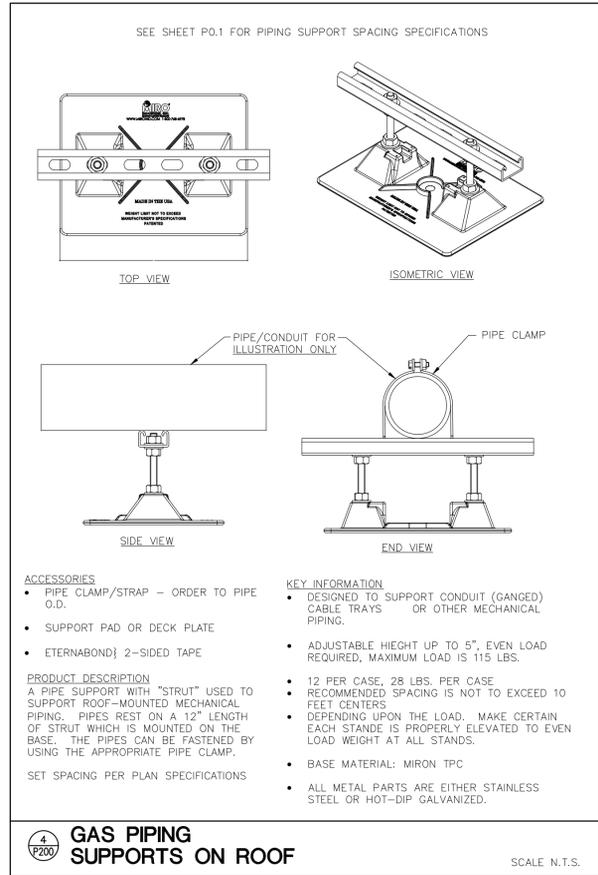
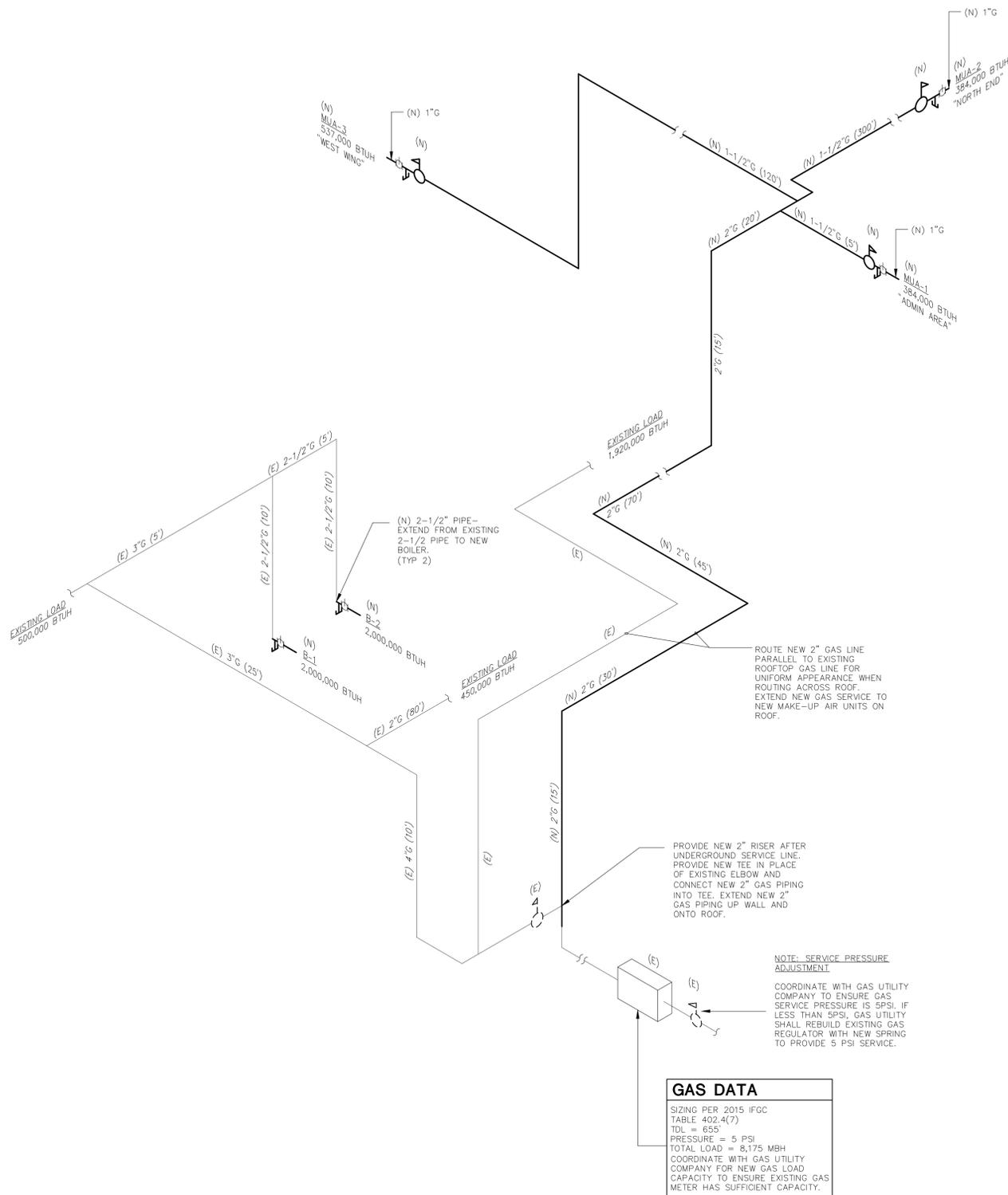


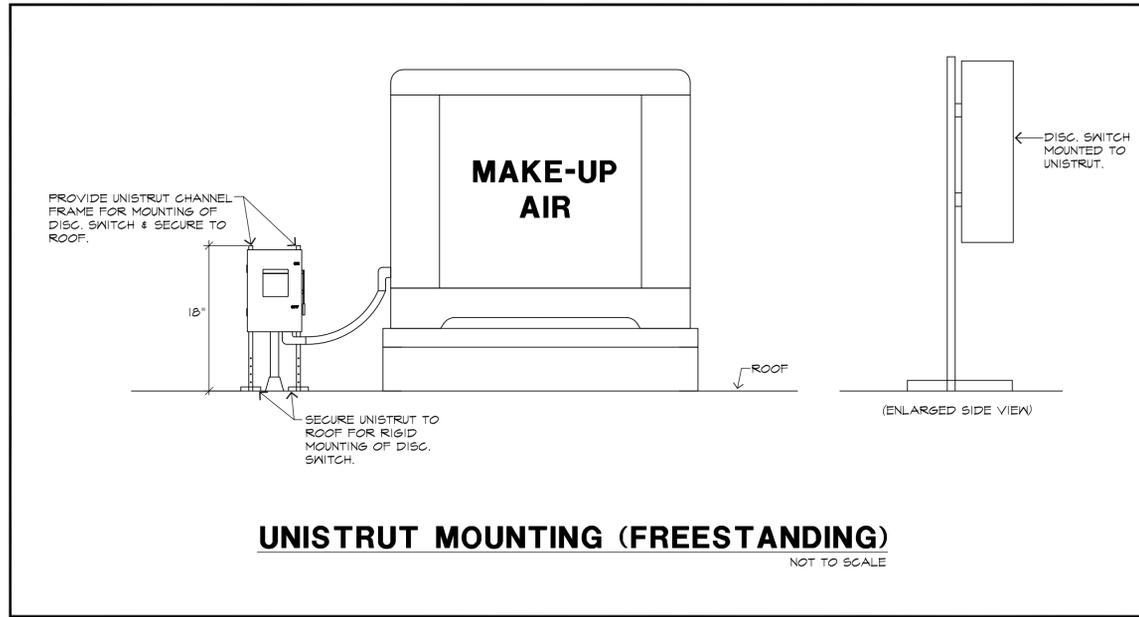
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## GENERAL NOTES

- A. THE ELECTRICAL CONTRACTOR SHALL VERIFY AND COORDINATE WITH THE MECHANICAL CONTRACTOR AND CONTRACT DOCUMENTS THE FOLLOWING AND COMPLY AS REQUIRED.
  1. LOCATION OF MECHANICAL EQUIPMENT, e.g. MOTORS, PUMPS, T-STATS, ETC.
  2. ELECTRICAL CHARACTERISTICS e.g. PHASE, VOLTAGE, H.P., AMPS, CONTROL WIRING, NO. OF CONNECTIONS, ETC.
- B. IT SHALL BE THE ELECTRICAL CONTRACTORS RESPONSIBILITY TO VERIFY ELECTRICAL CHARACTERISTICS AND ADDITIONAL REQUIREMENTS OF ALL ELECTRICAL EQUIPMENT (AS SHOWN FOR THIS PROJECT). VERIFY AND COORDINATE WITH THE EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN AND COMPLY AS REQUIRED TO COMPLETE THE THE ELECTRICAL WIRING IN AN APPROVED MANNER, e.g., VERIFY EXACT LOCATIONS, MOUNTING HEIGHTS, LOADS, H.P., NO. OF CONDUCTORS, INTERWIRING, CONTROLS, ETC., AS REQUIRED FOR EQUIPMENT TO BE FULLY OPERATIONAL.
- C. THE ELECTRICAL CONTRACTOR SHALL BE HELD FULLY RESPONSIBLE FOR RELOCATION, EXTENSION AND RECONNECTION OF ANY AND ALL SYSTEMS BEING DISRUPTED BY DEMOLITION WORK e.g. ELECTRICAL FEEDERS, ETC. SO THAT THEY ARE FULLY OPERATIONAL.
- D. CONTRACTOR SHALL COORDINATE REMOVAL OF EXISTING AND INSTALLATION OF NEW WORK SO THAT ALL EXISTING ELECTRICAL SYSTEMS (SERVICE FEEDERS, TELEPHONE, ETC.) REMAIN OPERATIONAL DURING USE OF FACILITIES BY OWNER. PRIOR TO ANY PLANNED INTERRUPTION OF ANY OF THE ELECTRICAL SYSTEMS, NOTIFY THE ARCHITECT AND OWNER IN WRITING WELL IN ADVANCE SO THAT THERE WILL BE ADEQUATE TIME TO PREPARE AFFECTED AREAS.
- E. AT COMPLETION OF ELECTRICAL INSTALLATION, PROVIDE OWNER WITH ACCURATE AS-BUILT DRAWINGS INDICATING ALL VARIATIONS FROM CONTRACT DRAWINGS AND A LETTER TO THE OWNER'S REPRESENTATIVE STATING PROJECT FULLY COMPLIES WITH ALL CONTRACT DOCUMENTS AND IF NOT, HOW INSTALLATION WAS ACCOMPLISHED, ALL CHANGES SHALL BE SUBJECT TO OWNER'S REPRESENTATIVE'S APPROVAL.
- F. THIS CONTRACT IS TO INCLUDE ALL CONTINGENCIES WHICH MAY ARISE AND WHICH MAY BE REQUIRED BY ALTERATION, DEMOLITION AND NEW WORK. THIS IS TO INCLUDE ALL REMOVAL, RELOCATION AND REWORKING OF ELECTRICAL WORK, e.g. CONDUIT, WIRING AND ITEMS OF ELECTRICAL EQUIPMENT REQUIRED AND ANY NECESSARY SPLICING OR EXTENSION OF WIRING SYSTEMS. THE ELECTRICAL CONTRACTOR SHALL VISIT SITE AND DETERMINE FULL EXTENT OF THE WORK. NO ADDITIONAL COMPENSATION WILL BE PERMITTED FOR FAILURE TO FULLY ASCERTAIN ASPECTS OF THIS PROJECT.

## ELECTRICAL SPECIFICATION

FURNISH AND INSTALL INCLUDING LABOR, SUPERVISION, MATERIALS, TOOLS, SERVICES, TRANSPORTATION, OVERHEAD COSTS, ROYALTIES, PROFITS, ETC., A COMPLETE INSTALLATION AS SPECIFIED HEREIN AND INDICATED ON ALL ELECTRICAL AND OTHER DRAWINGS, e.g. CONTROL WIRING FOR MECHANICAL SYSTEM, IN AN APPROVED NEAT, FIRST-CLASS, FINISHED, SAFE, WORKMANSHIP-LIKE MANNER THAT COMPLIES WITH THE CITY, ETC. CODES, ORDINANCES, RULES, STANDARDS ETC., INCLUDING CURRENT ADDENDA AND ERRATA. ENTIRE ELECTRICAL INSTALLATION SHALL COMPLY WITH OR SURPASS THE MOST RECENT EDITION OF THE NATIONAL ELECTRICAL CODE PER OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).

ALL MATERIALS AND EQUIPMENT FURNISHED BY THE ELECTRICAL CONTRACTOR SHALL BE NEW AND OF FIRST-CLASS QUALITY, UNLESS NOTED OTHERWISE, FREE FROM DEFECTS, AND CONFORM WITH UNDERWRITERS' LABORATORIES, INC. STANDARDS WHERE APPLICABLE AND BE SO LABELED. MATERIALS AND EQUIPMENT NOT SPECIFIED AND WHERE UNDERWRITERS' LABORATORIES APPROVAL IS NOT APPLICABLE AND THAT EQUIPMENT SHALL BE SUITABLE FOR USE INTENDED, e.g. WEATHERPROOF FOR EXTERIOR AND NET LOCATIONS, VOLTAGE, H.P., RATING OF DISCONNECT SWITCHES, ETC.

MATERIALS, EQUIPMENT, ETC., INCLUDING THOSE FURNISHED BY OTHERS, THAT ARE TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR SHALL BE RECEIVED AND PROPERLY PROTECTED BY THIS CONTRACTOR UNTIL ENTIRE INSTALLATION IS COMPLETE.

MAKE NO INSTALLATION OF WORK WHICH WOULD LEAVE INADEQUATE OPERATING OR SERVICING SPACE FOR ANY ITEM FOR THE ENTIRE PROJECT. DRAWINGS ARE NOT INTENDED TO SHOW IN DETAIL ALL FEATURES OF WORK. CHECK LOCATION OF ELECTRICAL WORK TO DETERMINE IN ADVANCE THAT IT CLEARS ALL OPENINGS, STRUCTURAL MEMBERS, ETC. ARRANGE AND SCHEDULE WORK SO THAT A MINIMUM OF CUTTING AND PATCHING IS REQUIRED. WHERE CONTRACT DOCUMENTS, e.g. DRAWINGS AND SPECIFICATIONS DO NOT MEET WITH MINIMUM CODES, ETC., THIS CONTRACTOR SHALL COMPLY FOR NO ADDITIONAL COST.

ALL DEVICES FOR PROJECT SHALL BE EQUAL TO COMMERCIAL GRADE 20A TOGGLE SWITCHES AND 20A RECEPTACLES. ALL DEVICE COVER PLATES TO BE COLOR OF DEVICES AND PLATES SHALL MATCH COLOR OF WALLS, e.g. IVORY COLORED ON LIGHT COLORED WALLS AND BROWN COLORED ON DARK COLORED WALLS AND W.P. TYPES FOR EXTERIOR OR NET LOCATIONS, APPROVED MANUF. # 3 S, HUBBELL & LEVITON.

ALL WIRING SHALL BE INSTALLED IN APPROVED RACEWAYS. RACEWAYS SHALL BE APPROVED FOR USE INTENDED. ALL ELECTRICAL CONDUCTORS SHOWN ARE COPPER, MINIMUM SIZE CONDUCTOR IS NO. 12 AWG, WITH THIN OR THIN INSULATION, CONTROL WIRING MAY BE NO. 14 AWG OR SMALLER IF REQUIRED OR RECOMMENDED BY SUPPLIER OF EQUIPMENT AS APPLICABLE.

PROVIDE & INSTALL SEPARATE EQUIP. GROUNDING CONDUCTOR IN ALL CONDUIT RACEWAYS PER NEC & LOCAL CODE.

ELECTRIC METALLIC TUBING (EMT): EMT TO BE USED WHERE CONCEALED IN AREAS ABOVE CEILINGS, FURRED SPACES, PARTITIONS OR WALLS. PROVIDE BOND CONDUCTOR WITH ALL BRANCH WIRING INSTALLED IN EMT MIN. SIZED CONDUIT 3/4".

FLEXIBLE CONDUIT (FLEX) SHALL BE USED FOR CONNECTIONS TO MOTORS AND OTHER ELECTRICAL EQUIPMENT WHERE IT IS SUBJECT TO MOVEMENT, VIBRATIONS, MISALIGNMENTS, CRAMPED QUARTERS, OR WHERE NOISE TRANSMISSION IS TO BE ELIMINATED OR REDUCED. LENGTH SHALL BE ADEQUATE BUT NOT TO EXCEED THIRTY-SIX (36") INCHES. FLEXIBLE CONDUITS AND FITTINGS USED TO MEET THE ABOVE REQUIREMENT SHALL, IN ADDITION, BE OF THE LIQUID TIGHT TYPE WHEN INSTALLED ON EXTERIOR. INSTALL A N.E.C. SIZE BONDING CONDUCTOR IN ALL FLEX, WHERE PERMITTED BY CODE, FLEX MAY BE USED WHERE THE INSTALLATION OF RIGID STEEL CONDUIT AND EMT ARE NOT FEASIBLE, WHERE FLEX IS INSTALLED IN RUNS OVER FOUR (4') FEET IN LENGTH IT SHALL BE TIGHT WITH A MINIMUM OF SLACK AND SHALL BE SUPPORTED AS DIRECTED BY THE ENGINEER.

DRAWINGS SHOWING ELECTRICAL WORK ARE PARTLY DIAGRAMMATIC AND ARE NOT INTENDED TO SHOW IN DETAIL ALL FEATURES OF WORK. NO EXTRA PAYMENT WILL BE ALLOWED WHERE OBSTRUCTIONS IN WORK OF OTHER TRADES OR WORK UNDER THIS SECTION REQUIRE OFFSETS, ETC. TAKE MEASUREMENTS AND DO FITTING ON JOB. CHECK LOCATION OF ELECTRICAL WORK TO DETERMINE IN ADVANCE THAT IT CLEARS ALL OPENINGS AND STRUCTURAL MEMBERS, THAT EQUIPMENT WILL BE PROPERLY CONCEALED AND THAT EQUIPMENT CLEARS ALL OTHER CABINETS, FIXED EQUIPMENT, WIN- DOWS, DOOR OPENINGS, ETC.

ANY ITEMS NOT MENTIONED IN THESE SPECIFICATIONS OR NOT INDICATED ON DRAWINGS BUT ARE NECESSARY FOR SUCCESSFUL AND EFFICIENT OPERATION OF THE WORK, SHALL BE HELD TO BE IMPLIED AND SHALL BE FURNISHED AND INSTALLED AS PART OF THIS CONTRACT AT NO ADDITIONAL COST. EQUIPMENT AND MATERIAL CHANGES IN LOCATION NOT OVER (10) TEN FEET IN ANY DIRECTION SHALL BE MADE AT NO ADDITIONAL COST.

SHOP DRAWINGS: SUBMIT WITHIN (30) THIRTY CALENDAR DAYS, (6) SIX SETS OF COMPLETE SHOP DRAWINGS, BROCHURES, SPECIFICATIONS, LITERATURE, PERFORMANCE DATA, DIMENSIONS (MAKING ALL MARKINGS WITH INK IN COLOR OTHER THAN RED), FOR ALL MATERIALS AND EQUIPMENT TO BE USED ON THIS PROJECT.

PRIOR TO SUBMITTING ANY OF THE ABOVE SHOP DRAWINGS, ETC., DATA, THE CONTRACTOR SHALL CAREFULLY VERIFY THAT ALL MATERIALS, EQUIPMENT PROPOSED FOR THIS PROJECT WILL MEET SPACE REQUIREMENTS, HAS PROPER ELECTRICAL RATINGS FITS INTO SPACE PROVIDED AND COMPLIES WITH THE CONTRACT DOCUMENTS.

THE ELECTRICAL CONTRACTOR SHALL FULLY GUARANTEE THE ENTIRE ELECTRICAL INSTALLATION AND ALL WORK UNDER THIS SECTION FOR A PERIOD OF TWO YEARS FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER AGAINST ALL EVIDENCE OF IMPERFECT WORKMANSHIP, FAILURE OR MALFUNCTION OF MATERIALS AND EQUIPMENT FURNISHED BY CONTRACTOR. WORK FOUND TO BE DEFECTIVE WITHIN THIS PERIOD, SHALL BE REPLACED PROMPTLY WITHOUT COST.

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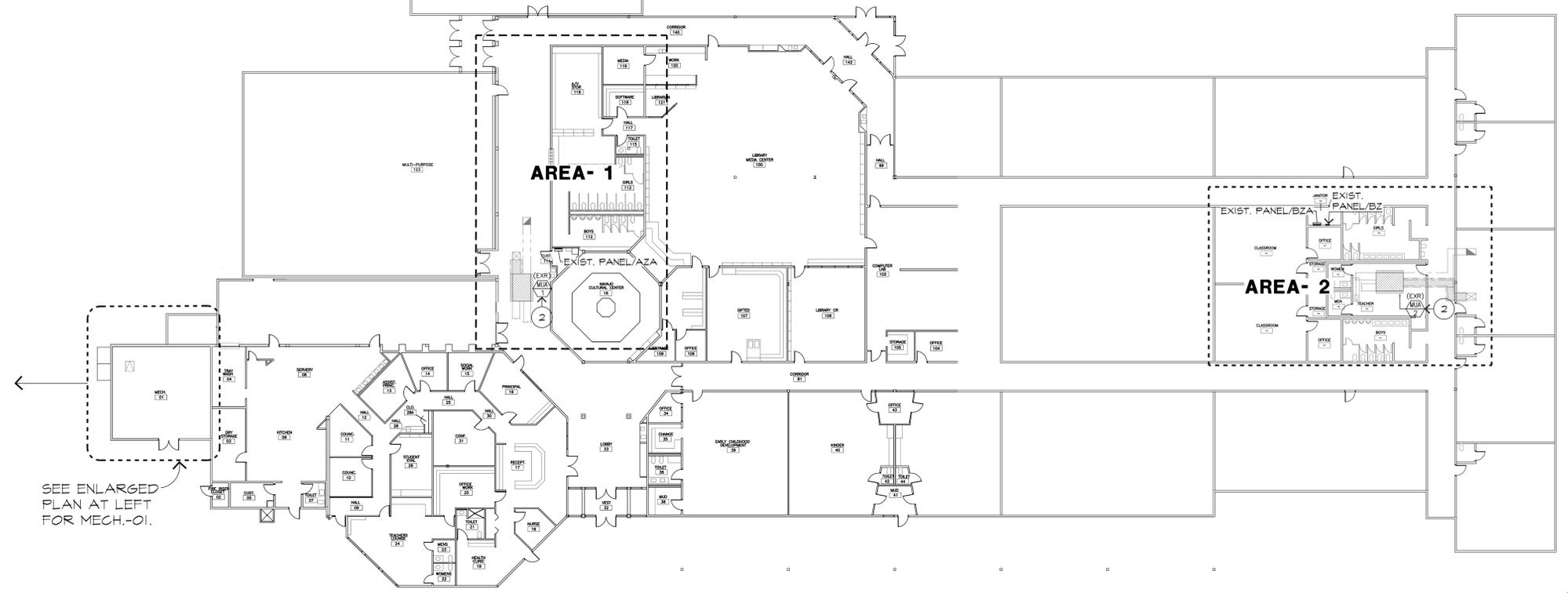
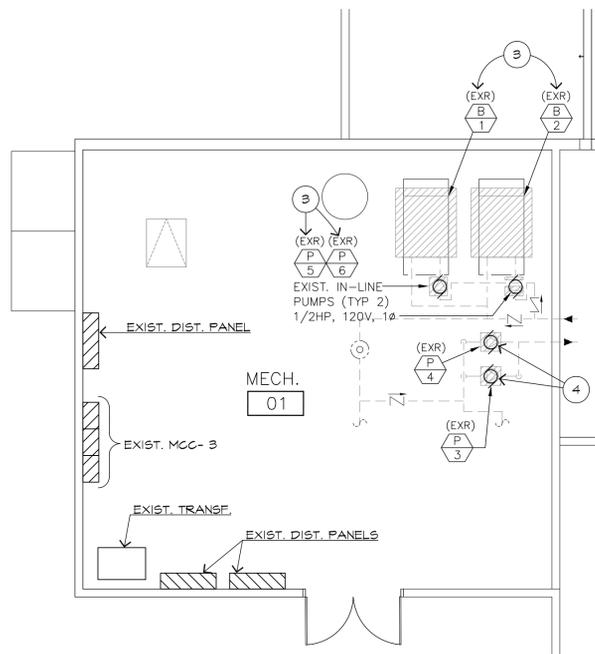
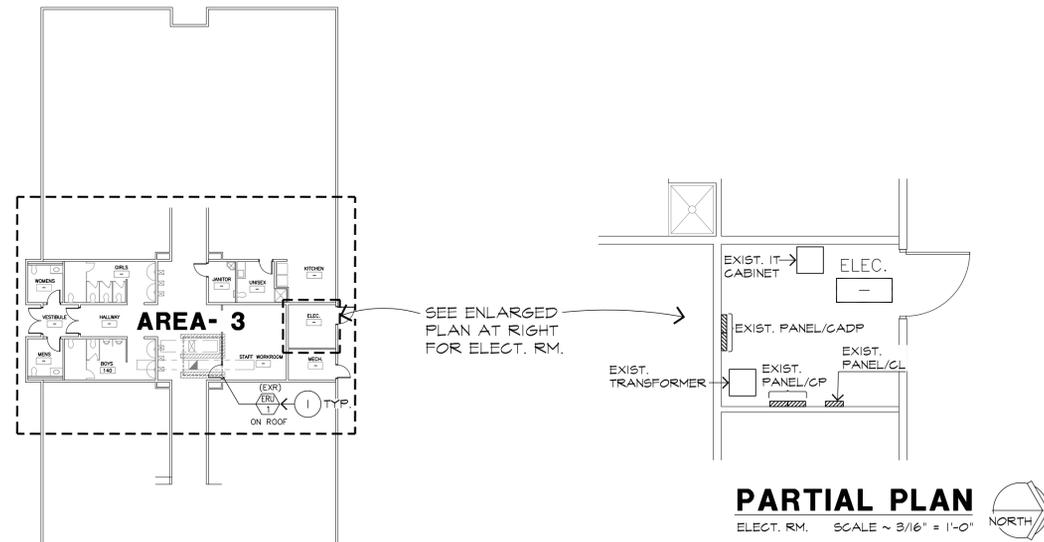
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**ELECTRICAL KEYNOTES** #

1. (EXR) INDICATES EXIST. ENERGY REG. UNIT TO BE DISCONNECTED, REMOVED & REPLACED W/ NEW MAKE-UP AIR & UNIT (SEE NEW WORK PLAN E300). REMOVE ALL EXISTING CONDUCTORS TO PANEL LOCATION & REPLACE W/ NEW (SEE E300).
2. (EXR) INDICATES EXIST. MAKE UP AIR UNITS BEING DISCONNECTED & REMOVED, INCLUDING ALL DISC. SWITCHES. FIELD VERIFY EXIST. SOURCE LOCATION & LEAVE EXIST. C/B'S IN PANEL AS SPARES. TURN TO 'OFF' POSITION & LABEL ALL PANEL SCHEDULES TO NOTE SPARES. PROVIDE & INSTALL NEW C/B'S SHOWN ON E400. REMOVE EXISTING CONDUCTORS TO PANEL & REPLACE W/ NEW (SEE E300).
3. EXIST. BOILERS & PUMPS P5 & P6 BEING REMOVED & REPLACED W/ NEW (SEE E300). EXIST. 120V CIRCUITS & FEEDERS TO PUMPS TO BE CAPTURED FOR REUSE.
4. (EXR) INDICATES EXIST. PUMPS P4 & P5 (10HP & 15HP) TO BE REMOVED & REPLACED W/ NEW (SEE SHEET E300). CAPTURE EXIST. FEEDERS/ CONDUIT TO MCC-3 LOCATION FOR REUSE & RECONNECTION.



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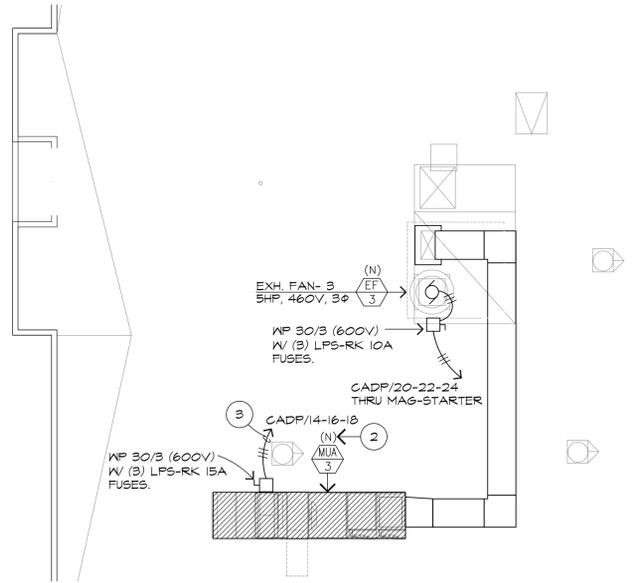
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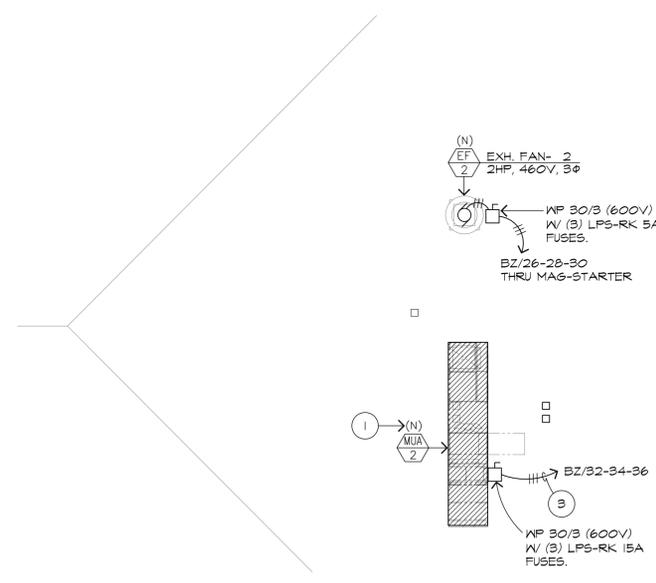
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**ELECTRICAL KEYNOTES**

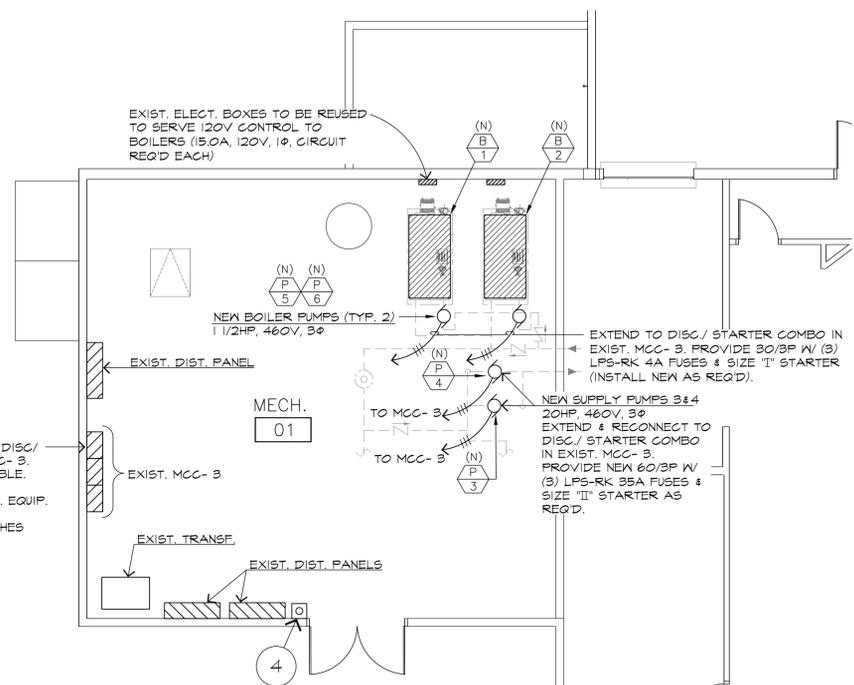
- (N) INDICATES NEW MAKE-UP AIR UNITS #1&2 (2HP, 460V, 3Ø). PROVIDE & INSTALL NEW 600V WP, HD, DISC. SWITCHES W/ (3) LPS-RK 15A FUSES (SIZED PER NAMEPLATE RATINGS). PROVIDE & INSTALL ALL NEW ROOF JACKS, UNISTRUT RACKS FOR MOUNTING OF DISC. SWITCHES (DO NOT MOUNT TO EQUIPMENT). INSTALL NEW BRANCH WIRING IN WP FLEX CONDUIT AND CONNECT TO C/B'S IN EXISTING PANELS (SEE SCHEDULES ON E400). NEW MAKE-UP AIR UNITS (SEE DETAIL ON E100).
- (N) INDICATES NEW MAKE-UP AIR UNITS #3 (5HP, 460V, 3Ø). PROVIDE & INSTALL NEW 600V WP, HD, DISC. SWITCHES W/ (3) LPS-RK 15A FUSES (SIZED PER NAMEPLATE RATINGS). PROVIDE & INSTALL ALL NEW ROOF JACKS, UNISTRUT RACKS FOR MOUNTING OF DISC. SWITCHES (DO NOT MOUNT TO EQUIPMENT. SEE DETAIL, ON E100). INSTALL NEW BRANCH WIRING IN WP FLEX CONDUIT AND CONNECT TO C/B'S IN EXISTING PANELS (SEE SCHEDULES ON E400).
- EXTEND 3#12 & 1#12 (BOND) - 3/4" C. & CONNECT TO NEW C/B'S IN EXISTING PANEL. (SEE SCHEDULES ON E400).
- MANUALLY OPERATED, TAMPER-PROOF REMOTE SHUTDOWN SWITCH NEAR ENTRY DOOR. CLEARLY MARK SWITCH WITH I RED PHENOLIC LETTERING STATING "EMERGENCY SHUTDOWN FOR GAS EQUIPMENT." ACTIVATION OF THE SWITCH SHALL IMMEDIATELY SHUTDOWN THE SUPPLY OF FUEL TO COMBUSTION UNITS, INTERLOCK WATER HEATERS, UNIT HEATER & GAS BOILERS LOCATED IN MECH. ROOM-01. PROVIDE 20A, 5-POLE CONTACTOR AS REQUIRED TO EXTEND ALL CONTROL & FAN CIRCUITS TO EQUIPMENT NOTED FOR EMERGENCY SHUTDOWN.



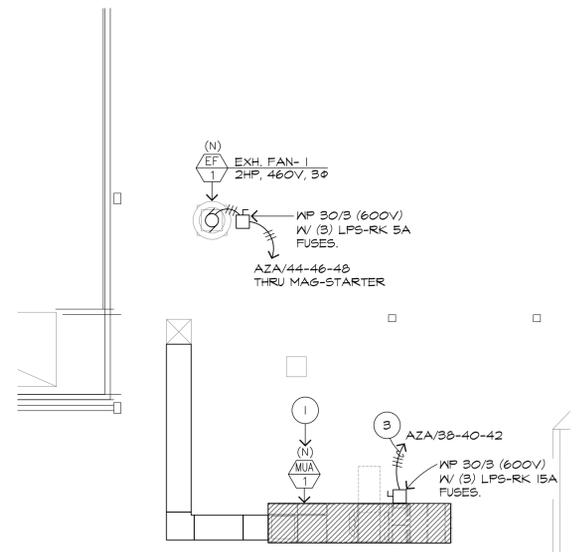
**ELECTRICAL ROOF PLAN**  
 AREA - 3  
 SCALE ~ 1/8" = 1'-0" NORTH



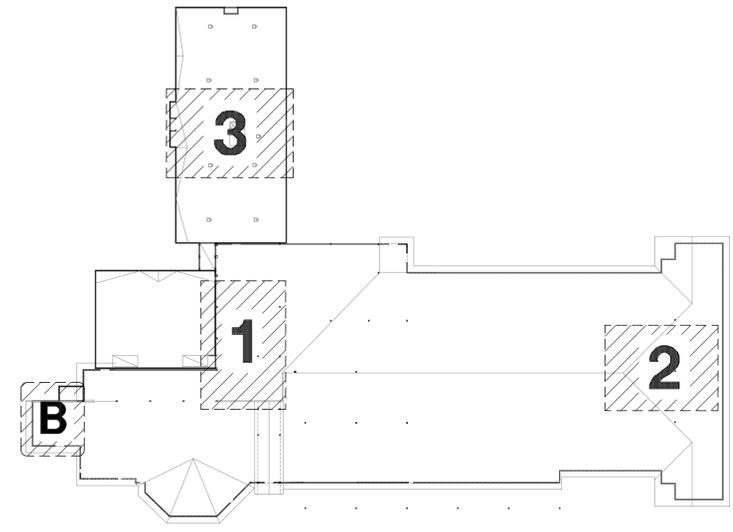
**ELECTRICAL ROOF PLAN**  
 AREA - 2  
 SCALE ~ 1/8" = 1'-0" NORTH



**ENLARGED PARTIAL PLAN - NEW**  
 AREA-B  
 SCALE ~ 3/16" = 1'-0" NORTH



**ELECTRICAL ROOF PLAN**  
 AREA - 1  
 SCALE ~ 1/8" = 1'-0" NORTH



**VICINITY MAP**  
 N.T.S. NORTH

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REV#	DATE	DESCRIPTION

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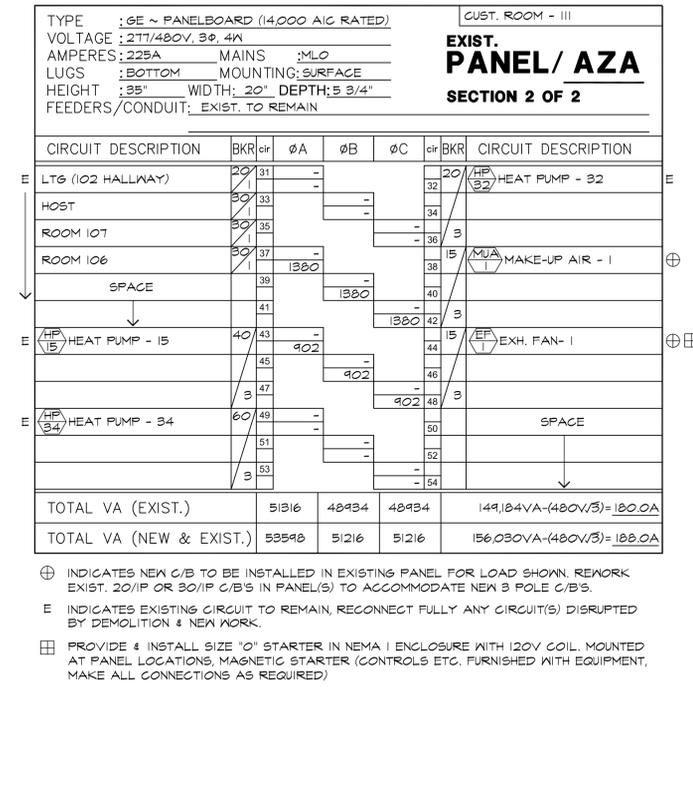
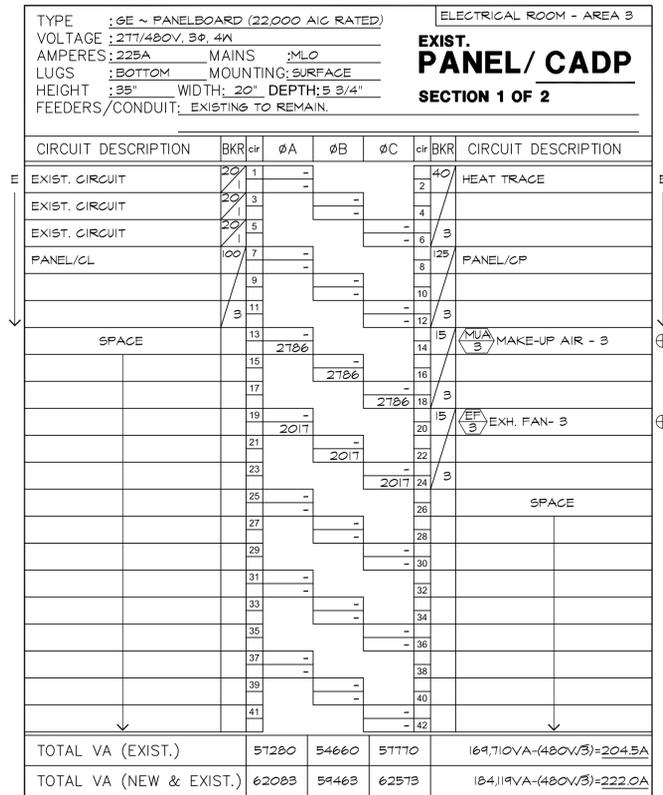
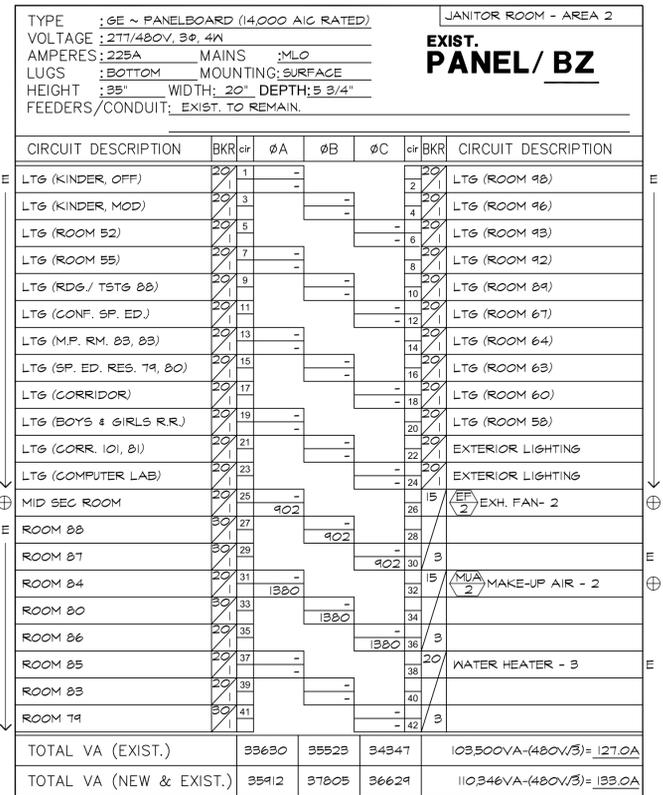
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SHEET:

**E300**

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- ⊕ INDICATES NEW C/B TO BE INSTALLED IN EXISTING PANEL FOR LOAD SHOWN. REWORK EXIST. 20/1P OR 30/1P C/B'S IN PANEL(S) TO ACCOMMODATE NEW 3 POLE C/B'S.
- E INDICATES EXISTING CIRCUIT TO REMAIN, RECONNECT FULLY ANY CIRCUIT(S) DISRUPTED BY DEMOLITION & NEW WORK.
- ⊞ PROVIDE & INSTALL SIZE "0" STARTER IN NEMA 1 ENCLOSURE WITH 120V COIL. MOUNTED AT PANEL LOCATIONS, MAGNETIC STARTER (CONTROLS ETC. FURNISHED WITH EQUIPMENT, MAKE ALL CONNECTIONS AS REQUIRED)

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