NOTE: THIS IS A STANDARD LEGEND, SOME OF THE SYMBOLS SHOWN ON LEGEND ARE NOT NECESSARILY ON THE DRAWINGS

SPECIFICATIONS

GENERAL REQUIREMENTS

- THE PROJECT DRAWINGS AND SPECIFICATIONS DESCRIBE THE SCOPE OF WORK TO REMODEL THE EXISTING CENTRAL HVAC SYSTEM TO SUPPORT THE TENANT IMPROVEMENT FOR THE WEIDNER CLASSROOM REMODEL
- DRAWING INFORMATION IS BASED UPON AVAILABLE OWNER DRAWINGS AND LIMITED FIELD VERIFICATION. DRAWING INFORMATION DOES NOT REPRESENT EXACT AS-BUILT CONDITIONS. FIELD VERIFY EXISTING SYSTEM AND BUILDING INFORMATION INCLUDING EXISTING EQUIPMENT LOCATIONS, PIPE AND DUCTWORK ROUTING, ZONE CONTROL THERMOSTAT AND OTHER EXISTING APPURTENANCES PRIOR TO START OF WORK.

SUMMARY OF WORK

- DEMOLISH EXISTING HRAD/FLEX DUCTWORK, AIR OUTLETS AND HYDRONIC PIPING AS
- SHOWN. REMOVE AND REFURBISH TWO EXISTING VAV TERMINAL UNITS FOR REUSE. PROVIDE NEW MEDIUM (1 INCH INSULATED) AND LOW PRESSURE DUCTWORK AS SHOWN. PROVIDE FRAMED PARTITION WALL OPENS FOR NEW DUCTWORK PENETRATIONS. SEAL
- NEW PARTITION WALL RATINGS. INSTALL NEW FIRE DAMPERS IN ACCORDANCE WITH DETAIL SHOWN AND APPLICABLE UL
- REINSTALL REFURBISHED VAV TERMINAL UNITS AS SHOWN WITH CLEAR ACCESS TO TERMINAL EQUIPMENT CONTROLLERS, RECOIL ACCESS DOORS AND HYDRONIC HEATING PIPING VALVES AND APPURTENANCES.
- PROVIDE NEW AIR OUTLETS, BRANCH HRAD/FLEX DUCTWORK AND VOLUME DAMPERS AS PROVIDE PROPER HANGAR SUPPORT FOR SUSPENDED DUCTWORK AND PIPING SYSTEMS.
- MODIFY EXISTING CORRIDOR SUPPLY AIR OUTLET TO ACCOMMODATE NEW CURVED GYPSUM CEILING SOFFIT OR REPLACE NEW WITH SIMILAR AIR OUTLET/SUPPLY PLENUM. RECONNECT HYDRONIC HEATING PIPING WITH NEW VALVES AND APPURTENANCES TO
- REFURBISHED VAV TERMINAL UNIT REHEAT COILS AS DETAILED. 10. RECONNECT EXISTING THERMOSTAT WIRING TO EXISTING VAV TERMINAL EQUIPMENT
- CONTROLLERS/REHEAT COIL CONTROL VALVES.
- FILL, TEST, ADJUST AND BALANCE HYDRONIC HEATING SYSTEM BRANCH PIPING.
- 12. TEST, ADJUST AND BALANCE ZONE VAV TERMINAL UNITS AND ASSOCIATED AIR OUTLETS TO AIR FLOWS AS SHOWN/SCHEDULED.
- 13. OPERATIONALLY TEST ZONE THEROMSTATS/CONTROLS FOR PROPER HVAC ZONE

CODES AND STANDARDS

- COMPLY WITH CURRENT APPLICABLE LOCAL, STATE, AND NATIONAL CODES, ORDINANCES, AND REGULATIONS, INCLUDING IBC, IMC IFC, UPC AND NEC.
- ADHERE TO ANSI 117.1 STANDARD FOR ACCESSIBLE AND USABLE BUILDINGS AND
- FOLLOW THE RECOMMENDED PRACTICES OF ASHRAE, ASME, SMACNA, NFPA, AND OSHA, AS THEY APPLY TO THIS PROJECT, EXCEPT IN CASES WHERE STATUTES GOVERN.

PERMITTING AND INSPECTIONS

- CONSTRUCTION PERMIT SHALL BE OBTAINED BY THE OWNER. PERMIT WILL INCLUDE A ROUGH IN AND A FINAL INSPECTION. ADDITIONAL INSPECTIONS REQUIRED WILL BE THE RESPONSIBILITY OF THE CONTRACTOR
- OBTAIN AND PAY FOR OTHER LICENSES AND INSPECTIONS REQUIRED BY APPLICABLE LAWS, ORDINANCES AND RULES GOVERNING THE WORK. ARRANGE FOR INSPECTIONS OF WORK BY AUTHORITY HAVING JURISDICTION AS REQUIRED
- COMPLY WITH FEDERAL, STATE AND LOCAL REGULATIONS FOR DISPOSAL OF DEMOLISHED EQUIPMENT, SHIPPING MATERIALS AND OTHER CONSTRUCTION DEBRIS.

<u>SUBMITTALS</u>

PRODUCTS

- A. SCHEDULED AND SPECIFIED HEREIN ARE THE BASIS OF DESIGN. ALTERNATE PRODUCTS OF EQUAL QUALITY AND PERFORMANCE MAY BE SUBMITTED FOR
- B. SUBMIT PHYSICAL AND PERFORMANCE DATA FOR EACH PRODUCT TO DEMONSTRATE COMPLIANCE WITH THE CONTRACT. OBTAIN OWNER'S APPROVAL OF SUBMITTED PRODUCTS PRIOR TO ORDERING.

CONSTRUCTION SCHEDULE

- A. SUBMIT CONSTRUCTION SCHEDULE WHICH OUTLINES EACH MILESTONE OF PROJECT ONSTRUCTION. INCLUDE PROCUREMENT, DEMOLITION, INSTALLATION, TA SUBSTANTIAL COMPLETION, FINAL COMPLETION AND ONE YEAR WARRANTY PERIOD.
- B. SCHEDULE CONSTRUCTION TO LIMIT IMPACT ON CLIENT OPERATIONS.
- CLOSEOUT SUBMITTALS
- A. SUBMIT COPY OF APPROVED SUBMITTALS, NEATLY ANNOTATED INSTALLATION, OPERATION AND MAINTENANCE MANUALS FOR APPROVED PRODUCTS. INCLUDE LOCAL MANUFACTURERS REPRESENTATIVE CONTACT INFORMATION AND SPARE PARTS
- B. SUBMIT SYSTEM PRESSURE TEST REPORT.
- C. SUBMIT FINAL TAB REPORT.
- D. SUBMIT CONTROL SYSTEM FINAL SET POINT ADJUSTMENT DOCUMENTATION.

PROVIDE ONE YEAR CONTRACTORS WARRANTY.

- FABRICATE, INSTALL AND SUPPORT GALVANIZED STEEL DUCTWORK PER SMACNA HVAC DUCT CONSTRUCTION STANDARDS — METAL AND FLEXIBLE.
- FOR POSSIBLE VAV TERMINAL UNIT UPGRADE).
- 3. LOW PRESSURE: +/- 2 IN WC, DOWN STREAM OF TERMINAL UNITS.
- 4. DUCT FITTINGS: LOW LOSS TYPE.
- 5. FLEX DUCT: UL LISTED, CLASS 1 FLEXIBLE AIR DUCT.
- DIMENSIONS SHOWN ARE AIR PATH DIMENSIONS. ADD THICKNESS OF LINING TO DETERMINE OUTSIDE DUCT DIMENSIONS AS APPLICABLE.
- SEAL SUPPLY AIR DUCTS AT JOINTS AND TRANSVERSE SEAMS WITH WATER SOLUBLE SEALING SYSTEM. HARDCAST OR EQUAL. USE OF DUCT TAPE AS DUCT SEALANT IS NOT PERMITTED.
- B. SIZE BRANCH DUCTS TO INDIVIDUAL DIFFUSERS SAME DIAMETER AS DIFFUSER CONNECTION COLLAR.
- . PROVIDE VOLUME DAMPERS AT EACH BRANCH AS SHOWN AND AS REQUIRED FOR BALANCING.
- 10. PROVIDE ACOUSTICAL LININGS AS SHOWN. ONE INCH THICK, 1.5 PCF, FLEXIBLE, EDGE-COATED, MAT-FACED GLASS FIBER INSULATION BONDED WITH THERMOSETTING RESIN THAT DOES NOT PROMOTE FUNGI/ BACTERIA GROWTH. PROVIDE ACOUSTICALLY LINED BAFFLE PLATES INSIDE RETURN AIR ELBOWS TO LIMIT MAXIMUM OPEN DIMENSION TO 30 INCHES.
- 11. PROVIDE GRILLES, REGISTERS, AND DIFFUSERS AS SCHEDULED AT THE LOCATIONS SHOWN WITHIN THE CEILING GRID.

HYDRONIC HEATING AND DOMESTIC WATER PIPING

- . TYPE L COPPER PIPING, SOLDER TYPE WROUGHT COPPER FITTINGS. FIT SOLDER
- JOINTS USING LEAD-FREE SOLDER WITH WATER SOLUBLE FLUX.
- PROVIDE FULL PORT QUARTER TURN BALL ISOLATION VALVES WITH TEFLON SEATS. HYDROSTATICALLY TEST AT 100 PSIG FOR 4 HOURS.
- . ARRANGE PIPING TO ALLOW FOR NORMAL THERMAL EXPANSION AND CONTRACTION.
- SEE INSULATION REQUIREMENTS.

- 1. BALL VALVES: TWO-PIECE FORGED BRASS BODY. EXTRUDED BRASS STEM. HARD CHROME PLATED BRASS BALL, 100 PERCENT FULL PORT, 150 PSI WSP.
- 2. LOW POINT DRAIN VALVES: HOSE END BALL VALVE WITH HOSE CONNECTION AND CAP. **PENETRATIONS**
- PROVIDE UL LISTED FIRE STOP SEALANT SYSTEMS FOR PENETRATION THROUGH FIRE RATED CONSTRUCTION.
- PROVIDE PIPE HANGERS AND EQUIPMENT SUPPORTS IN ACCORDANCE WITH IMC REQUIREMENTS AND MANUFACTURER'S SUGGESTED INSTALLATION INSTRUCTIONS.
- 2. INDEPENDENTLY SUPPORT PIPING AND DUCTWORK NEAR EQUIPMENT CONNECTION, SUCH THAT THE EQUIPMENT SUPPORTS NO WEIGHT.
- 3. PROVIDE INSULATED PIPING HANGERS WITH GALVANIZED STEEL INSULATION SHIELDS. 4. PLACE HANGERS WITHIN 12 INCHES OF EACH HORIZONTAL ELBOW. USE HANGERS WITH

HANGER SUPPORT

- 1. PIPE INSULATION: PROVIDE 0.5-INCH-THICK INSULATION FOR PIPES SIZES UP TO 1 INCH IN DIAMETER AND 1 INCH THICK INSULATION FOR LARGER PIPE SIZES. INSULATE NEW AND REWORKED HYDRONIC HEATING PIPING WITH 1 INCH THICK INSULATION. 2. DUCT INSULATION: INSULATE NEW AND REWORKED SUPPLY AIR DUCTWORK WITH 1-1/2
- INCH THICK INSULATION. INSULATION PERFORMANCE REQUIREMENTS:

1-1/2 INCH MINIMUM VERTICAL ADJUSTMENT

- A. PLENUM RATED. FLAME SPREAD 25, FUEL CONTRIBUTED 50, SMOKE DEVELOPED
- B. THERMAL CONDUCTIVITY K EQUAL TO 0.24 AT 100 DEGREES F. MEAN TEMPERATURE.
- C. FACTORY APPLIED COMPLETE VAPOR BARRIER, FLAME RETARDANT, ALL-SERVICE JACKET AND TAPE WITH PERMEABILITY RATING EQUAL TO 0.02 PERMS. USE APPROVED VAPOR BARRIER ADHESIVES. STAPLING OF JACKET NOT PERMITTED
- D. PREFORMED FITTING COVERS WITH ONE PIECE MOLDED PVC JACKETING AND FITTING
- COVERS SPECIFICALLY DESIGNED FOR SERVICE INTENDED. PROVIDE SADDLES AT PIPE HANGERS INSTALLED OUTSIDE INSULATION JACKET.

LABEL PIPES WITH CONTENTS AND DIRECTION OF FLOW AT MAXIMUM OF 20 FEET ON CENTER. USE PREMANUFACTURED LABELS.

2. DEMOLITION WORK TO INCLUDE REMOVAL AND DISPOSAL OFFSITE OF EXISTING HVAC

DEMOLITION

- EQUIPMENT, DUCTWORK, PIPING AND CONTROLS WHICH ARE NOT TO BE REUSED. 3. REMOVE OTHER EXISTING ABANDONED IN PLACE PIPES, DUCTS, EQUIPMENT AND CONTROLS DISCOVERED DURING CONSTRUCTION WITH THE NEW CLASSROOM ABOVE CEILING AREA.
- REMOVE EXISTING OLD BRACKETS, STEMS, HANGERS, CONDUIT, CONDUCTORS, DEVICES,
- AND OTHER ACCESSORIES TO PROVIDE A CLEAN INSTALLATION. REMOVE ABANDONED CONTROLS AND ASSOCIATED WIRING AND CONDUIT TO SOURCE OF
- RELOCATE AND/OR PROVIDE TEMPORARY SUPPORT FOR EXISTING EQUIPMENT EFFECTED BY THE NEW WORK. REINSTALL EXISTING EQUIPMENT AS NECESSARY TO MAINTAIN LISTING, SERVICEABILITY, AND FUNCTION. VERIFY THAT EXISTING DISRUPTED EQUIPMENT AND SYSTEMS ARE PROPERLY REINSTALLED AND OPERATIONAL UPON COMPLETION OF

<u>INSTALLATION</u>

SIGNAL AND SUPPLY.

- 1. FIELD COORDINATE EXACT LOCATIONS OF NEW EQUIPMENT, DUCTS, PIPES, AND CONTROLS WITH EXISTING SYSTEMS, STRUCTURAL ELEMENTS, AND ARCHITECTURAL REQUIREMENTS
- FURNISH AND INSTALL PRODUCTS IN ACCORDANCE WITH APPLICABLE CODES. LISTINGS. AND MANUFACTURERS WRITTEN INSTALLATION AND TESTING INSTRUCTIONS. PRODUCTS SHALL BE ASBESTOS FREE. PRODUCTS SHALL BE LISTED FOR THE INTENDED SERVICE: IAPMO, FM, UL, OR OTHER NATIONALLY RECOGNIZED TESTING LAB.
- PRODUCTS SHALL BE NEW, UNUSED, AND UNDAMAGED, OF STANDARD MANUFACTURE, OF LATEST DESIGN AND QUALITY, AND SUITABLE FOR THE PARTICULAR INSTALLATION.
- 4. COORDINATE WITH WORK WITH THAT OF OTHER TRADES TO ALLOW CONSTRUCTION TO PROCEED IN AN EFFICIENT MANNER.
- 5. IMMEDIATELY NOTIFY THE OWNER IN WRITING SHOULD CONTRACT DOCUMENT
- CLARIFICATION BE REQUIRED.
- 6. PROVIDE CLEAR ACCESS TO SERVICEABLE AND OPERABLE EQUIPMENT. UPON COMPLETION OF INSTALLATION, WIPE DOWN AND CLEAN HVAC SYSTEMS AND EFFECTED SPACES AND SURFACES OF ALL CONSTRUCTION DEBRIS. CLEAN VAV REHEAT

TESTING, ADJUSTING AND BALANCING (TAB)

- 1. TEST, ADJUST AND BALANCE (TAB) HVAC SYSTEM SHALL BE PERFORMED BY A NEBB CERTIFIED TAB AGENCY.
- 2. SCOPE OF WORK INCLUDES TESTING, ADJUSTING AND BALANCING HVAC SYSTEM: A. DUCT MOUNTED REHEAT COIL FLOW (GPM).
- B. AIR SUPPLY OUTLET FLOW (CFM).
- 3. PERFORM WORK IN ACCORDANCE WITH THE NEBB RECOMMENDED PROCEDURES AND AS SHOWN. BALANCE AIR AND LIQUID SYSTEM FLOW RATES TO WITHIN $\pm 1/2$ 5% OF DESIGN FLOW RATES. COORDINATE TAB PLAN, INCLUDING PHASING, TESTING, AND SCHEDULING WITH OWNER AND ENGINEER.
- 4. PRIOR TO START OF TAB, VERIFY EQUIPMENT AND SYSTEMS ARE FULLY INSTALLED, OPERATIONAL AND READY FOR TAB SERVICES.
- 5. CORRECT HVAC SYSTEM PERFORMANCE DEFICIENCIES DISCLOSED BY INITIAL OPERATIONAL TESTING PRIOR TO FINAL BALANCING.
- 6. ADJUST AIR OUTLET DEFLECTORS FOR PROPER AIR DIFFUSION PATTERNS PRIOR TO TAB. 7. SET AND PERMANENTLY MARK VALVE, DAMPER AND OTHER ADJUSTABLE DEVICE POSITIONS SUCH THAT THE FINAL ADJUSTMENT POSITION CAN BE EASILY RESTORED IF MODIFIED FOR MAINTENANCE AND TROUBLESHOOTING.
- 8. SUBMIT TAB REPORT WHICH CLEARLY DOCUMENTS EACH VAV TERMINAL UNIT, ITS DESIGN FLOW RATE AND ITS ACTUAL FINAL BALANCED FLOWRATE. TAB REPORT SHALL BE REVIEWED AND APPROVED BY THE ENGINEER OF RECORD PRIOR TO ACCEPTANCE OF THE PROJECTS HVAC SYSTEMS.

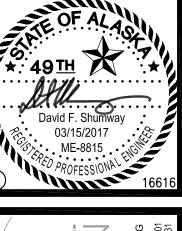
OPERATIONAL TESTING

UPON COMPLETION OF INSTALLATION AND TAB, CONDUCT A COMPLETE OPERATIONAL TEST OF EACH SYSTEM TO DEMONSTRATE PROPER OPERATION OF CONTROLS, INDICATIONS AND ALARMS ASSOCIATED WITH THE SYSTEMS. PERFORM THE OPERATIONAL TESTS IN THE PRESENCE OF THE OWNER.

CONTROLS SEQUENCE OF OPERATION

- 1. TYPICAL ZONE VAV TEMPERATURE CONTROL WITH REHEAT:
- A. REUSE EXISTING WALL-MOUNTED ZONE THERMOSTAT WITH INPUT TO ZONE VAV TERMINAL EQUIPMENT CONTROLLER.
- B. COOLING MODE: MODULATE THE VAV TERMINAL UNIT CONTROL DAMPER BETWEEN MINIMUM CFM AND MAXIMUM COOLING CFM TO MAINTAIN ZONE DAY SET POINT TEMPERATURE PLUS OR MINUS ONE (1)—DEGREE F. REHEAT COIL CONTROL VALVES REMAIN SHUT.
- C. HEATING MODE: MODULATE THE VAV TERMINAL UNIT CONTROL DAMPER BETWEEN MINIMUM CFM AND MAXIMUM HEATING CFM TO MAINTAIN ZONE DAY SET POINT TEMPERATURE PLUS OR MINUS ONE (1)-DEGREE F. MODULATE VAV REHEAT COIL CONTROL VALVE IN PARALLEL WITH CONTROL DAMPER.

49TH David F. Shumway 03/15/2017 ME-8815 166







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Construction Documents 21611.01 LEGEND & SPECIFICATIONS

SHEET NO: