- 16.2 WHERE DISCONNECT SWITCHES ARE NOT FACTORY INSTALLED, THEY ARE TO BE UNIT MOUNTED OR WALL MOUNTED BY THE MECHANICAL CONTRACTOR. LOCATIONS FOR DISCONNECT SWITCHES AND OTHER CONTROL DEVICES MAY NOT BE INDICATED ON THE PLANS. COORDINATE LOCATIONS WITH THE OWNER AND ELECTRICAL SUB-CONTRACTOR.
- 16.3 THE MECHANICAL CONTRACTOR IS TO WALL (OR UNIT) MOUNT DISCONNECT SWITCHES, START-STOP SWITCHES, ETC., IN THE CLOSE VICINITY OF THE EQUIPMENT BEING CONTROLLED. THE ELECTRICAL CONTRACTOR IS TO POWER WIRE TO (AND THROUGH WHERE REQUIRED) THESE DEVICES AND IS TO FINAL CONNECT POWER WIRING TO ELECTRICALLY OPERATED EQUIPMENT BEING INSTALLED BY THE MECHANICAL CONTRACTOR. THE MECHANICAL CONTRACTOR IS TO FURNISH SHOP DRAWINGS OF APPROVED ELECTRICALLY OPERATED EQUIPMENT TO THE ELECTRICAL SUB-CONTRACTOR FOR HIS USE. ANY CHANGES REQUIRED TO ACCOMMODATE APPROVED SUBSTITUTE EQUIPMENT SUCH AS LARGER WIRE, CONDUIT, BREAKERS, ETC., ARE TO BE THE FINANCIAL RESPONSIBILITY OF THE MECHANICAL CONTRACTOR.
- 16.4 TEMPERATURE CONTROL COMPONENT SUCH AS THERMOSTATS, SENSORS, INTERLOCKING RELAYS, AND OTHER TEMPERATURE REGULATING CONTROLS AS WELL AS CONTROL WIRING, INCIDENTAL POWER WIRING, CONDUIT, ETC., AS REQUIRED BY THIS SPECIFICATION, ARE TO BE FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR (OR HIS/HER ATC SUB-CONTRACTOR).
- 16.5 ELECTRICAL EQUIPMENT, COMPONENTS AND WIRING FURNISHED AND INSTALLED BY THE MECHANICAL CONTRACTOR ARE TO CONFORM TO THE FOLLOWING ELECTRICAL REQUIREMENTS, CODES AND REGULATIONS:
- A. UNDERWRITER'S LABELS: WHERE APPLICABLE, MATERIALS AND EQUIPMENT ARE TO BEAR THE LABEL AS LISTED BY THE NATIONAL BOARD OF FIRE UNDERWRITER'S LABORATORY.
- B. REGULATIONS: ELECTRICAL INSTALLATION IS TO MEET THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE OF NATIONAL BOARD OF FIRE UNDERWRITERS AMENDED TO DATE. IN ADDITION, ANY STATE, MUNICIPAL OR OTHER AUTHORITY'S LAWS, REGULATIONS OR RULES APPLICABLE TO THE WORK ARE TO BE FOLLOWED.
- C. ANY CONTACTOR OR STARTER TO WHICH LINE VOLTAGE EXCEEDS 120 VOLTS AND WHICH IS PROVIDED FOR EQUIPMENT WHICH WILL BE CONTROLLED BY AUTOMATIC TEMPERATURE CONTROL SYSTEM IS TO BE PROVIDED WITH 120 VOLT CONTROL TRANSFORMER WIRED TO LINE SIDE OF CONTACTOR OR STARTER.

DIRT NOISE AND CLEAN UP

- 17.1 CONSTRUCT BARRIERS AROUND THE AREA OF CONSTRUCTION TO THE SATISFACTION OF THE OWNER TO PREVENT CONSTRUCTION DIRT AND DEBRIS FROM CONTAMINATING ADJACENT FINISHED, OCCUPIED, UNAFFECTED AREAS.
- 17.2 BARRIERS ARE TO CONSIST OF PLASTIC SHEETING OR OTHER BARRIER MATERIAL WITH ZIP OPEN ENTRYWAYS AND PLASTIC ADHESIVE CARPET PROTECTION AROUND EACH ENTRY/EXIT SO DIRT AND DEBRIS IS NOT TRACKED FROM THE CONSTRUCTION ZONE INTO THE UNAFFECTED AREAS. LIMIT ENTRY AND EXIT TO OPENINGS AS DIRECTED BY THE OWNER
- 17.3 THE CONTRACTOR IS TO DO CUTTING AND PATCHING IN A MANNER TO CAUSE THE LEAST DUST, DIRT AND NOISE.
- 17.4 THE CONTRACTOR IS TO KEEP THE BUILDING FREE OF RUBBISH AND MATERIAL DURING THE COURSE OF CONSTRUCTION INSOFAR AS HIS WORK IS CONCERNED.
- 17.5 THE EXTERIOR AND INTERIOR PREMISES OF THE BUILDING ARE TO BE KEPT AS CLEAN AS POSSIBLE DURING THE ENTIRE CONSTRUCTION. WEEKLY CLEAN-UP WILL BE MANDATORY.
- 17.6 WHEN, IN THE OPINION OF THE ENGINEER, ANY ACCUMULATION OF MATERIAL IS OBSTRUCTING CONSTRUCTION PROGRESS, THE CONTRACTOR IS TO IMMEDIATELY REMOVE SUCH MATERIAL.
- 17.7 UPON COMPLETION OF THE PROJECT, THE CONTRACTOR IS TO REMOVE RUBBISH, SURPLUS EQUIPMENT, ETC., AND HAVE EACH AREA CLEANED SPOTLESS TO A STANDARD AS APPROVED BY THE OWNER AND ENGINEER.
- 17.8 THE CONTRACTOR IS TO THOROUGHLY CLEAN EQUIPMENT, LEAVING SAME IN FIRST-CLASS WORKING CONDITION, CLEAN PERMANENT FILTERS AND INSTALL CLEAN, THROW-AWAY FILTERS INTO EACH PIECE OF EQUIPMENT.

INSPECTION

- 18.1 THE FOLLOWING OPERATIONS ARE TO BE PERFORMED IN PREPARATION FOR FINAL INSPECTION. THIS CONTRACTOR IS TO DEMONSTRATE TO THE OWNER AND THE ENGINEER THAT ALL NEW EQUIPMENT IS OPERATING IN COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS.
- 18.2 MACHINERY: MACHINERY IS TO BE INITIALLY SERVICED. MACHINERY IS TO BE TEST OPERATED AND NECESSARY ADJUSTMENTS MADE TO MAKE IT PERFORM IN COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS.
- 18.3 CONTROLS: ALL CONTROLS WILL BE TESTED AND ADJUSTED BY THE HVAC SUB-CONTRACTOR (OR HIS/HER AUTOMATIC TEMPERATURE CONTROL SUB-CONTRACTOR) TO ACHIEVE THE INTENT OF THESE SPECIFICATIONS. CONTROLS ARE TO BE ADJUSTED WHILE THE SYSTEM IS OPERATING UNDER FULL LOAD CONDITIONS.

GUARANTEE AND WARRANTIES

- 19.1 THE CONTRACTOR IS TO GUARANTEE FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE THAT MATERIAL AND WORKMANSHIP FURNISHED UNDER THE CONTRACT ARE FREE FROM DEFECTS. THE CONTRACTOR IS TO REPLACE ANY EQUIPMENT OR MATERIAL FOUND DEFECTIVE WITHIN THE GUARANTEE PERIOD AT NO COST TO THE OWNER.
- 19.2 THE CONTRACTOR IS TO ALSO, DURING THE ONE YEAR GUARANTEE PERIOD, BE RESPONSIBLE FOR THE PROPER ADJUSTMENTS OF SYSTEMS, EQUIPMENT AND APPARATUS INSTALLED BY HIM AND DO WORK NECESSARY TO INSURE EFFICIENT AND PROPER FUNCTIONING OF THE SYSTEM AND EQUIPMENT.
- 19.3 PROVIDE COPIES OF COMPLETED WARRANTY CARDS THAT ARE TO BE SENT BACK TO EQUIPMENT MANUFACTURES FOR ALL EQUIPMENT WITH EXTENDED WARRANTIES.

INSTRUCTIONS AND MAINTENANCE MANUALS

- 20.1 THE CONTRACTOR IS TO FURNISH THE SERVICES OF COMPETENT PERSONNEL TO INSTRUCT EMPLOYEES DESIGNATED BY THE OWNER IN THE PROPER OPERATION AND MAINTENANCE OF THE EQUIPMENT AND SYSTEMS INSTALLED UNDER THE CONTRACT. THE CONTRACTOR IS TO ALLOT A MINIMUM OF FOUR (4) HOURS BY THEIR PROJECT FOREMAN TO COMMISSION AND GIVE OWNER INSTRUCTIONS ON THIS PROJECT.
- 20.2 A LETTER OF CERTIFICATION ITEMIZING THE EQUIPMENT, SYSTEM, INSTRUCTOR AND BEARING SIGNATURES OF THE EMPLOYEES INSTRUCTED IS TO BE DELIVERED TO THE OWNER UPON COMPLETION OF THE PROJECT. THE LETTER OF CERTIFICATION IS TO NOTE THE

- NUMBER OF HOURS SPENT IN EXPLANATION AND ACTUAL OPERATION OF SYSTEM WITH MAINTENANCE PERSONNEL. (TEMPLATE COPY OF AN ACCEPTABLE LETTER FORMAT IS AVAILABLE UPON REQUEST).
- 20.3 THE CONTRACTOR IS TO FURNISH THE OWNER WITH TWO (2) COPIES OF A BOUND "MAINTENANCE MANUAL" CONTAINING COMPLETE OPERATING INSTRUCTIONS, MANUFACTURER'S CATALOG NUMBERS AND COMPLETE DESCRIPTION AND PARTS LIST OF EACH PIECE OF EQUIPMENT FURNISHED UNDER THE CONTRACT.

END OF SECTION

SECTION 23 31 00 - HVAC DUCTS AND CASINGS

PART 1 GENERAL

- 1.1 SECTION INCLUDES
- A. Metal ducts.
- B. Ducts for laboratory and industrial-grade applications.
- 1.2 REFERENCE STANDARDS
- A. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- B. ASTM B209/B209M Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- C. NFPA 90A Standard for the Installation of Air-Conditioning and Ventilating Systems; 2021.
- D. NFPA 90B Standard for the Installation of Warm Air Heating and Air-Conditioning Systems; 2021.
- E. NFPA 91 Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids; 2020.
- F. SMACNA (DCS) HVAC Duct Construction Standards Metal and Flexible; 2021.
- G. SMACNA (ROUND) Round Industrial Duct Construction Standards; 2013.
- H. UL 2518 Standard for Safety Air Dispersion Systems; Current Edition, Including All Revisions.

1.3 SUBMITTALS

- A. See Section 01 30 00 Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fitting types, gauges, sizes, welds, and layout/configuration with dimensions.

PART 2 PRODUCTS

- 2.1 GENERAL REQUIREMENTS
- A. Duct Shape and Material in accordance with Allowed Static Pressure Range:
- 1. Round exhaust: Minus 15 in-wc (3735 Pa) of galvanized steel.
- B. Duct Sealing and Leakage in accordance with Static Pressure Class:
- 1. Duct Pressure Class and Material for Common Mechanical Ventilation Applications:
- a. Dust Collector Exhaust Air: -15 in-wc (-3735 Pa) pressure class, galvanized steel.

C. Duct Fabrication Requirements:

- 1. Duct and Fitting Fabrication and Support: SMACNA (DCS) including specifics for continuously welded round and oval duct fittings.
- 2. Use reinforced and sealed sheet-metal materials at recommended gauges for indicated operating pressures or pressure class.
- 3. Construct tees, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline.
- 4. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

2.2 METAL DUCTS

- A. Material Requirements:
 - Galvanized Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
 - 2. Aluminum: ASTM B209/B209M, aluminum sheet, alloy 3003-H14.
- 2.3 WELD FUME EXHAUST DUCTS FOR INDUSTRIAL-GRADE APPLICATIONS

A. Duct Class:

- 1. Class 4: Heavy dusts in high concentrations with high abrasion at a minimum conveying velocity of 4,000 to 4,500 fpm (20 to 23 m/s).
- $B. \ \ Sectional \ Shape \ and \ Material \ Requirements:$
- 1. Round Metal Duct:
- a. Pressure Class: Minus 15 in-wc (3.75 kPa).
- b. Maximum Air Service Temperature:
- 1) 250 degrees F (121 degrees C): Carbon steel, spiral pipe, duct class 1.
- c. Minimum Duct Thickness: Duct Class 1, 2 and 5; 18 gauge, 0.048 inch (1.2 mm).
- d. Compliance: Provide ductwork, fittings, supports, hangers, and appurtenances:
- 1) Round: SMACNA (ROUND) construction standard.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Install, support, and seal ducts in accordance with SMACNA (DCS).
 - $B. \ \ In stall \ products \ following \ the \ manufacturer's \ instructions.$
 - C. Comply with safety standards NFPA 90A and NFPA 90B.
 - D. Duct sizes indicated are precise inside dimensions.
 - E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
 - F. Properly support and ground all portions of the ductwork systto prevent static electricity build up within the

END OF SECTION



HVAC SPECIFICATIONS – 2 of 2

DUST COLLECTION & WELD FUME EXTRACTIO

WOOD SHOP & WELDING AREA

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East Hills

Engineering

Associates

A LIMITED LIABILITY COMPANY

BRETT N. YONISH, P.E. CHRISTOPHER G. ALBRIGHT, P.E.

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REVISIONS		
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DATE:	DRAWING NO.	

DRAWN BY:
S.M.M.

CHECKED BY:
C.G.A.

PROJECT NO.