SECTION 230130
HVAC AIR DUCT CLEANING

PART 1 GENERAL

1.01 SUMMARY

A. This Section includes cleaning & coating treatment for existing systems that will be reused as listed below.

B. Provide all labor, materials, including accessories to completely clean existing HVAC ductwork and equipment as indicated in Item 1.2.D. Including any duct mounted coils not being demolished. Clean these components of all dirt, debris, fungus, bacteria, grease, and foreign materials that may have accumulated in and on the surfaces of these systems. The Contractor shall field verify the ductwork layout prior to bidding.

C. Under Change Order, provide all materials and labor to apply anti-microbial coating to any existing lined ductwork scheduled to be cleaned. Field Verify during construction, the extent of any lined ductwork shown existing to remain.

D. The systems to be cleaned: As Noted on the Drawings

1.02 DEFINITIONS

A. ASCS: Air system cleaning specialist.

B. NADCA: National Air Duct Cleaners Association.

C. SMACNA: Sheet Metal and Air Conditioning Contractors' National Association.

1.03 SUBMITTALS

A. General: Submit the following for prior approval in accordance with Conditions of Contract and Division 1 specifications sections.
   1. Qualification and experience documentation
   2. Project schedule and procedure

B. Product data:
   1. Material Safety Data Sheets, if applicable, for the following:
      All chemicals, including but not limited to, biocides, detergents, degreasers, encapsulants, liner coatings, and sanitizing treatment.
   2. Duct access doors and access panels.
   3. Vacuum cleaning machines, air compressors, pressure washers, and/or related cleaning equipment and accessories for same.
   4. Airtight plastic closure plugs.

1.04 CLOSEOUT SUBMITTALS

A. Final cleaning report with color photographic before and after evidence. Multiple pictures for each duct system cleaned.

1.05 QUALITY ASSURANCE

A. ASCS Qualifications: A certified member of NADCA.
   1. Certification: Employ an ASCS certified by NADCA on a full-time basis.
   2. Supervisor Qualifications: Certified as an ASCS by NADCA.
   3. Experience: Submit records of experience in the field of HVAC systems cleaning.
   4. Equipment, Materials, and Labor: Have equipment, materials, and labor required to perform specified services.

B. Comply with current published standards of NADCA.

C. All of this section shall be performed by an independent specialty HVAC duct cleaning contractor experienced in commercial HVAC duct system cleaning. Submit information detailing qualifications and experience.

D. All works activities shall be performed in accordance with local, state and federal codes, including OSHA confined space entry regulations.

E. All proposed cleaning agents, chemicals including biocides, degreasers, sanitizing fluids, detergents, etc. shall be approved in writing by Health and Safety Department prior to materials being delivered on site.

F. A project closing report shall be submitted upon completion of entire cleaning project. Report shall include the following:
   1. Photographic (minimum 3" x 5", 35 mm color prints) documenting before and after conditions of systems cleaned.
   2. Photographs are to be identified by unit number and position at point of origination.
   3. If, during cleaning process, ductwork or accessories are found that are in need of repair/replacement, include photographic and written documentation as to location in system and include in project closing report.
   4. Project report shall be bound, neatly presented and organized according to HVAC unit number or fan number as marked within building.

G. During the cleaning process, Owner's designated representative may perform visual inspections anytime during the actual cleaning process at their own discretion.

H. All cleaning shall comply with National Air Duct Cleaners Association Standard 1992-01, as a minimum standard.

1.06 WORK COORDINATION

A. The duct cleaning contractor is responsible for field verifying which ductwork systems to be cleaned, contain existing fiberglass liner. All existing fiberglass liner within ductwork to be cleaned shall be coated.

B. The cleaning/coating contractor shall coordinate with construction schedule and construction manager all work and work scheduling requirements. Limited windows of access will be available for cleaning/coating to minimize duct accessibility issues. Cleaning contractor shall develop and periodically update a schedule of work in conjunction with the construction manager. The schedule shall indicate dates, times and procedures for each phase or portion of work. This schedule shall describe in detail what systems, fans, etc. will be affected (no air flow, ventilation) and what rooms, spaces or areas will require access for duct cleaning purposes. Include all types of procedures used in proposed project.

C. All work activities shall be coordinated with other trades and contractors working at job site.

D. Cleaning activities shall occur after all other construction activities have been completed and before testing and balancing activities are commenced.

E. The switching off of any HVAC unit sets off warning signals in the computers of the monitoring station, therefore, pre-schedule and prearrange shut downs with Owner's representative. The cleaning contractor shall be responsible for restoring all HVAC units, fans, etc. to normal operating modes at conclusion of each cleaning phase or activity.

F. After each phase of cleaning, i.e. duct section, air handler, portion of ductwork, the cleaning contractor shall contact the Owner's representative who shall perform a visual inspection of the completed work, approve such work before contractor proceeds to the next phase of the cleaning project. The cleaning contractor shall provide ladders, lighting, fiber optic bore scope and any equipment the Owner's representative may need to conduct a thorough inspection of the cleaning process throughout the entire system.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. For HVAC cleaning and decontamination, a HEPA filtered vacuum collections system capable of producing 1" water column, static pressure inside the section of isolated duct being cleaned.

B. Wet/dry vacuum shall contain HEPA filter systems.

C. Electrical portable air compressors shall be capable of producing 170 psi at 26 cfm.

D. Portable water pressure washer, consisting of electric pumps, pressure relief valve, heater and detergent metering devices capable of producing 2 gallons per minute at 700 pounds per square inch.

2.02 MATERIALS

A. Pre-manufactured sheet metal patches that are cross broke, hemmed, hemmed edges turned out 90□ and predrilled. With flexible elastomeric gasket. Minimum gauge of patch shall be 24 gauge galvanized metal or equivalent to duct wall thickness gauge if heavier than 24 gauge, 26 gauge or lighter is unacceptable.

B. Pre-manufactured access doors with locking seals.

C. Caulking: Use a silicone caulk specifically designed for sealing ductwork.

D. Air tight plugs.

E. Chemicals used in cleaning coils, dampers and fans.

F. Chemicals used in biocide/sanitizing treatments.

G. Anti-Microbial Duct Lining Coatings: Anti-microbial protective repair coating designed specifically for use on mechanical fiberglass insulation Benjamin Fosters 40-20 or 40-30 or FIBERLOCK IAQ 8000 This material coating shall not affect the thermal or acoustical properties of the insulation. Coatings shall meet NFPA Standard 90A and 90B. In addition, coatings shall meet state regulated TVOC requirements and contain an anti-microbial agent that meets the microbiological testing standards of UL 181, ASTM C1071, ASTM G21 and ASTM G22.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine systems to determine appropriate methods, tools, and equipment required for performance of work. Notify construction manager if unforeseen job conditions will impede or negate timely completion of work.

B. Prepare written report listing conditions detrimental to performance of work.

C. Proceed with work only after unsatisfactory conditions have been corrected.

3.02 CLEANING

A. Engage a qualified ASCS to clean the systems: As indicated in Part 1, Summary.

B. Perform cleaning before air balancing.

C. Repair or replace any building component or furniture damaged as a result of cleaning process.

D. Provide necessary supports and bracing to accomplish work in a safe and satisfactory manner.

E. Use duct-mounted access panels and doors, as required, for physical and mechanical entry and for inspection.
   1. Install additional duct-mounting access panels and doors to comply with duct cleaning standards. Comply with requirements in Division 23 Section "Air Duct Accessories" for additional duct-mounting access doors.
   2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection. Replace damaged and deteriorated flexible ducts. Comply with requirements in Division 23 Section "Air Duct Accessories" for flexible ducts.
   3. Disconnect and reconnect flexible connectors as needed for cleaning and inspection. Replace damaged and deteriorated flexible connectors. Comply with requirements in Division 23 Section "Air Duct Accessories" for flexible connectors.
   4. Remove and reinstall ceiling components to gain access for duct cleaning. Clean ceiling components after they have been removed and replaced.

F. Mark position of dampers and air-directional mechanical devices before cleaning, and restore to their marked position on completion.

G. Particulate Collection and Odor Control:
   1. Cover all terminals with cheesecloth or disposable blanket filter material. Seal airtight to device frame by use of non residue tape.
   2. Where venting vacuuming system inside building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron size (or greater) particles.

3. When venting vacuuming system outside building, use filtration to contain debris removed from the HVAC system and locate exhaust down wind and away from air intakes and other points of entry into building.

H. Clean the following metal-duct system components by removing visible surface contaminants and deposits:
   1. Air outlets and inlets (registers, grilles, and diffusers). (if any)
   2. Coils and related components.
   3. HVAC air ducts, dampers, actuators, and turning vanes.
   4. Dedicated exhaust and ventilation components.

I. Mechanical Cleaning Methodology:
   1. Clean metal-duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
   2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of ducts so areas being cleaned are under negative pressure.
   3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts or duct liner. Continue vacuum collection for a min of 20min after final cleaning and agitation is complete, vary speed several times.
   4. Clean fibrous-glass duct liner with HEPA vacuuming equipment, and do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth. If fibrous-glass duct liner is in relatively good condition coat with protective anti-microbial coating as specified in Part 2.
   5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
   6. Provide operative drainage system for washdown procedures.
   7. Biocidal Agents and Coatings: Apply biocidal agents and/or protective anti microbial coatings if fungus is present; use according to manufacturer's written instructions after removal of surface deposits and debris.
   8. Duct Liner Coatings: Any existing ductwork which is part of the cleaning scope of work and has existing fiberglass liner shall be lined as part of this contract. Apply anti-microbial seal coatings on all existing-to-remain ductwork which is cleaned.

J. Cleanliness Verification:
   1. Verify cleanliness after mechanical cleaning and before application of treatment, including biocidal agents and protective coatings.
   2. Visually inspect metal-duct systems for contaminants.
   3. Where contaminants are discovered, reclean and reinspect duct systems.
   4. Remove cheesecloth and/or other dirt entrapment material from outlets and terminals. Discard in approved manner. Final wash/clean terminals.
   5. Vacuum all work areas and restore to original condition.

3.03 DUCT ACCESSORIES INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Provide duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install duct-mounting access panels or doors where access doors do not currently exist to allow for the cleaning of ducts, accessories, and terminal units as follows:
   1. On both sides of duct coils.
   2. Downstream from volume dampers, turning vanes, and equipment.
   3. Adjacent to fire or smoke dampers; reset or install new fusible links.

4. Before and after each change in direction, at maximum 50-foot spacing.
5. On sides of ducts where adequate clearance is available.

D. Install the following sizes for duct-mounting, rectangular access panels and doors:
1. One-Hand or Inspection Access: 8 by 8 inches.
2. Two-Hand Access: 12 by 12 inches.
3. Head and Hand Access: 18 by 18 inches.
4. Head and Shoulders Access: 18 by 18 inches.
5. Body Access: 24 by 24 inches.
6. Body Plus Ladder Access: 24 by 24 inches.

E. Install the following sizes for duct-mounting, round access panels and doors:
1. One-Hand or Inspection Access: 8 inches in diameter.
2. Two-Hand Access: 12 inches in diameter.
3. Head and Hand Access: 12 inches in diameter.
4. Head and Shoulders Access: 18 inches in diameter.
5. Body Access: 24 inches in diameter.

F. Install the following sizes for duct-mounting, pressure relief access doors:
1. One-Hand or Inspection Access: 8 inches in diameter.
2. Two-Hand Access: 10 inches in diameter.
3. Head and Hand Access: 14 inches in diameter.
4. Head and Shoulders Access: 20 inches in diameter.

3.04 FIELD QUALITY CONTROL

A. Gravimetric Analysis: Sections of metal-duct system, chosen randomly by engineer or construction manager may be tested for cleanliness according to NADCA vacuum test gravimetric analysis.
1. If analysis determines that levels of debris are equal to or lower than suitable levels, system shall have passed cleanliness verification.
2. If analysis determines that levels of debris exceed suitable levels, system cleanliness verification will have failed and metal-duct system shall be recleaned and reverified.

B. Verification of Coil Cleaning: Cleaning shall restore coil pressure drop to within 10 percent of pressure drop measured when coil was first installed. If original pressure drop is not known, coil will be considered clean only if it is free of foreign matter and chemical residue, based on thorough visual inspection.

C. Complete final walk though of all areas of work with construction manager and engineer.

D. Report results of tests in writing. Provide photographic before/after documentation to submit to construction manager for final acceptance of work.

END OF SECTION 230130

This page intentionally left blank