

IMPROVED HOSPITAL OUTDOOR AIR VENTILATION RETROFIT

USING INTEGRATED PROJECT DELIVERY

This month's B2B will focus on an 80,000-sq-ft existing commercial office building being renovated to an outpatient health care facility. The entire HVAC systems will be removed and new central air handling systems will be installed. This month's test will address the design intent of outdoor air ventilation, exhaust air discharge, and air filters based on the health care systems building program.

The project delivery method shall be integrated project delivery (IPD) based on *2015 ASHRAE Handbook — HVAC Applications*, chapter 58 (Integrated Building Design). The IPD team shall include the health care system owner; building facility manager; owner representative; 3rd-party commissioning and air and water balancing (CxTAB) consultant; HVAC consultant engineer as the design team leader; structural, plumbing, and electrical consulting engineers; and the general contractor and HVAC subcontractor. The building's facility manager and her O&M staff will also participate in the IPD process beginning at the conceptual phase along with the hospital's 3rd-party infection control commissioning consultant.

The design engineer and the IPD team are directed to *2015 ASHRAE Handbook — HVAC Applications*, chapter 8 (Healthcare Facilities), chapters 36 through 43 (Building Operation and Management), and chapter 59 (HVAC Security). They will also read *ASHRAE 2016*, chapter 29 (Air Cleaners for Particulate and Contaminants), and *ANSI/ASHRAE/ASHE Standard 170-2013* for a complete understanding of ventilation and air filtration for health care facilities.

The IPD team will complete a survey of the existing building pertaining to proposed locations of air intakes, air exhausts, chimney stacks, and plumbing vents, as well as the proposed loading dock and parking area where motor vehicle engine exhaust could be drawn into the air intakes. The air intakes will be a minimum of 25 ft from any of these building components (e.g., windows, contaminants). Design considerations will also include outpatient medical-surgical vacuum system vents and adjacent building air exhausts, trash dumpsters, and railway tracks (e.g., idle train engine, cooling tower drift, and smoke control exhaust discharge).

The bottom of each outdoor air intake will be located at a minimum of 12 ft above grade for security as well as air quality, and a minimum of 4 ft above the roof based on anticipated snow drifting. Consideration for snow entrainment will also be a design consideration by the new air intakes. No central AHU will be located below grade where an air intake areaway would be required to avoid potential flooding of equipment room.

The proposed exhaust fans will be on the roof, with top angular discharge into 10-ft high air discharge ducts secured with guide wires. Prevailing winds, adjacent buildings, and discharge velocities must be taken into account based on chapter 24 of the *2013 ASHRAE Handbook — Fundamentals* to avoid short-circuiting of exhaust air into air intakes.

As an integral part of this ventilation focus, the IPD team will base the HVAC filtration design referencing chapter 29 noted above. When

it comes to final filters, the design shall be MERV 15, >95% efficient. There will be no filtration requirement on any of the building's new exhaust systems. The infection control consultant will review the HVAC basis of design in accordance with this infection control commissioning initiative and will commission the final installation.

The automatic temperature control system shall include several ventilation monitoring features, including air particle count in treatment rooms, lobby, and emergency rooms. In addition, the new central AHUs shall have differential pressure transmitters to assure constant air flow through the filter units and airflow minimum and maximum alarms, as well as space pressure in those rooms requiring positive or negative room pressure.

The IPD team shall begin to come together at Phase 2 Project Initiative and include the owner, facility manager, owner representative, design team, 3rd-party consultants, and general contractor. The remaining IPD team members will be brought on board at Phase 3 Concept Development e.g., HVAC subcontractor.

The IPD team shall produce Concept Documents and Design Documents (drawings and specifications). The Phase 5 Construction Preparation, Phase 6 Construction, Phase 7 Owner Acceptance, and Phase 8 Use, Operate, and Maintain shall follow. The IPD team shall complete a static pressure air model of each central air system, working closely with the 3rd-party CxTAB consultant. The O&M personnel shall review the documents beginning with the concept development phase and shall observe equipment startup, air balancing, commissioning system demonstration, and commissioning of infection control policy and procedure.

The IPD team's general contractor shall include the following during the shop drawing submittal phase:

- Equipment submittals - Fan curves - Sheet metal field fabrication drawings - Startup sheet - Troubleshooting sheets - O&M manuals, parts, and lubricants - ATC and energy management submittal including one complete ATC submittal integrating manufacturer's AHUs furnished ATC into an integrated overall ATC submittal.

The IP 3rd-party commissioning and TAB (CxTAB) services as follows:

- TAB system flow diagram of entire supply air, return air, and exhaust air systems with cfm and static pressure indicated at each piece of equipment and at each component (e.g., pressure drop across filter units).
- Commissioning functional performance test of central air and exhaust air systems.

Refer to The Facility Files for additional information pertaining to completing the B2B test. **ES**



The design engineer shall check off the boxes from the list of company's standardized field observation checklists below that he will need to upload on to his tablet computer prior to heading out to the construction site to complete his final HVAC inspection and punchlist. These checklists will be touchscreen type. When the engineer returns to the office or he sends the completed checklists

via the internet to the office, the completed checklists shall be automatically downloaded to the company's computer server and placed in the job folder's "Project Closeout" section of the folder. The completed checklists, along with associated digital photographs taken at the time of the field visit, will automatically be electronically sent to the following individuals and departments.

TEAM CORRESPONDENCE DIRECTORY CHECKLIST

(Check the appropriate boxes)

- Owner Owner Representative IPD Lead Engineer
- Construction Manager General Contractor Design-Build Contractor Building Owner's Facility Manager HVAC Subcontractor ATC Subcontractor Electrical Subcontractor Plumbing Subcontractor Fire Protection Subcontractor ATC Subcontractor Architect State Energy Department ASHRAE Piping Subcontractor Sheet Metal Subcontractor 3rd-Party CxTAB Consultant 3rd-Party Infection Control Consultant Equipment Manufacturers Building Inspector Others: (insert list) _____

HVAC CONTRACT SPECIFICATION CHECKLIST

- Division 1 Project Closeout Telecommunication Equipment Owner Furnished Equipment Structural Electrical Plumbing Fire Protection HVAC Infection Control ATC ACC Units Pumps Fans Air Handlers Terminal Units Piping System Sheet Metal System TAB Commissioning Others: _____

HVAC CONTRACT DRAWING INSTALLATION CHECKLIST

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