

# TEMPORARY AIR CONDITIONING

For An Emergency Shelter Center Infrastructure  
Project Using Integrated Project Delivery

This month's B2B will focus on an existing high school field house that also serves as an emergency shelter center in time of crisis. This section of the overall school facility is a 20,000-sq-ft building that includes the gymnasium adjacent to women's and men's locker rooms and toilet rooms with shower facilities. The heating system and its primary heating equipment are part of the existing infrastructure. Four central AHUs serve the field house and adjacent spaces. Each AHU has a heating coil sized for the air conditioning load of the building, as well as the heating load for the areas they serve. These dual-purpose coils have integral coil drain pans and drain piping for removing condensate water when used to air condition these spaces.

The existing heating system pipe distribution has valve and capped chilled water supply and return pipes that terminate just outside the building similar to exterior dry standpipe connections. When the original school building program was developed 10 years earlier, the school building committee made the decision to only provide air conditioning during the air conditioning season when the school, minus the administration area, would be vacant (refer to this month's article on Temporary HVAC System Design — How Does This Work).

The existing hot water heating system had been zoned to isolate the rest of the school hot water distribution piping when the school was first built so that in an emergency, a 75-ton air-cooled chiller and associated chilled water pump could provide emergency backup cooling to the 20,000-sq-ft field house. This new design add-on to the school is to have the air-cooled chiller delivered on a truck flatbed along with an electric generator to power the chiller and pump. The original outdoor landscape included a parking area for the temporary HVAC contractor to drive up the flatbed truck to within 40 ft of the existing valve and capped connections.

The field house space temperature during an emergency shall be 74°F +/- 2°F at a maximum relative humidity of 55% +/- 5%. The support areas, i.e. locker rooms, shall maintain space temperature at 78°F +/- 2°F at a maximum relative humidity of 55% +/- 5%.

The designer engineer is directed to Risk Management Series Design Guidance for Shelters and Safe Rooms at [www.fema.gov](http://www.fema.gov), as well as internet websites offering information on companies that provide temporary HVAC equipment. In addition, the engineer is directed to the 2015 *ASHRAE Handbook HVAC Applications*, Building Operations and Management, chapters 36 through 43.

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 town's building facility manager, school department representative, project owner representative, HVAC consultant engineer (as the design team leader), electrical and plumbing consulting engineers, a local temporary

HVAC contractor project manager, and security subconsultant, general contractor, and electrical subcontractors. The building department's O&M staff will also participate in the IPD process beginning at the conceptual phase, although the rental company technicians will be responsible for O&M of the chiller, pump, and generator based on their specific training for this type of equipment.

The air-cooled rental chiller shall be furnished with all required temperature and pressure gages, water strainers, flow switches, safety controls and alarms, and shutoff valves. HVAC temporary chiller-electrical generator contractor shall deliver the equipment and leave it on the flatbed adjacent to the building and its field-installed associated flexible pipe hoses for connection to the valve and capped connections at the time of the emergency. The chiller shall produce 45°F chilled water supply, with 55°F chilled water return to the field house piping zone. This specific zone is insulated per the State energy code and to prevent condensation from the chilled water piping.

The IPD team shall begin to come together at Phase 2 Project Initiative and include the town's building facility manager, school department representative, owner representative, design team leader (HVAC consultant engineer), temporary HVAC contractor, IPD general contractor, and his HVAC and electrical subcontractors. The remaining IPD team members will be brought on board at Phase 3 Concept Development.

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

- Equipment submittals - Pump curves - Startup sheet - Troubleshooting sheets - O&M manuals, parts, and lubricants -ATC and sequence of operation - Chilled water change-over drawings and operating instructions.

## The school's owner representative shall provide 3rd-party commissioning and Testing, Adjusting, & Balancing (CxTAB) services as follows:

- TAB system flow diagram of existing hot water heating system and the new hot water/chilled water zone with GPMs and pump heads indicated at each of the four AHUs.
- Commissioning functional performance test of HVAC system (chilled water, air-cooled chiller, and the four existing central AHUs).

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

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The design engineer shall check off the boxes from the list of company's standardized field observation checklists below that she will need to upload on to her tablet computer prior to heading out to the construction site to complete her final HVAC inspection and punchlist. These checklists will be touchscreen type. When the engineer returns to the office or she 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 Department Manager  
 HVAC Subcontractor  ATC Subcontractor  Electrical Subcontractor  Plumbing Subcontractor  
 Fire Protection Subcontractor  Telecommunication Subcontractor  Architect  State Energy Department  
 ASHRAE  Piping Subcontractor  
 Sheet Metal Subcontractor  3rd-Party CxTAB Consultant  
 3rd-Party TAB Consultant  Rental Equipment Contractor  
 Building Inspector  Others: \_\_\_\_\_

### HVAC CONTRACT SPECIFICATION CHECKLIST

*(Check the appropriate boxes)*

- Division 1 Project Closeout  Telecommunication Equipment  
 Rental Equipment  Structural  Electrical  Plumbing  
 Fire Protection  HVAC  Infection Control  ATC  
 Pumps  Chillers  Fans  Air Handlers  Terminal Units  
 Piping System  Sheet Metal System  TAB  
 Commissioning  Others: \_\_\_\_\_

### HVAC CONTRACT DRAWING INSTALLATION CHECKLIST

*(Check the appropriate boxes)*

- Telecommunication Equipment  Rental Equipment  
 Structural  Electrical  Plumbing  Fire Protection  HVAC  
 Infection Control  ATC  Pumps  Chillers  Fans  Air Handlers  Terminal Units  Piping System  Sheet Metal System  Equipment Room  Others: \_\_\_\_\_

### HVAC STARTUP CHECKLIST

*(Check the appropriate boxes)*

- Telecommunication Equipment  Rental Equipment  
 Structural  Electrical  Plumbing  Fire Protection  HVAC  
 Infection Control  ATC  Pumps  Chillers  Fans  Air Handlers  Terminal Units  Piping System  Sheet Metal System  Equipment Room  TAB  Commissioning  
 Others: \_\_\_\_\_

### COMMISSIONING FPT - Functional Performance Test

*(Check the appropriate boxes)*

- Telecommunication Equipment  Rental Equipment  
 Structural  Electrical  Plumbing  Fire Protection  HVAC System  Infection Control System  ATC System  Heating System  Chilled Water System  Condenser Water System  
 Pumps  Chillers  Fans  Air Handlers  Terminal Units  Piping System  Sheet Metal System  Equipment Room  
 Others: \_\_\_\_\_