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Fitzemeyer & Tocci

Mechanical / Electrical Engineering Solutions

News You Can Use…

Sprinklers and Glass

There are scenarios where we can design a “rated assembly” by installing sprinklers near non-operable windows. One of the first design elements that may come to mind is atriums. The building code addresses sprinklers installed on glass in atriums straightforwardly. Other scenarios that come into question are: paths of egress, rated enclosures, and exposure protection. There are sprinklers that have been listed for these other scenarios. They have specific installation requirements and ultimately require approval from the AHJ for their application.

The International Building Code (IBC) addresses atriums in Chapter 4. Section 404 requires a 1-hour fire barrier separating atriums from adjacent spaced, with exception: “A glass wall forming a smoke partition where automatic sprinklers are spaced 6 feet or less along both sides of the separation wall, or on the room side only if there is not a walkway on the atrium side... The glass shall be installed in a gasketed frame so that the framing system deflects without breaking the glass before the sprinkler system operates.” The IBC does not specifically allow this exception in other areas, such as paths of egress, where glazing is required to be rated. It does, however, allow for assemblies to be rated according to testing procedures outlined in *NFPA 252: Standard Methods of Fire Tests of Door Assemblies*, *NFPA 257: Standard on Fire Test for Window and Glass Block Assemblies*, or *UL9: Fire Tests of Window Assemblies*.

Sprinklers are sometimes used for exposure protection when an interior or exterior fire separation is required, as determined by the Building Code. Hydraulically, these scenarios can be very demanding. Sprinklers installed on the outside of a building are typically open type sprinklers controlled by an additional deluge valve. NFPA-13 requires the exposure protection sprinklers to be calculated for all sprinklers operating, including the sprinklers adjacent on the inside of the glass. With any of these systems, keep in mind that the sprinkler itself is part of the rated assembly. As in the case with atriums, the Building Code prescribes how to apply the sprinklers. In other cases, sprinklers shall be installed per their listing, as part of an assembly that has been tested and listed.

University of Massachusetts - Amherst
Wireless Service Installation, Phase 1
Amherst, Massachusetts
Architect: Civitects

The scope of this project was to the design wireless infrastructure throughout twenty-four (24) dormitory buildings at four (4) residential areas located throughout the campus – Central, Orchard Hill, Northeast and Sylvan, representing 1,366,842 sf. Fitzemeyer & Tocci Associates, Inc. was the designer of record for the project with architectural, structural, hazardous material, cost estimator, specification and information technology sub-consultants. The project provided wireless access throughout each of the twenty-four buildings achieving the first step of a University goal to provide full wireless coverage.

The design challenge was to provide the design and construction administration for all twenty-four buildings in an extremely abbreviated schedule – (10) weeks for design and (12) weeks for construction; the project started design in mid-January 2010 with construction completed by Mid-August 2010. The University was providing raceway material, data cable, wireless antenna boxes and wireless antennas. The wireless antenna locations were determined by signal strength survey performed by the University in advance of design, limiting flexibility regarding wireless antenna locations. The twenty-four buildings were scheduled to house summer camps limiting access during the construction phase. Each building contained one or more occupied apartments and the buildings were entertaining several other construction projects simultaneously.

Our solution included an integrated design approach with the University – Facilities & Campus Planning, OIT and Housing Departments to insure all of the project requirements and concerns were understood and met. Once the limitations of the University provided material was understood the design team organized the field survey work in the occupied buildings. Each building needed to be surveyed to understand the MDF/IDF room locations, the wireless antenna locations and the raceway route. The raceway support design, once complete, was reviewed and coordinated with the sub-consultants allowing them to generate supporting documentation.

All disciplines involved worked toward the goal of gathering design information onto a single set of coordinated drawings clearly outlining the scope. The documents included enough information to allow contractors to bid the project in combination with enough performance criteria to allow an installing contractor the flexibility to continue work with limited supervision.

Once the project was bid and awarded the design team was asked to work with the University and contractor on the construction administration to insure timely delivery of the project. The construction administration activities included weekly construction meetings, continuous and “on-call” site inspection and design support activities. The result was a successful project with a timely delivery due to a true team effort.

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Brattleboro Memorial Hospital, Short-Term Master Plan, Phase 1
Brattleboro, Vermont
Architect: Lavallee Brensinger Architects

The scope of work for this phase of the project included a complete renovation of 4,500 square feet of existing conference center space, the extensive renovation of 5,300 square feet of existing laboratory and lab support space, and the complete renovation of the hospital IT offices and data center in the West Wing. The renovations called for HVAC, plumbing, fire protection and electrical upgrades. The project posed a number of challenges throughout the course of design. Extremely limited floor-to-floor heights necessitated creative HVAC solutions and demanded tight coordination tolerances. The hospital schedule required that the lab remain functional during construction. The existing HVAC heat pumps are served by a combination sprinkler / condenser piping system, shared with the first floor Emergency Department, which also needed to remain functioning during construction.

The new HVAC system consisted of one new hospital-grade, semi-custom rooftop air handling unit for heating, cooling and ventilation. Air is delivered to the space via medium-pressure ductwork, run through new shafts built into the floor above, and located with an eye toward the project's Phase II, renovation of the Emergency Department. Primary heating and humidification is provided by existing hospital low-pressure steam infrastructure. Primary cooling is provided by a new air-cooled condensing unit paired with the air-handler cooling coil. A new general exhaust system serves the requirements of the conference center and lab offices.

The plumbing design provided for new plumbing fixtures throughout the conference center and the lab support space. Cold, hot & recirculated hot water piping is extended from existing. Oxygen and medical vacuum piping is re-routed to coordinate with all trades' new work. All abandoned piping was removed from this and all previous upgrades and renovations as part of the coordination effort.

The fire protection system is all new on the ground floor. The existing combination system was cut back and capped to maintain operation on the floor above. The new automatic wet sprinkler system is extended from the existing building main with a dedicated flow control valve.

The electrical design required new normal and emergency power systems to be routed from the main electric room to the renovation area. These new panels were installed in new electric closets to serve the entire wing in addition to the project area. Low-profile, high-efficiency light fixtures were used to accommodate the limited floor-to-floor high and preserve both a higher ceiling height and the necessary space above the ceiling for utilities. The design of the west wing IT space included power supply for two new Uninterruptible Power Supply's, with maintenance bypass panels, to serve the new the new data center.

Central Maine Medical Center, Endovascular Lab Renovations
Lewiston, Maine
Architect: Morris Switzer Environments for Health

The scope of this project was to convert approximately 5,500 sf of existing shell space into the new Endovascular Lab. The new lab consists of two procedure rooms, one nurse station and six beds in the prep/ recovery suite and supporting areas.

The HVAC heating system consisted of a combination of hydronic reheat coils within the VAV terminal boxes and hydronic radiant panels. The cooling for the area was provided by reconfiguring the existing cool-air ducted system and associated VAV terminal boxes. Supply and return ductwork systems were provided for air distribution and existing supply and return duct mains were reused where practical. Ceiling mounted diffusers and return air registers were used throughout. New and existing (reused) VAV terminal boxes with hot water heating coils were provided for temperature zone control. The exhaust systems were reconfigured and extended as required to accommodate the new space. DDC thermostats were provided for the temperature control zones with new controls extension and expansion of the existing Johnson Controls Metasys DDC building automation systems.

The existing plumbing and medical gas systems were extended and reconfigured as required to support the new Endo-Vascular Lab. New conservation type plumbing fixtures, medical gas outlets, valve boxes and alarm panels were provided for the space. The plumbing systems consist of hot and cold water, sanitary drainage and vent systems. The existing sanitary pipes within the renovated area were rerouted to accommodate the proposed layout and piping for new plumbing fixtures were extended and connected to the existing sanitary drainage system. The hot and cold water for the new fixtures are extended and connected from the existing hot and cold water systems.

The fire suppression which is extended and connected to the existing wet standpipe/sprinkler system was designed for light hazard occupancy for the renovated space as required by NFPA-13. The Procedure, Control and Equipment Rooms were protected by a new Pre-action system which also was connected to the wet standpipe/sprinkler system. The remaining area sprinklers were extended and connected to the existing wet standpipe/sprinkler system. The sprinklers are spaced and installed in accordance with NFPA-13 requirements.

The renovated area was classified as 'Business" which does not require extensive critical and life-safety branch circuits. The existing electrical services were utilized to provide power for the renovated area. Upgraded existing panels and new panels were provided in order to provide adequate amount of branch circuits to feed the loads. Normal distribution feeders connected to upgraded and new panels were used to service the new loads. Reused existing and new lights were provided to accommodate the renovated area. The fire alarm devices were wired and installed as required by the local Authority Having Jurisdiction. The fire alarm system in the renovated area was extended to the existing Medical Center fire alarm system.

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