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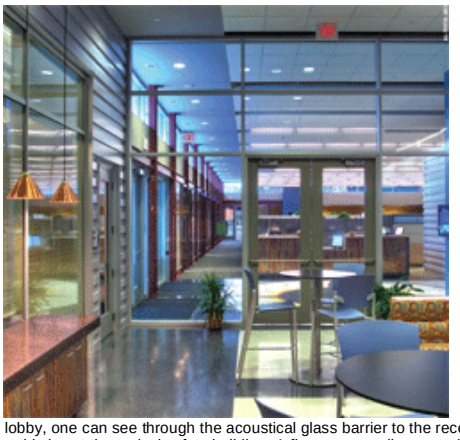
Tech-Sizing

Environmental health building offers regulated space and a warm welcome

By Maureen Patterson

In higher education circles, the health and safety department usually doesn't get the good facilities. Anything but. "They get the hand-me-downs of hand-me-downs," says Ken Kerns, associate director of environmental health and safety at Iowa State University (ISU) in Ames.

His department was located in a hodgepodge of less-than-stellar facilities until a new one was built in 2005. Upon entering the 35,000-square-foot building, one might not guess there are dangerous materials inside. A warm, comforting reception area with a terrazzo floor greets visitors. They can immediately see a reception area with a generous high ceiling to the left and a state-of-the-art learning center to the right. "They recognize that we are at a level of professionalism that maybe they didn't expect," says Kerns.



Standing in the learning lab lobby, one can see through the acoustical glass barrier to the reception area, where a sleek terrazzo floor announces that this is not the typical safety building. A flat screen wall-mounted display informs visitors of happenings in the facility. An open office area is beyond the reception desk.

Venturing farther into the facility, increased visible security shows visitors they're entering regulated space. The amount of windows decreases and the long corridor becomes narrower. Escorted guests pass through one set of doors, then another set of doors and a vestibule, where they are given protective gear, and finally through a set of doors with a red wall as the last warning. Proximity card readers, part of the university's Metasys security system, at each entry point limit access to those with clearance.

ALL PHOTOS: Architects Smith Metzger
The Environmental Health and Safety Services Building at Iowa State University blends administrative space and regulated space in one aesthetic, functional package.

Precast at a Premium

Sometimes the simple solution is best. That's what designers for the Environmental Health and Safety Services Building at Iowa State University (ISU) in Ames found.

Designers used precast whenever they could, and they designed the facility to do the project in a simple six or eight beds. "Where we have radioactive materials, concrete is an excellent shielding device for the low-level stuff we have," says Tom Whetstone, AIA, LEED AP, of Architects Smith Metzger. "When we went to deflagration, we could orient the reinforcing in the precast panels to span those wall systems. It became a simple way for us to use one building material in a myriad of ways to solve a lot of problems. Precast worked out to be a great product for our building."

But despite the precautions, the ISU facility does not use too much technology, even in the regulated areas. It's code-compliant, and even goes beyond code in many cases, but the regulated side is not a fortress. It's an organized, logical, well-contained space that promotes life safety with sound design.

Architects Smith Metzger

View larger image

The layout of the ISU building is organized and logical, with public spaces clearly separated from regulated areas. With its numerous aesthetic features, many building occupants were surprised that an environmental health and safety building could look so good.

"Just Enough"

Darryl Metzger, principal at Architects Smith Metzger, Des Moines, understands why people might want to overdesign a regulated facility. "It's tempting to overreact and to put in systems that are not necessary, or to put in incredibly sophisticated and expensive systems that might take maintenance beyond the capability, or understanding beyond the capability, of future inhabitants of this building," he says. "We tried very hard to do the right thing, to not underreact and not provide enough security and safety for each different function, but also not overreact. That was a theme that went throughout this project."

The design team learned a lot through touring other facilities. In one, says Tom Whetstone, AIA, LEED AP, of Architects Smith Metzger, rooms for various materials were separate and tucked away in out-of-the-way spaces. Safety workers loved the arrangement, but not those who had to work with the chemicals; they couldn't see if a colleague needed help. In another facility, all the materials, such as toxics and corrosives, were in one large room. This was great for the handlers but not as safe because a problem with one material would cause problems for all.

"We developed an idea where we standardized all the rooms to one size," Whetstone explains. These cells, as Whetstone calls them, are 170 square feet. There's enough room to put in a row of pallets and a forklift to move them in and out. All the cells are standardized across a grid. If a waste stream needs more space, it uses more than one module.

There were other benefits as well. "It took a lot of circulation square footage out of the program, put it into the corridor, and it took the workers out of the rooms, because they all had enough room in there to drop their stuff for storage and get out," says Whetstone. The smaller cells allowed only one set of doors to be needed, per code, requiring less peripheral space.

The cells are aligned along straight corridors. Their doors are painted blue on the front and yellow on the inside. With a quick glance, therefore, someone can see if a door to a cell is opened, and thus, if someone is inside. Building staff can keep tabs on each other, and see if a security breach has occurred. Plus, the easy-to-see layout helps egress to be simple and efficient, a lifesaver if a dangerous accident should occur. Thus, a good layout and some paint become both security and life-safety features in the facility.

The "just enough" philosophy carried through when the building team looked at water drainage. They didn't like the cost and maintenance of trench drains and the trip hazard of ramps. "We wanted to try and find a way to keep the floor nice and smooth and consistent, and still take care of the problems of spill containment," Whetstone recalls.

An elaborate system might have been overkill, considering the average spill is a gallon or two. The designers placed the drains in the front of the cells at the high side and sloped the cell floors - the floors are flat for 1 foot at the doors, then slope down 3 inches at the back - allowing 70 gallons of a spill to be contained. The slope is almost unnoticeable to users of the rooms. A Dudick Novalac epoxy coating protects the floor from stain and corrosion. If the sprinkler system is activated, a drain at the high side of the floor prevents liquids from spilling into the corridor.

Ten-foot-tall precast vanes jut out at intervals on the western side of the building, allowing views of a natural wooded ravine while blocking out harsh sunlight.

Another innovative solution used in the building was to install 10-foot-tall precast vanes jutting out at intervals on the western side of the building, allowing views of a natural wooded ravine while blocking out harsh sunlight. "It was the result of a lot of different ideas, everything from blinds to films to reflective glass to overhangs ... but this one is permanent, it just works, there's no mechanical devices that need to work, it allows the natural view, and we think it's a winner," says Metzger.

Building Saves Itself

One of the most interesting features of the facility is the deflagration rooms, which can combust without damaging the rest of the building or injuring the people in it. These five rooms, which contain flammable materials, required particular care. Their precast walls are 8 inches thick. They also have Overly Doors blast-resistant doors. Specially designed Construction Specialties roof vents - sandwich panels of aluminum - fit over the rooms like a cap and are tethered. In the event of an explosion, energy will release upward and exit the building through the roof panels, saving both the building and occupants.

This view of a deflagration room shows that one door opens 90 degrees while the other opens 180 degrees. The interior face of the doors is painted bright safety yellow. This serves as a flag - when the room is in use, workers in the center of the facility will know where their buddy is, or that a room is not secured. Outside the room are a light switch and outlet devices, allowing control of the room from the outside.

The designers could have gone with the cheaper option of taking out an exterior wall, but then they would have had to protect 50 feet of space outside and building management would have had to secure the area in and around the facility. "We thought it was much safer to take that energy and go vertically and go up through the roof," Whetstone says.

The designers also made fighting fires throughout the building safer. "The code requires us to hold a facility for 20 minutes. We've designed this facility to hold an event for 40 minutes, so the firefighters will show up but they don't have to fight the fire, the building does," says Whetstone.

A standard sprinkler system protects the main areas of the facility. The flammable materials areas use an Ansul foam sprinkler system while the reactive area uses an Ansul carbon dioxide fire protection system.

At the building's exterior, the public can access the facility through a road leading up to the front entrance. Firefighters can use an access road around the perimeter. The designers involved local firefighters early in the facility's design and wanted to give them the easiest, most efficient access possible. Safety was the No. 1 goal.

The five rooms holding flammable materials are equipped with lower explosive level (LEL) monitors, which have a couple of set points. If the monitors detect vapor levels of 2 percent, they activate and open up the ventilation system to clear the air so the vapors are sent out of the building, thus preventing explosion. This is not a standard safety feature in buildings with regulated materials, Kerns says, but it's one more way to ensure safety.

In the learning lab, a fume hood - the blue piece of equipment on the left - allows students to learn how to handle regulated materials. The fume hood acts as a barrier to protect people from hazardous materials. The white steel cabinet to the right is a biosafety cabinet that runs HEPA-filtered air over hazardous products to keep them clean. Not pictured are an emergency shower and eye wash. The ISU department's previous learning area was in a dungeon-like space; the graciousness of the new facility encourages people to come for training. Better facilities make teaching easier, says architect Tom Whetstone of Architects Smith Metzger.

A Johnson Controls building automation system functions throughout the facility and FireLite safety glazing is used for fire-rated windows and doors. In laboratory areas, Siemens fume hood controls work with Fisher Hamilton fume hoods to exhaust air and sound an alarm if air contaminants reach dangerous levels. Intrinsically safe lighting is in flammable materials rooms and conduit is intrinsically rated, preventing sparks, vital in such spaces. Lead-lined doors surround the radioactive cell. On the facility's roof, Strobic exhaust fans dilute exhaust air and move it safely out of the breathing zone of those in and immediately outside of the building.

An additional safety feature is in the three rooms that double as tornado shelters: One room is used for storage, another for fire extinguisher maintenance, and another for fire extinguisher storage. Two 1,600-pound doors by Overly Doors protect the spaces (the two fire extinguisher rooms are connected, and thus together use one heavy door). The spaces are available for occupants both of this building and of neighboring ones. "We wanted to show the rest of the university how we were able to add storm shelters with little additional cost. This building is a show-and-tell for other university spaces," says Kerns.

All these features may seem like they should have cost a lot, but they didn't. Only $6 million of the $7 million was used. Says ISU project manager Robert Holzwarth, "Cost-wise, it surpassed everyone's expectations in terms of what we were able to do. Due to the fact that it came in under budget during bid, we were able to put some things back in the project that we had to weed out during the design. We put back some terrazzo flooring that - near the entryway - turned out very nice."

The key was figuring out how to maximize results, keeping an open mind to all solutions. Says Whetstone, "With this building we found that the safety came much more naturally when we just embraced the idea of doing what's safe."