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ACADEMIC FACILITIES

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Safety Top Priority

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Of all disciplines in the academic curriculum, none is evolving as rapidly as science. Along with the course content, the way the sciences are taught and the facilities in which they are taught are also developing and growing. Structured lectures and laboratory exercises have given way to problem solving and experimentation. With investigation and discovery as key tools, classrooms and laboratories must foster the changing needs of interactive teamwork and collaboration.

Science education buildings are very specialized structures. They may cost up to 2.5 times or more to build than regular classroom buildings, reflecting the complex mechanical, electrical, and plumbing (MEP) systems required. Yet because science education is constantly changing to emulate the most current knowledge, the buildings will outlast the curriculum and must be both flexible and adaptable.

Richard L. Gelb Science Center at Phillips Academy Andover

Programming is Key

Programming is key and planning may take up to a full year. Faculty in all areas of the sciences must offer input for a true understanding of how the building will be used, what systems are critical to the research process, and what changes are anticipated in the long term. Collaboration across departments is key as end-users develop their wish lists so priorities can be logically set.

An architect experienced with laboratory design knows what questions to ask to ensure that all variables have been considered during the programming phase. The architect will be completely knowledgeable about code and safety requirements so time is not wasted designing components that won't pass the local building department.

A construction manager thoroughly familiar with a science building's sophisticated MEP systems adds great value in this early stage. The CM evaluates the architect's design to be sure that it is constructable. The experienced eyes of their personnel review plans to ensure that all elements– piping, wiring, cables, and ductwork– will fit in the space allotted without interference. A skillfully developed conceptual estimate grounds the project's budget in reality from the start.

Safety is the Top Priority

Safety is the utmost concern in laboratory facilities and today's requirements go well beyond emergency showers and eyewash stations. Considerations extend to the building's occupants and neighbors as well as to the community's water and sewer system.

After 4 years of formulation and input from 22 scientific and science education organizations, the National Research Council's National Science Standards were introduced in 1995. New buildings must have systems for legal, safe, and ecologically acceptable disposal of chemical wastes. HVAC systems must have an increased number of air changes per hour to maximize fresh air replacement. OSHA has standard regulations for commercial laboratories that monitor exposure to hazardous chemicals and require a Chemical Hygiene Plan; many academic research facilities choose to follow these guidelines as well.

Gelb Science Center

Erland Construction recently completed constructing the Gelb Science Center at Phillips Academy in Andover, Massachusetts. This was the first new academic building built on that prestigious campus in 40 years and it would be envied by many a college or university science department. Kallmann McKinnell & Wood Architects of Boston, a top-tier firm, designed this $16 million, 3-story building, leveraging extensive experience with corporate, government, and higher-level institutional teaching and research facilities. Planning was aided by input from the 24 science faculty members that teach secondary school biology, chemistry, and physics, as well as 11 courses at Advanced Placement level or beyond.

The building is elegantly beautiful – with 11'2" ceilings and 11' maple doors that complement the proportions of the rooms– but the design was driven by the utilitarian considerations of any new science building. Classrooms and laboratories are located at the perimeter of the building to simplify systems as they run up through the building while maximizing natural light. Stock rooms, storage areas, dishwashers for glassware, and toilet rooms are located in the central core for convenient access by everyone on the floor. Lab classrooms were configured to serve both laboratory and traditional class activities; tall chairs are paired with tabletops that double as both desks and lab stations and can be pulled together for work in larger groups.

The Chemistry Department, with the greatest concentration of fume hoods, was located on the top floor to shorten the ductwork required for venting. A Ph neutralization system in the basement renders chemical lab waste safe before disposal. Multiple electrical outlets and cable wiring for laptop computers are located in every classroom to accommodate all current media as well as providing for future additions.

While offices for department heads are situated on each floor, all other faculty offices are located on the 2nd floor to encourage cross-pollination of ideas. Interactive spaces for faculty and students to meet are also included on the 2nd floor. The school restored a powerful telescope and installed it in a new 18.5-foot dome in the south-facing observatory; computers capture astronomical images that are available in the classrooms for study and discussion.

Sound attenuation was an important design consideration since noise or vibration from the HVAC system might interfere with instruction. The mechanical room in the basement was built as a separate substructure, isolated from the rest of the building, to keep sound penetration to a minimum. Post-project testing demonstrated that the sound was totally confined. Mechanical equipment on the building's roof was also contained in a soundproof, isolated enclosure.

As construction manager, Erland faced a radon challenge. The topography of the Phillips Andover campus includes a good deal of ledge; testing of the previous building on this site had shown the highest concentration of radon of any building in the area. It was critical to keep the students and faculty safe from effects of this naturally occurring, potentially carcinogenic gas.

Working with the architect and his radon consultant, we completely surrounded the basement with an impermeable membrane that did not allow any air penetration through the slab, thus totally separating it from ground beneath. A back-up radon extraction system was also installed to capture the gas and vent it through the roof of the building. Provisions to add exhaust fans to supplement the system were made, but this system was so effective that they weren't necessary.

At the formal inauguration of the Gelb Science Center on January 7, 2004, Barbara Landis Chase, Head of School at Phillips Academy, commented, "Thanks to all of those involved with the design and construction, we have a magnificent building filled with light and graced by handsome, well-proportioned spaces. It has extraordinary vistas across the campus, and its materials were chosen with environmental impact in mind."

Collaboration Breeds Success

A science teaching facility built for collaboration was ultimately successful because of collaboration. Collaboration between the designers and the end-users ensured that needs were truly being met. End-users collaborated with other end-users in a give and take that eliminated gaps and unnecessary duplications. The construction manager collaborated with the design team and the school in a value management exercise that delivered the greatest cost efficiency. The MEP consultants and structural engineers actively collaborated with all other members of the project team to look for the most efficient, cost effective systems and building structure. The end result is a facility that fosters pride of ownership in its users and satisfaction for the school in the knowledge that the Gelb Science Center represents the greatest value for the construction dollars spent.

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