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“The planetarium has always been a popular venue for visitors to the University of Maine campus as well as a resource for teaching astronomy on the academic side. Our new planetarium and observatory are providing us with the opportunity to continue our mission and outreach to current and future generations of learners.”

– Alan Davenport, planetarium director



The Stars are Clearer Now

Emera Astronomy Center

Photo credits to: Mark Wellman, Butch Moor and Monty Rand

Having maximized the potential of its 1950s-era planetarium and observatory, the University of Maine in Orono, Maine, had long sought to build a new facility for the digital age and future generations of learners. “We had actually been considering a new planetarium since the mid-90s,” says Alan Davenport, planetarium director. “It was time to step up the quality, scale and style of the facility, and bring the technology up to modern scientific educational standards.”

When a private donation of \$3.2 million was added to \$1 million in university funding, followed by a \$1 million naming gift from the energy company Emera of Maine, plans were made for a new Emera Astronomy Center to replace the outdated Jordan Planetarium and nearby observatory. The project’s goal: To promote science, technology, engineering and mathematics education among K – 12 students, and provide research and educational opportunities for the university’s students, via a state-of-the-art facility with well-developed science programs.



The site had to accommodate the observatory and planetarium, provide a dark sky for viewing, and be in a central and accessible location on campus.

WBRC Architects Engineers, which has offices in Bangor and Portland, Maine, was hired to design the facility and serve as architect-of-record. The firm collaborated with Kasian, located in Calgary, Alberta, which brought educational and planetarium expertise to the project. In fact, architect Bill Chomik, a senior principal at Kasian, who has designed more than 20 planetariums around the world, didn't mince words when discussing the project with Davenport, nor with WBRC.

"Decide what equipment you want to use, how you would like to use the planetarium, how you would like to teach in it, and I will design a space that will fit your needs like a glove," Chomik told the planetarium director. He also told WBRC, after realizing the firm was the architect-of-record but had little planetarium experience, "Well, I do."

That confidence served the collaborators well as they forged ahead with Chomik designing the planetarium theater while WBRC worked on the rest of the project, a collaboration Chomik describes as "very rich and productive." Site selection was one of the team's first challenges. Not only did the observatory and planetarium need to be sited closer together, but in a dark sky location with minimal artificial light, plenty of parking, and in a central and accessible location on campus.

A site on Rangeley Road, on the northeast corner of the campus, fit those criteria. WBRC clad the square multi-purpose building and trapezoidal entrance that are part of the 7,400-square-foot center in gray brick, while the circular planetarium has an EIFS (exterior insulation finishing system) exterior mixed with mica to add a star-like sparkle to the façade. The geometric exterior design of the circular planetarium "is an abstract representation of an image recorded by the Hubble Space Telescope," explains Kris Kowal, project designer, WBRC.



The exterior of the planetarium is based on connecting points of intensity between stars and a series of linear images.



"We connected points of intensity between stars and a series of linear images began to emerge," he continues, describing the creative process that led to the exterior design. "Once diagrammed, the image itself was wrapped around the planetarium and impregnated with color." To balance security with the need for a dark sky, the team utilized tall light poles with white lights at the top. Red lights lower on the poles are illuminated, instead of the white lights, when the observatory is in use.



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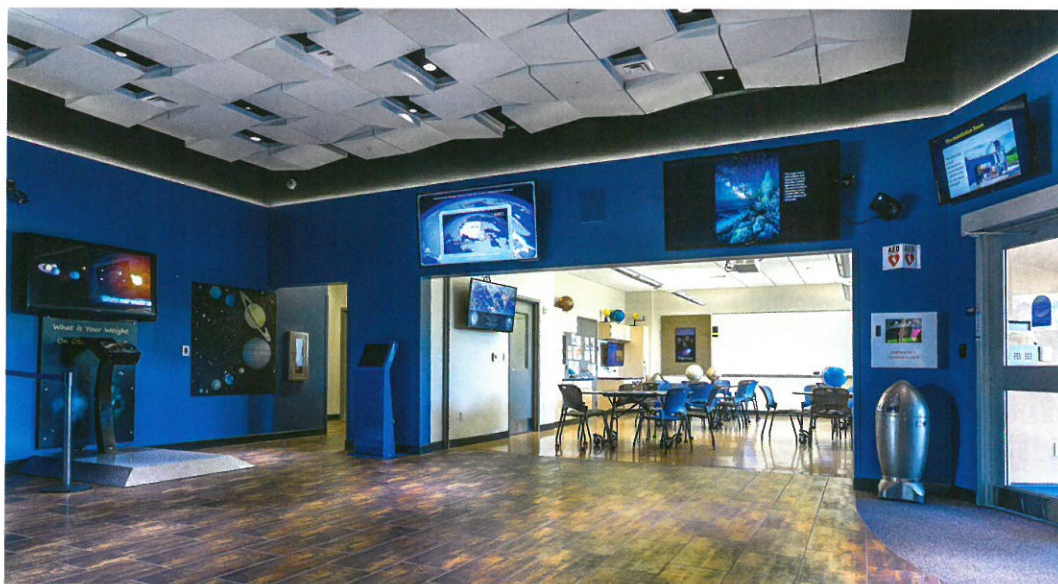
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In the lobby, metallic floors, dark blue walls and an undulating metal ceiling with star-like light fixtures add to the experience.



WBRC was also charged with designing a facility that would transport visitors from its earthly location to one of interstellar wonder. The team paid careful attention to the entry sequence into the building. "An architectural portal at each entrance facilitates this illusion," says Kowal, "making passage into the key spaces an active experience."

In the lobby, metallic floors, dark blue walls and an undulating metal ceiling with star-like light fixtures add to the experience. Interactive educational kiosks on topics including space exploration and energy conservation, as well as office space are located in the lobby, which separates the multi-purpose building on one side from the planetarium theater on the other. The multi-purpose building, which has large windows on the east side, is a flexible space that can accommodate large or small groups, and has a room with cubbies for children to store backpacks, coats and boots during their visit.



"The projection equipment is hidden, so there is kind of a magic to the space."

— Bill Chomik,
senior principal, Kasian

Planetarium with two Definiti projectors provides an immersive learning experience.

The experience of being transported from earth to the stars reaches its apex as guests enter the planetarium. The carpet pattern resembles satellite imagery of Earth. Seat fabric features round shapes and stars. Unlike in many other planetariums, "the projection equipment is hidden" in this facility, Chomik says, "so there is kind of a magic to the space." Historically, he explains, architects have designed the planetarium dome and then fit the equipment into it. In this case, the theater was designed around the equipment.

Two Definiti projectors, one at the front of the screen (dome) and one at the back, provide visitors with an immersive learning experience. The technology accommodates IMAX shows and 3D films, and projects high-definition, scientifically accurate models of stars, planets, and galaxies from a host of vantage points. The 33-foot dome, tilted 22 degrees for maximum comfort during viewing, is made from aluminum panels perforated with thousands of tiny holes and covered with a high-tech gray paint.

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The perforations help create a clear image, while ensuring proper airflow throughout the theater. "Mechanically speaking, it was important to drop air through the perforated dome and suck it out at the bottom of the theater to avoid a dirty screen," says Mat Ward, senior architect, WBRC. "We had to make sure everything that was behind the screen was matte black or covered by black fabric. Duct work also had to be insulated for sound."

The two projectors also free up plentiful floor space for seating. Because the planetarium is largely a teaching facility, the seating is less sloped than in a more public facility. "When a teacher is holding a class, they like to be able to move around the room," adds Ward. "So the slope is 15.2 degrees, with seating down the middle of the theater that can be removed during a class or put in place for a larger show."



The planetarium seating was designed for comfort and is less sloped than in a public facility to better accommodate instructors.



Observatory includes a 20-in digital PlaneWave CDK20 telescope.

Next to the Emera Astronomy Center is the observatory. The circular structure includes a 20-inch digital PlaneWave CDK20 telescope, which captures images of the night sky that are projected on the planetarium's dome. A pre-existing, four-foot-thick concrete slab was used as the observatory's foundation and reduces vibration from the adjacent road. To ensure temperatures inside and outside the observatory remain the same, which prevents fogged lenses, insulation is minimal and exhaust/intake fans were installed to reduce temperature variations.

The team ensured seating comfort for visitors, as well. "We developed a projection clash-detection modeling system," Chomik says, "that put a 6'4" person in every seat. This way, we could make sure there weren't any interference lines with the projection system. We also brought the dome down as close as possible, so the theater feels extremely immersive." The designers tilted the dome, and decreased the degree of seat tilt in the back rows, for maximum viewing comfort. Ample space between rows, per the client's request, ensures legroom and easy access.

An ADA seating area at the top and at the bottom of the theater, and a ramp wrapping around the outside, provide accessibility. Exit signs were strategically placed to minimize light pollution, while red lights line the stairs. To reduce sound and light, egress areas were sealed, a set of double doors was installed between the lobby and theater, and walls were insulated.



Nearly 80 school children as well as university officials and representatives from WBRC, Emera Inc and the Challenger Learning Center were invited to sign one of the beams used in the roof structure.

For this reason, the observatory was not included in the Emera Astronomy Center's pending submission for LEED Silver certification. One of the primary sustainable strategies driving the certification is the project's geothermal heating and cooling system, explains Ward, "with three additional electric thermal storage units that draw power at night when the rates are lower and store energy for use during the day." The closed-loop system, which is independent from the campus steam system, and doesn't require fuel oil or natural gas, may have a less-than five year payback and greater than 20 percent return on investment.

The star of the Emera Astronomy Center remains its planetarium, however. During construction, nearly 80 schoolchildren were invited to sign one of the beams used in the roof structure. "This is being built for people like you," Karl Ward, president of the construction company Nickerson & O'Day, told the children that day. University officials, and representatives from WBRC, Emera Inc., and the Challenger Learning Center also signed the beam before the kids signaled the crane operator to hoist it into position.

For generations to come, children will tell their children who will, in turn, pass on their enthusiasm for learning and discovery in remembrance of the names inscribed in a permanent part of the planetarium. Undergraduate and graduate students at the University of Maine will also enjoy unprecedented access to research and education in a state-of-the-art facility.

"The planetarium has always been a popular venue for visitors to the University of Maine campus as well as a resource for teaching astronomy on the academic side," Davenport says. "Our new planetarium and observatory are providing us with the opportunity to continue our mission and outreach to current and future generations of learners." ■