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UMASS-Dartmouth's School of Marine Science and Technology is Renovated in Team-Based Approach

By: Joseph Naughton and Rick Anderson, both of Hill International, Inc.

The University of Massachusetts-Dartmouth (UMD) School of Marine Science and Technology (SMAST) is one of the premier oceanic research institutions in the United States, supporting the study of a myriad of oceanic life and environments.

To enable this research, SMAST recently expanded and upgraded its facilities.

Located in New Bedford, Mass., UMD's Marine Science campus, featuring the Department of Fisheries Oceanography and the Department of Estuarine and Ocean Sciences, is home to graduate degree programs in interdisciplinary basic-to-applied marine sciences and the development of related innovative technologies.

The original 32,500 square-foot SMAST facility, referred to as SMAST East, quickly outgrew its space. The university began leasing additional space off-site, which led to financial issues, as well as challenges resulting from separating the school's programs and resources.

The solution consolidated the two locations to create one cohesive campus. This project included renovating the existing SMAST East building and constructing the new 64,500 square-foot SMAST West building. Hill International (Hill) provided project management services to the University of Massachusetts Building Authority (UMBA) for this $55 million project.

"This is a state-of-the-art research facility for all marine science," said Rick Anderson, who served as Hill's Project Manager. Hill's services included managing the design, construction, commissioning, occupancy, and closeout for this project, which finished more than $3 million under budget.

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The major tasks conducted under Hill's management included demolishing a building on an adjacent parcel, constructing the new 64,500 square-foot SMAST West building, renovating the existing SMAST East building, and site/landscape and utility work required to combine the sites into a single integrated campus. Due to its prominent location directly on the ocean and at the end of a peninsula, the facility was designed to withstand the direct force of a hurricane. The facility's glazing alone can withstand a 120 MPH impact of a solid mass, such as a 2 X 4. In addition, most of the critical utilities are located on the second level to withstand any seawater rise or flooding during a hurricane.

Working with the University, stakeholders, design team, construction manager, commissioning team, state and local authorities, and a host of consultants, Anderson developed and led a unique approach to the project with all parties encouraged to engage in the process from concept through handover. Working with the UMBA, the construction management firm was added during design development, which enabled the whole team to take advantage of the construction manager's (CM) experience in procurement, while several of its constructability strategies were incorporated into the design.

From the outset of design development, this project was "over budget." The team collaborated on scope adjustments to set the project back on track. First, the team decided not to decrease the footprint of the facility, instead developing a series of options allowing the building to be constructed at its original footprint, while identifying and setting aside a series of "deferred" work that could be added back into the project if the budget allowed. Next, as the design progressed, the team focused on selecting and procuring major equipment and systems at the best possible value.

As construction commenced, the entire onsite team was housed in one large trailer. This included the OPM, CM, designers, owner, funding agency, commissioning agent, and other specialty consultants. This arrangement immediately eliminated the "us against them" mentality found on many construction projects. In addition, the commissioning agent's early addition provided a significant head start in the process as commissioning activities began immediately as each subcontractor joined the project.

By housing the team in one location, communication was direct and immediate all day, every day, with issues known and addressed by the entire team collaboratively as they occurred. Said Anderson, "This eliminated the tendency to 'blame' others for problems and the mantra became, 'how do we as a team come up with the best solution for this issue right now.'"

This team-based approach also proved valuable regarding change orders, which were reviewed by the entire team weekly, and with the design team and CM, who partnered to develop cost and time-effective solutions to all change order requests.

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"As the project progressed, it became apparent that this total team approach was providing dividends," said Anderson. "The project began tracking under budget, allowing the uncommitted funds to be reinvested into the 'deferred' scope, as well as new scope for the existing SMAST East building. The scheduling and phasing strategies we developed worked in concert with design changes, re-incorporating 'deferred scope,' new scope, and factoring in the academic calendar. In the end, all critical milestones were met and the building began operations on time at the beginning of the academic year."

The SMAST West building features cutting-edge wet/dry research labs and researcher offices, computational research labs, flexible classroom space, a seawater research facility, administration space, and the Division of Marine Fisheries' offices, licensing, and dive-gear program. SMAST West achieved LEED Silver certification.

The centerpiece of the facility is a seawater research lab, which pumps seawater 1,200 feet at 400 GPM from the ocean through massive drum filters and treats the seawater before entering multiple heat exchangers that feed more than 18 tanks ranging from 10 feet in diameter to over 20 feet in the lab. The treatment of the seawater includes temperature control, drum and fluidized bed filtering, UV sterilizers, protein fractionators, degassing systems, energy recovery, and recirculating systems.

The system is maintained by sophisticated controls that sustain all variables within tight tolerances supported by a 750 KW standby generator. This system enables researchers to replicate ocean conditions whether inland waterways or 300 feet deep off the Grand Banks. The system is 100% redundant, ensuring fish and other aquatic animals in the tanks can be sustained during any power outage or in the event of a failure of equipment. The lab is outfitted with dimmable lighting control to simulate daylight and nighttime conditions if required. Radiant heating coils in the floor allow tight atmospheric control to maintain consistent atmospheric temperature within the lab. In addition, the lab is equipped to support networked monitors, sensors, and other computer recoding equipment.

"This facility is impressive," Anderson said. "Along with a state-of-the-art seawater lab, there is a super computer and computation labs. The professor in charge of the operation models weather, tracks ocean currents, and assists the Coast Guard. For example, the Coast Guard can give them a location and time of where something went missing in the ocean, and the researchers model where that item might be 10 hours later based on the weather and the ocean currents. This work is particularly critical during times of hurricanes and other large-scale weather events."

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