SUSTAINABLE LABORATORY COMPETITION

2011-2012 INTERNATIONAL SUSTAINABLE LABORATORY STUDENT DESIGN COMPETITION

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INTRODUCTIONS

The **Association of Collegiate Schools of Architecture** (ACSA) is pleased to announce the International Sustainable Laboratory Student Design Competition for the 2011-2012 academic year. Inspired by the success of the Laboratories for the 21st Century (Labs21®) Student Design Competition (2003–2004), the **International Institute for Sustainable Laboratories** (I^2SL) is hosting the International Sustainable Laboratory Student Design Competition with the **Office of Insular Affairs** (OIA) of the U.S. Department of the Interior and in collaboration with the Association of Collegiate Schools of Architecture and the **Joint Institute for Caribbean Marine Studies** (JICMS).

This competition will enable architecture and engineering students from around the world to provide new and innovative thinking in the creation of energy-efficient and environmentally-sustainable laboratories.

The competition will focus on the proposed Salt River Bay Marine Research and Education Center (MREC), to be located within Salt River Bay National Historical Park and Ecological Preserve (SARI) a unit of the National Park Service (NPS) on the island of St. Croix in the U.S. Virgin Islands (USVI).

I mage of Coral Reef in the U.S. Virgin Islands

THE IMPORTANCE OF SUSTAINABLE DESIGN

Sustainably designed buildings seek to reduce or eliminate their impact on the environment through reduced energy use and resource efficiency. The building industry—encompassing facility design, construction, engineering, and facility operation—is seeking to develop, redevelop, and retrofit buildings that are healthy, environmentally responsible, and cost-effective. The goal is to minimize natural resource consumption while enhancing social and economic benefits.

INNOVATION

This competition seeks to explore and develop ideas, systems, and applications utilizing sustainable designs for the Marine Research and Education Center laboratory and campus, based on the actual building program of the facility and the project goals of the partners.

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"As a building type, the laboratory demands our attention. What the cathedral was to the 14th century, the train station was to the 19th century, and the office building was to the 20th century, the laboratory is to the 21st century. That is, it is the laboratory that embodies, in both program and technology, the spirit and culture of our age and attracts some of the greatest intellectual and economic resources of our society." Don Prowler, FAIA, 1950-2002

The competition sponsors are combining efforts to make the public more aware of the important role that energy-efficient and environmentally-sustainable laboratories serve in the educational, economic, and social success of our communities and nations. This milestone competition will enable students to advance building innovations without the limitations of conventional industry practices—and use their unfettered creativity to shape the future of sustainable laboratory design, engineering, and operation.

COMPETITION PHILOSOPHY

Laboratories, as a building type, must provide spaces that enable scientists to conduct experiments with extensive rigor and controls, thereby ensuring that the results of experiments are authentic, replicable, and long lasting. The complementary needs for rigor, control, and safety have driven the evolution of the earliest laboratories into today's complex and sophisticated structures.

All laboratories—from instructional to research and testing facilities—should provide an environment that functions, attracts, engages, and motivates scientists to their highest level of creativity and intellect. This competition encourages participants to break through traditional thinking to creating buildings that do much more.

Given the impact of the built environment on the ecological health of our planet, sustainable design is one of the most critical issues challenging building designers. For laboratories, this is especially true, given that lab facilities are among the largest energy users among buildings. Architects and engineers, therefore, must embrace the ethic of sustainable design and engineering to create buildings not only of beauty and integrity, but also of ecological soundness and performance.

Based on this vision, the 2011-12 International Sustainable Laboratory Student Design Competition will promote in participating students an awareness of the challenges of creating laboratories sustainable in design, engineered systems, and operations.

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MARINE RESEARCH ON ST. CROIX

Research has been an important activity within the U.S. Virgin Islands for more than a quarter century.

St. Croix, the southernmost of these islands, provides a rich environment for tropical marine research, especially on coral reef ecosystems. Marine research activities began on St. Croix in the late 1960s, providing some of the oldest available data on coral reefs. Some of the world's leading marine researchers gathered data at two former marine laboratories on St. Croix: the West Indies Laboratory (WIL) on the east end of St. Croix, and the National Oceanic and Atmospheric Administration's (NOAA) National Undersea Research Program's habitats, the Hydrolab, then the Aquarius, which operated at Salt River Bay until Hurricane Hugo damaged both the National Oceanic and Atmospheric Administration and West Indies Laboratory facilities in 1989. The scientific records generated by investigators at these two facilities are rare for their duration, quality, and documentation of coral reef conditions.

Under a cooperative agreement with the National Park Service, West Indies Laboratory produced the first marine research and assessments at Buck Island Reef National Monument (BUIS), established off St. Croix in 1961. West Indies Laboratory researchers mapped, inventoried, and investigated the ecology, function, status, and trends of Buck Island marine resources, including its coral geology, reef fisheries, marine invertebrates, sea turtles, oceanography, and coral reef habitats. Over time, Buck Island became one of the best documented and studied marine ecosystems in the Caribbean and served as a premiere field school for hundreds of West Indies Laboratory students.

The documentation of the long-term degradation of St. Croix's marine resources was used in 2001 to support the expansion and designation of Buck Island Reef as a marine protected area. In addition, these data have guided resource managers in the recovery of acroporid corals, which are designated as a critical habitat in the U.S. Virgin Islands. These examples show how the National Park Service units on St. Croix have benefited from marine research capacity, and the need for this capacity will only grow as resource management issues become more complex.

THE MARINE RESEARCH AND EDUCATION CENTER CONCEPT

In the mid 1990s, scientists and researchers who had worked on St. Croix began to work with the National Park Service and the Office of Insular Affairs to restore St. Croix's marine research capacity.

In 1999, the Department of the Interior entered into a memorandum of understanding with the newly-formed Joint Institute of Caribbean Marine Studies to aid in the understanding of the marine environment, including coral reef ecosystems, promote marine education and public awareness, and assist in the development of appropriate public policy within the Caribbean.
Through this agreement, the partners sought to:

- Foster collaborative research programs to understand and sustain management of the coral reef ecosystems of the Caribbean.
- Provide support for marine education programs for school children and adults in the U.S. Virgin Islands.
- Foster cooperation with other government, institutional, and private organizations to better understand marine issues in the Caribbean.
- Enrich the learning experiences and opportunities for the University of the Virgin Islands and other university students.

Initial efforts focused on acquiring the West Indies Laboratory site, but the partners and the property owner could not reach agreement. In 2001, the National Park Service acquired property almost 100 acres on the east side of Salt River Bay. Given the combination of global and local threats to coral reefs and its resource management responsibilities, NPS approached the Office of Insular Affairs and the Joint Institutes for Caribbean Marine Studies about building the Marine Research and Education Center at Salt River Bay.

The Marine Research and Education Center project includes research laboratories, classrooms, a lecture hall, teaching aquaria, boats and diving equipment, and housing for students, staff, and visiting researchers. The facility will serve undergraduate and graduate students through a variety of marine education and research programs provided by the Joint Institutes for Caribbean Marine Studies.

In addition to providing research and education programs, the Marine Research and Education Center will enable the partners to strengthen undergraduate and graduate marine studies programs in the U.S. Virgin Islands by providing research and internship experiences not available on St. Croix.

By coordinating with the competition sponsors, the Joint Institute for Caribbean Marine Studies is seeking to instill among tomorrow's planners, architects, and engineers a deep and shared appreciation for scientific research while promoting sustainability as integral to successful scientific endeavors.

THE LOCATION: SALT RIVER BAY NATIONAL HISTORICAL PARK AND ECOLOGICAL PRESERVE

The Marine Research and Education Center will be located on a 96-acre site on the north central coast of St. Croix. The Hemer's Peninsula site east of Salt River Bay offers direct access to ridge-to-reef and reef-to-abyss ecological zones. The site has an extensive cultural history, including the remains of two pre-historic villages of the indigenous Tainos and a ball court constructed more than 2,000 years ago.

The Tainos were pre-Columbia inhabitants of the island. On November 14, 1493, Christopher Columbus's party came ashore at Salt River Bay. It is the only site within U.S. territory visited by Columbus's party during his voyages.

Salt River Bay National Historical Park and Ecological Preserve is one of a few co-managed National Park Service units; National Park Service shares the management responsibilities with the Government of the Virgin Islands. Within the park boundaries are more than 600 acres of mangrove estuarine habitat, coral reefs, and a submarine canyon.

Several miles east of the site, the St. Croix East End Marine Park was established in 2003 as the U.S. Virgin Islands' first territorial marine park. It encompasses 60 square miles, including five square miles of no-take areas off the northern and eastern coasts of St. Croix. Combined with the submerged lands within Salt River Bay National Historical Park and Buck Island Reef National Monument, these marine park areas protect one of the largest coral reef ecosystems in the Caribbean.

The Marine Research and Education Center will be within Salt River Bay's boundaries, so minimizing the impact of the facility on the park is an important project goal. Because a hotel and marina project was partially constructed during the 1970s (prior to Salt River Bay's designation as a national park), Hemer's Peninsula is considered a grey field—a site previously disturbed but not so affected that it is classified as a brown field.

Competition designs must consider the Salt River Bay National Historical Park and Ecological Preserve legislative mandate to study and preserve the park's historical and natural resources, as well as to advance the project's sustainability goals of net zero annual electricity use and net zero water use (so that the project collects at least as much of each of these resources as is used). Additional background information regarding the project partners' goals will be posted on the competition website for reference during the competition.

COMPETITION CHALLENGE

For the competition, students are required to address the following in their submissions:

- Laboratory details integrating the design and engineered systems for the marine research laboratory facility that is part of the Marine Research and Education Center.
- A concept plan describing campus utilities and infrastructure, including on-site energy generation, potable water supply, wastewater disposal, a seawater intake system providing both raw and filtered seawater to the wet laboratories within the Marine Research and Education Center, solid waste disposal, biological hazardous wastes disposal, and transportation infrastructure.

Teams of students from multiple disciplines, including but not limited to facility planning, architecture, engineering, and facility operations, are encouraged to collaborate to fulfill these requirements while addressing critical issues of the program. These include appropriate responses to climate and culture, deference to available natural resources, integration of design and systems, and the maintainability of the laboratory and campus long-term operations and maintenance in a sustainable manner.

In addition, students should apply the following evaluation criteria when defining the concept and scope of their proposal:

- Minimal or no fossil energy consumption.
- Ecologically sensitive water and waste water systems.
- Minimal or no impact to the marine and natural environments during construction.
- Architectural expression that embraces the ethic of sustainability and restoration.
- Integration of engineered solution with sustainable and restorative design strategies.
- Maintainability of building and its components.
- Beneficial ecological impact.
- Design for human performance.
- Design for flexibility and adaptability.
- Design for long-term sustainable operations and maintenance.
- Exceptional innovation.

REQUIREMENTS FOR MARINE RESEARCH AND EDUCATION CENTER DESIGN

The Laboratory shall:

- Incorporate life-cycle strategies that consider the living marine systems and that are at once restorative and adaptive. Because the mission of the Marine Research and Education Center is to understand marine ecosystems within the U.S. Virgin Islands, the program is envisioned to continue indefinitely. Because the means and methods to achieve research and education goals change over time, designs are encouraged to include strategies that can adapt to evolving needs.
- Utilize technologies that are appropriate for the remote nature of the site and that are maintainable/upgradeable for the lifespan of the building.
- Provide collaborative spaces that inspire learning through teaching and research.
- Serve to reenergize the scientific community in the Caribbean.
- Provide storage for scientific and historical records/artifacts.
- Accommodate 12 researchers and/or scientists.
- Include wet and dry laboratories that will support a flexible marine science research program; a computer lab supporting these laboratories that also can be used for classroom instruction; classroom space accommodating a maximum of 48 undergraduate students at one time; and teaching laboratories to serve these students.

The Campus shall:

- Be a local attraction and engage the local community, and perpetuate island culture.
- Minimize (elimination is preferred) the use of fossil fuel for energy use.
- Reduce the construction impacts of energy use, emissions, and erosion.
- Favor local materials and modular construction.
- Demonstrate the sustainability ties between design, construction, operations, and maintenance.

MARINE RESEARCH AND EDUCATION CENTER SPACE SUMMARY

As the Marine Research and Education Center campus will comprise multiple buildings, competitors are encouraged to use creativity in designing the number of individual structures and the separation or combination of their functions. Below is the Marine Research and Education Center's actual building program that encompasses the functions of the facility. This program should be used as guidance in the submittals but can be adapted for use by the teams.

Program Space	Description	Total GSF
Buildings		
Laboratory	*Wet & dry laboratories (flexible marine research for 12 research/scientists)*	
	Computer Lab	
	Classroom space (for a maximum of 48 students)	
	Teaching Laboratories	
	Storage for scientific and historical records/artifacts	
	Laboratory & Lab Support Spaces - TOTAL	15,000
Building Administration	Offices & office support spaces	3,500
Lecture & Teaching	Classroom, theatre, conference rooms	5,000
Community Outreach	K-12 education facilities, exhibits, & touch tanks	6,000
Collections	Collections archive/storage, object preparation, object cataloging	2,500
Living/Housing Accommodations	Student residences (up to 48 students), dining space (capacity for 60), staff housing (4 residences), support for these spaces	20,000
Boat Dock/Dive Operations	Dock & Dive operations & support spaces	3,000
Maintenance Building	Other support spaces including fuel storage, loading docks, etc.	5,000
Building Totals		**60,000**
Site		
Site Support	Seawater holding tanks, energy gentration, composting, transportation, etc..	

ENVIROMENTAL CONSIDERATIONS

AMBIENT AIR TEMPERATURE

The average dry bulb temperature of St. Croix is 82°F, with temperatures remaining relatively constant throughout the year with a typical swing of ± 10°F. There is very limited seasonal variation in temperature with modest diurnal temperature swings (day-night).

WATER TEMPERATURES

Water temperature data will be provided on the competition website.

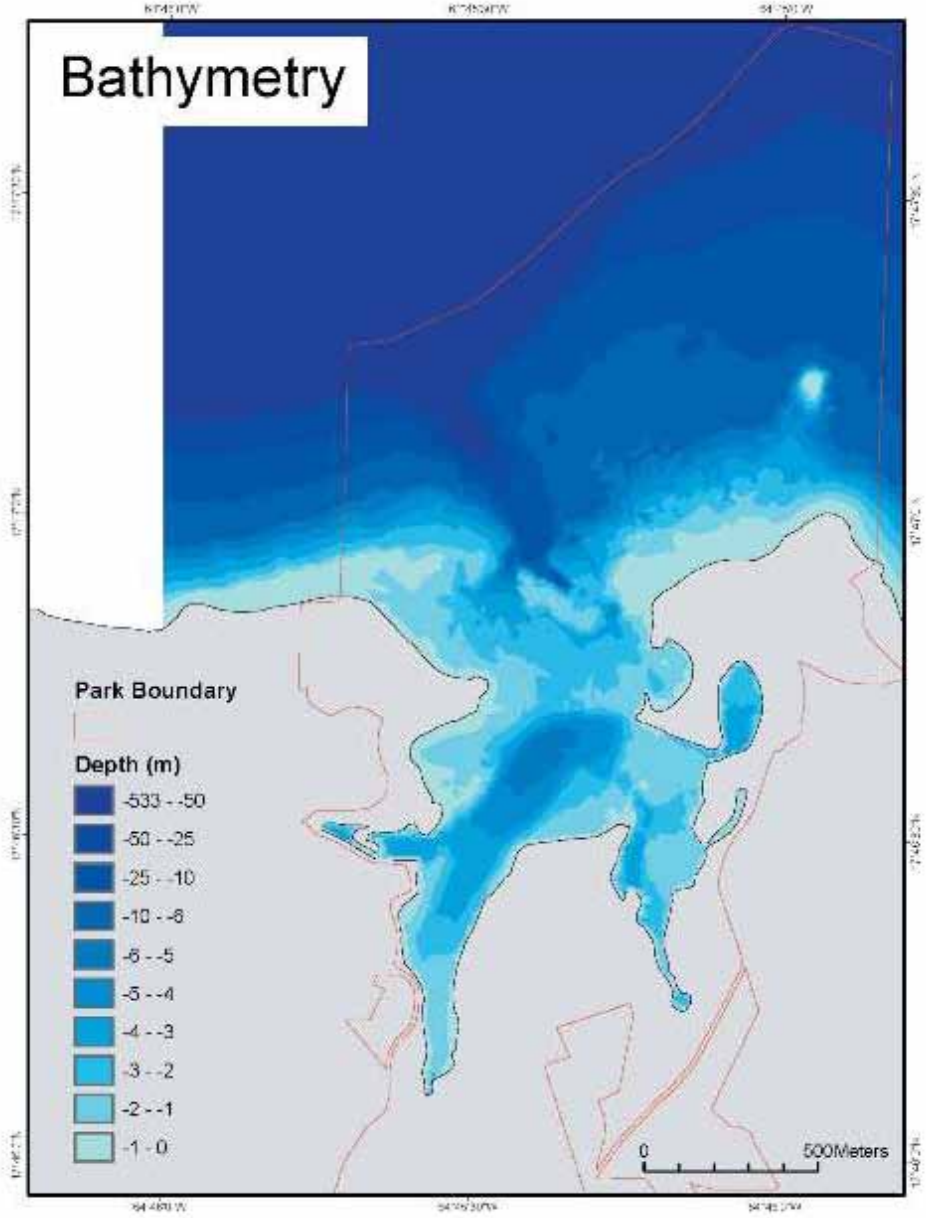

Figure 1: Interpolated bathymetry for Salt River Bay, based on the available soundings conducted in 1982 and 1977 from National Oceanic and Atmospheric Administration Geophysical Data System.

HUMIDITY

The relative humidity in St. Croix also has fairly limited seasonal variation, averaging approximately 70 percent and generally staying between a low of about 60 percent and a high of 90 percent.

WIND

A wind rose diagram plots the annual frequency of wind speed and direction, with the prevailing winds predominantly from the east and southeast and velocities most commonly in the range of 3 to 6 meters per second.

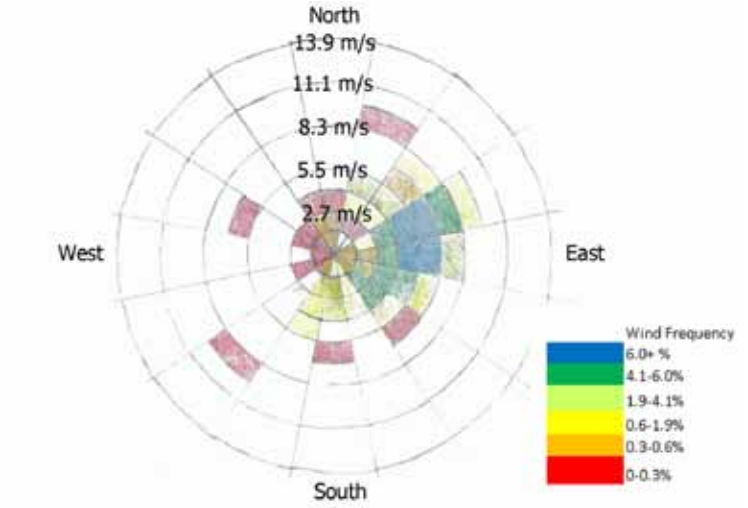

Figure 2: Wind Rose Diagram

SOLAR RADIATION AND CLOUD COVER

The solar radiation on site is relatively high, averaging 5.4 kilowatt-hours per square meter per day, with only 40 percent average annual cloud cover.

Figure 3 shows the sun path at the site, the park boundary, 100 year floodplain, and an archeological zone on the site. This exhibit was developed for the partners during the Marine Research and Education Center's conceptual design process and is provided here as guidance for campus master planning purposes.

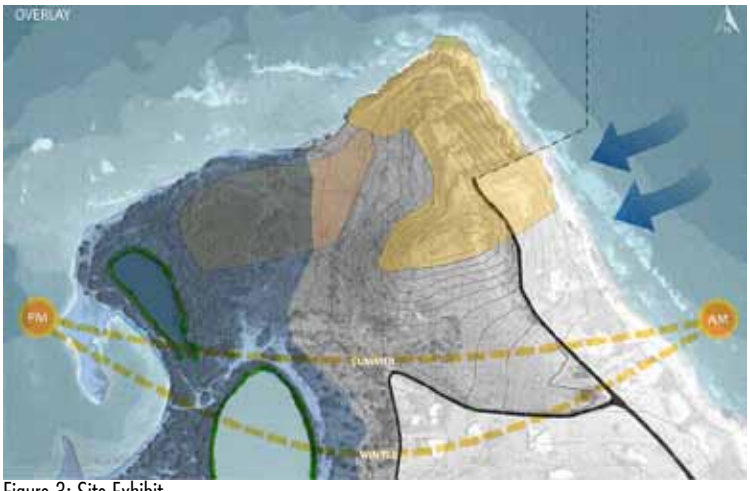

Figure 3: Site Exhibit

PSYCHROMETRIC CHART

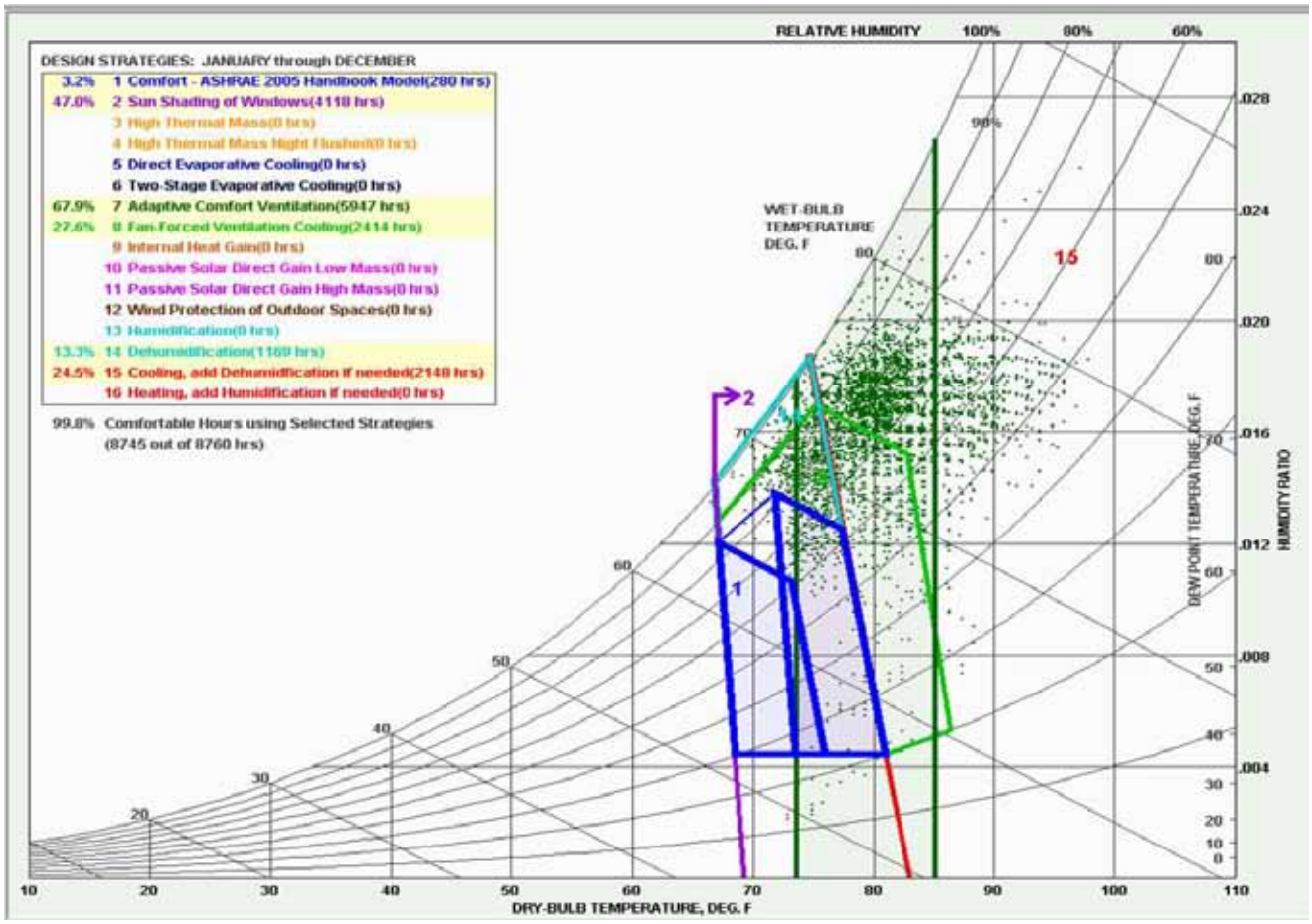

Figure 4: Psychrometric Chart

Figure 4 provides a graphic representation of human comfort conditions, plotting dry-bulb temperature, wet-bulb temperature, and relative humidity. The Marine Research and Education Center program contains both museum storage and laboratory spaces which have both temperature and maximum relative humidity requirements of 60 percent.

SUSTAINABLE DESIGN METRICS

Green building rating systems can provide an effective, holistic framework for both addressing the environmental impacts of building design and construction as well as setting concrete performance targets to inform design. Additional sustainable design resources may be found on page 18 of this program.

FACILITIES MAINTENANCE

Design and engineered systems must acknowledge the surrounding environment and occupants in regards to maintenance, accessibility, durability, and cost feasibility.

COMMUNITY AWARENESS AND IMPROVEMENTS

A key goal of the Marine Research and Education Center is the demonstration of environmentally-responsible, sustainable development. A key element of sustainability is that the project be designed in response to local environmental challenges and in harmony with local conditions while supporting cultural awareness.

A 2005 survey identified air quality and sewage as the environmental areas of greatest concern to St. Croix residents. The island is home to the HOVENSA Refinery, the second largest oil refinery in the United States and one of the 10 largest oil refineries in the world. In 2011 the U.S. Environmental Protection Agency began a 3-month study of air pollution in response to community concerns about the health impacts of airborne chemical releases from the refinery. Additional air quality threats are posed by the Richmond power plant near Christiansted, St. Croix, which produces electricity using oil-fired generators.

Highly publicized raw municipal sewage discharges have caused periodic fish kills and beach closures. The majority of homes on St. Croix are served by septic systems. Due to poor soil conditions, steep slopes, and limited regulations, untreated effluent from failing septic systems also poses an environmental challenge, both to human health as well as the marine ecosystems that are the focus of the Marine Research and Education Center. Erosion and sedimentation resulting from stormwater runoff caused by poor soils, steep slopes, and conventional development further stress the marine ecosystem. Additionally, the services conventionally provided by municipal systems in other locations are much more expensive and less reliable on St. Croix.

There is very limited freshwater supply from 'conventional' sources. There is little ground water and obtaining municipal water from a desalinization plant is energy-intensive and expensive. Municipal electricity is among the most expensive in the U.S., and the supply is unreliable with frequent, unpredictable interruptions which pose a particular challenge in a research environment where reliability is critical.

An environmentally responsible facility on St. Croix should be designed to directly address the local environmental challenges of air pollution; water pollution (both from sewage and stormwater); limited water supply; and polluting, expensive, and unreliable electricity.

Proposed Site for the Marine Research Education Center at Salt River Bay

EVALUATION CRITERIA

Faculty sponsors are expected to develop a system to evaluate the work of their students using the criteria set forth in this document. Describing performance goals is encouraged as an integral part of the design process, encouraging students to scrutinize their work in a manner similar to that of the jury.

The final result of the design process will be a submission of up to four presentation boards describing the design solution (see Digital Presentation Format and Required Drawings sections of this document). In addressing the specific issues of the Competition Program, submissions must clearly demonstrate the design solution's response to the following Evaluation Criteria:

- Beneficial Ecological Impact
  The design solution should achieve energy and environmental performance goals that significantly reduce energy use and environmental impact compared to standard practice. To this end, the project should adopt a whole-building design process (see definition below) that appropriately integrates building systems for performance. The project should consider life-cycle costs and benefits in adopting green design strategies pertaining to energy use, water conservation, and materials.

- A whole-building design process refers to the process where designers and operators with various expertise collaborate to achieve a common objective. The fundamental challenge of whole building design is to understand that all building systems are interdependent and the result of each set of decisions has a cascading impact on other design decisions. For example, the design of a daylighting system is the result of an architect designing a window system, working with an engineer designing a lighting and lighting control system, and an interior designer selecting wall color and interior furnishings. The result of this collaborative decision process is then used by the mechanical engineer when sizing the heating and cooling system and specifying duct sizes. The goal of the process is to lead to a building design where the building works and can be maintained for the life of the building as one integrated system.

- Minimal or No Fossil Energy Consumption
  The Government of the Virgin Islands requires a 25 percent reduction in fossil energy consumption in the Virgin Islands by 2020. Normally, placing a facility like the Marine Research and Education Center on the island would inhibit the ability for the island territory to achieve this goal. Therefore, to increase the likelihood of achieving the 25 percent goal, students should rely heavily on reducing demand through energy-efficient building systems and generating the remaining energy loads with renewable energy from any and all naturally occurring sources.

- Ecologically Sensitive Water and Waste Water Systems
  Caribbean communities either thrive or fail based on how they manage their fresh water resources. U.S. Virgin Islands code requires rainwater collection; and municipal water/sewer is not available at the project site. Furthermore, chemicals from treated water, failed septic systems, and poorly managed storm runoff are major contributors to decline in coral populations. The Marine Research and Education Center needs to capture, treat, store, and return its fresh water resources in a manner beneficial to the neighboring ecosystems.

- Minimal or No Impact to the Marine or Natural Environments During Construction
  Students should seek to limit waste generation, emissions, or erosion of the natural environments of the Salt River Bay National Historical Park and Ecological Preserve as well as the island of St. Croix. This project is envisioned as a zero waste model for island construction.

- Architectural Expression that Embraces the Ethic of Culture, Sustainability, and Restoration
  The design solution should demonstrate sustainable/restorative design as an integral and synergistic element of an architecture that is aesthetically delightful and contextually sensitive to people, place, and time. Many projects have as a goal the reduction of environmental impacts. The goal of this project is to design a facility that becomes a net asset to the occupants, campus, and community. The building itself should become a learning tool that invites and engages the campus community to see and experience sustainable design and, thereby, increase awareness of the positive ecological impacts a building can have.

- Integration of Solutions with Sustainable/Restorative Design Strategies
  Architectural design and engineered systems must reinforce the common commitment to sustainability and restoration both in form and function as well as support long-term sustainable operations.

- Maintainability of Products and Facility
  The delivery of a sustainably constructed and designed facility is only a first step toward meeting the objectives of this competition. The ability and durability of design, components, products, and systems must be readily accessible, cost effective in their maintenance, and long-lasting in providing the service for which they were intended. The maintenance process itself must have low environmental impacts on the staff, building occupants, and the community.

- Design for Human Performance
  The design solution should support and enhance the learning process through spatial configurations that foster collaboration between students and their faculty, and through spaces that achieve high levels of indoor environmental quality pertaining to ergonomics, thermal comfort, visual quality, acoustic performance, and indoor air quality.

- Design for Research Functionality
  The laboratory shall be designed to incorporate elements needed for modern marine science research with appropriate adjacencies between the indoor laboratories, classrooms, and outdoor research spaces.

- Design for Flexibility and Adaptability
  The design solution should allow for changes in programmatic needs and associated laboratory configurations by using modular design and flexible distribution systems in order to reduce waste generation in the future, and disruption of the building functions, and incorporates life-cycle strategies that consider living marine systems that are at once restorative and adaptive.

- Exceptional Innovation
  Special credit will be given to competitors that incorporate particularly innovative ideas in their design solutions—ideas that achieve results beyond the expectations of the sponsors.

DESIGN INNOVATION

The Marine Research and Education Center is a real project being developed by the Joint Institute for Caribbean Marine Studies in partnership with the U.S. government. Students should focus on their own innovative and original designs for the project.

Concepts and strategies contained in all submissions, not just winning submissions, have the opportunity of being applied at the actual Marine Research and Education Center campus. Students' contributions would be recognized if this occurs.

SUSTAINABLE LAB COMPETITION

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SCHEDULE

February 15, 2012	Online competition registration deadline
May 22, 2012	Final entry submission deadline
Summer 2012	Prize winners selected by competition jury
Summer 2012	Winners are notified by Association of Collegiate Schools of Architecture
September/October 2012	Distribution of the digital competition summary publication to all schools of architecture
October 2012	Winners announced and awards presented at the Labs21 2012 Annual Conference
Winter 2012	Submissions posted to the International Institute for Sustainable Laboratories' website
March/April 2013	Winning entries displayed at 2013 Association of Collegiate Schools of Architecture Annual Meeting, San Francisco, CA.
May/June 2013	Winning entries displayed at 2013 American Institute of Architects (AIA) National Convention, Denver, Colorado

Ariel view of the U.S. Virgin Islands, St. Croix

AWARDS/BENEFITS

The design jury will meet in summer 2012 to select winning projects and honorable mentions. Winners and their faculty sponsors will be notified of the competition results directly. A list of winning projects will be posted on the Association of Collegiate Schools of Architecture website at www.acsa-arch.org and the International Institute for Sustainable Laboratories website at www.i2sl.org. Cash prizes of $14,000 will be divided among winning students and their faculty sponsors.

Additional Benefits:

- Concepts and strategies contained in all submissions, not just winning submissions, have the opportunity of being applied at the actual Marine Research and Education Center campus. Students' contributions would be recognized if this occurs.
- All concepts and strategies, including student contact information if provided, will be placed on the International Institute for Sustainable Laboratories website. This information will therefore be available to any marine island or laboratory project worldwide.
- Winning students may be considered for internships with competition sponsors and other organizations involved in the sustainable laboratory community.
- Winning groups and instructors may be flown to San Jose, California, USA, for the Labs21 2012 Annual Conference. They will be recognized in the conference Opening Plenary session, given an opportunity to present their projects during the technical sessions, honored during the conference awards luncheon or an evening reception, and photographed for publication.

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ELIGIBILITY

Students from all Association of Collegiate Schools of Architecture member schools around the world will be eligible to participate in the competition. Students may work individually or in teams and must work with a faculty sponsor on the submission. Teams must be limited to a maximum of five students. There will be no additional fee for eligible students to participate in the competition.

LANGUAGE

The official language of the competition is English.

REGISTRATION

A faculty sponsor is required to enroll students by completing an online registration form (available at www.acsa-arch.org/competitions) by February 15, 2012. Faculty may complete a form for the entire studio or for each individual student or team of students participating. Students or teams wishing to enter the competition on their own must have a faculty sponsor who should complete the form. There is no entry or submission fee to participate in the competition. Each registered student and faculty sponsor will receive a confirmation email that will include information on how the student(s) will upload final submissions online. Please add the email address competitions@acsa-arch.org to your address book to ensure that you receive all emails regarding your submission.

During registration the faculty will have the ability to add students, add teams, assign students to teams, and add additional faculty. Registration is required by February 2012, but can be changed, edited, and added to until a student starts a final submission; then the registration is no longer editable. Faculty may assign a "Faculty Representative" to a registered student. This "Faculty Representative" will have access to change, edit, and add to the registration.

FACULTY RESPONSIBILITY

The administration of the competition at each school is left to the discretion of the faculty sponsor within the guidelines set forth in this document. Work on the competition may be structured over the course of one or two semesters (Fall 2011 and/or Spring 2012).

CODES

Refer to the International Building Code for information on standard requirements. Participants should follow the principles of universal and sustainable design.

SUBMISSIONS

All competition submission must include:

- Four digital presentation boards for the laboratory sized at 20" x 30" each. The digital boards should clearly show the students response and design solutions, with one board dedicated to each of the following: the laboratory model, sustainable resolution and campus plan.
- A 500 word maximum design essay that supports the above mentioned digital presentaion boards by describing the proposed campus infrastructure.

Incomplete or undocumented entries will be disqualified. All drawings should be presented at a scale appropriate to the design solution and include a graphic scale and north arrow.

DIGITAL PRESENTATION BOARDS

Submissions must be designed on no more than four 20" x 30" digital boards. The names of student participants, their schools, or faculty sponsors, must NOT appear on the boards. The digital boards should clearly show the students response and design solutions, with one board dedicated to each of the following: the laboratory model, sustainable resolution, and campus plan.

All boards are required to be uploaded through the Association of Collegiate Schools of Architecture website in Portable Document Format (PDF) or image (JPEG) files. Participants should keep in mind that, due to the large number of entries, preliminary review does not allow for the hanging end-to-end display of presentation boards. Accordingly, participants should not use text or graphics that cross over from board to board. The names of student participants, their schools, or faculty sponsors, must NOT appear on any of the submitted material.

The digital presentation boards must directly address the criteria outlined in the Evaluation Criteria section and must include (but are not limited to) the following elements.

For the laboratory

- Floor plans and circulation patterns.
- Elevations and building sections.
- Laboratory module layout.
- Building materials and application.
- Building systems and system integration strategies within the laboratory.
- Control strategies for daylighting, occupancy, air supply and exhaust, and energy management.
- Large scale drawing(s), either orthographic or three dimensional.
- A three dimensional representation in the form of either an axonometric, perspective, or model photographs, one of which should illustrate the character of the project.

For the campus

- Site plan showing infrastructure systems such as energy generation, waste management and recovery, water treatment and recovery, transportation, and accessibility.
- Plan for managing proposed infrastructure services, such as energy distribution, throughout the campus.

Please note that the digital presentation boards should graphically convey the design solution and context as much as possible, and not rely on the design essay to convey a basic understanding of the project.

DESIGN ESSAY

A 500 word maximum essay (in English) is required as part of the submission to support the campus schematic by describing the proposed campus infrastructure. Keep in mind that the digital presentation boards should graphically convey the design solution and context as much as possible and not rely on the design essay to convey a basic understanding of the project.

The names of student participants, their schools, or faculty sponsors, must NOT appear in the design essay. This abstract is included in the final online submission, completed by the student(s) in a simple copy/paste text box.

ONLINE PROJECT SUBMISSION

The student is required to submit final entries through the Association of Collegiate Schools of Architecture competition website at www.acsa-arch.org/competitions by 5 p.m. Eastern Time on May 22, 2012.

If the submission is from a team of students all student team members will have the ability to upload the digital files. Once the final submit button is pressed no additional edits, uploads, or changes can be made. Once the final Submission is uploaded and submitted each student will receive a confirmation email notification. The submission is not complete until the "complete this submission" button has been pressed. You may "save" your submission and return to complete it later. For team projects, any member of team may submit the final project.

A final submission upload must contain the following:

- Completed online registration including all team members and faculty sponsors.
- Each of the four 20" x 30" boards uploaded individually as high resolution Portable Document Format (PDF) documents or image (JPEG) files.
- A design essay (500 word maximum essay).

Winning projects will be required to submit high resolution original files/images for use in competition publications and exhibit materials. Upon receipt, submissions become the property of Association of Collegiate Schools of Architecture and the International Institute for Sustainable Laboratories.

Students are encouraged to research references that are related to St. Croix, laboratory responses, sustainability/environmental systems, the design problem, and precedent projects. An intention of the competition is to make students aware that research is a fundamental element of any design solution. Following are a few sample research reference websites, publications, and case studies.

PUBLICATIONS AND WEBSITES

The following resources provide specific information on laboratory design. Some of these are focused specifically on sustainability in laboratory facilities, and faculty sponsors are strongly encouraged to use these resources. They are essential for understanding the nature, scope, and objectives of the competition program.

- Marine Research and Education Center webinar www.i2sl.org/competition/webinar.html.
- A Design Guide for Energy-Efficient Research Laboratories http://ateam.lbl.gov/Design-Guide/
- American Institute of Architects, Center for Advanced Technology Design. Guidelines for Planning and Design of Biomedical Research Laboratory Facilities. (Washington, DC: American Institute of Architects, 1999)
- Braybrook, Susan. Design for Research: Principles of Laboratory Design. (New York: John Wiley & Sons, 1993)
- Cooper, Crawley. Laboratory Design Handbook. Boston: CRC Press, 1994.
- Griffin, Brian. Laboratory Design Guide, Third Edition (Architectural Press, 2004)
- Introduction to Low-Energy Design Guide www.labs21century.gov/toolkit/ledintro.htm
- Labs21 Case Studies www.labs21century.gov/toolkit/case_studies.htm
- Labs21 Environmental Performance Criteria www.epa.gov/lab21gov/toolkit/epc.htm
- McIntosh, I., PhD, et al. ASHRAE Laboratory Design Guide, RP-969. (Atlanta, GA: American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. , 2002)
- National Science Foundation. Planning Academic Research Facilities: A Guidebook. (Washington, DC: National Science Foundation, 1992)
- Ruys, Theodora. Laboratory Facilities, Vol. 1 of Handbook of Facilities Planning. (New York: Van Nostrand Reinhold, 1990)
- Watch, Daniel. Building Type Basics for Research Laboratories, Second Edition. (New York: John Wiley & Sons, 2008)
- Whole Building Design Guide http://wbdg.org
- Department of Energy Buildings Database http://buildingdata.energy.gov/
- Department of Energy Federal Energy Management Program High Performance Federal Buildings Database http://femp.buildinggreen.com/index.cfm
- National Renewable Energy Laboratory's (NREL's) Climate Neutral Research Campuses Online Tool www.nrel.gov/applying_technologies/climate_neutral/
- NREL's Climate Action Planning Tool www.nrel.gov/applying_technologies/planning_tool/

The following resources provide further information on sustainable design practices in general (i.e. practices that are applicable to a wide range of buildings, including laboratories). Students should refer to their own school libraries for many other sources of information on sustainable design issues.

- Renewable Energy Policy Project and Center for Renewable Energy and Sustainable Technology www.repp.org
- U.S. Department of Energy, Energy Efficiency and Renewable Energy www.eere.energy.gov
- U.S. Green Building Council www.usgbc.org
- International Living Future Institute's Living Building Challenge www.ilbi.org
- Powell, Kenneth, and Richard Rogers, Richard Rogers Partnership, Complete Works, Volume Two. (London: Phaidon Press, 2001), "Towards a Sustainable Architecture: Environmental Research and Development," p.236-299
- Steele, James. Sustainable Architecture – Principles, Paradigms and Case Studies. (New York: McGraw-Hill, 1997)
- The Architectural League NY Van der Ryn, Sim, and Stuart Cowan. Ecological Design, Tenth Anniversary Edition. (Island Press, 2007)

CASE STUDIES

In addition to the publications and websites previously listed, competitors are strongly encouraged to research, document, and analyze the projects listed below. This list is provided to encourage and promote the research and analysis of significant works of architecture relevant to the competition program and the integration of sustainable practices. An intention in all Association of Collegiate Schools of Architecture administered student design competitions is to make competitors aware that background research is a fundamental component of all design problems.

Center for Clinical Sciences Research, Stanford University, Palo Alto, California.
Foster & Partners, London, England

- Foster Catalog 2001. Munich: Prestel, 2001
- Architectural Record, 2001 June, v.189, n.6, p.130-137
- GA Document, 2001 Jan., n.64, p.66-73
- Lotus International, n.112, p.38-41
- World Architecture, 2001 Nov.-Dec., n.101, p.24-29

Faculty of Economics and Management, Utrecht University, Utrecht, the Netherlands.
Mecanoo Architecten, Delft, the Netherlands

- Houben, Francine. Mecanoo Architects - Contrast, Composition, Complexity. Boston:
- Birkhäuser, 2001
- Architectural Review, 1996 June, v.199, n.1192, p.63-67
- A+U: Architecture and Urbanism, 1996 Sept., n.9 (312), p.20-35
- Architektur, Innenarchitektur, Technischer Ausbau, 1996 May, v.104, n.5, p.41-45

Fortbildungsakademie Mont-Cenis, Herne-Sodingen (Ruhr), Germany
Jourda & Perraudin Architectes, Paris, France

- Abitare, 2000 Feb., n.392, p.96-101
- Architectural Record, 1999 Dec., v.187, n.12, p.199-204, 206, 208
- Architectural Review, 1999 Oct., v.206, n.1232, p.51-55
- Detail, 1999 Apr.-May, v.39, n.3, p.386-389
- Techniques & Architecture, 1999 June, n.443, p.98-107

Fred Hutchinson Cancer Research Center, Seattle, Washington
Zimmer, Gunsul, Frasca Partnership, Seattle, Washington

- Architecture, 1994 Mar., v.83, n.3, p.68-75
- <http://labs21.lbl.gov/docs/HUTCH30890.pdf>

Georgia Public Health Laboratory, Decatur, Georgia
Lord, Aeck and Sargent Architects, Atlanta, Georgia

- Architectural Record, 1999 June, v.187, n.6, p.166-169
- <http://labs21.lbl.gov/docs/gphl.pdf>

Institute for Forestry and Nature Research (IBN-DLO), Wageningen, the Netherlands
Behnisch, Behnisch & Partner, Stuttgart, Germany

- Blundell Jones, Peter. Günter Behnisch. Boston: Birkhäuser, 2000
- Architectural Record, 2000 Jan., v.188, n.1, p.96-103
- ARQ: Architectural Research Quarterly, 2001, v.5, n.1, p.90-91
- Architectural Review, 2001 Jan., v.209, n.1247, p.28-33
- Landscape Architecture, 2000 Nov., v.90, n.11, p.68-73, 91-92

Louis Stokes Laboratories-Building 50, National Institutes of Health, Bethesda, Maryland
Hansen, Lind and Meyer, Bethesda, Maryland

- <http://labs21.lbl.gov/docs/NIH5030943.pdf>

Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany
Heikkinen & Komonen, Helsinki, Finland

- Braun, Hardo ...[et al.]. Buildings for Science: Architecture of the Max Planck Institutes.
- Boston: Birkhäuser, 2001
- Architectural Record, 2003 Jan., v.191, n.1, p.110-117
- Architectural Review, 2002 Aug., v.212, n.1266, p.52-55
- Architettura, 1999 July-Aug., v.45, n.525-526, p.428-452
- Arkkitehti, 2002, v.99, n.2, p.32-41

Minnaert Building, De-Uithof Campus, Utrecht University, Utrecht, the Netherlands
Neutelings Riedijk Architecten, Rotterdam, the Netherlands

- Zeegers, P. J. Th., and Willem Jan Neutelings. Minnaert Building Utrecht University,
- Neutelings Riedijk Architects. Rotterdam: 010 Publishers, 1998
- Archis, 1998 Apr., n.4, p.40-51
- Architectural Review, 1999 Mar., v.205, n.1225, p.58-61
- A+U: Architecture and Urbanism, 1998 Sept., n.9 (336), p.108-125
- Domus, 1998 June, n.805, p.10-17
- el Croquis, 1999, n.94, p.112-135
- Techniques & Architecture, 1999 Aug.-Sept., n.444, p.84-89

Pharmacia Building Q, Skokie, Illinois
Flad & Associates, Madison, Wisconsin

- <http://labs21.lbl.gov/docs/pharmacia.pdf>

Science and Technology Center, Rider University, Lawrenceville, New Jersey
Kieran Timberlake Associates, Philadelphia, Pennsylvania

- Kieran, Stephen, and James Timberlake. Manual: The Architecture of Kieran Timberlake.
- New York: Princeton Architectural Press, 2002
- ARQ: Architectural Research Quarterly, 2001, v.5, n.2, p.126-150
- Progressive Architecture, 1994 Mar., v.75, n.3, p.64-69

UNESCO Laboratory and Workshop, Vesima (Genova), Italy
Renzo Piano Building Workshop, Genova, Italy

- Buchanan, Peter. Renzo Piano Building Workshop: Complete Works, Vol. 2. London: Phaidon Press, 1995
- Pizzi, Emilio. Renzo Piano. Boston: Birkhäuser, 2002
- Architectural Review, 1995 Sep., v.198, n.1183, p.76-80
- Abitare, 1993 Apr., 317, p.156-169

SUSTAINABLE LAB COMPETITION

2011-2012 INTERNATIONAL SUSTAINABLE LABORATORY STUDENT DESIGN COMPETITION

SPONSORS

The competition is being sponsored by the International Institute for Sustainable Laboratories and the Office of Insular Affairs of the U.S. Department of the Interior.

The **International Institute for Sustainable Laboratories** (I²SL)is devoted to the principles of sustainable laboratories—from design to engineering to operational practice. Through worldwide partnerships and the exchange of technical information, I²SL helps to produce high-technology facilities that address the rapid pace of science, medicine, research, and development in an ever-changing and dynamic world (www.i2sl.org).

The **Office of Insular Affairs**, U.S. Department of the Interior, has oversight of U.S. territories and assists territorial governments in addressing infrastructure and management needs related to water treatment and solid waste systems, roads, public buildings, hospitals, schools, and resource management issues (www.doi.gov/oia).

PROJECT PARTNERS

The **Joint Institute for Caribbean Marine Studies** (JICMS) is a consortium of four universities that will operate the MREC. They include the University of North Carolina Wilmington (UNCW); the University of the Virgin Islands (UVI); Rutgers, the State University of New Jersey (RU); and the University of South Carolina (USC).

National Park Service (www.nps.gov)

Government of Virgin Islands (http://ltg.gov.vi/)

Office of Insular Affairs, U.S. Department of the Interior (www.doi.gov/oia/)

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ADMINISTERING ORGANIZATION

The competition is administered by the **Association of Collegiate Schools of Architecture**, a nonprofit organization founded in 1912 to enhance the quality of architectural education. School membership in ACSA has grown from 10 charter schools to more than 250 schools in several membership categories. Through these schools, more than 5,000 architecture faculty are represented in ACSA's membership. ACSA, unique in its representative role for professional schools of architecture, provides a major forum for ideas on the leading edge of architectural thought. Issues that will affect the architectural profession in the future are being examined today in ACSA member schools. ACSA is committed to the principles of universal and sustainable design.

FOR ADDITIONAL INFORMATION

Additional questions on the competition program and submissions should be addressed to:

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