University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

FACILITIES MASTER PLAN 2012-2022



Facilities Master Plan 2012-2022

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1. EXECUTIVE SUMMARY

Mission Statement

Through its four laboratories across Maryland, the University of Maryland Center for Environmental Science (UMCES) is a research, education, and service institution of the University System of Maryland (USM) and a world leader in the science of coastal environments and their watersheds. The Center's faculty advances knowledge through scientific discovery, integration, application, and teaching, that results in a comprehensive understanding of our environment and natural resources, helping to guide the State and world toward a more sustainable future. Through its role as the responsible institution for administration of the Maryland Sea Grant College and numerous collaborative programs with other institutions, UMCES leads, coordinates, and catalyzes environmental research and graduate education within the University System.

UMCES faculty members advise, teach, and serve as mentors to many graduate students enrolled in USM institutions, particularly through the System-wide graduate programs in Marine Estuarine-Environmental Sciences (MEES), in which UMCES has a leading role. UMCES also delivers its services through environmental science education programs for K-12 students and teachers, pertinent and timely information to the general public and decision makers, technology transfer to industries and the Maryland Sea Grant College.

UMCES contributes to meeting the legislative mandates of the University System of Maryland in numerous ways including: achieving national eminence as one of the world's premier research centers focused on ecosystem science; uniquely integrating research, public service, and education related to the sustainability of environment and natural resources of Maryland and the Chesapeake Bay region; leading the System's nationally ranked graduate program in marine and environmental science; recruiting and retaining a nationally and internationally prominent faculty; attaining research funding and private support far in excess of its state support; promoting economic development; conducting outreach to state and federal agencies; and collaborating with other higher education institutions in Maryland in advanced research and graduate education.

UMCES is among the few institutions in the world to examine a large ecosystem, the Chesapeake Bay and its watershed, in its entirety. UMCES' commitment to integrating environmentally sustainable thinking in all operations including all aspects of future planning is paramount to its mission.

Plan Summary

The University of Maryland Center for Environmental Science, (UMCES), Facilities Master Plan 2012-2022 focuses on a unified vision for an institution that has multiple locations across the state of Maryland. Those locations are unified by the institution's mission in environmental research and public service and its academic vision, that are reflected in its approach to sustainable planning, design and practices.

The Plan uses a common set of planning and sustainable guidelines across the variety of campus histories and locations that make up UMCES. While Center activities are based at six separate locations, not all are on properties under the auspices of UMCES. The Appalachian Laboratory in the mountains of western Maryland, the Chesapeake Biological Laboratory at the mouth of the Patuxent River and the Horn Point Laboratory on the Choptank River on the Eastern Shore are all operated and maintained by UMCES. The Maryland Sea Grant College in College Park and the Annapolis office are both located in privately leased buildings while the Institute of Maryland and Environmental Technology, a three-institution partnership located on Baltimore's Inner Harbor, is housed in the Columbus Center which is operated by University of Maryland Baltimore County.

The Plan essential elements are:

- Planning guidelines for all UMCES locations and campuses
- Sustainability and environmental stewardship guidelines
- Survey of existing facilities and current condition
- Planned capital projects for each major campus
- Planned facility renewal projects for each major campus

2. VISION

The fundamental vision of this plan rests on an appreciation of the fact that the various sites which comprise UMCES constitute an amazing resource of great value and potential as research and educational tools.

The Plan proposes capital projects that, through their program of spaces and strategic location on campuses, will better connect the people that are doing research and teaching.

The Plan places a premium on developing purpose-built spaces on the major campuses to help foster more collaboration that is critical to the cross-disciplinary research and training that UMCES undertakes.

The Plan is guided by a set of overall sustainable design guidelines that apply to all UMCES locations and which are structured to emphasize critical issues that are central to the UMCES academic mission.

The Plan relies on continued development and expansion of IT infrastructure to allow UMCES to more easily share resources and information across campuses and to expand the distance learning initiatives that are already active at UMCES.

The Plan strengthens the public outreach and educational programs at UMCES by providing enhanced and improved facilities to support those activities.

3. PLANNING PRINCIPLES

To achieve this vision the following specific planning principles will guide the physical development of the campuses and the individual facilities within them. These planning principles incorporate sustainable design issues within them as this activity is no longer seen as a separate subset of issues but as fully integrated in the planning and design process for UMCES.

- Integrate sustainable/green design as a holistic approach in the development of land, and the design, construction, and maintenance of all campus facilities.

- Promote a campus community environment at each location. Provide this by locating facilities closer together and improving the design of exterior spaces and paths as well as providing spaces within the facilities that encourage collaboration and chance meetings.

- Foster both formal and informal exchange among the researchers, students, faculty, and staff from all disciplines. Program and design space at a campus scale (outdoors), and within individual facilities, (open accessible meeting and collaboration spaces), to that end.

- Utilize engineering and design innovations to improve environmental quality and conserve materials and energy. Include “Sustainable Design” principles that are consistent with the Maryland Green Buildings Council Report dated November 2011 and national sustainable design standards as outlined by the United States Green Building Council, (USGBC) LEED building evaluation system.

- Campus development and operations should be consistent with Maryland’s Smart Growth policies, Greenhouse Gas Reduction Act, EmPOWER Maryland Initiative and Chesapeake Bay Agreements, which include green buildings, renewable energy efficiency, and water conservation requirements.

- Innovative materials and environmentally sound construction should influence physical development as well as the regional characteristics of the site and buildings.

- LEED Sliver should be the minimum requirement for certification level with a target of LEED Gold certification and a minimum of 35% energy savings over the current energy code compliant standard for all new projects and major renovations.

- Design and construct building space with the maximum flexibility feasible so that over the lifespan of a facility, 40-60 years, changing research needs can be accommodated.

- Treat outdoor service, storage, and work compounds as usable and positive outdoor space with attention to functional arrangement, security, and visual appearance.

- Including accessibility by people with disabilities must be an integral component of the planning and design of buildings and site improvements (i.e. parking, roads, walks, landscaping).

4. SUSTAINABLE DESIGN GOALS AND INITIATIVE

As part of an overall institutional focus on sustainable design practices related to Capital Projects and Facility Renewal Projects, UMCES will focus efforts on sustainable practices in four major sectors.

- Greenhouse gas reductions
- Storm water management and domestic water conservation
- Resource conservation
- Education, civic engagement and communication

These goals and initiatives add up to a comprehensive approach that ties into the American College and University Presidents Climate Commitment, (ACUPCC),signed by President Donald Boesch on December 18, 2007. An important part of that commitment is UMCES institutional Climate Action Plan (CAP) for becoming climate neutral. Related efforts within the Master Plan focus on both retrofitting existing facilities with more energy efficient systems as well as using new projects to raise the bar even further with the more comprehensive opportunities that new projects afford. Campus energy infrastructure projects through utility partnerships also provide a benefit to the institution and the state through reduced operating costs.

5. MAJOR CAPITAL PROJECTS

The Facilities Master Plan provides a framework for initiating solutions to the multiple physical development issues confronting three of the UMCES' laboratories. The other sites of UMCES activities are located in facilities managed by other parties and therefore are not part of this Plan. The documentation for each location focuses on academic programs and UMCES objectives, existing assets and deficiencies and identifies capital development projects required for the next ten years. Consideration has been given during preparation of the Facilities Master Plan to the history and mission of UMCES; existing and projected research, education and service programs and clientele; administrative organization and staffing; the existing inventory of facilities; and the appropriate measures of projected growth. Capital Projects (over$1,000,000), are the major strategic components in the plan, and are developed in conjunction with and supported by the Facility Renewal Projects.

- Appalachian Laboratory
    - Laboratory Building Addition
    - Field Laboratory
- Chesapeake Biological Laboratory
    - R. V. Truitt Replacement Laboratory
    - New Information & Communications Services Building
    - Mansueti Laboratory Renovation
- Horn Point Laboratory
    - Coastal Dynamics Laboratory
    - Morris Marine Lab Renovation

Facility Renewal Projects

This Facilities Master Plan documents a need for increases in maintenance, operating, facilities renewal, and additional funds to maintain the existing physical plant and to provide modern, state-of-the-art research and support facilities through the renovation and upgrading of existing facilities. These required improvement projects, coupled with the associated infrastructure improvements, are essential to strengthen and enhance existing research programs, to provide a renewed identity and focus to each campus, and to help UMCES overall achieve a more integrated sense of institutional purpose and identity.

These projects will contribute substantially to reduced energy use and are inherently supportive of a sustainable design approach in that they re-purpose existing buildings and thereby extend the useful life of existing materials and reduce green house gas emissions that would otherwise go to all new construction projects.

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University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

1. UMCES Institutional History and Background

1.1 UMCES Overview

Through its four laboratories across Maryland, the University of Maryland Center for Environmental Science (UMCES) is a research, education, and service institution of the University System of Maryland (USM) and a world leader in the science of coastal environments and their watersheds. The Center's faculty advances knowledge through scientific discovery, integration, application, and teaching, that results in a comprehensive understanding of our environment and natural resources, helping to guide the State and world toward a more sustainable future. Through its role as the responsible institution for administration of the Maryland Sea Grant College and numerous collaborative programs with other institutions, UMCES leads, coordinates, and catalyzes environmental research and graduate education within the University System.

UMCES faculty members advise, teach, and serve as mentors to many graduate students enrolled in USM institutions, particularly through the System-wide graduate programs in Marine Estuarine-Environmental Sciences (MEES), in which UMCES has a leading role. UMCES also delivers its services through environmental science education programs for K-12 students and teachers, pertinent and timely information to the general public and decision makers, technology transfer to industries and the Maryland Sea Grant College.

UMCES contributes to meeting the legislative mandates of the University System of Maryland in numerous ways including: achieving national eminence as one of the world's premier research centers focused on ecosystem science; uniquely integrating research, public service, and education related to the sustainability of environment and natural resources of Maryland and the Chesapeake Bay region; leading the System's nationally ranked graduate program in marine and environmental science; recruiting and retaining a nationally and internationally prominent faculty; attaining research funding and private support far in excess of its state support; promoting economic development; conducting outreach to state and federal agencies; and collaborating with other higher education institutions in Maryland in advanced research and graduate education.

UMCES is among the few institutions in the world to examine a large ecosystem, the Chesapeake Bay and its watershed, in its entirety. UMCES' commitment to integrating environmentally sustainable thinking in all operations including all aspects of future planning is paramount to its mission.

UMCES also provides a unique approach to graduate education. By partnering with University System of Maryland (USM) institutions for classroom-based studies, UMCES is able to provide graduate students with a more intense, laboratory or field-based research education. Our graduate students do not learn about research solely from textbooks, instead, they work with their faculty advisor, learning from some of the best environmental researchers in the nation. This type of program provides a unique opportunity to prepare new kinds of environmental scientists needed to conduct research or scientific assessments on the complex issues of the future. Most of UMCES graduate students are enrolled in the Marine-Estuarine-Environmental Sciences (MEES) Program at the University of Maryland, College Park (UMCP.)

Providing professional research opportunities under the direct supervision of its leading faculty, UMCES annually supports more than one hundred exemplary graduate students through four collaborative programs:

- Marine Estuarine Environmental Sciences Graduate Program
- Environmental Toxicology
- Applied Ecology
- Conservation Biology and Wildlife/Fisheries Management

1.2 UMCES Locations: History and Background

Center Administration (CA)

The UMCES Center Administration provides oversight to UMCES programs and facilities. CA coordinates all centralized reporting and maintains the financial, procurement, human resources, and sponsored program for the institution. CA is located in the former residence of Francis V. DuPont on the grounds of the Horn Point Laboratory. Integration and Application Network (IAN) group is part of CA and is also housed, in part, at Horn Point Laboratory.

1. Center Administration at HPL

2. UMCES Annapolis Office

UMCES Annapolis Office

Established in 2006 by the Integration and Application Network group, UMCES Annapolis office is co-located with the National Socio-Environmental Synthesis Center

(SESYNC) at 1 Park Place in historic downtown Annapolis, Maryland.
The office is available for meetings, training courses and workshops designed to help foster scientific programs.

UMCES Research Fleet Operations

The UMCES Research Fleet Operations (RFO) is the backbone of UMCES coastal science research programs, providing scientists with access to the Chesapeake Bay and its rivers.

The Research Fleet Operations consists of docking and maintenance facilities for the UMCES vessels which are located at Solomons Island, home to University's flagship Research Vessel Rachel Carson and several smaller vessels. This is located at CBL.

Chesapeake Biological Laboratory (CBL)

Founded in a small waterman's shack in 1925, CBL is the oldest state-supported marine laboratory on the East Coast. It has been the stage for numerous landmark discoveries that serve as a foundation for environmental practices currently used to preserve and protect the Chesapeake Bay.

The Laboratory became affiliated with the University of Maryland as part of the Natural Resources Institute in 1961. In 1973, the Institute and Laboratory were made a part of the University's new Center for Environmental and Estuarine Studies that was subsequently renamed the University of Maryland Center for Environmental Science.

The Laboratory's mission is three-fold; promoting excellence in aquatic research, educating students of all ages, sharing the results of ongoing exploration with the larger scientific community and citizens of Maryland. Specific research programs at CBL include ecosystem restoration studies, fisheries sciences, and environmental chemistry/toxicology.

Horn Point Laboratory (HPL)

The Laboratory established in 1973 at Horn Point, an 847 acres property donated to the city of Cambridge by Mr. Francis DuPont in 1962. The state of Maryland then gave the property to the University of Maryland to serve as grounds for an institution of environmental and estuarine studies.

1. R/V Rachel Carson

2. Chesapeake Biological Laboratory

3. Horn Point Laboratory

The Horn Point Laboratory is located on the banks of the Choptank River, a tributary of the Chesapeake Bay on Maryland's Eastern Shore. The laboratory engages in interdisciplinary research with faculty engaged in research on the biology, chemistry, physics, and ecology of organisms and ecosystems from wetlands and estuarine waters of the Chesapeake Bay to the continental shelf and open waters of the world's oceans. Areas of scientific expertise include oceanography, plankton dynamics, marine macrophyte and wetland ecology, systems ecology, nutrient dynamics and eutrophication, physiological ecology of benthic invertebrates, benthic-pelagic interactions, and aquaculture.

Appalachian Laboratory (AL)

The Laboratory, then called the Appalachian Research Laboratory, was created in 1961 as a field station of the Inland Resources Division of the University of Maryland's Natural Resources Institute. Located in western Maryland, the Appalachian Laboratory is at the farthest upland reaches of the Chesapeake Bay watershed within the state.

The Laboratory has continued to grow, expanding its faculty and student enrollment. In 1999, the laboratory was moved into a newly constructed 47,000 square-foot building and greenhouse, south of Frostburg State University. The research and teaching facility features state-of-the-art laboratories and equipment for examining terrestrial, freshwater and watershed ecology.

The AL faculty conducts research on the structure of terrestrial and freshwater systems and the ecology of their component species, contributing to the knowledge of the complete Chesapeake Bay system from upland stream to tidal tributary to the coastal Atlantic Ocean. Other disciplines include aquatic ecology, behavioral and evolutionary ecology, conservation and restoration ecology, landscape ecology, watershed hydrology and biochemistry as well as environmental education and outreach programs.

Institute Of Marine And Environmental Technology (IMET)

The Institute of Marine and Environmental Technology (IMET) was established in 2010 in Baltimore's Inner Harbor by USM and partnering institutions. The IMET is located in Columbus Center, a facility managed by UMBC.

IMET capitalizes on the strengths of the University of Maryland Center for Environmental Science, the University of Maryland, Baltimore County and the University of Maryland, Baltimore to conduct marine and environmental research and create technologies designed to

1. Appalachian Laboratory

2. Institute of Marine and Environmental Technology

foster the protection and restoration of coastal marine systems and their watersheds.

By focusing on the sustainable use of natural resources and the improvement human health, UMCES at IMET brings the research, training and technology transfer capabilities of the partner institutions to Baltimore's Inner Harbor.

Maryland Sea Grant College (MSGC)

Maryland Sea Grant College located in College Park was established in 1977 and focuses on the sustainable use, protection, and restoration of Maryland's marine resources and especially the Chesapeake Bay.

Since 2002, the Maryland Sea Grant College facility is located in a privately owned space currently sub-leased from the University of Maryland, College Park and administered by UMCES. The Maryland Sea Grant College draws on the talent and expertise of the state's universities and academic laboratories to foster innovative marine research, education, and outreach. Both on its own and in collaboration with its many partners, Sea Grant proactively addresses scientific, economic, and social challenges facing the Chesapeake Bay.

Educational programs support graduate fellows who work directly with Sea Grant-funded researchers, and sponsor undergraduate summer students in the Research Experiences for Undergraduates program. Through an Aquaculture-in-Action curriculum, online interactive lessons, and science fellowships for teachers, Sea Grant has helped raise the bar on environmental science education.

3. Maryland Sea Grant College

2. Summary of Previous Master Plan

2.1 UMCES Previous Needs and Remaining Challenges

The previous master plan covering 2002 – 2012 focused on a number of areas needing improvement for the various UMCES sites. In general those needs as defined in that earlier plan included the following:

- Improved and expanded laboratory facilities
- New library spaces for both CBL and HPL to replace outdated and cramped facilities
- A new research vessel
- New Information and Communications facilities for CBL
- Additional educational space
- Various facility renewal projects to meet the ongoing aging facility needs

Some of the projects have been completed and in some cases other projects were defined, funded and completed in the past 10 years, but a majority of the funding and projects have not been completed. The most significant impact for UMCES overall has been:

- Lab space is in many cases not well suited to current research and needs major upgrades or renovation.

- Facilities are expensive to operate and require retrofitting with newer energy-efficient technologies to reduce energy cost and better support the overall environmental mission of UMCES.

- Continued lack of space for modern library facilities both for the proper storage and retrieval of various media and especially for study and collaboration space, which is essential to an institution like UMCES engaged in interdisciplinary research.

- While there is some space available on the two larger campuses, CBL and HPL, the types of spaces and buildings that are available do not match up with the requirements for new space needs. This points to the need for major renovations to many existing facilities.

2.2 Capital And Facility Renewal Projects Completed or Still Pending

The previous UMCES Facilities Master Plan identified a number of major capital projects which have been delayed due to lack of funding. The summary below shows the projects from the 2002 - 2012 plan that have been completed and that remain to be completed.

Completed Projects:

Appalachian Laboratory:
- Irrigation
- Landscape Upgrades

Chesapeake Biological Laboratory:
- Land acquisition
- Solomon's House Renovation
- Restoration of the Research Pier, (currently under design)
- Truitt Laboratory Addition

Horn Point Laboratory:
- Environmental Information Center
- Aquaculture and Restoration Ecology Laboratory (AREL)

Projects Not Completed:

Appalachian Laboratory:
- Lab Addition
- Field Labs

Chesapeake Biological Laboratory:
- Truitt Laboratory Replacement
- Information and Communication Services Building
- Outreach Building

Horn Point Laboratory:
- Renovate The Morris Marine Science Laboratory

To those existing projects there have been added new capital project needs and a number of major renovation projects brought on by aging facilities.

3. Current Status: Challenges and Opportunities

3.1 Challenges

This master plan has been structured to address the following overall challenges faced by UMCES that have been identified as part of this facility master plan exercise:

- Unpredictable funding availability and timing
- Multiple and distant locations of the UMCES Labs
- Large diversity of research and the continuing evolution of the science of environmental research and education
- Many facilities that are largely built upon sites that were residential in nature and have been adapted over time to education and research purposes.

These four major issues influence and drive the recommendations contained within this master plan.

3.2 Opportunities

UMCES also has many opportunities that help define its mission and contribute to unique qualities that are essential to the institution and give it meaning and purpose. Those issues will in turn help define the types of capital and facility renewal projects for UMCES for the next 10 years.

- Environmental studies and research are topics of growing interest and importance to the State of Maryland, the nation and the world at large. There will be increasing demand for the type of research and training that UMCES provides to both serve the academic research community as well as the general public which needs to be better informed and made aware of the science behind many of the most pressing issues of the day.
- The geographic distances between UMCES campuses have forced the institution to adopt innovative technologies to enable its scientists to provide graduate instruction as well as to better collaborate and exchange information using a much lower carbon

footprint. This trend has every sign of continuing as new technologies allow scientists to more easily share and transmit information.

- Trends in technology growth and the digitizing of a great deal of research data should also enable UMCES to take certain resources like its library, its periodical collection, and its research data archives and share it across campuses much more easily than ever before.

- The adoption and deployment of increasingly sophisticated and inexpensive collaboration technologies that work for both individual researchers and larger groups will spread the demands from the Interactive Video Network (IVN) system to the overall campus computer networks. Increasing bandwidth and a more robust and reliable computer network will be required to meet these demands.

- The location of UMCES' campuses where critical research can be close to or even a part of the ecosystem that it is studying creates a distinct advantage.

- UMCES can further distinguish itself by emphasizing aspects of sustainability that relate more directly to the UMCES research mission. Overall trends in sustainability point to the increasing importance of water quality issues, topics that UMCES addresses every day in its research.

- The proximity to the Chesapeake Bay and its watershed and the scale of the campuses makes it easier to reach out and engage the public and to fulfill both its broader education mission and its service goals.

UMCES has truly unique sites and landscapes within the Chesapeake Bay watershed and will accentuate those assets in its facility planning efforts and projects over the next ten years.

3.3 Existing Building Conditions

The quality of the physical plant has a direct and immediate impact on programs and academic initiatives undertaken at each site. Many of the Center's heavily used structures were in existence prior to the formation of UMCES, often with non-research purposes in mind. Since capital construction does not offer immediate remedy for many current problems, the laboratories look to facilities renewal projects to maintain a plant commensurate with their programmatic needs in research, service, and education. In addition, renovating existing facilities is one of the single most efficient sustainable strategies that can be employed. It reuses building and infrastructure resources already on site and prevents large quantities of solid waste from being trucked away for disposal. It is important to emphasize that addressing the needs of aging facilities before they become too old to save is important to the environmental mission of UMCES.

Each site will be discussed in turn in separate chapters and the corresponding Building Condition Codes applicable to the existing facilities will be covered for each site.

4. Strategies For Future Development

4.1 Planning Overview

Continued success and the achievement of the Center's potential requires a flexible and creative strategy for future development that does not depend on growth in State general funding alone. The strategy, which involves all phases of UMCES operations, from research and education to facilities and administration, is based on strengthening existing research, service, and education activities while improving administration and operations through internal redeployment of existing resources and generation of non-State revenues. Because of the general climate of annual decreases in financial resources for the University, including the base of State support and projections of self-sustaining revenues, defined development may be difficult to meet. However, important research thrusts, growth in graduate education, operation of new facilities, and renewal of existing facilities will still require additional State resources.

Planning is an effective method for dealing with problems and change; hence, it must be dynamic rather than static. In order to provide continuity in the development process, a set of overall goals and planning principles are required. These form a framework to accommodate physical change across the entire institution within the framework of the UMCES Strategic Plan. The following goals and principles are intended to guide the physical development of the Center toward the stated objective: A systematic approach to understanding the environment and its relationship to man and his activities.

4.2 UMCES Goals

The following defined goals for physical development respond to UMCES mission and program direction:

- Be a leader in the implementation of sustainable development practices and reduced greenhouse gas emissions.
- Project an image appropriate to the University System of Maryland, UMCES, and its service to the people of the State of Maryland, U.S. and the world.
- Pursue land use development balancing the functional needs of the programs with the preservation and enrichment of the natural environment and aesthetic attributes.

- Accommodate the needs of the broader community and the public through educational outreach.

- Place facilities to encourage interpersonal relationships, stimulate the exchange of ideas, and create an overall sense of community for the institution.

- Design and construct facilities appropriate to programs associated with research, education, and service and with as much flexible space as possible.

- Ensure architectural expression, disposition of buildings, and site improvements that are in harmony with the scale and character of the local ecosystems, community, region, etc.

4.3 UMCES Planning Principles

To achieve these goals the following specific planning principles are defined to guide the physical development of the campuses and the individual facilities within them.

- Take the lead in integrating green design as a holistic approach in the development of land, the design, construction, and maintenance of facilities. This can help attract and retain employees, protect end-users' health, and achieve long-term cost benefits. As the premier institution in Maryland for environmental science education and research UMCES should lead the way and focus on issues of particular environmental concern to the Chesapeake Bay and its watershed.

- Employ careful and creative planning towards a better defined sense of an academic research campus, to serve the research activity areas, protect the natural features, and reflect and reveal the character of each site.

- Promote a campus community environment at each location. Provide this by locating facilities closer together and improving the design of exterior spaces and paths as well as providing spaces within the facilities that encourage collaboration and chance meetings.

- Foster both formal and informal exchange among the students, faculty, and staff from

all disciplines. Program space at a campus scale (outdoors), and within individual facilities (open accessible meeting and collaboration spaces) should be allocated to that end.

- Utilize engineering and design innovations to improve environmental quality and conserve materials and energy. Include “Green Design” principles that are consistent with the Maryland Green Buildings Council Report dated November 2011 and national sustainable design standards as outlined by the United States Green Building Council, (USGBC) LEED building evaluation system. Campus development and operations to be based on the Smart Growth Initiative and the Chesapeake 2000 Agreement, the latter for advancing the restoration of the Chesapeake Bay and addresses green buildings, green power, and energy efficiency, and water conservation requirements .

- Innovative materials and environmentally sound construction should influence physical development as well as the regional characteristics of the site and buildings. Wherever possible use local building materials to help reflect the character of the region and reduce transportation costs.

- Design and construct building space with the maximum flexibility feasible so that over the lifespan of a facility, 40-60 years, changing research needs can be accommodated. This will primarily affect decisions regarding building structure, (bays and planning modules), and building infrastructure design, (HVAC, electrical, plumbing, cabling, etc.).

- Treat outdoor service, storage, and work compounds as usable and positive outdoor space with attention to functional arrangement, security, and visual appearance.

- Include accessibility by people with disabilities should be an integral component of the planning and design of buildings and site improvements (i.e. parking, roads, walks, landscaping).

- LEED Sliver should be the minimum requirement for certification level with a target of LEED Gold certification and a minimum of 35% energy savings over the current energy code compliant standard for all new projects and major renovations.

- Academic/research/support projects (i.e. infrastructure) and land acquisition should be funded primarily by state appropriations and supplemented by funds from other sources as may be necessary.

4.4 Facilities Implications

The adequacy of existing facilities in terms of physical condition, programmatic suitability, mechanical support systems and the sufficiency of space are critically important issues to all three major research laboratories as well as the other UMCES locations. Inadequate levels of capital funding for new facilities and major renovations, as well as insufficient funding for deferred maintenance, have led to serious problematic conditions such as:

- Continued use of non-purpose-built facilities for laboratory and other uses not originally anticipated
- Aging and inadequate laboratory facilities
- Aging physical plant using obsolete heating, air conditioning, and plumbing systems that lead to higher than expected energy use and operating costs
- An overall lack of purpose built collaboration and gathering spaces

These conditions jeopardize the ability of UMCES to carry out its mission. Strategies for physical development at the UMCES research laboratories to correct facilities deficiencies are outlined in the individual sections focusing on each respective laboratory.

4.5 Space Needs and the Impact of Space Guidelines

As previously stated and outlined in UMCES original Facilities Master Plan 1992-2002, the 2002-2004 Update, and the 2002-2012 Update, the space guidelines and allowances do not adequately convey the operations of UMCES. The guidelines for assessing space needs and determining space eligibility for a wide variety of space types were developed without full consideration for the facility needs of special function (research) institutions of the State, and much of the space needed by the University of Maryland Center for Environmental Science must be separately justified on an ad hoc basis.

Since the UMCES mission and operating characteristics differ substantially from those of an undergraduate college or university, application of the guidelines to UMCES research-based programs results in low or no guideline allowances. A misconception that UMCES is not eligible for construction in a number of space categories has resulted from UMCES inability to generate appropriate allowances for certain kinds of spaces.

UMCES continues to require instructional space, such as lecture (HEGIS 110/115) or class laboratory areas as UMCES scientists teach over 100 graduate level students each semester within UMCES facilities. In some instances, this situation has resulted from Guidelines formulae which depend upon data not available; unfortunately, the inability to perform a space guideline computation due to lack of input data has been equated with a lack of space eligibility, despite the existence of activities requiring certain categories of space. The growth in educational needs will be addressed by both new instructional space and the continuing expansion of the IVN system which is used for many of the classes now taught at UMCES.

Another clear example of previously undefined space eligibility to which UMCES has been entitled on an ad hoc basis involves meeting room space (HEGIS 680/5). Because UMCES full-time degree earning students (FTDE) matriculate at other USM institutions, no allowance for meeting space was generated by the current space guidelines model even though UMCES frequently hosts seminars and conferences and utilizes residential space to accommodate conferees at each of its three Laboratories. Nonetheless, the functional justification for such space at UMCES Laboratories is compelling. Education activities associated with the dissemination of information to professionals require facilities dedicated to meeting and meeting-related functions, which include special furnishings, (typically tables with upholstered seating), state-of-the-art audiovisual equipment, and an environment designed for learning. Distance learning/research sharing is now available at each of the laboratories and in most cases is being used to full capacity. In addition to identifying quantitative space requirements for UMCES activities and programs, there is an equivalent need and concern for the qualitative requirements associated with the instructional, conference and meeting spaces. These spaces need certain acoustical and lighting criteria to function properly with the AV equipment that is integral to their function.

5. Capital Projects And Facility Renewal Projects

5.1 Capital Projects

The Facilities Master Plan provides a framework for initiating solutions to the multiple physical development issues confronting the three research laboratories on the properties under the auspices of UMCES. The documentation for each location focuses on academic programs and Center objectives, existing assets and deficiencies and identifies capital development projects required for the next ten years. Consideration has been given during preparation of the Facilities Master Plan to the UMCES's history and mission, existing and projected research, education, and service programs and clientele, administrative organization and staffing, the existing inventory of facilities. Capital Projects are the major strategic components in the plan, (over $1,000,000), and are developed in conjunction with and supported by the Facility Renewal Projects.

5.2 Facility Renewal Projects

This Facilities Master Plan documents a need for increases in maintenance, operating, facilities renewal, and additional funds both to maintain the existing physical plant and to provide modern state-of-the-art research and support facilities through the renovation and upgrading of existing facilities. These required improvement projects, coupled with the associated infrastructure improvements, are essential to strengthen and enhance existing research programs, to provide a renewed identity and focus to each campus and to help UMCES overall achieve a more integrated sense of institutional purpose and identity. These projects will contribute substantially to reduced energy use and are inherently supportive of a sustainable design approach in that they re-purpose existing buildings and thereby reuse existing materials and reduce green house gas emissions that would otherwise go to all new construction projects.

6. Sustainability

6.1 Current Initiatives Related to Climate Action Plan

UMCES President Donald Boesch signed the American College and University Presidents Climate Commitment (ACU PCC) on December 18, 2007 with an effective date of January 15, 2008. A program report relative to this plan can be found at: (http://rs.acupcc.org/progress/566/)

An important part of that commitment is UMCES institutional Climate Action Plan (CAP) for becoming climate neutral, which includes:

- A target date for achieving climate neutrality as soon as possible
- Interim targets for goals and actions that will lead to climate neutrality
- Actions to make climate neutrality and sustainability a part of the curriculum and other educational experiences for all students
- Actions to expand research or other efforts necessary to achieve climate neutrality
- Mechanisms for tracking progress on goals and actions

Current progress as reported in January of 2012 includes:

- Greenhouse gas inventories have been taken and goals were set for reducing emissions at each of the laboratories.
- Aging infrastructure has been upgraded to newer, more energy-efficient systems by working with Constellation Energy. Recently signed agreements will save both energy and reduce costs over the next 15 years.
- A commitment to construct all new campus projects to at least the U.S. Green Building Council's LEED Silver standard or equivalent.
- UMCES purchases or produces at least 15% of the institution's electricity from renewable sources.

- UMCES is a member of the Maryland Green Registry.

- In addition to leading the Center's efforts, President Donald Boesch also leads the University System of Maryland's 12-campus sustainability effort as the system's Vice Chancellor for Sustainability.

6.2 UMCES Sustainability Goals and Initiatives

As part of an overall institutional focus on sustainable design practices related to Capital Projects and Facility Renewal Projects, UMCES will focus efforts on sustainable practices in four major sectors:

Greenhouse gas Reductions

1. Utility Emissions Reductions

    - Apply alternative technologies and alternative fuel options to decrease overall emissions.

    - Expand energy conservation through retrofits in existing buildings across campuses.

    - Set a target of designing new construction and renovations to use 35% less energy than required by current energy code.

2. Transportation

    - Encourage walking and biking as a mean of campus commuting through incentives, bike lanes and walking paths, and the establishment of bike storage and repair facilities.

    - Encourage, where feasible, a telecommuting policy for UMCES employees and students.

    - Replace retired campus fleet vehicles with appropriate zero or low-emission vehicles.

    - Increase use of videoconferencing for distance learning, meeting and communicating with geographically distant campuses and individuals.

Storm Water Management and Domestic Water Conservation

- Focus on water security / water quality issues directly as they affect the particular campus sites in relation to the health of the Chesapeake Bay. What happens on each of these sites is a microcosm of how development affects water quality in the Bay.

- Implement sustainable design principles and innovative site design techniques to all future projects to minimize adverse environmental impacts on ecologically sensitive areas and the regional watershed.

- Build new projects on sites that have already been developed wherever possible and create additional green space.

- Reduce storm water runoff through on-site mitigation techniques such as rain gardens or green roofs, when appropriate.

- Install rainwater storage and reuse systems in new construction projects and major renovations when possible.

- Minimize irrigation through the use of drought resistant planting and properly selected soils.

- Reduce the total square footage of impervious surface area on campus by building parking areas that allow water infiltration. Investigate systems that allow water to be filtered and reused for other purposes.

- Upgrade toilets to low flow models and urinals to waterless models.

- Reduce lab water use by installing efficient appliances and closed circuit water cooling systems.

- Distribute information to the campus community that encourages efficient water usage.

- Create or allow for living shore lines wherever possible.

Resource Conservation

1. Solid Waste and Green Cleaning

    - Install multi-function recycling receptacles in all dormitories, classrooms, conference rooms, labs, appropriate common spaces.

    - Increase amount of recycling options.

    - Require the recycling of at least 95% of all eligible materials from demolition and construction waste as part of construction contracts.

    - Implement pilot test for full line of green cleaning products.

    - Work with vendors to maximize toner/ink cartridge recycling, and increase bulb/lamp recycling.

    - Create incentives for students, faculty, and staff to refrain from excessive paper usage in campus printing facilities.

2. Material Use and selection for new projects

    - Maximize use of eco-friendly and low volatile organic compound building materials.

    - Select the use of material with high recycled content, carpet, drywall, steel, ceiling tiles.

    - Select materials with certifications that attest to the material's total environmental impact including the manufacturing process, such as the Cradle to Cradle certified program, Green Seal, Ecologo and SMART certification my MTS.

3. Purchasing Goods, Services, and Food Products

    - Develop a Life Cycle Assessment (LCA) program through better management of the product supply chain.

    - Establish further alliances with purchasing cooperatives to combine purchasing power which will affect market changes and reduce the collective environmental footprint.

- Require purchase of Energy Star appliances whenever available.
- Implement recycled paper hand towels in all existing towel dispensers along with evaluation of other more resource efficient hand-drying options as needed.
- Implement conserving dispenser technology for disposable paper products.
- Pursue additional sustainable paper products.
- Educate the campus community concerning the environmental, social, and economic impact of their food choices in order to decrease their demand for non-sustainable food.

Education, Civic Engagement and Communication

- Promote sustainable practices among campus community members through education and by example.
- Support student initiated sustainability initiatives.
- Increase the visibility of sustainability initiatives in UMCES publications.
- Develop a dynamic sustainability website.
- Distribute newsletter and other promotional materials electronically in collaboration with allied research programs.
- Place signs at appropriate places on campus to inform the community about sustainability initiatives relative to certain spaces or services.
- Cultivate closer relations with external media on environmental issues.
- Discover/show existing habitats and ecosystems on the campuses that are hidden or undiscovered. Use these to enhance the education programs and mission.
- Locate renewable energy projects to be seen and experienced as an integral part of each campus' educational outreach experience. Provide real-time data on how much power and environmental benefit they are creating.
- Use new facilities and major renovations to demonstrate green building and energy efficiency technologies.

III UMCES APPALACHIAN LABORATORY

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Appalachian Laboratory

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AL Main Building

1. UMCES Appalachian Laboratory

1.1 Research Programs

The Appalachian Laboratory (AL) is dedicated to the study of terrestrial and freshwater ecosystems, with special focus within the Chesapeake Bay watershed. AL researchers seek to determine the effects of natural and human-induced changes on organisms, landscapes, and biogeochemical and hydrological cycles. The research conducted at AL is both diverse and interdisciplinary, spanning scales from genes to landscapes and watersheds, and encompassing terrestrial, wetland, and aquatic ecosystems. This high degree of flexibility, coupled with a strongly collaborative faculty, has enabled AL to address a variety of research needs within the state, the country, and across the globe. AL contributes to the UMCES mission through research, education and service in four areas:

Ecosystem Ecology

Ecosystem ecology encompasses a broad range of issues and approaches but ultimately involves studies of organisms, the physical environment, and their interactions within a defined area. Emphasis in ecosystem ecology is on the status, flux, and transformation of energy, water, and materials within a particular ecosystem. Therefore, ecosystem ecology is a natural entry point into studies of global change and the effects of climate variability and anthropogenic disturbance on ecosystems. Current research in watershed ecology at AL is designed to help improve our understanding of broad-scale ecosystem and hydrological dynamics, of biogeochemical processes within watersheds as well as at the terrestrial-aquatic and terrestrial-atmospheric interfaces, and of natural controls and human influences on surface water quality and quantity.

Ecosystem ecology research at AL also concentrates on landscape ecology, which reaches outside of watershed boundaries to include all aspects of scale and connectivity in the study of terrestrial ecosystems. Recent research at AL has focused on the expansion of native and invasive species across landscapes, how climate change and other ecological disturbances influence the assembly and stability of plant communities, and the role of urban heat islands in accelerating plant phenology. This type of work uses a large array of tools and techniques, including remote sensing and spatial statistics, isotopic analysis of plant and animal tissues, and phylogenetics.

Aquatic Ecology

Aquatic ecology, which includes the study of the interrelationships between living freshwater organisms and their environment, is yet another scale at which ecosystem ecology research is conducted at AL. Faculty members have focused on the biological and ecological status of wetlands, streams, rivers, and impoundments in Maryland, including long-term participation in large, state-wide ecological monitoring programs.

Molecular Ecology

Molecular ecology is a synthetic area of study that integrates ecosystem ecology with molecular genetics and genomics. The basis of molecular ecology is to relate naturally occurring genetic variation within and among individuals, populations, and species to the processes regulating the distribution and abundance of organisms, how they respond to changes in their environment, and how these responses affect the structure of communities and the flow of energy and nutrients through ecosystems.

1.2 Education & Service

The Appalachian Laboratory has a strong history of involvement with K-12 and public science education as well as with graduate education. Through the Appalachian Laboratory Environmental Science Education (ALESE) program, AL faculty and staff are involved with teacher professional development, education and outreach product development, as well as providing environmental science outreach to schools and other groups. Because the programs are built directly from scientific research activities at AL, ALESE participants learn science by experiencing research.

1. Current computing facilities for Landscape Ecology and Remote Sensing.

2. Molecular Ecology Laboratory.

3. Interactive Video Network (IVN) classroom

2. Existing Site Development and Facilities

2.1 Existing Site

Total Area of AL Property	10.95 Acres
Area Disturbed during Construction:	8.5 Acres
Area Undisturbed (mostly wooded):	2.45 Acres
Total Area Roofed or Paved:	3.5 Acres

The Appalachian Laboratory sits on a 10.95-acre site in the city of Frostburg, in western Maryland. Located on the northwest side of Midlothian Road and southwest end of Frostburg State University campus, the site slopes steeply from west to east with the main building oriented in the north-south direction. *(Illustration 2.1)*

The site also contains two stormwater management dry ponds built in 1998 to control stormwater runoff from AL facilities. Stormwater Quality Area #1 is located at the southeast corner of the site, off of the administrative wing of the building. Stormwater Quality Area #2 is located at the north east corner of the site, off of the laboratory wing of the building, adjacent to the loading dock and greenhouse. Both ponds are under renovation to upgrade to current Maryland Department of the Environment standards.

The main access to the site is via automobile, although safe and dry indoor bike storage is provided to encourage cycling. Many faculty, staff and students live locally allowing them to either bike or walk to campus. Direct vehicular access, including a building drop-off zone, is provided from Braddock Road. Parking capacity is suited for existing and future development, totaling 107 spaces. The facilities are totally accessible for persons with disabilities, and include 6 ADA accessible parking spaces: 4 car and 2 van accessible spaces, with required access aisles. *(Illustration 2.3)* The remote location and size of the site limits opportunities for alternative transportation by staff and faculty, as well as students. The main buildings are easily accessible by pedestrians within the site.

1. Main Building

2. Stormwater Collection Pond

3. View from Loading Dock

2.2 Existing Facilities

The physical plant consists of four structures totaling 48,427 Gross Square Footage (GSF) and 31,814 Net Assignable Square Footage (NASF). The Appalachian Laboratory building (#900) houses the main research laboratories on site. Additionally, the campus includes a greenhouse, garage, and chemical storage building (Illustration 2.1 and 2.5). Table 2.1 summarizes each physical structure at the AL campus, including construction dates, GSF, (NASF), and condition code.

Each of the three levels of the main building (Building #900) are shown in illustrations 2.2, 2.3, 2.4 for a visual overview of the existing program.

The overall condition of the facilities is satisfactory with the exception of the greenhouse. The greenhouse, considered one of the research laboratories, requires major renovation or replacement within the next few years (Figure 3) Failure of the greenhouse plumbing system, which includes heating and cooling environmental controls, will force this facility to close, adversely impacting the research of multiple AL faculty.
See Table 2.1 for more information.

900 Appalachian Laboratory Building

The main building contains a classroom used for meetings and presentations; Interactive Video Network (IVN) room; administrative offices; faculty offices; graduate student offices; small conference room; library; laboratory support rooms; building and computing service areas; and research laboratories for water chemistry, soil and plant ecology, wildlife sciences, quantitative landscape ecology, watershed hydrology, stream ecology, forest ecology, general ecology, molecular ecology, and stable isotope research. A bridge within the three-story atrium connects the two-story administrative wing with the laboratory wing.

901 AL Chemical Storage Building

The Chemical Storage Building provides safe, secure storage for faculty samples, hazardous materials and lab gasses. It is currently in satisfactory condition.

902 AL Greenhouse

Built within a year of main building. Currently used by 2 researchers. Two water tanks with sensors feed the greenhouse and generator. Piping and heating is deteriorating and will require replacement within 5 years. The internal shading system within the greenhouse needs to be replaced.

1. AL Building Lobby

2. AL Greenhouse

3. AL Greenhouse - Deteriorating plumbing system

903 AL Garage

This structure provides grounds maintenance equipment storage. Currently the facility is in satisfactory condition.

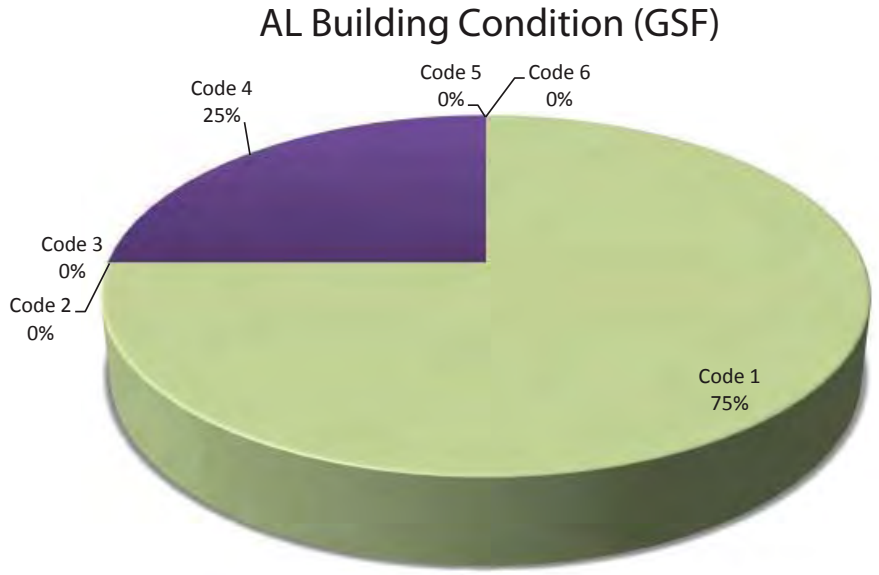
TABLE 2.1*

Building Number	Building Name	Total GSF	Building NASF	Efficiency	Year Constructed	Replace Value	Condition Code	Renovation Cost
900	Appalachian Laboratory	42,843	26,631	0.62	1999	19,275,237	1	1,927,524
901	AL Chemical Storage	363	320	0.88	1999	145,817	1	14,582
902	AL Greenhouse	4,226	3,799	0.90	1999	1,919,290	4	191,929
903	Garage	855	840	0.98	2000	76,950	1	5,130
AL Totals		**48,287**	**31,590**			**21,340,344**		**2,134,034**

** Information for Table 2.1 was obtained from UMCES SGAP 2011.*

TABLE 2.2

The table below references the building condition codes from the previous Table 2.1. The percentages shown reflect the number of buildings with that particular code assigned to it.



Building Condition Code:

1.	**Satisfactory**	Suitable for continued use with normal maintenance.
2.	**Remodeling – A**	Requires restoration to present acceptable standards without major room changes, alterations, or modernization. The approximate cost of remodeling is not greater than 25% of the estimated replacement cost of the building.
3.	**Remodeling - B**	Requires major updating and/or modernization of the building. The approximate cost of remodeling is greater than 25% but not greater that 50% of the estimated cost of the building.
4.	**Remodeling - C**	Requires major remodeling of the building. The approximate cost of remodeling is greater than 50% of the remodeling/replacement cost of the building.
5.	**Demolition**	Should be demolished or abandoned because the building is unsafe or structurally unsound, irrespective of the need for the space or the availability of funds for replacement. This category takes precedence over categories 1, 2, 3, and 4.
6.	**Termination**	Planned termination or relinquishing or occupancy of the building for reasons other than unsafeness or structural unsoundness, such as abandonment of the temporary units or vacating of leased space. This category takes precedence over categories 1, 2, 3, and 4.

2.34 Facility Needs:

The following is a summary of overall facility needs by type of space.

Laboratory

- New, state-of-the-art molecular ecology and genomics laboratories to meet the latest research challenges of the most recently hired faculty. The current facility does not have the capacity or technology to adapt to new, rapidly evolving laboratory techniques to support our research in new strategic areas.

- New high performance computational facilities capable of efficiently handling real-time data acquisition in geospatial modeling, remote sensing, and genomics. These research areas generate vast amounts of data that must be processed with newer computational resources for which AL does not currently have the capacity. Due to the age of the building, network connectivity is not ideal. With an addition of a computational facility, building-wide intranet and wireless should be improved.

- Facilities to improve the interface between field and laboratory activities, providing staging and storage of equipment and improved capabilities for sample processing and analysis. The interface between field and lab activities at AL has never been ideal. Improving that interface would improve the flow of equipment and samples between the field and lab and improve sample processing techniques and throughput. It would also better address AL needs to handle special types of samples that require newer technologies, like clean rooms, and have special storage requirements. This would bring immediate benefits to all AL scientists involved in field work.

Instruction

- Additional instructional/meeting space to accommodate projected growth in environmental education, outreach programs and graduate student activities. Existing instructional spaces include the main Interactive Video Network (IVN) room and the small IVN room. These rooms are all reaching saturation of available time slots. The rooms are heavily used to support administrative and research group activities including meetings, lectures, defenses, colloquia/conferences, workshops and award ceremonies. Currently some events must be cancelled for lack of space.

- An expanded computer/network center, integrated with the existing building network and telecom backbone, to support the new labs and classrooms. The current center is at capacity and the demands for data storage and transfer are increasing. More computer based research and modeling is anticipated in the next 10 years.

- Additional IVN capacity. The main and small IVN rooms (with capacities of 36 and 8, respectively, separated by operable partitions) give priority use to remote class instruction via the UMATS. Because of their built-in projection system and per person power and network, these rooms are also in demand for other activities, frequently causing scheduling conflicts and sometimes requiring students to find another location to attend a particular class.

- Improved technology in the general classroom. The classroom designed for local instruction is not equipped with the current educational technology needed for effective instruction.

- A permanent weather-protected area for outside instruction, workshops, outreach activities and graduate student activities. Without proper facilities, research personnel and graduate students are limited both in the amount of time spent on outdoor activities and the type of activities that can be performed. Growth in the environmental education and outreach program makes this kind of support space essential.

- Given the current space limitations, AL has had to conduct its outreach program off-site, which limits the types of activities that can be held. The need for specific and extensive equipment requires a more permanent space that allows researchers to effectively communicate and display their research. A dedicated educational outreach classroom that serves as a companion to the outdoor instructional area would enable AL to much more effectively communicate its mission and research to the local community and beyond.

Office/Admin

- Currently office space will not accommodate the projected increases in faculty, staff, graduate students, research assistants, and post-doctoral associates.

- A second, better-equipped conference room is needed and is planned in the new building addition. The existing conference room (160 GSF with a capacity for 12 people) is set up in a traditional round table configuration with no intranet or audio-visual support making this room unsatisfactory for most activities.

Other

- Additional general and specific storage areas. The first floor has one general storage room (200 GSF); the 2nd and 3rd floors each have three small closets (20 GSF, 20 GSF and 52 GSF). A shop room has been converted to shared faculty and staff storage (200 GSF). As the research personnel continue to expand, the field and research gear, archived research data, and administrative records are quickly consuming the limited storage space within the building. This lack of space forces research personnel to store items within the research labs, hampering daily research and, at times, causing safety concerns.

- Field staging areas that accommodate the loading and unloading of vehicles. This need includes a mud room / locker area.

- Permanent field research station to facilitate intensive experimental research and further support AL's mission and research programs. This will provide stability and continuity to a diversity of long-term research and community outreach projects.

3. Planning Strategies and Facilities Implications

3.1 Planning Overview

With the growing strength of AL's research capabilities in wildlife, fisheries, conservation, and ecosystem ecology, and through recent hiring of faculty with expertise in state-of-the-art techniques, AL is well positioned to provide society and decision makers with the scientific information needed to address the complex, large-scale environmental problems that confront the state and the nation.

However, looking ahead, the funding climate promises to become more challenging and competitive, proposal requests broader in scope and more interdisciplinary, and research needs more dependent on new technologies. AL has begun responding with faculty hires in strategic areas, but the ability to support faculty's skill sets and to meet the latest research challenges are constrained, especially in molecular ecology/genomics and geospatial modeling/remote sensing. These areas require new lab facilities and instrumentation capable of realizing the increase in sample processing and throughput, and computational resources capable of efficiently handling vast amounts of data. A two-story building addition to the existing facility would efficiently provide the needed infrastructure, space, and new instrumentation to address the next generation of environmental problems.

The integration of new technologies within the laboratory does not lessen the continued need for significant field-based sampling. A long-standing limitation at AL has been the lack of an efficient interface between field and lab activities, such as the sheltered loading of vehicles, processing of samples, and storage of equipment. The solution would be to add a new lab-field interface for staging and storage of equipment and samples, either by modification of current facilities or inclusion in the proposed building addition. Improved efficiency in the flow of equipment and samples between the field and lab would bring immediate benefits to many researchers at AL.

Certain field-based research questions can only be addressed with long-term monitoring or manipulative experiments that are not easily managed on public property or without permanent unrestricted access to an appropriate facility. This affects the research of multiple AL faculty who conduct long-term monitoring with permanently mounted sensitive equipment or who require adequate field space to set up manipulative mesocosm or common garden experiments. The acquisition of a dedicated field station by AL/UMCES within western Maryland is required to address these needs, as well as additional opportunities for new

1. A photo from the current molecular ecology lab space, which is very cramped and has limited space required to accommodate new and rapidly emerging technologies.

2. The building loading dock was constructed for tractor trailers – not for the types of vehicles used by AL researchers. Vehicle loading and unloading of equipment and gear for field research is difficult due to the configuration of the loading dock and its exposure to the elements.

outreach projects that expose students and the community to hands-on environmental science research.

Lastly, the efficient operation of facilities will minimize operating budgets and overhead, maximize the productivity and collaborative activities of students and faculty, and set a leadership example of environmental consciousness for the community. While the current facility has largely met these needs over the last 13 years, space and operations need to be updated or retrofitted with an eye towards efficiency and sustainability. Doing so by the use of modern “green” approaches to energy and water use not only gives AL a return on investment, but also generates opportunities for community outreach and collaborative partnerships with neighboring USM institution Frostburg State University.

For the Appalachian Laboratory to remain maximally productive and useful to the state of Maryland and the nation on environmental issues, AL must continue evolving to address emerging research questions using the latest state-of-the-art approaches, to collect and manage these data as effectively as possible, and to provide leadership to the community on issues of science and sustainability.

Goals

AL will focus on the following particular goals as they relate to facility growth and change over the next 10 years. Refer to UMCES overall Goals and Planning Principles for additional information. (Section II-4)

- Maintain high standards for research in a maximally efficient, environmentally focused facility.
- Equip researchers with the instruments and facilities necessary to respond to research needs in rapidly evolving technologies and emerging fields.
- Recognize the multi-faceted nature of environmental research and address the need for efficient transition between field and lab activities.
- Acquire permanent field facilities that provide stability and continuity to a diversity of long-term research and community outreach projects.
- Maintain and keep current with state-of-the-art measurement techniques in both the laboratory and the field.

- Better equip AL's faculty to address outreach and education requirements of federal funding agencies.

- Further improve and foster our collaborative efforts, both within AL and across UMCES.

- Continue to train the future generations of scientists through a unique graduate education program where students work alongside scientists performing their own cutting edge research.

AL Campus Planning Principles

AL's campus and facility renewal projects will be guided by the planning principles outlined in the UMCES chapter. (See Section II-6.2 UMCES Sustainability Goals and Initiatives)
The following additional principles relate to particular conditions on the AL site:

- Maintain the physical connection and proximity of facilities that supports strong collaboration and sense of community on the AL site

- Incorporate green technologies in any future renovations or new construction projects. Pursue LEED certification where appropriate.

- Account for historical mining activities in the Frostburg area and plan for underground stability testing and grouting.

- Better integrate the facility with usable outdoor space

3.2 Capital Projects

Summarized below are the needed facility and infrastructure projects for the next five and ten year periods followed by a description/justification for each project. Total project budgets include design fees, construction costs, and equipment purchase in 2012 dollars.

TABLE 3.1 Capital Project Budgets*

(P)-Planning; (C)-Construction; (E)-Equipment; (AP)-Land Acquisition;

Project	5 Year Program	Post 5 Year Program	Total Project Budget
Building Addition		$3,243,000 (P) $25,682,000 (C) $3,000,000 (E)	$31,925,000
Field Laboratories		$500,000 (A) $407,000 (P) $3,476,000 (C) $550,000 (E)	$4,933,000
Total:			**$36,858,000**

** Information for Table 3.1 was obtained from UMCES Capital Budget Information System (C.B.I.S 2012).*

1. Building Addition

Land acquisition is not necessary for the addition to the existing main building. The preferred solution is the construction of a 16,390 NASF, two-story addition to the current facility. Given the current dissatisfactory condition of the greenhouse, its replacement on top of the addition would be the most efficient solution. This would provide the necessary research, educational, lecture, and outreach areas to support ever-increasing activities at the lab. The new addition should complement the existing facility's design and construction materials.

The construction of a gabled all steel rectangular pavilion approximately 16' x 24' installed on new concrete pad with reliable power and lighting would also facilitate instructional, outreach workshop and group projects and graduate student activities as an outdoor, protected classroom.

As Frostburg is an old mining town, the ground beneath the addition will need to be tested and grouted to support the facility prior to construction. This results in higher building costs for site preparation.

Suggested program for the addition to include:

1. Molecular Ecology/Genomics Facility
    - State-of-the-art molecular genetics lab
    - Shared centralized “core” lab space used by multiple PIs, students, postdocs, etc. designed to facilitate interaction and foster collaboration among users.
    - Separate clean room space dedicated to working with DNA from paleo-sediment cores and other environmentally degraded samples
2. Field Staging/Prep – improving the interface between the field and the lab
    - Sample processing labs
    - Field Equipment Storage
    - Improved vehicle loading/unloading access
    - Field Equipment Construction/Maintenance Areas
3. Computing
    - High Performance Computing Facility
4. Meeting and Gathering Space
    - Additional IVN and/or classroom space
    - Meeting area(s) for small group discussion
    - Kitchen/faculty break room
    - Showers/locker rooms

5. Environmental Education/Outreach Facilities
    - Multipurpose classroom(s) suitable to environmental education and workshops
    - One or more educational labs
    - Outdoor classroom/pavilion
6. Additional office space for faculty, students, RA's, and post-docs
7. Research greenhouse facility for multiple researchers

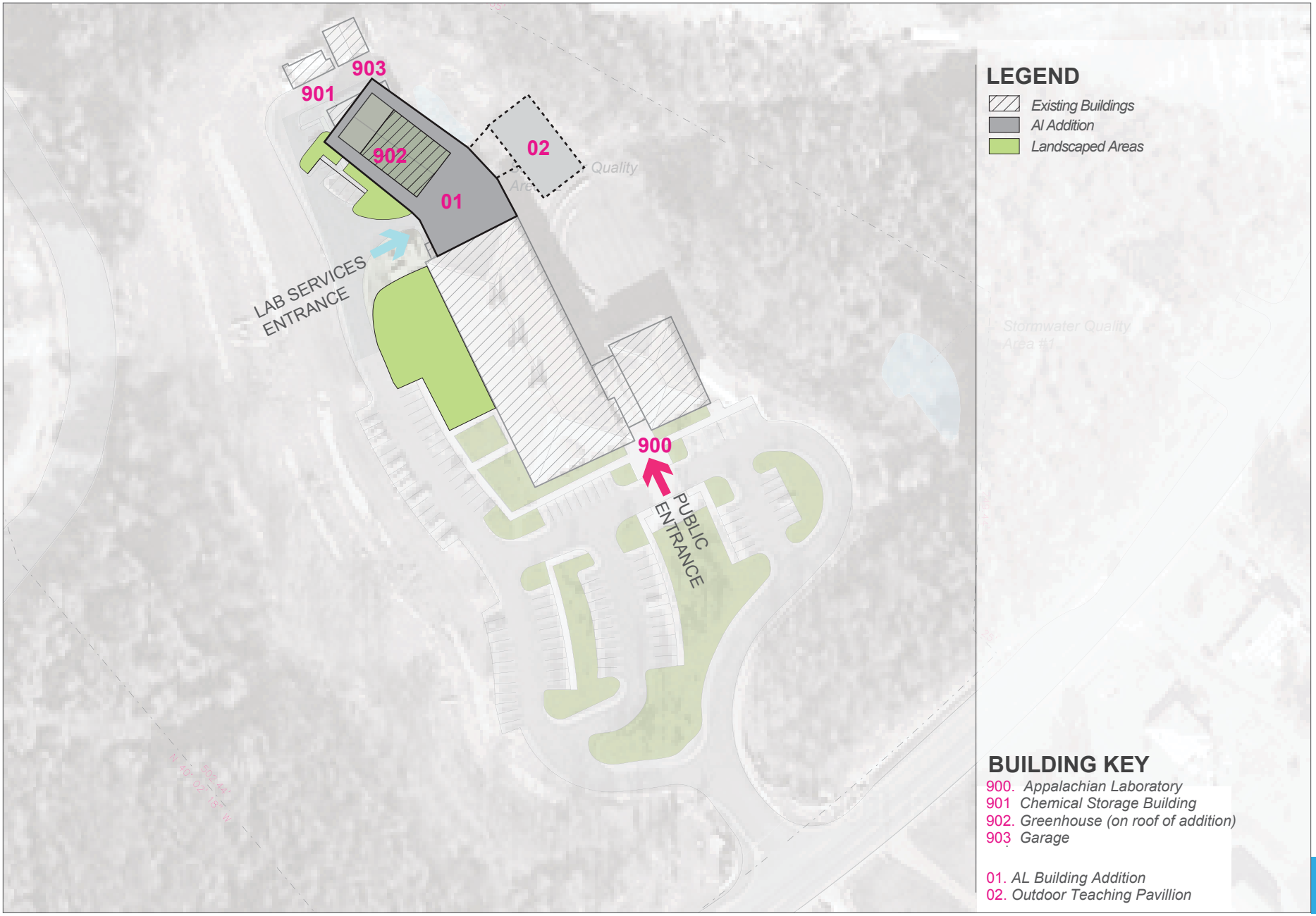


Illustration 3.1
AL Building Addition

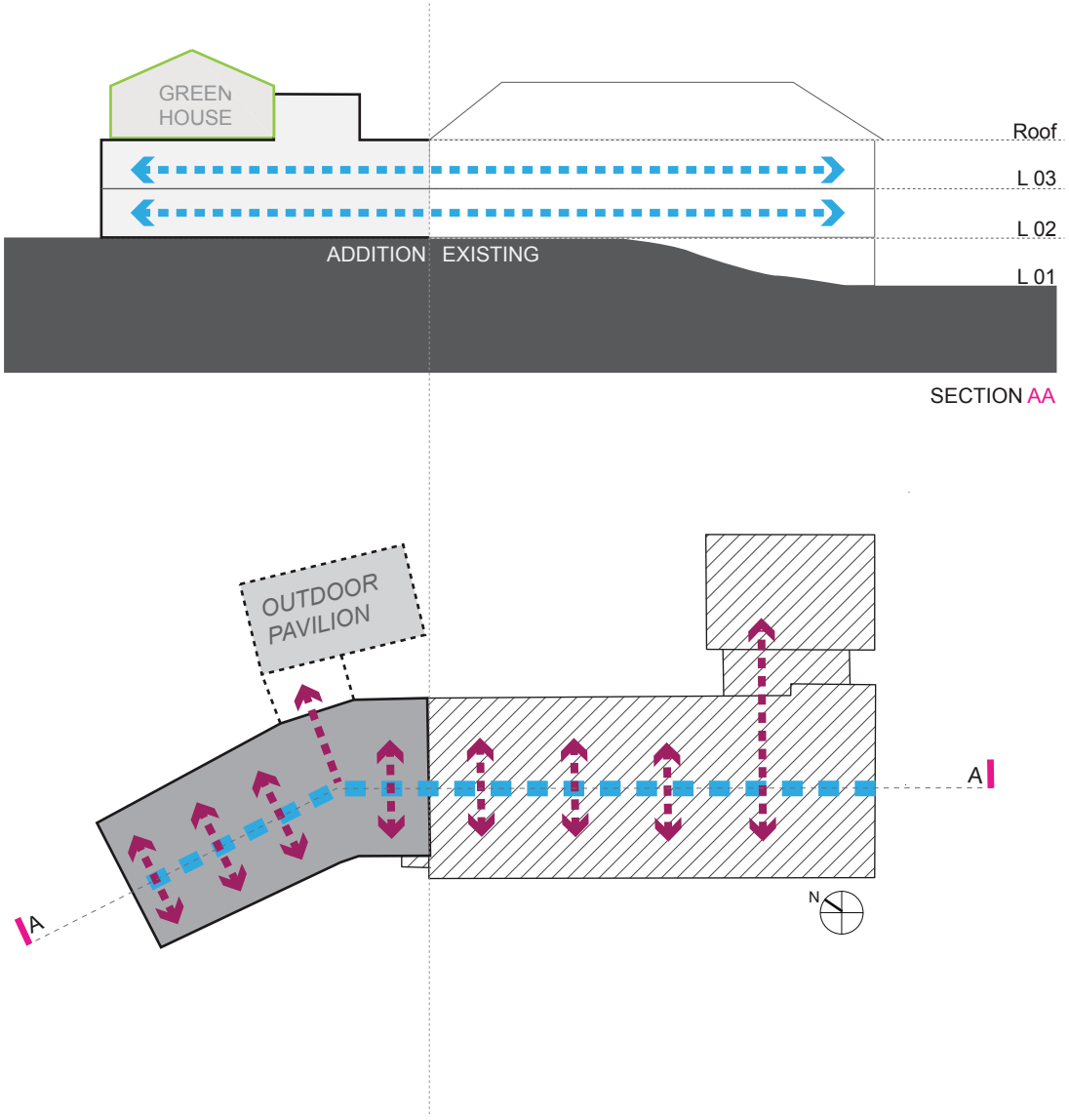
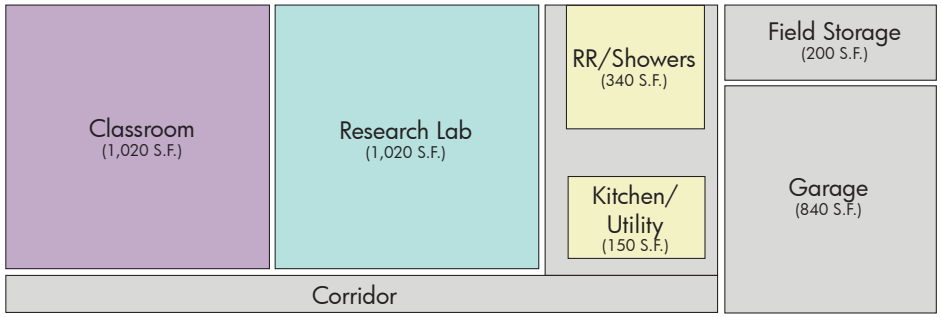


Illustration 3.2
AL Building Addition - Circulation Diagrams

2. Western MD Field Research Station



< 3,500 NSF building to accommodate:

- Monitoring equipment
- Laboratory facilities
- Equipment storage
- Field prep and staging areas
- Educational/classroom space
- Kitchen, showers, locker rooms
- Meeting space(s)

Illustration 3.3 - Example Field Research Station Plan Diagram

Intensive experimental research on the effects of land disturbances, land use conversions, climate change and other activities on terrestrial and freshwater ecosystems is usually conducted within small, protected (i.e. secure), instrumented watersheds where both short-term and long-term ecosystem studies can be conducted. Currently, Appalachian Lab research in this area is hampered by the lack of an available watershed research station in western Maryland. The construction of a watershed research station on Maryland State Forest land would be used to support such research activities.

The scope of this project includes a facility approximately 3,500 NSF. The construction should be a durable, secure facility with reliable power and utilities. Internal partitions in lieu of permanent walls will allow for changes as research needs change. The facility should be built to also allow for future expansion as the research needs increase. The field station should include a permanent stream discharge gauging and water sampling station constructed on nearby watershed, experimental stream channels designed to simulate characteristics of real stream channels, and a meteorological station.

Construction of these facilities will further UMCES Appalachian Laboratory's sustainability efforts and support AL's commitment to reducing carbon emissions by clustering field research activities. The field stations will minimize the commute time by research staff, faculty and students by providing on-site resources that currently require travel back and forth from the lab to the field.

The station will allow for collection and analysis of data as well as provide an on-site facility for personnel that will be housed there. Additionally, depending on the selection and availability of the site location, the construction will incorporate compatible materials and equipment that will minimize the station's climate impact. AL will seek to make the new buildings, structures and additions as carbon and energy neutral as possible by providing renewable energy systems as an integral part of the design and relying upon as few utilities and outside services as possible. Some possible systems to help achieve this include composting toilets, cisterns to collect rainwater for laundry and cleaning, and renewable energy systems; such as photovoltaic panels, solar hot water panels and small scale wind power.

3.3 Facilities Renewal Projects

1. Replace Victaulic Fittings in building.
2. Re-build Air Handling Unit I-Lab (exterior).
3. Building Generator Rebuild.
4. Re-design building exhaust system to provide Individual lab/room control.
5. Attic Re-Insulation Main Building (After exhaust re-design).
6. Carpet/Tile Replacement.
7. Loading Dock Siding/Enclosure from weather.
8. Fume Hoods Replacement.

3.4 Implementation Strategy

Capital Projects

The timing anticipated for the two capital projects for the Appalachian Lab is provided at the beginning of the capital projects section. The two projects are on independent sites and so they do not affect each other, so they could proceed simultaneously. Both project have equal importance for the Appalachian Lab and serve different needs, expanding research space and providing adequate facilities for field work that relate to the core mission of the institution.

Additional Projects

The balance of the planned facility renewal projects will be scheduled based upon the particular need and system and when it reaches the end of its useful life. These projects should coordinate as much as possible with the Capital Projects schedule.

The building generator rebuild should consider the increased size and emergency power needs of the overall facility that will occur with the Building Addition Project. If it happens before the scheduled capital project, a building load for the addition should be estimated and used to re-size the emergency generator. The re-design of the building exhaust system has the potential to provide substantial energy and cost savings to the facility as exhaust which now runs in an on or off mode can be tailored to lab occupancy and use.

The loading dock enclosure is a short-term fix to a current issue that will be solved in the Building Addition Project. It is needed to improve the flow of materials going into and out of the building related to field research. Given the anticipated capital project (building addition), this interim facility renewal project could be done using materials and systems that have a 10 year life-span vs. a 30 year life span.

Landscape improvements should be done in conjunction with the sustainability and carbon emissions plan. Plants that require little to no irrigation, native species and plants that will create habitat will be used. Any planting that can reduce runoff should also be considered.

4. Sustainability

4.1 Current Status

The Appalachian Laboratory continues to implement practices that enhance the environmental sustainability of operations at AL and is seriously committed to the reduction of greenhouse emissions and overall climate footprint. In 2007 the Appalachian Laboratory Environmental Sustainability Council (ALESC) was created as an advisory body to UMCES Environmental Sustainability Council at the laboratory/departmental level. The ALESC has completed a comprehensive inventory of greenhouse gas emissions and is working towards completion of an institutional action plan for becoming climate neutral and reducing greenhouse gases.

4.2 Sustainable Approach

With continued monitoring of emissions, AL's goal is to keep emissions on a downward slope. This will require continued close monitoring and better maintenance of equipment to gain as much energy efficiency as possible from existing equipment, replacement of non-energy efficient equipment, and continuation of recycling and conservation efforts already in place. In addition AL will need to set aggressive energy efficiency targets for any new construction, equipment or systems being implemented in the next 10 years. In addition to setting high goals for LEED certification levels, (Silver certification should be a minimum, with Gold being the target), separate targets should be set for energy efficiency, (minimum of 35% savings over a similar code compliant building). Laboratory buildings are harder to achieve more aggressive targets but with careful planning and attention to new technologies and control systems these targets are achievable.

The 10-year study of GHG inventory shows that 69.% of the Appalachian Lab's CO2 emissions result from electricity use. The bulk of the electricity and natural gas usage is for lighting, heating, ventilation and cooling of the facility.

Although AL emissions have been on a slight decrease for the last several years, the first step toward continuing reducing the AL carbon footprint must focus on the use and consumption of energy within the building.

4.3 Sustainable Actions

Current courses of action:

- Administrative Policy Modifications
- Revised Building Maintenance Plans
- Hybrid vehicle purchases
- Greener landscaping
- Meadow and tree planting
- Environmentally Preferred Procurements
- IT Policies
- Recycling Program

Specific additional actions related to water conservation and quality on the site are as follows:

- Reduce storm water runoff by providing more bioswales and other similar storm water mitigation strategies.

- Collect rainwater on-site and use it for any landscape irrigation needs.

- When repaving of parking lots is required consider permeable paving to allow water to be recharged into the ground, (geotechnical investigations will be required to make sure that the underlying geology is suitable for ground water recharge).

- Reduce water use in the facility through the use of:
    - Automatic sensors in rest rooms.
    - Reduced water use devices for the labs.
    - Recapture water from wash down areas for reuse.

Planned courses of action to reduce AL climate footprint will focus on all areas of existing and new facilities. Related to Capital Projects the following actions should be taken related to future planned projects as well as ongoing operations of facilities.

Capital Projects

Building Renovation & Addition

- Set higher than conventional LEED certification goals, (LEED Gold minimum).
- Set ambitious energy efficiency targets, (35% savings over a similar energy code compliant building).
- Seek all passive and renewable energy savings through the design and configuration of the building envelope itself.
- Use heat gathered in the greenhouse as an energy source for the building.
- Use latest technologies related to demand controlled lab fume hoods to save energy.

Western MD Field Research Station

Set aggressive LEED certification goals, (LEED Platinum target since this is a new stand alone building or the Cascadia Living Building Challenge which promotes zero-energy buildings, https://ilbi.org/)

- Seek to make the building carbon and energy neutral by providing renewable energy systems as an integral part of the building and relying upon as few utilities and outside services as possible. Some possible systems to help achieve this are:
    - Composting toilets.
    - Cisterns to collect rainwater for laundry and cleaning.
    - Renewable energy systems; photovoltaic, solar hot water, small scale wind power.

Facility Renewal Projects

- Power-down policy for Computers and Lab Equipment.
- Installation of solar film on windows to reduce summer heat load.

- Increased video conferences to reduce carbon emissions due to business travel.
- Installation of a renewable energy source; photovoltaic, solar hot water, geothermal, small scale wind power.
- Renewal Energy Certificates (REC) related to any new renewable energy sources added to the site.
- Increased building insulation to increase overall energy efficiency all year round.
- Gray water and/or barrel collection systems for rainwater.
- Window replacements to increase energy efficiency through thermal break frames, higher insulation values on glass and special coatings to further reduce energy use.

IV UMCES CHESAPEAKE BIOLOGICAL LABORATORY

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Chesapeake Biological Laboratory

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1. UMCES Chesapeake Biological Laboratory

1.1 Research Programs

Founded in 1925, the Chesapeake Biological Laboratory has long been a national leader in fisheries, environmental chemistry and toxicology, and ecosystem science and restoration ecology. The breadth of expertise among CBL faculty opens the door for research that cuts across the boundaries of traditional scientific disciplines and fosters collaboration with leading researchers within the CBL community and beyond.

Ecosystem Studies & Restoration Science

Ecological research at CBL includes the study of molecular, organismal, community, and systems ecology. This hierarchical approach to research contributes to a greater understanding of the complex factors influencing the components of coastal and aquatic systems, the mechanisms of global diversity, and the responses of ecosystems to natural and man-made changes.

One of the strengths of the ecology group at CBL is its diversity. Faculty members hail from ecological, engineering, and oceanographic backgrounds. While some faculty are involved primarily in scientific discovery, others are addressing applied environmental issues.

Environmental Chemistry & Toxicology

Understanding the fate of pollutants and their effects on terrestrial and aquatic ecosystems is a major goal of environmental toxicology. Researchers at the Chesapeake Biological

1. Solomons House

2. Beaven Hall

3. Bernie Fowler Laboratory

Laboratory focus their work in two primary areas: aquatic toxicology and environmental organic chemistry.

Aquatic Toxicology

CBL's aquatic environmental toxicology faculty study issues that relate to the chemical characteristics and fate of contaminants. The ultimate fate of a released chemical is determined by a variety of abiotic and biotic processes.

CBL toxicologists play lead roles in investigating the effects of pesticides and industrial contaminants on reptiles, amphibians, fish, and mollusks within the Chesapeake Bay watershed and other areas of the United States. Globally, their efforts include assessing causes for the decline of coral reefs.

Possessing a broad base of expertise, including molecular and biochemical toxicology, immunotoxicology, and ecological toxicology, the faculty employs both traditional and molecular methods to identify the responses of aquatic species to excess nutrients, diseases, and chemical stressors. They also are furthering the use of molecular biomarkers as early warning signs of contaminant effects among aquatic life.

Environmental Organic Chemistry

With sensitive field sampling and laboratory analytical techniques, researchers measure the flows and levels of chemicals occurring in and between the atmosphere, surface waters, sediments, soils, and biota. Experiments under well-controlled laboratory conditions support in depth field studies, with process-based mathematical models integrating the findings.

Fisheries Science

Fisheries science in Maryland began in the 1920s with pioneering oyster research by Professor R. Truitt, founder of Chesapeake Biological Laboratory (CBL). Since then, CBL fishery scientists have contributed significantly to knowledge of the Chesapeake Bay's fished species and of the habitats and ecosystems supporting them. Current endeavors continue to emphasize the Chesapeake Bay, which, as one of the world's most productive estuaries, also serves as a model for coastal and estuarine fisheries and ecosystems throughout the world.

CBL's fishery scientists apply an ecosystem-based approach to much of their research, recognizing that such considerations are vital to the sustainability of aquatic resources.

1. Saunders House


2. CBL Campus


3. Pump House on Research Pier

In addition, CBL is committed to interdisciplinary research that brings forth innovative approaches to issues facing marine fisheries.

1.2 Education & Service

CBL faculty members currently advise over 20 graduate students. The Laboratory offers tours, seminars on current research and graduate studies, and field-oriented activities for undergraduate classes.

Faculty members are dedicated to training a new generation of scientists who will continue CBL's legacy of excellence and service. Along with teaching, the faculty supervises the research of graduate students, who are supported by national fellowships, grants, and university fellowships.

CBL serves the people of Maryland with active involvement in a variety of outreach and public service programs dealing with coastal and watershed issues, regional fisheries information, and environmental planning and conservation. CBL also serves the local, state and federal legislators for the purpose of providing objective opinions and information concerning the environment. CBL's fisheries faculty is committed to using science to help solve pressing issues in fisheries management. Faculty members serve on numerous international, national, and regional advisory panels to help ensure the sustainability of the planet's aquatic resources.

1. Environmental Education Program

2. Aquatic Toxicology Research

3. Fisheries Research Center

2. Existing Site Development and Facilities

2.1 Existing Site

Total Area of CBL Property	8.5 Acres
Total GSF:	124,100 S.F.
Building NASF:	77,232 S.F.
Total Number of Structures:	22

The Chesapeake Biological Laboratory (CBL), is located on Solomons Island at the southern tip of Calvert County at the mouth of the Patuxent River near the midpoint of the Chesapeake Bay. This portion of Calvert County is a peninsula bordered by the Patuxent River on the west and the Chesapeake Bay on the east. Consisting of 8.5 acres, the campus is the largest individual property owner on Solomons Island occupying prime parcels on the Patuxent River and the point/entrance into Mill Creek from the River. The location provides excellent access to all parts of the estuary. (See Illustration 3.3_01 Existing Site Plan)

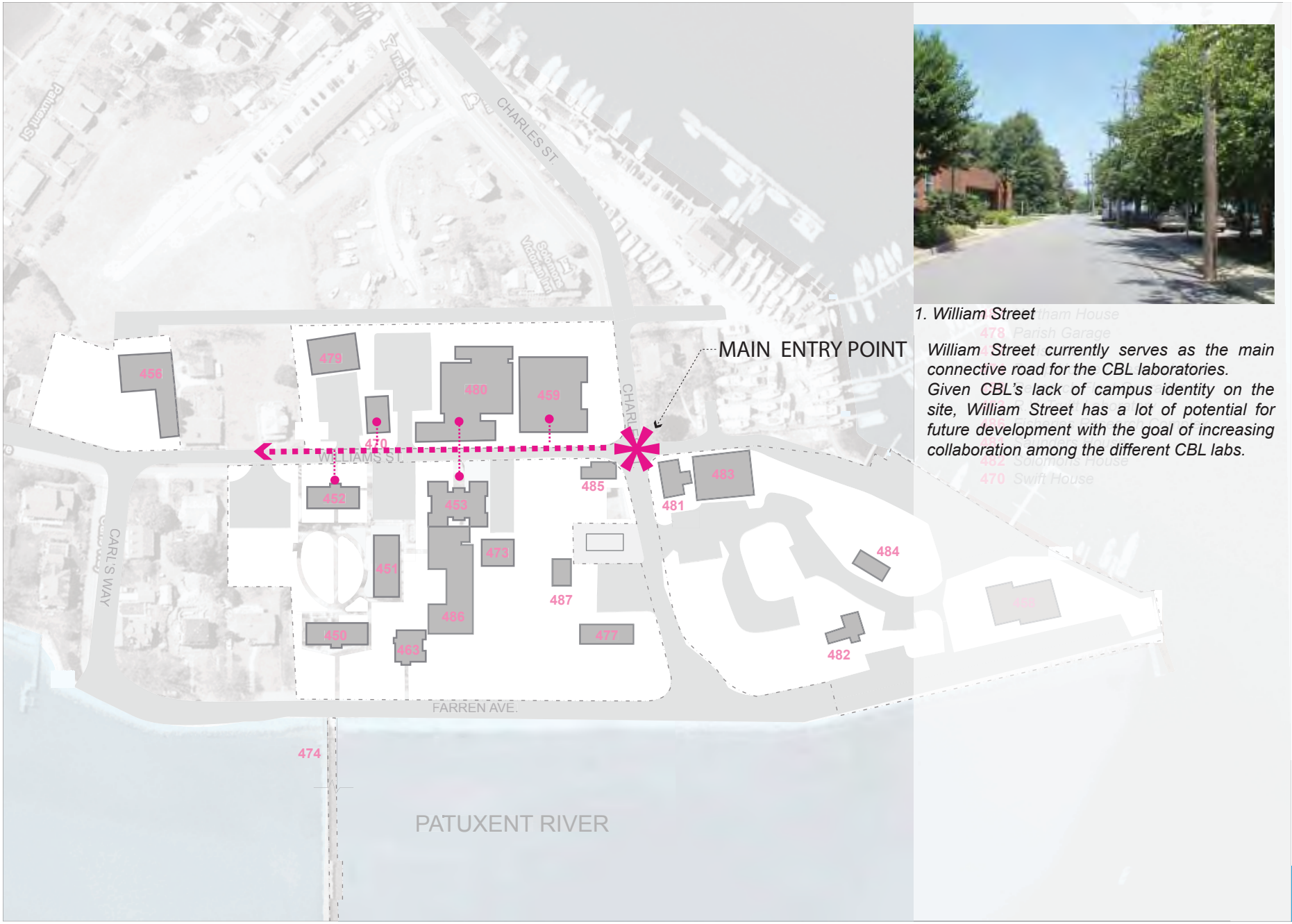
The CBL campus is both bound and bisected by public streets. Maltby Street on the west and Farren Street to the east and south (paralleling the Patuxent River) are boundary streets. Charles Street bisects the campus in the east west direction, separating the original campus from Marina and the RFO facilities. In turn, Williams Street runs north to south and bisects the original campus. In addition to the twelve parking spaces on Farren Avenue, CBL has ten parking lots giving the campus a parking capacity of 124 vehicles. (See Illustration 3.3_03 Parking and Circulation) Although CBL has sidewalks and landscaping included as part of the Site Development program for the campus, there are deficiencies in these categories throughout campus that impact both the visual appearance and safety of the pedestrian.

There are a few parcels of land that prevent CBL from being contiguous. Two parcels located on Williams Street separate the maintenance building from the laboratory property while a second parcel on Charles Street is bordered by the CBL on three sides. The potential exists to purchase privately owned residential parcels in the future to provide contiguous land holdings for a better definition of a University precinct and future expansion and flexibility in facility planning.

1. Williams Street

2. Walking paths

3. Resting Areas



1. William Street

William Street currently serves as the main connective road for the CBL laboratories. Given CBL's lack of campus identity on the site, William Street has a lot of potential for future development with the goal of increasing collaboration among the different CBL labs.

Illustration 2.3
Campus Organizational Structure

NOT TO SCALE

NORTH

2.2 Existing Facilities

The Chesapeake Biological Laboratory currently operates in 22 structures totaling 124,100 GSF and 77,232 NASF. See Table 2.1 for individual building gross square footage (GSF), net assignable square footage (NASF), and condition code. The condition of the physical plant ranges from a third of the structures in good condition and able to function with regular maintenance, to roughly 16% of total structures needing minor renovation and the rest needing major renovation or complete replacement.

450 Beaven Hall

Built in 1931, Beaven Hall is the oldest state-funded building on the CBL campus. It was rededicated in 1992 to honor George F. Beaven (1903-1964), a scholar widely recognized as Maryland's leading authority on the shellfish of Chesapeake Bay. Today, after extensive renovation, Beaven Hall houses the CBL administrative offices, including the Office of the Director, the campus library and faculty offices. The library is extremely overcrowded and needs to be relocated.

485 Coulon House

Built in 1940 and commonly known as the Solomons Laundromat, the property was purchased by CBL in 2000. The lower level has been renovated for community outreach and storage, while the second floor has been converted to two apartments for visiting scientists. Campus laundry occupies the back portion of the building. Also referred to as Becker House.

484 Carey House

In 2000 the CBL campus bought the Carey House, built in 1903 to be used as the Solomons Marine Hospital. The house has been renovated and is used as guest quarters for visiting scientists, speakers and faculty after it was moved to its current location on Solomons Point. The house sits along the side of the CBL recreational area where you can frequently find students playing volleyball or horseshoes.

479 Chemical Storage Building

The property that the Chemical Storage building sits on encompasses portions of the Swift property and the Carey property. The storage facility was constructed in the mid-1990s and the parking lot and loading area were finished in 2000. The Chemical Storage Building provides safe, secure storage for faculty samples, hazardous materials and lab gasses.

1. Beaven Hall

2. Coulon House

3. Coastal Technology Lab

473 Chiller Enclosure
Open equipment structure that houses the chiller and electrical equipment.

483 Coastal Technology Lab
Formerly a dealership and service shop for marine equipment and boats, this property was acquired by CBL in 2000. The ACT, headquartered at CBL, is a NOAA-funded partnership of research institutions, resource managers and private sector companies dedicated to fostering the development and adoption of effective and reliable sensors and platforms. ACT provides the information required to select the most appropriate tools for studying and monitoring coastal environments.

480 Bernie Fowler Lab
Opened in 1994 and formally dedicated in honor of former Maryland State Senator C. Bernard "Bernie" Fowler in November 1998. The Bernie Fowler Laboratory (BFL) provides over 25,000 S.F. of research space for environmental chemistry, organic and trace metal geochemistry, biogeochemistry and ecotoxicology. In addition to instrumentation in individual faculty research laboratories, the building houses a shared mass spectrometry laboratory, containing instruments for structural identification (several mass spectrometers with gas and/or liquid chromatographic interfaces) and carbon/nitrogen stable isotope analyses. An additional laboratory is dedicated to trace element analysis, including elemental and methylmercury measurement. Separate organic and metal-free clean rooms for sample preparation are located on both floors of the building.

451 Cory Hall
Built in 1960 and dedicated in 1992, Cory Hall recognizes pioneering entomologist Dr. Ernest Cory (1887-1979), who headed the University of Maryland's Entomology Department for more than 40 years. Today, Cory Hall houses offices and laboratories of faculty involved in various aspects of the Chesapeake Bay Monitoring Program, including the Nutrient Analytical Services Laboratory.

463 Kopp House
Kopp House is believed to date from the 1870's, when it was constructed as one of a number of two-story duplex dwellings, called "company houses." Built by Isaac Solomon (from whom Solomon's Island takes its name), these buildings housed his oyster packing workers. Most of these homes were demolished in the first few decades of this century, but the Kopp House survived and became an official part of the CBL campus in 1978. The building houses several faculty offices, as well as a furnished apartment for use by visiting scientists and guests for short-term accommodations.


1. Bernie Fowler Lab


2. Cory Hall


3. Kopp House

456 Maintenance Facility
The maintenance facility was purchased in the late 1960s and has continued to serve as the center for the CBL maintenance and facility staff. Additions to the building have been built over the years.

459 Mansueti Laboratory
Mansueti Laboratory was built in 1980 and dedicated in 1992 in honor of Dr. Romeo Mansueti (1923-1964), a naturalist and scientific writer of unusual scope and proficiency. Today, Mansueti Laboratory houses offices and laboratory space for CBL faculty/students in ecology.

452 Nice Hall
Nice Hall was constructed in 1938 and recognizes Mrs. Edna Amos Nice, wife of then Maryland Governor Harry W. Nice. The building currently houses an 18-bed student/visitor dormitory, lounge, and kitchen facilities, as well as the CBL Computer Center and faculty/staff offices.

487 Northam House
The Northam property is the most recent purchase of land by the CBL campus. It was purchased in 2010 and is used as a storage area.

477 Parish House
Acquired by the Laboratory in 1990, the Parish House now houses faculty/staff offices. The original Solomons Episcopal parish rectory once stood on this site, adjacent to the two-story Parish House. Built in 1906 and used for both community and church activities, at various times the first public library, a gymnasium, a movie theatre, and later the Town Hall were housed in the spacious second floor, which also hosted Solomons High School graduations from 1927-1939. Dr. Reginald Truitt used portions of it as a research laboratory in the late 1920's before Beaven Hall was completed in 1931. Both structures were demolished in the mid-1950's, but the "new" Parish House was constructed on the same site in 1962.

474 Pump House / Research Pier
The pump house supplies water to all research laboratories on campus.

458 Research Fleet Operations Center
The UMCES Research Fleet is the backbone of the Center's coastal science research programs, providing scientists with access to the Chesapeake Bay and its rivers.
The Research Fleet Operations Center, built in 2001, is home to the University's flagship R/V Rachel Carson and several smaller vessels.


1. Nice Hall


2. Research Fleet Operations


3. R.V. Truitt Extension

453 R.V. Truitt Laboratory

The R. V. Truitt Controlled Environmental Laboratory was constructed in 1973 and dedicated in honor of Dr. Reginald V. Truitt, a zoologist at the University of Maryland College Park and founder of CBL. In March of 2008 systemic system problems beset the facility and required its closure in order to protect the safety of personnel and research. The facility is not currently occupied and is not in use.

486 R.V. Truitt Extension

FRC houses CBL's recently renovated seawater and filtration system, and contains facilities for the culture and maintenance of estuarine organisms. Wet laboratories supplied with flowing, temperature-controlled seawater are utilized for ecological, behavioral, and toxicological studies on fish and invertebrates. Dry laboratory areas and walk-in environmental chambers are also available. The building also house several faculty and student offices.

481 Saunders House

Saunders House is believed to have been built in the early 1890s, and throughout much of the early part of the century was the site of a general store and ice cream parlor run by Thomas and Bertie Saunders. Sometime in the 1930's, an after-hours Men's Club was established here, a favorite gathering place for many of the local shipwrights, merchants, and fishermen. It currently houses faculty offices.

482 Solomons House

Solomons House is the oldest structure in Solomons, dating from ca. 1780, and can be identified on an 1814 map of the region compiled and drawn by Commodore Joshua Barney, renowned local naval hero of the War of 1812. Solomons House has been extensively altered in the intervening 200+ years. Purchased by the Laboratory in 1994 is today used for the CBL Visitor Center.

470 Swift House

Acquired by the Laboratory in 1969, Swift House currently houses several faculty/ scientific staff offices. It was formerly known as the Yorker House. The building is believed to date from the 1870s as one of a number of two-story duplex dwellings - the "company houses. " The Swift House serves as office space for faculty and students.

2. Saunders House

3.Solomons House

2. Swift House

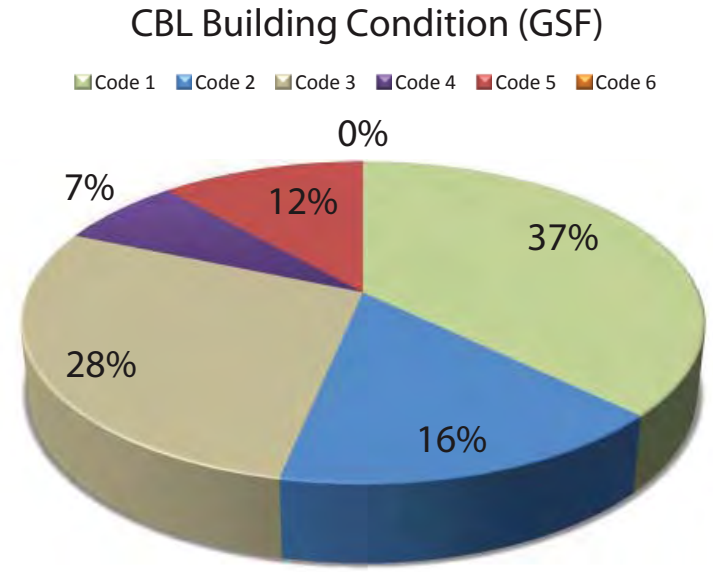
TABLE 2.1*

Building Number	Building Name	Total GSF	Building NASF	Efficiency	Year Constructed	Replace Value	Condition Code	Renovation Cost
450	Beaven Hall	9,280	5,728	0.62	1932	2,670,696	3	1,735,952
485	Coulon House	2,417	2,059	0.85	1920	605,225	3	116,000
484	Carey House	1,100	1,030	0.94	1930	275,444	3	46,200
479	Chemical Storage	3,000	2,687	0.90	1993	796,958	2	79,696
473	Chiller Enclosure	1,544	0	0.00	1982	265,481	5	26,548
483	Coastal Technology Lab	4,500	4,366	0.97	1994	838,225	2	83,822
480	Bernie Fowler Lab	25,860	14,790	0.57	1994	13,644,147	2	1,364,415
451	Cory Hall	5,104	3,217	0.63	1961	1,468,883	3	954,774
463	Kopp House	2,245	1,749	0.78	1940	646,090	3	258,436
456	Maintenance Facility	4,412	1,812	0.41	1952	821,833	4	205,458
459	Mansueti Lab	10,176	5,299	0.52	1980	4,738,764	3	473,876
452	Nice Hall	7,200	4,902	0.68	1938	2,072,091	3	1,346,859
487	Northam House	1,440	780	0.54	1960	414,418	4	269,372
478	Parish Garage	240	175	0.73	1960	37,140	4	9,285
477	Parish House	2,001	1,382	0.69	1960	575,869	2	57,587
474	Pump House/Research Pier	433	0	0.00	1969	3,723	5	372
458	Research Fleet Operations	8,056	6,273	0.78	2001	2,059,904	1	1,338,938
453	R.V. Truitt Lab	13,911	7,771	0.56	1974	7,339,665	5	733,966
486	R.V. Truitt Extension	12,157	8,224	0.68	2007	6,414,226	1	641,423
481	Saunders House	2,570	1,533	0.60	1920	665,659	4	166,415
482	Solomons House	2,210	1,533	0.69	1880	572,415	3	143,104
470	Swift House	4,244	1,922	0.45	1930	1,099,245	3	274,811
CBL Totals		**124,100**	**77,232**			**48,026,098**		**10,327,309**

** Information for Table 2.1 was obtained from UMCES SGAP 2011.*

TABLE 2.2

The table below references the building condition codes from the previous Table 2.1. The percentages shown reflect the number of buildings with that particular code assigned to it.



Building Condition Code:

1.	**Satisfactory**	Suitable for continued use with normal maintenance.
2.	**Remodeling – A**	Requires restoration to present acceptable standards without major room changes, alterations, or modernization. The approximate cost of remodeling is not greater than 25% of the estimated replacement cost of the building.
3.	**Remodeling - B**	Requires major updating and/or modernization of the building. The approximate cost of remodeling is greater than 25% but not greater that 50% of the estimated cost of the building.
4.	**Remodeling - C**	Requires major remodeling of the building. The approximate cost of remodeling is greater than 50% of the remodeling/replacement cost of the building.
5.	**Demolition**	Should be demolished or abandoned because the building is unsafe or structurally unsound, irrespective of the need for the space or the availability of funds for replacement. This category takes precedence over categories 1, 2, 3, and 4.
6.	**Termination**	Planned termination or relinquishing or occupancy of the building for reasons other than unsafeness or structural unsoundness, such as abandonment of the temporary units or vacating of leased space. This category takes precedence over categories 1, 2, 3, and 4.

2.3 Facility Needs:

The following is a summary of overall facility needs by type of space:

Laboratory

- Disciplinary clusters to share technology/instruments across disciplines.
- Physical connections to improve programmatic and social interaction.
- Infrastructure to support ecological research/water security.

Instruction

- Adequate additional space to expand innovative informational and computerized instruction to include a wider and more varied user group.
- Improvement in video conferencing.

Office/Admin

- Additional office space.

Other

- Housing for students and visiting scientists.
- Additional library space for book storage and study space.
- Signage to indicate campus point of entry. It currently lacks an easily identifiable place of arrival.
- Sidewalks are in need of repair and, in many cases, do not exist. Not only does this condition constitute a hazard to pedestrians, but leads to a poor image of the area.
- There are very few outdoor recreational facilities for the faculty, staff, and students. Street furniture (seating, additional picnic benches, courtyards, etc.) would enhance existing areas used for informal and passive recreation.

1. Current Campus Signage


2. Current Walking Paths


3. Current Library Space

3. Planning Strategies and Facilities Implications

3.1 Planning Overview

Land

Land still remains the limiting growth factor at CBL. Without the acquisition of additional privately owned properties surrounding the campus, expansion potential is limited. A recent land acquisition has opened up an opportunity for some much needed expansion near the center of the campus.

Core Growth in Lab and Education Spaces

It is the desire of CBL to expand and grow facilities that support the core research and education mission of the lab. The CBL campus is planning for expansion related to research themes that include water security and restoration ecology. The required facilities to support this research expansion include lab space, office space for faculty, staff and students, state-of-art computing and library facilities, classrooms and conference rooms. CBL also needs lab space that promotes collaboration within and among disciplinary groups as well as external colleagues. Current lab space is very cellular and does not provide the space necessary for cross disciplinary work underway at CBL.

Library and Information Technology Needs

CBL has an extensive current and historical library collection. The campus library facilities occupy an inadequate space in the original administration building at CBL (Beaven Hall) and the campus is unable to provide the quality space needed for the exciting new directions in the organization, format, and constituencies of informational services. Current space is entirely taken up for book and manuscript storage leaving little to no space for researchers or students to work in. Just as important is the need for adequate additional space to expand innovative informational and computerized services to include a wider and more varied user group. Existing IT space on campus is in basement space in Nice Hall. It is inadequate and vulnerable to flooding and so must be relocated and expanded. Computer labs in this same facility are undersized for the campus population and not in the same location as the library thereby reducing their research capabilities.

Improving the Overall Campus Environment

The campus suffers from the lack of a “front door” and sense of clear “arrival.” The approach along Charles Street leads to a view of the Bay beyond with the main part of the campus off to the right. The intersection of Charles and Williams Street, the heart of the campus, is not well marked nor does it provide a sense of arrival to the campus. There is an opportunity to locate a new facility to provide this sense of arrival as well as meet many of the campuses needs for a new Library/Information Commons and IT space. Meeting rooms and other collaboration spaces would fulfill a campus-wide need as well as compliment the IT and Library functions. This building could also become the central-hub for CBL visitors and an important component of CBL’s education and service mission.
Other ways to improve campus inter-connectivity could include new and improved pathways among buildings, housing and office space for visiting researchers, and providing dorm space for students and interns.

Site and Landscape

CBL seeks to improve the pedestrian and vehicular access, and other aging infrastructure. CBL desires to effectively communicate the scientific and social history of the campus. A consistent, theme-based signage program which includes descriptions of the history and research activities at each building would begin to tell the CBL story to visitors of Solomon Island. Signage should be integrated with walking paths throughout the campus. Additionally, information kiosks within the campus footprint containing current and relevant CBL information would be beneficial for visitors touring the Island and would be a method of relaying the CBL story.

Sustainable Design

As an environmental laboratory, CBL desires to lead the way in sustainable practices. CBL desires to have an eco-friendly campus that actively displays and promotes energy efficiency and is a place where others visit to see how complex issues related to sustainability and environment problems are solved. Reduction in storm water run-off, reduced nutrient inputs and low-emissions are key components. Integration within the campus physical plant systems to reduce stand-alone systems, and renovation vs. replacement of buildings are key component to this effort. Parking areas with designated areas for low-emission vehicles and bicycles, solar powered areas and interior furnishings made entirely of recycled products are examples of ways to demonstrate a commitment to sustainability.

CBL will focus on the following particular goals as they relate to facility growth and change over the next 10 years. Refer to UMCES overall Goals and Planning Principles for additional information. (Section II-4)

Goals

- Reinforce campus identity throughout the site.
- Maintain and celebrate cultural heritage on campus.
- Make interdisciplinary research a core strength at CBL to facilitate new and expanded themes.
- Increase the efforts for sustainable practices.
- Improve environmental education outreach to local community and citizens throughout Maryland.
- Increase collaboration with local institutions.
- Increase infrastructure connectivity to avoid single point of failure issues with IT, emergency power and HVAC.

CBL Campus Planning Principles

- Maintain and enhance the “small town campus” scale, atmosphere, and appearance. Show sensitivity to the adjacent residential properties.
- All buildings will be designed with LEED standards, minimum Silver level, with a goal of achieving GOLD level.
- Better define the CBL campus boundaries and image.
- A campus map showing the location of the buildings/functions and designated visitor parking areas should be installed near, or integrated with, the Campus identification sign on Charles Street.

- Explore the possibilities of acquiring properties adjacent to the campus that will provide contiguous land for academic and research space.

- Continue cooperation with the local governmental agencies of the town, county, and regional planning districts in capital developments of mutual interest, which includes roadway and pedestrian way traffic flow and access.

- Maintain the “simpler” landscaping principles that require less maintenance and be more sustainable, promote attractive development, to protect and preserve the appearance and character of the surrounding area.

3.2 Capital Projects

Summarized below are the needed facility and infrastructure projects for the next five and ten year periods followed by a description/justification for each project. Total project budgets include design fees, construction costs, and equipment purchase in 2012 dollars.

TABLE 3.1 Capital Project Budgets*

(P)-Planning; (C)-Construction; (E)-Equipment; (AP)-Land Acquisition;

Project	5 Year Program	Post 5 Year Program	Total Project Budget
R.V. Truitt Replacement	$1,150,000 (P) $6,150,000 (C) $7,350,000 (C,E)		$14,650,000
Information & Communications Services Building	$1,586,000 (P) $10,752,000 (C) $1,500,000 (E)		$13,839,000
Mansueti Laboratory Renovation		$650,000 (P) $4,750,000 (C) $700,000 (E)	$6,100,000
Total:			**$34,589,000**

** Information for Table 3.1 was obtained from UMCES Capital Budget Information System (C.B.I.S 2012).*

1. R.V. Truitt Replacement

The R.V. Truitt Laboratory, originally constructed in 1973, was closed in March 2008 due to safety and structural concerns. This closure resulted in a reduction of 7,771 NASF at CBL and caused 8 faculty research laboratories to be relocated. The new project's primary purpose is to replace the existing R.V. Truitt Laboratory (13,911 GSF) on CBL's campus. The scope of work proposed in this program includes the relocation of key shared mechanical components to a support building, the Chiller Enclosure ("CE" #473), and its renovation, the demolition of the existing Truitt facility and the construction of a new seawater laboratory.

The re-designed Chiller Enclosure will house the multiple shared mechanical systems which are currently supported through Truitt. This design should incorporate new technologies and equipment and work to reduce the overall carbon footprint of the facility.
At a minimum, the project must meet the LEED Silver certification for new construction. The new facility shall incorporate the latest technologies in thermal efficiency including high efficiency fluorescent lighting, thermal pane glass, variable speed air supply and exhaust systems and an automated building energy management system.

The proposed building must fit into the architectural character and scale of Solomons, a historic town on the Chesapeake Bay. The Solomons Master Plan ("SMP") should be reviewed by the consultant as a part of the design process. Partial planning funds have been approved for fiscal year 2013.

2. Information And Communications Services Building

This program plans the construction of an 8,720 NASF Information and Communications Services Building (ICS). This facility will provide space for library and information retrieval services, a supporting computer center and an Interactive Video Conference Center that are vital to modern research and education needs that rely on library and support services.

The project will provide adequate space for the library collection and information technologies needed to support the research and instructional programs of the campus. It will improve access to instructional and research materials to meet the routine demands of staff, faculty, students and visitors. It will also allocate space designed to support the information retrieval oriented computer facilities and Interactive Video needs.

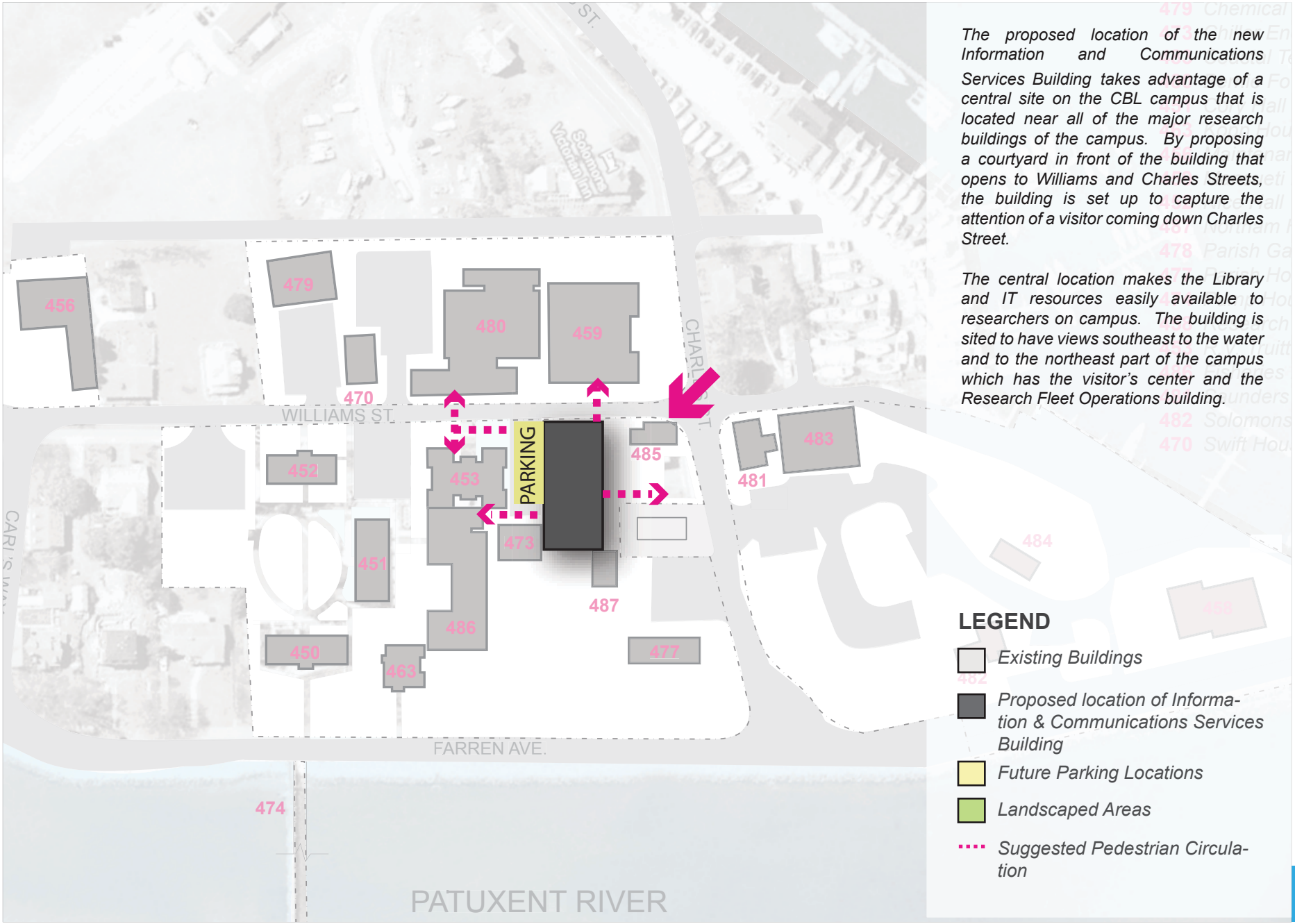
One of the central themes in UMCES activities involves interdisciplinary research directed toward answering large-scale environmental problems. This theme demands improved facilities, and one of the most critical issues that has been identified at CBL concerns library and information retrieval capabilities. The space available for the library, computerized information retrieval services, campus computer center, and interactive video conferencing has become inadequate to meet the routine demands of staff, faculty, students and visitors. On the basis of current growth, it seems likely that the library collection will increase in 10 years to over 77,000 volumes per 2012 SGAP and within 20 years to over 80,000 volumes. The current library shelves are over 99% full and there is no space available in its present location for additional shelving.

In general the design solution should address, but not be limited to, the following:

- A suitable design solution that responds to the surrounding environment.
- Integration of on-site and off-site pedestrian circulation and separation of vehicular and pedestrian traffic.
- Development of the surrounding outdoor as an amenity and as an integral part of the building.
- Energy efficient and sensitive design for 12-month climate control for the building, as well as safety and functional flexibility.
- Parking, service, fire apparatus, accessibility for people with disabilities in accordance with ADAAG regulations, and utility requirements.

Suggested program includes:

- Library with compacted shelving (3 rooms) and day-to-day access to periodicals.
- Study Space for reading and work areas adjacent to library and IT functions.
- Project Rooms - 2 small conference rooms, each programmed with a smart wall.
- Studio for Science - project room with high-density computer access and smart wall. The room needs to have direct access to daylight and noise control to increase collaboration.
- IT Center to serve the whole campus with network and data support.
- GIS Room situated between IT center and library functions.
- Computer Teaching Lab for 18-20 people with desktop and laptop stations.
- Print Center to serve the whole campus and housed within the IT center at ICS.
- Mobile Interactive video stations - Smaller mobile IVNs allow for flexibility in space use and maximise collaboration with other UMCES campuses.
- Visitor Reception Area - Flexible lobby space to receive casual visitors or meeting area for scheduled tours.
- Administration & Staff Offices to include director’s office and support staff, IT and Library Support offices.



The proposed location of the new Information and Communications Services Building takes advantage of a central site on the CBL campus that is located near all of the major research buildings of the campus. By proposing a courtyard in front of the building that opens to Williams and Charles Streets, the building is set up to capture the attention of a visitor coming down Charles Street.

The central location makes the Library and IT resources easily available to researchers on campus. The building is sited to have views southeast to the water and to the northeast part of the campus which has the visitor's center and the Research Fleet Operations building.

Illustration 3.2-A
Information and Communications Services Building - OPTION A

NOT TO SCALE NORTH

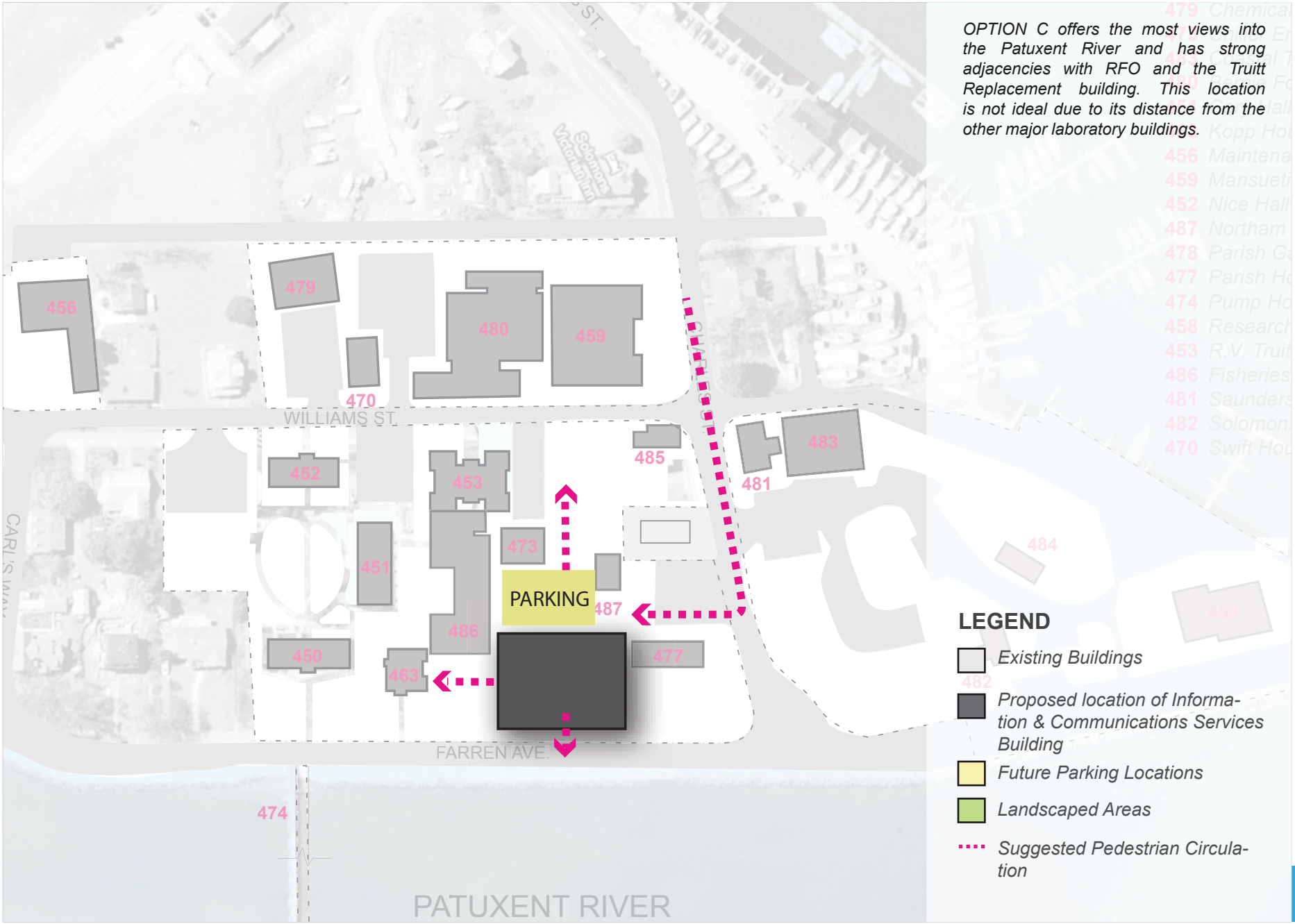


Illustration 3.2-C
Information and Communications Services Building - OPTION C

NOT TO SCALE

NORTH

3.3 Facilities Renewal Projects

Buildings

1. Beaven Hall
   - Complete window replacement.
   - Replace 3 aged A/C units with heat pumps.

2. Coulon House
   - Replacement of 2 aged heat pumps.

3. Bernie Fowler
   - Steam coil & pan replacement - air handlers.
   - Generator replacement 80kw 277a/480v.
   - Replace Uninterrupted Power Supply Unit.

4. Carey House
   - Replace furnace/AC with heat pump.

5. Cory Hall
   - Update to Honeywell digital controls.

6. Chemical Storage Building
   - Replace air handler.

7. Mansueti Laboratory
   - Replace Air Handler - incorporate cooling.
   - Add supplemental a/c to front office.

8. Nice Hall
   - Replace 1 heat pump / 2 AC units.

9. Parish House
   - Replace windows.

10. Saunders House
    - Replace 2 heat pumps.

11. Solomons House
    - Replace 2 heat pumps.

12. Swift House
    - Replace windows.

Infrastructure

13. Campus wide signage program to clearly define campus arrival and campus buildings and history.

14. Parking lot improvements and resurfacing with permeable pavement.

15. RFO Bulkheading.

3.4 Implementation Strategy

Capital Projects

The timing of the two capital projects proposed for the Chesapeake Biological Lab is provided at the beginning of the capital projects section. The Truitt Replacement is expected to be implemented in the next year.

The I&CS building meets a pressing need for an appropriate library/meeting space as well as a new IT hub for the campus that presents serious challenges to CBL. An interim solution may be needed if funding will not be available in the next five years.

Additional Projects

The balance of the planned facility renewal projects will be scheduled based upon the particular need and system and when it reaches the end of its useful life. These projects will be coordinates with the Capital projects schedule. As the projects involve separate buildings, they can be scheduled on an as needed basis.

Upon completion of the Truitt Replacement, the labs from Mansueti Laboratory will be moved over, freeing up Mansueti for a major renovation.

Upon completion of the I&CS building, the library space in Beaven Hall can be renovated into office space and existing IT space in Nice Hall can also be renovated to an appropriate use for the building.

4. Sustainability

4.1 Current Status

The Chesapeake Biological Laboratory continues to implement practices that enhance the environmental sustainability of operations at CBL and is seriously committed to the reduction of greenhouse emissions and its overall climate footprint. CBL has been an important part of the overall UMCES sustainability efforts and a significant contributor to the Climate Action Plan greenhouse gas reduction efforts.

The following are current initiatives and CBL's future sustainability goals and actions in relation to Capital Project and Facility Renewal Project planning.

1. Raingarden by Solomons House

4.2 Sustainable Approach

With continued monitoring of emissions, CBL's goal is to keep emissions on a downward slope as reflected in FY10. This will require continued close monitoring and better maintenance of equipment to gain as much energy efficiency as possible from existing equipment, replacement of non-energy efficient equipment, and continuation of recycling and conservation efforts already in place. In addition CBL will need to set aggressive energy efficiency targets for any new construction, equipment or systems being implemented in the next 10 years. In addition to setting high goals for LEED certification levels, (Silver certification should be a minimum, with Gold being the target), separate targets should be set for energy efficiency, (minimum of 35% savings over a similar code compliant building). The density of the CBL campus together with the upcoming Truitt Replacement Lab Project presents opportunities to implement larger and much more efficient campus-wide or precinct systems for utilities like chilled water. These kinds of systems combined with more sophisticated controls can yield significant savings in overall energy efficiency.

Focus on Water Conservation and Quality

Issues related to water quality and water security, which are an integral part of research at CBL, also play an important role which may have little direct affect on carbon emissions and energy use. Water use within the facility and on the site along with associated issues related to storm water runoff should be focused upon with a goal of implementing best practices in these areas.

Some specific actions in this area would include:

- Reduce storm water runoff by providing more bioswales and other similar stormwater mitigation strategies especially along areas that feed into wetlands or directly into the bay. These could also start to define the edges of a new “green street” at Williams Street where these strategies would be deployed along both sides of the street as a demonstration project.
- Continue to collect rainwater on-site and use it for any local irrigation needs.
- When new parking lots are planned as part of a capital project, or existing lots come up for repaving, consider permeable paving to allow water to be recharged into the ground.
- The barrel system provides a test case for a larger, more inclusive rain barrel system that could be later implemented campus-wide.
- Rooftop gardens increase building insulation and intercept stormwater. They are particularly effective for flat or shallow-pitch roofs. The Mansueti, Fisheries Research Center and Truitt buildings might be good candidates for rooftop gardens.
- Reduce water use in the facility through the use of:
    - Automatic sensors in rest rooms
    - Reduced water use devices for the labs
    - Recapture water from wash down areas for reuse

1. Permeable Paving

2. Stormwater management through landscaping

Refuse and Recycling

CBL’s Recycling and waste minimization program currently includes all mixed office paper, cardboard, paperboard, magazines, toner cartridges, plastics #1 & #2, batteries (alkaline and rechargeable), CPUs, cell phones, monitors, printers and mixed metals. Continued recycling efforts have enabled CBL to keep solid waste to a minimum. Additionally, two compost bins were placed at two communal eating areas – outside the Bernie Fowler Laboratory and Beaven Hall – to aid in CBL’s biodegradable waste reductions. “Green” cleaning products are used throughout lab buildings.

Transportation

CBL recently sold several of its campus vehicles. The laboratory is currently looking into purchasing an electric vehicle for on-campus transportation needs.

4.3 Sustainable Actions

Planned courses of action to reduce CBL's greenhouse gas footprint will focus on all areas of existing and new facilities. Related to Capital Projects the following actions should be taken related to future planned projects and Facility Renewal Projects as well as ongoing operations of facilities. These are defined in greater detail in the Climate Action Plan with strategies and suggested policies to implement them.

Capital Projects

R.V. Truitt Laboratory Addition

- Set higher than conventional LEED certification goals, (LEED Gold target).
- Set ambitious energy efficiency targets, (35 -45% savings over a similar energy code compliant building).
- Seek all passive and renewable energy savings through the design and configuration of the building envelope itself.

Seek to make sustainable systems "transparent" and visible to the day to day users of the facility. Use them as an opportunity to teach occupants and users about the energy efficient strategies at work in the facility.

Information and Communication Services Building

- Set aggressive LEED certification goals; LEED Platinum minimum since this will be a completely new building and will become the new "front door" to the CBL campus.

- Provide renewable energy systems as an integral part of the building. Some possible renewable energy systems to help achieve this include photovoltaic panels, solar hot water, larger scale geothermal and small scale wind power. Providing a pitched roof to integrate the building into the existing residential architecture of the surrounding buildings would provides a good surface for the installation of either PV or solar hot water panels.

Facilities Operations

- By addressing air-flow problems in the Bernie Fowler Laboratory (BFL), CBL has significantly reduced its operating costs and GGE. These units were converted to re-circulating units, thereby reducing heating costs for those sections of the building.
  CBL has modified fume hoods at BFL, that now supply room with dedicated exhaust hoods that run at a constant volume 24/7, by installing variable speed controls. The hoods were fitted with occupancy sensors so air-flow can be adjusted based on the current utilization of the lab. A heat recovery loop was installed on the systems, and the warm exhaust air produced by the fume hood is captured and used to heat the circulating glycol loop which heats the air in the building.

- Heating and cooling thermostats are programmed to have a maximum threshold of 68° in the winter and a minimum threshold of 76° in the summer for all buildings (this does not include research labs which must be set to their required research temperature). During long breaks (i.e. winter and spring), all thermostats in offices are reduced further.

- Solomons House Improvements:
  - Switched to LED lighting throughout the building.
  - Replaced worn carpeting with “green” flooring - a vinyl product 65% recycled content.
  - Installed rain barrels and additional rain garden.
  - Replaced restroom fixtures to low-flow.

- Power-down policy for Computers and Lab Equipment.

- Increased video conferences to reduce carbon emissions due to business travel.

- Light colored paint is used for exterior painting jobs in order to reflect light and keep buildings cool in the summer.

- Landscaping has been simplified to minimize maintenance, with an emphasis on the use of native plants. Seventy five native trees and shrubs were planted throughout the campus since FY 2009 and a rain garden was created in front of the Fisheries Research Complex.

Facility Renewal Projects

- Installation of renewable energy sources; photovoltaic, solar hot water, geothermal, small scale wind power. There is an opportunity to integrate these into the new capital projects in the next ten years as well as provide these as part of facility renewal projects on existing buildings.

- Renewal Energy Certificates (REC) related to any new renewable energy sources added to the CBL site.

- Increased building insulation and air tightness through re-caulking and sealing of building exteriors, windows and doorways to increase overall energy efficiency all year round.

- Window replacements to increase energy efficiency through thermal break frames, higher insulation values on glass and special coatings to further reduce energy use.

- Landscape improvements related to creating a green street on Williams Street.

- Expand gray water and/or barrel collection systems for rainwater.

V UMCES HORN POINT LABORATORY

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1. UMCES Horn Point Laboratory

1.1 Research Programs

The Horn Point Laboratory (HPL) conducts operations from the site of the former Francis V. DuPont estate. The property offers HPL unique opportunities to conduct Chesapeake Bay-related environmental studies, as the campus embraces every Eastern Shore ecological system from estuaries and marshes to forests and farmlands. The Horn Point Laboratory conducts research that deals primarily with the detection and prediction of changes in estuarine and marine ecosystems and the population of organisms that inhabit them. Research projects address both basic and applied issues primarily within the Chesapeake Bay, its tributaries and Mid-Atlantic area coastal bays and actively involve partners and stakeholders, including diverse educational programs.

HPL contributes to the UMCES mission through research, education and services in four areas:

Aquaculture Restoration Ecology Program

Horn Point Laboratory has a multi-disciplinary team of scientists who specialize in aquaculture of fish and shellfish, marsh and seagrass ecology, and water quality of coastal systems. They are actively involved in science that supports holistic and proactive restoration of oysters, submerged aquatic vegetation, fish, and wetlands.

Research emphasis of the aquaculture restoration ecology group extends from shoreline erosion and remediation impact on SAV, ecosystem responses to nutrient management, estuarine macropyhte production, effect of turbidity and light on SAV, oyster culture and restoration technology and evaluation, fish culture technology, sturgeon enhancement, and aquatic plant nutrient management applications.

1. HPL Aerial Photograph

2. AREL - Aquaculture & Restoration Ecology Laboratory

3. Oyster Research at HPL

Biological Oceanography

Biological oceanography is concerned with the role of estuarine and marine organisms in biogeochemical processes and food web dynamics. An integrated group of researchers specializes in the study of bacteria, phytoplankton, protistan microzooplankton, zooplankton, seagrasses, marsh plants, and bivalves. HPL's strength lies in collaborative studies organized around central research themes such as food web ecology & modeling, harmful algal blooms, seagrass and marshland ecology, and the impacts of eutrophication.

Research extends from the analysis of intracellular molecular processes to watershed-scale ecosystem studies using an array of techniques including molecular and phylogenetic analysis of biomarkers, cultivation and examination of organisms, experimental mesocosms, field and ship-based observation and experimentation, automated sampling and observing systems, GIS, and modeling.

Nutrient and Biogeochemical Cycles

The Chemical Oceanography group at Horn Point Laboratory has expertise in both water column and sedimentary chemistry. Research interests include a wide variety of topics ranging from basic to applied research including instrument development. Much of HPL's focus is on nutrients that in excess lead to eutrophication and oxygen deficiency, and that may promote harmful algal blooms. A particular interest is the processes that control fixed-nitrogen concentration over regional to global space scales, and hourly to geologic time-scales.

Because of the inter-disciplinary nature of the research, collaborative research with several UMCES/HPL colleagues and a large number of U.S. and international colleagues is always encouraged. Collaborative projects with Horn Point Laboratory colleagues include investigations of harmful algal blooms and studies of how the drastic decrease in oysters may have exacerbated anthropogenic nutrient additions.

Physical Oceanography

The Physical Oceanography group at Horn Point Laboratory spans a diverse range of interests and research. Generally physical oceanographers are concerned with the motion of the ocean. This includes waves, currents, movement and erosion of sediments, pollutants and biology, interactions of the ocean with the atmosphere and the land surface, and the interactions of the ocean with climate variability.

1. Research at HPL

2. Aquaculture Restoration Ecology_Oyster cage

3. Biological Oceanography

The scales of these processes are diverse, ranging from dynamics in rivers and harbors, to Chesapeake Bay, to the coastal and global oceans. However, much of the effort is focused on issues of interest to Chesapeake Bay, ranging from basic science to applied restoration programs.

Faculty members in this group focus their efforts primarily in the discipline of physical oceanography and coastal engineering. However, the laboratory's strength lies in the interdisciplinary linkages formed among biologists, chemists, geologists, geographers and fluid dynamicists both at HPL and UMCES, and across the United States and globe.

1.2 Education & Service

Graduate education and undergraduate student internships are the laboratory's primary educational programs. Undergraduates are recruited from Maryland and throughout the nation to participate in a summer internship program in which students design and conduct research under the guidance of the HPL faculty.

The Horn Point Laboratory Environmental Education Center (EEC) is the premier Eastern Shore resource for environmental education that enriches and informs the connection between Its citizens and their natural environment. The Center uses the unique resources of the laboratory's marine and estuarine scientific research to further this vision.

A comprehensive residential educational and meeting facility was built in 1992 on 80 acres at HPL to support youth environmental education programs held at the laboratory.

Today the center offers programs such as:

- K-12 environmental science, environmental literacy, stewardship education and Science, Technology, and Math (STEM) education enhancement programs that include outdoor activities and experiences;

- Adult environmental education and activities on a variety of topics including those related to the Laboratory's research, as well as recreational and outdoor experiences;

1. Sediment testing

2. Physical Oceanography

3. Lecture Hall at Coastal Science Laboratory

2. Existing Site Development and Facilities

2.1 Existing Site

Total Area of HPL Property	847 Acres
Total GSF:	226,435 S.F.
Building NASF:	153,201 S.F.
Total Number of Structures:	51

Located on the tidal waters of the Choptank River in Dorchester County approximately eight miles from the Chesapeake Bay, the Horn Point property consists of 846.86 acres of forest stands, farmland, and two small tidal ponds, DuPont Cove and Lakes Cove. The site has around 375 acres of fields, 436.86 acres are in woodlands, and 35 acres are in lakes, ponds and marshes. The cleared land consists of landscaped lawns, gardens, and roadways. The open fields include a private airport with three grass runways. A pier on the property provides access for moderate-size (60-80') marine research vessels. Twenty ponds on the campus are used for finfish aquaculture and submersed aquatic vegetation studies. A hatchery is devoted to aquaculture and algal research. *(Illustration 2.1 Site Plan)*

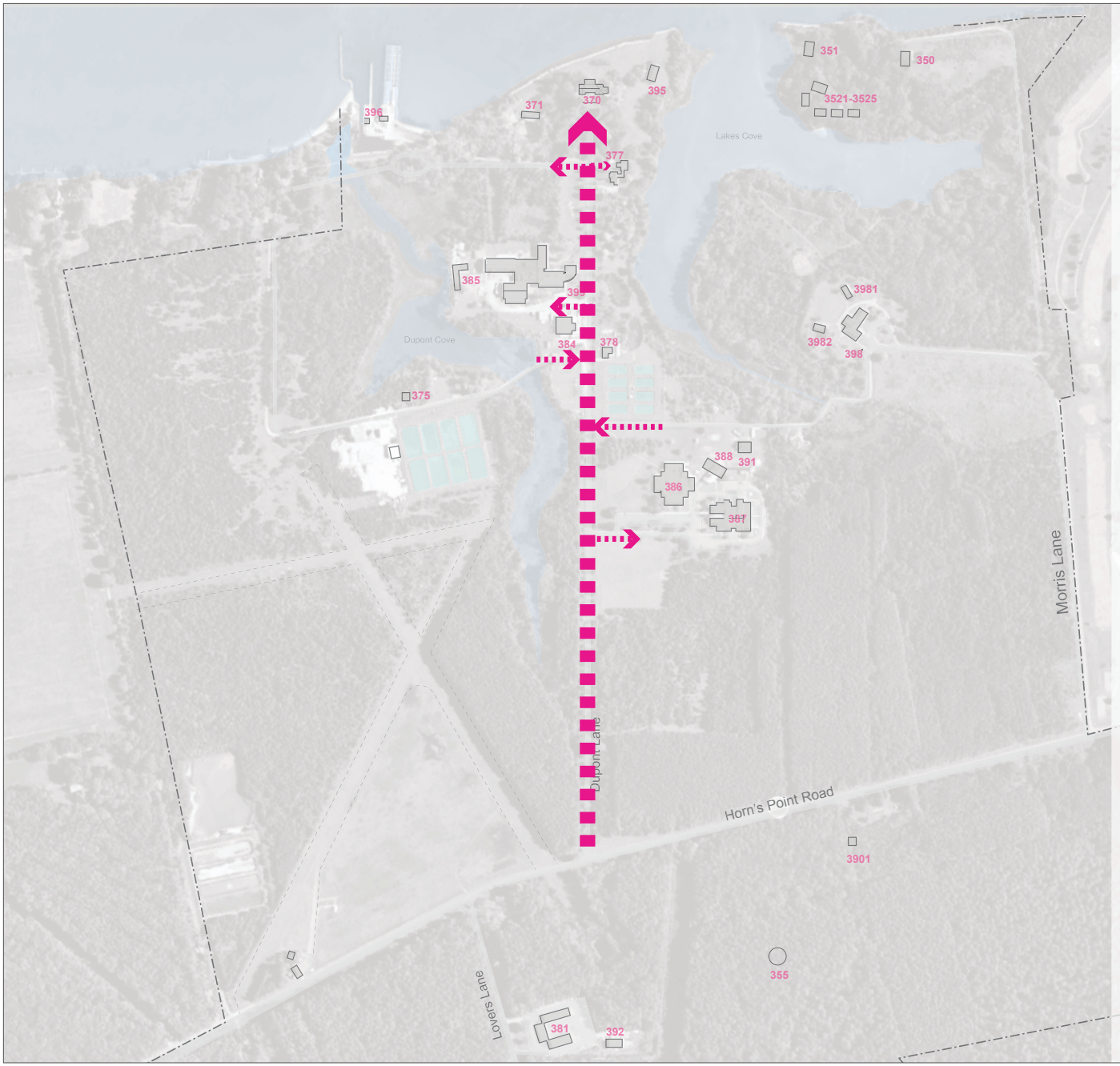
Most of the HPL site sits inside the Chesapeake Bay Critical Area zone under Limited Development (LDA). The HPL falls into the LDA designation since the site does meet the "institutional" feature of the LDA category. This designation offers the HPL greater flexibility to expand its facilities. In addition, since the state owns the land, future critical area development must comply with the State's mandated criteria. *(Illustration 2.4 Critical Areas Map)*

Currently there is a total of 4.6 miles of roads on the HPL campus. *(Illustration 2.1 Site Plan)* Primary access to both UMCES Center Administration and HPL is from Horns Point Road onto DuPont Lane. *(Figure 2)* The Horns Point Road bisects the campus into two parcels. Secondary access from a service road is available to the east of DuPont Lane and provides access to the major research complex and indirect access to the Environmental Education complex. To the west of DuPont Lane is another service road that provides access to the aquaculture ponds. To the north of the service road is a right-of-way and another service road that provides access to the residential property and boat basin facilities. Morris Lane is another access point for the Environmental Education complex off Horns Point Road further east of DuPont Lane. A service drive extends to the river for access to the campsites and cove trail.

1.HPL Entry Gate

2.DuPont Lane

3. Center Administration at HPL



1.HPL Campus

The diagram illustrates the central drive and access point for the Horn Point campus. Original to the DuPont estate, it is lined with large mature holly trees. It is simple, long and dramatic; ending at the house which now serves as Center Administration. Many of the major facilities of the campus are just off of this main drive. This main drive is a powerful landscape design element that should be emphasized and better developed to give the campus a sense of identity and place. As future projects and building sites are developed they should include work to develop and improve the edge of the main drive. Design and planning recommendations that reinforce the main drive are provided in Illustration 3.1

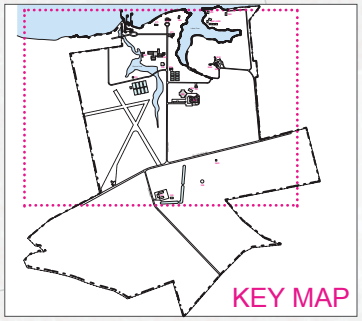


Illustration 2.3
Campus Organizational Structure

NOT TO SCALE

NORTH

2.2 Existing Facilities

The HPL contains 51 structures, including the UMCES Administration Building and Well house. Of the total current facilities, 14 structures are part of the original DuPont estate. Most of those buildings were built prior to 1950 and later adapted to the needs of a modern environmental research laboratory. The original property consisted of a private residence with small support buildings (caretakers residence, bath house, farm buildings such as a barn, chicken house, pump house, etc,) some of which have been demolished.

There are 15 major facilities with the former DuPont residence serving as the UMCES Administration Building. Below is a summary of the current condition of all facilities at HPL. (See Table 2.1 for USM Building Condition Codes and Table 2.2 for more building information.)

370 UMCES Administration Building
This two story (basement and first floor) former residence of Francis V. DuPont overlooks the Choptank River and serves as the administrative headquarters for UMCES and is used for small conferences.

3701 Administration Building Well House
Brick facility holds the fresh water well equipment for the administration building and the dormitory.

3842 Algal Greenhouse
Formerly used for growing algae for the oyster hatchery. This building is slated for reuse on a different part of the Laboratory.

3841 Ambient Water Filtration Building
This one story building is used for the storage for field research materials.

396 Ambient Water Pumping Station
This concrete block building supplies the ambient Choptank River water to give campus research facilities seawater.

399 AREL (Aquaculture and Restoration Ecology Laboratory)
Newest research lab at HPL houses oyster research and restoration in a two story building. Attached to AREL is the HPL Greenhouse which used to support oyster research.


1. The former DuPont Residence


2. AREL


3. IAN Building

384 Aquaculture Hatchery

Former home for both the oyster and finfish hatchery which was supplanted by the AREL Building. Outside tanks are still used for oyster setting. This building, which contains some asbestos, is slated for demolition.

3761 Barn Complex Well House

Contains tanks and piping for freshwater distribution to parts of the campus.

351 Canoe Shed

This is a one story structure used to provide secure storage for canoes. It is located along the Cove Trail.

391 Chemical Storage

This facility is being renovated to be a Biosafety Lab II.

386 Coastal Science Laboratory

This one story structure is one of the main lab buildings at HPL and provides research laboratory/support space, faculty offices, classroom and meeting rooms including two studio locations to hold interactive video conferencing, as well as the administrative offices, library. The laboratory cannot accommodate the analytical and chemistry research currently underway and the utility systems are inadequate. Modifications to accommodate the rapid growth to the laboratory have jeopardized the efficiency of the mechanical and electrical systems.

398, 3981, 3982 Environmental Education Activity Building & EE Residential Facility

The Environmental Education Activity Building, (398), is an activities/shower/toilet facility, which includes a dining room, commercial grade kitchen, receiving area, a small classroom, a wet laboratory, boys and girl's toilet and shower facilities, conference room, and an office. In addition, there is an outdoor dining area and two outdoor showers. EE Residential Facility, (3981-3982) have two bunk style sleeping rooms for extended stay programs. They are separated by a lounge.

3521, 3522, 3523, 3524, & 3525 Adirondack Shack (Environmental Education Shelters)

These five shelters, part of the Cove Trail, provide rustic accommodations for three to four participants each on overnight trips.

1. Water Pump Station

2. Student Dormitories

3. Coastal Science Building

350, 3501 Environmental Education Pavilion & Well House

This is a one story structure used for year round protection from inclement weather as well as a gathering space and eating facility with a vented barbecue pit for Cove Trail tour groups.

388 Environmental Information Center

This is a one-story building that serves as the computer center and computer laboratory for HPL.

394 Fish Systematics Laboratory

This is a one-story research laboratory facility.

355 Forest Classroom

This structure along the Forest Environmental Education Trail is a tree house for gatherings and a rest area.

371 Integration and Application Network (IAN)

Formerly the bathhouse of the DuPont estate, these are currently used as offices for IAN.

3711 Generator Building

Constructed as part of the DuPont estate to provide emergency generator backup to the residence, bathhouse, and greenhouse.

377 Lakes Cove Dormitory

This two-story modular structure provides living accommodations for 28.
The facility contains two efficiency apartments with a capacity of two each and twelve double rooms. There is a common kitchen, dining, and living room/lounge area.

3901 Learning Center Well House

Well house contains freshwater pumping equipment for the former Learning Center.

381 Maintenance Complex

This one story “U” shaped complex houses offices, the HVAC/plumbing shop, the carpenter shop, spray booth and paint storage, automotive shop and storage, wash bay, equipment storage, warehouse, grounds keeping storage, lounge/lunch room, and men’s and women’s lockers/showers.

1. Setting Pier

2.Oyster Research at AREL

3. Current Map Room

3811 Maintenance Complex Well House
Building holds fresh water equipment for maintenance building well.

387 Morris Marine Science Laboratory
This one story structure provides research laboratory space for the investigation of fish ecology, physical oceanography, and oyster physiology. It houses an analytical laboratory for water quality analyses, aquaculture studies, and a sediment laboratory used to study the chemical and geological techniques for determining rates of sediment accumulation and release of nitrogen and phosphorus. In addition, this facility provides a water quality control room for both full strength ocean water and variable salinity water and offices and meeting space for the researchers. Designed as a wet laboratory, the building now contains renovated dry laboratory facilities.

3871 MMS Well House
Well house holds well pumping equipment to supply the water tower, which is the main source of potable water and fire sprinkler supply for the campus.

392 Research Support Maintenance
This facility houses the machine shop.

378 Submerged Aquatic Vegetation (SAV) Laboratory
This is a one-story structure serving as a combination of wet and dry research laboratories.

385 Seafood Science Technology Building
This structure houses tanks and chillers to simulate winter temperatures for oysters in order to control spawning.

3712 Secured Storage
This one story, former “Dog House” provides HPL with secure general storage.

375 Visiting Faculty Residence
This facility serves as housing for visiting faculty.

395 Widgeon Pavilion
This is an open air, roof covered structure that provides for multiple uses ranging from picnics and gatherings to outdoor meetings.

2. Oyster Research

3. Environmental Education Bulkhouse

TABLE 2.1*

Building Number	Building Name	Total GSF	Building NASF	Efficiency	Year Constructed	Replace Value	Condition Code	Renovation Cost
370	UMCES Administration Bldg	10,369	6,120	0.59	1950	2,984,100	2	746,025
3701	UMCES Admin Well house	225	0	0.00	1950	32,239	2	3,224
3842	Algal Greenhouse	1,800	1,700	0.94	1980	8,400	2	840
3841	Ambient Water Filtration	672	0	0.00	1992	492,547	2	49,255
396	Ambient Water Pump St.	983	0	0.00	1992	501,502	4	325,976
399	AREL Research Lab	65,600	33,338	0.51	2003	29,382,000	1	2,938,200
3991	AREL Ozone Generator	192	173	0.90	2005	12,000	1	1,000
384	Aquaculture Hatchery	6,000	4,960	0.83	1975	3,165,695	4	2,057,702
3761	Barn Well House	305	0	0.00	1974	27,008	3	10,803
3911	Chemical Storage	395	316	0.80	2002	89,591	1	8,959
386	Coastal Est. Sci. Lab	25,760	19,822	0.77	1980	13,838,501	3	5,535,401
3861	Coastal Lab Well house	240	0	0.00	1981	20,633	2	8,253
3873	Compressed Gas Storage	160	0	0.00	2005	5,000	1	500
3872	Dive Locker	160	0	0.00	2005	10,000	1	1,000
398	Env. Ed. Activity Bldg	7,165	6,050	0.84	1993	2,062,019	2	824,808
3521	Env. Ed. Adirondack	128	0	0.00	1989	14,329	4	5,731
3522	Env. Ed. Adirondack	128	0	0.00	1989	14,329	4	5,731
3523	Env. Ed. Adirondack	128	0	0.00	1989	14,329	4	5,731
3524	Env. Ed. Adirondack	128	0	0.00	1989	14,329	4	5,731
3525	Env. Ed. Adirondack	128	0	0.00	1990	14,329	4	5,731
351	Env. Ed Canoe Shed	720	0	0.00	1983	35,056	2	14,023
350	Env. Ed. Pavilion	1,176	0	0.00	1985	104,136	3	41,654
3981	Env. Ed. Residential Bld	1,627	1,240	0.76	1993	288,145	3	115,258
3982	Env. Ed. Residential Bld	1,627	1,240	0.76	1993	288,145	3	115,258
3501	Env. Ed Wellhouse	96	0	0.00	1988	24,760	2	9,904
388	Environmental Information Center	3,523	2,083	.59	2011	2,000,000	1	800,000

** Information for Table 2.1 was obtained from UMCES SGAP 2011.*

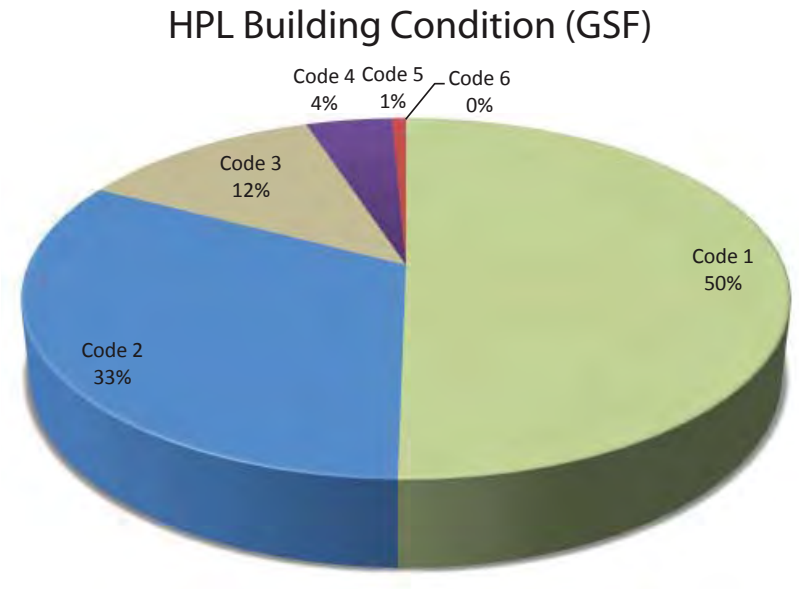
TABLE 2.1 (continued)

Building Number	Building Name	Total GSF	Building NASF	Efficiency	Year Constructed	Replace Value	Condition Code	Renovation Cost
3763	Fiber Optic Bldg	108	0	0.00	2003	10,000	1	1,000
394	Fish Systematics Lab	672	450	0.67	1992	178,519	1	17,852
355	Forest Classroom	379	339	0.89	1987	97,750	4	9,775
3711	Generator Building	560	0	0.00	1950	72,216	5	72,216
371	IAN Facility	1,584	1,267	0.80	1925	420,794	1	168,318
3901	Learning Cnt Well house	48	0		1945	6,190	4	4,023
381	Maintenance Complex	12,800	10,240	0.80	1982	3,683,718	2	368,372
3811	Maintenance Well House	310	0	0.00	1982	39,977	1	3,998
3871	Morris Lab Well house	300	0	0.00	1989	25,792	2	2,579
387	Morris Marine Lab	26,500	21,200	0.80	1989	14,236,036	3	1,423,604
382	Museum Cottage	1,005	853	0.85	1937	172,803	5	112,322
383	Museum Hangar	2,458	1,540	0.63	1937	422,637	4	274,714
3992	Microsia Filter Bldg	160	144	0.90	2006	5,000	1	1,000
373	Oyster Culture Facility	2,200	2,200	1.00	2001	30,000	1	19,500
348	Oyster Setting Facility	21,000	18,508	0.88	2010	9,500,000	1	6,175,000
3731	Oyster CultureFacility II	3,072	2,458	0.80	2006	90,000	1	10,000
392	Research Support Maint.	3,710	2,986	0.80	1988	1,423,604	2	142,360
378	SAV Laboratory	2,228	1,782	0.80	1986	854,930	2	85,493
385	Seafood Tech Lab	1,725	1,639	0.95	1937	481,979	4	313,286
3712	Secured Storage	160	128	0.80	1950	27,511	2	2,751
374	Storage	470	376	0.80	1930	80,813	3	32,325
375	Visiting Faculty Residence	1,503	1,202	0.80	1948	419,951	1	41,995
377	Visitor Student Housing	7,700	6,160	0.80	1989	2,151,443	2	215,144
391	Warehouse 1	3,000	2,687	0.90	1992	773,746	2	77,375
395	Widgeon Pavilion	3,200	0	0.00	1990	447,053	1	44,705
3951	Widgeon P. Restrm	148	0	0.00	1992	19,086	3	4,771
HPL Totals		**226,435**	**153,201**			**91,114,667**		**23,261,179**

** Information for Table 2.1 was obtained from UMCES SGAP 2011.*

TABLE 2.2

The table below references the buidling condition codes from the previous Table 2.1. The percentages shown reflect the number of buildings with that particular code assigned to it.



Building Condition Code:

1.	**Satisfactory**	Suitable for continued use with normal maintenance.
2.	**Remodeling – A**	Requires restoration to present acceptable standards without major room changes, alterations, or modernization. The approximate cost of remodeling is not greater than 25% of the estimated replacement cost of the building.
3.	**Remodeling - B**	Requires major updating and/or modernization of the building. The approximate cost of remodeling is greater than 25% but not greater that 50% of the estimated cost of the building.
4.	**Remodeling - C**	Requires major remodeling of the building. The approximate cost of remodeling is greater than 50% of the remodeling/replacement cost of the building.
5.	**Demolition**	Should be demolished or abandoned because the building is unsafe or structurally unsound, irrespective of the need for the space or the availability of funds for replacement. This category takes precedence over categories 1, 2, 3, and 4.
6.	**Termination**	Planned termination or relinquishing or occupancy of the building for reasons other than unsafeness or structural unsoundness, such as abandonment of the temporary units or vacating of leased space. This category takes precedence over categories 1, 2, 3, and 4.

2.3 Facility Needs:

Presently HPL facilities are spread out on the site making it difficult to access without a car and there are no continuous walking or biking paths. The dispersed site also lacks a point of arrival. While DuPont Lane, a tree lined road serves as the formal entrance to campus from the ram decorated pillars, all the way to the old DuPont home, the latter is too far inside the campus to serve as a welcome center. Coastal Science is the first building one encounters on DuPont Lane; it does not serve as an appropriate welcome center to the campus. A more formal arrival point needs to be established on DuPont Lane to welcome and orient visitors to the HPL campus. Also to be noted is the lack of visibility of much of HPL's diverse and rich natural environment from DuPont lane. This is especially noted during the summer months, where view of the marshes is completely blocked off by high shrubs.

Laboratory

- Morris Marine needs major renovation. Current facility is reaching end of useful life and will not be able to support modern laboratory needs.
- Need larger shared labs to increase collaboration among researchers and students, as well as increasing support for the proposed expansion of the program to winter and summer classes.
- Need additional analytical laboratories for water quality testing.

Instruction

- EE program needs to improve its presence on campus through landscaping and signage to navigate and inform visitors about environmental issues and research being conducted.
- Renovate and convert old laboratories into teaching labs.

Office/Admin

- Additional offices for faculty, graduate students and post-doctoral candidates.
- Small conference rooms in close proximity to faculty and student offices.

Other

- Student Residences are outdated and need renovation. Expansion is needed to support the projected growth in graduate students and undergraduate summer internships.

- Lecture hall/auditorium to accommodate approximately 100-150 attendees. Such a facility would help achieve HPL's goal of scientific collaboration by enabling the lab to host larger conferences with UMCES researchers and international scientists. Associated smaller meeting places and break out rooms would also be needed.

- Additional library space is needed to serve the growing HPL community. The current space is still in the original 772 square foot room in the Coastal Science Laboratory, which was built in 1978. The space is over crowded and does not provide study space for faculty, researchers or students. The library is not a destination or used to its capacity compared to other peer institutions.

- The Electric transformer by the river needs to be relocated due to riverbank problems.

- A central place for all members of UMCES to gather for lunch or larger all hands meeting is needed to help foster a stronger sense of community.

- Accessibility is still problematic in the older buildings on campus. (EE building - direction of the wood decking is not ADA compliant.)

- Campus exterior lighting needs improvement.

- Need additional recreational facilities on campus. Currently there are only outdoor courts, walking paths, and shower facilities.

- Need 9-11 track poles for campus security.

- Some buildings need back-up generators (EE and some of the labs are on limited emergency power.

- An additional well and water tower are needed to serve the growing research community at HPL.

- Need campus wide resurfacing of the road system.

- Campus Signage.

3.1 Planning Overview

Planning for the next 10 years at HPL will be flexible and adaptable to future needs while addressing the current issues that interfere with the success of the lab's operations, from research and education to administration and service to the community.

HPL operates on a site rich of history and physical attributes that are currently not used to their fullest advantage. Most of the marshes and river views are hidden from the main campus roads, including DuPont lane, an elegant tree lined road that runs through the site connecting major research clusters at HPL and Center Administration. (Image 1 & 2)

The HPL campus is presently so spread out that requires use of vehicles to move from one building to the other. When planning for future development, an important goal should be to decrease daily travel distances. As mentioned in UMCES overall Goals and Planning Principles in Section II-4, research collaboration is greatly improved by physical connections among the different laboratories on all UMCES campuses.

There is strong potential for DuPont lane to be furthered developed into a connective corridor, enriched by state of the art research facilities, outdoor recreational and research areas, and walking paths to create a greater sense of community within the site. Illustration 3.1 shows a planning framework for the HPL campus where DuPont lane is featured as the spine of the campus where all current and future development connects. By increasing its visual prominence on campus, it also creates a sense of arrival and orients visitors throughout the site. It also creates the opportunity for interaction and collaboration among HPL community members by shortening walking distances to and from labs, as well as adding parking and open recreational space in between them. A walking path that loops around the site connects all major laboratories and residential areas, while increasing visual connections with the river and outdoor research activities. In addition, by locating development along one central spine, the need to extend building services for future development is minimized, therefore lowering infrastructure costs.

1.View from DuPont Lane

2. Obstructed view to the marshes.

3. View towards the Choptank river.

HPL will focus on the following particular goals as they relate to facility growth and change over the next 10 years. Refer to UMCES overall Goals and Planning Principles for additional information. (Section II-4)

Goals

- Reinforce campus identity throughout the site.
- Increase collaboration among researchers, students and staff.
- Create a greater sense of community at the HPL site.
- Increase the delivery of environmental information to all communities (local and visiting research scientists, the media, students of all ages, legislators, tourists, etc)
- Maintain and celebrate the diverse ecosystems at HPL.

HPL Campus Planning Principles

- Protect natural and esthetic features of the site.
- Limit vehicular conflict with pedestrian circulation. Encourage walking on a daily basis by creating safe and pleasant walkways throughout the campus. Provide better outdoor lighting for these areas.
- Construct bike stations to encourage alternative ways of transportation within the campus as well as to help promote an environmentally friendly image throughout campus. They could serve as information centers at crucial locations for visitors.
- When planning new development, previously occupied sites should be considered to avoid disturbing the natural features of the site.
- The interface between public programs and research activities should be organized in such a way that neither interferes with the other.
- Continue to support the growth of the Environmental Education Program by the maintenance of the current EE buildings and the surrounding areas.

1. View from Old Hatchery

3.2 Capital Projects

Summarized below are the needed facility and infrastructure projects for the next five and ten year periods followed by a description/justification for each project. Total project budgets include design fees, construction costs, and equipment purchase in 2012 dollars.

TABLE 3.1 Capital Project Budgets*

(A)-Acquisition; (P)-Planning; (C)-Construction; (E)-Equipment;

Project	5 Year Program	Post 5 Year Program		Total Project Budget
Coastal Dynamics Laboratory (CDL)		1,995,000 $17,319,000 $1,500,000	(P) (C) (E)	$20,815,000
Morris Marine Lab Renovation		1,323,000 $12,457,000 $1,200,000	(P) (C) (E)	$14,980,000
Total:				**$35,795,000**

** Information for Table 3.1 was obtained from UMCES Capital Budget Information System (C.B.I.S 2012).*

1. Coastal Dynamics Laboratory

The CDL, a new two story building sited somewhere between Coastal Science and the AREL building, will serve as a new hub for the HPL campus. The current growth projections require additional laboratory space as well as a new science collaboration space that will serve the HPL research community as well as visiting scientists. Presently, there is no existing space that could be modified to be a major meeting hall to accommodate approximately 100-200 attendees.

Suggested program includes:

- Lecture Hall with 150 tiered seats.
- Twelve research labs that can be reconfigured for various researchers.
- Analytical Lab for water quality testing. (to be relocated and expanded from Morris Marine Laboratory.

- Offices (25-30) for Faculty, FRAs, grad students, post-doctoral candidates and visiting faculty.

- Conference rooms: Two conference rooms for small groups (6-8 people). One room for medium size group (12-14 people). One large conference room for a group of 20-25 people.

- Kitchen/pantry for catered events.

- Lobby/Dining area for campus wide use.

- Utility area to house fiber cable inter-connectivity (eliminates a weak link in HPL fiber system).

This building would be constructed to meet LEED Silver certification at a minimum. Because this building will be part of a tour route on campus, windows between the hallway and the labs would be incorporated into the design.

2. Morris Marine Laboratory

When the CDL building is constructed the Morris Marine Building could be repurposed for:

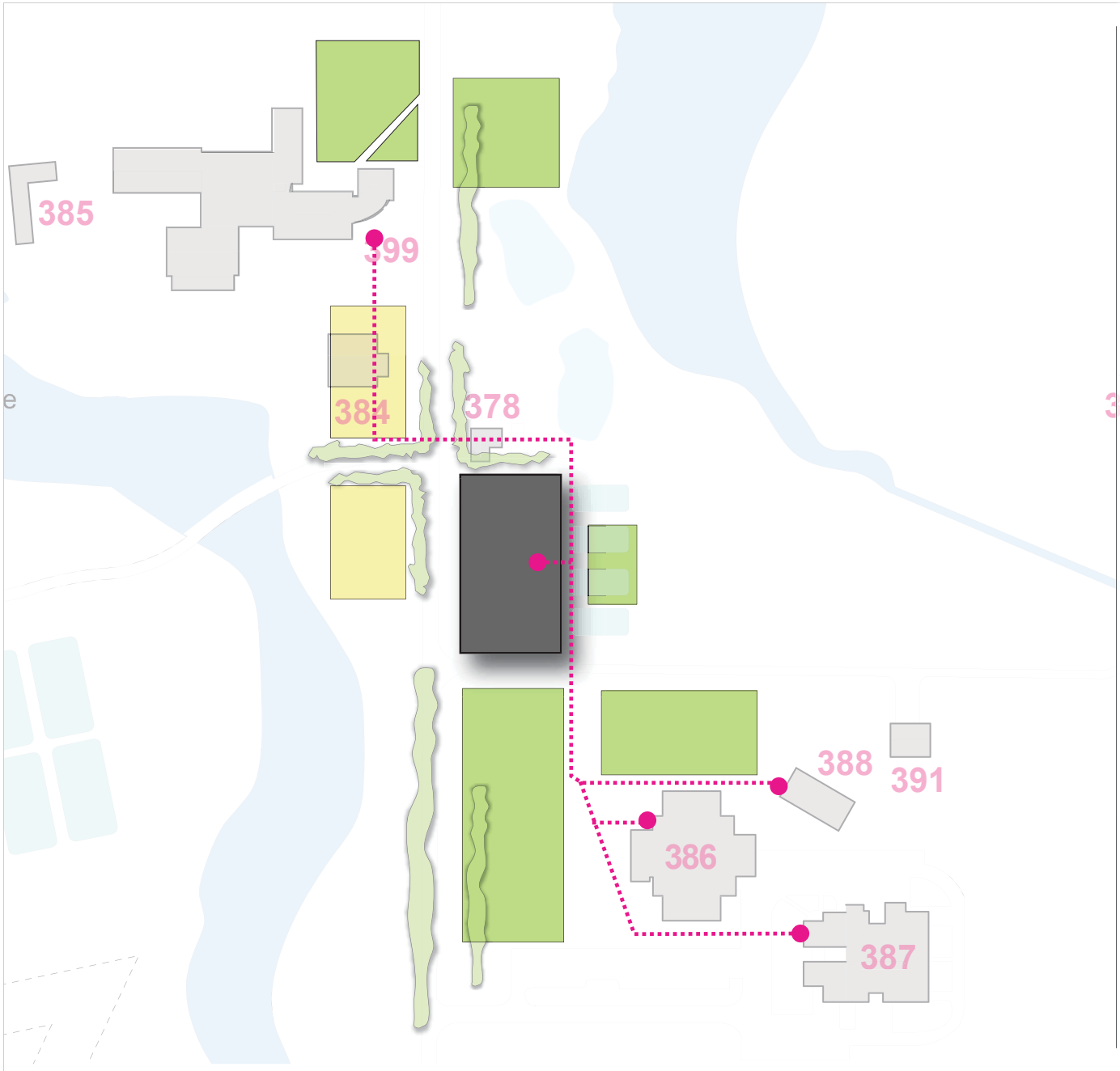
- Machine Shop to relocate from Maintenance Complex to serve the needs of the adjacent labs in Coastal Science, CDL and AREL.

- Small employee gymnasium / indoor recreational area.

- “Incubator” space for new labs.

- New labs that require high bay space and seawater infrastructure.

Approximately 75% of the building space would be available for these purposes by moving or decommissioning laboratories and removing the seawater systems and filters.
The Physical Oceanography Lab(s) would not move from this building because the high bays and overhead doors are ideal for the equipment they work with.



The diagram illustrates a strategy to site a new facility for the Coastal Dynamics Lab and have it act as a bridge and link between two significant clusters of research activity on the campus. The key to this approach is to think of the site and landscape design in conjunction with the building design so that building entries, parking lots and paths to entrances work together to create a campus environment. The building is sited so that a path between AREL and the Coastal Estuarine Science Lab goes right past the entrance to this new facility.
The building is also conceived of as a low scale structure to enable a number of extremely sustainable strategies:

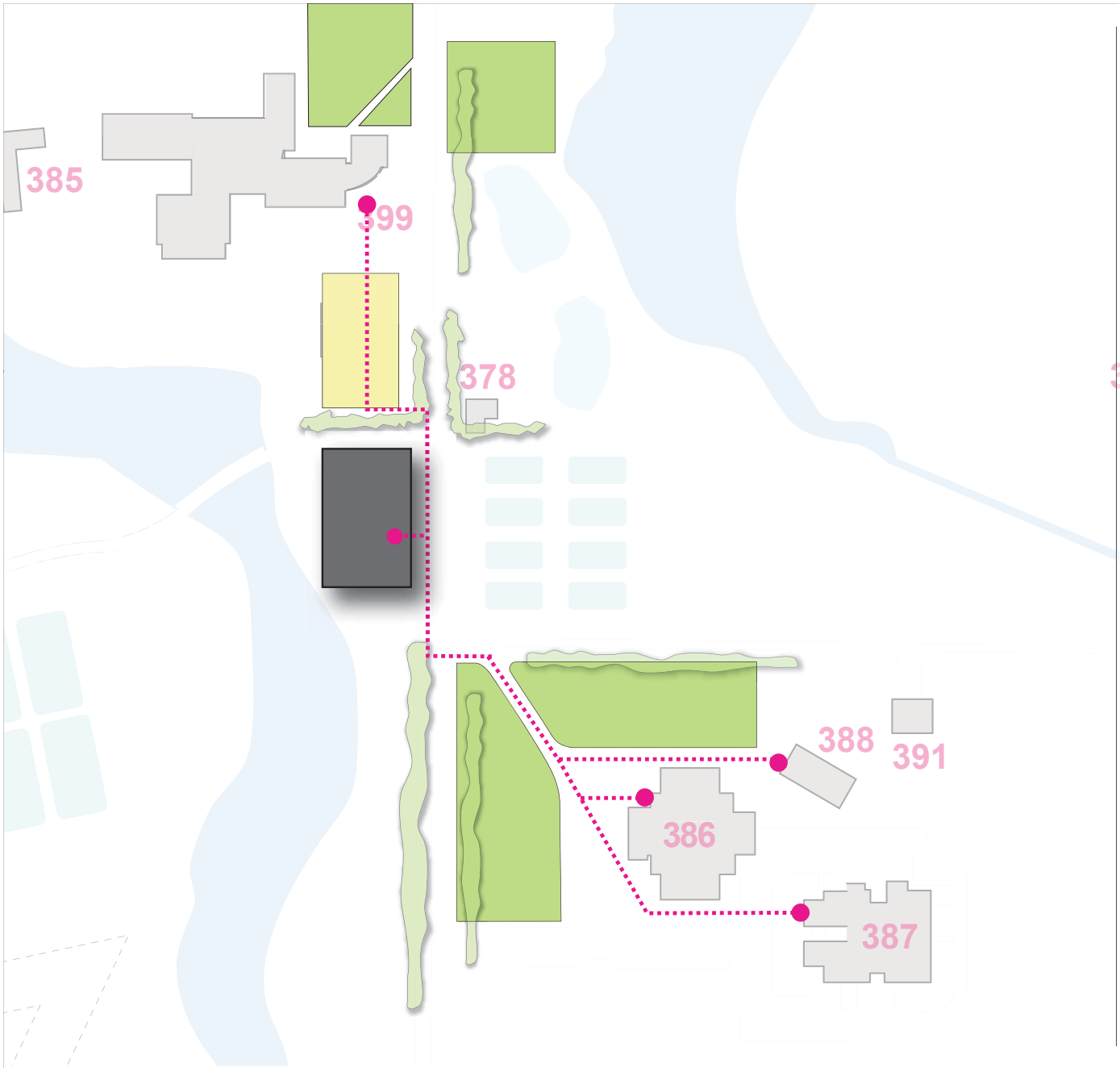
- *Daylighting from the roof to save on electricity*
- *Large roof area available for both green roof to effectively treat and hold rainwater and provide a possible platform for PV panels for renewable power generation. The green roof is also a great insulator in both summer and winter.*
- *Building footprint configured to enclose outdoor space, (courtyard) as an amenity space for the campus*

LEGEND

- *Existing Buildings*
- *Coastal Dynamics Laboratory*
- *Future Parking Locations*
- *Landscaped Areas*
- *Suggested Pedestrain Circulation*

Illustration 3.2
Coastal Dynamics Laboratory - Location Option 1

NOT TO SCALE NORTH



The diagram illustrates a variation on how to site a new facility for the Environmental Sustainability Lab. In this option the building courtyard space opens to the main drive and creates an entry court for the facility. The path between AREL and the Coastal Estuarine Science Lab goes right past the front entrance to this new facility, along the main road and proposes a large front porch to anchor the building to the main entry axis of the campus. There are other variants on this diagram, including options to bring campus circulation between the two research clusters right through the building itself.

The approach also depends upon making positive spaces of the new parking areas. The parking areas proposed are well landscaped with trees to shade the cars, permeable paving to allow water to be recharged into the ground and paths that will link to the main research clusters. This approach can turn what are often eyesores into important and useful spaces that help improve the overall image of the campus.

LEGEND

- *Existing Buildings*
- *Coastal Dynamics Laboratory*
- *Future Parking Locations*
- *Landscaped Areas*
- *Suggested Pedestrain Circulation*

Illustration 3.3
Coastal Dynamics Laboratory - Location Option 2

NOT TO SCALE NORTH

3.3 Facilities Renewal Projects

Building Projects

1. Boilers in Coastal Science should be replaced in the next ten years depending on the status of the building.

2. Heat Pumps in the dormitory need to be replaced in the next three years.

3. Upgrade fire alarm systems in Morris Marine and Coastal Science (In budget for 2012).

4. Migrate door locks to card system.

5. Add more security cameras (pier, Environmental Ed., Boat basin).

Infrastructure

1. Telephones and IT
   - Run telephone lines and fiber in conduit from Bio Safety Lab (BSL) II to Environmental Education (EE).
   - Pull new cable between Student Dormitory and Center Administration.
   - Start switching to VoIP.
   - Rewiring of Coastal Science and Morris Marine.
   - Change terminations in AREL and EIC Building.
   - Convert to VoIP.

2. Domestic Water
   - Tie in Dormitory, Central Administration and pier to tower water supply.
   - Supplement the main well with one of the non-potable wells at AREL.
   - Provide a second water tank or tower.

3. Electric Loop
   - Cables and switches were installed in 1994-95 and need to be replaced within the next ten years.

4. Shoreline
   - Need to be stabilized from west of Stone Jetty past Lake's Cove.

- Ongoing harbor dredging to maintain boat basin.
- Installation of living shoreline where possible
- Stabilize Lakes Cove shoreline to be use as part of environmental education programs.

5. Site work
   - Tear down old hatchery building
   - Move old algal greenhouse
   - Install parking for AREL
   - Tear down hangar cottage.

3.4 Other Sources

- **Coastal Science Building**

  The Coastal Science Building could continue to house the HPL administrative staff, computer modeling staff, student classrooms with IVN (or similar distance learning systems) and an expanded library/study area. This building could continue to have some laboratories to serve as “incubator” space or classroom labs. The entrance should be re-oriented so that it faces the Coastal Dynamics Lab and AREL in order to tie it into the rest of the campus more effectively.

- **Student Dormitory**

  Plans should be explored to add on to the dormitory to provide a couple more apartments. Additions would have to be within the footprint of the existing building because it sits with in the critical area boundaries. An alternative would be to build a new dormitory. The interior of the dormitory should also be renovated.

- **Campus Roads**

  Campus roads need major repair for safety as well as campus image. All roads and parking lots need resurfacing within the next 5 years. Consider widening roads to accommodate bike lanes to encourage cycling on campus between buildings. Environmental Education Dormitories should be equipped with modern HVAC and insulated to allow for year round use. A new third dormitory should be built that incorporates personal privacy issues and can accommodate families.

3.5 Implementation Strategy

Capital Projects

The timing of the two capital projects proposed for the Horn Point Lab is provided at the beginning of the capital projects section. The projects are to be planned independently of each other and so they do not affect each other in any way so they could even happen simultaneously. Both project have equal importance for the Lab and serve different needs, expanding research space and providing adequate facilities for research and collaboration, the core mission of the institution.

Additional Projects

The balance of the planned facility renewal projects will be scheduled based upon the particular need and system and when it reaches the end of its useful life. These projects should coordinate as much as possible with the Capital projects schedule. The following are some implementation comments related to the individual projects.

Any major work (boilers, fire alarm upgrades, etc.) in Coastal Science should be coordinated with an anticipated overall renovation to this building.

Any site infrastructure work that involves cabling between buildings or new domestic water lines, should be coordinated with repowering and resurfacing projects for campus roads.

Some of the site work projects, tearing down the old hatchery, building and installing parking for AREL should be sequenced such that they support the new Coastal Dynamics Laboratory project and site location. A new parking area provided as part of this new capital project could be sized to accommodate some of the AREL parking needs.

When possible some resurfacing projects could be converted to permeable paving projects to support the sustainable mission of the campus related water quality.

4. Sustainability

4.1 Current Status

The Horn Point Laboratory continues to implement practices that enhance the environmental sustainability of its operations. HPL is seriously committed to the reduction of greenhouse emissions and its overall climate footprint. The HPL site on the Choptank River and with its large amount of acreage, wetlands and different ecosystems is a truly unique environment. As the largest research laboratory and as the home of Center Administration it has a unique opportunity to play an important role in educational outreach and expanding the public's understanding of sustainable practices through a hands on approach. HPL has been an important part of the overall UMCES sustainability efforts and a significant contributor to the Climate Action Plan's greenhouse gas reduction efforts.

The following are current initiatives and HPL's future sustainability goals and actions in relation to Capital Project and Facility Renewal Project planning.

4.2 Sustainable Approach

With continued monitoring of emissions, HPL's goal is to keep emissions on a downward slope as reflected in FY10. The most important step toward reducing the HPL climate footprint must focus on the use and consumption of energy within the buildings. This will require continued close monitoring and better maintenance of equipment to gain as much energy efficiency as possible from existing equipment, replacement of non-energy efficient equipment, and continuation of recycling and conservation efforts already in place.

HPL will need to set aggressive energy efficiency targets for any new construction, equipment or systems being implemented in the next 10 years. In addition to setting high goals for LEED certification levels, (Silver certification should be a minimum, with Gold being the target), separate targets should be set for energy efficiency, (minimum of 35% savings over a similar code compliant building). HPL has a number of larger aging facilities (Morris Marine and Coastal Estuarine Science Lab) that should benefit from major renovations in the next ten years and yield significant energy savings over current operations.

The dispersed buildings of the HPL campus present unique challenges to achieving greater energy and transportation efficiency. One simple but important goal would be to substantially improve the walking and biking paths on the campus so that once one arrives at the campus, all further movement can be either on two legs or two wheels.

1. New buildings and renovation to consider roof-top garden for better stormwater management

2.Solar hot water technology is a viable opportunity

3. Recycling Programs.

The planning approach for HPL proposes creating a greater density of building in selected areas to take advantage of the proven sustainable benefits of greater density of facilities.

Focus on Water Conservation and Quality

As an academic institution that focuses on research and teaching related to Environmental Science, all attention related to environmental issues should not be focused upon energy efficiency and carbon reduction only. Issues related to water quality and water security, which are an integral part of the UMCES and HPL research mission, also play an important role which may have little direct affect on carbon emissions and energy use. Water use within the facility and on the site along with associated issues related to storm water runoff should be focused upon with a goal of implementing best practices in these areas. Some specific actions in this area would include:

- Reduce storm water runoff by providing more bioswales and other similar storm water mitigation strategies especially along areas that feed into marshes and wetlands.

- Consider alternate uses for some of the large fish ponds that have been reduced in use or abandoned. Discussions centered around either allowing these to become wetlands or investigating options to grow algae to convert it into a biofuel that could be used on campus. The Wikipedia article is a good primer http://en.wikipedia.org/wiki/Algae_fuel .

- Collect rainwater on site and use it for any local landscape irrigation needs.

- When new parking lots are planned as part of the capital project, consider permeable paving to allow water to be recharged into the ground. Currently parking occurs in unpaved areas and so oil and other fluids from vehicles are not being captured. Specific plants and permeable paving should be implemented to demonstrate best practices for the parking areas on the campus. (geotechnical investigations will be required to make sure that the underlying geology is suitable for ground water recharge).

- Reduce water use in the facility through the use of:

    - Reduced water use devices for the labs.
    - Recapture water from wash down areas for reuse.

1.New low-E windows were installed in the DuPont building

2. Geothermal system at Center Administration

3. Interactive Video Network

Refuse and Recycling

HPL/CA's recycling and waste minimization program currently includes all mixed office paper, cardboard, paperboard, magazines, toner cartridges, plastics #1 & #2, batteries (alkaline and rechargeable), CPUs, cell phones, monitors, printers, mixed metals and used motor oil. Center Administration paper purchases for all copiers and printers currently are 100% post-consumer recycled. CA is in the process of replacing all paper products used in the break-rooms and kitchens with 100% compostable products such as stalk plates, glasses and cups and utensils.

4.3 Sustainable Actions

UMCES Horn Point Laboratory has and will continue to implement strategies that reduce and lessen its potential climate footprint. Primary targets will begin with addressing the emissions from the buildings and working outward. Below is a list of current and planned courses of action for reductions. These are defined in greater detail in the Climate Action Plan with strategies and suggested policies to implement them.

Capital Projects

Coastal Dynamics Laboratory linking AREL and Coastal Science Lab:

- Set higher than conventional LEED certification goals, (LEED Gold minimum).
- Set ambitious energy efficiency targets, (40% savings over a similar energy code compliant building).
- Seek all passive and renewable energy savings through the design and configuration of the building envelope itself.
- Design a building that relies on daylight to save energy.

Since the facility will be a major draw for the rest of the Horn Point campus, the facility should seek to make sustainable systems "transparent" and visible to the day-to-day users of the facility. Use them as an opportunity to teach occupants and users about the energy efficient strategies at work in the facility.

1. Small scale wind turbine

Morris Marine Renovation and the Coastal Science Lab:

- Set aggressive LEED certification goals, minimum LEED Platinum, since this will be a complete renovation of the building which will provide an opportunity to substantially improve the energy performance of the building exterior and replace all mechanical systems within the building.

- Use the building to provide renewable energy systems as an integral part of the building. Some possible renewable energy systems to help achieve this are photovoltaic, solar hot water, small-scale wind power. The large pitched roof of both of the existing buildings provides a good surface for the installation of either PV or solar hot water panels.

Facilities Operations

- Improvement of existing facilities according to the Energy Performance Contract (EPC) recommendations by Constallation Energy.

- Reduction of building energy use by programming heating and cooling thermostats.

- Strict recycling and waste minimization programs.

- Replacement of non-energy efficient equipment with Energy Star models.

- Administrative use purchases give priority to recycled products.

- The Interactive Video Network (IVN) is used to minimize vehicle miles traveled.

- Power-down policy for Computers and Lab Equipment.

Facility Renewal Projects

- Installation of a renewable energy source; photovoltaic, solar hot water, geothermal, small scale wind power. There is an opportunity to place a large solar array on the ground on a number of locations on the site. *See Illustration 4.5_01 for Solar Fields Location Options.*

- Renewal Energy Certificates (REC) related to any new renewable energy sources added to the site.

- Increased building insulation and air tightness through re-caulking and sealing of building exteriors, windows and doorways to increase overall energy efficiency all year round.

- Gray water and/or barrel collection systems for rainwater.

- Window replacements to increase energy efficiency through thermal break frames, higher insulation values on glass and special coatings to further reduce energy use.

- Carbon Offset Projects.

- Installation of living shoreline areas where feasible.

Facilities Master Plan Process

The University of Maryland Center for Environmental Science involved and obtained feedback from all stakeholder groups in our community. A Facilities Master Plan Task Force coordinated the overall process. With the support of the Laboratory Directors, Town Hall meetings were held at each of the three campuses covered within this Plan. These meetings were open to all employees providing a chance to express their vision for our future. The Sustainability Committee members were involved during these meetings and provided invaluable insight. Drafts were reviewed by each of the three campuses in this FMP as well as the Sustainability Committee and all helped mold the final product.

Facilities Master Plan Task Force:
Erica Kropp, Vice President for Administration
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