Site Development Study: Romberg Tiburon Center for Environmental Studies
San Francisco State University

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1.0 Executive Summary

1.1 Project Overview

SF State’s Romberg Tiburon Center for Environmental Studies (RTC) conducts research and offers instruction in marine biology, oceanography, wetlands ecology and evolutionary genetics. The Center’s significant contributions include monitoring of the San Francisco Bay estuary system and collaborative oceanographic research projects throughout the world. This Development Plan is undertaken to identify physical changes needed to support these programs.

RTC has a complex history that reflects the bay’s maritime history. Successive changes in ownership, a rich cultural legacy and a dramatic physical setting have inspired many planning efforts for this site. This study (Plan) references and benefits from these plans and, in that sense, is part of a continuum of effort. Just as these previous studies have reflected the broad issues of their time, this Plan is strongly shaped by recent events. Economic crisis and corresponding reduction in support for higher education have further weakened public commitment to institutions. Successful planning in this context requires both modesty in expectations and great ambition in identifying funding sources. The Development Plan is intended to enhance the Center’s ability to compete for funds through readiness to build and a quickness to adapt.

Most buildings on the 36-acre campus reflect the Center’s former military and industrial uses. All exhibit some degree of damage, and structural evaluation indicates that some present a significant degree of seismic risk. Nevertheless, the robust nature and straightforward quality of many structures contributes to a general adaptability for research. The Plan identifies changes to these buildings and site infrastructure that will be required to maintain and enhance research capabilities, educational obligations and outreach programs. Extensive renovation, selective new construction and site restoration will meet an institutional commitment to carbon neutrality. The Plan articulates a vision of vital ecological study conducted in a highly sustainable setting.

Waterfront and Wharf. Restoring the Port of Tiburon

1.2 Participants in the Study

Through an inclusive process, researchers, students, administrators and operations staff were consulted to assess needs and contribute to a vision for future development. The Plan reflects the strategic interests of these groups and benefits from the direct participation of these individuals:

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1.3 Goals and Objectives

The Site Development Plan is undertaken to provide RTC with a realistic basis for capital planning. The site has been studied to identify infrastructure and engineering issues and to assign anticipated costs for these critical elements. The Plan places greatest emphasis on specific projects that will directly benefit the Center’s programs. This approach is characteristic of the implementation phase of planning; translating research and education needs into tangible facility and environmental responses.

The Plan provides a cohesive set of guidelines to improve the public image for visitors and to enhance workplace quality for researchers, administrators and students. As a general precept, physical development maintains the general character of the site’s marine industrial heritage, recognizing a general suitability for research and the value of this legacy as a cultural resource to create a meaningful program in a memorable place.

1.4 Site Context

1.4.1 Climate

RTC is located on the Tiburon peninsula on the north shore of the San Francisco Bay. The site is located on a steep, south-facing slope adjoining the bay, where the peninsula rises sharply out of the bay. The site experiences the mild, Mediterranean climate characteristic of Marin County. Summer temperatures tend to be in the 60s, cooling to the 50s during winter. September is the warmest month with an average temperature of 71.30 degrees Fahrenheit, while January is the coldest month of the year with an average temperature of 46.40 degrees Fahrenheit. Diurnal temperature variations tend to be limited, with a summer average of 14 degrees Fahrenheit and a 12 degree swing in winter.

The annual average precipitation is about 38 inches. Winter tends to be wetter than summer, with the most rainfall in January averaging over seven inches.

1.4.2 Culture

The RTC campus occupies a 35 acre parcel near Tiburon. Tiburon is a small community (current population 9,000), notable for a resort-like ambiance and a median household income ($149,000 in 2009) about twice the State average. Forbes Magazine has rated this area as one of the most expensive zip codes in the United States.

The site is located on Paradise Drive, about 3 miles from the center of Tiburon. Paradise Drive is a narrow two-lane roadway, characterized by heavy tree cover and single family residences on large lots. While RTC enjoys good relations with the community both through direct outreach and its Advisory Board, limited traffic, lack of visibility from the roadway and the small campus population contribute to a degree of isolation.

RTC is a former military and industrial site, an artifact from the time when Tiburon was an active fishing port and an important local railroad. The scale and character of buildings stand in sharp contrast to the bucolic, residential character of the area. A sense of the remote and the now enigmatic character of the buildings combine with panoramic views of the bay to contribute a magical quality to the place. These factors are the inspiration of many creative visions and have potential to elicit public support.

1.5 Development Concept

RTC’s research program is defined by marine and estuarine research, but these areas of investigation broadly extend to include a range of activities from benchtop science to field work. The Center’s educational mission directly supports graduate students and post-doctoral researchers, but includes undergraduate instruction and public outreach as well. These three components, research, education and outreach, are cornerstones of RTC’s mission and define land-use patterns on the Plan.

Overall site area is the greatest physical challenge to planning. The Center’s population is currently about 100 people at peak periods of use. Even if the number of occupants doubles, site area and the distance between buildings tend to separate groups. The site is steeply sloping, dropping almost 200 feet vertically from the entry gate to the shoreline.

Program consolidation into better-defined areas for like uses is an essential feature of the Plan. These areas or “Development Zones” are described in Section 5 of this document.

Buildings at the Center vary in condition and type but in aggregate, about 125,000 square feet of built area is available for consideration. Modifications to four key buildings, about 80,000 square feet, will consolidate programs and meet projected needs. Modifications for function and aesthetics are shown in illustrations that depict conditions within the Development Zones.

Since the site is one of the few locations in the estuary with deep water immediately adjacent to shore, restoration of the waterfront and wharf will enable berthing of research vessels. This is the greatest opportunity for collaboration and is the initial focus of the Plan.

1.6 Connective Elements

While dense tree cover over much of the site contributes a serene quality to the Center’s landscape, it’s important to note that most species are non-native, primarily eucalyptus. Biological restoration is valued for reasons evident when planning for an ecological research campus. Conceptually described in this study as “habitat,” it’s important to note that the University has not signaled any intent or entered into any arrangement that would formally dedicate these areas as such. The term is applied here to establish a conceptual basis for the reintroduction of native plant communities.

Utility infrastructure poses a second significant challenge for site development. All systems are outdated, inadequate, inappropriate or badly deteriorated. Replacement or upgrade of all major utilities is required and has been evaluated comprehensively as part of this study. Given the magnitude of this effort, replacement is likely to require phased construction. Where possible, the utility upgrades should be carried out in conjunction with building construction or renovations. The intent is to leverage both the contractor mobilization effort and to improve potential for donor-funding.

Sustainable site development may reduce the costs and extent of changes that may be required for traditional infrastructure components. As shown diagrammatically in Section 6, the site’s natural drainage tends to support stormwater detention and treatment through swales and biofiltration. More speculatively, waste treatment through bioremediation or phytoremediation is proposed for further study. Wastewater treatment through working wetlands is a potential given adequate site area and validation through the Center’s wetlands research.
Assigning separate, revenue-generating and outreach activities to an “Upper Campus” and research programs to the “Lower Campus” consolidates programs and reduces the need to traverse the steeply-sloped site. With connecting roads and available parking, vehicles are generally used by all campus personnel and it may be most reasonable to assume that disabled users would follow this same practice. In an effort to reduce vehicle traffic, a footpath system has been shown that incorporates both a convenience stair and an extended pathway to meet universal access.

### 1.7 Building Systems

The Center’s buildings reflect a long history of military and industrial use and incorporate a wide variety of construction technologies. These include single or two-story wood frame houses (B11 and 20), the bearing masonry blacksmith shop (B22), the heavy timber frame barracks buildings (B49 and 50), and steel frame industrial structures (B36 and 86). All exhibit the variety of problems that could be expected due to the age of these buildings (ca. 1910-1940) and significant levels of deferred maintenance. Despite these issues, many exhibit good potential for adaptive re-use.

The University separately commissioned a comprehensive seismic evaluation of the Center. From this study, selected structures were placed on the CSU “Seismic Priority List 1” and require immediate attention. The Coal Crane Trestle, (the free-standing concrete piers shown in the illustrations) falls in this category. Buildings 49 and 50 have been recommended for high-priority retrofit. Buildings 11, 21, 22 and 37 are regarded as non-occupied and the second floor of B54 must be vacated. Seismic improvements to all structures have been assumed by this study.

Mechanical, electrical and plumbing systems for all buildings apart from B36 are at the end or long past their service life.

Architectural exterior wall systems generally consist of wood and metal siding, though of various types and profiles. B21 is finished with exterior plaster. Though badly deteriorated and the site’s oldest structure, the Blacksmith Shop is painted brick masonry. Though not tested, at least two buildings, B39 and 54 are covered with a composite siding that may be asbestos bearing. Roofs are both flat with built-up systems and pitched, using wood shakes, asphalt shingles and metal roofing.

### 1.8 RTC Campus Guidelines

In response to this diversity of shapes and materials, these proposed campus guidelines introduce a limited material palette and a unified formal vocabulary. The intent is to maintain the original character of the buildings. Consistent with the actual or potential historic status of these buildings, new elements are somewhat neutral, relying on similar themes and consistent materials to unify the campus. Additions are generally characterized by a quality of lightness, through expressed steel frames and insulated glass. New siding materials are restricted to corrugated metal, with site-reclaimed redwood siding applied in feature areas.

Site and landscape materials follow similar protocols. Consistent with former industrial uses, the site is presently over-paved and removal of significant areas of asphalt is proposed. Existing roadways will be retained and repaired but where possible, hard surface paving will be replaced with pervious materials. New plantings are limited to contextually appropriate natives, reintroducing the specific ecologies of the site: coastal oak woodland, coastal scrub, coastal grasslands and sage scrub - the four biological communities described in Section 6.

### 1.9 Project Costs

A Site Development cost model was prepared by Davis Langdon Cost Estimators. This cost model was prepared based on unit rates obtained from records of recent construction of similar buildings. The model is broken into the cost of renovating existing structures and building new structures, as described in Section 4.

### 1.10 Project Schedule

This Plan describes renovation and new construction at RTC for the 10 year period between 2010 and 2020. It is not the intention of the Plan to dictate what order the work occurs in, as it is recognized that sources of funding for individual projects are difficult to anticipate, and that any of the renovation or new construction projects described in this document could proceed at any time. Nevertheless, a proposed project order is described in the Project Schedule, Section 9.
2.0 Goals and Objectives

2.1 A Place for Discovery and Learning
RTC is an extraordinary place but it is first and foremost a place for discovery and learning. Conduct a planning process that addresses the needs of research and education and evaluates facilities as means to support those interests.

2.2 Program Consolidation
Science communities are defined by their capacity to collaborate and communicate. Site area, steep slopes and the distance between buildings tend to diminish this capacity at the Center. Define areas for like-uses on the site. Reinforce the research core area.

2.3 Opportunities for Funding
The Center is a field station with little opportunity to qualify for institutional support. Create an achievable and affordable Site Development Plan. Seek multiple means of funding individual projects. Identify projects to be carried forward through donor funding. Let each project tell a compelling story.

2.4 Cultural Heritage
The site's former military and industrial uses determined this location and remain visible in the unique architecture and engineering artifacts that provide physical character for the Center. Recognize this heritage in the planning process. Maintain select building stock and reinforce the authenticity of place.

2.5 Infrastructure Replacement
Science communities are characterized by high utility operating demands and defined by their ability to access critical utility services. The Center is limited by aged infrastructure inadequate to its purpose and inappropriate to supporting scientific research. Replace all infrastructure with safe and sustainable services.

2.6 Renovation Potential
The Center is home to more than 125,000 square feet of existing buildings. The best prospects for growth and best opportunities for consolidation suggest that academic research and teaching programs might be housed in about half that area. Analyze the existing facilities capacity to serve these needs before initiating new construction.

2.7 Strategic New Construction
Specialized program requirements, operating demands or critical location may indicate a need for new facilities. Evaluate new construction potential to enhance the Center's research and teaching capacity, and locate these structures to strengthen site connections and campus infrastructure.

2.8 A Sustainable Setting
RTC is one of the first in line to monitor the ecological health of San Francisco Bay and estuary and to communicate results. Energy conservation and environmental contribution should have equal allegiance and evidence in campus buildings and operations. The Site Development Plan is an opportunity to demonstrate those values through the University's commitment to carbon neutrality.
3.0 Development Scope

The Center operates as a field station with imposed limits for institutional growth. Transfer of title to the University further restricts site uses to programs or activities that directly support the Center’s educational mission. The scope of development recognizes these constraints and offers appropriate solutions. This study does not dwell on conjectural possibilities for growth in the event that these requirements change. Past planning efforts on the site have assumed significant increases in building area with much higher levels of use and those studies retain value in demonstrating potential. The intent here has been to offer a realistic basis for construction projects that support demonstrated need and reasonable assessment for growth.

In this context, the Plan proposes the best options to house current and future programs. The scope of planning is based on specific requirements, as outlined in the University’s RFP and listed in the specific categories below. These components are further described in the referenced sections of the Site Development Plan.

3.1 Comprehensive Space Analysis

All occupied and available space at RTC was assessed for potential to accommodate instructional and research uses. A tabulation of all existing building areas is provided in Section 4 with a long-term programmatic basis for growth. As indicated, the campus population is likely to remain relatively small over time and does not exert significant pressure to add area. In consequence, the Plan maintains a “loose-fit” quality. The Plan broadly supports research, education and outreach programs, determining locations but retaining flexibility for area assignment and dates for development.

Anticipated program growth and area requirements are described in Section 4.

3.2 Renovations and New Construction

With modest requirements for growth, any planning and design for new buildings was evaluated against the feasibility of preserving and re-purposing existing facilities. All existing buildings to remain at RTC exhibit varying levels of deterioration and many require significant effort to restore or repurpose. Renovation is proposed when the basic structure or form is well-suited to new uses (B86); when the building location benefits the campus plan (B49 and 50); and when buildings represent significant cultural resources (B22 and 54).

Deteriorated or dangerous conditions prohibit occupancy in some buildings, and the general unsuitability of others to support research or education recommends demolition. Buildings recommended for removal are discussed in Section 4.

Functional and technical considerations for specialized facilities do provide a basis for some new construction. Open, running seawater at floor level required for bay water research presents serious issues for accessibility and maintenance in B36. New construction better able to accommodate this program is proposed, co-located with a replacement structure for the Research Greenhouse.

Specific construction activities are described by Development Zone in Section 5.

3.3 Residential Space Analysis

While the Center supports a small population relative to site area, its remote location from the SF State main campus and the need to monitor experiments over extended periods of the day make residential uses a reasonable subject for study. In addition to the convenience, an evening population improves site security and reduces transportation demands for the site. The residential program is consistent with the overall scale of campus population and includes: a single residence for a visiting researcher; a small number of separate living units to support post-doctoral researchers and their families; and a congregate residence for graduate students.

Identified as new construction, conceptual development of the residential program is shown in Development Zone 3, described in Section 5.3.

3.4 Utilities Analysis

3.4.1 Water Supply

Water is supplied to the campus by the Marin Municipal Water District. Three separate domestic water lines extend to the site from a main in Paradise Drive. A fourth existing connection from Paradise Drive still connects to B49 but is no longer used for domestic service.

The existing domestic water system piping is beyond its useful life and requires replacement. The system is constructed of materials that have been prohibited in potable water systems for 40 years and has developed many leaks, requiring an unusually high degree of maintenance. Reflecting both this deteriorated condition and inadequate coverage, temporary water lines are above ground and linking much of the site.
Replacement of this system will both conserve a valuable natural resource and provide significant savings in annual maintenance. The proposed routing of the replacement system is shown on the diagrammatic plan, Section 6.4, “Site Utilities and Proposed Connections”. The anticipated scope of work includes the cut-and-cover trenching from the point of connection at the public main in Paradise Drive, extending down and along the campus entrance road. This would serve as the campus domestic water main, with separate connections extending to the various buildings. Each building will need a backflow preventor and pressure reducing valve to conform to current code and construction practices.

A summary of projected domestic water demands is shown in the table, Section 7.2. This tabulation is preliminary but assumes best practices in systems design. All new and replacement construction will be designed to meet PER/LEED criteria to reduce potable water demand through Innovative Wastewater Technologies (WEn2) and Water Use Reduction (WEn3).

3.4.2 Sanitary Sewer

The campus currently relies on a centralized septic system consisting of three leach fields, multiple septic tanks and a lift station (currently not in use). While not failing, this on-site disposal system is primarily reliant on the leach fields. As shown on the diagrammatic site plan in Section 6.5, the fields are in very close proximity the bay and may become a source of pollution. In addition, the fields occupy a key position in the Research Core, much better assigned for future research and education buildings. One of these, the "Bay Water Research Center" described in Section 5.2.4, is shown directly atop the exiting leach fields, in an effort to leverage construction funds for infrastructure replacement.

Replacement of the existing system will likely reuse a portion of the existing gravity lines, adding a new lift station, and extending new waste lines to a public sewer main. The existing Marin County Sewer District sewer main is located north of the site along Paradise Drive. This public sewer system is only a few hundred feet away from the property line, so a short extension is required for connection. Capacity in that system, both in conveyance as well as treatment is available.

The anticipated scope of work includes some modifications to and realignment of existing piping as well as cut-and-cover trenching from the point of connection on Paradise Drive and extending down the campus entrance road. This will provide the gravity and force main portions of the campus sanitary sewer system. Construction of a lift station in the Research Core area (Zone 2) will collect and lift all waste water from the campus. Remedial treatment of the leach fields to remove contaminants by bioremediation or phytoremediation is described in Section 6.5.

While connection to the County Sewer has been assumed as a baseline approach, on-site treatment of waste water should be evaluated for feasibility. The relatively small sewer load required, even after full build-out of the site (about 30,000 gallons per day) as well as changing statutory requirements for wastewater treatment suggests that on-site reclamation and recovery should be studied as a long-term goal. Clear separation of “gray water” from “black water” (sewage) is recommended, with membrane filtration, reverse osmosis, ozonation, or other advanced treatments used to any waste water used for irrigation or domestic non-potable applications.

3.4.3 Stormwater Treatment

Existing storm water facilities are not adequate to handle large storm events and the campus experiences minor flooding and erosion/sedimentation in some slope areas.

The site is largely defined by two valleys or watersheds that drain to the bay. Steep slopes and heavy tree cover in the southernmost watershed have limited any ability to create channels or re-direct surface flow. While the area in the immediate vicinity of B36 has been stabilized through site walls and drains, storm water causes minor flooding in paved areas nearby and adjacent to the leach fields. Drainage structures in the northern watershed flood during large storm events, causes erosion which is visible throughout much of the site.

As shown on the “Biofiltration Stormwater Swales” plan in Section 6.3, a general strategy of using naturalized swales along the roads complemented by storm water infiltration areas is proposed. This strategy is depicted conceptually but reflects existing site drainage patterns, with open, vegetated swales used to slow and filter storm water.

Distributed across the site, the intent will be to construct these site elements in conjunction with building or infrastructure projects. Design conditions must meet PER standards and LEED criteria for Stormwater Quantity Control (SSc6.3). Best management practices (BMPs) to remove suspended solids from the run-off are recommended as well. Given the relatively low building density (about 120,000 square feet on a 36-acre site), there is more than adequate area to extend swales, construct weirs and create detention basins as needed to achieve the standards established by LEED guidelines for Stormwater Quality (SSc6.2).

3.4.4 Natural Gas

Existing campus buildings utilize propane or diesel fuel fired heating systems. For operational efficiency and long-term cost savings, conversion to natural gas fired systems is recommended. The local utility, Pacific Gas & Electric (PG&E) distributed natural gas to Teaberry Lane just north of the site that could serve as a point of connection for a new campus main.

The scope of work includes cut-and-cover trenching from the point of connection at Teaberry Lane to the campus extending down and along the campus entrance road. As individual buildings are modernized or constructed, natural gas systems would be introduced to serve new heating equipment and connected to the new campus gas main.

3.4.5 High Voltage Electrical

The campus is served by multiple overhead electric lines with power provided by PG&E. Those overhead lines are old and operating at maximum capacity. Located areas that are almost inaccessible because of the ground slope and heavy tree cover these lines are frequently damaged by falling tree limbs. The cost of maintenance for the distribution system is the responsibility of SF State however, not PG&E.

Replacement of that overhead system with a new 12.47 kV service is recommended. While replacement costs must be borne by the University, new underground services would not only eliminate regular winter power outages, but also provide the necessary electrical capacity to service this research campus.

Scope of work includes directional drilling underground from the points of connection as the most cost effective and least disruptive means for distribution of the electric services. These lines are conceptually shown on the plan in Section 6.4, “Site Utilities and Proposed Connections.” A new generator and transformer will locate in the Research Core area (Zone 2), with switch gear provided near existing service points.

3.5 Waterfront Improvements

Restoration of a fully functional waterfront capable of accommodating large research vessels was identified as the single greatest contributor to continued vitality and expansion of the Center’s research potential. Reconstruction of the wharf touches many aspects of the RTC mission: collaboration with visiting marine research organizations, increased capacity, undetected access for researchers performing field-work; a potential means to commute by boat; and an opportunity for education and outreach. As an added critical contribution, the restored port functions can serve as a staging area for emergency supply operations, supporting the North Bay in the event of disaster.

Conceptual development of the waterfront and wharf is shown in Development Zone 1, described in Section 5.1.
3.6 Geotechnical Engineering

The site is steeply sloping, dropping almost 200 feet from the Upper Campus to the Research Core area. Without a programmatic or economic basis to physically expand the campus, steep slopes have not been considered for construction and are anticipated to remain as open space. This approach reduces but does not eliminate the need to perform geotechnical evaluation for the site. The North Waterfront area was subject to a landslide that displaced about 300 tons of soil onto the now-demolished buildings in that area.

While most buildings are located on level sites, some are adjacent to steep slopes. This proximity is reflected in the general site development strategy and in assessing the viability of various structures. Specific examples of this influence are evident in these planning decisions:

Conditions at B36 have been mitigated through construction of retaining walls, diversion channels and drains. The approach has been generally successful and has corrected the periodic flooding of the building. While slope proximity remains problematic, this is seen as an inherent condition that does not diminish the building’s historical value or continued ability to house research programs.

B49 and B50 are built into the slope, partly below grade at the landward side and fully above grade at the bay side. This physical condition places torsional stresses on the building’s frame and will require structural modification to address this issue. With surprisingly little evidence of damage from water intrusion or soil settlement, both buildings were seen as having potential for program development. Geotechnical analysis is required in this location if renovation of these structures is carried forward.

B30 is similarly built into and against a steep slope. In this case, the building has experienced a number of problems that might be anticipated from this condition. Coupled with structural and accessibility issues, and lacking much potential to accommodate the Center’s programs, demolition of this structure is recommended.

3.7 Marine Operations

Marine operations are currently housed in several locations, with boat storage in B74, diving gear storage in B50 and personnel in various locations. With the desire to remove B74, the proposed conversion of B49 and 50 to research uses and new construction in the waterfront area, relocation of Marine Operations has received significant attention in the planning process. If renovated, B86 has the area capacity and the industrial character needed to house personnel, vessels and equipment in a single location.

The re-purposed B86 and an Addition are shown in Development Zone 2, described in Section 5.2.

3.8 Outreach Center

RTC’s program and location provide many potential opportunities for public outreach and several locations were considered for this function including: B22 for its historic significance; B54 for character and capability for seating large groups in a restored auditorium; the restored wharf as a compelling location with direct access to the Bay; and the proposed new Bay Water Research Center. All have merit and are seen as having some capacity to accommodate public visitation. In final analysis, B39 was seen as having best potential to meet these needs. Direct visibility from Paradise Drive, proximity to the Conference Center, and building character were compelling reasons. In addition, keeping unescorted visitors at the top of the site, away from the heart of the research campus, provides an extra level of security to the facilities on the lower campus.

The renovated B39 is shown in Development Zone 4, described in Section 5.4.

3.9 Parking, Pedestrian and Vehicular Circulation

All campus roadways are owned and maintained by the University. Reflecting the site’s former military and industrial uses, roadways and paved areas are extensive, covering more than 11 acres. Many paved areas lack delineation to control traffic or provide defined routes and all are in need of repaving due to age and extensive patching. Rather than undertaking comprehensive repairs to this extensive system, three approaches can be applied:

For all campus roadways and for paved areas in the immediate vicinity of buildings, (the Parking Lots near B36, B39 and B49/50), routine maintenance with repaving as necessary is recommended. Parking and roadway paving will be undertaken with the individual building construction projects described elsewhere in the document.

The extensive paved area developed for anti-submarine net deployment (Zone 2) does not meet an essential need and can be significantly reduced in area. Paving near the waterfront and pier, with adequate area for large truck turning and helicopter landing must be preserved, and both pedestrian and vehicle connection to B36 should be strengthened. The Bay Water Research Center and associated landscape have been located to achieve this reduction, to provide greater separation of marine operations at the waterfront, and to more clearly direct traffic to B36.

No activities are proposed for the North Waterfront area (Zone 5) unless it becomes necessary to construct a temporary boat launch. It is also hoped that the leased operations currently housed in B30 (Zone 3) can be relocated to B49/50 with eventual removal of B30 and redevelopment of this area. For both of these locations, only minimum maintenance is recommended to support current operations and safety.

3.9.1 Service and Delivery

RTC does not maintain a dedicated service yard nor was this need indentified during the planning process. All buildings do, however, enjoy direct connection to roads or drives and truck access, even tractor trailers are easily accommodated throughout the Research Core and Waterfront areas (Zones 1 and 2). If any changes in current operations arise, an enclosed service yard could be provided in the vicinity of B86, associated with the repurposing of that building for Marine Operations. This location is easily accessed by delivery vehicles and a covered enclosure could extend to create a protected loading zone. If open, this service yard should be surrounded by a minimum 8’ high visual screen wall.

3.9.2 Vehicle Parking Spaces

Given the small campus population, both current and projected (perhaps 200 people at build-out) parking needs are more than met by current conditions. Consequently, general vehicle parking was not identified as a concern for the study. The reduction in paved area described above is recommended on this basis. It is important to note that once annually RTC conducts a very popular event called “Discovery Day.” Since the entire paved area near the waterfront is occupied during the event, additional parking areas on-site will need to be identified.

3.9.3 Bicycle Parking

While the Tiburon peninsula is a popular destination for recreational bicycling, the remote location does not encourage daily bicycle commuting to the site. Internally, the close proximity of programs in Research Core and the very steep slope separating the Upper Campus tend to limit bicycle use on the campus. Despite this, bicycles are somewhat in evidence now and may become more popular with development of a residential campus component. For consistency with LEED guidelines for Alternative Transportation access (S8c4.2), assigned bicycle parking as a percentage of building population should be assigned to new construction or renovation projects. Bicycle parking should be convenient to building entries but out of general pedestrian and bicycle circulation routes. Paving surfaces at bicycle parking areas should be semi-permeable to aid in the recharging of ground water and appropriately sloped to avoid puddles and ponding.
3.9.4 Trash and Recycling

Trash and recycling should be contained within a three sided enclosure located in the building service and delivery access area. The enclosure should have direct access for contents removal, and provide space for two 6’x6’x6’ trash bins, one 4’x4’x4’ recycling container and two small recycling bins. General recycling and trash receptacles should be located proximate to all building entries.

3.9.5 Emergency Vehicle Access

RTC falls within the Tiburon Fire protection district. The nearest facilities (Fire Station No. 10) are about 3 miles from the campus at 4301 Paradise Drive. Though somewhat circuitous, the extensive paved area provides fire truck access for all buildings on the campus. The local authority has not indicated that conditions on campus present any particular obstacles and no additional roadway extensions or turnabouts were identified as necessary by this study. This should be confirmed with changes to the campus, including new construction, renovation or demolition. It is possible that some paved areas may need to be upgraded to accommodate fire truck imposed loading and extended access.

3.9.6 Accessibility

Division of the State Architect/Access Compliance (DSAAC) requires that projects be designed to the latest disabled access provisions in the Building Standards Code (BSC), in effect at the time of filing of an application with its offices. Due to the age and significance of campus buildings, the state Historic Building Code would almost certainly apply to preservation efforts, and any site conditions should be regarded as falling within the higher standards established for new construction.

Currently, disabled parking spaces are located in the vicinity of buildings with public functions, instructional programs or research activities. While stalls and path-of-travel conditions were not surveyed by this study, deteriorated paving surfaces and some localized sloped conditions will require modification to ensure that parking associated with new construction or renovations is compliant with current standards.

3.10 Site Security

The RTC site and buildings present a number of security challenges. As a public, educational institution, an open and accessible campus is both desirable and expected. As a field station housing sensitive equipment in a somewhat remote location and without a permanent security presence, a higher degree of caution should be exercised. Security recommendations follow these precepts: Permanent perimeter security fencing is undesirable – both in conveying an image of exclusion and as aesthetically inappropriate to the setting. An enhanced and enforceable level of security at an individual building level is desirable and should be assumed as buildings attain higher levels of use and more frequent access.

Protection of occupants is a particularly critical concern. Extensive site area, little site lighting and lack of resident site population present issues for public safety. The Plan proposes site lighting as an infrastructure element but addresses security more broadly in these areas: Program consolidation is intended to reduce traffic across the site; higher use of buildings provides a greater degree of observation; and a resident population can extend the potential to visually monitor the site after hours. In addition, installation of card key activated gates at vehicle access points, closed after business hours, to the lower campus would greatly enhance site security.

3.11 Landscape

The restoration of historic landscape, the use of landscape in education and outreach, and the limited development of outdoor use areas that are compatible in character with the campus built context are the principal objectives of the landscape design. Planting concepts will be developed for individual projects on the RTC campus. Planting design will respond to these three general criteria:

3.11.1 Open Space

Restoration of original-state biological communities specific to this location is desirable, both as a demonstration of principles and as an opportunity for academic study. The site is currently covered in mature trees of various species, with eucalyptus dominant in this landscape. The earliest photographic evidence shows open, grass-covered slopes. With great variation in exposure and topographic elevation, it is assumed that a number of biological communities may have been present.

Given the disturbed nature of the site and the 20-acre area to be addressed, restoration is an ambitious goal and has not been given priority as an independent project. Absent funding to carry this effort forward, a biological assessment is recommended to determine the extent and character of historic vegetative patterns.

3.11.2 Demonstration Gardens and Research Collections

Restoration or reintroduction of native plantings provides pedagogical opportunity as well. The landscape adjacent to the Bay Water Research Center carries this potential and is planned as a (contained) coastal wetland. Some public visitation of this facility is anticipated and the landscape will include exhibition areas and interpretive displays.

RTC research programs are focused on marine/estuarine biology and investigation of terrestrial systems is not anticipated. Nevertheless, there may be some potential for research and instructional programs from other University Departments to contribute intellectually to the development of these areas.

3.11.3 Feature Landscape and Site Amenities

These areas are limited in size, reflecting the small campus population but recognizing the remarkable physical setting. The general design approach should be subtle, incorporating hardcape features, which echo the form and geometry of the buildings, while merging with the adjacent landscape.

With a preference for native species, plant materials may be more broadly considered to address programmatic goals: drought tolerance; protection from prevailing winds; shade in summer months; and spatial definition of these outdoor use areas.

3.11.4 Irrigation

Plant selection is restricted to native/adapted species specific to this location. No permanent irrigation system is proposed, however temporary irrigation may be required to stabilize new plantings. The temporary system should be installed to meet PER requirements or LEED criteria for Water Efficiency (WEc1).

If any plant materials associated with biological research programs for the project will be designed to be compatible with the campus’s existing central control system and future reclaimed water system, with flow meters to measure water usage minimum on an hourly/daily/monthly basis. Valves, heads, emitters, wire and clocks will be per University standards.
3.11.5 Outdoor Furnishings
Each project will provide outdoor furnishings, including bicycle racks, concrete trash, recycling receptacles and benches and/or seat walls in context with the site’s character.

3.12 Land Utilization
The Plan identifies six separate zones within the RTC campus: Waterfront and Wharf; Research Core; Future Development; Conference Center; North Waterfront; and Education and Outreach. Not strictly bounded or considered as separate parcels, these zones are identified to consolidate programs and coordinate proposed construction activities. The Zones are separately described in Section 5.

3.13 Hazardous Waste
A site for short-term storage of hazardous waste was identified during the development of the Plan. Hazmat storage is housed in a temporary, demountable building that is not regarded as a permanent location, but was selected for convenient access and ability to visually monitor the buildings from adjacent structures. These separate structures are dedicated to waste generated by research operations and not soils or building materials that may result from demolition or site disturbance.
4.0 Facilities Development Program

4.1 Concept Overview

The Facilities Plan seeks to strengthen and reinforce the function of RTC as a premier site for research and teaching. Strategically, the Plan has been developed to accommodate growth in existing facilities and to recognize current fiscal constraints. The following program describes the functions and components that comprise the RTC community as well as the conditions of the site.

4.2 The RTC Community

RTC is a unique community of scientists from SF State and other governmental and private research entities, focused on estuarine, marine, and coastal ecosystem research in the San Francisco Bay and other marine environments. SF State forms the core scientific group and includes faculty from four departments and two colleges within the University. The current RTC faculty includes the Director; eight tenured or tenure-track faculty; seven research faculty; eight postdoctoral associates; 12 visiting scientists, and 13 research technicians. At present, there are 26 graduate students, nine undergraduate students, two high school students/interns, and three lab volunteers. With administrative and support staff, this represents a campus population of about 100 people.

Three other scientific organizations are also located on the RTC campus. These institutions have their own scientific staff and research initiatives, but are compatible with SF State’s mission. These organizations contribute to the scientific life at RTC. Students and postdocs often move between the labs, and some of the SF State faculty hold joint appointments in these institutions:

- The San Francisco Bay National Estuarine Research Reserve (NERR) is a partnership between NOAA, SF State, the California State Parks, Solano Land Trust and the Bay Conservation and Development Commission. SF Bay NERR is headquartered on site and runs its research, environmental monitoring and education activities from this location.
- The Marine Invasions Research Lab of the Smithsonian Environmental Research Center (SERC) maintains its location.
- Taxon Biosciences, located in B30, is a private start-up biotechnology company that uses high throughput PCR to profile microbial communities throughout the Bay region. Several graduates of SF State have found employment at Taxon.

The following Development Program will make recommendations for each of the elements described above; however, as the anchor to the site, the main emphasis will be on SF State’s facilities.

The Center currently provides space for non-science related activities, such as SF State’s Ceramics Department and the Graduate Art Program. These programs make use of areas that would otherwise remain unoccupied and contribute some vitality to the Center. While a good case could be made for an interdisciplinary alignment of arts and sciences as parallel means of environmental study, the current activities of these programs do not appear to support the Center’s ecological mission. While the possibility for collaboration may have value, establishing needs for science research and teaching has been the primary focus of this study.

4.3 Future Growth at RTC

Given the fiscal conditions in the State of California in 2010, many State employees, CSU faculty among them, question the wisdom of suggesting that any growth is possible. However, in a Faculty Retreat on 12/14/2009, the faculty discussed relatively modest growth and expansion of their programs. Based on a model of optimum research areas and expanded capabilities, faculty suggested that the size of the faculty will double in the upcoming 30 years, growing at a rate of approximately one new faculty member and associated graduate students and postdocs every 2 years. Assuming that each faculty member brings approximately seven new students and postdocs, growth would be projected as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Faculty</th>
<th>Total Faculty &amp; Students</th>
<th>Required Additional Laboratory Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>15</td>
<td>89</td>
<td>(Existing)</td>
</tr>
<tr>
<td>2020</td>
<td>20</td>
<td>130</td>
<td>20,500 gsf (gross square feet)</td>
</tr>
<tr>
<td>2030</td>
<td>25</td>
<td>170</td>
<td>41,000 gsf</td>
</tr>
<tr>
<td>2040</td>
<td>30</td>
<td>210</td>
<td>61,500 gsf</td>
</tr>
</tbody>
</table>

Note that the projection of additional space needs for the site assumes that each faculty will occupy approximately 1200 sf of laboratory space, 750 sf of lab support space, 150 sf of offices, and 565 sf of office support/classroom spaces. A net/gross factor of 65% is applied to these numbers to account for infrastructure support for the laboratories, yielding a faculty growth of roughly 4,100 gsf per new faculty member.

4.3.1 Other Research Entities

Historically, the availability of appropriate facilities and the ability of RTC staff to administer the leases, has limited the ability of other research and environmental policy organizations to locate at RTC. As funding for infrastructure and renovation of the buildings is found, it is likely that existing tenants may grow and future tenants may be identified to lease additional space. The discussion of a New Research Building in Section 5.3 addresses this issue. In addition, B39 could also provide attractive office space for environmental policy groups wanting visibility from Paradise Drive. Other research entities desiring to locate on the RTC campus might be leveraged to contribute to renovation of the Partnership Research Buildings (B49 and B50) described in Section 5.2.
4.4 Curriculum

It is beyond the scope of this Plan to discuss the strengths and weaknesses of the academic curriculum at RTC, other than to note that developing a multidisciplinary degree in Marine and Estuarine Studies based at RTC would provide the Center with enhanced visibility at SF State, and an increased standing among the student body. Longer-term goals of developing an independent program, that perhaps even admits PhD students would also increase the Center's status at the University and visibility in the broader academic arena.

4.5 Facilities

As has been described above, the large inventory of buildings on the site is both a strength and a liability. There is ample supply of built spaces for the Center to occupy and use, however the age of the buildings and concomitant requirements for restoration, renovation, and seismic upgrade creates a significant demand for capital funds that the Center cannot reasonably meet from ordinary funding sources.

This Plan recommends making the best use of some existing buildings to focus research activities on campus and support future growth, while identifying other buildings for demolition. The historic value of several of the structures on campus has also been considered, leading us to recommend conservation or stabilization of some structures, even when there is no identified immediate use. It is recommended that RTC work with the Tiburon Belvedere Historical Society to seek funds to preserve some of the older buildings and structures.

Table 4.6 lists the significant buildings on campus, their size and current use. RTC occupies 85% of the buildings on campus, some only for storage such as B86, and others for active research activities, such as B36. Table 4.7 makes recommendations for renovation, demolition, or historic preservation.

4.5.1 Facilities to be Renovated and/or Occupied

The buildings to be occupied and/or renovated are shown in the first section of Table 4.7. It is recommended that 98,030 sf of the existing building stock or 78% of the building square footage be retained or renovated. These buildings are described in more detail, some with illustrations, in Section 5.

4.5.2 Facilities to be Demolished

The second portion of Table 4.7 indicates that six buildings are recommended to be demolished, 16% of the built area. Three of them are included on SF State's Tiburon Building Demolition List. B30 and B33 are listed as they are inappropriate for their current use, and the site would be better served by a New Research Building (Section 5.3.2). Finally B74 and B74a are included because B74 is in serious structural degradation, and both buildings are planned to be replaced by a renovated B86 (Section 5.2.2).

4.5.3 Structures to be Preserved

Two buildings are specifically identified to be preserved as historic resources: The Water Tower B75, and the former Blacksmith's Shop, B22. These are some of the oldest buildings on campus that are probably already eligible for the National Register of Historic Places of Marin County. It is incumbent on RTC to preserve these remnants of the past so that they may persist into the future. The Plan proposes ultimately making B22 into a History Museum for the site. B54, the former Theater Building is recommended to be restored to a classroom and seminar building (Section 5.6.3). Finally, not listed in the table is the coal crane trestle, since it is not a building. It is recommended that the Center take the necessary steps to preserve this valuable and interesting historic artifact. See Section 5.2.5.

### 4.6 Existing Buildings Space Summary and Occupancy

<table>
<thead>
<tr>
<th>Building No.</th>
<th>Building Name</th>
<th>Available Area</th>
<th>Use/Program</th>
<th>Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Ohrenschall Guest House</td>
<td>3,600</td>
<td>Residential</td>
<td>Visitors</td>
</tr>
<tr>
<td>36</td>
<td>Research Center</td>
<td>27,200</td>
<td>Lab/Office, Class &amp; Mtg</td>
<td>RTC and NERR</td>
</tr>
<tr>
<td>39</td>
<td>Administration Office</td>
<td>7,080</td>
<td>Office/Class Rentals</td>
<td>RTC, NERR, Marin Biologics</td>
</tr>
<tr>
<td>49</td>
<td>Maintenance/Marine Ops</td>
<td>16,925</td>
<td>Office, Shops and Studios</td>
<td>RTC and SF State</td>
</tr>
<tr>
<td>50</td>
<td>Storage</td>
<td>16,925</td>
<td>Storage and Archives</td>
<td>RTC and SF State</td>
</tr>
<tr>
<td>53</td>
<td>Bay Conf Ctr/Residence</td>
<td>7,700</td>
<td>Conf/Office/Caretaker</td>
<td>RTC/Rentals</td>
</tr>
<tr>
<td>30</td>
<td>Gallery/Admin Office</td>
<td>8,440</td>
<td>Lab/Office</td>
<td>RTC, Taxon, SERC</td>
</tr>
<tr>
<td>54</td>
<td>Physiology Lab</td>
<td>7,600</td>
<td>Lab/Office</td>
<td>RTC</td>
</tr>
<tr>
<td>74</td>
<td>Vehicle Warehouse/Office</td>
<td>2,000</td>
<td>Boat, Vehicle Storage</td>
<td>RTC</td>
</tr>
<tr>
<td>74a</td>
<td>Offices</td>
<td>650</td>
<td>Office</td>
<td>RTC</td>
</tr>
<tr>
<td>86</td>
<td>Central Warehouse</td>
<td>11,000</td>
<td>Storage</td>
<td>NOAA (sublease)</td>
</tr>
</tbody>
</table>

Sub-total Occupied Area 109,130

<table>
<thead>
<tr>
<th>Building No.</th>
<th>Building Name</th>
<th>Available Area</th>
<th>Use/Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Caretaker Residence</td>
<td>2,700</td>
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</tr>
<tr>
<td>21</td>
<td>Machine Shop</td>
<td>3,780</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Blacksmith/Carpentry</td>
<td>3,640</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Welding Bldg.</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Rockfish Research Lab</td>
<td>4,020</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Dispensary</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>Water Tower</td>
<td>800</td>
<td></td>
</tr>
</tbody>
</table>

Sub-total Unoccupied Area 17,340

Total All Building Areas 126,470
### 4.7 Proposed Building Space Summary

**Buildings or Structures to be Occupied, or Renovated for Adaptive Reuse and Occupied**

<table>
<thead>
<tr>
<th>Building No.</th>
<th>Proposed Building Name</th>
<th>Available Area</th>
<th>Changes</th>
<th>Use/ Program</th>
<th>Proposed Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Ohrenschall Guest House</td>
<td>3,600</td>
<td></td>
<td>Residential</td>
<td>Visitors</td>
</tr>
<tr>
<td>36</td>
<td>Research Center</td>
<td>27,200</td>
<td>Expand</td>
<td>Lab/Office, Class &amp; Mfg</td>
<td>RTC</td>
</tr>
<tr>
<td>39</td>
<td>Visitors Center &amp; NERR Bldg.</td>
<td>7,080</td>
<td>Renovate</td>
<td>Visitor's Center Office &amp; Labs</td>
<td>RTC, NERR</td>
</tr>
<tr>
<td>49</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>Renovate</td>
<td>Lab/Office</td>
<td>RTC/Partnership</td>
</tr>
<tr>
<td>50</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>Renovate</td>
<td>Lab/Office</td>
<td>RTC/Partnership</td>
</tr>
<tr>
<td>53</td>
<td>Bay Conference Center</td>
<td>7,700</td>
<td>Renovate</td>
<td>Conference Center</td>
<td>Vendor Sublease</td>
</tr>
<tr>
<td>54</td>
<td>Classroom &amp; Seminar Building</td>
<td>7,600</td>
<td>Renovate</td>
<td>Academic functions</td>
<td>RTC</td>
</tr>
<tr>
<td>86</td>
<td>Engineering &amp; Operations Building</td>
<td>11,000</td>
<td>Renovate</td>
<td>Office &amp; Storage</td>
<td>RTC &amp; NOAA</td>
</tr>
</tbody>
</table>

**Sub-total Building Area** 104,030

**New Buildings to be Constructed**

<table>
<thead>
<tr>
<th>Building Name</th>
<th>Available Area</th>
<th>Use/ Program</th>
<th>Proposed Occupants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baywater Research Center</td>
<td>9,000</td>
<td>Greenhouse, classroom, laboratory</td>
<td>RTC</td>
</tr>
<tr>
<td>Overwater Marine Ops Building</td>
<td>1,500</td>
<td>Pier Operations Office or Classroom</td>
<td>RTC</td>
</tr>
</tbody>
</table>

**Sub-total Area** 10,500

Demolition Plan. Buildings and structures to be removed are shown in pink above. See table next page.
4.8 Code, Life Safety, Accessibility

Part of the renovation of each structure on campus will be to update that building’s code compliance, safety and accessibility features. In some cases these upgrades will be a significant component of the work, such as in B39, where the multiple floor levels will require significant rework to achieve an accessible structure. In other buildings, such as B86, these renovations should be relatively minimal. Seismic upgrades will be significant in several of the structures, especially the unreinforced masonry B21. B54 will also need significant seismic upgrades to undo the unfortunate seismically-incompatible previous renovations. Other buildings on campus will need typical upgrades appropriate to their construction type.

Site accessibility will also be an issue of ongoing concern. Given the steeply graded site, it is not realistic to expect that the whole campus will be accessible to a wheelchair user. An accessible connector path between the upper site and the lower site is shown in Item 2 of Section 6.6, Circulation. The required length of the pathway illustrates its infeasibility. A better strategy is to assume that disabled students or employees would use their vehicles to move from the upper to the lower portions of the site, and to provide appropriate disabled access parking stalls at both levels.

4.9 Historic Resources

RTC is located on a site with a history of uses ranging from a Codfish Cannery, to a Coaling Station for ocean going vessels, to a staging area for the Roebling Company during the construction of the Golden Gate Bridge. During WWII, the property was host to the Navy Net Depot, where the antisubmarine nets for San Francisco Bay were built and repaired. Buildings and structures associated with this history can still be found on the 36-acre site and may possess historic significance. This Plan describes conceptual designs of potential improvements at RTC including the adaptive use, rehabilitation and demolition of existing buildings, as well as new construction. These proposals are summarized in the Proposed Building Space Summary Table in Section 4.7. The following observations by Carey & Company Historic Preservationists describe the procedures and limitations for assessing, rehabilitating and demolishing historic resources. A detailed Historic Resources Assessment should be completed before proceeding with any of the work described in this Plan.

Given the history of the property, any proposed development of the site would likely be subject to environmental review as Cultural Resources under the California Environmental Quality Act (CEQA). Current requirements may be found at http://ceres.ca.gov/ceqa/docs/2010_CEQA_Statutes_and_Guidelines.pdf. CEQA recognizes several ways that a building, structure, or object can be defined as a historical resource. These include listing in the California Register of Historical Resources, listing in a local register of historical resources, or identification by a local agency.

The historic resource may be a significant structure, an individual building, or a larger grouping of buildings and structures that form a historic district. Specific historical status will be considered at the time of re-design and possible removal. The possibility that buildings and structures at RTC constitute individual historic resources or a historic district should be evaluated as part of the detailed Historic Resources Assessment.

Once historic resources are identified on site, any proposed projects must be evaluated for potential impacts to the historic resources. The lead agency, SF State, must determine if there is a possibility that any project on the site may have significant affect on historic resources. Such impacts could be associated with adaptive use and rehabilitation and most certainly with demolition. New construction also could have impacts. For adaptive reuse or rehabilitation CEQA uses the Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings as the evaluation standard. Generally a project that follows the Secretary’s Standards is mitigated adequately. If the lead agency determines that the project follows the Secretary’s Standards, the project could be categorically exempt and require no additional environmental review, at least for historic resources.
The demolition of a historic resource presents a different circumstance than alterations. Although this action is not directly addressed in CEQA, case law has determined that demolitions cannot be mitigated. Mitigations can and should be recommended, but the adverse impact will remain significant and unavoidable. The environmental impact report would acknowledge all significant and unavoidable impacts among which, in this case, would be the demolition of a historic resource. As with other such impacts, the lead agency must then prepare a statement of overriding considerations, essentially stating why the benefits of the proposed project outweigh its negative environmental effects.

Marine research field stations can be placed in existing historic buildings. Some examples of similar stations which use historic buildings across the U.S. are: Coastal Marine Laboratory, University of New Hampshire; Duke University Marine Laboratory; Grice Marine Laboratory, College of Charleston, South Carolina; Skidaway Institute of Oceanography, Marine and Coastal Science Research and Instructional Center, Skidaway Island, GA; and James J. Howard Marine Sciences Laboratory, Sandy Hook, NJ. Similar opportunities to adaptively use historic resources can be an integral part of the future development proposed for RTC, thus extending and contributing to the history of this site with its water-oriented uses. Continued use of the historic buildings will contribute to retaining RTC’s unique sense of place that has been built on fascinating layers of history related to San Francisco Bay. Adaptive use is also inherently sustainable by avoiding the use of energy in demolition and disposal; retaining the embodied energy in the existing building; and lessening the use of energy and natural resources for completely new construction.

Not all existing buildings, even historic ones, need to be retained and section 4.7 notes those which are proposed for removal, adaptive use and rehabilitation, and new construction. This approach to the Plan acknowledges the contributions historic resources can make to the overall development of a setting for learning and collaboration.

4.10 Sustainable Campus

The Plan recognizes the University’s commitment to carbon neutrality. The scale of RTC makes this easier to characterize and may provide a template for science field stations. Measures to achieve this goal are encouraged and fully integrated with this planning effort.

There is sometimes a tendency at planning level, to render absolute judgments and set commendable but ultimately unachievable goals for energy and environmental performance. The continued viability of the Center for its contribution to local environment is however, more fundamentally sustainable and a more critical contribution. Each individual project (renovation or new building) should adopt practical sustainable design strategies that are developed specifically for that project. The following recommendations are more site-specific and should be considered during site upgrade work preparing for building renovation and new building construction.

4.10.1 Solar Thermal Water Heating

The type of buildings planned will utilize significant amounts of domestic hot water. Since gas is not prevalent on site, solar thermal water heating should be a priority for the campus. The solar water heating system can either be building integrated or site integrated and can be designed in such a way to increase capacity from the solar load reflection from the Bay Water. Solar thermal also has many synergies with geo-exchange systems (see below). Costs have come down on solar thermal systems and paybacks of seven to ten years are expected.

4.10.2 Photovoltaic Systems

Due to the research focus within RTC, high equipment loads are expected which will impose significant electrical requirements on campus. Electrical generation can be provided through the use of photovoltaic PV systems. As described with the solar thermal system above, solar intensity can be increased from the solar load reflection from the bay water. Many integrated systems such as parking covers can help reduce the first cost investment of the solar PV installation. In addition, as buildings are being renovated, roof integrated systems could be implemented. Costs of solar PV systems continue to come down and simple paybacks of 15 to 18 years are expected.

4.10.3 Geo-Thermal Exchange

Studies have already been done to assess the viability of the bay as a geo-exchange system. It is recommended that these considerations be studied further so as to allow for a free source of heat rejection/absorption as well as providing the opportunity to switch buildings to a heat pump technology. This technology will heat and cool buildings and not utilize fossil fuels such as gas or oil. Even if the bay cannot be utilized, consideration should be given to incorporating a geo-exchange system on the site, utilizing the high water table. Such systems could be either vertical bore systems or horizontal slinky coil systems. We would expect simple paybacks of ten to 15 years.

4.10.4 Natural Ventilation Systems

Natural ventilation through fully engineered solutions should be considered for non-pressure sensitive spaces. The Bay provides for very reasonable temperatures throughout the year. If combined with high thermal mass buildings, the potential for radiant heating and cooling, and natural ventilation would prove to be very energy-efficient and provide a high degree of comfort for little fossil fuel use.

4.10.5 Recycled Water

Due to the high levels of water use in scientific buildings, a central water re-use (gray or black water) system should be considered. The recycled water system would reduce the site replacement of sewage conveyance by reducing the quantity of conveyance sent back to treatment facilities.

4.10.6 LEED®

The Leadership in Energy and Environmental Design program, or LEED, was developed by the United States Green Building (USGBC) council to “provide owners…a concise framework [to identify and implement] practical and measurable green building design, construction, operation and maintenance solutions”. Administered by the Green Buildings Certification Institute (GBCI), LEED has gained general acceptance in providing third party oversight to achieve sustainability goals.

With nearly 800 projects certified and more than 2700 awaiting certification, LEED criteria are now generally familiar in the design and construction industries. LEED evaluation rests on five basic categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Interior Environmental Quality. Two additional categories recognize specific Innovations and Regional Priorities in assessing building performance.

Due to the broad application of this program and recognizing LEED as the point of inspiration for various green building programs that have followed, these standards have been referenced in this document as concise descriptions of development goals. A sample LEED matrix has been included in the appendix to demonstrate the potential level of performance for projects at RTC. While recommended by this study, SFU/RTC are not obligated to certify or conform to any LEED guidelines at this time.

4.10.7 PER

Construction at RTC must comply with the sustainable design standards developed by the California State University system. CSU standards are outlined in the “Program for Environmental Responsibility” or PER. In general terms, PER can be regarded as a LEED Silver equivalent (non-binding), with performance assessed through a LEED-like evaluative matrix. In this document, “LEED” PER has been used as a point of reference to underscore the similarities in approach.
In practice, LEED certification may be instituted as policy by campus or initiated for specific projects. Eight CSU buildings have successfully obtained certification, including science buildings for Stanislaus and Humboldt State, and 22 more are registered with intent to certify.

4.10.8 CALGreen

In January 2010, California adopted the country’s first statewide mandatory green building code, and in January 2011, the California Green Building Standards Code (CALGreen) goes into effect. CALGreen establishes a set of mandatory requirements and two separate sets of voluntary code provisions, called “Tier 1” and “Tier 2”. Municipalities are required to adopt the mandatory provisions but can also choose to incorporate the more rigorous voluntary measures as part of the local building standards. Compliance with CALGreen standards is overseen through direct inspection by local officials, as opposed to document review undertaken by private, third party certification programs.

Though CALGreen is still in draft/developmental form as a policy, it appears that future RTC construction projects must meet these criteria. (“Provisions of this code shall apply to…State-owned buildings, including buildings constructed by the Trustees of the California State University.”) If adopted as described above, evaluative criteria for RTC will be identified as “LEED/PER/ CALGreen.”

4.10.9 President’s Climate Commitment

SF State is a signatory to the “President’s Climate Commitment,” a collective action by American colleges and universities to “Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.” With action plans now in place, direct actions to support this policy can be implemented.

As a small but physically distinctive part of SF State, RTC may offer some potential to at least assess the current cost of neutrality. Anticipated energy requirements for the campus are described in Section 6 of this document. Beyond statutory requirements and in pursuit of this vision, the following conservation strategies are recommended.
5.0 Development Zones

For planning purposes, the 36-acre site has been sub-divided into six separate areas called “Development Zones.” The zones are primarily intended to support program consolidation, a key concept of the Plan. Consolidation improves communication, economizes on infrastructure development and provides a long-term framework for the land use. As articulated, these Zones reflect site topography, current investment in the program areas, and the ability of existing buildings to accommodate or adapt to new uses.

These separate areas are conceptually located on the campus plan below. Site elevation drops about 200 feet between Zones 4 and 6 and the plan is rendered to illustrate these very steep grades. Topography has largely determined site original uses and significantly influences the current plan. The intent is not to sub-divide the campus however, and zone boundaries are not fixed. Section 6 of this document describes the Connective Elements that link these areas.

Specific goals for development and significant physical features of these areas are described in the following sections. While the zones are numbered, this does not reflect priority for construction or sequence for development.

Campus Development Zones: General Locations
5.1 Zone 1: Waterfront and Wharf

5.1.1 Waterfront Development

RTC is one of the few locations in the entire San Francisco Estuary with deep water immediately adjacent to the shore. Restoration of the waterfront will allow loading and unloading of personnel and equipment from large research vessels such as Pacific Ocean-based ships, and a midway stop for West Coast research cruises between Newport, Oregon and San Diego. This is a critical enhancement of research capability that may provide benefit to the City of Tiburon and Marin County as well through enhanced access to emergency response vessels.

The Plan identifies the scope of construction and introduces potential regulatory issues but has not initiated any activity related to the entitlement processes.

5.1.2 Restoring the Port of Tiburon

The extensive paved area along the waterfront and a functional pier and wharf provide significant resources for emergency preparation and response for the entire North Bay region, in particular Marin County and southern Sonoma County. RTC has a long relationship with the Tiburon Fire Department, allowing the Fire Department to use the site for different types of emergency training. During the Angel Island fire, Cal Fire used RTC to successfully stage one of their helicopters. The pavement provides area for staging emergency supplies that can be transported by water or air to the site during an emergency response. Rebuilding the wharf is a key component for creating a “Port of Tiburon” that will facilitate emergency response.

Portions of this zone should include space set aside for the storage of emergency supply conex containers, sufficient clearance for tractor trailer rigs to turn around and helicopters to land, and the infrastructure necessary for moving supplies from boats or barges to the site for staging and distribution to emergency shelters around the county.

5.1.3 Wharf Reconstruction

An expanded wharf and docking facility will greatly enhance vessel operations by permitting RTC to berth its primary research vessels immediately adjacent to the laboratories. Critical capability includes a small boat facility, float space for experiments and engineering studies, a wet laboratory with winches and access to bay waters, and docking facilities for ocean-going research vessels. With upgrades to the cyber infrastructure, telemetry and communications to and from the pier will be transformed, broadening the actual and virtual use and encouraging collaboration, both within the SF State community and the scientific community at-large. Renovation will provide direct and safe access to the water surface for scientific sampling.

Just inshore of the western caissons of the main wharf a ramp connects to floating sections, attached to the caissons and oriented to allow easy access for boats. The float orientation will be long-side parallel to the strong currents and a wave attenuator will shelter the boats from the shorter waves. Wharf reconstruction provides these capabilities:

- Sufficient area to accommodate all existing and additional instrumentation
- Ability to support the weight of trucks and forklifts to mobilize and deploy heavy equipment
- A permanent crane to deploy equipment and to launch and recover small boats
- A set of floating sections to allow safe water access and loading of the RTC boats
- Wharf infrastructure (fenders, dolphins, bollards) for docking of ocean-going vessels
The Port Of Tiburon. Wharf Reconstruction may include the research support facility shown here. A multi-purpose building this could exclusively support research vessels when heavily trafficked, or serve related research and educational functions. The existing Boat Shed seen in the background will be replaced by B86 conversion.
The Port Of Tiburon. Wharf reconstruction may include the research support facility shown here. A multi-purpose building this could exclusively support research vessels when heavily trafficked, or serve related research and educational functions.
5.2 Zone 2: Research Core

5.2.1 Research and Administration Center: B36 Completion

Building 36 currently houses research and administration for the Center. The building has received the greatest investment of all structures on site, benefiting from a level of fit-out that has not been undertaken elsewhere. This building will remain the primary research hub for the center, accommodating any near-term requirements for new or expanded programs. A completed interior is shown on page 1-4.

5.2.2 Engineering and Operations Building: B86 Renovation and Expansion

Renovation and additions to B86 are proposed, as shown on the illustration on page 5-6. Currently designated as “warehouse” space, these modifications will allow transfer of vehicle storage and offices from Buildings 74 and 74A, and marine operations currently housed in B49. Demolition of B74 and 74A, shed-type structures adjacent to the concrete trestle structure is assumed and removal of the trestle itself becomes a possibility.

As shown, the basic form of B86 remains, with a seismically strengthened steel frame, new roofing and cladding. Exterior finishes follow the general precepts for campus development. Re-cladding materials include metal panels, salvaged wood and insulated glass. A continuous canopy protects new overhead acting doors and provides a covered walkway, connecting a completed B36 and the renovated B49 and B50.

5.2.3 Partnership Research Facilities: B49 and 50 Conversions

These buildings currently house a mix of programs including studios for the Fine Arts Department and storage for Anthropology. Storage and support functions for marine-related field work are currently located at the lower level of B49. Removing these uses clears the building for significant interior renovations that include seismic strengthening and utility distribution. Though the heavy timber frames present some limits for loading and vibration, the simplicity of the plan and regular, open column bays are well-suited to certain research uses.

In the exterior view on page 5-7, badly deteriorated exterior wood stairs have been removed and replaced with appropriate means of egress for safety and accessibility. These steel-frame elements can be structured to help resist the torsional motion that these long, narrow buildings may be subjected to in an earthquake. Re-cladding includes re-roofing, replacement windows and restoration of the existing redwood siding.

5.2.4 Bay Water Research Center: Greenhouse, Laboratories and Classroom

With modest requirements for growth, a highly sensitive coastal location and a significant stock of existing buildings, the Plan limits new construction to a few key elements. The Bay Water Research Center removes an existing, ad hoc structure to house those functions in a new research greenhouse and provides new shared laboratories for bay water access. Modernization and renovations to the bay water pumping system infrastructure would accompany the construction of this building. A new gateway building, public outreach and education is provided in the Visitor Center portion of the building seen in this view. Adjacent to the building, a restored coastal wetland landscape replaces leech fields currently in this area. Removal of some existing paving re-routes traffic away from the working waterfront and creates green space at the heart of the research campus.

5.2.5 The Trestle

The degraded remnant of the coaling gantry crane's trestle track could be stabilized and retained as a valuable historic resource. The level of spalling from the structure will make restoration of the trestle difficult; however, stabilizing it in its current configuration is still feasible. If the structure is demolished, a limited section may remain as an exhibit of the site’s historic uses and character.
Engineering and Operations Building. In this illustration, B86 has been renovated with new metal siding and windows. A series of overhead doors allow the building to function as a series of open industrial bays. The continuous canopy shown here provides protection for operations access and serves as a covered walkway form B36 to B49/50.
Partnership Research Facilities. B49 and 50 are shown here, seismically strengthened with braces and external frames. The original redwood siding is stripped and refinished and replacement windows installed. New stair and elevator connections follow campus guidelines for material, character and craft.
Bay Water Research Center. This building houses both a Research Greenhouse and the Visitor Center/Classroom shown here in the foreground. A Coastal Wetland planted area replaces part of the large expanse of existing concrete paving.
5.3.2 New Research Building

It is proposed that B30 be demolished and that a new research building be constructed for lease to a private research entity, such as Taxon Biosciences. The advantages of offering this site to a private lessee extend to both RTC and the future tenant. RTC would gain the increased intensity and possibilities for interaction with more scientists on the site. The tenant would gain access to the beautiful location, and the cache of being associated with RTC. Lease fees could be used to support research and operations at RTC, and could be a significant contribution to the budget. It is possible that a third party developer could be brought in to finance the construction of the building, to the joint benefit of itself and the RTC. It is recommended that the new building be kept to two stories, and that the floor plates be limited to 12,000 gsf. After the terms of the lease expired, the building would revert back to RTC ownership, and could be either re-leased, or occupied by RTC staff. Some slope stabilization would need to be completed before a new building could be constructed at the site, and the driveway and parking lot would need to be improved.

5.3.3 Campus Residences

As described in Section 1, there is need for onsite housing for students and postdocs. While the Ohrenschall Guest House provides short-term housing for up to six visitors, it doesn’t meet the need for longer term housing for staff and students. This Plan proposes that a series of two-story town houses and shared residences be constructed along the site entrance road above buildings 49 and 50. The old caretaker’s house, Building 11, would be removed and new residences constructed on the slope above or below the entrance road. This housing would be a mixture of family residences for visiting scholars or postdocs, and dormitory or co-op style housing for graduate students. Residences would have their own kitchens since central food service is not planned on campus.

The proposed location is within walking distance to B36 and the other laboratory buildings, but still separated from the research zone. Residents in this location would contribute to the security of the lower campus by providing an obvious presence along the entry roadway.

Construction of the housing could be funded by a lease arrangement with a private developer similar to the arrangements suggested above for the New Research Building.

5.3 Zone 3: Future Development
5.3.1 Development Concepts

Development Zone 3 is located at mid-slope, neither strongly connected by program or physical pathways to either the upper or the lower campus. Existing structures include B30, the former mess hall for the naval base. A series of additions without strong formal logic, the building lacks the design and structural integrity of other campus structures. Though presently occupied by Taxon Biosciences, a private sector lessee, the building is poorly suited for research activities. Deteriorated exterior finishes, inadequate utility services and issues related to site drainage and retaining wall condition give further cause to recommend abandonment and demolition of this structure.

Proposed uses for this area are based on these assumptions:

- Academic sciences will be consolidated in the Core Research area (Zone 2 adjacent).
- RTC needs will be met for the foreseeable future by renovation or expansion of the Zone 2 buildings.
- Mid-slope location offers some basis for uses that can benefit from being near to the research core, but do not need direct adjacency.
5.4 Zone 4: Conference Center

5.4.1 Revenue Generation: Allowed Activities

The upper campus comprises B39, formerly the Officer’s Quarters for the Navy, B53, the Bay Conference Center, formerly the Officer’s Club, and the old water tower, B75. The Development Plan suggests that this area be utilized for revenue generation, public outreach, and for activities carried out by other agencies, such as the San Francisco Bay NERR. These activities, while not directly benefiting the RTC research function, can provide indirect support through revenue generation, and drop-in public outreach.

5.4.2 Conference Center

The conference center building provides stunning views of the San Francisco Bay in a charming collegial setting. While the building suffers from poor acoustics, an inadequate food preparation area, outmoded restrooms, and disorganized parking access, we believe that with relatively minor renovations it has great potential as a revenue generating facility. Small conferences, meetings, parties, small weddings and other sorts of events could be held in the building to generate significant revenue.

While RTC is not in the hospitality business, this facility has provided an important source of revenue. Full restoration of these buildings is recommended. An outside vendor with specific food service expertise could be contracted to advise RTC on the best prospects for enhancing capacity or function for this important resource.

Gates at the roadway leading down to the main site and at any stairs or walkways proposed in Section 6 could prevent access to the lower campus. With proper management the conference center could provide a significant revenue stream to the RTC operating budget.

The Officer’s Bar on the lower level of this building has been preserved. Wall paint, writing, and graffiti from the Navy days remain extant in this space. These elements should be preserved as valuable records of the cultural history of the site.

5.4.3 Public Outreach B39

B39, the former Officer’s Quarters building is the most visible building on the site to traffic on Paradise Drive. As such, it is a prime location for a public outreach function, such as a walk-in visitor’s center. RTC and SF Bay ecology could be highlighted in the displays and reinforced by the bay views from the building. Given that SF Bay NERR is also interested in public outreach and a visitor’s center, it is possible that space could be shared between RTC and SF Bay NERR. In the near term this visitor’s center could also describe the unique and interesting history of the various uses of the site, the cannery, the coaling station, and the naval net depot. There is also room in B39 for a classroom for public outreach activities, again shared between RTC and the NERR.

Significant renovation will be required for B39, including creating a uniform floor level, ADA accessibility upgrades, asbestos remediation, and restroom improvements.

5.4.4 National Estuarine Research Reserve

SF Bay NERR currently occupies office space in B39 and laboratory space in B36. Maintaining the NERR offices in a renovated B39 would be advantageous to the group, as it would give the NERR more visibility to the public and acknowledge their identity separate from the RTC. In addition, renovating the existing laboratory on the lower level of B39 for NERR research use should be considered. Whether the scientists would choose to occupy a lab in this building at the top of the site versus remain in their labs in B36, is an open question, however the possibility of consolidating NERR functions into a single building, with public visibility, appears to be attractive.

5.4.5 Water Tower

The historic metal water tower, B75, located behind B39, is an interesting structure that in the near term should be protected from further degradation. Providing a new roof and a coat of exterior sealant would help to stabilize the structure until funds to either restore it or convert it to another use could be found.

5.4.6 East of Paradise Drive

The land that was deeded to SF State in the 1980s also includes property east of Paradise Drive up the hill where a water tower stands. This land is not easily accessible from the site and so tends to be neglected when inventorying site components. Given the spectacular views from the property and its separation from the rest of the Center, the best use of the land might be to separate it from the rest of the Center and sell or deed it in a long term lease for residential use. Proceeds from the transfer could be used to improve RTC site utilities, fund the operating budget or undertake any number of needed site improvements. Another possibility is to construct a residence for the RTC director that would also allow on site entertaining for prospective donors.
5.5 Zone 5: North Waterfront

5.5.1 Boat Launch

The north waterfront is the least developed and the least accessible area of the current site. The access road is not currently in good repair, the sea wall is degraded, the hillside slope is not stable, and significant environmental clean up is needed from the Navy years. Advisory Board member John Kern has been successful at obtaining funds to clean up protected portions of the north waterfront.

Nevertheless the north waterfront could function as an alternate boat launch site for small boats from the RTC.

5.5.2 Future Use

During an emergency response, this area could be used for the storage of emergency supply conex containers or other equipment in support of the “Port of Tiburon” function described in the Zone 1 Development section. While this area would require significant renovation to take on more than simple storage functions, it can easily provide additional hard surfaces for storage and lay down yards supporting other activities on site.

The Plan does not propose any further development for the North Waterfront Area in the near future. Minimal maintenance should be undertaken to stabilize the sea wall, hillside and shoreline to prevent further degradation.
5.6 Zone 6: Education and Outreach

5.6.1 Site Heritage, Community Features

Zone 6 is proposed to become the education and outreach section of the site. It currently hosts a collection of some of the oldest and most historically valuable buildings on the campus. Only B54 is currently occupied, however recent renovations have left it structurally compromised, and there are plans to vacate the second floor of the building.

5.6.2 The Idea Forge: B22 Conversion

Building 22 is the Blacksmith's Shop, the oldest building at RTC. This unreinforced masonry structure has apparently remained relatively undamaged by the multiple seismic events since its construction. We recommend that this building be renovated as the core of historic preservation on the site. In the fullness of time, this building could serve as the centerpiece of the Naval Coaling Station and Net Depot Historical Museum. In the near term, those display functions would be carried in B39 and the Blacksmith's Shop could be stabilized to prevent further degradation. B21, directly adjacent is currently being used for storage and for fire fighter training exercises. We recommend that this building be demolished, as described earlier.

Significant seismic stabilization would be required for B22, such as new steel braces tied into the existing masonry walls. Accessibility upgrades would also be necessary should the building become a public space. In the meantime, attention should be paid to the roof and weatherproofing the structure in order to protect it from further damage.

5.6.3 Recasting the Network: B54 Restoration

Building 54 is a compelling example of Art Deco military theater design. The theater has been partially converted to laboratory functions at the lower two levels, however the original stage, part of the original raked seating area, and the projection booth still remain. Recent evaluations have determined that the renovations are not seismically stable and that the laboratory spaces on the theater level should not be occupied. This Plan recommends that the theater building be restored to its original and best use as an auditorium and theater for the RTC scientific community. A large space where all the staff on site could gather for scientific presentations would be a strong contribution to the RTC community, and returning the theater building back to its original plan and function would be a significant re-use of a historic structure. The theater could be used for research seminars, visiting scientist lecture series, large outreach presentations, and community events. Other areas in the building could be converted to smaller classrooms for teaching activities.

Seismic strengthening would be part of the restoration, as would accessibility upgrades, asbestos remediation, and structural upgrades. Before renovation could begin, laboratories currently operating in the building would need to be relocated to other buildings on campus: such as B36, the new Baywater Research Building, B86, or perhaps one of the partner Research Buildings. Attention should be paid to providing replacement laboratories with similar access to baywater, and protection from carbon isotope contamination.
Building 54, The Old Military Theater. We propose that this building be returned to a use similar to its original design, that of a theater, seminar room, and classrooms in support of RTC’s need for classroom and gathering space.
6.0 Connective Elements

6.1 Project Areas

Areas correspond to the Development Zones described in the previous section. The following diagrams recognize these zones as distinct areas with separate programs, joined by the site systems and landscape features characterized as Connective Elements.

PROJECT AREAS

Zone 1: Waterfront and Pier
   Restore Port of Tiburon
   Waterfront Development
   Pier Reconstruction
   Disaster Preparedness
   Emergency Access

Zone 2: Research Core
   Research and Administration
   Partnership Research Facilities
   Wetlands Research Center
   Native Demonstration Garden

Zone 2b: Operations and Engineering

Zone 3: Future Development
   Development Concepts
   New Research Building
   Campus Residences
   Open Space

Zone 4: Conference Center
   Revenue Generation
   Conference Center
   Leased Space

Zone 5: North Waterfront
   Boat Launch

Zone 6: Education and Outreach
   Site Heritage Community Features
   Recasting the Network: B54 Restoration

Habitat Management
6.2 Biological Habitat Management

BIOLOGICAL HABITAT MANAGEMENT

1. **Coastal Oak Woodland**
Coastal Oak Woodland is located on the majority of the site. It is dominated by Coast Live Oak (Quercus agrifolia). The other canopy species include Bay Laurel, Maple, Madrone, and California Buckeye. The understory and edge plantings in the region frequently consist of Coyote Brush and other shrubs with Herbaceous species.

   Evaluate and restore Coastal Oak Woodland by removing invasive species and replanting edges. Invasive species include: Eucalyptus and Broom.

2. **Northern Coastal Scrub**
The Northern Coastal Scrub is located on the northern side of the site. This plant community is dominated by small to medium sized scrub and often contains Coyote Brush, Sage Brush, Manzanita and Sticky Monkey Flower.

   Evaluate and restore Northern Coastal Scrub areas and remove invasive species.

3. **California Coastal Grassland**
The grassland areas are located on the northern portion of the site and in impacted areas around buildings. Grassland areas are characterized by their perennial or annual plant species domination. Evaluation of these areas is necessary to determine exact typology. Grassland areas hold potentials to retain hillsides with added deep rooted plantings like Chamise and Oak Scrub.

   The introduction of butterfly, native bee and hummingbird gardens adjacent to dwellings in this zone adds biodiversity and visual interest.

4. **Coastal Sage Scrub (proposed)**
Create appropriate coastal typology along the waterfront. Use Coastal Sage Scrub or alternative possibilities if deemed appropriate like Coastal Perennial Grasslands or Saline Emergent Wetlands.
Stormwater swales as an ecological technology can be utilized to slow and filter stormwater at its source, lessening the impacts of pollution while articulating natural systems and enhancing visual interest. Biofiltration allows stormwater to be channeled into open, shallow vegetated swales with a constructed subsoil matrix or underlying existing soils. The vegetation and soil together help in the uptake or filtration of pollutants.

Point Source Biofiltration is placed strategically for runoff from roofs and paved areas.

1. Capture runoff at or before storm drain for filtration
2. Larger biofilter placed mid-system before entering detention pond
3. Stormwater Detention/Filtration Pond (Drains to Bay)
A. Pre-Leach Field Remediation
B. Post-Leach field Remediation
SITE UTILITIES and PROPOSED CONNECTIONS

1. **Sewer Line**
   New Sewer Line - Hook up to sewer connection on Paradise Drive.

2. **Electrical**
   Overhead Electrical Lines (otherwise noted)

3. **New Water Line**
   New Water Line - Connect to service point on Paradise Drive.

4. **Natural Gas**
   New Natural Gas Line - Hook up to gas lines on Teaberry Lane.

---

**Romberg Tiburon Center for Environmental Studies**

**Site Development Study**

6.4 Site Utilities and Proposed Connections

16 December 2010
Phytoremediation and Bioremediation

Phytoremediation is the use of plants to filter, contain, or extract organic contaminants in soil and water. The potential depth of remediation is determined by the root zone.

Bioremediation is the use of microbial activity to modify metal contaminants, which on this site could potentially be found in household chemicals and aging plumbing infrastructure.

A combination of Phytoremediation and Bioremediation could be utilized to remediate the leach fields after the campus is connected to the Marin County sewer line.

Planning Steps:
1. Test soil for possible contaminants which could include: nitrates, phosphates, pathogens (viruses and bacteria) and household chemicals.
2. Determine viable plants for pollutants and planting strategies with to aid in transpiration and aeration of soils.
3. Add beneficial aerobic bacteria and or fungus to the soil to remediate moisture in deeper levels of the soil, if deemed appropriate.
4. Refrain from capping or compacting the soil to maintain aerobic conditions and to allow biogases to release until remediation is complete.
5. Conduct geotechnical analysis prior to construction of structures or paved areas.
6.6 Circulation

CIRCULATION
Vehicle Roadways and Parking Areas

- Entry points
- Multi-use Paths
  Vehicles - Bikes - Pedestrians
- Universally Accessible
  Pathways and Trails
- Stairways
- Parking
6.7 Proposed Buildings and landscape

SCHEME 1 | PROPOSED BUILDING and LANDSCAPE

1. Seawater Greenhouse
2. Classroom Building
   - Exhibits
   - Lab Space
3. Wharf
4. Lab Experiments Staging Area
5. Native Demonstration Garden
   - Stormwater Wetland
   - Native Meadow Garden and Remediation Planting
6. Habitat Management
7. Stormwater Biofilters
8. Event Space | Plaza
   - Campus Events
   - Dock Access and Staging Area
   - Marin County Emergency Staging Area
7.0 Building Systems

7.1 Building Electrical Analysis

The existing electrical service at RTC is operating at a maximum capacity. The new loads proposed in the Site Development Plan and the need for reliable power cannot be accomplished without a new electrical service from Pacific Gas and Electric. Investigation to date, including calculations derived from the proposed build-out, has indicated a need to upgrade to a new 12.47 kV PG&E service which will be provided from an existing overhead line along Paradise Drive, to a new substation located at the lower campus. A new 12.47kV distribution system originating from the new substation will serve the existing buildings to remain and future expansions. Existing buildings at the lower campus will be electrically upgraded and served from the new 12.47 kV distribution system. The preliminary analysis of load requirements is as follows:

<table>
<thead>
<tr>
<th>Existing Buildings</th>
<th>Proposed Bldg. Name</th>
<th>SQ FT</th>
<th>VA/SQFT</th>
<th>Estimated Load (VA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Ohrenschall Guest House</td>
<td>3,600</td>
<td>10</td>
<td>36,000 VA</td>
</tr>
<tr>
<td>36</td>
<td>Research Center</td>
<td>27,200</td>
<td>15</td>
<td>408,000 VA</td>
</tr>
<tr>
<td>39</td>
<td>Visitor Center &amp; NERR Bldg.</td>
<td>7,080</td>
<td>15</td>
<td>106,200 VA</td>
</tr>
<tr>
<td>49</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>15</td>
<td>253,875 VA</td>
</tr>
<tr>
<td>50</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>15</td>
<td>253,875 VA</td>
</tr>
<tr>
<td>53</td>
<td>Bay Conference Center</td>
<td>7,700</td>
<td>15</td>
<td>115,500 VA</td>
</tr>
<tr>
<td>54</td>
<td>Classroom &amp; Seminar Building</td>
<td>7,600</td>
<td>15</td>
<td>114,000 VA</td>
</tr>
<tr>
<td>86</td>
<td>Marine Operations Bldg.</td>
<td>17,000</td>
<td>15</td>
<td>255,000 VA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Buildings</th>
<th>Proposed Bldg. Name</th>
<th>SQ FT</th>
<th>VA/SQFT</th>
<th>Estimated Load (VA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Baywater Research Center</td>
<td>9,000</td>
<td>15</td>
<td>135,000 VA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Buildings/Structures to be Preserved as Historic Resources</th>
<th>Proposed Bldg. Name</th>
<th>SQ FT</th>
<th>VA/SQFT</th>
<th>Estimated Load (VA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Blacksmith/Carpentry</td>
<td>3,640</td>
<td>12</td>
<td>43,680 VA</td>
</tr>
<tr>
<td>75</td>
<td>Water Tower</td>
<td>800</td>
<td>4</td>
<td>3,200 VA</td>
</tr>
</tbody>
</table>

Estimated Sub-Total Electrical Load: 1,724,330 VA
25% Additional Capacity: 431,083 VA
Estimated Total Electrical Load: 2,155,413 VA

7.2 Site Plumbing Analysis

The existing domestic water, storm drainage and sanitary sewer services at RTC are past their service life. The new loads proposed in the Plan and the need for reliable utilities will require replacement of the existing main sanitary sewer, storm drainage, and domestic water infrastructure both within the existing buildings being renovated as well as on the site.

<table>
<thead>
<tr>
<th>ESTIMATED SANITARY SEWER LOAD SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bldg. No.</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Existing Buildings</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>36</td>
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<tr>
<td>39</td>
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<td>49</td>
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<tr>
<td>50</td>
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<tr>
<td>53</td>
</tr>
<tr>
<td>54</td>
</tr>
<tr>
<td>86</td>
</tr>
<tr>
<td>New Buildings</td>
</tr>
<tr>
<td>-</td>
</tr>
</tbody>
</table>

Estimated Total Sanitary Flow: 30,225 GPD
### ESTIMATED DOMESTIC WATER LOAD SUMMARY

<table>
<thead>
<tr>
<th>Bldg. No.</th>
<th>Proposed Bldg. Name</th>
<th>SQ FT</th>
<th>Pipe Size</th>
<th>Flow Rates (Gallons Per Minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Ohrenschall Guest House</td>
<td>3,600</td>
<td>4&quot;</td>
<td>57 GPM</td>
</tr>
<tr>
<td>36</td>
<td>Research Center</td>
<td>27,200</td>
<td>(2) 6&quot;</td>
<td>424 GPM</td>
</tr>
<tr>
<td>39</td>
<td>Visitor Center &amp; NERR Bldg.</td>
<td>7,080</td>
<td>5&quot;</td>
<td>110 GPM</td>
</tr>
<tr>
<td>49</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>(2) 5&quot;</td>
<td>264 GPM</td>
</tr>
<tr>
<td>50</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>(2) 5&quot;</td>
<td>264 GPM</td>
</tr>
<tr>
<td>53</td>
<td>Bay Conference Center</td>
<td>7,700</td>
<td>5&quot;</td>
<td>120 GPM</td>
</tr>
<tr>
<td>54</td>
<td>Classroom &amp; Seminar Building</td>
<td>7,600</td>
<td>5&quot;</td>
<td>118 GPM</td>
</tr>
<tr>
<td>86</td>
<td>Marine Operations Bldg.</td>
<td>17,000</td>
<td>5&quot;</td>
<td>265 GPM</td>
</tr>
</tbody>
</table>

**Estimated Total Domestic Water Flow**

1,762 GPM

### ESTIMATED STORM LOAD SUMMARY

<table>
<thead>
<tr>
<th>Bldg. No.</th>
<th>Proposed Bldg. Name</th>
<th>SQ FT</th>
<th>Pipe Size</th>
<th>Flow Rates (Gallons Per Minute)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Ohrenschall Guest House</td>
<td>3,600</td>
<td>4&quot;</td>
<td>57 GPM</td>
</tr>
<tr>
<td>36</td>
<td>Research Center</td>
<td>27,200</td>
<td>(2) 6&quot;</td>
<td>424 GPM</td>
</tr>
<tr>
<td>39</td>
<td>Visitor Center &amp; NERR Bldg.</td>
<td>7,080</td>
<td>5&quot;</td>
<td>110 GPM</td>
</tr>
<tr>
<td>49</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>(2) 5&quot;</td>
<td>264 GPM</td>
</tr>
<tr>
<td>50</td>
<td>Partnership Research Bldg.</td>
<td>16,925</td>
<td>(2) 5&quot;</td>
<td>264 GPM</td>
</tr>
<tr>
<td>53</td>
<td>Bay Conference Center</td>
<td>7,700</td>
<td>5&quot;</td>
<td>120 GPM</td>
</tr>
<tr>
<td>54</td>
<td>Classroom &amp; Seminar Building</td>
<td>7,600</td>
<td>5&quot;</td>
<td>118 GPM</td>
</tr>
<tr>
<td>86</td>
<td>Marine Operations Bldg.</td>
<td>17,000</td>
<td>5&quot;</td>
<td>265 GPM</td>
</tr>
</tbody>
</table>

**Estimated Total Storm Water Flow**

1,762 GPM
7.3 Site Gas Requirement

Currently there is no natural gas distribution to the buildings and propane is utilized for the boiler systems. An analysis of expected gas loads is presented, however, as depicted in the sustainability section of this plan, it may be more effective to move a heat pump based heating source in lieu of gas or oil based heating sources. The preliminary analysis of load requirements is as follows:

<table>
<thead>
<tr>
<th>ESTIMATED GAS LOAD SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Buildings</strong></td>
</tr>
<tr>
<td>Bldg. No.</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>36</td>
</tr>
<tr>
<td>39</td>
</tr>
<tr>
<td>49</td>
</tr>
<tr>
<td>50</td>
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<tr>
<td>53</td>
</tr>
<tr>
<td>54</td>
</tr>
<tr>
<td>86</td>
</tr>
<tr>
<td><strong>New Buildings</strong></td>
</tr>
<tr>
<td>Bldg. No.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Estimated Total Gas Load</strong></td>
</tr>
</tbody>
</table>
8.0 Cost Summary

8.1 Estimating Process and Market Conditions

The pricing included in this document reflects probable construction costs obtainable in the project locality in September 2010. Pricing assumes competitive bidding for every portion of the construction work. This estimate is a determination of fair market value for the construction of these projects. It is not a prediction of low bid.

The estimate is based on the measurement and pricing of quantities wherever that information is obtainable and/or reasonable assumptions for other work not covered in the drawings. Unit rates have been obtained from historical records and/or discussions with contractors. The unit rates reflect current bid costs in the area. All costs include an allowance for the site surrounding the building. Escalation to the construction dates shown on the schedule (section 9) has been incorporated into the construction costs and is projected at the historic rate of 3.5% per year.

Since Davis Langdon has no control over the cost of labor, material, equipment, or market conditions at the time of bid, this statement of probable construction cost is based on industry practice, professional experience and qualifications, and represents Davis Langdon's best judgment as a professional construction consultant familiar with the construction industry. However, this estimate is no guarantee of the actual construction costs.

8.1.1 Inclusions

The projects consist of a series of renovations for adaptive reuse of eight existing buildings on campus and the construction of two new buildings. Infrastructure costs are included in each project.

Building 36: Scope includes adding 8,000 sf of infill space for eight new labs and minor renovations to the balance of space. Specific scope includes strengthening the existing seismic connections, patch and paint to the exterior walls and roof as required to accommodate the new construction, upgrading the finishes and lighting in the atrium, all new systems for the new lab space including lab benches and one fume hood per lab. The balance of space will be refreshed with new finishes, paint, and minor reconfiguration.

Building 39: Scope of work include seismically upgrading the existing building, reframing a portion of the ground floor for ADA compliance, removing the existing applied siding and restoring the original siding (windows to remain), replacing the existing roof and complete renovation of the interior for office, visitor center, and one laboratory. An elevator within the building footprint is also included.

Buildings 49 and 50: Scope includes upgrading the structure to support the new lab program, repairing and refinishing the existing wood siding, replacing the windows, new exit stair enclosure, new entrance doors, all new interiors including partitions, finishes, lab casework and equipment and mechanical and electrical systems.

Building 53: Scope includes removing the existing applied siding and restoring the original siding (windows to remain) and roofing, minor modifications to the interior walls, refreshing the existing finishes and new mechanical and electrical systems.

Building 54: requires extensive interior demolition to restore the original theater interior, and add classrooms and meeting space. For budgeting purposes, we have used historic building costs for other buildings similar in scope (approximately $700/sf current cost).

Building 66: This project is comprised of two parts: the existing structure will be updated with new siding, windows and roofing for use as storage. A new single story lab/office building will be added adjacent to the existing structure. For budgeting purposes we have allocated $500/sf current cost to this building.

Two new buildings have also been considered: a greenhouse/laboratory/classroom building and an overwater marine operations office. While detailed plans are not yet developed for these programs, for budgeting purposes we have allocated $450/sf for the greenhouse and lab and $750/sf for the classroom building.

8.2 Component Cost Summary

### Overall Construction Cost Summary – Renovation of Existing Structures

<table>
<thead>
<tr>
<th>Building No.</th>
<th>Proposed Building Name</th>
<th>Escalation to</th>
<th>Gross Area (gsf)</th>
<th>Cost per sf</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>Research Center</td>
<td>Fall 2012</td>
<td>28,000</td>
<td>214.36</td>
<td>$6,002,000</td>
</tr>
<tr>
<td>39</td>
<td>Visitors Center and NERR Building</td>
<td>Fall 2013</td>
<td>7,080</td>
<td>417.62</td>
<td>$2,957,000</td>
</tr>
<tr>
<td>49</td>
<td>Partnership Research Buildings</td>
<td>Fall 2020</td>
<td>19,925</td>
<td>734.42</td>
<td>$12,430,000</td>
</tr>
<tr>
<td>50</td>
<td>Partnership Research Buildings</td>
<td>Fall 2020</td>
<td>19,925</td>
<td>734.42</td>
<td>$12,430,000</td>
</tr>
<tr>
<td>53</td>
<td>Bay Conference Center</td>
<td>Fall 2013</td>
<td>7,700</td>
<td>243.96</td>
<td>$1,879,000</td>
</tr>
<tr>
<td>54</td>
<td>Classroom and Seminar Building</td>
<td>Fall 2016</td>
<td>7,600</td>
<td>882.63</td>
<td>$6,708,000</td>
</tr>
<tr>
<td>86</td>
<td>Engineering and Operations Building</td>
<td>Fall 2020</td>
<td>11,600</td>
<td>198.26</td>
<td>$2,300,000</td>
</tr>
<tr>
<td>86 addition</td>
<td>Office and Labs</td>
<td>Fall 2020</td>
<td>6,000</td>
<td>700.00</td>
<td>$4,200,000</td>
</tr>
<tr>
<td></td>
<td>Wharf and Pier Restoration</td>
<td>Fall 2014</td>
<td>20,000</td>
<td>230.00</td>
<td>$4,600,000</td>
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<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$53,598,000</td>
</tr>
</tbody>
</table>

### Overall Construction Cost Summary – New Buildings

<table>
<thead>
<tr>
<th>Building No.</th>
<th>Proposed Building Name</th>
<th>Escalation to</th>
<th>Gross Area (gsf)</th>
<th>Cost per sf</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baywater Research Center</td>
<td>Fall 2014</td>
<td>9,000</td>
<td>570.33</td>
<td>$5,133,000</td>
</tr>
<tr>
<td></td>
<td>Overwater Marine Ops Building</td>
<td>Fall 2014</td>
<td>1,500</td>
<td>850.00</td>
<td>$1,275,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$6,408,000</td>
</tr>
</tbody>
</table>

Flad Architects 16 December 2010
9.0 Project Schedule

The following project schedule illustrates an expectation of the general order of projects that would be required by future growth on the campus. Escalation in the cost estimates based on this schedule. It is important to note that this schedule is not binding. Most of the projects listed here could be built at any time if funding were to be found for them.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Building 36 Renovation &amp; Build Out</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Building 39 Renovation</td>
<td></td>
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<tr>
<td>3 Building 53 Renovation</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4 Baywater Research Center</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Wharf and Pier Renovation &amp; Overwater Ops Office Bldg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6 Building 54 Renovation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Building 86 Renovation &amp; Expansion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>8 Building 49 Renovation</td>
<td></td>
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<tr>
<td>9 Building 50 Renovation</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

Romberg Tiburon Center Site Development Schedule
10.0 Appendices

B86: Engineering and Operations Building

Renovation and additions to B86 are shown in this view. Currently designated as “warehouse” space, these modifications will allow transfer of vehicle storage and offices from B74 and 74A, and marine operations currently housed in B49. Demolition of B74 and 74A, shed-type structures adjacent to the concrete trestle structure is assumed and removal of the trestle itself becomes a possibility. The B49 interior is cleared for new uses shown in the adjacent illustration.

As shown, the basic building form remains, with a seismically strengthened steel frame, new roofing and cladding. Exterior finishes follow the general precepts for campus development. Re-cladding materials include metal panels, salvaged wood and insulated glass. A continuous canopy protects new overhead acting doors and provides a covered walkway, connecting a completed B36 and the renovated B49/50 complex.

B49/50: Partnership Research Center

Restoration and modifications to Buildings 49 and 50 are shown in this view. These buildings currently house a mix of programs including studios for the Fine Arts Department and storage for Anthropology. Storage and support functions for marine-related field work are located at the lower level of B49. Removing these uses clears the building for significant interior renovations that include seismic strengthening and utility distribution. Though the heavy timber frames present some limits for loading and vibration, the simplicity of the plan and regular, open column bays are well-suited to certain research uses.

In this view, badly deteriorated exterior wood stairs have been removed and replaced with appropriate means of egress for life safety and accessibility. These steel-frame elements can be structured to help resist the torsional motion that these long, narrow buildings may be subjected to in an earthquake. Re-cladding includes re-roofing, replacement windows and restoration of the existing redwood siding.
Bay Water Research Center

With modest requirements for growth, a highly sensitive coastal location and a significant stock of existing buildings, the Site Development Plan limits new construction to a few key elements. The Bay Water Research Center removes an existing, ad hoc structure to house those functions in a new research greenhouse. The building also contains new shared laboratory spaces designed around the provision of seawater drawn from the bay. These labs will replace the current shared seawater lab in Building 36 and provide for a better research environment, and more robust facility.

A new gateway building, public outreach and education is provided in the Visitor Center seen in this view. Adjacent to the building, a restored coastal wetland landscape replaces leech fields currently in this area and introduces school groups to local ecology. Removal of some existing paving reroutes traffic away from the working waterfront and creates green space at the heart of the research campus.