4 PLAN ELEMENTS

This section provides a general land use plan and describes the context and framework for the development of the site, facilities, and infrastructure; and the preservation of open space. It also defines the policies UC Berkeley and LBNL will employ to meet its long-term facilities needs and support its daily operations in a safe, efficient, and sustainable manner. The Plan is organized into the following elements:

- Land Use
- Access, Circulation, and Parking
- Open Space and Landscape
- Utilities and Infrastructure
- Sustainability
- Safety and Preparedness
- Implementation

These elements provide guidance to ensure that each new project contributes to a cohesive development of the site and promotes realization of the Richmond Bay Campus vision. They provide the flexibility necessary to accommodate both known and unforeseen programmatic needs yet place an emphasis on the qualitative aspects of the site's natural and built environment. The Plan embodies the University's institutional values of resource conservation and environmental stewardship guiding development of a sustainable research campus that reflects its scientific endeavors. Policies are presented within each element, along with bulleted sub-policies that indicate how the overarching policy will be implemented.

Opposite page: View of the coastal terrace prairie on the campus site.

LAND USE

Context

The Richmond Bay Campus will have a land area of approximately 134 acres. The site slopes downward from the north to south toward the bay; the highest point is approximately 28 feet above sea level. While today there is a scattering of generally small buildings and minimal infrastructure to serve them, the site has the potential to ultimately host a large and vibrant research campus. Existing site uses, open space and a mix of indoor and outdoor research and support facilities, will remain in the near term and be replaced incrementally with new development. Certain ecologically-sensitive areas of the site will remain undeveloped including the grasslands at the heart of the site as well as the bay-front marsh (see Figure 2.4 for additional existing site context).

Land uses immediately adjacent to the site are industrial, office, and transport, along with the Marina Bay single- and multi-family residential neighborhood immediately to the southwest. The California Department of Health Services is located to the northwest, a Pacific Gas and Electric (PG&E) service station forms the site's western boundary, and Bio-Rad Laboratories, a private research equipment manufacturing company, is located south of Regatta Boulevard. The adjacent property to the east is the location of former chemical production operations previously owned by Zeneca - the Campus Bay Business Park is located on part of this site. A major regional park, the Point Isabel Regional Shoreline, lies east and south of the South Shoreline Area extending to the southern city limits.

Land Use Development Framework

Development at the Richmond Bay Campus will be guided by this LRDP within an overall density that is appropriate for the site while preserving environmentally-sensitive areas. Accordingly, the Land Use Plan is comprised of two zones which form the site-wide development patterns and guide the locations of new buildings and infrastructure:

- Natural Open Space
- Research, Education, and Support

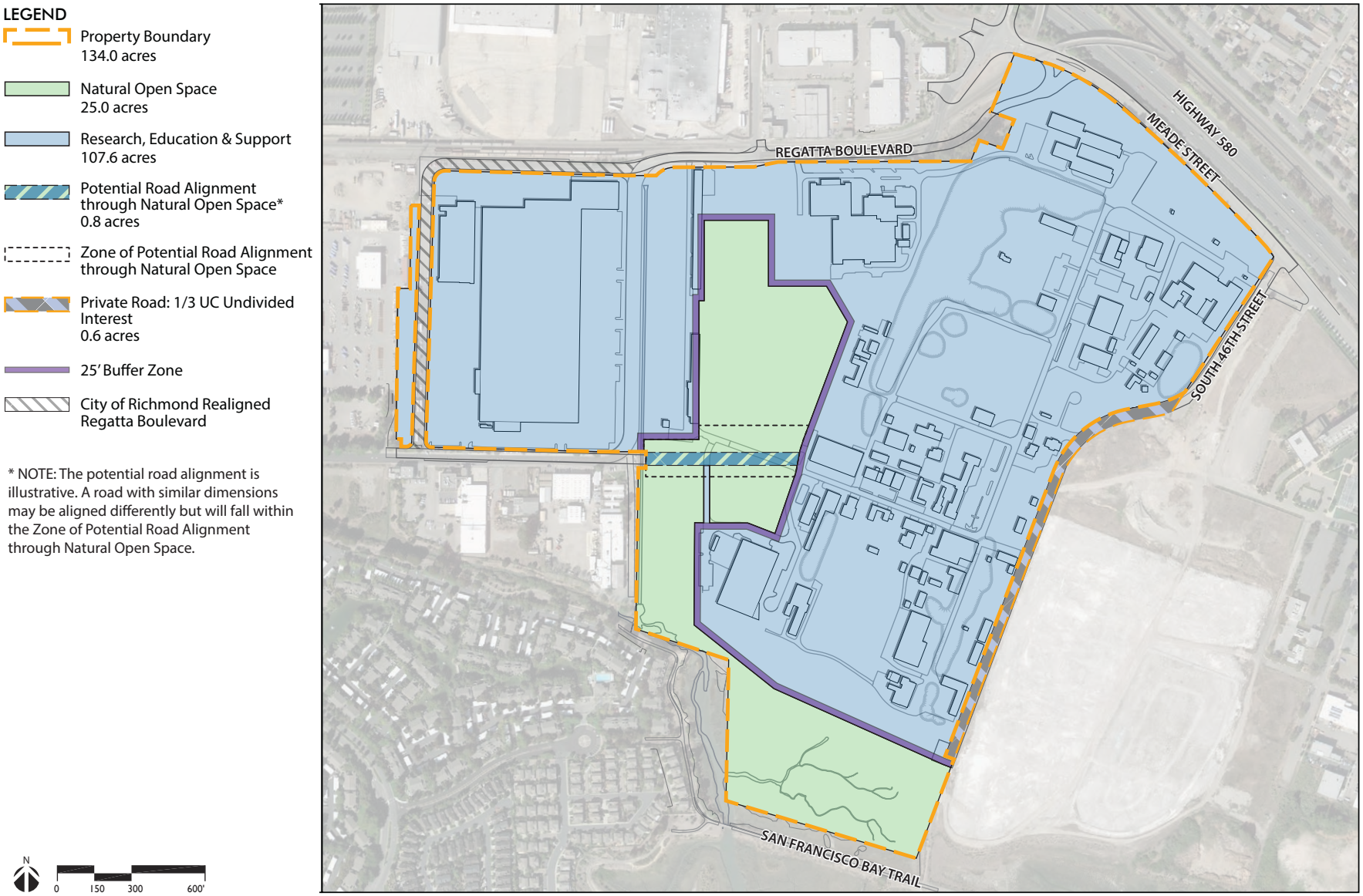
Definitions for each land use designation are provided below. Figure 4.1 illustrates the locations of these zones on the site and their relationship to the surrounding area.

Natural Open Space

The Natural Open Space land use designation applies to valuable natural areas such as the Western Stege Marsh and coastal grasslands. Activities within these areas will be limited to maintenance, field research, and education with the purpose of maintaining these resources in their natural condition. Development in this zone will be limited to minor access roads and structures, and boardwalks or pathways to facilitate maintenance, research, and education.

Approximately 25 acres within the Richmond Bay Campus will be designated Natural Open Space. Approximately fifteen of those acres are coastal terrace prairie grasslands functionally connected to the approximately ten acre Western Stege Marsh at the southern end of the site. Marshlands and mud flat parcels owned by the University south of and not included in the Richmond Bay Campus, totaling approximately 61.7 acres, will also remain in their natural condition.

Figure 4.1: *Land Use Plan*

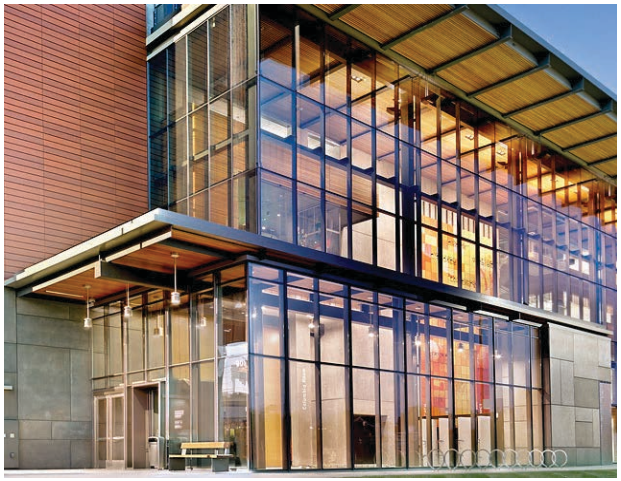


Research, Education, and Support

The Research, Education, and Support land use designation applies to land areas on the site that are either currently developed with facilities that will remain in their present form or be expanded, or areas that will be developed with new facilities. This land use will include 107.4 acres of the Richmond Bay Campus, which is sufficient to meet projected program needs at an appropriate density for the site. The types of facilities and activities that will be allowed in designated Research, Education and Support areas include:

- Laboratory, classroom, office, and administration buildings for researchers, faculty, postdocs, students, and non-University public and private entities.
- Product and process development space for private sector startups, small businesses, and industry counterparts that are synergistic with UC Berkeley and LBNL research areas.
- Support infrastructure and facilities for operations, transportation, utilities, renewable power generation, firefighting, security, safety, hazardous materials management, and corporation yard uses including vehicle and materials shops and storage. Support facilities for specialized research programs such as plant and animal research facilities, greenhouses, and clinical spaces.
- Community outreach and education resources including exhibit, lecture and event spaces as well as conference facilities and meeting rooms focused on public education.
- Amenities such as dining, short-term accommodation facilities (for visitors), retail, and recreation facilities.
- Transportation-related facilities including parking lots and structures, bus and shuttle stops, and roadways/circulation pathways. Parking structures may house parking administration offices, bicycle support facilities, and utility structures such as distributed central plants.
- Developed open spaces that are usable by employees and visitors, ranging from courtyards, terraces, and quad-like spaces, to walkways, tree groves, and recreational fields. Open spaces in this zone may be paved or landscaped, with or without seating or other site furnishings. They will range in scale from larger areas for outdoor gatherings to smaller spaces for small group interaction or individual reflection. Stormwater will be managed within these zones in swales, permeable landscaping, and storm drainage systems. Small structures including pavilions, overlooks, and site walls may be located in these areas.
- Transition zones to buffer development from the Natural Open Space areas, allowing for maintenance access and minimizing the transference of non-native species or noise or light intrusions. The buffer zone will disallow permanent structures within 25 feet of the Natural Open Space areas. Paving will be pervious where practical and any planting will consist of native or non-invasive species.
- Structures that protect the Richmond Bay Campus from sea level rise such as sea walls, retaining walls, or embankments.

The Western Stege Marsh, as well as coastal terrace grasslands, will be designated as Natural Open Space.



Research buildings, community facilities, outdoor dining areas and plazas and developed open spaces will be among the uses included in the Research, Education, and Support designated area.

Planning Concepts

Four site planning concepts guide the overall organization of development plans for the site: the land and sense of place; neighborhoods; collaboration and interaction; and connections.

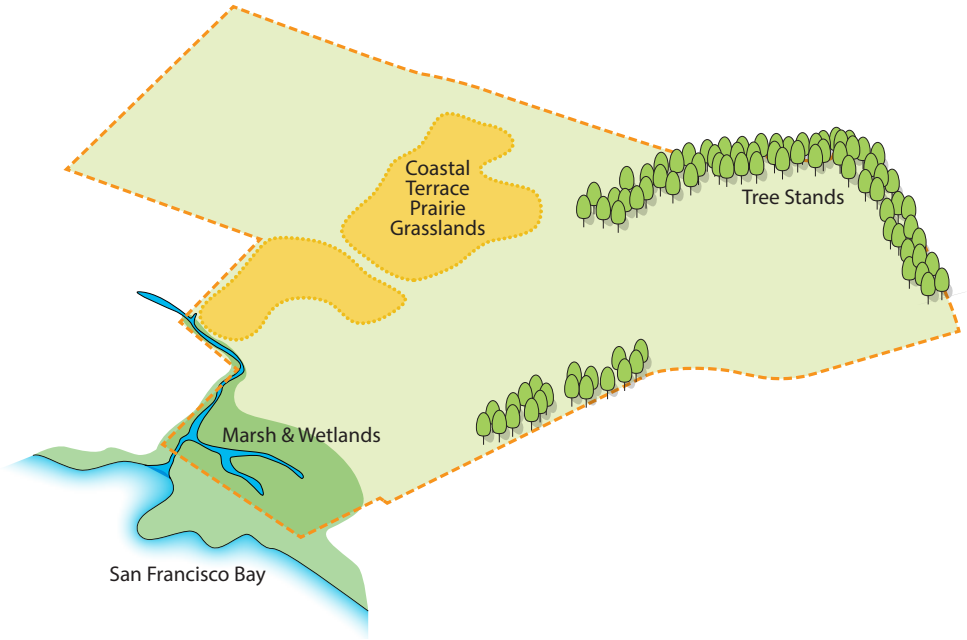
The Land and Sense of Place

The Richmond Bay Campus land use plan will preserve important natural attributes of the site, particularly the grasslands, marsh, and wetlands which are essential to maintaining the site's quality. These features will be retained as fundamental drivers of the site plan. The eucalyptus tree stands provide habitat for monarch butterflies and other wildlife and act as orienting landmarks. These non-native tree species will be replaced during development with other trees and features which perpetuate these functions as appropriate and in a manner consistent with the sustainability and landscaping policies within this LRDP.

The bay climate also has important implications for building and site design. Building layout and orientation, plus landscape design will help to block wind and create protected courtyards and other comfortable outdoor spaces. Stormwater management utilizing integrated landscape-based engineering strategies will enhance the experiential quality of the site and demonstrate commitment to sustainability. The abundant daylight will influence building orientation and provides significant opportunities for the use of daylighting within buildings. Building orientation, plus the mild temperatures will minimize the need for heating and mechanical cooling of indoor spaces.

The Richmond Bay Campus will occupy a beautiful waterfront site where building designs will take full advantage of the outstanding views from throughout the site. Near the waterfront there are clear-day views to the San Francisco skyline, the Bay Bridge, Treasure Island, and the San Francisco Bay. From many parts of the campus, views to the surrounding hillsides in Marin, Contra Costa, and Alameda counties provide visual interest and act as orienting landmarks. The design of buildings will also benefit from views on the site towards the natural features of grasslands and tree stands, and the attractive interaction spaces along the main pedestrian pathways. Views of the campus from surrounding neighborhoods and hillsides are dominated by green, blue, brown, yellow, and gray hues – the use of building finishes within this palette will minimize the visual impact of development.

As the Richmond Bay Campus is developed, a building context will be created and a new sense of place, linked to the built environment, will evolve. New buildings will relate to existing buildings and both will shape the campus identity as seen from beyond the campus boundaries. New buildings will vary in height, massing, and configuration to create a lively, diverse, and interconnected urban place.



Neighborhoods

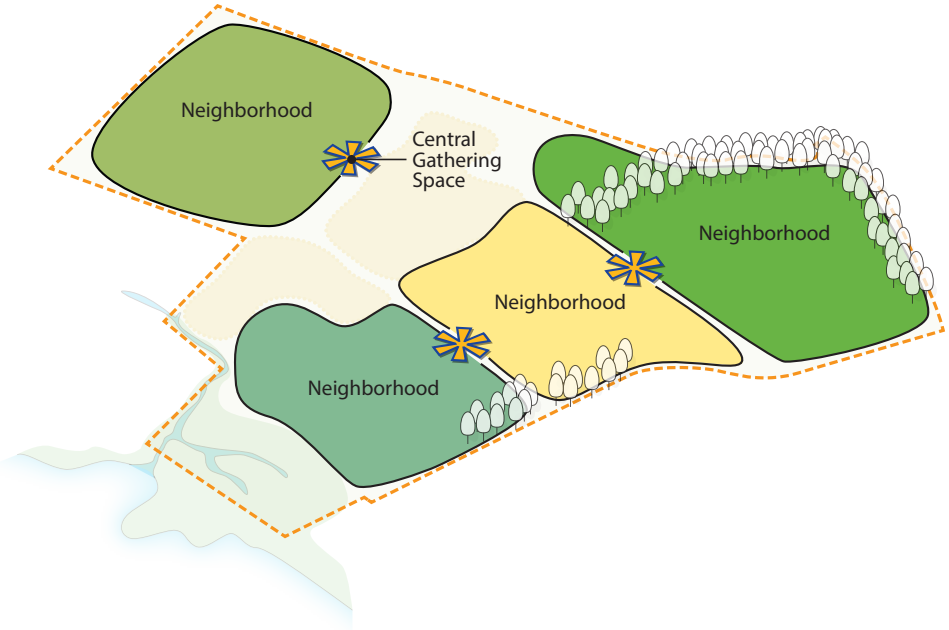
The Richmond Bay Campus will be organized by four distinct "neighborhoods" or groupings of buildings and spaces. The neighborhoods will break down the site into sectors which lend themselves to cohesive planning and development with significant economies of scale for common realm investments. Each neighborhood will be planned and designed to segregate vehicular and pedestrian uses to the extent practicable. Although parking will continue to be provided in surface lots during initial development, ultimately most parking will be structured.

Buildings will generally be oriented on an east-west axis with footprints consistent with research laboratory use that maximize passive solar orientation and minimize heating and cooling requirements. The open spaces between buildings will be configured for protection from prevailing winds. Buildings will be designed to take maximum advantage of the views in all directions.

Each neighborhood may have a unique design theme or aesthetic identity expressed through the prevailing architecture style of the time or plant material, open space, and landscaping design. These characteristics will exhibit the best practices of sustainable development to enforce the living laboratory theme of the campus.

Each neighborhood will have a central space around which concentrations of active uses—dining, meeting rooms, recreation or building lobbies—will be focused. These central spaces may also have an iconic element such as a vertical marker of substantial height, sculpture, fountain, or other landscape element to act as a place-making and orienting device. These spaces will be designed to create a more collegial environment that encourages and facilitates interaction among employees and guests.

The specific configuration and design of new development within these neighborhoods will be guided by the Physical Design Framework and concept plans cooperatively developed by LBNL and UC Berkeley. Both documents will support the goals of this LRDP and address the specific design of buildings, outdoor spaces, and circulation networks.

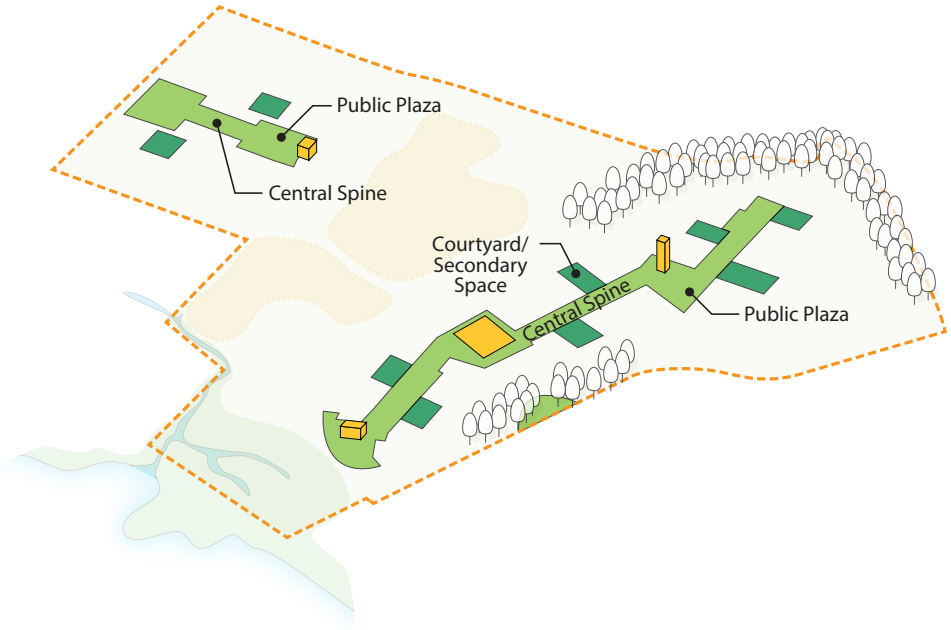


Collaboration and Interaction

Team science and collaboration, hallmarks of LBNL and UC Berkeley from their founding to present day, will be defining characteristics of the research activities to be undertaken at the Richmond Bay Campus. Buildings will be designed to facilitate teamwork, interaction, inspiration, and innovation. The use of lobbies and open stairs; the location of coffee rooms, dining halls, and restrooms; and the configuration of hallways, offices, and conference rooms will be designed to foster casual interactions which initiate important exchange of ideas and inspiration.

The campus will be designed to bring together staff, scientists, and guests from separate buildings to common spaces where they can interact on a daily basis. A north-south linear open space will be the primary pedestrian pathway connecting the central space of each neighborhood on the eastern side of the campus. Active social spaces such as building lobbies, dining venues, and meeting and special event spaces will be located along this central sequence of spaces to enliven the center of the campus. On the western side of the campus, buildings will be organized around a similar east-west open space which will accommodate public events and campus programs.

Additional outdoor collaboration and interaction spaces such as recreation fields, courtyards, and small seating areas will supplement the primary campus spaces to offer a range of choices from large group interaction to a more solitary, contemplative experience. These outdoor areas will be strategically located at major building entry points and along pedestrian routes; and will provide comfortable furnishing, lighting, and other amenities that create safe and comfortable places for collegial interaction.



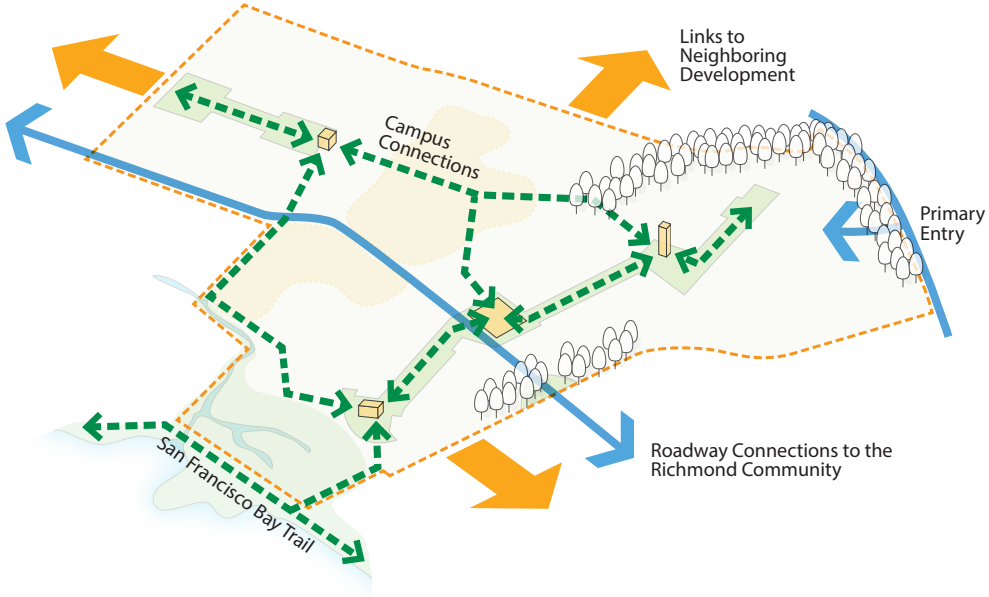
Connections

A diverse constituency will require access to the Richmond Bay Campus. The primary entry for visitors will be provided at a location on the northern edge of the site with the greatest visibility from the regional roadway network. Convenient visitor parking will be provided here and visitors will be able to access all parts of the campus from this point of origin. Parking structures will be distributed to provide for quick pedestrian access to and from campus buildings.

Circulation on campus will take place mainly by bicycle or walking. This emphasis on an auto-free environment will give the site a campus-like quality and minimize the potential for pedestrian and vehicle conflicts. At the same time, numerous pedestrian, bicycle, and vehicular connections to the surrounding community will ensure that the campus is integrated into the surrounding urban fabric.

LBNL and UC Berkeley desire an open and engaged relationship between the campus and the Richmond community. Although the site is currently fenced, as a critical mass of facilities and population is reached, the perimeter fencing will be removed and security will be provided at the building level. As the South Shoreline Area develops into the research hub envisioned by the City of Richmond, connections with adjoining institutions and potential partners will be achieved through thoughtful extensions of the public infrastructure of roads and trails, with an emphasis on creating a multi-modal environment.

Employees at the Richmond Bay Campus will also be patrons of the amenities along the Richmond shoreline. A realigned Lark Drive running east-west through the site will connect to Regatta Boulevard, forming a continuous connection through the Marina Bay area and continuing west to the Ford Assembly Building and proposed ferry landing where commuter service is projected to begin in 2015. Designed to accommodate bicycles, pedestrians and shuttles, this will be a key South Shoreline Area street connecting jobs, housing, and amenities.



Illustrative Development Scenario

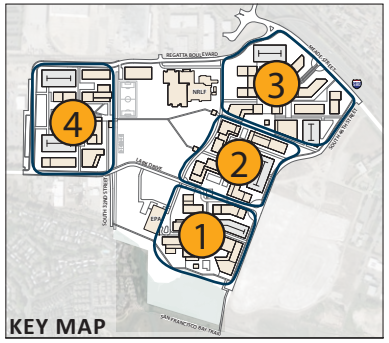
The Illustrative Development Scenario, Figure 4.2, is a conceptual portrayal of the Richmond Bay Campus at full implementation of this 2014 LRDP consistent with its goals, campus program and population projections, and Land Use Plan. The development scenario demonstrates application of the four site planning concepts and is intended to present a reasonable portrayal of the scope and scale of potential development at the Richmond Bay Campus. Its form is based on the assumptions that building configurations will vary and that all building sites will be built out to optimize the site's development capacity. The building footprints allow for typical laboratory configurations. However, it is not possible to accurately forecast the complex series of development opportunities and decisions, including future building locations, sizes, configurations, construction schedules, etc. that will comprise full implementation of the LRDP program. The actual shape and locations of buildings, organizing elements, and overall density is expected to vary as individual projects are approved, funded, and developed in the future. Therefore, the development scenario portrayed in Figure 4.2 is not intended to be a precise representation of the actual development program that will take place over the 40-year planning horizon of the 2014 LRDP.

The development scenario provides the basis for the analysis of environmental impacts due to full implementation of the LRDP program. In addition, the organization of the illustrative plan informs the circulation, open space, and infrastructure element sections which follow.

Table 4.1 shows the breakdown of the proposed building space and population by neighborhood.

Table 4.1: *Projected Building Space and Population by Neighborhood*

	GSF	Population
Neighborhood 1	813,000	1,700
Neighborhood 2	780,000	1,700
Neighborhood 3	1,880,000	4,000
Neighborhood 4	1,284,000	2,800
EPA & NRLF	651,000	70
TOTAL	**5,408,000**	**10,270**



Development Density

New development will realize the potential of the campus in a manner that balances density with an attractive environment. Building heights will vary with lower buildings at the waterfront edge and taller buildings in the northern and western areas of the site. Building size, shape, and finishes will be varied for visual interest on site and views into the campus from off site. Rooftops visible from upslope facilities as well as from beyond the campus will be designed with sensitivity to external viewers as well. Figure 4.2 illustrates a thoughtful approach toward creating an urban fabric that will provide the needed building area while preserving natural features, view corridors, and access to light and air.

Density, measured by the ratio of building floor area to the area of a site (FAR) is an important indicator of development character. The current overall FAR of the Richmond properties is 0.22 considering the existing 1,050,000 gross square feet (gsf) of building space and the proposed 107.4 acres of land use designated Research, Education, and Support. With the occupied building area increase to 5,400,000 gsf projected in this LRDP the Richmond Bay Campus FAR will be 1.15. For reference, the City of Richmond's Business/ Light Industrial General Plan land use designation for adjacent properties allows a density range of 0.25 to 3.0 FAR.

Figure 4.2: *Illustrative Development Scenario*

Land Use Policies

The land use policies that follow support the vision that the Richmond Bay Campus will be a distinctive, attractive and inspirational place to conduct world-class collaborative science.

LU1 **Land Use Policy on Development Capacity: Provide for development of up to 5,400,000 square feet of facilities.**

- Maximize density to reduce overall building footprints, conserve open space, and share attractive views.
- Vary building heights for visual interest on site and views into the campus, with lower buildings at the waterfront edge and taller buildings in the northern and western areas of the site.
- Convey the values of the campus in each phase of development.

LU2 **Land Use Policy on Character: Provide a setting capable of attracting new research programs and retaining world class researchers.**

- Support excellence in building design that is harmonious with the waterfront location and creates visual variety in form and massing. Include iconic structures or buildings on the campus.
- Locate and design buildings, rooftops, open space, and circulation routes to allow for a variety of view corridors within and beyond the campus.
- Create a distinct identity and sense of place by preserving and enhancing the site's assets including the grasslands, marsh, and bayfront areas.

LU3 **Land Use Policy on Inspiration: Facilitate the casual interactions and new awareness of synergistic research which leads to inspiration and innovation through the layout of the campus, provision of amenities, and design of buildings and spaces.**

- Plan initial development to create a critical mass of core facilities and research programs selected to attract future synergistic enterprise.
- Design buildings to include uses such as informal meeting zones, open stairways, light-filled lobbies, and transparent walls which promote the exchange of new ideas.
- Provide amenities such as cafes, sculpture gardens, public art, recreation fields, and outdoor gathering places at multiple scales with weather protection where feasible for casual interaction, contemplation, and community-building activities.
- Develop the campus to become the centerpiece of a vibrant and revitalized South Shoreline Area, serving as a catalyst for additional development on nearby properties.

LU4 **Land Use Policy on Growth: Ensure that the Richmond Bay Campus grows in a logical and cost-effective manner.**

- Retain existing uses on campus for as long as possible and evaluate opportunities to retain or relocate uses on site for the long term.
- Concentrate development to preserve future capacity while maintaining natural areas.
- Create complete collections of buildings and open spaces as development progresses.
- Phase growth to create the critical mass of activities and population needed to support amenities.
- Plan and develop infrastructure to allow logical and cost effective extensions to support future development.
- Implement LRDP provisions for development undertaken by the private sector for synergistic uses by public or private entities.

LU5 **Land Use Policy on Community: The Richmond Bay Campus will be an asset to residents of local East Bay communities.**

- Provide programs and facilities on site that can be used for education and outreach to the local community including an arts program that helps to establish the campus as a visitor destination.
- Support integration of the campus into the Richmond South Shoreline Area; remove peripheral fencing as adequate population is achieved; and consider adjacent uses in decisions on building siting and design.
- Allow convenient multi-mode access to the campus and promote public transit, bicycle, and pedestrian transportation modes.
- Identify Lark Drive and Regatta Boulevard as streets where the public realm will be designed to integrate with the neighboring community fabric.

ACCESS, CIRCULATION AND PARKING

Context

Access to the University's Richmond properties is most conveniently gained by motor vehicle (see Figure 4.3). Two I-580 freeway interchanges, Bayview Avenue and Regatta Boulevard, provide relatively direct access via Meade Street; more indirect access can be gained from the Marina Bay Parkway/23rd Street interchange.

The Richmond Field Station portion of the site currently has one primary entrance from Robin Drive at Seaver Avenue near South 46th Street. The entire Richmond Field Station site is fenced; additional gates are located on South 46th Street and on Regatta Boulevard, but are not currently open on a daily basis. The Regatta site is also fenced; its entrances and parking lots are most conveniently accessed from the north-south portion of Regatta Boulevard. Motor vehicle parking is currently accommodated in surface parking lots distributed throughout both properties with approximately 760 spaces existing in 2013.

Three BART stations are located within three miles of the site: Richmond (which also has an Amtrak station), and El Cerrito del Norte and El Cerrito Plaza (which have AC Transit and other bus system connections). No shuttles currently operate from these stations to the site. A limited number of shuttles run between UC Berkeley and the site on weekdays.

Bicycle access to the site is possible from all directions. The Bay Trail crosses the southern edge of the site and links to the South Shoreline Area and other communities beyond. Access to the City of Richmond in the easterly and northern directions is also convenient via the Bayview Avenue, Regatta Boulevard, and Marina Bay Parkway/23rd Street overpasses. The Bay Trail provides a continuous connection between the site and the cities of Richmond, El Cerrito, Albany, Berkeley and Emeryville, and connections from the Bay Trail, Ohlone Trail, and UC Berkeley will be available in Albany via Buchanan Street.

A ferry terminal is proposed for the South Shoreline near the Ford Assembly Building with a direct commuter service connection to and from San Francisco projected to begin in 2015. This terminal would be less than three miles from the Richmond Bay Campus by motor vehicle or a 15-minute bicycle ride on the Bay Trail.

Figure 4.3: *Regional Access*

Access, Circulation and Parking Development Framework

UC Berkeley and LBNL have successful transit systems and transportation demand management programs which encourage cycling, walking, and transit use; and allow for alternative work schedules, telecommuting, and video conferencing. Appropriate elements of these strategies will be implemented at the Richmond Bay Campus. Convenience and safety in commuting whether by BART, bus, shuttle, ferry, bicycle, walking, or vehicle will support the attraction and retention of the workforce. Connections between the Berkeley and Richmond sites will also be necessary since researchers, faculty, staff and students may often be on multiple sites in a single day.

While the plans for the Richmond Bay Campus emphasize access by bicycle and shuttle transit, the campus will also have a vehicular access framework that serves multiple entry points, facilitates convenient deliveries, and slows traffic to support pedestrian and bicycle safety (see Figure 4.4).

Access

The Richmond Bay Campus will be designed to encourage convenient access from multiple directions for both campus employees and the community. Multiple access points will be developed as follows:

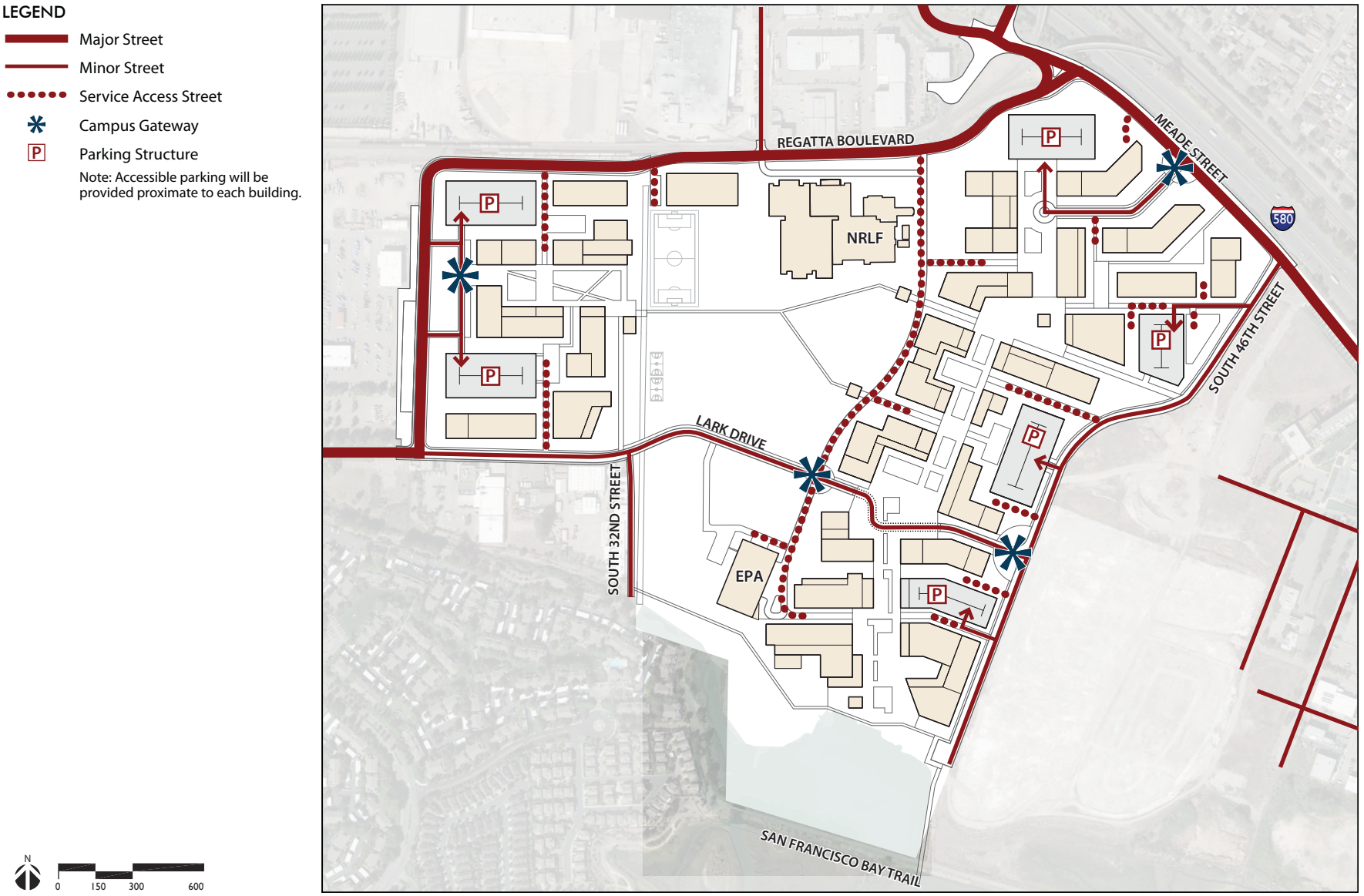
- Visitor arrival points will be located at central, well-defined locations to ensure clarity for infrequent visitors and ease of access to visitor parking.
- Secondary entrances will provide access to perimeter parking structures for campus commuters. These entrances will restrict access to maintain a safe, pedestrian-oriented campus.
- Gateway elements at all entrances will be designed to present a welcoming campus image.
- Service and delivery bays on buildings will generally be located at the perimeter of each neighborhood, when possible, to limit large service vehicle access to the pedestrian-oriented campus.
- The existing access to the Bay Trail will be improved to accommodate an increased volume of bicyclists.

Vehicular Circulation

Improvements will be made to the street system on and adjoining the Richmond Bay Campus (see Figure 4.4) to enhance site access and connectivity with the local community, including the following:

- Regatta Boulevard will be relocated to the western edge of the campus from its current north-south location east of the Regatta Building, in coordination with the City of Richmond Engineering Services Department. The re-routed Regatta Boulevard will intersect at the southwest corner of the campus with an extension of Lark Drive. This reconfiguration will create a contiguous 134-acre site to be developed and managed as the Richmond Bay Campus. The public realm along the re-aligned Regatta Boulevard would be designed to integrate with the neighboring community fabric.
- Lark Drive will pass through the campus approximating its current alignment and extend to Regatta Boulevard at the western edge of the site. On the east side of the campus it will intersect with South 46th Street. Lark Drive will provide an important link to adjoining research and industrial districts to the east as they are developed in the future. It will also be the primary route, together with Regatta Boulevard, to connect the campus workforce with the amenities and services (parks, cafés and restaurants, the ferry landing) along the Marina Bay shoreline to the west. Additionally, it will provide public access into the campus. This street will be designed to calm traffic with elements such as narrow roadway width, intersection treatments (e.g., curve radii), and special paving that prioritize pedestrian and bicycle travel and safety. The open space north of Lark Drive will be physically connected to the open space south of Lark Drive with a culvert under the road to provide safe passage for wildlife. The public realm along Lark Drive will also be designed to integrate with the neighboring community fabric. (see Figures 4.5 and 4.6)
- Peripheral Streets on the borders of the site, such as South 46th Street, will provide access to parking structures and service routes. They will also be part of the larger transit, pedestrian, and bicycle network surrounding and serving the campus. Sidewalks and bicycle lanes will be provided on all peripheral streets.

Figure 4.4: *Vehicular Circulation*



- Service Access Streets will allow maintenance and delivery vehicles to access the service courts of individual buildings (see Figures 4.7 and 4.8). These streets will be accessed from peripheral streets where possible and will extend into the campus as far as loading docks or service entries. Service vehicles will be limited to these specific corridors. The streets will be designed to encourage use by pedestrians and bicycles; general vehicular traffic will be restricted. Along the grassland's eastern perimeter, a service access street will provide maintenance access to the natural areas while serving as a buffer from the active campus uses (see Figure 4.8). Plantings, lighting and signage will be compatible with the adjoining natural areas and typically be located on the developed side of the street.

Figure 4.5: *Section - Lark Drive at Grasslands*

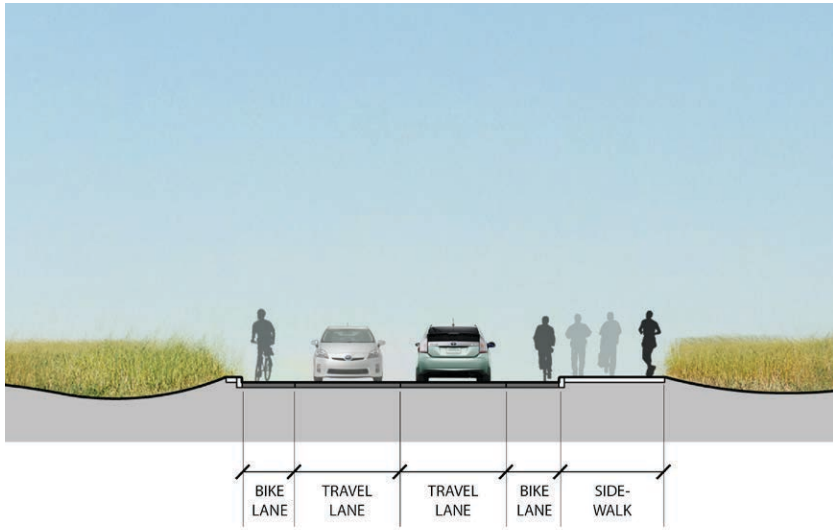
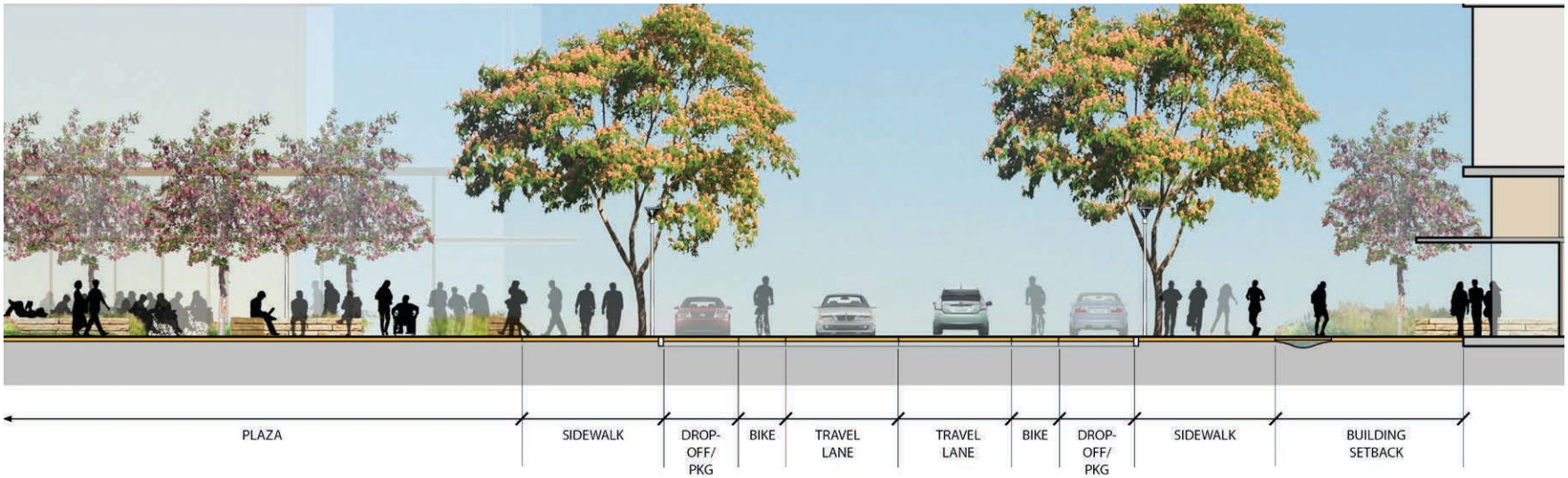


Figure 4.6: *Section - Lark Drive at Central Spine*



4.5 Lark Drive at Grasslands

4.6 Lark Drive at Central Spine

4.7 Service Access Street between Buildings

4.8 Service Access Street at Grasslands Edge

4.9 Central Spine

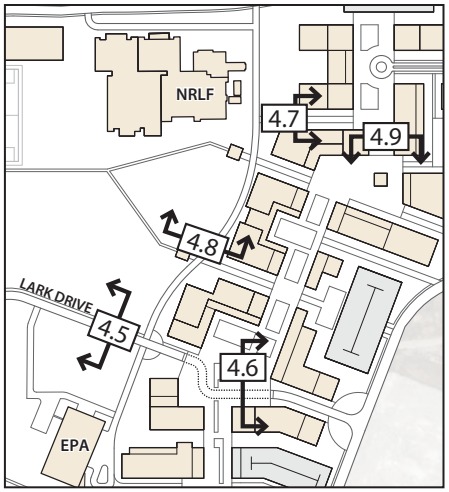


Figure 4.7: *Section - Service Access Street between Buildings*

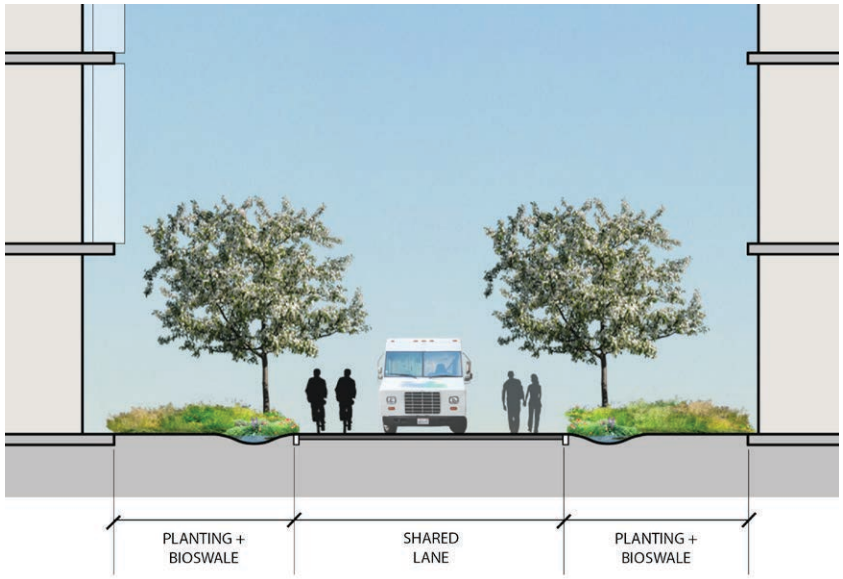
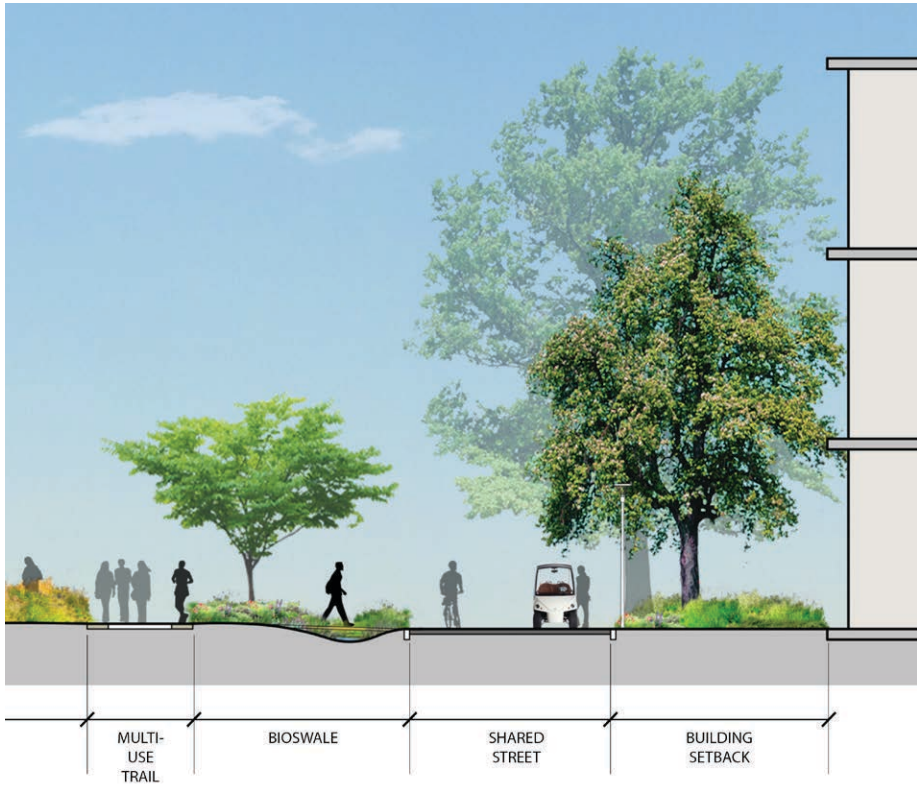


Figure 4.8: *Section - Service Access Street at Grasslands Edge*



Pedestrian and Cycling Circulation

The street network, such as that depicted in the illustrative development scenario, is intended to create a pedestrian-friendly environment with narrow streets and traffic calming features. Pedestrian access will be accommodated virtually unimpeded throughout the campus (see Figure 4.10). A central pedestrian and bicycle spine will extend throughout the three eastern neighborhoods from the visitor entry in the north to the bayfront in the south as well as east-west through the western neighborhood. These spines are intended to be the primary pedestrian orienting and movement passageways for the campus, linking most buildings and users (see Figure 4.9).

The central spine will contain a mix of landscape and built environments with views to the bay, wooded areas, and grasslands; as well as spaces that are protected from channeled southwesterly winds. As a consequence, rather than a single linear space, the central spine will take on different alignments along its length, providing a range of views and sheltered spaces. Areas for stormwater retention will also be incorporated into the central spine and the hardscape will be pervious where practical.

Raised boardwalks will extend across and in some locations around the grasslands and marsh. These will be sited and designed for minimum intrusion into these sensitive areas. They will provide connections between the western and eastern developed areas and also traverse the southern part of the site along the Western Stege Marsh and Meeker Slough. This southern walkway will connect to the proposed Bay Trail staging areas at South 32nd Street and South 46th Street. These trails will be designed in accordance with conservation goals and marked to minimize access into sensitive areas. They will also be accompanied by interpretive signage and other educational elements.

Service access streets throughout the Richmond Bay Campus will be part of the pedestrian network as well. Paving and signage will communicate the

Figure 4.9: *Section - Central Spine*

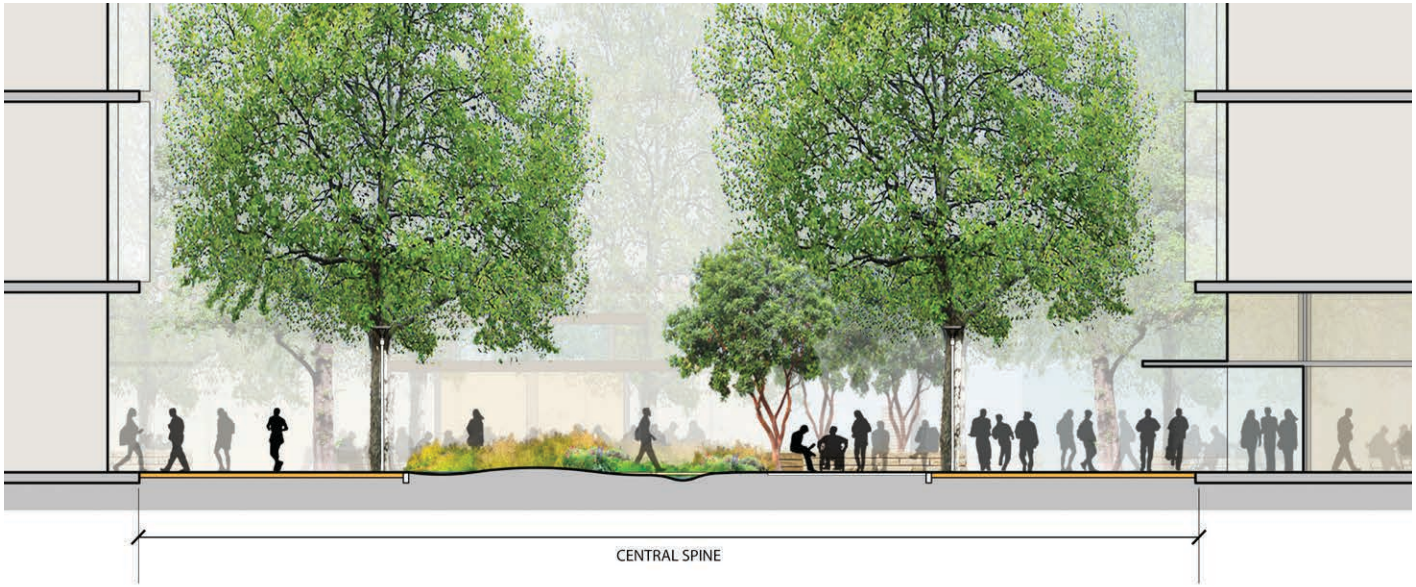
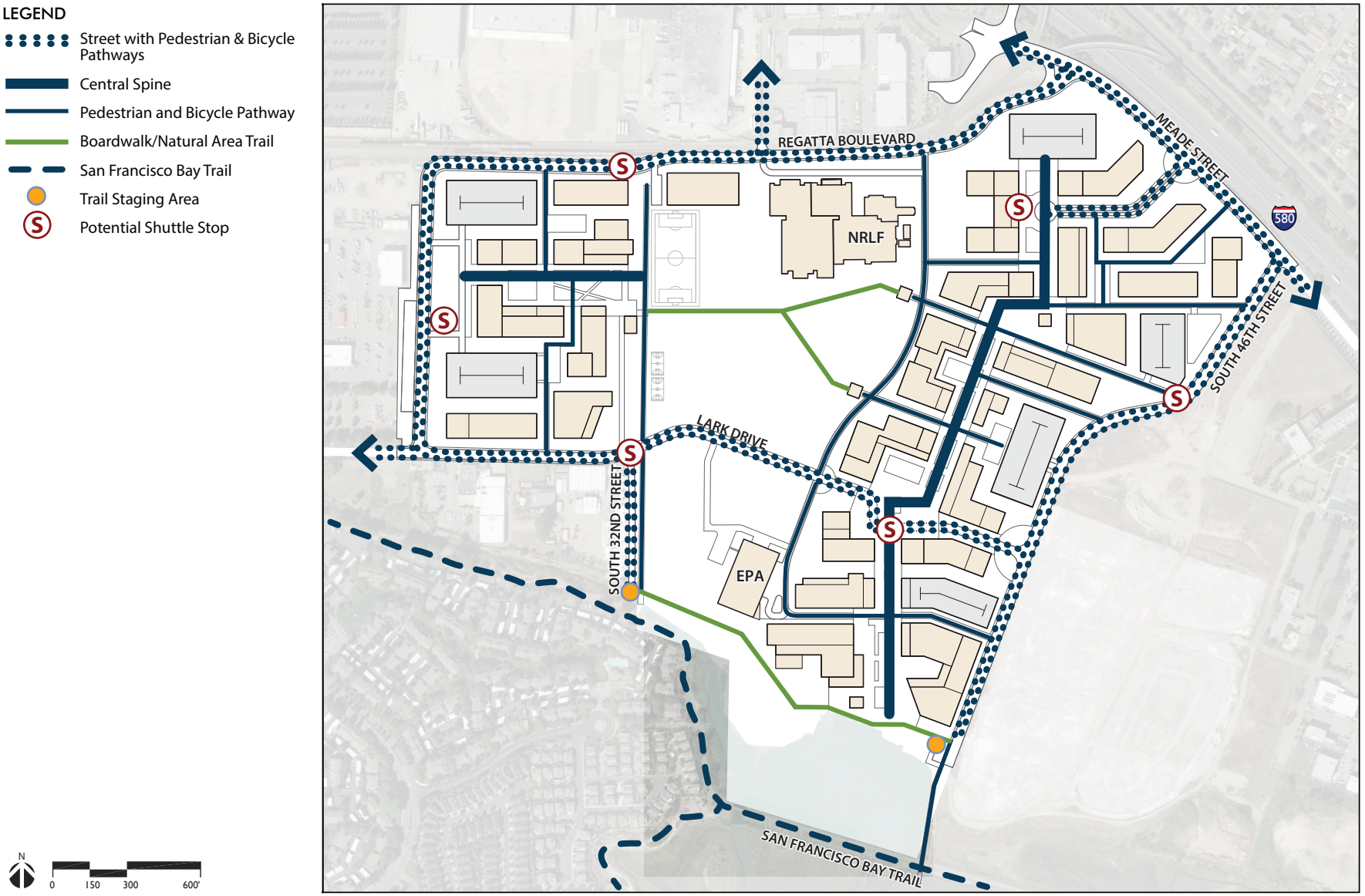


Figure 4.10: *Pedestrian and Cycling Circulation*



shared nature of these corridors. Wherever possible, loading docks and maintenance areas will be located along the neighborhood perimeter to minimize potential conflicts with pedestrians and bicyclists.

The Bay Trail provides convenient access regionally along the bay throughout the Richmond, Albany and Berkeley waterfronts. Direct access from the Bay Trail into the Richmond Bay Campus will make bicycling a viable and convenient commuting option. The bicycle committees at LBNL and UC Berkeley have recommended route improvements for consideration in the City of Richmond's pending circulation plan for the South Shoreline Area. Bicycle access from BART will be similar to the shuttle when factoring in the total time of travel to a specific destination on campus.

On-street bicycle lanes located on Lark Drive, Regatta Boulevard, and South 46th Street will provide bicycle access to campus. Bicyclists will also be permitted to use the shared streets and pedestrian pathways that are otherwise limited to service vehicles and/or pedestrians on campus. All shared pathways will be designed to provide adequate width for safe travel by all modes – typically 12 to 16 feet. If increased bicycle traffic volumes raise concerns for pedestrian safety, measures such as designating bicycle walking zones or separate routes will be implemented. Bicycle parking will be provided throughout the campus in convenient, visible, and secure locations.

Transportation and Parking

As the Richmond Bay Campus grows, development will occur on many of the existing surface parking areas, and new parking will be provided in parking structures. Structured parking is desirable on the campus to maximize building capacity for research and support space dedicated to the campus' mission. Structured parking will also allow for more land to be preserved as open space throughout the campus.

UC Berkeley and LBNL have robust transportation demand management (TDM) plans at their existing campuses, and will use their experience to develop a TDM plan for the Richmond Bay Campus. The goals of the TDM plan will be to create a program that could evolve and adapt as the campus grows, to partner with the City of Richmond and other public or private entities housed at the campus, and to minimize parking demand over the long term.

Parking demand rates per employee, student, or visitor are expected to be higher in the earliest phases, and be reduced as the Richmond Bay Campus matures. The campus "drive-alone" rate is projected to be 50% at full implementation of the LRDP which will result from the implementation of programs such as more robust local transit, shuttles to BART, bikeways, shuttles to UC Berkeley and the main LBNL site, carpooling/rideshare matching services, car share access, and convenient bicycle parking. These programs will ultimately result in a relatively "low traffic, low carbon" condition where the drive-alone rate for the Richmond Bay Campus approximates the current drive-alone rates for the LBNL main site (55%) and UC Berkeley employees and staff (43%).

While these rates are aggressive given that the Richmond location has much less transit access than the Berkeley sites, with opportunities for employees to live nearby, as well as enhanced transit service, shuttles, and improved bicycle and pedestrian access, they are reasonably achievable during the development of the campus. Additional parking will be provided for carpool, visitors, government, University, and vendor vehicles resulting in an overall parking space ratio of approximately 60% relative to the daily population at full implementation of the LRDP.

Table 4.2: *Projected Parking Demand by Neighborhood*

	Parking Demand
Neighborhood 1	1,000
Neighborhood 2	1,000
Neighborhood 3	2,300
Neighborhood 4	1,600
EPA & NRLF	40
TOTAL	**5,940**

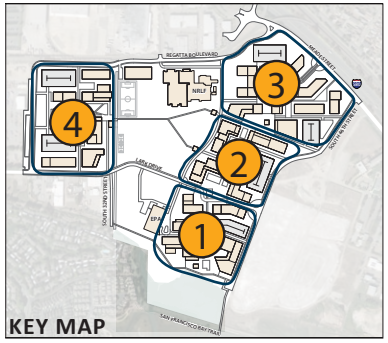


Table 4.2 shows the projected parking demand for the Richmond Bay Campus at full implementation of the LRDP program. Distributed into the "neighborhoods" described earlier, it represents a logical correlation of parking with facilities and population on campus. The minimized parking capacity will help reach sustainability goals by encouraging multiple-occupant vehicle commuting. As shown in the illustrative development scenario, parking structures are intended to be located at the periphery of the campus, leaving the interior free for unconstrained pedestrian movement.

Transit

Convenient access to and from the Richmond Bay Campus by public or privately operated transit will be critical to the success of the campus and will help to minimize vehicle trips and their associated parking needs and greenhouse gas emissions. In the near term, expanded shuttle routes will carry campus employees to and from BART as well as the main UC Berkeley and LBNL sites. Over time, additional shuttles will connect site users to the planned ferry terminal near the Ford Assembly Building as well as to other off-site destinations such as dining establishments and convenience retail in the Marina Bay neighborhood or downtown Richmond.

Shuttle routes and stops will be located throughout the Richmond Bay Campus in locations designed to minimize walking distances to buildings. The on-site shuttle route and stops will be adjusted as required with development phasing. Figure 4.10 illustrates shuttle stops as they might be distributed at full implementation of the LRDP program. Seating and shelter will be provided at each stop and, when possible, stops will be co-located with other on-site activities such as cafes or plazas. Attractively designed shelters will function as wayfinding and placemaking elements on the campus. Shuttle routes will also be indicated with special paving material or finish to assist with navigation and raise awareness of shuttle options.

As additional development takes place on sites surrounding the Richmond Bay Campus, there will be an opportunity to coordinate shuttle routes with other property owners to enhance their viability and efficiency.

Access, Circulation, and Parking Policies

Access and circulation policies in the LRDP support the principles that the Richmond Bay Campus will facilitate sustainable land use and circulation patterns; coordinate planning with the City of Richmond for the South Shoreline Area and maximize connectivity to the surrounding community; be easily accessible from LBNL and UC Berkeley; and fully accommodate all travel modes.

The following four policies will guide Richmond Bay Campus access and circulation with the goal of implementing a comprehensive multimodal transportation plan.

ACP1 **Access and Circulation Policy on Connectivity: Ensure that the Richmond Bay Campus is readily accessible through a variety of transportation modes, including transit (BART, Amtrak, AC Transit, and ferry) and shuttle services as well as bicycle and pedestrian routes.**

- Coordinate connectivity plans with City of Richmond transportation plans for the South Shoreline Area and provide convenient connections to City neighborhoods, one or more BART stations, and commercial areas.
- Work with city, regional, and state authorities to facilitate bicycle and shuttle transportation network improvements between the Richmond Bay Campus and the Berkeley campuses.
- Implement campus shuttle service improvements with initial development and additional improvements as needed for each project implementing the LRDP.
- Provide robust electronic infrastructure to promote virtual connectivity, telecommuting, and remote teleconferencing.
- Facilitate the improvement of connections to transit service, ferry service, and bicycle and pedestrian pathways and provide convenient access between the Richmond Bay Campus and nearby amenities.

ACP2 **Access and Circulation Policy on Sustainable Access: The Richmond Bay Campus will feature and prioritize access to, from, and around the site by sustainable means.**

- Develop a transportation demand management plan to identify strategies for reducing single vehicle trips and encourage travel by other modes. Prioritize convenient access and entries for transit vehicles. Make shuttle use appealing for employees and visitors through frequent scheduling; display real time arrival information at key stops, building lobbies, and over the network; integrate CCTV and/or emergency phones into shuttle stops; and provide network access in shuttle vehicles.
- Target less than 50% of all trips being made to the campus in single occupant vehicles by supporting alternative modes of transport.
- Maximize convenient access for employees and visitors, particularly in early stages of campus development. Manage parking to facilitate travel between the campuses.
- Encourage bicycle use through provision of convenient and secure bicycle parking and maintenance facilities, including showering facilities and changing rooms. Provide bicycle parking for a minimum of 20% of anticipated peak period occupants of new buildings.
- Implement a bicycle sharing program, with bikes to “borrow” at convenient locations in each campus neighborhood, to encourage biking among campus and nearby destinations.
- Ensure shuttles and other modes serving the campus are equipped with racks to carry bicycles and maximize the capacity of the racks.
- Capitalize on sustainable transportation research conducted at the Richmond Bay Campus and elsewhere, implementing new practices and technologies on the site. Support alternative energy and hybrid vehicle use in shuttles, service, and personal vehicles.
- Improve the pedestrian and bicycle connection between the Richmond Bay Campus and the Bay Trail, construct the proposed staging areas for Bay Trail access, and provide appropriate access to open space areas.
- Provide infrastructure to improve sustainability of vehicle-related travel, such as electric charging stations.

ACP3 **Access and Circulation Policy on Pedestrian Priority: Create a pleasant, safe, and convenient pedestrian environment that encourages pedestrian circulation within and around the campus.**

- Design site circulation to separate vehicular traffic from walking areas except on shared service roads.
- Provide safe, attractive, and efficient walking connections between shuttle stops, facilities, and parking.
- Design pedestrian routes to be attractive, interesting, and educational.

ACP4 **Access and Circulation Policy on Parking: Implement convenient parking in a phased, cost-effective manner.**

- Provide accessible and service vehicle parking adjacent to buildings.
- Locate visitor parking to be convenient and easily accessible from primary campus entrances.
- Provide parking in surface lots in the early years of development in the areas of future development sites.
- Provide parking structures as the campus is developed over time to minimize the amount of land devoted to parking.
- Provide limited-time street parking on the segments of Lark Drive and Regatta Boulevard where retail and other amenities are located.

OPEN SPACE AND LANDSCAPE

Context

The Richmond Bay Campus natural landscape links culture with nature and the past with the present. The trees, grasslands, and marsh are well-managed and highly valued for their inherent interest, contribution to local distinctiveness, and artistic inspiration. They provide a range of ecosystem services and heavily influence the character of the site.

The pine and redwood trees along the northern perimeter of the campus provide an attractive visual screen for views of the site from the north. The eucalyptus trees, originally planted as a blast buffer for the legacy explosives manufacturing activities located at the site, now serve as a visual landmark from surrounding areas and provide habitat for a variety of wildlife. However, the eucalyptus trees are not native, are prone to limb breakage, and are a fire hazard.

The coastal terrace prairie grasslands, shown on Fig. 2.4, are a remnant of what was once common in the East Bay. These grasslands provide opportunities for preservation, education, on-site interpretation, and expanding the views of locations beyond the campus.

The Western Stege Marsh at the southern extent of the site has been the focus of ongoing maintenance and restoration. Efforts by UC Berkeley have returned much of the marsh's original habitat value. This waterfront area of the site provides an attractive foreground to long views across the bay from the southern campus neighborhood.

Open Space and Landscape Development Framework

Although over one million square feet of existing facilities currently exist on the Richmond Bay Campus site, it has a feeling of openness rural in nature. The dominant eucalyptus in the north, grasslands in the center, and bay views and marshes in the south inform the character of the usable outdoor space of the site. Each of the four neighborhoods envisioned for the campus has a location within the larger site that provides clues as to how the open space and landscape help to create the campus' identity. The gentle slope of the site toward the south will allow bay views from taller buildings in the north or from the southerly outdoor areas; this slope will also inform site grading and drainage and influence the selection of materials and plantings. The configuration, programming, and design of open space at the campus will support the interactive nature of the research endeavors.

Elements of the Richmond Bay Campus open space development framework include:

- Pathways and Streets
- Gathering Spaces
- Recreation Areas
- Informal Landscape

Figure 4.11 is a diagrammatic illustration of the open space framework.

Pathways and Streets

The streets within the Richmond Bay Campus will provide access around the site for pedestrians, bicyclists, and service vehicles and serve as part of the open space network. Lark Drive will be configured to promote pedestrian and bicycle use and discourage high vehicle speeds. Service access streets will be designed to be comfortable for pedestrians with paving, lighting, and signage that signals to drivers that these are shared by multiple modes.

The central spine will contain a mix of landscape and built environments; courtyards, plazas, paths, and overlooks will all be found along its length. Views will be provided to the bay, wooded areas, and grasslands; and spaces that are protected from channeled southwesterly winds will be created. As a consequence, rather than a single linear space, the central spine will take on different alignments along its length, providing a range of views and sheltered spaces. Areas for stormwater retention will also be incorporated into the central spine and the hardscape will be pervious where practical.

Figure 4.11: *Open Space Framework*

Landscaping and built elements such as street lighting along the urban sections of Lark Drive and Regatta Boulevard might be integrated seamlessly with similar elements located throughout the South Shoreline Area. Views to Marin County will be visible along Lark Drive and a more intimate environment will be developed along Regatta Boulevard. Areas for stormwater retention will also be incorporated into the landscaping.

Gathering Spaces

Diverse gathering spaces, ranging from open areas with high visibility to smaller, intimate spaces will be provided throughout the site. Major spaces or commons will be located along the central spine. All gathering spaces will be designed to provide shelter from inclement weather and sunny places to linger. More intimate spaces like courtyards, alcoves, patios, and other outdoor rooms will accompany each facility and may be fully protected, located within the perimeter of the building, or at an edge opening to the central spine, grasslands, or forest.

Ornamental, non-invasive landscaping will be used to add color and visual interest where high levels of pedestrian or vehicle traffic occurs at the main campus entrances, common areas, and small gathering areas within the developed portions of the site. The developed areas of the campus, corresponding to research clusters, support areas, and parking lots are currently landscaped with a variety of plant materials. This strategy will be continued as aging or outdated facilities are removed and new development occurs.

Recreation Areas

An outdoor recreation area suitable for informal games of basketball or soccer will be located to the east of the western campus neighborhood, providing a significant amenity for the campus that could potentially be used by community members as well. Smaller facilities such as basketball or volleyball courts will also be provided in this area or at locations throughout the site.

Informal Landscape

The Richmond Bay Campus will sit within an informal landscape setting. In addition to the areas designated Natural Open Space, grasslands, trees and other plantings will surround and extend into the developed areas of the campus.

Monitoring and proactive maintenance of the grasslands and marsh, which are threatened by invasive species, will add biological value and promote the visual interest of these areas. Pedestrian access along the Bay Trail and on campus trails will provide additional recreational, interpretive, and contemplative opportunities for campus employees and members of the public.

The pine and redwood trees along the northern perimeter of the campus currently screen the view of the site from the surrounding community and will be maintained -- as their health allows -- for the long term. Additional screening trees will be planted along South 46th Street to filter the views of Richmond Bay Campus buildings from areas at higher elevations. The eucalyptus tree stands will be replaced over time.

Open Space and Landscape Policies

Open space and landscape policies in the LRDP support the principles that the Richmond Bay Campus will be an inspirational and sustainable place; be distinctive and attractive; harmoniously feature the natural assets of the site, including climate, grasslands, and proximity to San Francisco Bay and the Bay Trail; conserve open space and allow access to attractive views; provide practical opportunity for innovation and education in sustainable design; and convey the LRDP values for the campus as a whole during each phase of growth.

The following policies will guide the development of the site's open space and landscape:

OSL1 **Open Space and Landscape Policy on Primacy of Landscape: The landscape of the Richmond Bay Campus, its unique location at the edge of San Francisco Bay, and the coastal prairie grasslands will be protected and featured in the daily experience of the campus.**

- Feature ornamental landscaping at the public realm and entry points to create a more welcoming and vibrant campus; the palette will be selected for non-invasives and with sensitivity to protection of natural open spaces.
- Implement feasible means to effectively remove and stop the spread of invasive species from sensitive marsh and grasslands.
- Establish buffers, setbacks, and procedures to review new plantings in order to protect and enhance coastal plant communities and wildlife habitat on the site.
- Provide visual connections to the bay, surrounding hills, and natural features of the site and incorporate interpretive elements, public art, and signage into the open space areas to create educational opportunities.
- Refer to the site's natural features and employ ecologically-sensitive native plantings in the site's landscape design.

OSL2 **Open Space and Landscape Policy on Interaction: The open space and landscape of the Richmond Bay Campus will create and promote opportunities for interaction.**

- Promote a healthy exchange of ideas by providing easily accessible landscape spaces that encourage formal and informal interaction among researchers, staff, students, and community members.
- Mitigate adverse climate conditions through landscape forms that enhance the comfort of open spaces.

OSL3 **Open Space and Landscape Policy on Sustainability: New landscapes will be consistent with "Bay-friendly" design.**

- Design landscaping that does not rely on irrigation from potable water after an initial establishment period. Specify native species where practical and foster biodiversity which supports and enhances local ecosystems. Coordinate landscape design and maintenance efforts with the surrounding community where possible.

UTILITIES AND INFRASTRUCTURE

Context

The East Bay Municipal Utility District (EBMUD) currently serves the Richmond Field Station with one 8-inch domestic water supply line. The existing utilities include a network of 8, 6, and 4-inch diameter water mains. Two 8-inch fire protection water main lines currently serve the Richmond Field Station. Current irrigation demands are low and are provided through connections to the potable water system.

The Richmond Field Station and Regatta properties are currently served by sanitary sewer mains located at the south and north edges of the site. A 12-inch sanitary sewer main runs along the southern-most edge of the site and connects to a 15-inch main north of the marsh area. Two 24-inch sanitary sewer mains are located at the northernmost portion of the site and connect to a 30-inch main on Regatta Boulevard. Wastewater from the site flows to the City of Richmond's publicly-owned treatment plant, located west of the campus on Canal Boulevard.

Stormwater drainage at the Richmond Field Station currently flows from the north to the south by way of sheet flow, open swales, culverts, and storm drains. The existing stormwater drain system includes two main 24" lines generally located near the eastern and western edges of existing improvements. The eastern main storm drain and a sub-catchment to the east of the EPA building discharge to the transition area north of Western Stege Marsh. The western main storm drain and a sub-catchment to the west of the EPA building discharge to Meeker Slough. The trapezoidal concrete stormwater drain channel conveys runoff from northern neighboring properties and the eastern side of the Regatta property to Meeker Slough. The western side of the Regatta property drains to Meeker Creek near the Marina Bay Parkway.

Pacific Gas and Electric (PG&E) currently provides electrical power to the Richmond Field Station and Regatta properties through multiple overhead 12-kilovolt electrical lines. Both underground and aerial power lines comprise the on-site electrical service infrastructure. PG&E also provides natural gas service to the site through multiple high-pressure gas mains, with underground gas lines serving the larger facilities.

AT&T currently provides communications service to the site with 48 strands of fiber optic cable and 300 pairs of copper wire.

The capacity of this existing site infrastructure is insufficient to support development at the Richmond Bay Campus of the magnitude described in this LRDP. Table 4.3 provides a projection of utility demands and consumption assuming a full LRDP implementation at the site. An entirely new utilities infrastructure will be needed to meet these requirements.

Projected Utility Demand

Projected utilities demands listed in Table 4.3 are based on metered loads of existing facilities housing biosciences programs. The metered data was scaled down for variations in climate, improved building and system design, and consolidation of program functions. The projections are based on the assumption that the majority of the facilities at the campus will have a similar load profile with energy-intensive uses. The intent was to identify the upper limit of utilities consumption for CEQA analysis purposes and provide future land use decision makers with a margin of flexibility in the event a facility such as a high-performance computing center were to be located at the Richmond Bay Campus. These values are not intended to be used to calculate an energy budget for any particular project. With innovative design and compliance with the University's sustainability policies, including those defined in this LRDP, it is expected that the projected demand in 2050 will be significantly lower than the values listed in Table 4.3.

Table 4.3: *Projected Utility Demand*

Utility	Projected Demand (2050)
Potable Water	340 million gallons/year (peak demand – 2,230 gpm)
Firefighting Water	(peak demand – 6,000 gpm)
Wastewater	273 million gallons/year (peak demand – 2,140 gpm)
Chilled Water	12,600 tons of cooling installed
Heating Hot Water	218,400 kBTUs/hour
Electrical energy	142,400 megawatt hours/year (peak demand – 24.7 MW)
Standby Power	peak demand –16 MW (installed capacity –20 MW)
Natural Gas	6,600,000 therms/year (peak demand – 240,300 kBTUs/hour)
Telecommunications	1,000 strands of fiber optic cable and 3,600 pairs of copper wire

Utilities and Infrastructure Development Framework

All new permanent utility lines on the campus will be located underground to minimize maintenance requirements and contribute to the appearance of the campus. New distribution lines and related facilities will be phased with campus development. The Richmond Bay Campus utility infrastructure will consist of the following systems as described in this section:

- Water Supply and Distribution
- Sanitary Sewer System
- Stormwater Drainage
- Electrical Power and Distribution
- Telecommunications
- Natural Gas Distribution
- Heating and Cooling Systems

Water Supply and Distribution

Potable Water

The potable water infrastructure will be expanded and distributed throughout the campus via an interconnected network of mains that connect to EBMUD facilities. Connections will be made in at least two locations for redundancy and to ensure adequate system pressure is maintained throughout the site. A third connection may be necessary depending on final system configuration and available flow and pressure. Figure 4.12 illustrates the general proposed domestic and fire water distribution system.

Sizing of the water distribution infrastructure for future development will be based on the projections shown in Table 4.3. Twelve-inch diameter trunk mains will be required to deliver water to the site. Connections to these trunk mains will be sized to meet localized demands in accordance with development phasing.

Fire Protection Water

The fire protection water system will be distributed throughout the campus and connected to EBMUD facilities with two or more interconnection points to comply with applicable fire codes and provide adequate flow and system redundancy. While the flow rate requirements will vary throughout the site by building type, it is expected that the maximum will be 6,000 gpm, as shown in Table 4.3. The UC Berkeley and LBNL Fire Marshals will confirm system design and capacity as needed during campus development.

Irrigation Water

As the Richmond Bay Campus develops, irrigation water will be required in higher quantities, primarily in the vicinity of proposed buildings to establish new landscaping. A distinct irrigation water network will be developed as a non-potable water system for both interior and exterior uses if recycled water becomes available from the local utility. EBMUD's current recycled water transmission pipeline terminates approximately three miles from the site at the intersection of Buchanan Street and Highway 580 in the City of Albany.

Figure 4.12: *Domestic and Fire Water*

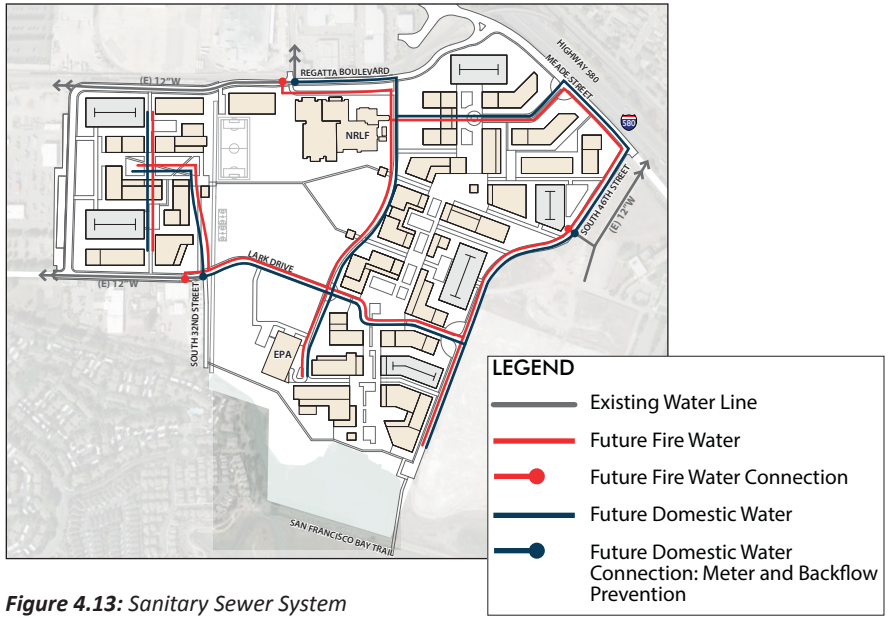


Figure 4.13: *Sanitary Sewer System*

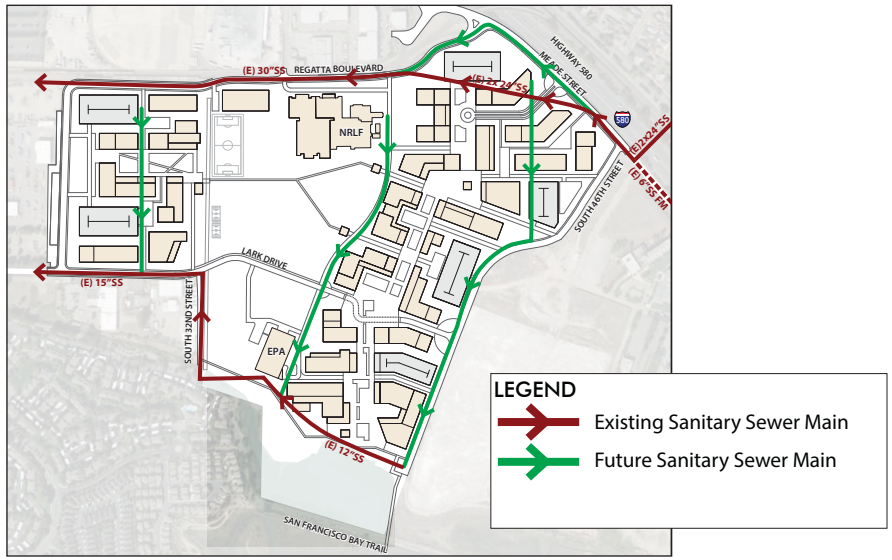
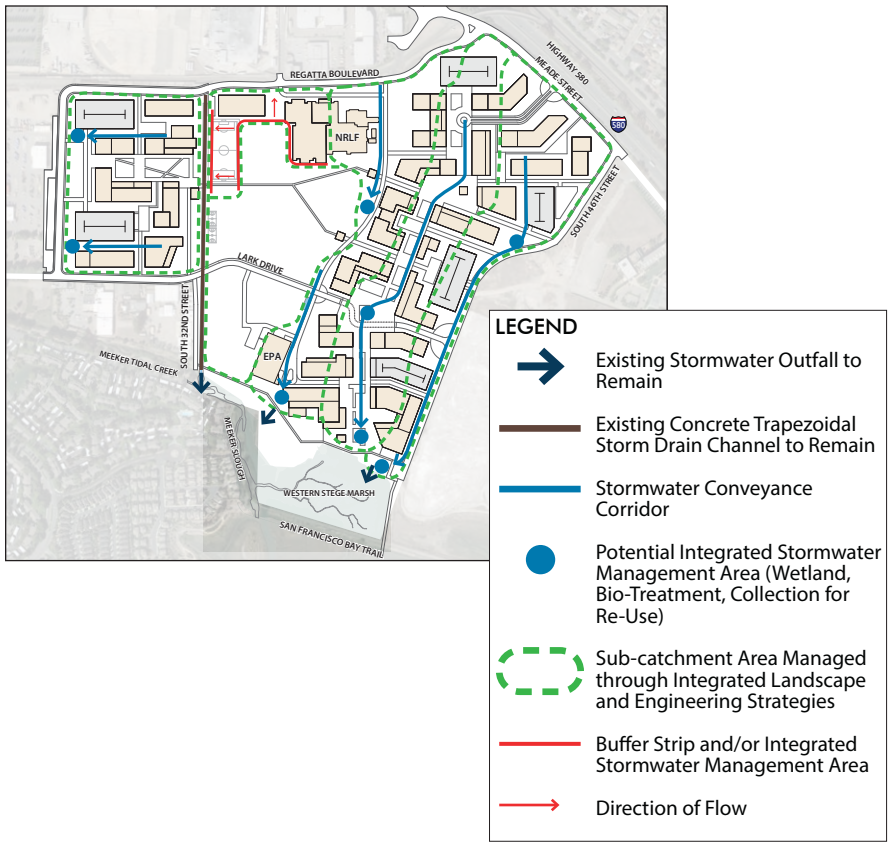


Figure 4.14: *Storm Drainage*



As part of the long-term water supply planning, EBMUD may investigate expanding the existing recycled water infrastructure or constructing a localized satellite facility that utilizes on-site waste and rain water treatment to provide recycled water to the campus. It will be supplied through a separate service connection and metered separately from the potable water system.

Sanitary Sewer System

Future infrastructure development will include a new system of sewer mains and laterals configured to discharge wastewater to the public sewer system through a gravity flow configuration. The system's configuration will be based on generation rates and site topography in relation to the vertical location of the existing public system. The system will primarily flow from north to south following the campus' main circulation elements and topography. The two 24" sewer mains located at the northernmost portion of the site will require realignment due to the proposed changes in the Regatta Boulevard alignment. An estimate of wastewater demand at full development of the LRDP program is included in Table 4.3. Figure 4.13 illustrates the general layout of the proposed sanitary sewer system.

Stormwater Drainage

As the Richmond Bay Campus is developed, additional stormwater quality treatment and source control measures will be implemented to create a sustainable, integrated stormwater management system which minimizes runoff. It is anticipated that stormwater quality discharge permit requirements may include infiltration where practical; evapotranspiration through landscape-based stormwater facilities; as well as capture, treatment, and re-use systems (tanks and ponds supported by treatment and irrigation systems or recycled water systems). Wherever possible, drainage design for future development at the Richmond Bay Campus will utilize low impact surface conveyance solutions to minimize the scope of the underground distribution system. Figure 4.14 illustrates a conceptual storm drainage system for the campus.

Electrical Power Distribution

Electrical power will be provided by suppliers on a competitive, best value, basis which will consider renewable energy, cost, and other factors. A summary of estimated electrical demand at full development of the LRDP program is included in Table 4.3. The sitewide power distribution system will be designed and constructed to meet this demand and ensure reliability, maintainability, and redundancy. The initial phases of development will be served at 12kv; as loads increase there is potential for the campus to be served at 115kv connected to an on-site substation which would feed the sitewide 12kv power distribution system. Figure 4.15 illustrates the general electrical power distribution system routing.

Telecommunications

As the Richmond Bay Campus develops, the telecommunication infrastructure will be upgraded and distributed in an underground loop configuration allowing connection by multiple service providers. The distribution of the new telecommunications network will be routed in the same configuration as the electrical system.

Natural Gas Distribution

With Richmond Bay Campus development, natural gas delivery service will continue to be provided by PG&E. The natural gas will be provided by suppliers on a competitive basis. Projected natural gas demand at full implementation of the LRDP program is included in Table 4.3. Figure 4.16 illustrates the general proposed natural gas distribution system routing.

Heating and Cooling Systems

The proposed campus configuration provides the flexibility to construct either decentralized or central plant heating and cooling facilities to serve each distinct neighborhood. These services could be provided with every building as it is constructed or centralized into one or more central plant facilities. Further, these plants could provide both chilled and condenser water; only condenser water; or include heat recovery chillers providing chilled water and low temperature hot water. An estimate of projected heating and cooling demands for the Richmond Bay Campus at full implementation of the LRDP program is identified in Table 4.3.

Figure 4.15: *Electrical Power Distribution*

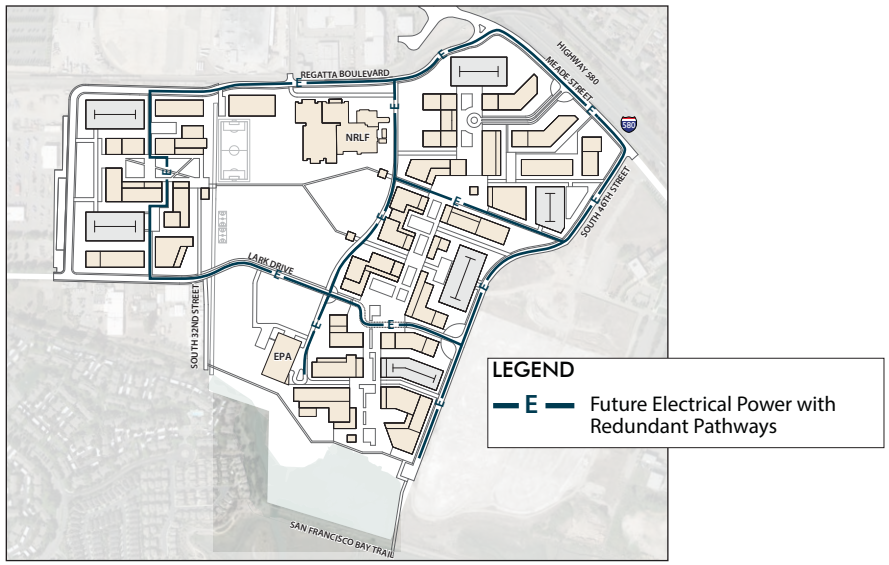
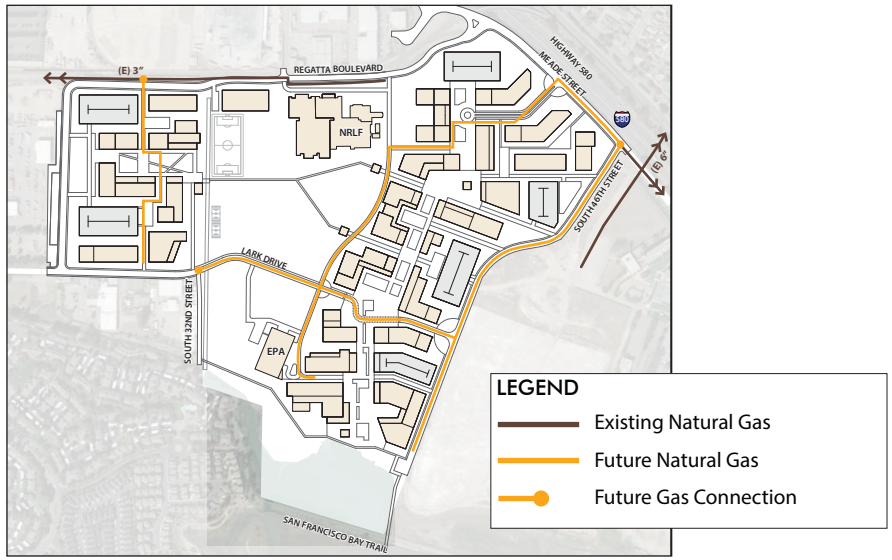


Figure 4.16: *Natural Gas Distribution*



Protection from Sea Level Rise

As described in the section on Sea Level Rise, BCDC projects an increase in sea level of 16" by year 2050 and 55" by year 2100. BCDC guidance states (BCDC, 2009):

> Where shoreline protection is necessary to protect development, it should be constructed to provide protection for a 100-year flood that takes future sea level rise into account. Shoreline protection can be structural, natural, or a combination of both. Choosing the appropriate form of shoreline protection—one that both protects public safety and minimizes ecosystem impacts—is critically important.

The southern-most portion of the Research, Education, and Support area is potentially subject to water inundation by year 2100 due to a 100-year flood taking future sea level rise into account. A variety of options to protect the facilities to be constructed in this area from water inundation will be evaluated. One option is to increase the base elevation of this area from an average of approximately 13 feet above sea level (asl) to a minimum of 15 feet asl. The soil used to increase the base elevation would have a gentle south-facing slope approximating the 17:1 profile south of the EPA building to minimize wave run-up elevation.

The use of natural shore forms to provide erosion and flood control benefits is a potential strategy to adapt to accelerated sea level rise. In addition to increasing the minimum site elevation, a natural shore form such as a beach could be constructed south of the Bay Trail embankment to provide sustainable wave dissipation.

Future development at the Regatta property would also potentially be subject to water inundation by year 2100 due to a 100-year flood, taking future sea level rise into account. Specific protections for development at the Regatta property would be defined, using updated projections, at the time of a proposal to construct one or more facilities at that portion of the campus.

Utilities and Infrastructure Policies

Utilities and infrastructure policies in the LRDP support the principle that the Richmond Bay Campus will provide a robust infrastructure phased over a 40-year period.

Two overarching policies will guide decisions regarding implementation of site utilities:

UI1 **Utilities and Infrastructure Policy on Efficiency: Build a safe, efficient, cost-effective infrastructure.**

- Provide a safe and reliable utility infrastructure capable of supporting the research programs conducted on the campus.
- Design infrastructure in a manner that can be phased over time and provide redundancy as needed.
- Consolidate utility distribution into centralized corridors which primarily coincide with campus streets.

UI2 **Utilities and Infrastructure Policy on Sustainability: Design infrastructure improvements to embody sustainable practices.**

- Design infrastructure to minimize energy use and maximize on-site renewable energy generation.
- Plan infrastructure in a manner that promotes minimal use of potable water.
- Explore and implement measures to use recycled gray or black water on site for non-potable uses such as irrigation and toilet flushing.
- Maintain or restore, to the maximum extent technically and practically feasible, the predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration of stormwater flow.
- Incorporate low impact development strategies in site planning to manage stormwater.
- Protect campus development from 55" of sea level rise through the year 2100 using natural shore forms where practicable; and coordinate closely with the East Bay Regional Park District on maintaining the Bay Trail embankment.

SUSTAINABILITY

Context

UC Berkeley and LBNL are national leaders in sustainability-related scientific research, and they strive to make facilities and infrastructure decisions that result in sustainable operations as well. Each has strong policies and programs in place to address a wide range of sustainability topics ranging from carbon neutrality to waste stream diversion. Each institution continually seeks ways to further improve and expand their comprehensive sustainability programs.

In the last decade, the University of California established a wide-ranging standard for sustainable practices and has become a leader for institutions of its scale. The University adopted the most recent version of the UC Sustainable Practices Policy in August 2011, setting goals to advance environmental practices in key areas. All projects at the Richmond Bay Campus will meet or exceed the goals defined in this, or any future, applicable, sustainability policy. As the current policy notes:

> The University of California is committed to responsible stewardship of resources and to demonstrating leadership in sustainable business practices. The University's campuses should be living laboratories for sustainability, contributing to the research and educational mission of the University, consistent with available funding and safe operational practices.

The City of Richmond has recently adopted a new General Plan which includes an Energy and Climate Change Element that identifies goals and policies in this area. In 2012 Richmond became a partner in a Community Choice Aggregation program, which allows energy purchased from renewable energy sources to be delivered through existing distribution systems, reducing greenhouse gas emissions associated with energy use.

The City of Richmond, LBNL, and UC Berkeley are among the many founding members of the East Bay Green Corridor, a commitment by the mayors of all major cities along the eastern shoreline of San Francisco Bay and the corridor's major university and research institutions to build upon the region's existing strength as a center for emerging green technology, innovation and entrepreneurship.

At the California state level, a planning and regulatory environment has developed alongside compliance activities associated with the Global Warming Solutions Act (AB32).

Sustainability Development Framework

The vision for the Richmond Bay Campus is to become a model of sustainability and environmental stewardship. UC Berkeley and LBNL expect to test and showcase innovations in sustainable design and operations, to educate and inspire staff and visitors, and serve as a living laboratory through which research interests and sustainable facilities operations will align. Living laboratory opportunities will arise from all phases of planning, designing, financing, constructing, and operating the Richmond Bay Campus and span multiple disciplines – scientific research, urban planning, information technology, ecology, business management, and facilities design.

The planning, design, and operations of the Richmond Bay Campus will be subject to standards set by the State of California, the Regents of the University of California, and the Department of Energy, as applicable. Given the role of programs at the campus in performing research and developing technologies directly related to energy and other elements of sustainability policy, development and operations at the Richmond Bay Campus will attempt to exceed these standards.

Development of the Richmond Bay Campus will provide the opportunity to enhance the University of California's stewardship and leadership in critical areas such as energy efficiency; transportation; waste minimization and diversion, stormwater management; climate change and sea level rise; and environmental remediation.

Sustainable measures employed at the Richmond Bay Campus will include energy efficiency, promotion of alternative transportation modes, waste minimization and diversion, and stormwater management.

Sustainability Policies

The sustainability policies below support the vision that the new campus will be a model of sustainability and environmental stewardship. Issues of sustainability are broad in scope and include numerous and diverse stakeholders. Decisions made in planning, design, construction, and operation on the campus therefore have broad reach. While the scope of sustainability is extensive, specific quantitative targets are necessary to motivate and guide implementation. As such, the sustainability policies below cover a wide range of development activities at various levels of detail. These sustainability policies are intended to be consistent with planning related to AB32, as well as regulatory policy placing energy efficiency, demand response, and distributed renewable generation as preferred approaches to meet new energy loads.

S1 **Sustainability Policy on Decision Making: Sustainability choices will be given equal weight with other planning, programming, cost, and design factors for facilitating scientific research and facility operations.**

- Include deliberate steps during early planning, design, and construction to encourage communication and integrated design across all disciplines to identify coordinated, low-cost means to fully satisfy occupant needs with minimized resource use.

S2 **Sustainability Policy on Living Laboratory: The Richmond Bay Campus will be cultivated as a living laboratory, in which planning, operating practices and infrastructure, facilities performance monitoring data, and sustainability goals are leveraged to engage, apply, and strengthen research.**

- Install energy, water and other performance monitoring systems to facilitate efficient use of those resources.
- Develop infrastructure and resources for the campus based on state-of-the-practice research in sustainability fields. Make and prioritize decisions based on scientific research and outcomes and lifecycle costing whenever possible.

S3 **Sustainability Policy on Site Development: Embody environmental stewardship and respect the unique character of the Richmond Bay Campus in site development.**

- Draw on the neighborhood context and prominently feature the natural assets including climate, wetlands, and proximity to the San Francisco Bay and the Bay Trail.
- Actively promote sustainability as a core value at the campus and provide practical opportunities for innovation and education in sustainable design.
- Manage soil contamination as a component of each construction project.
- Control construction dust by implementing the best management practices (BMPs) defined in the BAAQMD CEQA Guidelines.

S4 **Sustainability Policy on Transparency: Operate transparently in sustainability efforts by setting targets, measuring performance, and regularly reporting results.**

- Establish a multi-stakeholder committee that periodically evaluates sustainability goals and progress made towards those goals in a transparent process.
- Make the cost for future flexibility, redundancy, and spare capacity explicit and subject to budgeting processes.

S5 **Sustainability Policy on Energy and Climate: Pursue energy efficiency targets and renewable energy use consistent with leading-edge best practices in mitigating climate change.**

- Develop, track, and pursue energy efficiency goals that include annual consumption and peak demand targets for all buildings and infrastructure.
- Use building orientation and passive design strategies to minimize energy use.
- Maximize on-site generation of renewable energy.
- Purchase grid power from 100% renewable sources where available at reasonable cost.

- Directly address the challenge of high energy use in laboratory research facilities by exploring innovative design and making use of the mild climate at the Richmond Bay Campus site to minimize energy use.
- Develop projections for infrastructure and resources to serve the campus that are measured relative to benchmarks from best practice scenarios.
- Prepare a Climate Action Plan to guide Richmond Bay Campus development and operations and publicly report greenhouse gas emissions using standard protocols.

S6 **Sustainability Policy on Green Building: New construction projects exceeding $5 million will target certification through the US Green Building Council of LEED Gold® at a minimum.**

- In addition to the LEED Gold requirement, laboratory and data center spaces and buildings will be designed to an equivalent "Gold" level using the LBNL Environmental Performance Criteria (EPC) or equivalent rating system for each building type.
- Buildings will be designed to comply with the UC Sustainable Practices Policy, the UC Berkeley Campus Sustainability Plan, the LBNL Policy on Sustainability Standards for New Construction, and any future sustainability policies, as applicable.

S7 **Sustainability Policy on Reduced Total Costs: Plan and manage use of all resources to minimize lifecycle costs.**

- Implement integrated design approaches that manage first costs and minimize life cycle costs for all facility and infrastructure investments.

S8 **Sustainability Policy on Waste Minimization: Waste minimization and diversion planning for the Richmond Bay Campus will target 100% diversion of municipal solid waste to composting and recycling by 2020, while simultaneously minimizing all waste streams.**

- Take advantage of opportunities to minimize the overall amount of material handled either as compost, recycle, or landfill waste identified through ongoing evaluation of activities.
- Apply acquisition policies to minimize waste and environmental impacts.

S9 **Sustainability Policy on Health and Wellness: Richmond Bay Campus development will promote health and wellness of the community - including employees, and visitors – as well as ecosystems associated with the site.**

- The on-campus transportation system will encourage walking and bicycling between buildings on the campus, minimizing the levels of greenhouse gases produced for local travel.
- Provide an outdoor recreation area suitable for physical exercise.
- Provide walkways with signage interpreting the ecological value of the grassland and marsh areas.
- Provide health-conscious food choices at on-site eating amenities.

S10 **Sustainability Policy on Local Connections: The Richmond Bay Campus procurement policies will embody the University's commitment to sustainability and improving the quality of life of citizens in the local communities.**

- Food and other goods and services will be sourced from local growers and vendors to the degree practicable.
- Recognize that potable water is a shared resource that must be conserved though building design, utility and landscape approaches.

SAFETY AND PREPAREDNESS

Context

Both UC Berkeley and LBNL have successful histories of managing safety in research operations. Safety issues are well understood and research is subject to extensive controls which are strictly enforced. The University's safety record has demonstrated a dedicated effort to meet, and in some cases exceed, the standard of compliance set by federal, state, and local regulatory agencies.

The EPA facility at the Richmond Field Station and users of leased space in the Regatta warehouse building are responsible for the management of their safety and materials separately with oversight by appropriate agencies.

The Richmond Bay Campus falls within the jurisdiction of the University of California Police Department (UCPD) which performs all patrol, investigation, crime prevention education, emergency preparedness, and related law enforcement duties for the site. UCPD has mutual aid agreements in place with the City of Richmond Police Department, operates joint patrol programs in the South Shoreline Area, and coordinates efforts at all levels to ensure the effective provision of police services. The site is located within the jurisdiction of the City of Richmond Fire Department.

Safety and Preparedness Development Framework

Preparedness

As occurs at UC Berkeley and LBNL, safety protocols at the Richmond Bay Campus will address the following topics:

- Emergency planning, drills, and exercises
- Self assessment and quality assurance of environmental, health, and safety (EHS) activities
- Hazardous and radioactive materials storage, use, and waste handling
- Fire protection engineering
- Emergency response to fire, medical, and hazardous materials incidents
- Air emission and wastewater discharge controls
- Occupational health and safety
- Seismic events

Site Security

The Richmond Bay Campus is envisioned as an open campus. The security fence currently installed along the site perimeter will be removed once a critical mass of on-site population and enhanced security measures are achieved. Employee work space will be secured within buildings, other portions of buildings will be accessible as needed, and the outdoor areas on the campus will be accessible by all. Community members will be able to frequent on-site businesses such as cafes and use meeting spaces or lecture halls, as well as campus trails. Developed as well as natural areas will be monitored for intrusion or disturbance. Thoughtful placement of building lobbies with good visibility and well-lighted outdoor areas with clear paths of travel to parking or transit services will also contribute to site security.

Hazardous Waste and Radioactive Materials Handling

Activities involving hazardous materials at the Richmond Bay Campus will be subject to numerous federal, state, and local laws and regulations. Chemical reagents, solvents, fuels, paints, cleansers, and pesticides will be used in activities such as laboratory research, building and grounds maintenance, vehicle maintenance, and fine arts. Other hazardous materials, including radioactive and biohazardous materials, will also be used in laboratory research. UC Berkeley and LBNL are committed to creating a safe workplace and ensuring that safe work practices are continually maintained.

Site planning will promote operational safety at the Richmond Bay Campus. Specific truck routes for hazardous material transport will be defined and coordinated with the City of Richmond. Loading docks designed for safe delivery and shipping of hazardous materials will generally be located at the perimeters of the Richmond Bay Campus neighborhoods accessible via service roads

and away from the primary pedestrian central spines. Standby generators will also be located at the perimeters of the neighborhoods and provide backup power to life/safety systems during normal utility power disruptions.

Emergency Services

The closest City of Richmond Fire Station is located on Bayview Avenue approximately one half mile and four minutes away. It is expected that LBNL and UC Berkeley will continue to use local emergency services until fire safety and emergency assessments indicate the need for additional services. Eventually, emergency service equipment and personnel may be housed on the campus.

UCPD operations for the Richmond Field Station are managed from the approximately 1,900 square feet, 60 year-old Building 194. Law enforcement and security assessments may eventually indicate the need for expanding police services, which may necessitate improving or replacing the existing police station. LBNL will retain ultimate responsibility for all security, fire protection, and emergency service requirements for all DOE-funded facilities, assets, and personnel.

Safety and Preparedness Policies

Safety and preparedness policies in the LRDP support the principles that the Richmond Bay Campus will model inclusion and healthy living; allow for addressing contamination in a cost-effective and transparent manner in association with new development; become an open campus; and welcome research partnerships and engagement beyond existing partnerships.

All aspects of Richmond Bay Campus operations will be compliant with applicable state, federal, and local regulations. Two policies will guide decisions addressing safety and emergency preparedness on the Richmond Bay Campus.

SP1 **Safety and Preparedness Policy on Model Programs: Develop model environment, health, and safety programs for the Richmond Bay Campus.**

- Develop comprehensive and effective physical safety, life safety, and emergency service plans to protect the environment, the public, employees, and guests at all times.
- Ensure clear and responsible management of environment, health, and safety programs and services.
- Implement land use controls to prohibit unsafe exposure of workers, visitors, and the surrounding community to environmental contaminants.
- Utilize transparent environment, health, and safety reporting practices.

SP2 **Safety and Preparedness Policy on Inclusion: Ensure that the Richmond Bay Campus contributes to and serves as a resource for the Richmond community.**

- Encourage inclusion with an open campus where security boundaries occur at the building level rather than the campus level to advance the ideals of institutional transparency and mutual trust.
- Enable community access to amenities such as outdoor spaces and meeting facilities to promote a better understanding of the University's mission.
- Expand partnerships with local agencies, including fire and police departments, as well as local neighborhoods to promote understanding and address safety and security concerns of neighbors as well as the campus workforce.

IMPLEMENTATION

Context

The University is committed to continuously delivering innovations in science and technology which address significant problems facing humankind and the environment. Discoveries across a broad range of scientific disciplines promise to advance human knowledge and improve health, environmental protection, and our economy. Research facilities purpose-built to achieve these discoveries will be the key to future global competitiveness. Demand for such facilities at the Richmond Bay Campus will evolve as science and technology advance and national priorities emerge. The long-term success of the campus as a place for state-of-the art research will also depend on the provision of adequate infrastructure, attractive open spaces, efficient services, and amenities.

Implementation Framework

Phasing

In such a dynamic environment, it is impossible to predict the specific types or configurations of new facilities that will be required in the future. Therefore, a strategy has been developed to guide initial development within each neighborhood and assure long-term integrated campus development. The neighborhood development concept ensures that each portion of the campus enjoys a sense of place and fosters cross-organizational interaction. The LRDP provides for flexibility in phasing; adjacent open spaces, pedestrian walkways, landscaping and amenities would be built in parallel with building projects while creating linkages to previously developed parcels. The neighborhood concept allows economies of scale for common realm investments in each phase of development.

The location and configuration of initial development will establish a strong campus identity, a high quality work environment, and a critical mass of people and services as buildings are built and occupied. Temporary surface parking lots will be located adjacent to the first buildings with structured parking eventually to be built as the surface lots become building sites.

The order and pace of neighborhood development will depend on the ongoing needs of each institution as well as third party demand. The Regatta area on the west side of the site will likely be developed last, as it currently contains the highest-density development.

Neighborhood Concept Plans

Implementation of the LRDP will be informed by the preparation of Concept Plans, or detailed planning studies, for each of the four neighborhoods before any new development will be allowed to occur within the neighborhood. Figure 4.17 illustrates one possible demarcation of neighborhoods for which Concept Plans will be prepared. Each Concept Plan will be prepared when UC Berkeley and LBNL have a strong sense of the facilities program to be constructed within the neighborhood. Design criteria and conceptual-level data will be provided in each plan on such topics as:

- location of neighborhood boundaries and entrances from primary corridors and central spines
- location of vehicular circulation and parking; pedestrian, bicycle, and shuttle circulation
- location of buildings, parking structures, shuttle stops, open spaces, landscape zones, areas to be preserved, and setback zones, and stormwater management areas, as well as services and amenities (for example, food services, fitness facilities, etc.)
- location of utility corridors and connections, as well as basic sizing for each system
- sustainability features and Climate Action Plan update
- design elements such as bird-safe building design and wildlife habitat sensitivity
- sources of vibration or electromagnetic radiation
- tsunami, flood, sea level rise, and other hazards

- elements that facilitate linking the neighborhood with existing and/or subsequent development of the adjacent neighborhoods and properties
- supportive detail as necessary, e.g. sections, utility consumption calculations, basic design criteria, wind and solar data, etc.
- mitigation measures to be implemented as defined in applicable environmental impact review documents, and operational procedures to be implemented as defined in applicable regulatory jurisdictional documents
- an implementation schedule and financial strategy for public realm improvements, integrated with the sequence and schedule for construction of individual buildings

Figure 4.17: *Neighborhoods*

Operational Structure

Land use and design process responsibility at the University's Richmond properties currently are held by the UC Berkeley campus, and will continue to be held by UC Berkeley under this LRDP. The UC Berkeley Chancellor will continue to have ultimate operational responsibility and land use authority for the site. The prioritization, planning, review, approval, and implementation process for major capital investments will be consistent with that articulated in the current UC Berkeley LRDP and Capital Financial Plan. However, development of the Richmond Bay Campus will be a cooperative effort of LBNL and UC Berkeley. While the entities have a close existing partnership and both are managed under the auspices of the University of California, the institutions are distinct administrative entities of the University. Upon determination by the Regents to adopt the 2014 LRDP and certify the LRDP EIR, an organizational structure will be established to oversee operations at the Richmond Bay Campus and implement the LRDP, subject to the ultimate administrative control of the UC Berkeley Chancellor.

Some of the facilities developed on the Richmond Bay Campus will be used by LBNL to accomplish the missions and activities assigned and funded by the US Department of Energy (DOE). Some of the existing buildings and new buildings on the site will be occupied by UC Berkeley teaching and research programs. The laws, regulations, and policies that will apply to design and construction of an individual facility will depend on its funding source; and the laws, regulations, and policies that apply to the operation of an individual facility will depend on the organization occupying the facility.

It is expected that facilities primarily occupied by LBNL programs or UC Berkeley programs would be maintained and operated by LBNL or UC Berkeley, respectively. The facilities LBNL will be responsible for will be managed in accordance with applicable policies and federal and state regulations as outlined in the University's contract with the Department of Energy. The facilities UC Berkeley will be responsible for will be managed primarily in accordance with state regulations. New facilities completed by private sector entities will be subject to operational oversight by either LBNL or UC Berkeley, as determined by the LBNL Director and the UC Berkeley Chancellor.

Implementation Policies

All aspects of Richmond Bay Campus development will be compliant with applicable state, federal, and local regulations.

I1 **Implementation Policy on Phasing: Ensure significant initial population influx to support placemaking, a strong campus identity, and a highly functional work environment from the outset and seamlessly integrate future phases of the Richmond Bay Campus.**

- Design each neighborhood to be complete including infrastructure, open spaces, services, and amenities; and part of a coherent and integrated campus.
- Treat land as a valuable resource with facilities configured in a dense manner to allow for development up to the site's capacity with preservation of natural areas.
- Promote community within each neighborhood and offer a variety of environments to the campus workforce.
- Create complete collections of buildings and open spaces prior to developing other areas of the site.
- Capitalize on economies of scale for common realm investments in each neighborhood.
- Design neighborhood infrastructure for compatibility with, and extensions of, site-wide utilities and circulation networks.
- Retain existing programs at the site to the extent possible while the campus develops. Accommodate those with an important relationship to new Richmond Bay Campus programs within new facilities as existing facility sites are redeveloped.

I2 **Implementation Policy on Neighborhood Concept Plans: Develop a Concept Plan for each Richmond Bay Campus neighborhood prior to development within the neighborhood.**

- Each Concept Plan will comply with all UC policies and conform to the Richmond Bay Campus Long Range Development Plan and Physical Design Framework documents.

- Each Concept Plan will be reviewed by the UC Berkeley Design Review Committee and Campus Architect and approved by the Chancellor or the Chancellor's delegate.

I3 **Implementation Policy on Individual Projects: Individual site preparation, utilities infrastructure, building, and other construction projects will follow all LRDP and other applicable policies and procedures.**

- Proposals for individual project development at the Richmond Bay Campus will be reviewed for consistency with the LRDP, its EIR, and any necessary further compliance with CEQA and NEPA.
- All capital projects and related improvements will be reviewed in accordance with UC Berkeley's Design Review process, consistent with the administrative control of the Richmond Bay Campus delegated to the UC Berkeley Chancellor; and consistent with UC Regents policy.
- UC Berkeley's design review process entails initial consultation with staff responsible for compliance with adopted plans, landscape design and physical plant maintenance. As detailed in UC Berkeley's 2020 Long Range Development Plan EIR, project-specific design guidelines are prepared for major new projects, and reviewed with the UC Berkeley Design Review committee, composed of independent design professionals. The UC Berkeley Design Review committee reviews the project during the design phases and makes recommendations to the campus regarding design. Depending on project cost and in accordance with University policy the UC Berkeley Chancellor, UC Board of Regents, or their designee will approve design following a CEQA determination.
- The UC Berkeley Campus Architect will issue a Finding that the project will bear an appropriate share of public realm improvements cost consistent with the Concept Plan and that the improvements will be provided in a timely way.
- The design and construction of capital projects subject to the procurement policies and regulations of the Department of Energy will be managed by LBNL. The design and construction of capital projects subject solely to the procurement policies and regulations of the University of California will be managed by UC Berkeley. The design and construction of 3rd-party capital projects will be managed by either LBNL or UC Berkeley depending on the institution defining the need for the building.
- Capital projects managed by UC Berkeley will be designed and constructed in accordance with the goals and strategies adopted in the UC Berkeley Sustainability Plan. Capital projects managed by LBNL will be designed and constructed in accordance with the LBNL Sustainability Standards for New Construction. All capital projects will be designed and constructed in accordance with the University of California Sustainable Practices Policy.