

**DRAFT**

UNIVERSITY OF CALIFORNIA

**BERKELEY LAB**

**LBNL**

**DESIGN GUIDELINES**



# LBNL DESIGN GUIDELINES

INTRODUCTION

BACKGROUND

1

VISION

2

GUIDELINES

3

# Introduction

The facilities at Lawrence Berkeley National Laboratory (LBNL) have undergone a gradual but steady evolution since ground was broken for its first building in the Berkeley Hills in 1940. This evolution, necessary to adapt to the changes in the Laboratory's scientific endeavors over the years, has been guided by a series of Long Range Development Plans (LRDPs) and master plans which determine the broad uses and development patterns for the Laboratory main site.

This document, the LBNL Design Guidelines, is a companion document to the larger scale and broader focus planning documents such as the Long Range Development Plan. In contrast to these general, public documents, the Design Guidelines Document is meant primarily as an internal tool, providing detailed design directions for planners, architects, and landscape architects who are designing projects for the Laboratory. The Guidelines supplement the LRDP and ensure that the special qualities of Berkeley Lab will be enhanced and preserved.

The Design Guidelines document is intentionally flexible — a living document that is continuously being refined and updated.



Draft 12-15-06

eas are typically dense enough to visually separate the Laboratory from adjacent residential properties and to serve as a transitional element between the Laboratory and more rural surroundings to the east. For this reason, vegetated areas are visually compatible with the larger landscape from off-site viewpoints.

### Views

The Lab is situated near the northeastern perimeter of the UC Berkeley campus in a scenic area that encompasses the Oakland-Berkeley hills and Strawberry and Blackberry Canyons. The hills provide a semi-natural, vegetated open space backdrop to the LBNL hill site. Most areas of the western slopes of these hills are wooded with native stands of oak and California bay or with introduced eucalyptus or conifers. Geographic features, most notably the steep slopes that make up Strawberry Canyon, define the site's visual setting, and stands of tall trees provide cover for the site from most potential viewpoints in the surrounding region.

The LBNL site is intermittently visible from surrounding short-, medium-, and long-range viewpoints. For purposes of analysis in this EIR, short-range views are those from vantage points on the site, with view corridors limited to or across the site; medium-range views are those from public vantage points up to approximately one mile from the hill site boundary; and long-range views are those from public vantage points greater than one mile away from the hill site.

Medium- and long-range viewing opportunities of and across the site are generally not available due to topographic variation and intervening vegetation. Short-range views are generally available only from on-site roadways and parking areas as well as from within Laboratory buildings. Short-range views include the surrounding hillsides, vegetation, and other LBNL buildings. Because LBNL is a controlled-access site, short-range views are observed primarily by Lab employees and authorized visitors. There are limited opportunities for short-range public views of the site, except for views from locations at the Lawrence Hall of Science upslope from the LBNL site.

The LBNL site is visible in medium-range views from nearby elevated off-site locations, including residential neighborhoods to the north and northwest in the city of Berkeley, such as from Parnassus Road and Hilgard Avenue, and Le Conte Avenue and Ridge Road in the North Side or "Seminary Hill" neighborhood. Nearby and adjacent buildings include several office and research buildings associated with LBNL's Central Research and Administration Area (Buildings 50,

50A-F, 70, 70A) as well as several small office buildings and trailers (Buildings 65, 65A, 65B). Many buildings, walkways, and landscaped areas within the Central Research and Administration Area offer dramatic long-range views of the adjacent communities, San Francisco, and the Bay.

Long-range views of the site are available from locations in downtown Berkeley and from points farther west, such as the Berkeley Marina. Long-range views within the LBNL site are available from locations along north-south axis streets such as Cyclotron Road, from locations with higher elevations to the east of the site along East Road, and from traffic turnouts. These vantage points afford views westward toward the Bay of historic landmarks such as the Golden Gate Bridge and Alcatraz Island, as well as the urban landscape of the adjacent Berkeley and UC campus development.

Due to the site's considerable size and the intervention of buildings, vegetation, and geographical features, the entire LBNL site – or even the majority of the site – is not visible from any single viewpoint (except from overhead by aircraft).



# Background

## Location and Landform

The Berkeley Lab main site is located on the steeply sloping hillsides of the Oakland-Berkeley hills. The steep topography rises from an elevation of approximately 500 feet near the main visitor entrance at the Blackberry Canyon Gate to approximately 1,100 feet near Building 71 at the northern border of the hill site.

Because of its varied topography and upland location, the LBNL site was constructed as a series of buildings clustered together on interlinked terraces, separated by rustic landscaped areas. Permanent buildings are generally located adjacent to surface parking lots; temporary one-story trailers are often located between the site's permanent buildings and on-site roadways. The steep topography of the LBNL site influences its visual character by separating structures vertically, and it reinforces the clustered pattern of development. Buildings located quite close together in plan (overhead) view are seen as discrete elements in the landscape in mid- and long-range views of the site.

## Land Use and Building Design

The Berkeley Lab main site is occupied by roughly 110 conventionally constructed buildings, along with approximately 90 on-site trailers, utility buildings, and other miscellaneous structures. The greatest density of both on-site development and activity is concentrated in two adjoining clusters: the Blackberry Cluster which includes the Building 50 complex, and the Charter Hill Cluster, which includes the Advanced Light Source (Building 6), also known as “Old Town.” With the exception of the eight-story Building 50 complex, the majority of the Laboratory's buildings range in height from one to four stories, with taller buildings stepped into the hillside, reducing apparent building height. Other areas on the hilltop site, such as the Life Sciences Cluster in the eastern portion of LBNL near the Strawberry Canyon Gate on Centennial Drive, are less densely developed.

The visual character of LBNL's built environment is eclectic. Most buildings display an industrial look and utilitarian quality due to the type of building materials (e.g., poured-in-place concrete, corrugated metal siding, etc.) and the visible mechanical equipment (exposed pipes, vents, panels, and tanks) related to the activities occurring in the buildings. Most of the Laboratory's buildings are painted in neutral colors (grey, beige) to blend with the natural setting. Some of the site's newer buildings are painted in livelier colors (light green, powder blue), such as Building 84 in the Life Sciences Cluster near the eastern edge of the main

site. A few Berkeley Lab buildings are recognizable landmarks, including Building 50 and the Advanced Light Source, both of which are visible from off-site locations. However, eucalyptus and pine trees along with oak and bay laurel are interspersed throughout the site and adjoining areas; these trees contribute to screening of many views to the site from the UC Berkeley campus and from adjacent streets and neighborhoods. Nevertheless, current views of the Laboratory from nearby areas are not of pristine natural settings, even where trees predominate. Instead, human intrusion is widespread, with evidence of built forms—buildings; roadways, sidewalks, and hillside stairways; bus shelters; fencing; signage; and streetlights and other utilities—nearly omnipresent.

Much of the built environment on the hilltop site lacks a strong overall sense of visual hierarchy. Most structures were historically built on an “as-needed” basis and are generally not related in ways that support interaction or optimal use of the developed areas. Permanent buildings are typically connected directly to parking areas, and many contain little (or no) open space to buffer pedestrian entrances from adjacent surface parking or other temporary structures. With the exception of painted numbers on the sides of most of the buildings, the majority of the Laboratory's buildings are not identified with highly noticeable signage to indicate the building's name or function, as might be typically found with commercial or publicly accessible institutional buildings. Temporary buildings and trailers are often indistinguishable from each other and provide limited visual interest. Many of the site's pathways and gathering areas encroach on service areas, loading zones, parking, and utility corridors, which detract from a cohesive image of the Laboratory site.

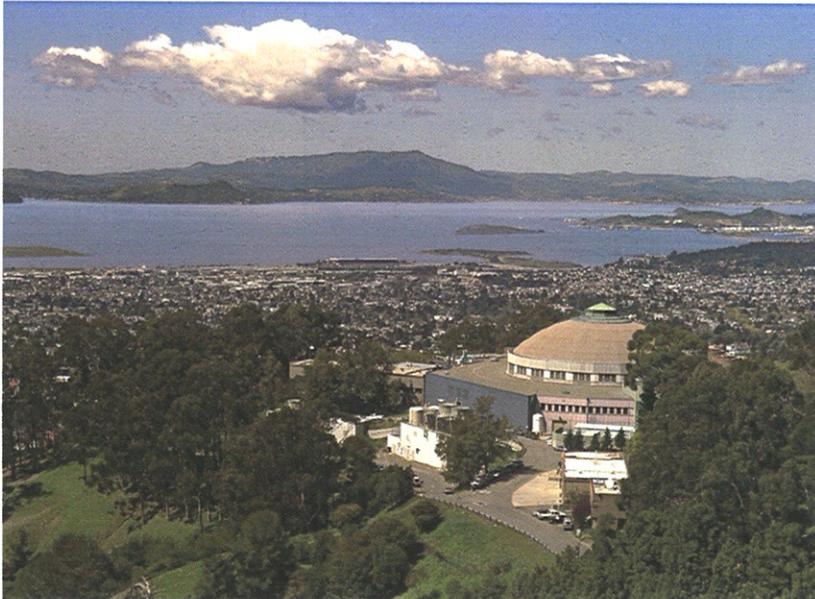
## Vegetation

Annual grasses are the dominant vegetation type on the main site, extending over about one-third of the site. Eucalyptus is the predominant tree, with more than 10 percent of the site covered by stands of blue gum eucalyptus, planted here as elsewhere in the Oakland-Berkeley hills beginning in the late 1800s. More than 25 acres of the site are covered by wooded areas that support coast live oak, California bay, and big-leaf maple trees, and another approximately 7 acres are planted with coast redwood, Monterey pine, Torrey pine, and Canary Island pine. The large areas of native and non-native trees and shrubs give the Lab an aesthetic that is sometimes described as “buildings in nature,” as the site structures are, for the most part, scattered amid trees and other vegetation. Although the Laboratory manages on-site vegetation to reduce the risk of wildland fire, vegetated ar-

# Vision

## Site and Facilities Vision

Berkeley Lab has historically met the needs of its scientific initiatives by constructing durable, purpose-built structures that exist in relative isolation from each other. Recent trends in science have created a need for facilities that support and encourage collaboration between researchers across multiple disciplines. This need, along with a general desire to renew and refresh the atmosphere of the Laboratory, has led to a new Vision for Berkeley Lab's facilities that will, over time, evolve the Laboratory into a more pedestrian-focused environment with greater emphasis on collaboration and interaction. This Vision, articulated in the 2006 LRDP but repeated here for emphasis, is built on four principles inspired by the special qualities of the Laboratory setting. These principles are the foundation of the site and facilities vision to make Berkeley Lab "An outstanding place to do world-class science."



*Preserve and enhance the environmental qualities of the site as a model of resource conservation and environmental stewardship.*

As a leader in energy and environmental research and the stewards of this extraordinary site, the Laboratory has an opportunity and responsibility with each new project to be a model for environmentally responsible development. Construction of new facilities will take place on land within already developed areas of the site to allow undisturbed open space to remain at the site's perimeter. Sensitive habitats and riparian areas are protected and stands of screening trees will be expanded to screen views of Laboratory buildings from all directions.

New buildings will meet or exceed the UC Presidential Policy for Green Building Design. Whenever possible, new building elements and/or design strategies developed by University of California researchers will be showcased in new projects as a way to reinforce a "culture of sustainability" at Berkeley Lab. All of this will be done in a way that enriches the unique place that is Berkeley Lab.

*Build a safe, efficient, cost-effective scientific infrastructure capable of long-term support to evolving scientific missions.*

Life safety is a top priority at Berkeley Lab. New facilities will provide state of the art protection against potential occupational hazards and will address the two natural hazards common to the East Bay region—wildland fires and seismic activity. Future development and landscape improvements will continue and strengthen the Laboratory's existing fire protection and vegetation management strategies that have served as a model to the region. The replacement of older facilities with new ones built to modern life safety standards will significantly reduce the threat to life safety in the event of fire and earthquakes as well as the potential occupational hazards of scientific research.

The efficient, long-term operation of a research institution where scientific needs are constantly changing is a challenge that demands a high degree of flexibility in the way new projects are planned and designed. Accordingly, the Plan provides the flexibility needed to meet both known and unforeseen programmatic needs in a cost effective way without compromising the environmental assets of the site.

Operational efficiency is also strengthened by bringing researchers and their programs closer together. Whenever possible, new projects will be located in close proximity to facilities with common activities and/or related research interests to capitalize on the benefits of collaboration and shared use of specialized equipment and facilities.

*Build a more campus-like research environment.*

Berkeley Lab's scientific endeavors rely on the healthy exchange of ideas sustained through formal and informal social interaction among scientists, engineers, students, and support staff. To build an environment that fosters this valuable social interaction, the design of new Laboratory projects will draw inspiration from university campus type settings. Future development at the Laboratory will place an emphasis on the pedestrian experience both indoors and outdoors to create a setting conducive to interaction and collaboration.

New projects will be planned to segregate pedestrian and vehicular circulation. Buildings, built at greater densities than they are now, will better define outdoor spaces between them. Future development will build upon the informal character of the Laboratory and lead it in a direction where buildings are not thought of as individual objects, but work in concert to weave the Laboratory site into a coherent whole.

*Improve access and connections to enhance scientific and academic collaboration and interaction.*

As the Laboratory takes on new challenges it will increasingly rely on the rapid innovation that emerges from interdisciplinary collaboration. Whether at the scale of individual researchers, or a consortium of public and private institutions working together, clear and convenient access to and around the Laboratory is vital to the work and culture of team science at Berkeley Lab.

The Laboratory is committed to providing access in the safest, most environmentally responsible way possible. In 2006 nearly half of the Laboratory's adjusted daily population commuted to the main site on its shuttle system which has connections to UC Berkeley and regional mass transit systems. New and improved pedestrian routes will provide safe and direct linkages between onsite shuttle stops, facilities, and parking. The improved walkways will offer an outdoor amenity that not only provides a sense of connection to the natural setting and views, but also promotes chance meetings along the way.

**Conceptual Development Framework:**

The Development Framework defines the rationale for where and how new development should occur within the zones defined in the Land Use Plan, and provides a means to implement these six strategies:

- Increase development densities within areas corresponding to existing clusters of development to preserve open space, and enhance operational efficiencies and access
- To the extent possible, site new projects to replace existing outdated facilities and ensure the best use of limited land resources
- To the extent possible, site new projects adjacent to existing development where existing utility and access infrastructure may be utilized
- Create a more "collegial" environment that encourages and facilitates interaction among the variety of Berkeley Lab employees and guests
- Site and design new facilities in accordance with UC Presidential Policy for Green Building Design to reduce energy, water, and material consumption and provide improved occupant health, comfort, and productivity
- Exhibit the best practices of modern sustainable development in new projects as a way to foster a greater appreciation of sustainable practices at the Laboratory

# Vision

The Development Framework has four components: research clusters, outdoor use areas (cluster commons), linkages among research clusters, and the Central Commons.

## *Research Clusters*

Future development at Berkeley Lab will build upon and strengthen the existing hillside cluster development pattern to create a more campus-like setting that reflects its unique site and functional needs. The main site is organized into six “research clusters” defined by major topographic features encompassing research functions that share common needs and interests. One “service cluster” provides a central location for facilities and shipping/receiving operations.

A network of pedestrian paths links these clusters to the “Central Commons” area that serves as the social heart of the Laboratory. The Central Commons and pedestrian pathways are essential elements of the Laboratory’s functional and experiential qualities and are discussed in further detail on the pages that follow.

Most new buildings will be located on infill sites and/or adjacent to existing facilities, resulting in a higher density of development within each cluster, improving operational efficiencies and creating a more collegial setting. These new facilities will also be planned and designed to segregate vehicular and pedestrian uses. Spaces for vehicular circulation, parking, deliveries, and service activities will be located at the perimeter of each research cluster. Outdoor spaces for pedestrian uses will be located towards the center of these clusters, in spaces formally defined by the edges of new and existing buildings.

## *Cluster Commons*

Within each research cluster at the Laboratory, improvements will be made to the outdoor areas at their centers. These outdoor areas, many of which are currently occupied by surface parking, temporary buildings, or service fixtures, will be transformed into small quads or plazas as might be found on a university campus. These outdoor areas, furnished with benches, lighting and other amenities will provide informal venues for discussion, relaxation or meals. Located at the front doors of adjoining facilities and on pedestrian routes linking parking and other clusters, these areas will be opportunities for interaction for Laboratory researchers and guests.

## *Pedestrian Linkages among Research Clusters*

The network of major pedestrian routes through the Laboratory is important, not just for ease of circulation and wayfinding, but also as a means for interaction, as seeing one’s colleagues outside the workplace is an important means to share insights and generate new ideas. These pathways between neighborhoods will be improved where already existing and added where needed. In addition, the path between the Laboratory and the Berkeley campus will be improved. Improvements may include better lighting, paving, seating and other amenities.

## *Central Commons*

The area around the Cafeteria presently serves as an important hub for Laboratory activity and will be further improved to become the Central Commons. Like a traditional campus quad, this social heart of the Laboratory will be developed into the place where the primary eating, meeting, and event activities take place. To support these uses, additional usable outdoor areas will be provided, furnished with pedestrian-scaled lighting and seating, protected from wind but taking advantage of views and providing areas of sun and shade. All of the important pedestrian circulation pathways will lead to this area, and it will be well-served by the shuttle system and by a comprehensive signage and wayfinding system.



# Design Guidelines

The Design Guidelines are divided into five major categories, as follows:

- A. The Land, Topography, and Views
- B. Research Clusters
- C. Linkages
- D. Building Specific Guidelines
- E. Cluster Planning Diagrams

The Guidelines are grouped according to these broad conceptual categories rather than by discipline to encourage designers to think cohesively and integrally about the design of projects in concert with all disciplines, rather than within the narrow vision of their individual disciplines.

There is not an individual category here for sustainability. Designers are expected to follow the UC Board of Regents Green Building Policy and Clean Energy Standard, which is not duplicated here; however, many of the individual guidelines are related to sustainability, and are dispersed throughout the document.

## A. The Land, Topography and Views

Berkeley Lab's character is defined by its physical setting – the landscape, the spectacular views, and the pervasive topography – as well as by the no-nonsense, industrial character of the historic buildings and support structures. An overarching goal of these guidelines is to preserve the unique character of this historic and scientifically important place while improving its physical condition through new development.

The park-like setting—of woodlands with a clear under story, grassy hillsides, trails and landscaped outdoor use areas—is a defining characteristic of Berkeley Lab. The intent of the guidelines is to maintain and enhance the natural assets that contribute to this special setting. These guidelines ensure new landscape features will contribute to the integration of new development into the Berkeley Hills setting by minimizing visibility and reducing impacts to the site's natural resources. Furthermore, the landscape design elements will play a central role in establishing a unified image for the laboratory that will support orientation and the overall experience at the Laboratory.

### Landscape Zones

The landscape of the Lab is divided conceptually into five broad categories, as defined in the LRDP: Screening Trees, the Rustic Landscape, the Rustic Riparian Landscape, The Ornamental Landscape, and the Significant Ornamental Landscape (see Landscape Framework Plan). Design guidelines vary for each of these zones.

*Objective: Provide screening landscape elements to visually screen large buildings*

The large stands of screening trees at the Lab provide critical visual screening of facilities and operations. Tree stands that provide important visual screening, as well as zones identified for new stands of trees, have been identified in the LRDP.

- Whenever possible new plantings will be introduced to provide visual screening for future building sites, where shown on the LRDP Landscape Framework Map.
- Every effort to preserve important screening trees (as identified) will be taken when siting new facilities. In the event that screening trees must be removed for new projects, new plantings of a species with adequate density, height and life-span will be strategically located as to provide visual screening of new and existing facilities.

*Objective: Projects or portions of projects which fall within the Rustic Landscape zones identified on the LRDP Landscape Framework Plan shall provide new plantings consistent with this zone.*

The Rustic Landscape is the natural setting of the Oakland and Berkeley Hills within which the Lab as a whole is situated. This landscape zone forms an important perimeter buffer for the Lab as well as dividing belts between Research Clusters.

- Plant palettes for new plantings within the Rustic Landscape Zone shall be of species native to the bay area coastal range. The plant material should be drought tolerant, non-invasive and low maintenance.



*Objective: Projects or portions of projects which fall within the Rustic Riparian Landscape zones identified on the LRDP Landscape Framework Plan shall provide new plantings consistent with this zone.*

The Rustic Riparian Landscape is those portions of the Rustic Landscape that have riparian habitats. These areas are identified on the LRDP Landscape Framework Plan and are in many cases protected from development.

- Plant palettes for new plantings within the Rustic Riparian Landscape Zone shall be of species native to the bay area coastal range. The plant material should be drought tolerant, non-invasive and low maintenance.



*Objective: When new plantings are provided within the Ornamental Landscape zones identified on the LRDP Landscape Framework Plan, they shall be appropriate to the zone.*

The Ornamental landscape zones at the Laboratory are the areas of landscaping in and immediately around the Research Cluster development areas. Here a more ornamental palette of plantings can be used that is intentionally distinct from the Rustic Landscape.

- Plant Palettes within the Ornamental Planting Zones shall consist of ornamental trees, shrubs, and groundcovers planted within the commons area and in visual proximity to pedestrian walkways and parking lots.
- A comprehensive planting plan will assign a unique palate to each developed cluster and special places like Laboratory entries and the Cafeteria Commons. The planting plan is intended to provide enhancements for the grounds, visual screening and orientation.



*Objective: Provide a special feeling of arrival at Significant Ornamental Zones using distinctive landscape plantings and elements*

A handful of areas at the Lab have been identified as locations where significant, special planting and landscape treatments should occur, including the entrances to the Lab and the two major public commons spaces (see LRDP).

- Plantings and landscape treatments within the Significant Ornamental Zones shall be of a special, highly-designed nature.



### Common Landscape Elements

*Objective: Create a cohesive identity across the Lab as a whole by following established precedents for new landscape elements*

- Landscape elements common across the Laboratory such as signage, lighting, outdoor furniture, fencing and visual screening shall be designed to provide a cohesive identity across the laboratory.
- To improve orientation and way-finding, site-wide design themes for landscape elements may vary to express the identity of each Research Cluster.
- Special attention will be given to environmental art installations across the Laboratory site. Installations will enhance the experience of the Laboratory while providing practical assets that screen views to service areas, enhance wayfinding, and provide walkway and retention structures.

*Objective: Provide appropriate Site Lighting for safety and security*

- For all new projects lighting of streets and parking lots will provide the necessary light levels to ensure safety and security while limiting impacts to the neighboring land uses.
- Pathway lighting will only be located on pedestrian spines connecting major commons areas and within commons areas. Use low height bollards of a design compatible with landscape design themes.
- Unique lighting treatments should be provided in selected areas of the site. These include the main entry gates, critical arrival points, landmarks and service entries. Site entry lighting will only be used to light the identity signage at the Blackberry and Strawberry Gates. In maintenance yards and equipment lay-down areas lighting may be pole mounted. All lighting will be cut-off type lighting designed to contain light in the work area without “spillover.”

*Objective: Minimize further increases in impermeable surfaces at the Lab*

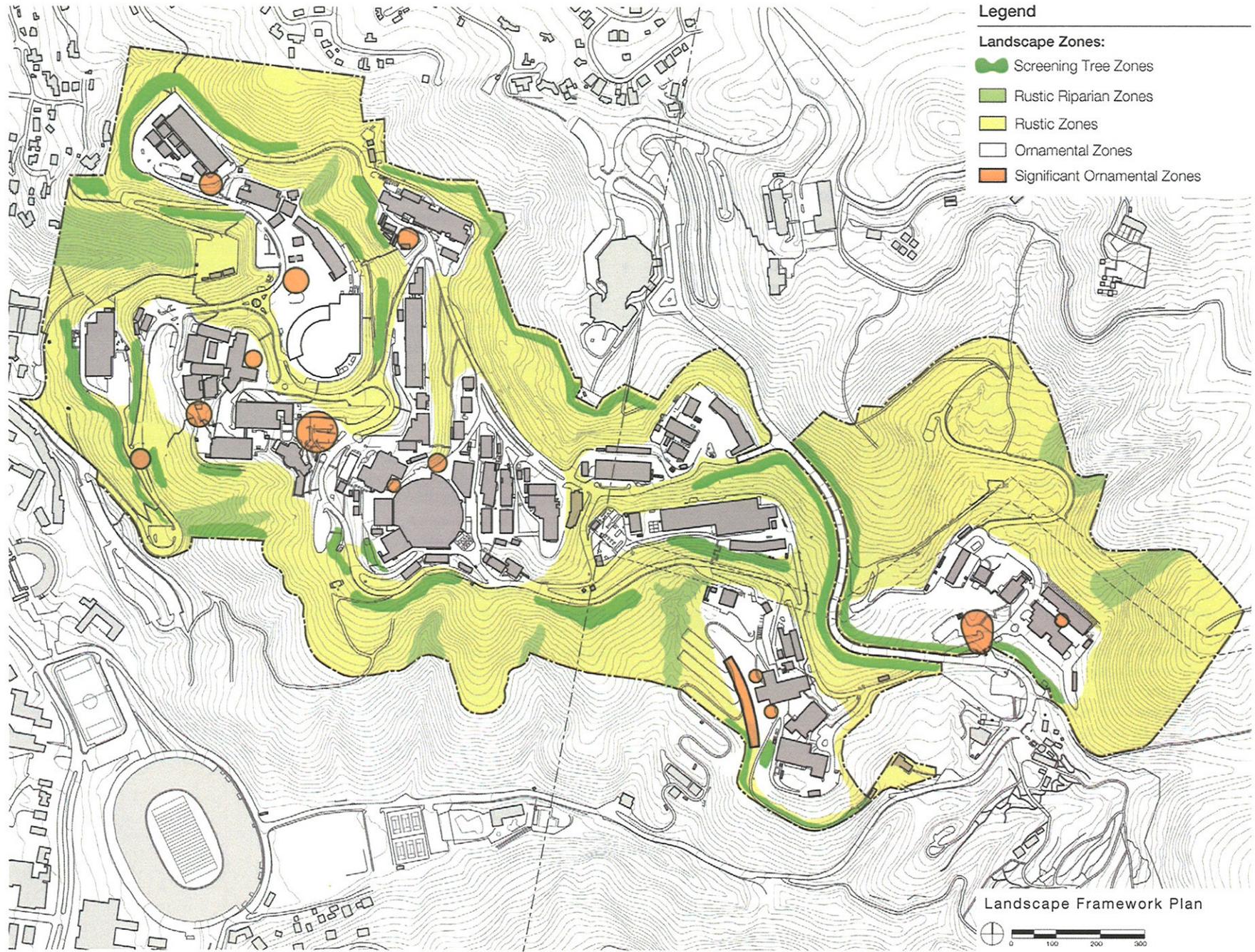
- Permanent roadways will be surfaced with asphalt or other materials that will prevent seepage of contaminating oils and sediments. Roadways shall be constructed to support truck loads as specified in Lab road standards. Access roadways intended for limited access and emergency access only may be constructed with landscape pavers to increase permeable surfaces.

### Landforms, Buildings, and Massing

New projects will be sited and designed to minimize the impacts to the existing hillside terrain and to minimize visibility from other parts of the lab and from surrounding communities.

*Objective: Minimize Impacts of Disturbed Slopes*

- To the degree practicable, cut and fill slopes will be minimized. Cut and fill slopes exposed to view shall be promptly restored, using best management practices to minimize erosion. New vegetation should be planted in a manner to return the visual quality of the slope to a condition similar to its original state or better.
- Building footprints shall be designed with long-narrow aspect ratios parallel to the natural topography where feasible.



**Legend**

**Landscape Zones:**

- Screening Tree Zones
- Rustic Riparian Zones
- Rustic Zones
- Ornamental Zones
- Significant Ornamental Zones

Landscape Framework Plan



*Objective: Create landform elements consistent with design on the Hill*

- Given the dominate hillside site conditions of the Laboratory, site retention structures are a pervasive design element in the landscape. Design and placement of site retention structures shall integrate with the design of adjacent buildings and commons areas. Where possible retention structures should be used to minimize the impacts of new fill slopes.

*Objective: Screen Roofscapes*

- Rooftops of Laboratory buildings are highly visible to residents and institutions at higher elevations. Attention shall be given to the design of rooftop surfaces and elements to minimize the visual impacts. Building and research support equipment shall be rooftop mounted only when required for the proper operation of the intended use of the equipment such as ventilators, lab vent stacks and scrubbers. Visual screening devices shall be used to screen views of such equipment from public view points at higher elevations. Rooftop screening devices and equipment shall be designed as elements integral to overall building design themes.

*Objective: Respect View Corridors*

- New buildings shall be configured as to preserve valuable distant views from commons, courts and key public spaces within neighboring buildings. Attention shall be given to create special “framed” and foreground views between pedestrian spaces that provide visual interest and orientation.

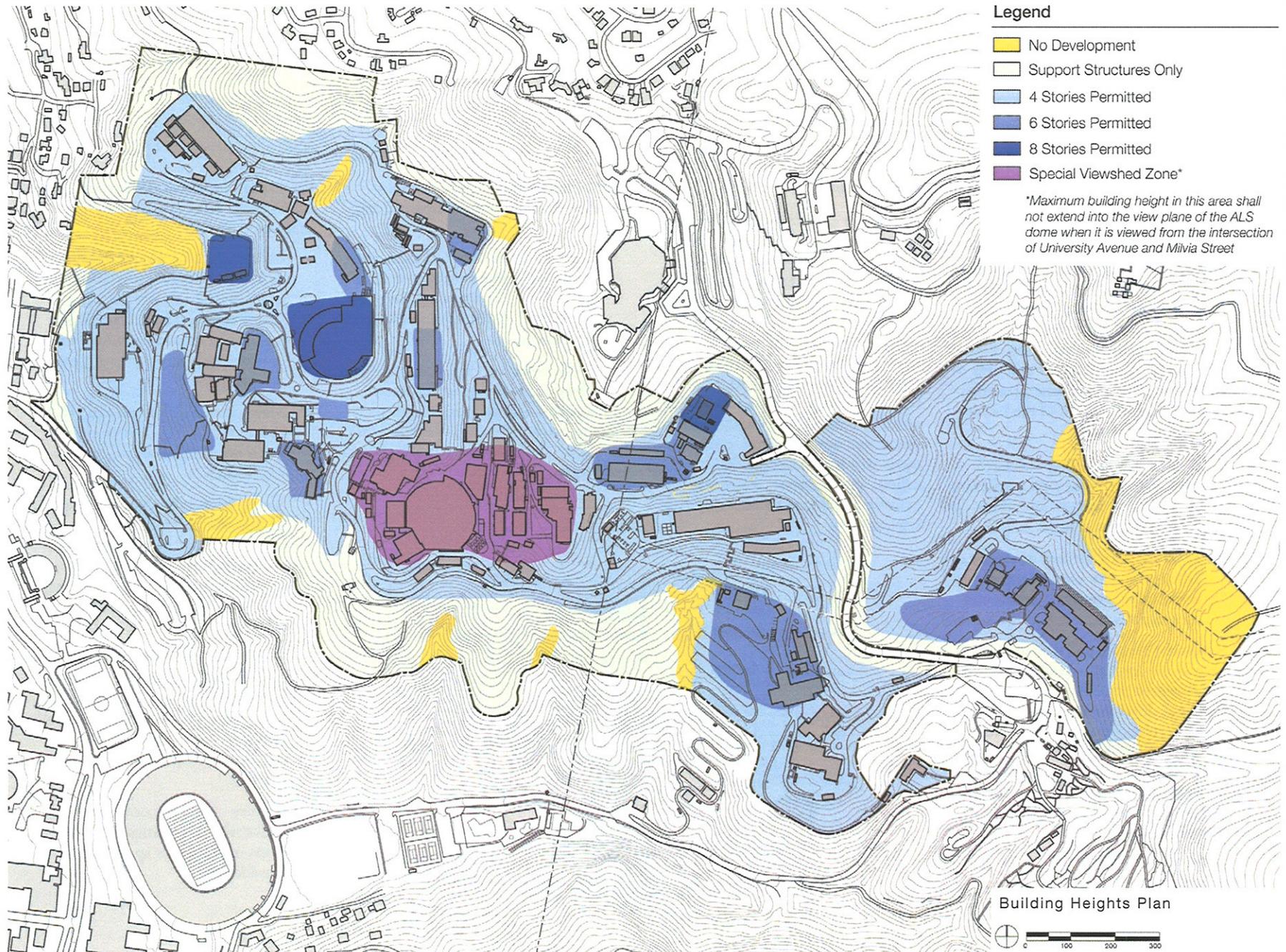


*Objective: Integrate buildings into the overall landscape using appropriate materials*

- The palette of exterior building materials allowed for new buildings shall be of a color and texture that integrates well with the natural environment and is consistent with the most durable and cost effective building assemblies for laboratory and office buildings.
- The base of new buildings—where building forms, slope retention structures, and outdoor plazas meet the hillside terrain—shall be cast in place or pre-cast concrete of a natural color and a texture consistent for base elements.
- Exterior wall materials will primarily consist of, but not be limited to, concrete, metal panel and glass curtainwall systems with featured accents of stone, wood and tile where appropriate. The color and texture of these materials shall integrate with the natural surroundings to reduce the visibility of buildings in distant views. A consistent palate of color and texture will be used to ensure a cohesive image and enhance orientation. Highly reflective materials and elements shall not be allowed unless they are deemed necessary to support mission needs.

*Objective: Mass and site buildings to minimize their visibility*

- To the degree feasible, the massing of new buildings will be configured to minimize their visibility when viewed from equal and lower elevations, and to complement the hillside terrain.
- Large buildings shall be designed to reduce their perceived mass and impart a human scale to the site. Buildings with a horizontal dimension greater than 200’ or a vertical dimension greater than four stories shall incorporate changes in both façade plane and vertical height to reduce its perceived scale and bulk.
- Building heights for all new buildings are typically limited to four stories. However in locations where the site’s topography creates a natural backdrop or provides appropriate visual screening building heights may be increased. New buildings shall conform to the height limits indicated on the building heights Plan.



**Legend**

- No Development
- Support Structures Only
- 4 Stories Permitted
- 6 Stories Permitted
- 8 Stories Permitted
- Special Viewshed Zone\*

*\*Maximum building height in this area shall not extend into the view plane of the ALS dome when it is viewed from the intersection of University Avenue and Milvia Street*

Building Heights Plan



## B. Research Clusters

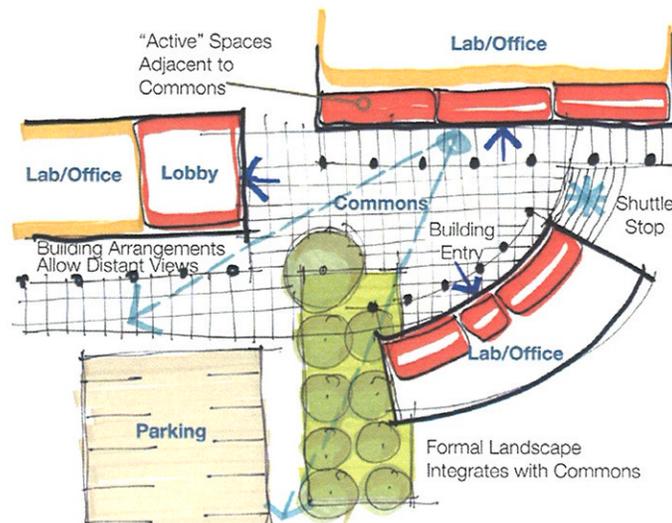
A key element of the Conceptual Framework established to guide development at the Lab is the concept of the Research Cluster. The Lab has been conceptually divided into six discreet Research Clusters – concentrated, dense developments of research buildings, each having its own subtly unique character and social structure. The creation of these Research Clusters will help to fulfill two of the four basic principles contained in the Vision of the Laboratory site and facilities;

- Build a “campus-like” research environment—one with a coherent development pattern and image conducive to team science; and
- Enhance scientific and academic collaboration with public and private initiatives by improving access and connections.

Research Clusters will develop over time as the aggregate result of multiple development projects. It is important that each development respect the long-range development concept for each cluster and build on the efforts of its predecessors to work together towards a common, coherent goal. There are a number of fundamental parts of the Research Cluster concept.

### The Commons

In order to encourage informal interaction within each Research Cluster, activities and new development in each Cluster will focus on a central campus-like collegial space called The Commons. Analogous to how a town square functions within a civic community or to a quad in a campus community, the Commons will form the social heart of each Research Cluster, creating a strong focal point, gathering space, and Sense of Place. Each Commons will have a unique scale, configuration, and character, depending on existing conditions and development scenarios.



*Objective: Create new Commons Spaces in clusters that currently lack them*

- New building sites and locations of new Commons Spaces shall be defined by Lab Planning, and new projects shall conform to the given footprints.
- New buildings shall be located and designed to create well-defined, campus-like pedestrian commons and courts between buildings that provide pedestrian access to buildings.

*Objective: Stimulate pedestrian activity and interaction in the Commons Spaces*

- Building facades facing commons and courts should provide weather protection at exterior building spaces such as covered porches at main entries and covered walkways to provide sheltered exterior places of interaction.
- Major entrances to buildings shall be located on the Commons space when possible, or on major pedestrian routes.
- Seeing one’s colleagues at work is an important stimulus to interaction. Therefore, the ground floors of buildings enfronting Commons spaces shall be made as transparent as possible to create a visible connection between inside and outside.
- Social and collegial spaces such as lounges, informal meeting spaces, journal rooms, etc shall be located either directly off of or overlooking commons spaces and shall be visible and made prominent from the outside.
- The use of arcades or covered walks where buildings form the edges of commons spaces shall be considered.

- Outdoor commons, courts and pedestrian pathways will have a hard surface appropriate to their function. Special outdoor spaces will feature patterned concrete and or brick inlay in a design consistent with building design themes. Joint detailing and saw cuts may be used as a cost effective method of providing scale to these surfaces. Where possible permeable surfaces such as planting pavers shall be employed to increase the permeable surface areas in parking lots and plazas.

**Objective: Allow light to reach the Commons Spaces**

- Buildings facing outdoor commons shall be scaled to admit sunlight and impart a comfortable human scale to these places. Additionally, new building massing shall be configured to allow solar access for adjacent buildings to the degree feasible.

**Objective: Create as high a density and critical mass around commons spaces as possible**

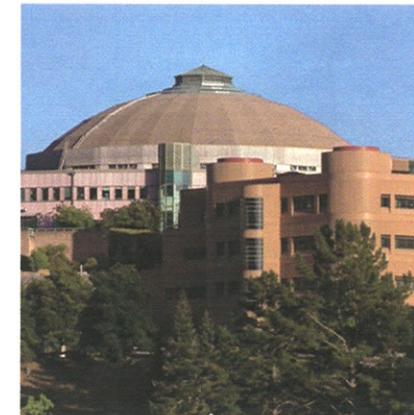
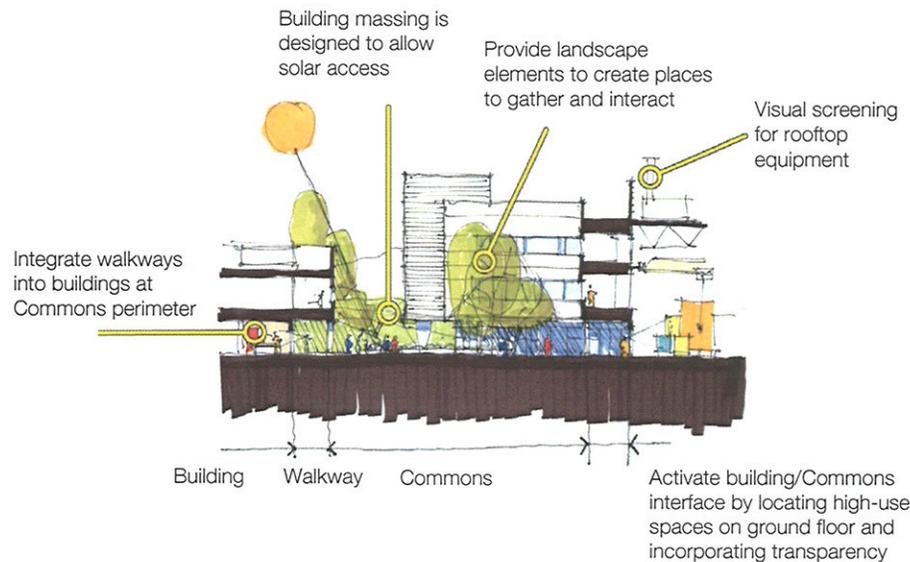
- Buildings shall be massed with their greatest population density in proximity to the Commons spaces
- Buildings within Research Clusters shall be built to as great a density as possible within the allowable development envelopes.

**Identity**

Each Research Cluster, because of topography, historic buildings, plant palette, and so on will develop a unique identity.

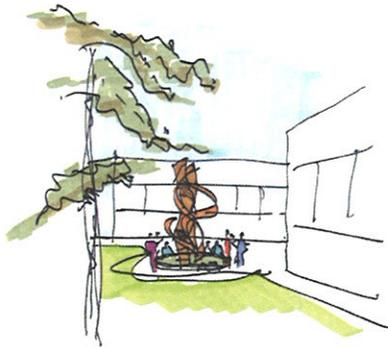
**Objective: Create new Keystone Structures in clusters that currently lack them**

- Over time, each developed cluster shall include a “keystone structure.” Keystone structures will typically be the largest building in the group of buildings and will feature building elements of a scale and design that signify the unique character for the cluster to reinforce identity and orientation.



**Objective:** Utilize artifacts to create identity and add interest to each Cluster

- There are many interesting historic objects scattered around the Lab. These artifacts are important reminders of the Lab's legacy as well as items of interest which stimulate interaction. Placement of these artifacts at major pedestrian nodes and at prominent locations in each commons is encouraged.



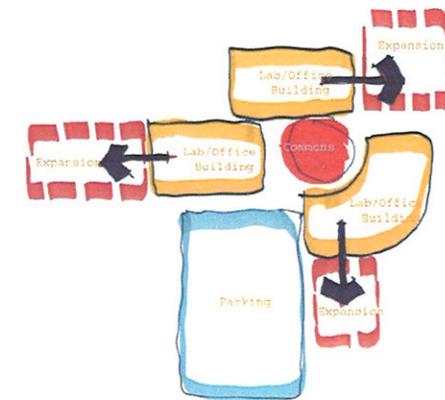
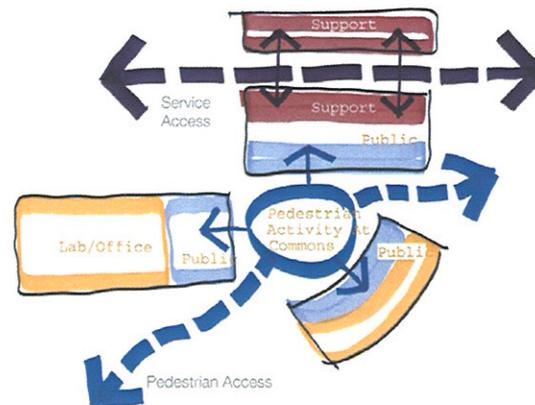
**Objective:** Create consistency between buildings in individual clusters.

- Designers shall examine the architectural precedents, especially of historic buildings, present in the Research Cluster where their project is to be located. A clear rationale based on precedent for the architectural expression of each project will be developed.

## Function

**Objective:** Segregate public entries and paths from service entries and paths where feasible

- Main building entries and service entries will be clearly separated. Main building entries shall face onto pedestrian spaces with common access to other buildings.
- Building entries and plazas shall be distinguished by special design treatments of paving, lighting, and furnishings, and shall incorporate provisions for disabled access.



**Objective:** Where segregation is not possible, and service and public access overlap in accessing buildings, design service courts to intelligently serve both

- Pathways to main entrances shall be clearly marked and protective measures for pedestrians shall be designed.
- Multi-use pedestrian and service access courts and routes shall be designed to slow vehicle traffic using articulated paving, bollards, or other devices.

**Objective:** Develop Research Clusters in a way that is mindful of future expansion

- Identify and reserve areas for future expansion on each building project.

## C. Linkages

The Hill Site is characterized by its steep topography which creates separate research clusters located on a series of hillside terraces and ridges. The topography is such that one can never get a comprehensive view of the place. Rather, one's experience of the site is defined by the movement from area to area, from terrace to ridge to valley. Views are constantly shifting, changing, and opening anew. The pathways that link various areas together, both vehicular and pedestrian, are important linkages, both for the experience of the Laboratory and for encouraging people to move from place to place, to visit, and to explore. The design guidelines in this section are intended to ensure pedestrian and vehicular access is provided in a way that creates a campus-like experience unique to the Lab while providing safe and efficient access to all Laboratory facilities.



Draft 12-15-06

### Pedestrian Access

The Hill site is an intricate network of stairs, roads, and paths that negotiate the steep topography of the site. As each new project is developed adjustments may be made to the existing network of pedestrian pathways to provide direct access between each cluster commons, parking lots and Laboratory gateways.

*Objective: Design Pathway Layouts that support pedestrian flow and encourage casual interaction*

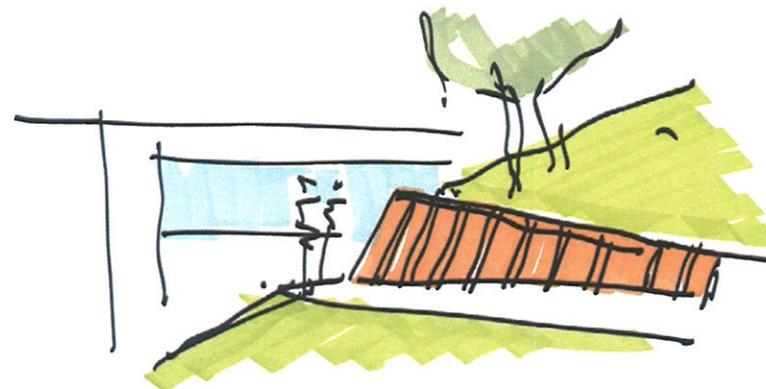
- Development of new pathways and improvements to existing ones shall provide a natural appearing unobtrusive network with structural elements artfully placed and designed as landscape features.
- Pedestrian pathways providing access between cluster commons will continue to vary in width. The main pedestrian spines between major commons areas shall be constructed of a width of approximately 8'-0" allowing two pairs of pedestrians to pass comfortably. Pathways along roadways and between all other commons areas shall remain at their current width.
- Pathway intersections, view platforms and stair landings provide opportunities for outdoor interaction spaces. The design of new walkways shall incorporate such spaces to the extent possible.

*Objective: Materials utilized in walkway construction should be appropriate for their location and intended use.*

- Material choices for walking surfaces may include, but are not limited to asphalt, stabilized aggregate, concrete pavers and patterned/colored concrete. Within new projects Pathway materials and colors shall be consistent with surfaces provided in commons and plaza areas.

*Objective: Construct new walkway structures such as stairs, bridges, slope retention for walkways, and guardrails of materials compatible with the surrounding landscape*

- Use concrete, wood or core-ten steel.
- Design themes for these structures should be coordinated with adjacent building design themes, designs for shuttle stop shelters, signage and lighting to provide a comprehensive visual identity across the laboratory site.



*Objective: Use buildings to overcome the topography and provide ease of pedestrian flow and disabled access*

- Where possible, design interior and exterior circulation to provide pathways from lower elevations to higher elevations, using elevators to overcome large differences that can't be accommodated by ramps



**Vehicular Access — Roads**

*Objective: Design all new streets to accommodate two-way vehicle traffic flow as well as pedestrian access.*

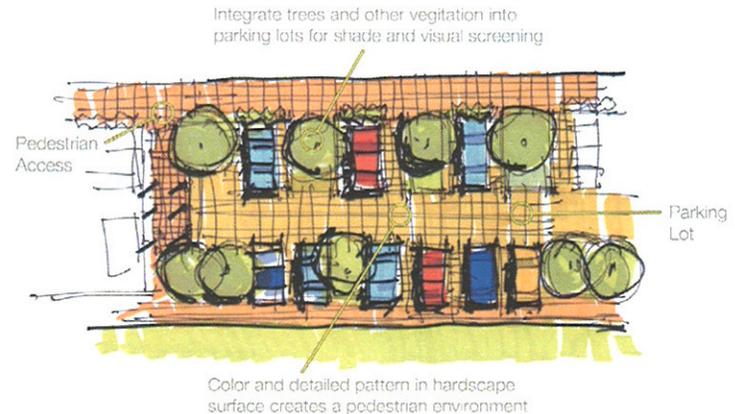
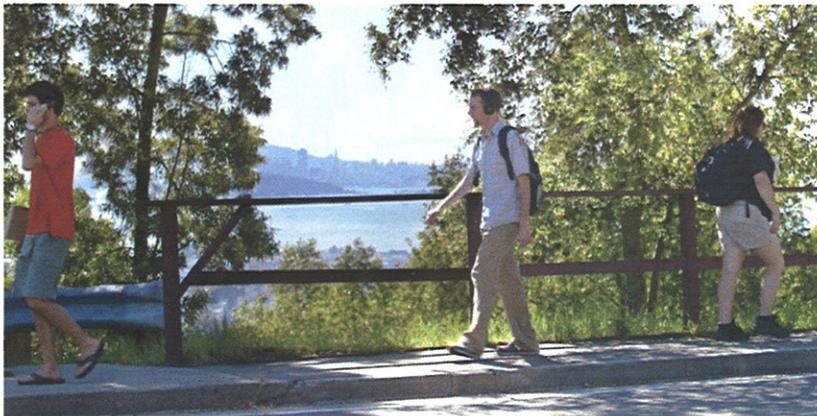
- Streets shall be no greater than 24'-0" wide.
- Curbs and sidewalks shall be provided where appropriate for pedestrian safety and erosion control.

*Objective: Create service yards with sufficient room and in a manner that controls polluted runoff.*

- Service yards and access roads shall be of a width necessary to maneuver delivery trucks and emergency vehicles. Surfaces shall be asphalt with concrete pads as necessary to provide a durable truck staging area at loading docks. Surface drainage in these areas will be directed away from landscaped areas and into collection intakes to reduce seepage of contaminating oils and other chemicals.

**Vehicular Access — Parking Lots and Parking Plazas**

The intent of the Parking Design Guidelines is to integrate parking into the overall site appearance through measures that minimize visual impact, protect water quality, limit the negative effects of associated noise and lights, and utilize materials that result in the least environmental impact.



*Objective: Minimize visual and environmental impacts of new parking lots*

- New parking lots and improvements to existing lots shall be sited and designed to minimize their visual impacts to off-site locations, visitors and Laboratory staff.
- New parking lots shall be designed to follow the existing terrain and shall be terraced to minimize slope retention and cut and fill of the site
- Drainage from the parking areas will be contained by natural materials that can be used as edge treatments to guide drainage to filtered outlets and control erosion at the pavement edge. Gutters and or wheel stops shall be used to keep cars out of swale and other surrounding areas.
- Parking areas shall be visually screened in a way appropriate to the location of the parking lot on the site and the characteristics of the surrounding area. Native trees and shrubs within parking lots will be maintained and planted to provide shade and screen distant views to lots from both on and off-site locations. Native shrubs and small trees will be planted at the lot's perimeter to cause the parking and its screening to recede into the natural surroundings. Provide shade trees interspersed throughout to break up large parking areas.

*Objective: Create parking plazas to accommodate multiple functions where restricted sites do not allow for them to be segregated*

Parking plazas are a multi-use space capable of providing space for delivery, emergency access and reserved parking in conjunction with safe pedestrian access routes to building entries within constrained spaces.

- Reduce parking density within the plaza to allow free pedestrian movement and generous landscape plantings.
- Provide barriers such as raised planting beds, bollards, and ramped walkways to slow traffic and allow a protected zone for pedestrian movement.
- Provide plaza surfaces that resemble that of pedestrian-only spaces to reinforce the pedestrian use of the space and slow traffic.

## **Vehicular Access — Parking Structures**

*Objective: Site and design parking structures to integrate with the natural surroundings.*

- Configure parking layouts to allow floor plate aspect ratios suited to the specific conditions of the site—long, narrow structures (1-2 aisles) on hillside sites and square structures (3-4 aisle) on level sites.
- Configure efficient parking layouts to reduce the area dedicated to circulation by allowing entry points from multiple levels of the site.
- Parking structures and associated site retention structures shall be constructed of cast-in-place and/or pre-cast concrete. Surface texture shall be compatible with adjacent architectural design themes. Finish color will be compatible with surrounding buildings and is intended to blend with the natural surroundings Enclosed lobbies, and stairwells may be clad in glass.
- To the degree possible incorporate shade trees and plantings at the building's perimeter and top level where exposed to view. Provide adequate tree coverage or other shading devices when feasible at the top level to shade cars, reduce glare, and minimize visual impacts. Continuous planting beds at each level may be incorporated into the structure's façade to further integrate the structure into the surrounding landscape.

## D. Building Specific Guidelines

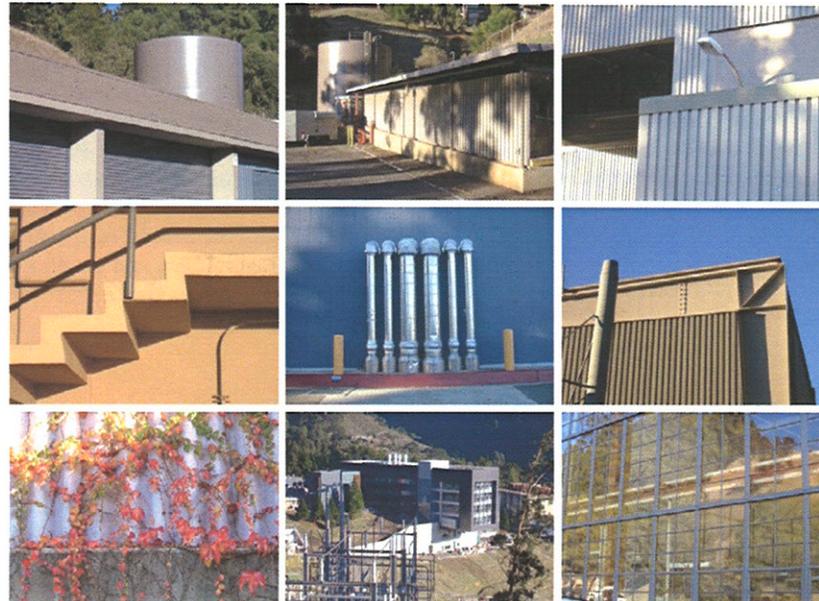
### Building Organization

*Objective: Create buildings that are flexible, modular, and expandable*

- Each new building shall be configured to accommodate a broad range of functions in both the long and short term. In general a building width of between 60' and 80' can accommodate a variety of office, lab and support space layouts. Structural grids shall be based on dimensions compatible with industry standards for laboratory equipment as well as furniture and office modules to ensure future flexibility.
- Each new building shall have a floor-to-floor height of at least 15'-0" in order to accommodate a wide range of research functions and the infrastructure they require.

*Objective: Create buildings that encourage interaction among their inhabitants*

- Circulation, both vertical and horizontal shall be designed to foster communication by being enjoyable places, providing access to daylight and views.
- Active public spaces such as lobbies, meeting and break rooms, and display areas shall be located adjacent to outdoor spaces and pedestrian routes and pathways.



*Objective: Organize service functions to minimize conflicts and visual impacts*

- Service entries and associated equipment and activities shall be located to minimize visibility. All bulk trash containers and building and support equipment shall be concealed within enclosures designed as integral elements of the architecture. Loading docks shall be concealed and secured when not in use.

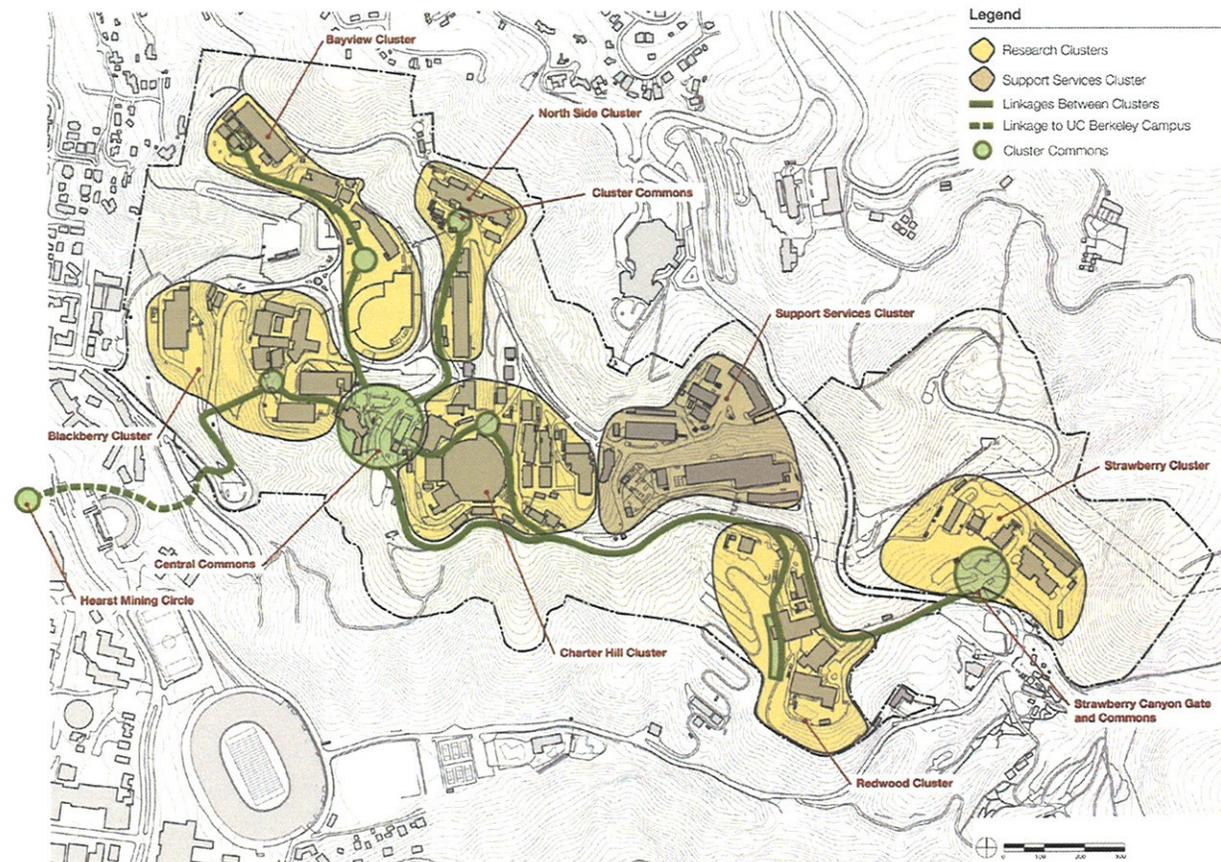
### Architectural Expression

*Objective: Create buildings having a coherent architectural expression*

- Each building shall be a coherent architectural composition and shall employ a single unifying vocabulary of forms, details and materials on all building facades. Design themes for new building facades shall be designed to integrate new development into the natural and built context and to provide a cohesive Laboratory image. The architectural expression of each new building will promote the enduring architectural themes of each cluster that contribute to the cohesiveness of the overall visual fabric of the Laboratory.
- The design of building facades shall consider treatments that respond to the characteristics of each exposure with respect to heat, light, ventilation and view. Provide shading devices to reduce solar heat gain and glare particularly on the larger southern and western exposures directed toward distant bay views. Employ devices and design strategies to allow natural ventilation and air flow to the degree feasible. Use larger glazed exposures to the north and east for natural light.

## E. Cluster Planning Diagrams

Each of the six Intellectual Centers on the Hill site will be developed over time in accordance with the preceding guidelines in support of the broad vision and principles described for the Laboratory. While the same guidelines apply to each Center, each has unique constraints and opportunities that will help them develop with a unique identity. The following diagrams examine each Intellectual Center in detail, and describe how the guidelines will be applied to each portion of the Berkeley Lab.

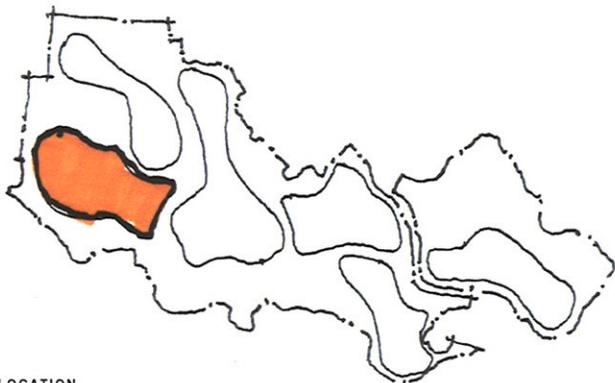


## Blackberry Research Cluster

### Overview

The Blackberry Research Cluster forms the heart of Berkeley Lab, and also has the most developed existing Commons space of all the clusters. This cluster also includes the Blackberry Gate, downhill from the Cafeteria, which is the main entrance to the Lab. Sited on the western slope of the Laboratory, it is the most visible portion from the City of Berkeley. New development in this Research Cluster has a strong potential to establish linkages, both with other parts of the Lab, and with the Berkeley campus.

The cluster currently contains some of the highest density development, including the Buildings 50 and 70 complex, housing office and research, and Building 88, which houses the 88" Cyclotron, a national user facility focusing on low energy physics experiments.



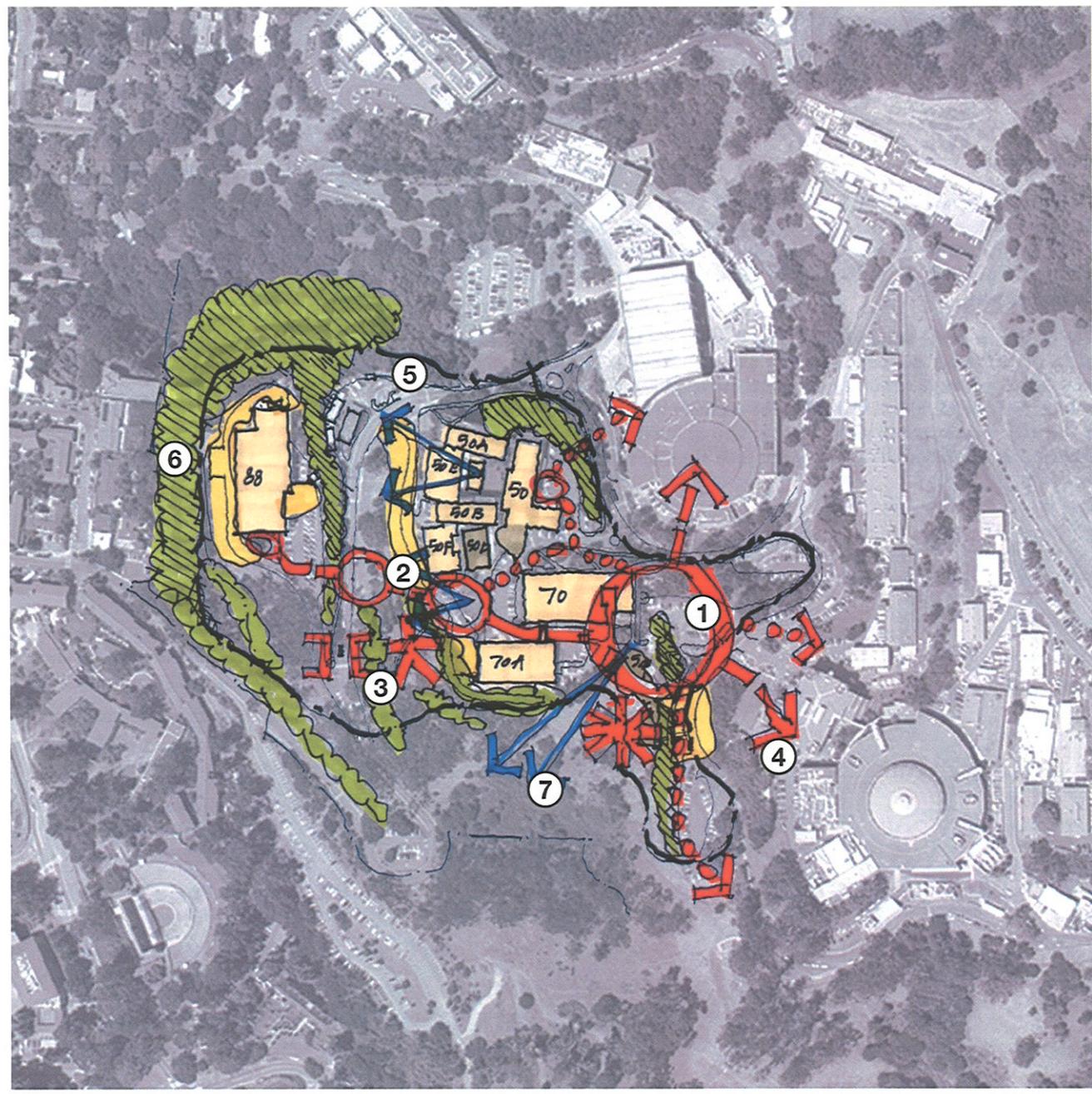
LOCATION

### Notations

1. The Cafeteria Commons is the social heart of the Laboratory. Major pedestrian spines converge at the commons and the cafeteria provides a casual place to interact.
2. A main east-west pedestrian spine linking Building 88, potential new projects and the Cafeteria Commons can provide a central commons space. Other, secondary, outdoor use spaces are located at main entry points.
3. A revitalized Blackberry Gate will improve security and safety while providing an improved and welcoming image.
4. The Cafeteria building is nearing the end of its useful life. The redevelopment of the cafeteria will present an opportunity to increase the utilization of the site for research activities while significantly improving the social heart of the Laboratory.
5. The shuttle transfer area, where the Off-site and On-site shuttles exchange passengers, is a social place that may be improved and/or relocated to the Cafeteria Commons.
6. Stands of screening trees allow partial view of Laboratory buildings. These stands will be maintained to maintain the park-like setting.
7. The cluster features vista views of the Bay and Golden Gate. New development in the cluster will preserve view access to commons areas and existing buildings to the degree possible.

LEGEND

	service zones
	existing screening trees
	new screening tree stands
	new roadways
	main pedestrian spine
	pedestrian path
	commons area
	keystone structure
	viewshed
	cluster boundary

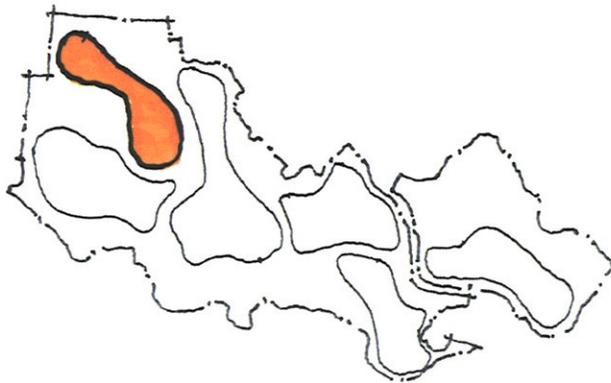


## Bayview Research Cluster

### Overview

Comprised of two level terraces—the 90 and 51 areas—and encompassing the Bevatron Redevelopment Area, the Bayview Research Cluster offers some of the greatest potential for high density development at the Laboratory. The site has a historical heritage, as the location of the Bevatron, now undergoing a gradual deconstruction.

The 90 terrace is the northwestern most point of the Laboratory – a terminus of the pedestrian spine and Laboratory Campus. It is also the closest terrace to residential neighbors of any development on the hill. Development in this area will be sensitive to this relationship. The southern portion of the 51 terrace, however, is located out of view from the City of Berkeley and therefore can accommodate a building of greater height than elsewhere in the Lab.



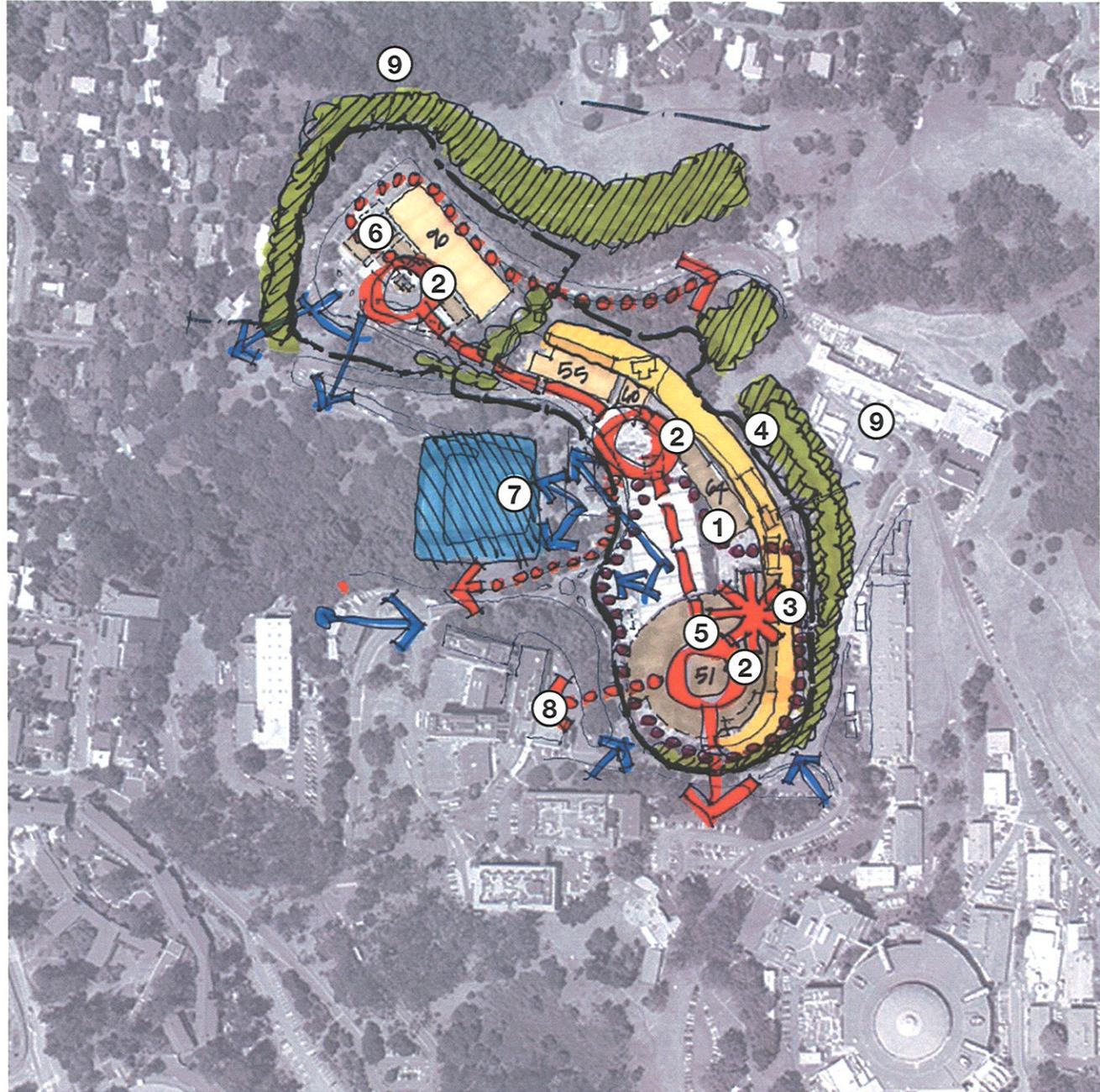
LOCATION

### Notations

1. The Laboratory's main pedestrian spine currently parallels Alvarez Road, linking the 90 and 50 Complexes and the Cafeteria Commons to the south. As the site develops, this pedestrian spine will move toward the middle of the site and link a series of pedestrian commons spaces.
2. Three commons areas are envisioned; a primary one at the center of the historic building 51 site, and secondary ones near building 60 and at the main entry of building 90.
3. The redevelopment of the Bevatron site is well suited for a Keystone Structure given its historical significance, generous height limit, and proximity to the intersection of Cyclorton, Alvarez, and Lawrence Roads.
4. The service zone, a corridor located along the eastern edge of the site, incorporates existing utility buildings and service lines. This zone will provide space for future utility buildings as well as lanes dedicated to service and emergency access.
5. Approximately one third of the site area will be made available for new construction once the 51 Complex is removed. This site allows the tallest building envelopes at the laboratory.
6. Temporary trailers located in the 90 parking lot are slated to be removed, freeing up space for parking in the short term and providing a level development site for an addition to Building 90.
7. The Blackberry Canyon parking lot is currently the largest developable lot on the hill. Shielded from view, it is an ideal site for a future parking structure of up to 900 spaces.
8. The 50 complex and knoll block views to much of the 51 terrace from the surrounding community.
9. Stands of trees screen views from higher and equal elevations. New trees will be planted to maintain adequate screening.

LEGEND

	service zones
	existing screening trees
	new screening tree stands
	new roadways
	main pedestrian spine
	pedestrian path
	commons area
	keystone structure
	viewshed
	cluster boundary

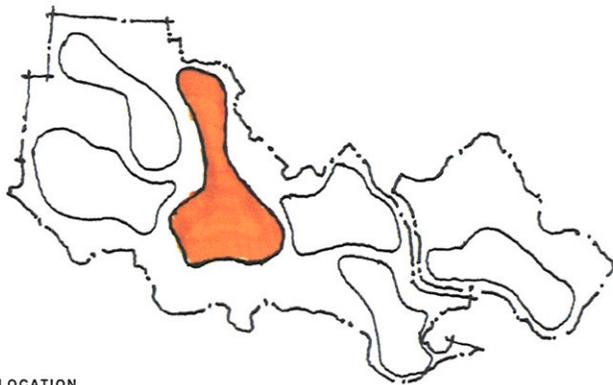


## Charter Hill/North Side Research Clusters

### Overview

The Charter Hill/North Side Research Clusters consist of three level terraces along the western slope of the hill site. The Laboratory began on this site—on Charter Hill—with the development of the 184 inch Cyclotron. The historic domed building remains as the center portion of the Advanced Light Source. The cluster is adjacent to the Cafeteria Commons. A few modest enhancements and proper building placement will foster a more collegial quality of the pedestrian environment in this area.

The area known as “Old Town” is the portion of this cluster adjacent to the ALS. Developed during WWII, the buildings are now obsolete, and Old Town is an area that is a good candidate for redevelopment. Relatively level, this area is ideally suited for either a single large footprint facility or a campus-like complex of research buildings housing activities that would benefit from the close proximity to the ALS.



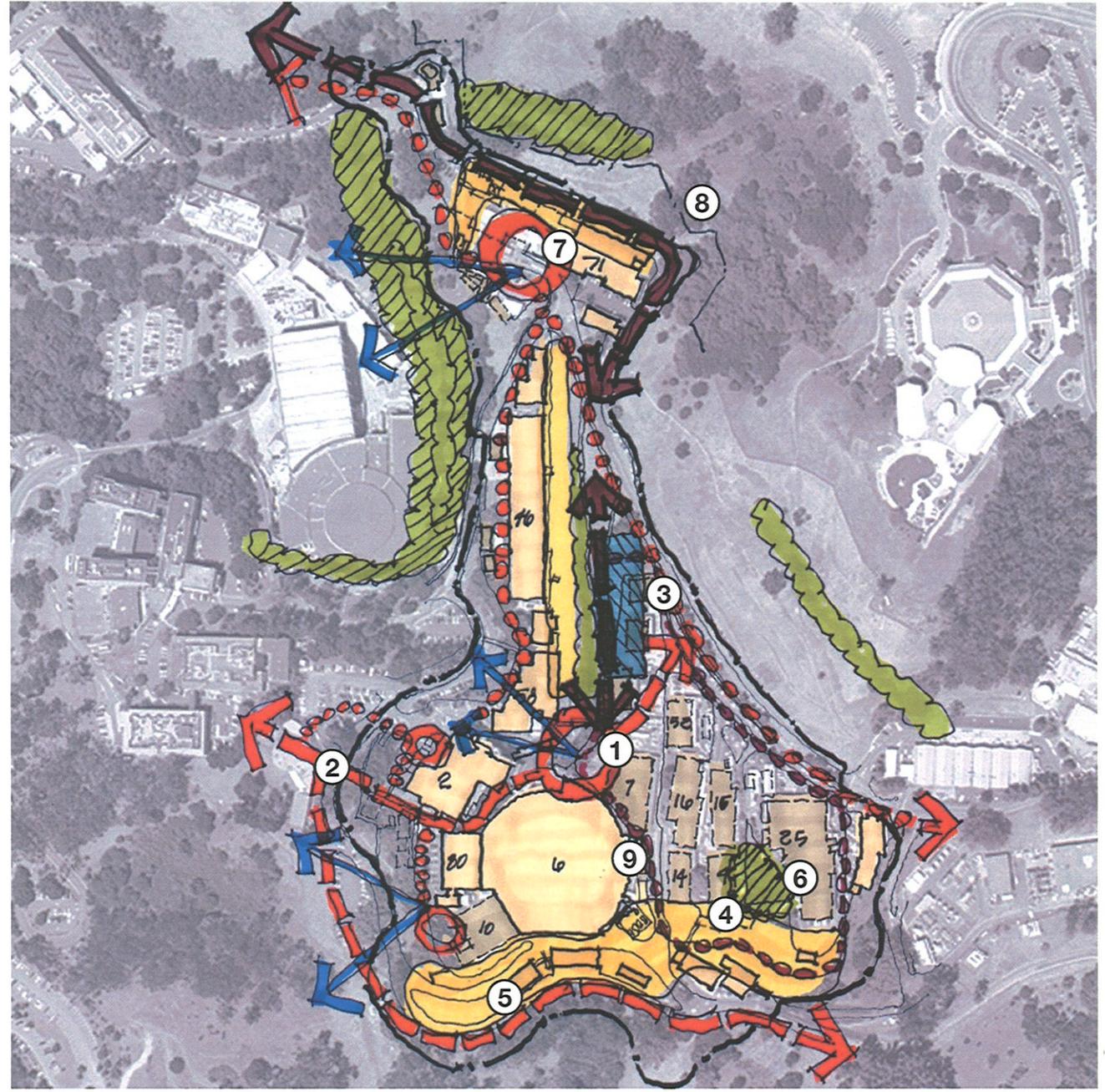
LOCATION

### Notations

1. New development in the Old Town portion of the site will center on a primary pedestrian commons located at the main entry of the ALS.
2. The main east-west pedestrian spine will link the ALS Commons to the Cafeteria Commons to the west and a drop-off/ point of entry along McMillan Road to the west.
3. The site for a potential 300 car parking garage has direct access to the ALS commons.
4. A new service roadway will link McMillan Road to the commons area and the service zone to the south of the ALS. As this roadway connects with busy pedestrian areas they will be designed per LRDP guidelines for “Parking Plazas.”
5. To the degree possible, new utility buildings and service areas will be located within the existing service zone located along the southern portion of the Center.
6. New development in the Old Town area should be planned to preserve the existing Redwood grove.
7. New development on the 71 Terrace will center on a pedestrian commons located between the new development to the south and the existing 71 Complex.
8. Improvements to the existing service access road to the north and east of Building 71 will route 2-way traffic around the perimeter of the complex to maximize the development potential of the limited level area of the site.
9. The ALS dome is a regional landmark. New development adjacent to the historic building will be limited in height so as to not obstruct or detract from the character of the views to the dome.

LEGEND

	service zones
	existing screening trees
	new screening tree stands
	new roadways
	main pedestrian spine
	pedestrian path
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	viewshed
	cluster boundary



## 69/77 Support Services Area

### Overview

The 69/77 Support Services Area consists of two level terraces with considerable grade change between the two. Historically, these terraces have provided facilities for support services and are more industrial in character than most of the rest of the Lab. The site includes maintenance and engineering shops, shipping and receiving, the Grizzly substation and PG&E power supply line. Over time however, redevelopment of the site could accommodate new facilities that would benefit from proximity to the Laboratory's third entry, the Grizzly Gate. From a visual impact perspective, the upper terrace can accommodate a building mass of up to eight floors due to the adjacent hillsides that provide a natural backdrop. Surrounded by slopes and vegetation, this portion of the site has a secluded feel.

### Notations

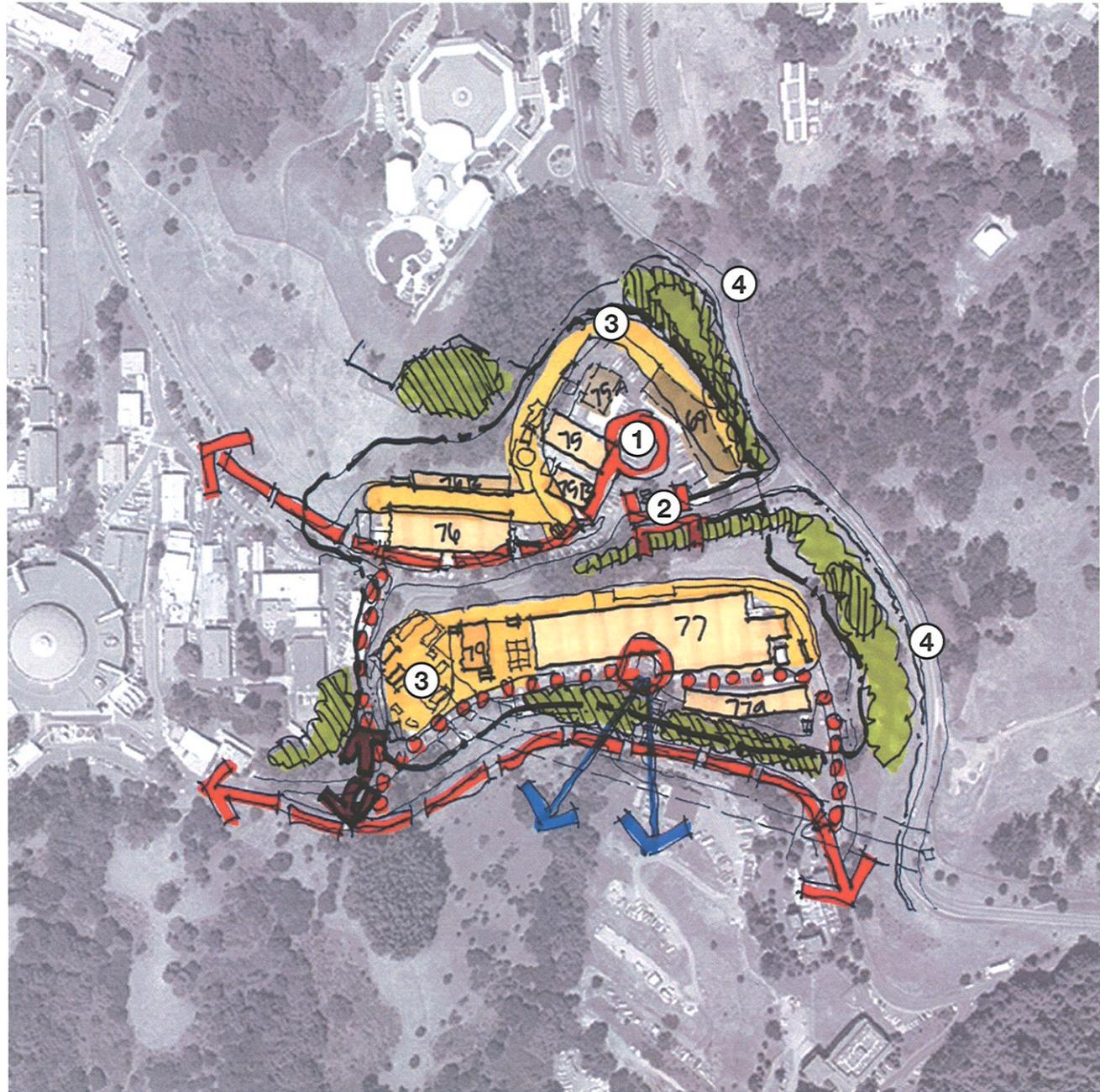
1. A commons area at the center of the upper terrace is the eastern terminus of the Laboratory's upper pedestrian spine.
2. The Grizzly Gate is currently the only unstaffed point of entry for vehicles and is predominantly used by employees and truck traffic. The redevelopment of the Grizzly Gate can provide a welcoming point of entry to visitors, students, and personnel from collaborating institutions should new development in this portion of the laboratory warrant.
3. Service zones are planned to incorporate existing areas while providing a separation from pedestrian spaces by locating these zones at the perimeter of the terrace sites.
4. Existing vegetation screens views to the facilities from Centennial Drive and from Panoramic Hills in Strawberry Canyon. New vegetation may be planted to enhance these screening tree buffers.



LOCATION

LEGEND

	service zones
	existing screening trees
	new screening tree stands
	new roadways
	main pedestrian spine
	pedestrian path
	commons area
	keystone structure
	viewshed
	cluster boundary



## Redwood Research Cluster

### Overview

The Redwood Research Cluster is located on the northern slopes of Strawberry canyon in an area of the laboratory that, until recently, has not been developed with the same intensity as the western portions. With the development of the Molecular Foundry next to the existing NCEM and the nearby ALS – all national user facilities – this Research Cluster is a destination for talented researchers from around the globe.

Once the site of the old UCB Chicken Husbandry Facility, the level terraces that once housed this facility can be seen today. The area has the potential for a direct access point to Centennial Drive, which could provide easy and immediate access to UCB and other users. The development pattern that has emerged over time locates the main entry of most buildings facing toward Lawrence and Lee Road, up slope and to the east. Service entries are typically located to the west and down slope.



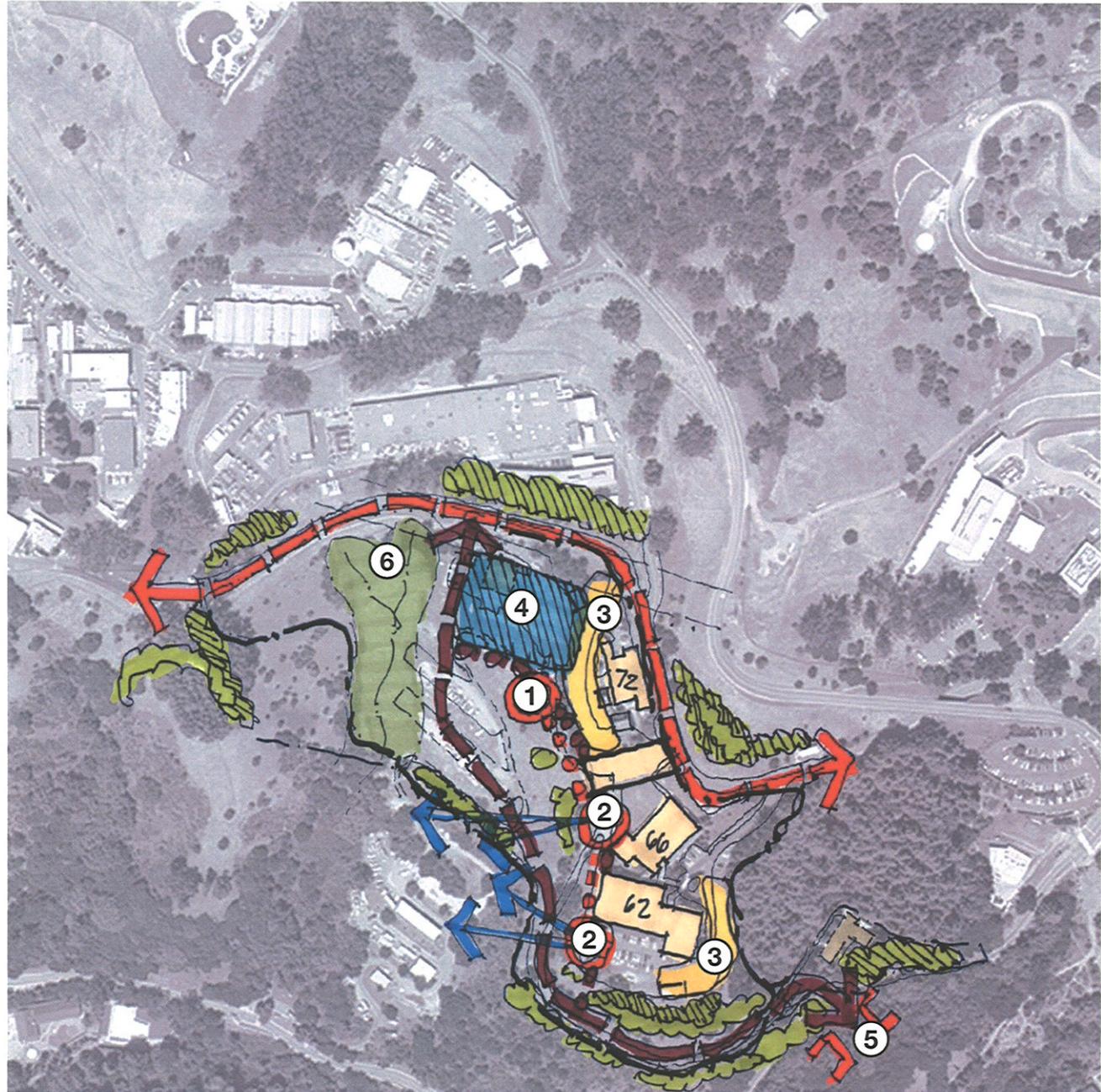
LOCATION

### Notations

1. In order to connect new development with the existing development pattern, a new circulation plaza for pedestrians as well as service and visitors vehicles is located along the western side of the existing buildings.
2. Primary entry points of existing buildings are accessed through small commons, or outdoor use areas, located along this northwester portion of the circulation plaza.
3. Two dedicated service zones, one located near Building 72 and one near Building 62 provide a segregated space for existing and future utility buildings.
4. A proposed site for a 300 car parking structure provides an "anchor" or terminus to the circulation plaza.
5. A new access road could provide visitor, user and Lab personnel direct access from Centennial Drive and a link to Lawrence Road. A primary purpose of the new roadway is to serve as an additional egress point for the Laboratory.
6. New development is setback from the Chicken Creek Limited Management Area to minimize impacts.

LEGEND

	service zones
	existing screening trees
	new screening tree stands
	new roadways
	main pedestrian spine
	pedestrian path
	commons area
	keystone structure
	viewshed
	cluster boundary



## Strawberry Research Cluster

### Overview

The Strawberry Research Cluster is a prime development site for the Laboratory. Located in a natural bowl, the site is surrounded on the north, east and west by hillsides of Strawberry canyon. Centennial Drive creates the southern boundary. The area feels secluded in the woods with down canyon views through the trees. This cluster features the Strawberry Gate, the Laboratory's eastern most point of entry. Much of the area has developed at a low density.



LOCATION

### Notations

1. New development will center on the "Strawberry Gate Commons," which links the existing commons areas between buildings 74 and 84 and a new pedestrian route connecting to a proposed new parking structure.
2. A site well suited for a "Landmark Structure" is identified at the commons area. With the slopes of the natural bowl setting as a backdrop, a building of six levels is visually compatible with the site.
3. A new service road will be constructed along the western area boundary. This roadway will provide complete emergency and service access for new and adjacent/existing development.
4. A proposed 300 car parking structure will provide the necessary, close-in parking spaces for new development within the eastern portion of the Lab site.
5. The Strawberry Gate entry will be reconfigured to provide the necessary staging lanes to accommodate the projected traffic throughput. Visual enhancements to the gate will also be made to reinforce a consistent Laboratory image.
6. The Laboratory has developed over time a mature and dense stand of screening trees along the Centennial Drive frontage. New development will allow the vegetation to remain intact, and ongoing vegetation management programs will continue to replenish older stands to maintain the wooded character of the Centennial Drive Corridor.

LEGEND

	service zones
	existing screening trees
	new screening tree stands
	new roadways
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