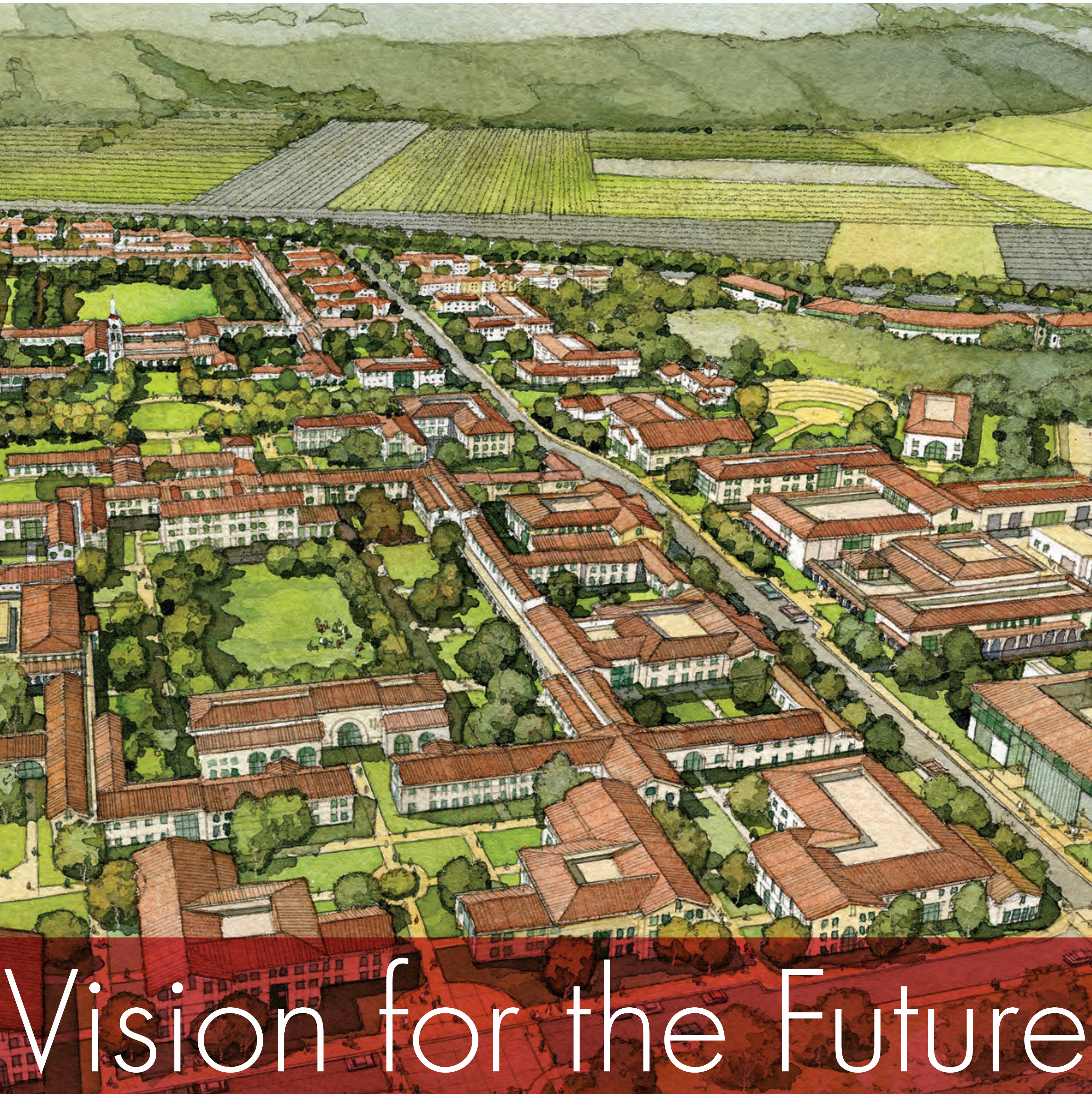
Channel Islands

CALIFORNIA STATE UNIVERSITY



Vision for the Future


SOLANO HALL

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Executive Summary

The Vision Plan for California State University Channel Islands (CI) is the culmination of many ideas generated through a rigorous planning process and represents the best thinking and efforts of many people who care deeply about the campus.

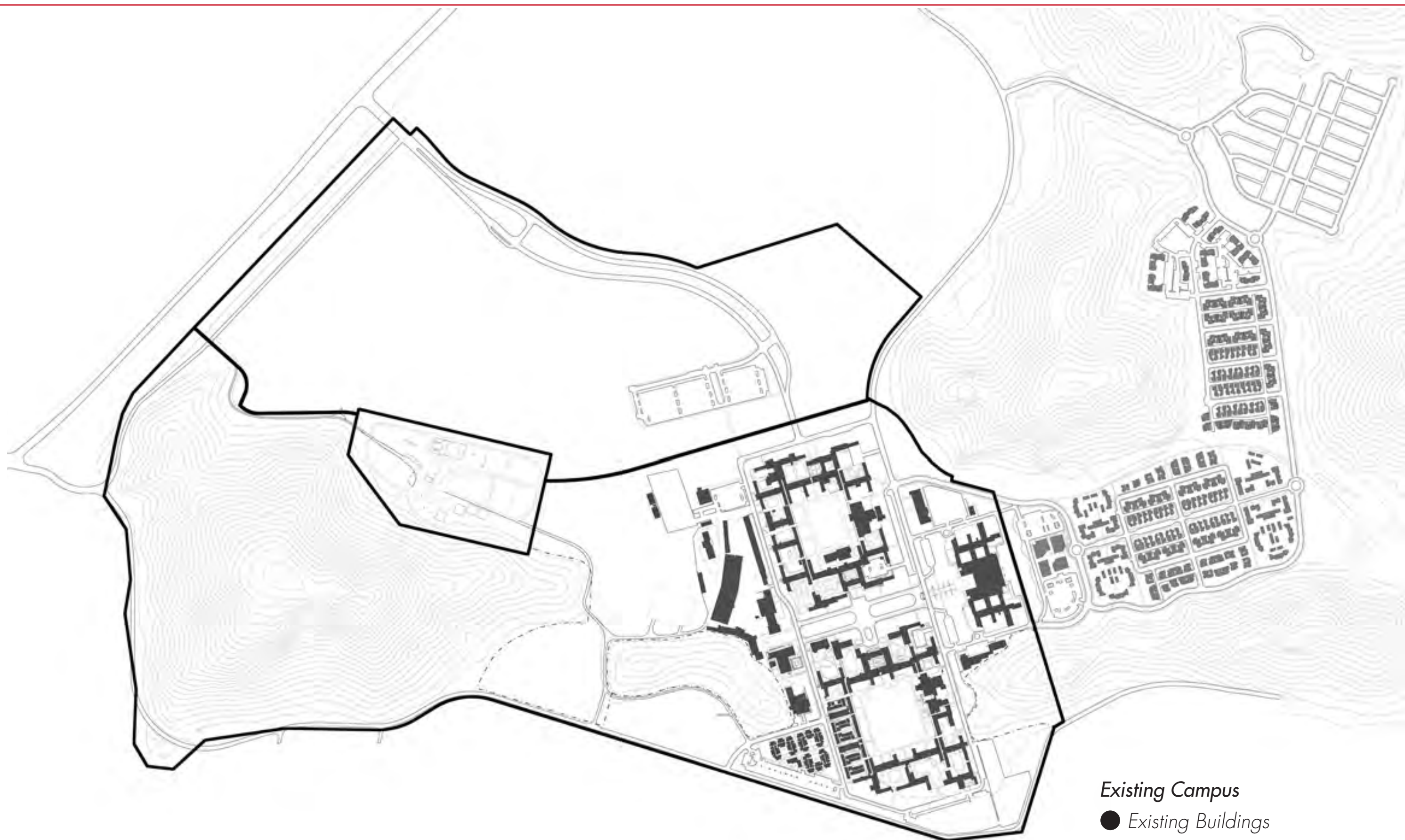
It is intended to be both a framework that will assist the University in developing strategically and cogently on both the short- and long-term horizon.

The Vision Plan reflects the goals and objectives of the planning process. It accommodates the full programmatic goal of 15,000 students through the development of new academic space, housing, and indoor and outdoor student support space. Highlights include a new performing arts center and arena/recreation-wellness center along Ventura Street, the redevelopment of West Campus and the area around the Broome Library, and athletic/recreation fields. The more public spaces proposed on the campus not only provide much needed student space on campus but also help the campus engage and embrace the larger community. While the Vision Plan calls for almost 1,400,000 GSF of new construction, it also proposes the renovation of over 200,000 GSF of the original campus core. By successfully integrating the renovation of the original buildings with newer, more efficient buildings, the Vision Plan reflects the character and intimacy of the core campus.

The Vision Plan strives to transform the entire campus into open, collaborative environments to promote integrative and innovative learning. It successfully balances preserving historic integrity and advancing institutional goals by transforming a historically isolated property into a campus encouraging social interaction and interdisciplinary learning. This is accomplished through embracing the original "dayrooms" that create informal learning and gathering spaces with strong indoor/outdoor relationships to the courtyards, both existing and proposed.

The University's picturesque setting is unlike any other collegiate campus in the world and is a place of high-quality architectural character and intimate scale. The Vision Plan expresses the cultural heritage of the campus and surrounding area by protecting and restoring the original campus quads and limiting building height to preserve a sense of its origins, physical beauty, and views of the surrounding landscape. The Vision Plan also respects the Board of Trustees' desire to maintain the existing architectural character throughout the campus.

Finally, one of the more important aspects of the Vision Plan is its commitment to sustainability. Through various transportation demand management strategies, such as an improved shuttle system, CI is committed to reducing its on-campus parking ratio. The Vision Plan also proposes climate-specific native planting and landscape irrigation using reclaimed water. The installation of solar panel canopies in parking areas, reducing heat island effect through landscape and shade trees, and filtering stormwater runoff from impervious surfaces through landscaping or permeable paving help create a sustainable 21st century campus.



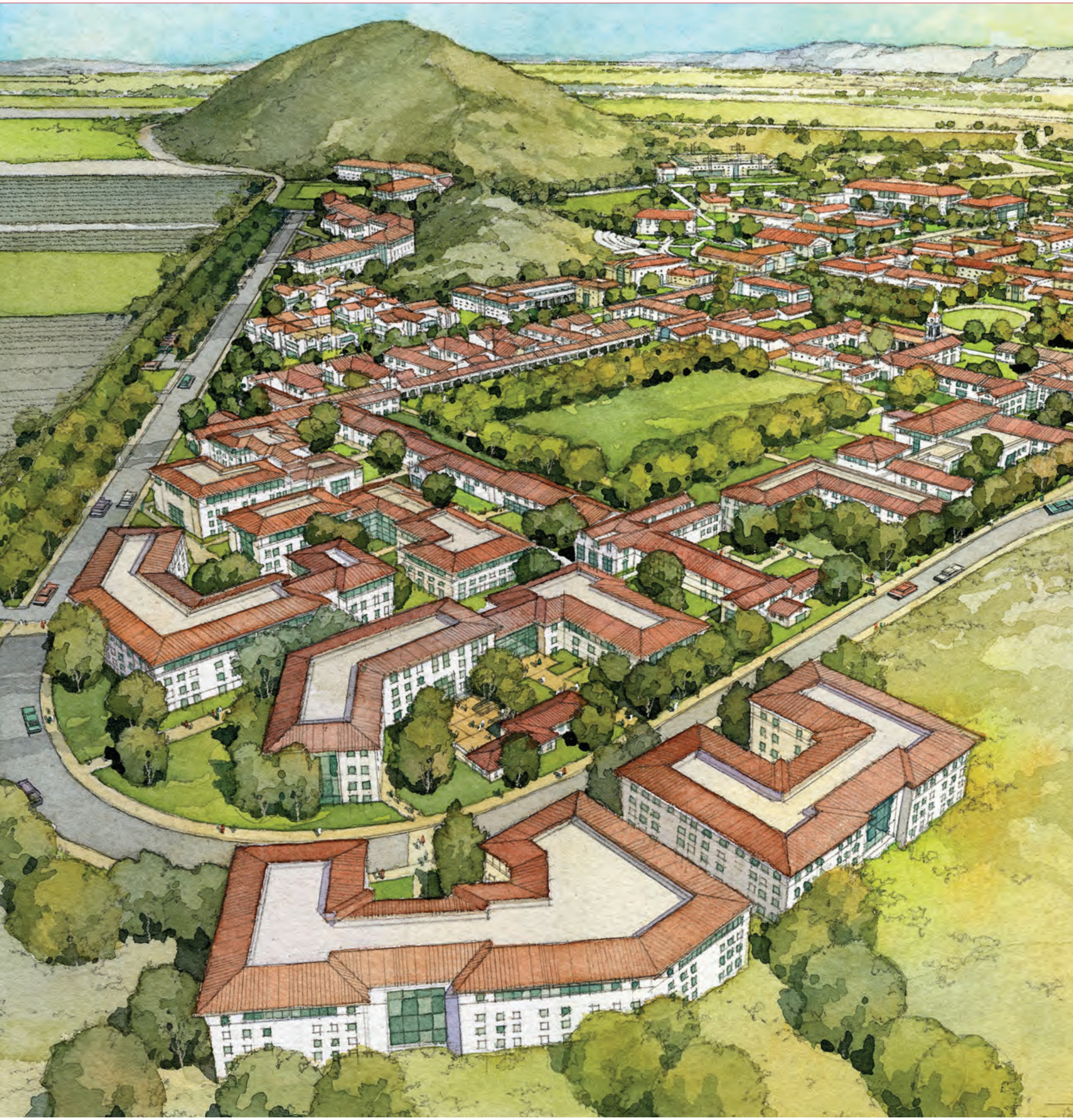
Existing Campus

- *Existing Buildings*
- *University Glen Buildings*

Proposed Vision Plan

- *Existing Buildings*
- *Proposed Buildings*

Existing view looking west



Proposed view looking west

Existing view looking southwest

Proposed view looking southwest

Existing view looking south from campus entry

Proposed view looking south from campus entry


CALIFORNIA REPUBLIC
UNIVERSITY

Introduction

California State University Channel Islands (CI), the newest campus within the California State University System, began offering classes in 2002 and has since grown to an enrollment of more than 4,300 students. According to state system directives, the campus is ultimately intended to grow to 15,000 students.

To prepare for CI's opening, plans were developed to guide decision-making pertaining to renovation and new construction of buildings on the campus. However, the University has reached the point at which a more detailed and nuanced Vision Plan is needed for it to develop strategically and cogently in the future.

Goals and Objectives

- Accommodate growth to 15,000 students (FTES)
- Enhance CI's precepts of an integrative and innovative approach
- Reflect the character and intimacy of the core campus
- Express the cultural heritage of the site and area
- Engage the larger community
- Embrace sustainability

Planning Process

CI's planning process involved a wide range of participants, including faculty, staff, administrators, students, and community representatives. The Vision Plan Steering Committee was shaped to inform and facilitate the process. This committee met throughout the planning process and was responsible for setting the overall direction of the Plan. The University President's Cabinet provided strategic oversight throughout the process. At important points during the collaborative process, faculty, staff, administration, and students provided firsthand experience of the campus and assisted in developing and evaluating design options.

Groups

- President's Executive Committee
- Campus Vision Plan Steering Committee
- Sustainability Task Force
- Student Focus Groups
- Housing and Student Life
- Athletics, Recreation, and Wellness
- Archives and Campus History
- Office of Planning and Construction
- Campus Police

Campus walks and interactive workshops with key stakeholders

The planning process was structured according to five phases of work as follows:

Observations

During the Observation Phase, the planning team analyzed the quantitative and qualitative aspects of the campus to gain overall insights into the specific needs, culture, philosophy, and setting of the campus so they would be reflected in the development of the Vision Plan.

Academic Planning and Programming

In a concurrent series of planning sessions, the Provost's Office, President's Cabinet, academic planning committees, Faculty Senate Executive Committee, students, faculty, administration, and staff participated in discussion and preparation of the Academic Plan. The goal of the Academic Plan was to ensure the mission, vision, and values of CI were reflected in the present and future academic structure of the University. Throughout the process, the academic planner and physical planning team collaborated to ensure that the Academic Plan influenced the programmatic and analytical progress of the Vision Plan.

Concept Development

The Concept Plan was built upon the precepts and information accumulated during the previous phases. Broad brush in its approach, the Concept Plan diagrammatically conveys the main ideas generated during the Observation Phase, ensuring the Vision Plan remains true to these original recommendations throughout the planning process.

Precinct Studies

In order to test ideas and spatial organizations for specific areas of the campus, multiple design alternatives were developed during the Precinct Studies phase. Members of the campus community were engaged to review design suggestions, with attention given to functional relationships, site capacity, landscape framework, pedestrian and vehicular circulation, and parking. Schemes were drafted, shared, and revised with the campus community until consensus began to coalesce around two final alternatives.

Final Plan and Design Guidelines

The Final Plan is a refinement of the ideas generated in the previous phases. The final document suggests the strategies and communication tools CI can use to implement the plan. The Design Guidelines suggest broad recommendations to direct the design of future projects at CI. They sustain the Vision Plan's intentions by preserving special qualities of the campus.

Distinct Spanish Mission Style architecture throughout the campus

Observations

The university's picturesque setting is unlike any other collegiate campus in the world. Not only does it sit at the foothills of the beautiful Santa Monica Mountains to the east, but it is also surrounded for miles by flat, highly active, and productive agricultural fields and orchards immediately to the north, south, and west.

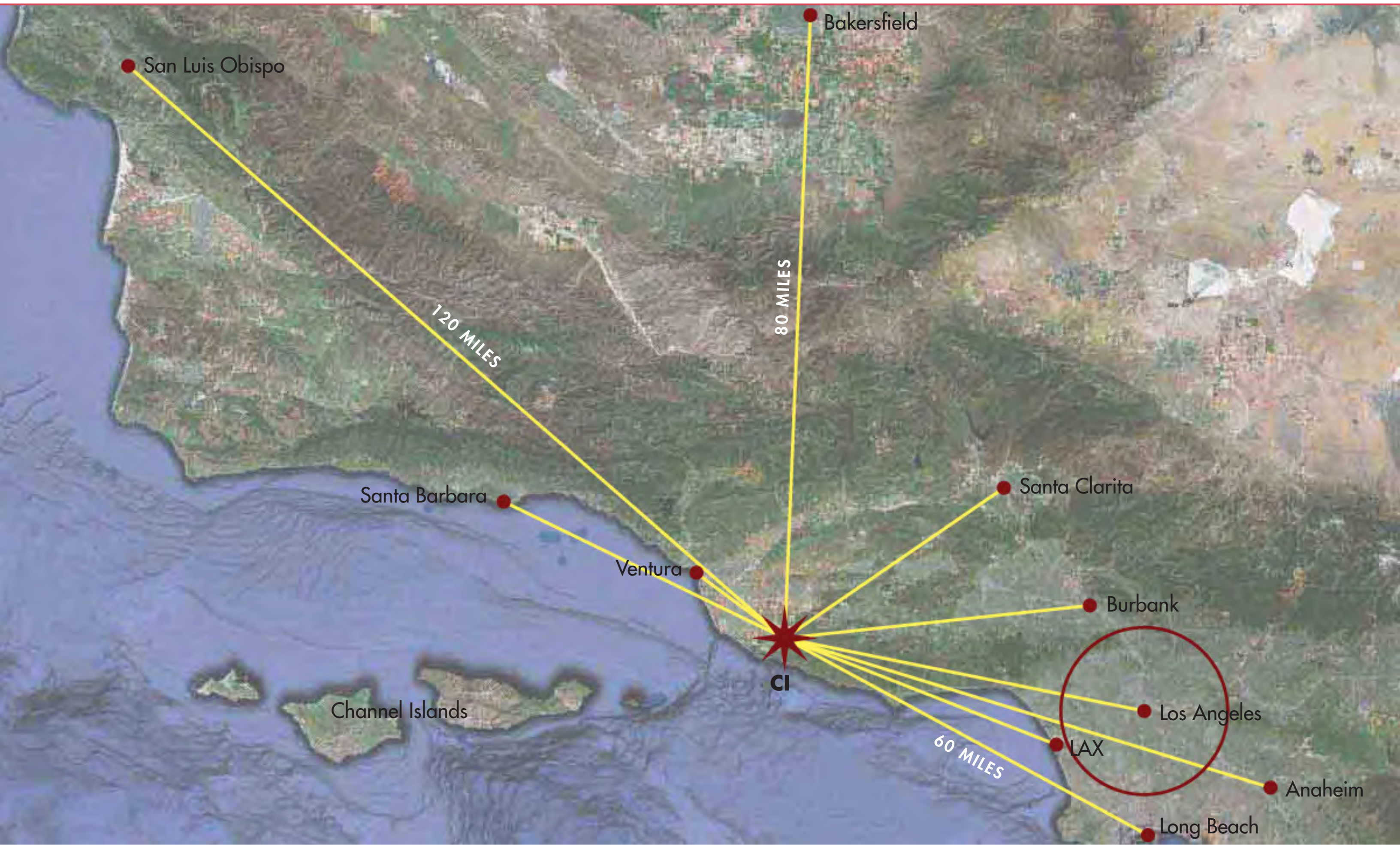
Location and Context

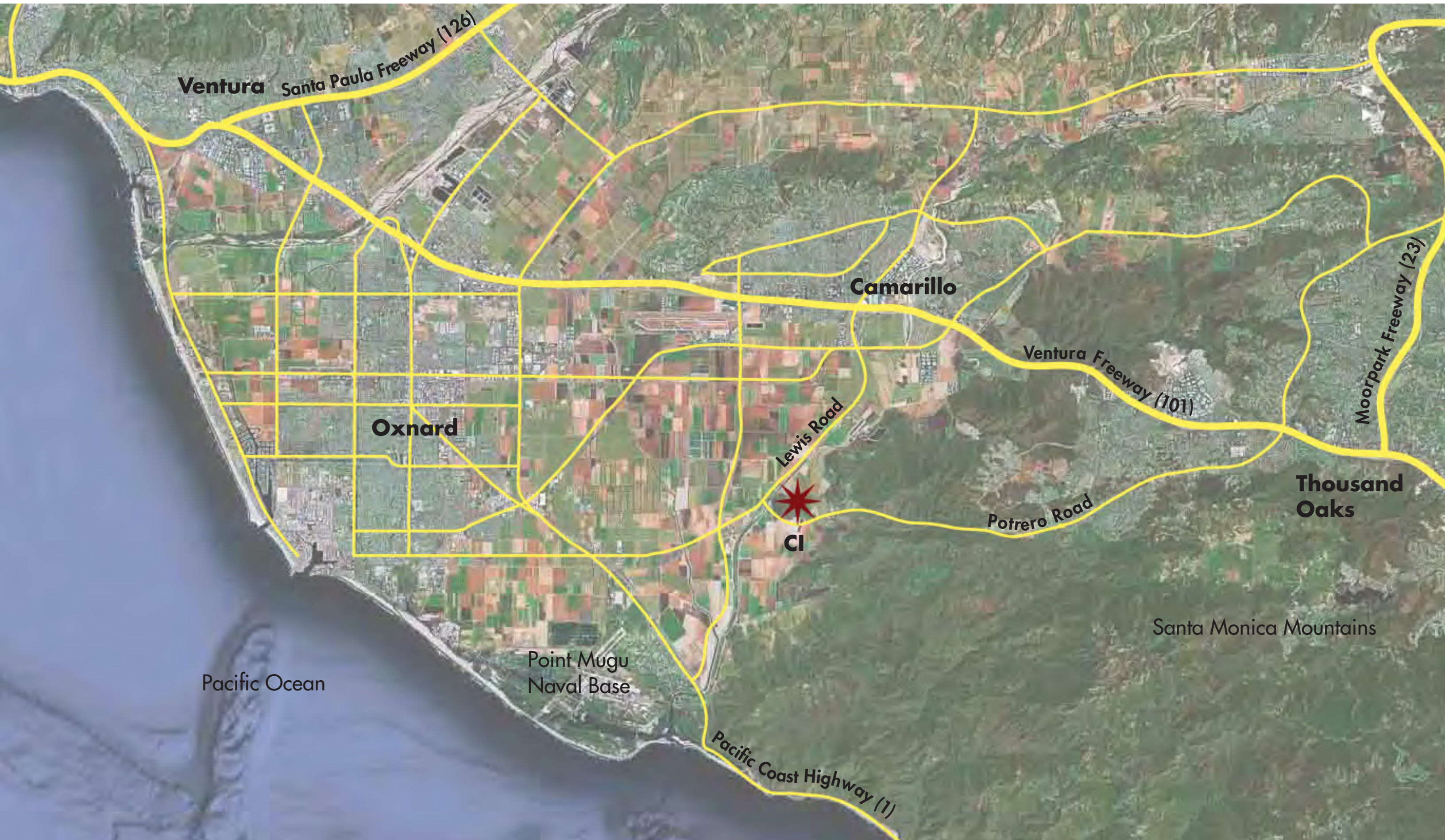
The CI campus is located in Camarillo, California, approximately 40 miles northwest of Los Angeles and 40 miles southeast of Santa Barbara, in Ventura County. Five miles inland from the Pacific Ocean, it sits on the Oxnard Plain along the western front of the Santa Monica Mountains. To the southwest, beyond the coastline, are the eight Channel Islands, the source of the university's name. Four miles to the north is Interstate Highway 101 and five miles to the south is California Highway 1 along the Pacific coast. Downtown Camarillo is approximately four miles to the north of campus.

In addition to its proximity to the Santa Monica Mountains, the campus is bordered to the west by Round Mountain (elevation 500 feet above the campus elevation). Peanut Hill, in the middle of campus, has an elevation of 80 feet above the campus elevation.

The overall site, owned by the State of California, is a tract approximately 1,200 acres in size, although only a fourth of that land is designated for direct campus use. The northeast portion of the site is reserved for use as a regional recreational park. The eastern portion of campus includes University Glen, a residential community with a small town center. The buildable segments are described as Core, East, West, and North campuses and are the focus of this Vision Plan. The remainder of land consists of unbuildable parcels due to steep topography.

This Page: View of campus surroundings: agricultural fields in the foreground and the Santa Monica Mountains in the background; Right/Top: Regional Context; Right/Bottom: County Context


Bakersfield
San Luis Obispo
120 MILES
80 MILES
Santa Barbara
Santa Clarita
Ventura
Burbank
CI
Channel Islands
Los Angeles
LAX
60 MILES
Anaheim
Long Beach


Ventura
Santa Paula Freeway (126)
Camarillo
Ventura Freeway (101)
Moorpark Freeway (23)
Oxnard
Lewis Road
Thousand Oaks
CI
Potrero Road
Santa Monica Mountains
Pacific Ocean
Point Mugu Naval Base
Pacific Coast Highway (1)

Camarillo State Hospital, circa 1953, looking northeast with South Quad in the foreground

History

By the time Spanish explorers landed in California, the region and several of the Channel Islands had long been inhabited by native people known as the Chumash. Expert opinion differs, but it is likely that the Chumash occupied the area for more than 9,000 years, living primarily in several villages and seasonal communities. It is clear that this tribe was active on the site that is now the CI campus; for example, Round Mountain is considered sacred today as a result of its role in a Chumash summer solstice ceremony.

The Chumash were largely unaffected by the exploratory Spanish voyages by Juan Rodriquez Cabrillo in 1542 and Sebastian Vizcaino in 1602. This autonomy began to dissipate during the period between 1769 and 1823, as 21 Spanish missions were built in California. The mission closest to today's CI campus was Mission Buenaventura.

Mission culture and European diseases dramatically changed the life of the Chumash. At the time of European contact, the Chumash had evolved into a commerce-oriented confederation. However, with the establishment of the missions came the beginnings of a European sense of land ownership. This investment became more tangible when Spain began assigning land grants in 1784. The authority to grant land shifted to Mexico in the early 1830s.

In 1836, Mexico made a land grant, newly titled Rancho Guadalasca, to a founding landowner named Ysabel Yorba. Rancho Guadalasca occupied an area of 30,594 acres and included what would become the site of the CI campus. At the time of the land grant, the ranch was used to raise cattle and horses and was managed by Yorba from Santa Barbara. Yorba built an adobe house on the ranch in 1837, although its precise location has yet to be found.

Undated historical photo of the bell tower

In the late 1860s, Ysabel Yorba sold her ranch to investors, and by 1871 more than two-thirds of the land was owned by William Broome for use in growing citrus fruit and produce. The remaining parcel of approximately 8,200 acres was purchased by Joseph Lewis, also for agricultural use.

In 1932, the State of California purchased 1,760 acres of Lewis' land for the new Camarillo State Hospital. Construction of the facility, which was conceived of as an agriculturally-based and largely self-sustaining community, began in 1934. Camarillo State Hospital opened in 1936 and construction continued until 1951. The north end of the hospital's grounds was used for farm operations focused on harvesting vegetables, grain and fruit trees, and dairy production. At its peak in the late 1950s, the hospital had a patient population of more than 7,000.

Beginning in the mid-1960s, the California State University System began actively seeking opportunities to open a campus in Ventura County. Ultimately, this effort would span three decades; by the mid-1990s, a Task Force commissioned by the governor was still looking for a site. However, this search would soon be over. By the 1990s, the board of Camarillo State Hospital was beginning to reevaluate its services due to a shrinking patient population and a declining budget. In 1996, the trajectories of the state hospital and the CSU system met, and the governor's Task Force recommended the hospital site as the new home for the 23rd campus in the California State University system. After the hospital officially closed in the summer of 1997, the property was conveyed to the California State University. Renovation of the signature Bell Tower began the following year and the first classes on the new campus were held in the fall of 2002.

Natural Systems

Geology

The campus lies on the Oxnard Plain, a part of the larger Ventura Basin. The adjoining mountains are of volcanic material and the Plain is largely alluvial. The core of the academic campus sits in a small valley between Round Mountain and the southern flank of Conejo Mountain. The underlying soil of the academic campus is an alluvium of gravel, sand, and clay eroded from the adjoining slopes. Like the larger region, the hillsides are primarily volcanic in composition.

Topography

The entire 1,200-acre CSU tract has a broad range of elevations, with a mixture of relatively flat or gradually sloping land with counter points of steep-sided hills and mountains. In the southwestern portion of the tract, where the CI campus sits, the elevations range from approximately 30 feet above sea level to 70 feet above sea level, except for Round Mountain and Peanut Hill. The slope of the flatter land trends down from the northeast section of campus to the southwest. A variation on this topography is the promontory on the eastern part of campus where the prestigious Broome Library stands. There is a noticeable rise of approximately 10 feet from Camarillo Street to the library, making it one of the prominent locations on campus.

Hydrology

The campus is part of the Calleguas Creek Watershed, which covers approximately 340 square miles in southwestern Ventura County. It ultimately drains to the ocean through Mugu Lagoon, one of the largest remaining coastal salt marshes in Southern California. Approximately half of the watershed land is undeveloped and the remaining area is split between agricultural and urban use. The upper portion of the watershed includes the cities of Thousand Oaks, Simi Valley, and Moorpark.

The Calleguas Creek Watershed is the subject of study by Ventura County, addressing issues that include water quality, loss of ecosystems, flooding, and erosion/sedimentation as part of its Watershed Protection District. A coalition of local property owners, water and wastewater agencies, environmental groups, agricultural parties, and government agencies have collaborated in developing the Calleguas Creek Watershed Management Plan.

Portions of Calleguas Creek run through and adjacent to campus. Once intermittent, it now has a constant flow as a result of urban development upstream. Long Grade Canyon Creek runs from the Santa Monica Mountains through the campus from east to west to join Calleguas Creek. Because of its location, CI plays an important role in the overall quality of the lower watershed.

Calleguas Creek is the primary source of flooding in the area. A FEMA-designated floodplain surrounds and includes portions of the campus to limit the kinds of uses possible in those areas. The designated floodplain includes all of North Campus and the agricultural land immediately adjacent to the southern edge of campus. The FEMA-designated areas and surrounding hills and mountains limit the portions of campus that are developable, resulting in a relatively well-defined site appropriate for campus growth.

Vegetation/Habitat

The coastal sage scrub habitat of Southern California can be seen in the hills and nearby mountains of campus. This natural environment is home to many diverse species of animals and plants, with many specific to just this region. The disturbed lower areas of the 1,200-acre site include some remnant or resurgent scrub and riparian communities as well as the urban landscape of University Glen and the campus core.

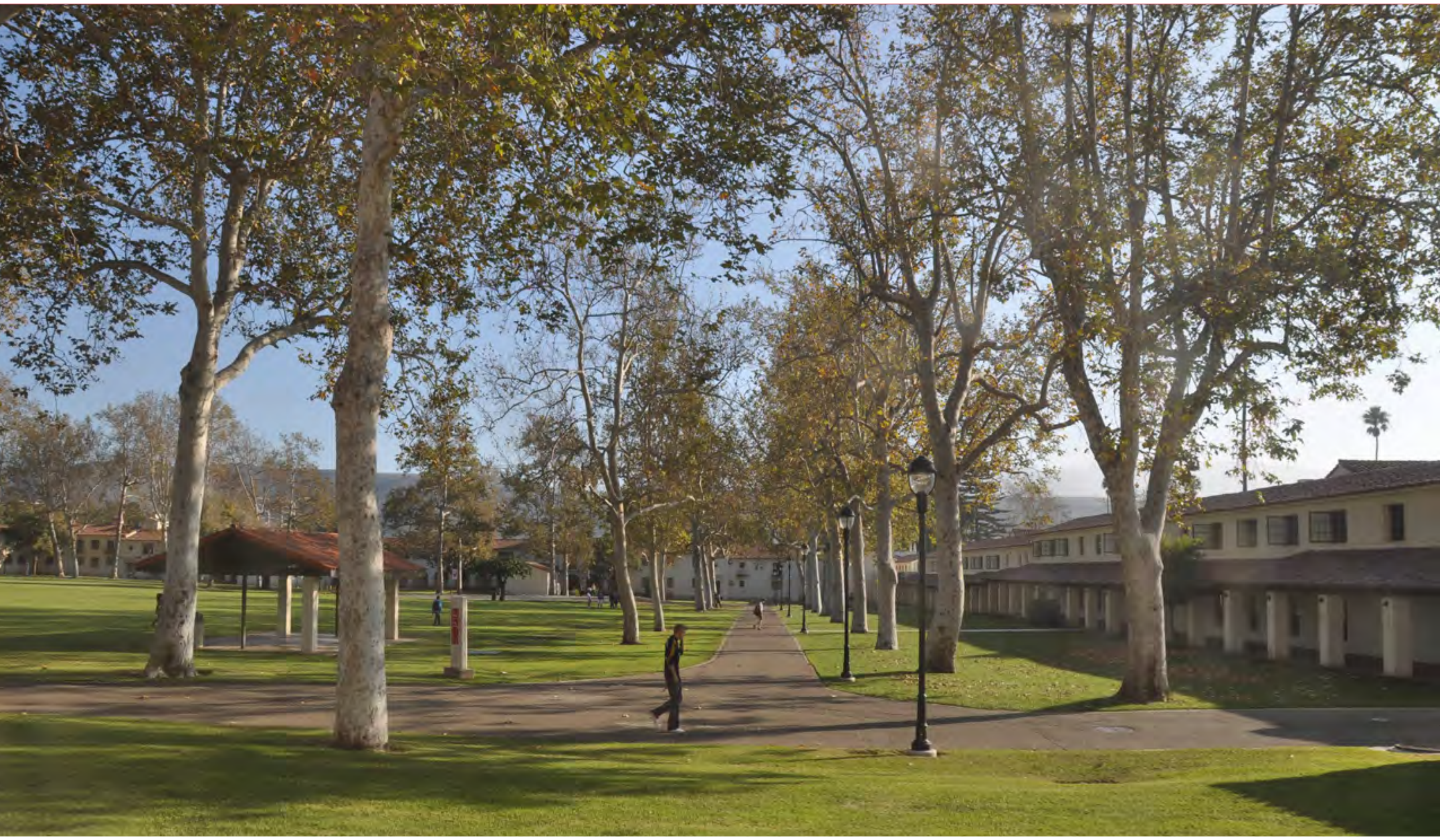
Surrounding the campus are high production agricultural fields and orchards as well as the foothill and mountain range extension of the coastal sage scrub habitat that is part of what is known as the Mediterranean biome. This

Topography and Floodplain

- *Highest Point*
- *Lowest Point*
- *Flood Plain*

Hydrology

- *Flood Plain*
- *Calleguas Creek*
- *State-Owned Boundary*



Early morning view of the South Quad

ecosystem is defined by mild winters, warm and dry summers, an adjacent cold ocean, related terrestrial plant, and animal communities and marine habitats. It is linked to only four other relatively small areas in the world with these Mediterranean conditions: the region bordering the Mediterranean Sea, central Chile, the Cape region of South Africa, and southwestern Australia. The CI campus is a beautiful representation of the biome and agricultural settings.

Climate

CI has an attractive, mild climate characterized by warm, dry summers and mild, rainy winters. Summer temperatures have average highs in the upper 70s (Fahrenheit degrees) and lows in the lower 60s, with frequent sunny days. Relatively short winters have average highs in the mid 60s and lows in the upper 40s. Average evening relative humidity is 60 to 70 percent. Average rainfall is between 13 and 14 inches annually, primarily during the winter, but the campus usually has more than 300 days of sunshine a year.

Summer winds typically come from the west and winter has a mix of wind from the west and from the northeast. The average wind speed is 5.9 miles per hour, with little variation across the year. Occasionally, the campus will experience several days of Santa Ana winds. These unusually strong breezes bring hot, dry air from the northeast. Formed in autumn and early spring, the temperature of these extremely dry winds can be well into the 90-degree range. For the most part, the campus enjoys steady, mild ocean breezes.

Existing Campus
Existing Buildings
University Glen Buildings

Built Systems

Campus Boundaries

The boundaries of the campus were established by the purchase of 1,200 acres of land by the State of California in the 1930s. As part of the land transfer to the University, the northeastern segment of the site was established as a park for passive recreation and is known as the Regional Park. The plan for this area is being developed separately from the Vision Plan.

The central segment of the site is East Campus, which includes University Glen, a residential and town center development. The land for University Glen was ground-leased for 99 years by a government agency, the California State University Channel Islands Site Authority, which is the developer of the residential community. The Site Authority allowed revenues generated from University Glen to be used to develop the CI campus. Phase One of University Glen consists of 658 housing units, along with the Town Center and other amenities. Future phases are in development.

The southwestern segment of the 1,200-acre site consists of the academic campus and is the focus of this Campus Vision Plan. This area comprises the buildable areas of the site, with Round Mountain to the west. An independent site for the Camrosa Water Reclamation Facility (waste water treatment plant) is located within the campus boundary between Round Mountain and North and West Campuses but is not controlled by the CI.

One off-site campus facility exists at Channel Islands Harbor in Oxnard. It supports the CI Waterfront Program that includes kayaking, sailing, windsurfing, and rowing.

Development Capacity

Campus Developable Land

State-Owned Boundary

Developable Area

The full, state-owned site is 1,200 acres, but the area available for the CI campus is far smaller. Subtracting Round Mountain, Peanut Hill, and the hillsides to the east of the University, the developable area consists of the campus core at 129 acres, West Campus at 22 acres, and North Campus at 154 acres for a total of 305 developable acres. The campus' central power plant (CI Power) is located within the West Campus to the north of Peanut Hill and will remain in use for the long term.

Physical Environment

CI is a place of high-quality architectural character and intimate scale. The consistency of the Mission Revival and Spanish Colonial Revival architecture conveys a sense of age and personality in contrast to its youthful population.

The existing campus buildings and open spaces are organized into a simple configuration of two rectangles (the quads) and an intermediate, high profile axis (the Central Mall). Within the two large, central enclosed quads is a finer grain of one- to three-story buildings arranged around more intimate courtyards.

The campus core is the dominant area of academic activity. The Broome Library sits to the east on a small rise. To the west of the campus core is a mix of mostly flat and pitched roof structures for support, operations/ maintenance, and a few academic activities. To the southwest is the concentration of student housing.

On campus, the four most visually significant buildings create markers on the Mall. The new Broome Library and the original Powerhouse terminate each end of the Mall. The Bell Tower and University Hall, with their nine arches, define the irregular pedestrian cross-axis that aligns the North and South Quads.

View looking east across the Central Mall towards Broome Library from the top of Peanut Hill

The two quads, with their vast size and low enclosures, are spaces unique to CI. The low buildings that enclose them have long facades and arcades on the east and west sides. The perimeter of the South Quad is lined with a remarkable, almost-complete double row of sycamore trees. From these quads, the peaks of the surrounding mountains are visible.

Vehicular Circulation and Transit

The CI campus is bordered by two major roadways, Lewis Road on the north and west, and Potrero Road on the south. The major entrance to campus, University Drive, originates from Lewis Road and winds its way through North Campus alongside new parking and space for future recreational playfields to Santa Barbara Avenue.

Camarillo Street, a secondary entry to campus off of Lewis Road, connects into the campus at the northeast corner of the campus core at Santa Barbara Avenue. Public access is also available at the southwest corner of campus along Potrero Road. In addition to the three public entrances, a minor service road reserved for university vehicles connects Potrero Road to the Central Plant on campus.

Currently, the campus roads are united by a two-way loop road, which serves as the primary circulation system within the core of the campus. The curb-to-curb widths along the loop vary considerably. While the narrow width along portions of the loop result in low vehicular speeds, the roadway width is less than would normally be provided for two-way travel. This narrowness results in a tough turning radius for both cars and trucks. The Central Mall, originally Los Angeles Avenue, is closed to vehicular traffic and now functions as a pedestrian mall divided by a wide grassy median with shade trees.

Rincon Drive and Chapel Drive form a loop around the eastern edge of the campus, where Broome Library and the adjacent mixed-use Town Center are located. San Luis Avenue is configured for one-way travel to facilitate the flow of traffic around the on-campus transit bus stop. Fillmore Street is a minor two-way service road that currently provides service access to Broome Library and to a small parking lot. Oxnard Street runs between Ventura Street and the external Potrero Road, providing one of the three entries to the campus.

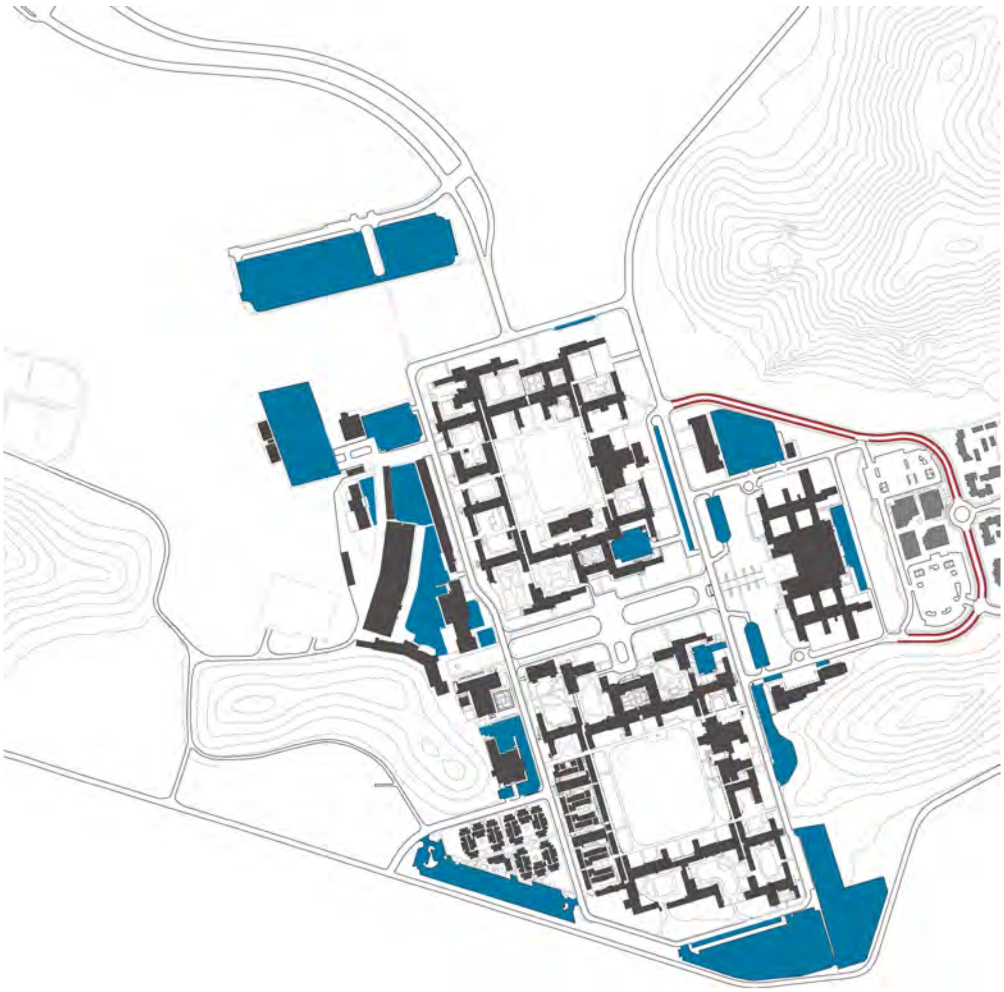
One bus stop is situated on the campus. It is currently located midway along San Luis Avenue, north of Broome Library but has plans to be moved to Santa Barbara Avenue at the campus gateway in the future. The bus stop has limited amenities, including signage, lighting, benches, and shelter. VISTA transit is operated by the Ventura County Transportation Commission (VCTC) and provides service to the campus via two routes, but the headways do not run close together. One route comes to campus every 30 minutes and the other every hour. Shuttle buses stop at the Camarillo Metrolink station, at Oxnard College, and at a transfer location near the Centerpoint Mall in Oxnard. Less than 5 percent of the CI population takes public transit to campus.

Parking

Parking on the CI campus is provided by numerous surface lots located throughout the campus. The surface lots that exist within the campus core distract from the beauty of the campus. Approximately 2,415 parking spaces are available in these on-campus lots. On-street parking is available on most streets in the areas adjacent to the east side of campus, along Rincon Drive and the Chapel Drive loop. Use of these off-campus parking spaces is shared with residents, employees and patrons of businesses in the Town Center, and residents of University Glen. If you were to combine the total amount of surface parking that exists on campus, it would take up more than half of the existing campus core. The majority of people coming to campus drive alone, accounting for the 2013-2014 year parking supply ratio of the campus at 0.56 spaces per FTES. The average ratio in Fall 2010 for CSU campuses was 0.38 spaces per FTES and CI's considerably higher ratio is probably due to the University's remote location and lack of multiple modes of public commuter transportation sources.

As the campus continues with beautification and building expansion, former campus core parking lots are being converted to pedestrian or building usage and parking is being replaced in the north campus lots with long-term potential for 5000+ spaces north of the Long Grade Creek levee to handle the increasing student population.

Note: This report is based on Spring 2014 statistics. Future campus decision making should take into account the most recent parking and FTES numbers. More detail can be found in the Parking Appendix.

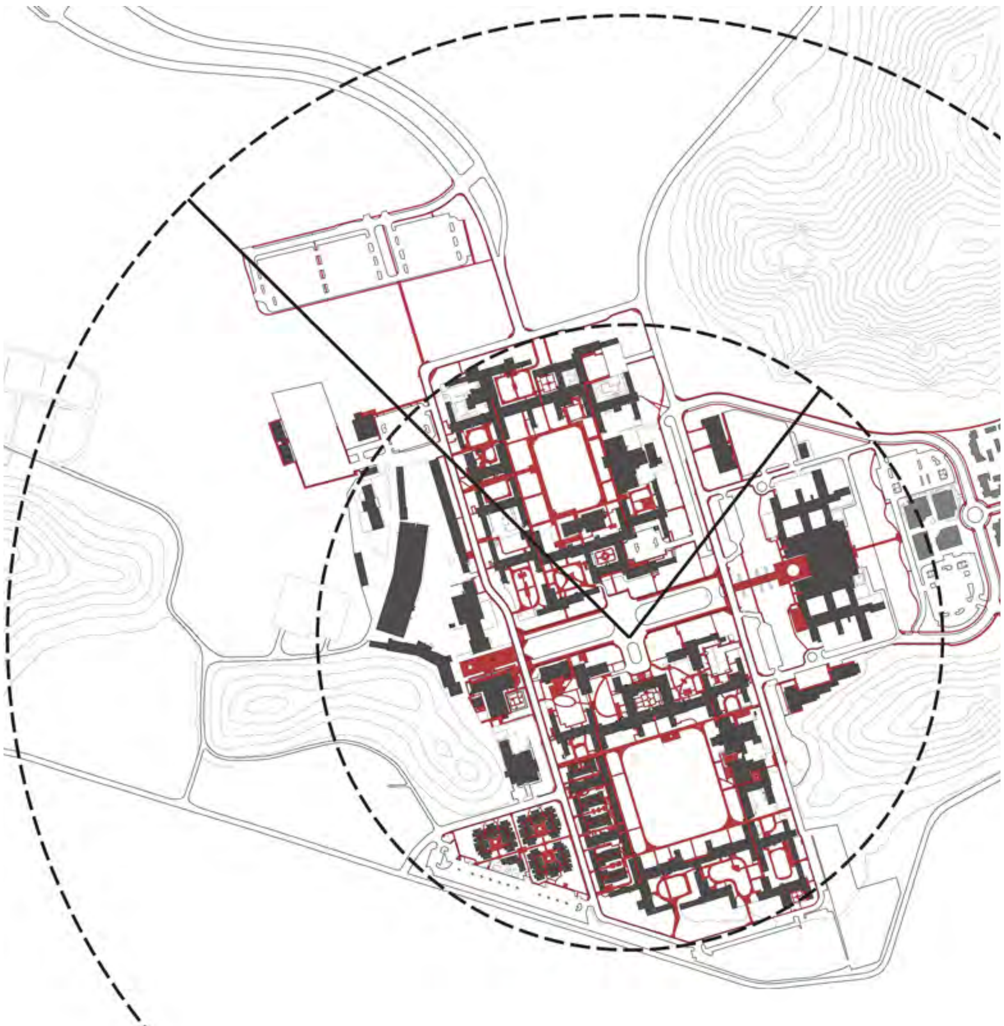


Parking

- *Surface Parking Lots*
- *On-Street Parking*

Aggregated Parking

- *Surface Parking Lots (combined)*



Pedestrian Circulation

Pedestrian Circulation

Pedestrian and Bicycle Circulation

The compact configuration of the campus promotes walking, as buildings are contained within reasonable walking distance from one another. A considerable number of east-to-west and north-to-south walking paths are provided; however, most of the pedestrians on campus use the Central Mall as the main east-west path, with a key focus of pedestrian traffic being at the intersection of the Central Mall and Camarillo Street. Other areas of pedestrian activity occur near student housing and the Student Union along Ventura Street, and in the areas around the perimeter parking lots along Ventura Street and Camarillo Street. Due to the relatively low level of existing activity on campus, pedestrian-vehicle conflicts in these areas are minor but may become more problematic as the

campus expands. In its original use, the hospital campus was meant for isolation and containment. Therefore, pedestrian connections in and out of the two quads are limited and confining gates and walls make it difficult to experience the beauty of these spaces.

Some bicycle use on campus occurs on the internal campus streets and pathways and on the streets within University Glen. While bicycles are permitted to travel on campus streets, there are currently no marked bicycle facilities within the campus except along the new access road. Bicycle lanes are present on the shoulders of Lewis Road, the primary regional access route to the campus, but they are not very wide and can be perceived as being very unsafe.

Gateways and Views

The campus has its roots in an inwardly focused design, stemming from its original use as a state mental health hospital. From Lewis Road, the campus is barely visible. The historical arrival on campus had been almost incidental, from Lewis Road along Camarillo Street, between the dramatic hillsides and the verdant agricultural fields and orchards. The new entrance drive into the North Campus creates a more notable arrival gateway at Lewis Road and at the face of North Quad. A minor gateway is present off Potrero Road on the southern edge of campus.

Views are an integral component of campus character and personality. The juxtaposition of mountains and agriculture with more distant ocean vistas sets CI apart from other campus settings and reinforces a philosophical connection to the earth. Significant views fall into three categories: those looking into the campus from an exterior vantage point, those directed from the campus to the landscape surrounding it, and views captured from one point on campus to another.

The primary views outside the campus are from Lewis Road, along University Drive, and the upper elevations of the Regional Park. The secondary short range view is from Potrero Road looking north. Significant views from the campus are those of the surrounding rugged hills. Several notable and defining views occur from within the campus to the mountains to the east and west as seen from South Quad, North Quad, the mall, and Broome Library. The southern campus perimeter offers remarkable views to mountains and agricultural fields. From higher elevations, the Pacific Ocean and Channel Islands are visible.

Notable internal views are those of the Bell Tower as seen from the mall, the library, and South Quad, as well as those to the library and Powerhouse as seen from within the mall. The vast open space, low-rise buildings, and spacing of trees on campus make these defining views possible.

From Top: View looking west down the Central Mall towards the Powerhouse and Peanut Hill beyond; View of the Santa Monica Mountains beyond the bell tower; View of Round Mountain beyond University Hall; View of Round Mountain from Broome Library

Campus Edges

The public edges of the campus are not highly defined. A dirt access road and Lewis Road form the northwestern edge of North Campus. Potrero Road generally delineates the southern edge of campus, which is a mixture of parking lots and a recreation field. Ventura County's Agricultural/Urban Buffer Policy, requiring a 150-foot setback from any property line adjacent to agricultural fields, mandates a buffer between buildings and potentially other uses along the southern edge of campus and Potrero Road. In addition to the setback, a double row of trees is required to help reduce human exposure to agricultural chemicals and protect the economic viability and long-term sustainability of the Ventura County agricultural industry.

The Camrosa Water Reclamation Plant, located near the western boundaries of the campus, utilizes an aerobic process to treat sanitary waste. As a result, there are periods when a strong and unpleasant odor drifts east and northeast from the plant. Potential development plans for the plant by the City, set to modify the treatment process and reduce the odor, are encouraging to the University.

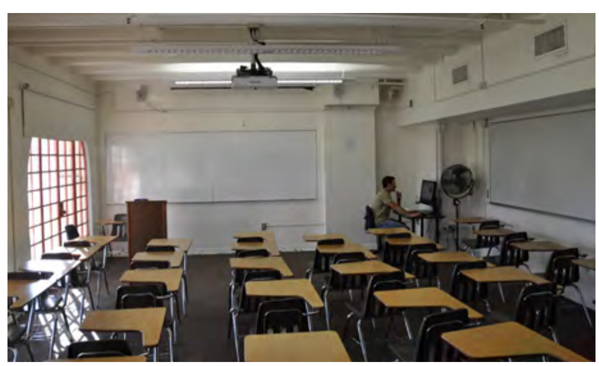
Architectural Character

The CI campus inherited a remarkable inventory of Mission Revival and Spanish Colonial Revival buildings from the state mental health hospital. Some of these historic structures, dating from the 1930s and 1940s, have been renovated for University use and some are unused and have yet to be renovated. In addition to this architectural fabric, the campus features buildings that have been constructed over the past decade. The majority of these new buildings are designed to mirror the existing revival styles of architecture on campus. One exception is the Broome Library, a state-of-the-art teaching, learning, and study space for the campus community, which is the one truly modern-style building on campus. Buildings outside the campus core are more utilitarian in style.

The original buildings of the campus core incorporate a series of brightly-lit day rooms. These spaces are often two stories in height with large sash windows and inset doors opening to the outside. Located in a fairly regularized pattern on the campus, they provide an unusual opportunity to create informal learning and gathering spaces with strong indoor/outdoor relationships to courtyards.

An unfortunate drawback of the beautiful, original buildings in the campus core is that they are narrow and not the best footprint for university-related uses such as classrooms. Built of poured-in-place concrete, the existing buildings are frequently and inflexibly too narrow and too low for functional teaching and lab space. After repurposing a number of the existing buildings over the past decade, the University has discovered the limitations



Top Photos: Campus architectural character
Bottom Photos: Functionally outdated classrooms in the narrow wings of the existing buildings

of their structure to becoming the well-proportioned and efficient spaces required of a 21st century campus.

Another challenge presented by the original buildings' internal corridors is that they do not always align properly. Buildings range in height from one to three levels so that the floors of adjacent, connected structures often do not align or are not contiguous from one structure to the next. Because of this incongruity and changes in site topography, a long connected corridor often shifts up and down several feet, making it difficult to provide continuous, barrier-free circulation.

The Vision Plan team reviewed the functional potential of the existing buildings and their relationships to the quads, along with the likely growth patterns of the campus, to create a preliminary plan for future building viability. In addition to the narrow, original buildings within the

Dayrooms

Dayroom Location

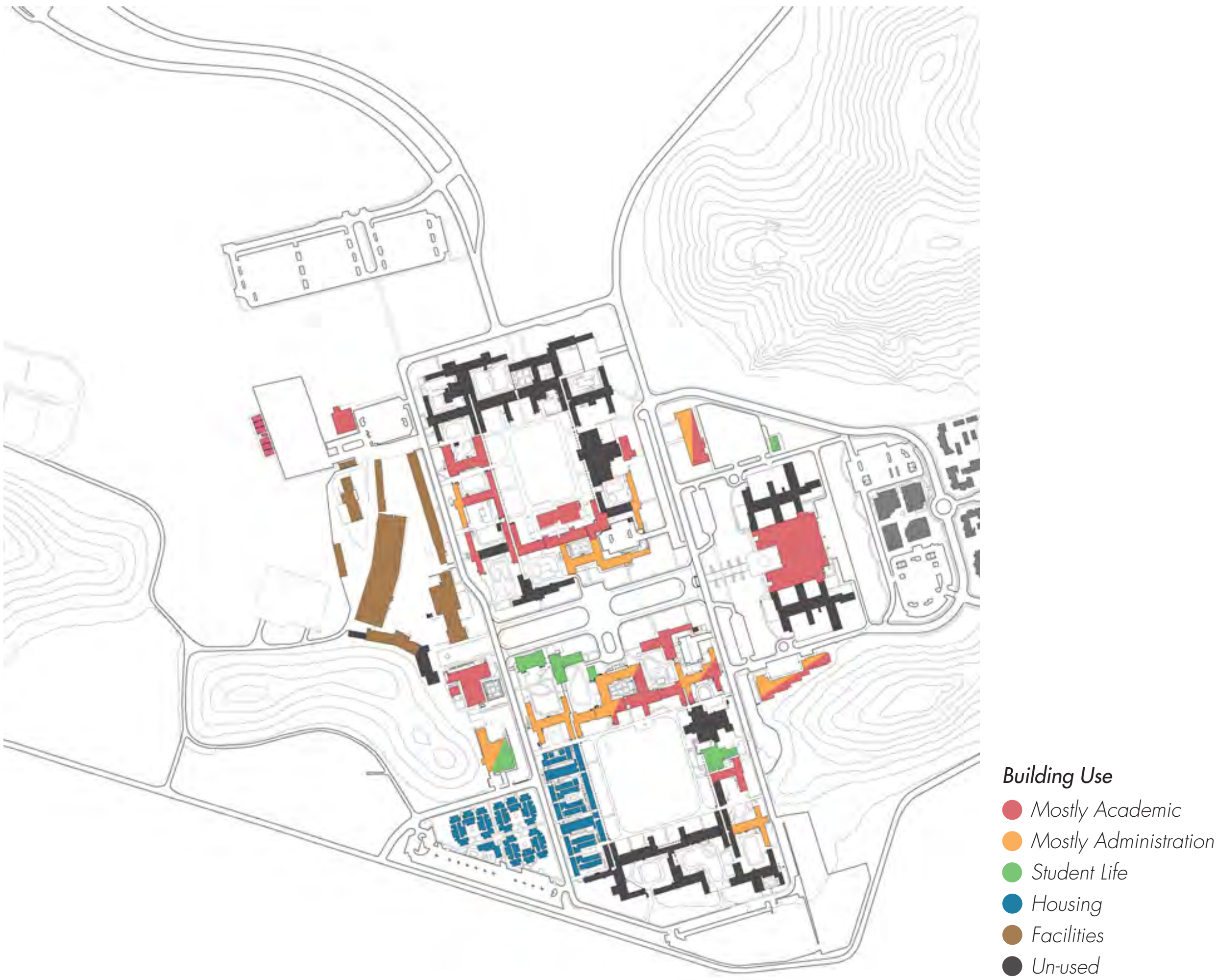
campus core, some buildings in other locations do not support the mission and goals of a 21st century campus. For example, many operations and maintenance buildings on the west side of campus are one level, irregular in shape, of poor quality construction, and do not make the highest and best use of land.

Building Height

The heights of buildings vary within the campus but all remain within the 60' height limit mandated by the Board of Trustees. Most of the buildings within the campus core are two levels. Del Norte Hall, the newest building in North Quad is three levels. A few of the wings of buildings in the campus core are only one story. The Broome Library, a focal point of the campus, is three levels, along with Anacapa Village housing. The majority of buildings west of Ventura Street are one story buildings.

Building and Land Use

A variety of building and land uses make up the campus, representing a fairly even distribution of activities across the campus. The campus core consists of predominantly academic and administrative space. This pattern extends to the east of Camarillo Street, where the library is located, along with additional academic/administrative space and a small student health center. Student housing is located in the southwestern portion of the campus with a recreation field sited beyond the residence halls. Space used by facilities (maintenance and operations) is largely contained in the area west of Ventura Street. However, this area also houses some academic space, a recreation center, and parking. A new student union with a food service venue is located in the South Quad, along the mall.



Most of the un-used, un-renovated original buildings are located on the north end of North Quad and south end of South Quad, along with the wings of the library. Wetland and riparian areas are located in North Campus. The building and land use patterns on the campus suggest a desired mix of academics, housing, student life and administration; however, maintenance and operations takes up a disproportionate amount of space on campus compared to other uses.

Open Space & Landscape

The CI campus is blessed with a beautiful and quintessential California setting. From the new entry, the view to the campus from Lewis Road reveals a panorama of agriculture set against nature, establishing the setting's real identity. The rich and productive agricultural plain, with an all year growing environment on prime agriculture soils, supports high value crops such as citrus orchards,

strawberries, and artichokes. The new road, flanked by new regional tree plantings, bridges the riparian habitat of Calleguas Creek, past these productive fields, to a broad view of the low campus buildings tucked into the scenic backdrop of the western extent of the Santa Monica Mountains. In the natural areas growing on slopes and among rock outcrops a great diversity of native plants thrive, including toyon, lemonade berry, and laurel sumac. These plants appear lush, but survive without irrigation.

These mountains and agricultural fields buffer CI from the larger community, establishing the campus as a place apart. The campus, with its nearby ocean, beaches, and hiking, located halfway between the gateway to the semi-rural central coast and urban Los Angeles, offers diverse open space experiences.

This surrounding undeveloped open space serves as design inspiration and provides many opportunities to enhance environmental literacy. Native plant communities include riparian woodland, coastal sage, chaparral, and grasslands that serve as outdoor labs to learn about regional natural environments. Rocky outcrops with distinctive bright green and orange lichen inspire design ideas such as the selection of the furniture fabric colors in the library.

On campus, expansive courtyards and quads define the developed open space. Prior to the site's establishment as a college campus, the landscape design emphasized visibility for security, with large open areas of lawn and aggressively trimmed shrubs. New landscapes soften this approach with the use of regionally adapted and native plants, placed to avoid the need for shaping and pruning.

More detail can be found in the Landscape Framework Appendix.

Infrastructure

Two projects have significantly improved the campus infrastructure. A recently completed utility project added new electrical infrastructure and distribution capacity to campus. A new hot and chilled water distribution replaced the previous steam system to improve energy efficiency. Additional water, waste water, storm drain, reclaimed water, natural gas, and telecommunications/data capacity replaced 50 to 70-year-old systems to meet current needs and future enrollment growth, estimated at 15,000 students.

The second infrastructure project, within the North Campus, is University Drive and stormwater management improvements. It broadens Long Grade Canyon Creek with wetlands and riparian edges, builds a levee to meet 25-year flood levels, includes a 534 space parking lot, anticipates future parking, introduces native plant material, and provides space for future athletic fields.

Courtyards and other outdoor spaces throughout the campus

Hydrological deficiency on the West Campus

Hydrology

The current campus consists of approximately 122 acres of developed land that drains water to three different outlets, each of which eventually flows to Calleguas Creek. Two outlets are located on the south side of the campus, to the north of Potrero Road. These outlets convey water underneath Potrero Road so that it eventually outlets into the farmland south of Potrero Road. The stormwater then flows in irrigation ditches within the existing farmland until it reaches Calleguas Creek. The third outlet for site run-off is into a tributary of Calleguas Creek at the north side of the campus, just east of the entry along Camarillo Street.

The hydrological deficiencies on campus occur in three main areas. One is along Ventura Street, from the Central Mall north to Santa Barbara Avenue. The runoff ponds along Ventura Street and does not flow adequately into the storm drain inlets due to the undersized storm drain.

Another deficiency is the detention pond to the west of the Chiller Plant. Because the outlet pipe for this pond is undersized, water often sits for days after a large storm event. The constraint faced by the University is that it cannot increase the rate or volume of water flow conveyed by the three existing drainage outlets or it will receive negative downstream effects on surrounding properties. The third main deficiency is the drainage ditch along Potrero Road that crosses the road in a culvert and flows south into the farmland. The culvert is undersized for the quantity of flow in the ditch and results in roadway overflow during heavy rains and some runoff onto the neighboring agricultural fields.

More detail can be found in the Hydrology Appendix.

Co-Gen Plant on West Campus

Energy

The campus is currently served by two primary sources of electrical energy, the on-campus cogeneration (CoGen) Plant and Southern California Edison (SCE). The CoGen Plant uses natural gas and produces both steam and electric power used for heating, hot water, and the production of chilled water for cooling. The CoGen Plant is located in West Campus on approximately 1.4 acres of land, plus the surrounding drainage area just northwest of Peanut Hill. The Central Plant completed in late 2010 includes two chillers, heat exchangers for conversion of incoming steam to hot water and various plant auxiliaries, such as pumps and cooling towers. Power distribution within the campus has been upgraded by the Campus Infrastructure Improvement Project completed in 2010. The infrastructure project included provision of new chilled water piping, new hot water piping systems, and conversion from steam to hot water piping. The electrical part of the infrastructure project provided 12kV power distribution for more efficient and reliable delivery of electricity to buildings.

More detail can be found in the Energy Appendix.

Top Photos: Co-Gen Plant on West Campus
Bottom Photo: Facilities Management & Operations

Interior view of Broome Library

Sustainability

CI is committed to environmental sustainability as a charter participant in the Sustainability Tracking, Assessment & Rating System (STARS), developed by the Association for the Advancement of Sustainability in Higher Education (AASHE). The University has already achieved a STARS Silver rating (on a scale from Bronze to Platinum) in 2011 for its efforts to save energy and conserve natural resources. The campus' initiative is supported by the statewide requirements of California's Executive Order No. 987, which outlines energy and sustainability requirements for the CSU system. The Executive Order sets policy for energy conservation, sustainable building practices, and physical plant management for the California State University system.

The CI Sustainability Task Force completed its first greenhouse gas inventory in 2011. The campus has also made notable progress in energy and water conservation. During the two years leading up to the 2011 greenhouse gas inventory, CI reduced its electricity consumption by 27 percent based on kWh per gross square foot and reached a recycle rate of 50 percent. The University is now actively working to reduce the use of potable water in restrooms, kitchens, and mechanical equipment. More climate-specific planting is being done and more than 97 percent of irrigation is accomplished with reclaimed water purchased from the Camrosa Water Reclamation Facility. CI has also saved 28 percent of its domestic water. In addition, the campus achieved 75 percent scores for sustainability related to both curriculum and research in the STARS system. In 2011, the CI Sustainability Task Force also established a new next-steps plan, focusing on five issues: transportation, strategic energy, recycling awareness, environmental literacy, and new building goals.

A sustainability workshop, fostering a partnership between the vision planning team and the Sustainability Task Force, outlined the following goals:

- Graduate all students with environmental literacy
- Make sustainability demonstrable on campus
- Minimize energy use; maximize renewable resources
- Minimize water use; demonstrate integrative approaches
- Limit impact of vehicles on campus and in region
- Evaluate the application of "cradle to cradle" on campus

The campus vision planning process is grounded in this commitment to sustainability.

Academic Plan

The Academic Plan consists of four strategies that integrate Mission, Vision, Values, and General Strategies defined by the Strategic Plan of the University 2008-2013.

In concurrent planning sessions, the Provost's Office, President's Cabinet, academic planning committees, Faculty Senate Executive Committee, students, and other faculty, administration, and staff participated in discussion and development of the Academic Plan. This initiative was completed during the Observation Phase to provide program content and criteria for the Campus Vision Plan. The process proceeded through four steps:

1. Systematic review of documents describing the institution and its academic approach.
2. Interactive workshop attended by members of the groups listed above to focus on five overarching questions about the institution (see Academic Plan Appendix).
3. Plenary Session, with 40 representatives of the groups working in small teams, to address specific aspects of academic planning that were generated from the workshop.
4. On-campus wrap-up session for responses, comments, and critique of the emerging academic plan, followed by authorization of the resulting plan.

Throughout the process, the academic planner and vision planning team worked with the various University groups to guarantee the early Vision Plan analysis and programming were cross-fertilized. This collaboration also ensured that the Academic Plan directly influenced the attributes and future resources of the physical Vision Plan.

The Academic Plan consists of four strategies that integrate Mission, Vision, Values, and General Strategies defined by the Strategic Plan of the University 2008-2013:

Encourage and support student-centered learning through teaching, inquiry, scholarly, creative, and co-curricular activities.

1. Programs will concentrate on enhancing current courses of study to promote depth in the discipline (programmatic strength).
2. As the University is allowed to develop, additional tenure-track faculty committed to creative approaches to teaching and learning will be hired. An appropriate number of faculty will be hired to engage the number of students served and to provide opportunities for students to experience various points of view.
3. Faculty development will be provided to introduce and train faculty to create hybrid/blended courses to assess and enhance student learning outcomes and provide expanded opportunities to serve a growing student population.
4. Funding will be provided to encourage pilot courses for new models for the delivery of instruction.
5. Cross-disciplinary and multi-use spaces will be designed to foster faculty/student interaction and team teaching.
6. Specialized spaces will be designed to serve science programs that will enhance the Science, Technology, Engineering, and Mathematics (STEM) initiatives and promote research for undergraduate and graduate students.
7. New and renovated structures will reflect the mission of the University (form to follow function).
8. Wellness will be emphasized in coursework and in co-curricular opportunities, as well as in designing spaces to promote healthy lifestyles for students, faculty, and staff.

Key campus stakeholders engage in Academic Plan discussions

9. Research facilities will be designed to promote interdisciplinary initiatives.
10. Rehearsal/practice spaces will be developed for appropriate majors in theater and music.
11. Large spaces (500 people) will be designed to accommodate invited speakers and to host special events.

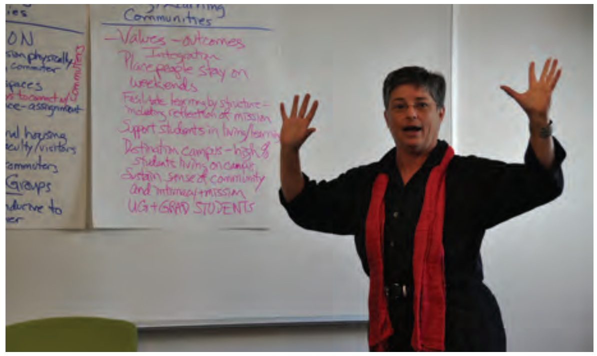
Foster community engagement with students and provide regional and global access to the University.

1. Needs assessments conducted with students and community representatives will determine the ways in which the University can be connected to the local community.
2. The University will be a model for environmental sustainability practices to share with the community.
3. Programs on the campus will be designed to meet community needs.
4. The University will work with the community to provide venues for events, lectures and conferences.
5. Programs providing non-credit, life-long learning opportunities for 1,000 participants will be expanded.
6. Study abroad will involve long- and short-term opportunities and be encouraged by all disciplines represented by the University.
7. Foreign students will be recruited to study at the University, particularly from countries in Asia and South America, but not limited to those nations. As intercollegiate athletics is developed, athletes will also be recruited worldwide.
8. Internships and externships will be developed for students in all majors and will be linked with the region and the world.

9. Bike paths will be built to connect the University with the local community.
10. The University will work with the community to extend and improve bus service to campus.

Continue developing innovative practices that enhance the quality and effectiveness of the University, including academic programs, student support services, business enterprises, and physical infrastructure. Additional majors will be developed that enhance existing programs and be guided by both the resources required as well as projected enrollments.

1. Faculty offices will be designed to preserve interdisciplinary interaction and mix tenured, tenure-track, and temporary faculty together with student affairs staff.
2. Administrative offices will be co-mingled with faculty and staff offices.
3. A child care center will be identified to serve faculty, staff, and student children and to explore the possibility of a learning laboratory for the Early Childhood Program.
4. Flexible classroom space will be designed to fit cross-disciplinary programs, both indoors and outdoors, and have wireless capability and be laptop ready.
5. On-line communication will be developed for mentoring, tutoring, and advising.
6. The University will develop a streamlined pathway for integrating community college students into its programs.
7. The University will enhance a "one-stop shop" for students (admissions, financial aid, registration, cashiering, advising) which will be accessible for both residential and commuter students.
8. Learning communities will dominate the first-year experience and the Dolphin Interest Groups will result in increased retention and improved graduation rates.



Key campus stakeholders engage in Academic Plan discussions

9. Residential life will be enhanced by:
    a. Building "theme" housing and learning communities around common interests.
    b. Developing housing that engages the campus core to encourage the mixing of academic and residential programs; housing will also reflect a variety of options.
    c. Developing a faculty-in-residence (living and/or office space) program.
    d. Identifying commuter space in residence halls and as well as common space for study and recreational uses for commuters.
10. A wellness center will be designed to serve both intercollegiate athletics and the campus at large. It will include recreation, nutrition counseling, student health, and a variety of wellness programs.
11. As the intercollegiate athletics programs are developed, beginning with women's soccer, facilities will be built to support these sports as they are added to the University.
12. Intramural activities for non-athletes will be encouraged and spaces designed to accommodate that population.
13. The Office of Institutional Research will report semi-annually to the University community data related to retention, progression, and graduation rates and the factors influencing those outcomes.

Develop inclusive partnerships and programs that support the community and encourage public and private funders to feel included as part of the University.

1. A comprehensive campaign will be formulated to raise private dollars for need-based and merit-based scholarships, and support for designated spaces.
2. Partnerships with local and regional companies will be expanded for the purpose of fund-raising and externships for students.

Key campus stakeholders engage in Academic Plan discussions

3. Linkages with local PreK-12 schools will result in improved student success, i.e., graduation rates from high school, percentage of students going to college, and better test scores, particularly in math and science.
4. Nursing graduates will provide a steady stream of qualified nurses to local and regional hospitals.
5. Students majoring in the sciences will qualify for advanced degrees in biology, chemistry and engineering, medicine, and dentistry.
6. The University will expand the Advancement function to identify potential dollars for the development of some aspects of the Vision Plan.
7. The University will increase grant applications from the federal government, state government, and private foundations and corporations to enhance academic and student support programs.

Academic Plan and Vision Plan Incorporation

The following Academic Plan attributes were translated into the application of the Vision Plan in the following ways:

1. Integrative
   - No departmental icons
   - Discipline-integrated faculty offices
   - Greater building transparency to reveal diverse activity

2. Innovative
   - Greater recognition of University programs through visual transparency of buildings
   - Visible display of campus innovations
   - Unusual juxtaposition of disciplines on campus

3. Living/Learning
   - Residence halls configured for living/learning opportunities
   - Student housing juxtaposed with academic uses

4. College Immersion
   - Residential goal of maintaining 30 percent full-time equivalent students living on campus
   - Larger venue for on-campus events
   - Greater recreational opportunities for sports teams

5. Hybrid Learning
   - Adjust projected space needs for academic buildings
   - Facilitate stronger class collaboration and engagement

6. Experiential Learning
   - Introduce more specific outdoor areas designed for experiential learning
   - Distribute experiential learning settings in buildings

7. Interactive Wellness
   - Integrate wellness with physical activities, health center, recreation, and athletics

8. Informal/Social Learning
   - Develop existing hospital day-rooms into a recognizable pattern of small group gathering spaces
   - Include more specific outdoor areas for informal groups and spontaneous meetings

Vision Plan Program

The Vision Plan is intended to guide the growth of the campus from approximately 4,300 full-time equivalent students (FTES) 2013-2014 to 15,000 students (FTES). It recommends changes on the CI campus based on statistical projections, functional expectations, spatial relationships, and design guidance.

	Existing Program (4,300 students)	Existing Program Need (4,300 students)	Short-Term Program (5,000 students)	Mid-Term Program (7,500 students)	Long-Term Program (15,000 students)
Academic and Support	426,000 ASF (99 ASF/FTES)	387,000 ASF (90 ASF/FTES)	450,000 ASF (90 ASF/FTES)	600,000 ASF (80 ASF/FTES)	1,125,000 ASF (75 ASF/FTES)
Housing	171,000 ASF (~20%)	297,000 ASF (~30%)	345,000 ASF (~30%)	518,000 ASF (~30%)	1,035,000 ASF (~30%)
(230 ASF/Bed)	820 beds*	1,290 beds	1,500 beds	2,250 beds	4,500 beds
TOTAL	597,000 ASF	684,000 ASF	795,000 ASF	1,118,000 ASF	2,160,000 ASF
Parking Spaces	2,415	2,150	2,750	3,375	5,250
% FTES	56%	50% (CSU)	55%	45%	35%

**On-Campus Design Capacity; See Housing Section*

Numerical Program

Due to the inter-disciplinary nature of the Vision Plan, the term academic or non-residential program refers to spaces on campus that are not housing units. The term is also associated with uses such as administration, maintenance, student life, and dining.

Since CI is a new campus, only a fifth of the way to its proposed size and profile, it is premature to project a specific program onto the entire setting. However, other campuses within the 23-campus California State University system can be used as a benchmark or reference point for reasonable growth projections. The 2009 CSU "Space and Facilities Database Management System: Complete Space Report by Facility" provides useful comparative figures.

For example, as a new university inheriting a campus intended for a different purpose, the amount of existing space per FTES at CI is relatively high (about 99 ASF, excluding housing). This ratio is due in large part to the initial stage of fitting the needed program to a group of existing structures. As the campus grows, it will benefit from new, purpose-built construction, increasing the effectiveness of the space, its flexibility, and its efficiency. The table above illustrates the progressively lower ratio expected as the population grows. These ratios are derived from the CSU Space Report.

Blended or Hybrid Learning

Space projections are modified by an emerging factor in higher education called blended or hybrid learning. "Blended learning" is a creative mix of face-to-face learning and online, Web-based content and activities. With online content and experiences, the face-to-face "in class" time is reduced, but the overall impact of the education grows. On one hand, this reliance on digital tools is expected to reduce the demand for classrooms, allowing the institution to build and maintain less space. On the other hand, that same reduction frees up some space to create higher quality and more effective face-to-face learning environments that typically have larger square foot to student ratios.

The ultimate effect of blended learning on space is difficult to imagine since both the application of this new method is evolving as is the technology required of it. For the initial application of blended learning at CI, the President's Office has proposed a goal of 18 percent of time and content delivered on-line. That projection is based on some lecture classes going to a higher percentage and some hands-on labs going to smaller percentages.

For this Vision Plan, the 18 percent factor will be applied simply to instructional and research space, which is most likely to be affected in the near future. This category, on average, represents approximately 32 ASF/FTES, which breaks down to 20 ASF class instruction, 3 ASF research, and 9 ASF of other instructional space. With the latter two being largely specialized spaces, the factor was applied to 20 ASF class instruction and phased in at 5 percent for 5,000 students, 10 percent for 7,500 students, and 18 percent for the full 15,000 students.

As the initial planning target is likely to change over time, the influence of blended learning should be monitored and tested for each future update of the Vision Plan.

Building Efficiency

Two different factors are used to project ASF to GSF (gross square feet) in planning the growth for the campus. Based on the experiences of the University, the conversion of the existing Mission-style buildings to academic use averages a net to gross factor of approximately 40 percent. This percentage is due to the narrow footprints and extensive internal circulation of the adopted buildings. New buildings achieve a net to gross factor of approximately 60-65 percent. These factors have been used to convert the projected ASF to GSF appropriate to CI.

Housing

CI has 171,000 ASF of housing on-campus in Santa Cruz Village and Anacapa Village with a design capacity of 820 beds. Due to an increase in students and increased demand for on-campus housing, singles have converted to doubles and doubles have converted to triples for a total of 1,155 students living on-campus. Off-campus, in University Glen, an additional 124 students are housed in singles and doubles even though the design capacity is 108 beds.

During the 2013-2014 school year, CI housed approximately 30 percent of the FTES on and off campus, at 1,279 beds, even though the design capacity is 928 beds. Therefore, there is a significant need for more housing on-campus. Housing 30 percent of students, higher than most CSU campuses, has been advantageous to the quality of on-campus life. It is also a response to the lack of affordable student options in the nearby communities due to the expensive residential market. In addition, the real estate market shows no indication of private sector interest in providing off-campus student housing, due to high land costs and higher returns for other housing types. Both the President's Office and the Vision Plan Steering Committee have recommended that 30 percent of FTES continue to be housed on campus at 230 ASF/bed. The goal for later years will be dependent on financial feasibility.

The University is considering the academic benefit of a small number of residential colleges. To provide the flexibility for that potential, some of the future housing should be planned in coherent 300-400 bed configurations, supplemented by learning spaces and faculty units appropriate to residential college use.

Large Footprint Facilities

The campus is now largely made up of smaller scale buildings, with relatively small footprints. Its centerpiece, Broome Library, is a notable exception to this diminutive size. Several functions needed in the future will require larger building footprints and will require special attention to massing and scale, as follows:

- A 5,000-seat arena for athletics and events
- Recreation / Health & Wellness Center that can be combined or phased with the arena
- Performing Arts Center (500-seat proscenium, 100-seat black box, small stage-set shop, related support space)
- Conference capability

Athletic & Recreation Facilities

The outdoor program developed by CI for projected athletic and recreation facilities is as follows:

- Soccer stadium
- Baseball field (or possibly a shared baseball stadium)
- Softball field
- Three Intramural / practice fields
- Optional recreational pool (25 meter)
- Optional tennis courts

Community

CI has made a fundamental commitment to build relationships with the Ventura County community to provide service to its neighbors and to strengthen student civic engagement. These activities assume many forms and can occur on-campus and/or off-campus. When on-campus, programs like the Extended University, Osher Lifelong Learning Institute, and the annual College for A Day make effective and efficient use of facilities that are available

Students gather in the wide variety of outdoor activities that exist within the campus, such as dining, commencement, and festivals.

evenings and weekends. Outreach programs like the High School Friday make use of campus activities that are underway but would benefit from a "home room" with supplementary outfitting to support meeting and lunch on a rainy day.

At the campus vision planning scale, the community relationships focus on larger activities. The expressed needs include a conferencing, gathering, or meeting space for groups or forums of 300-400 people, multi-cultural performances, and co-sponsored festivals or fairs. These events dovetail with other future needs of the campus that include the proposed conference center and performing arts center. Outdoors, the proposed amphitheater and proposed development of the landscape does and will support larger festivals and fairs.

Outdoor Functions

The sizes and shapes of outdoor areas are intended to support an array of activities that may occur year round, seasonally, or only occasionally. Several of those functions are at a scale that they appear in the Vision Plan such as an amphitheater or a recreation playfield. Others are those that should be programmatically developed for specific application in a detailed landscape plan that recommends locations based on appropriate size, orientation, acoustics, curriculum, and prime audience.

These outdoor activities would include the following:

- Small classes
- Experiential learning and learning resources
- Informal gathering and studying
- Recreation/Athletics
- Events
    - Performances and Ceremonies
    - Commencement and Homecoming
    - Festivals and Street parties
    - Student Orientation
    - Guest speakers
- Sustainability
- Habitats and Research

Parking

As of the spring of 2014, the campus had approximately 2,400 on-site parking spaces for students, faculty, staff, and visitors, based on the University's inventory. This number equates to approximately 56 percent of full-time equivalent students (FTES) parking on campus, which is above CSU's more typical 38 percent. This parking ratio has been appropriate at CI due to the distance of the University from population centers in Ventura County and to a local public transportation pattern that does not yet serve the campus well. Based on the capacity of the land and sustainability goals, the University hopes to provide parking spaces for 35 percent of FTES on-site when the campus has 15,000 students. This strategy will result from well-implemented transportation demand management strategies and active initiatives with surrounding communities, the region, and public transportation providers.

To realistically phase in this responsible reduction, the parking space ratio is proposed to change gradually, with much of the decrease occurring during the period of growth between 7,500 and 15,000 students. This is the period when the campus population becomes more significant as a transportation destination, where increased shuttle service and other transportation demand management strategies are more likely to be implemented. The University will monitor progress towards the goal of 35 percent on a yearly basis.

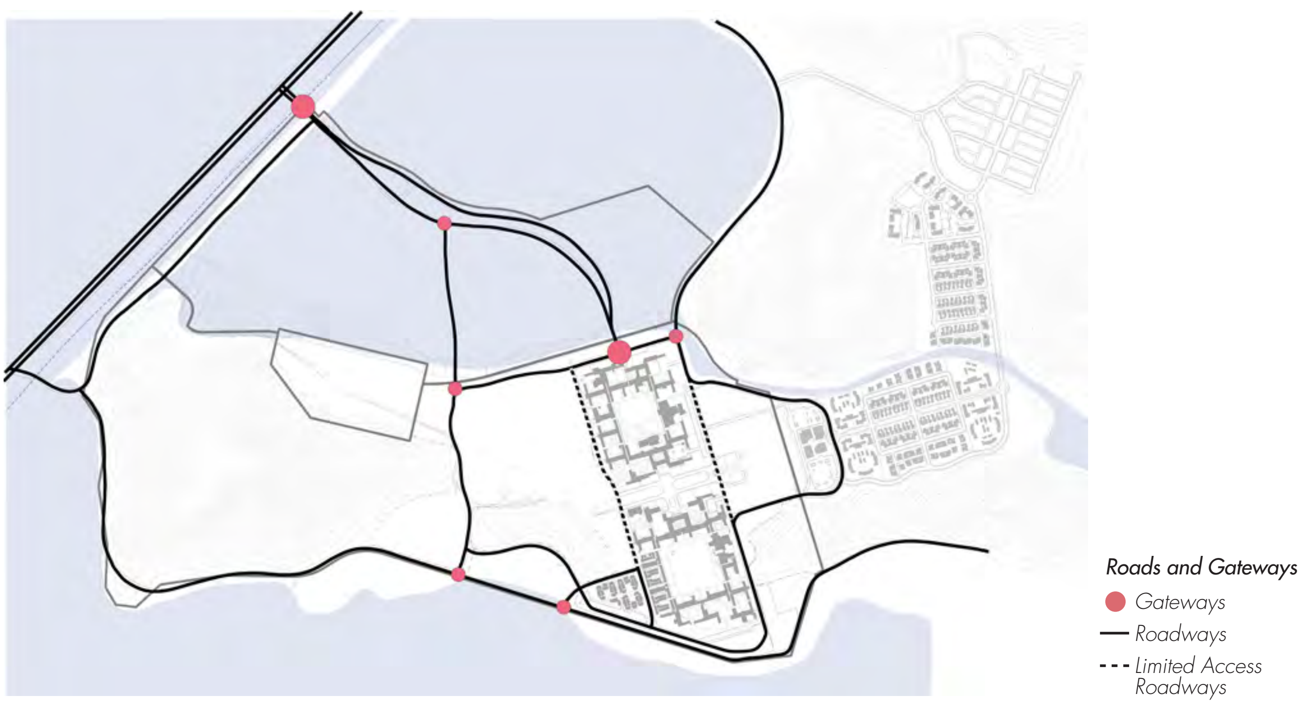
Coordination with Camarillo

The City of Camarillo and the Camarillo Chamber of Commerce are actively discussing and testing ideas to stimulate greater Old Town activity and business. Subjects of interest have included a conference center and a hotel, an amphitheater, and a performing arts center. As CI's curricular planning evolves, the campus should coordinate these ideas, viability, and timelines with the city and Chamber to assure mutual benefit.

Concept Development

The development of the Concept Plan began with a series of design workshops over a two-day period. Groups active in these workshops included the Campus Vision Plan Steering Committee, Academic Affairs, Student Affairs, the Office of Planning and Construction, and students. The intent of the workshops was to build on the planning goals and the campus observations developed in the previous phases to develop a broad-brush, conceptual plan for the project.

During the workshops, each group was divided into teams and tasked with sketching a high-level concept plan for the campus. The groups discussed concepts such as land uses, circulation, and even what the future campus tour could offer. Each team presented its concept plan to the group and the outcomes were discussed and debated to understand the full intent of the illustrated ideas. The Vision Plan team then developed a representative concept plan based on these team plans and discussions, the efforts of the programming and academic plan work, and early campus observations and analysis.



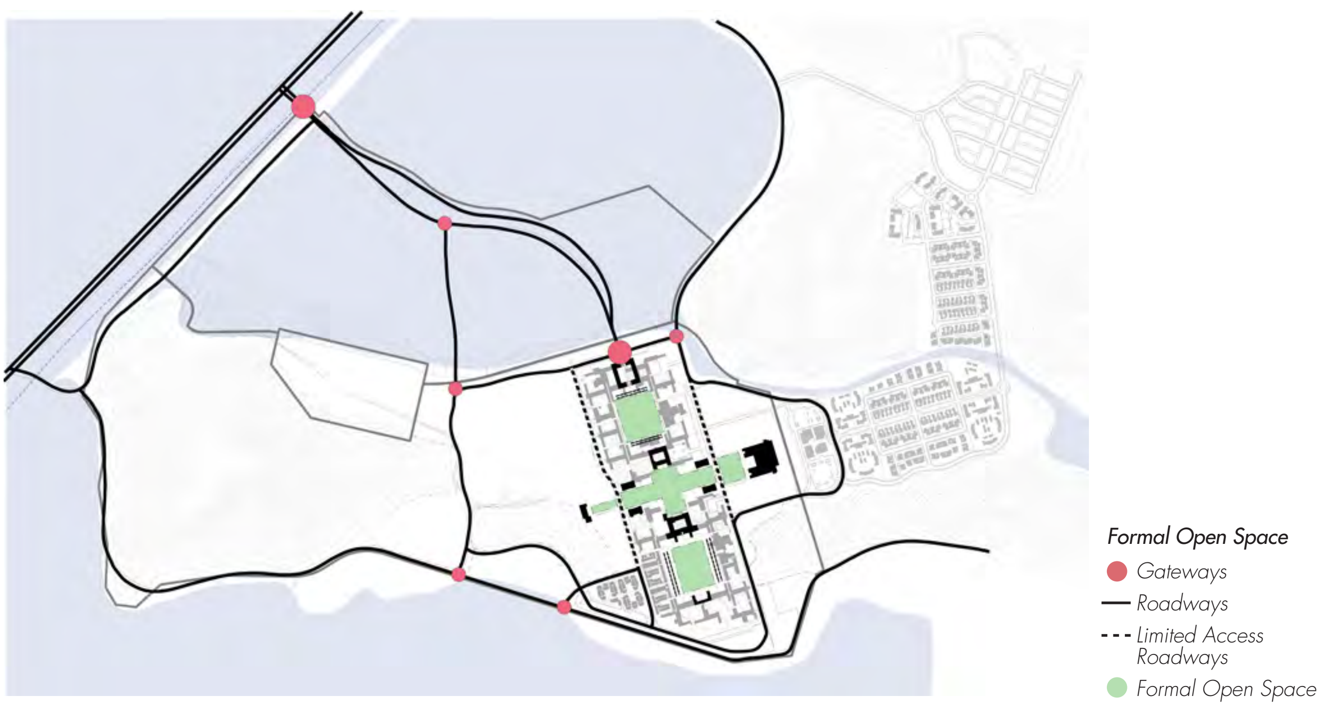
Roads and Gateways

A proposal heard frequently during the workshops was a pedestrian- and bicycle-oriented campus. To accomplish this goal, the campus will need to move parking and its related traffic from the campus core. As the campus grows to the east and west, portions of Camarillo Street and Ventura Street will be freed of vehicles, with access only granted to a campus shuttle bus and necessary delivery trucks. A new outer loop road would serve the remaining vehicular circulation.

As conceived, the primary gateways to campus would remain at Lewis Road and University Drive through North Campus, where it arrives at the North Quad. Secondary gateways will remain at Potrero Road and Camarillo Street at the northeastern part of campus. Two new secondary gateways along the western edge of campus will help direct visitors into the campus while keeping their vehicles out of the campus core; one being the existing central plant access road and the other crossing over the levee through North Campus.

Formal Open Space

The original campus mall and the two large quads should remain the core of the formal open space system. As conceived, Broome Library, the Powerhouse, Bell Tower, and University Hall will continue to frame the space. The four buildings will help anchor the improved mall landscape that is now free of public vehicles and will subsequently become a strong campus center. A new Gateway Hall at the campus entry, the existing Del Norte Hall, and a renovated new housing center on the center axis of South Quad will help define the quads.



Fields and Parking

Playing fields and parking are the principal functions compatible with a floodplain area, so these uses will largely occur within North Campus. Moving the majority of parking to the North Campus will help the University reach its goal of creating a more pedestrian friendly campus core. A parking garage on the far western part of the West Campus will provide space for a large number of cars on a small amount of land and still keep vehicles away from the campus core. In addition, a casual recreation field will be located closer to student housing on the south edge of campus. A feature athletic field venue that cannot be situated in the floodplain will be located in the West Campus close to the parking garage.

Land Use

Academic uses, including administrative space, should continue to be strongly embedded in the campus core. Doing so will facilitate the integrative intent of the curriculum. By concentrating student housing in the southern portion of campus, the University can foster community-building. Student life spaces should be intermixed throughout the campus but with heavier concentrations in each Quad for food service and in the northeastern part of the West Campus in the form of a recreation center, arena, and performing arts space.

Building Heights and Connections

The low scale and intimate spaces of the original Mission-style buildings on campus are part of its appeal. For compatibility between the existing and new architecture, the plan recommends maintaining the current 60-foot height limit for the vast majority of structures on the campus. In the campus core, especially around the quads, the height should be limited to the existing fabric of one-, two-, and three-level buildings. Proposed housing closer to the core can stay within 60 feet at four levels. Due to


Land Use
Gateways
Roadways
Limited Access Roadways
Formal Open Space
Proposed Fields
Proposed Parking
Proposed Housing
Proposed Academic
Proposed Student Life
Proposed Facilities


Heights and Connections
Gateways
Roadways
Limited Access Roadways
Formal Open Space
Proposed Fields
Proposed Parking
Proposed Housing
Proposed Academic
Proposed Student Life
Proposed Facilities
Connections
Potential Height > 60 feet

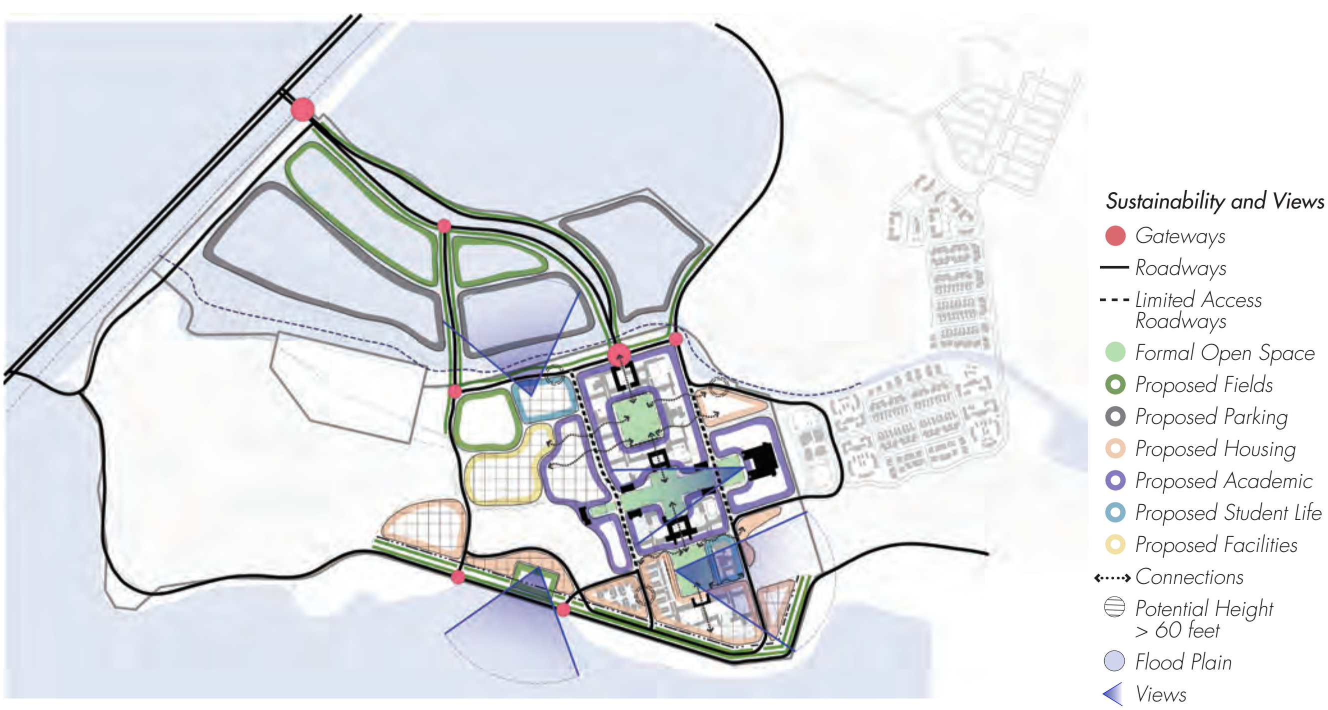
the very limited area in which development can occur, future housing areas on the West Campus may need to be greater in height to complete the full program but with a maximum of 80 feet. The higher limit is restricted to the West Campus where the visual impact of those higher structures is ameliorated by Peanut Hill and Round Mountain and by limited visibility from the campus core.

In its original use, the hospital campus was meant for isolation and containment. Therefore, pedestrian connections in and out of the two quads are limited and confining gates and walls make it difficult to experience the beauty of these spaces. The Vision Plan should create stronger pedestrian connections within the campus core and also to newer development outside the core.

Sustainability and Views

Consequential land use components of sustainability include the maintenance of extensive natural environments, creation of wetlands and riparian areas associated with Long Grade Canyon Creek, and managing stormwater within campus boundaries. The installation of solar panel canopies in parking areas, creating a strong shuttle system to lessen the dependency of cars, and committing to a compact campus will help create a sustainable 21st century campus.

Both the setting and orientation of internal views are important to the University's identity and campus legibility. Significant views from the campus to the surrounding mountains, especially from the South Quad, and the agricultural fields to the north and the south should be maintained and enhanced. New construction on campus and greater building heights present the opportunity to take advantage of views to the Pacific Ocean and Channel Islands beyond the immediate setting. Significant internal views, such as the long mall anchored by Broome Library and the Powerhouse, will be maintained and enhanced. The Bell Tower, the University icon, will provide a strong orientation point from within the campus.



Campus play fields

Precinct Studies

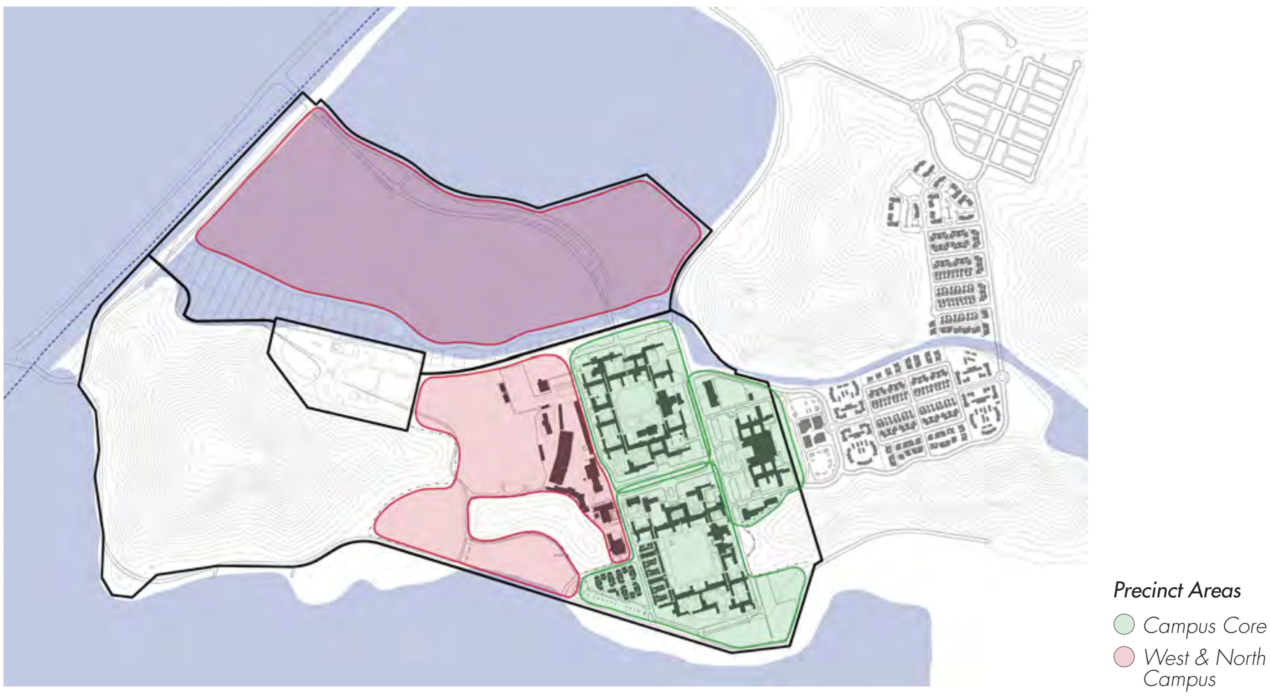
During the Precinct Studies phase, the vision planning team divided the CI campus into two geographically distinct segments, or precincts, in order to test the ideas generated during the previous Concept Plan phase. The campus core is defined as Precinct One and the West and North campuses comprise Precinct Two.

The vision planning team then outlined the goals for each precinct and developed alternative planning approaches to issues targeted during the Concept Plan phase and refined the most appropriate solutions for the two precincts.

Two multi-day design workshops were held in May and September 2011 to discuss the plans proposed for each precinct. Every session began with a precinct walk to provide the opportunity for the Steering Committee and vision planning team to make fresh observations, understand the campus in greater detail, and gain insight into challenges and opportunities. During the workshops, the entire group investigated solutions to campus challenges, such as physical capacity of planned enrollment growth, road and pathway configurations, landscape enhancements, sustainable development, and academic expansion through a series of design schemes. These schemes were ultimately combined in overlapping ways, taking the best ideas from each option to synthesize a coherent strategy for each campus precinct.

Based on the Observation and Concept Plan workshops, the Precinct Studies phase explored a variety of ways to achieve the goals of the Vision Plan in the following manner:

- Reflect an interdisciplinary program approach
- Respect the scale of existing architecture
- Create a strong sense of arrival at the campus entry
- Eliminate cars in the core of campus
- Develop a more pedestrian- and biking-oriented campus
- Provide better transit on and off campus
- Maintain existing open space and create more intimate outdoor spaces
- Provide for larger scale programs in an appropriate manner
- Develop an integrated pattern of new and old buildings by creating more educationally effective building footprints along with renovating the existing, more compact footprints
- Meet the future programmatic needs of a 15,000-student campus based on the responsible capacity of the land

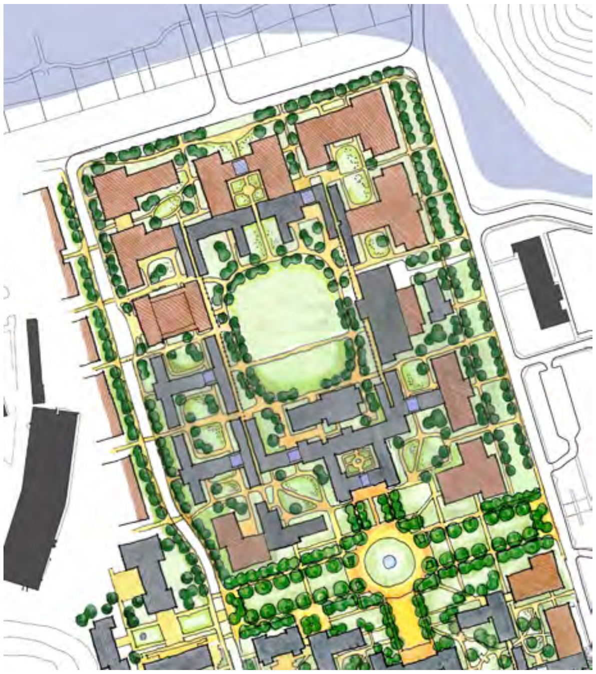


Precinct One: Campus Core

North Quad

Three planning alternatives for the North Quad analyzed different degrees of balance between building renovations and new construction, as well as the scale of the new structures. The schemes also explored an enclosed versus an open Gateway Hall, as well as a performing arts center within the campus core. Each variation starts with the assumption that parking within the existing courtyards is removed, with the exception of prospective student parking for admissions at Gateway Hall, necessary special needs parking, and service access.

The second option sites a new building directly in line with Del Norte Hall on the opposite end of the Quad. The third option explores student housing on the northeast corner of the Quad so that it is fully integrated into the academic campus.


North Quad Option A


North Quad Option B


North Quad Option C


North Quad Option D

South Quad Option A

South Quad Option B

South Quad Option C

South Quad

The three variations explored the areas around the South Quad to test the degree of building infill possible within the precinct and the configuration of student housing to the south. All variations assume that Santa Paula Street is moved further to the south to create more contiguous, buildable land south of the Quad and eliminate the hard turn from Camarillo Street into Santa Paula Street.

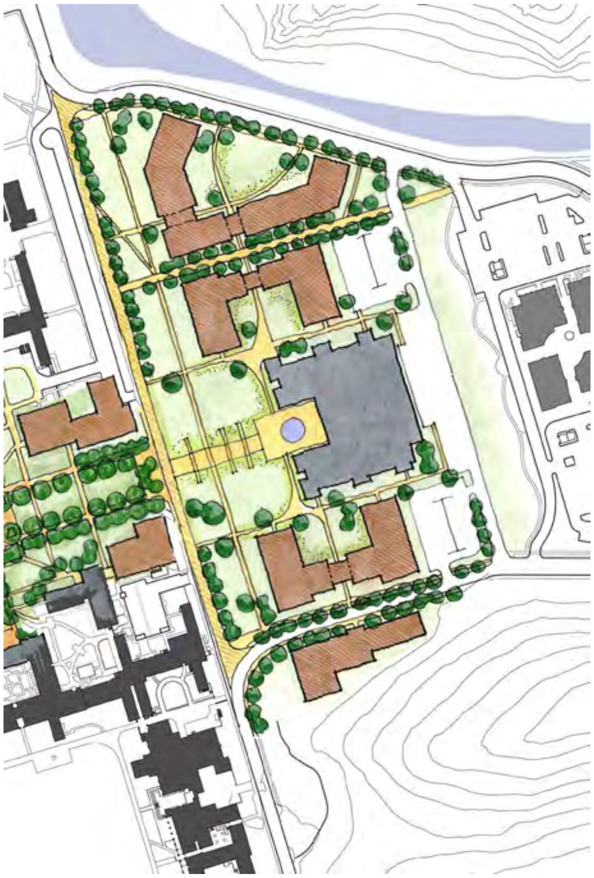
Library Edge

The four variations explored at the boundary of Broome Library look at the possibility of student housing in this area, the reuse or removal of the remaining wings attached to the north and south of the library, and adjustments to the amount of parking. The opportunity to replace Malibu Hall with Chapel Drive was also explored as a means to create more contiguous buildable land south of the library and eliminate the hard turn from Chapel Drive to Camarillo Street.

Library Edge Option A

Library Edge Option B

Library Edge Option C



Library Edge Option D

Precinct Two: North Campus and West Campus

From the ideas generated by the Precinct One Campus Core workshop, a number of assumptions and directives were made for Precinct Two, including the following:

- Accept the remainder of the program that does not fit in the campus core
- Accommodate large facilities that include a performing arts center, an arena, a recreation/wellness center, playing fields, and a relocated operations and maintenance facility
- Accommodate the parking need
- Provide land for on-site renewable energy sources
- Manage the capacity of stormwater run-off from the campus
- Preserve the architectural character and pathways of the campus core
- Create connections from the campus core to the North and West campuses with harmonious landscape and open space patterns compatible with the core


West Campus North Option A

West Campus – North

The three alternatives for the north end of the West Campus explore various arrangements of athletic fields, larger program buildings, academic buildings, parking, and stormwater retention. The first option does not provide any athletic fields on West Campus but suggests a parking garage, which screens the Camrosa Plant from view. It also shows a new, gracious quad offering plenty of academic expansion space, a performing arts center at the western end, and an arena/recreation center on Ventura Street.

The second option shows a potential layout of facilities should a partnership between the University and a Single A or Double AA baseball team be formed. The plan recommends a special athletic venue to accommodate the baseball team, a soccer field, and an amphitheater built into the north edge of Peanut Hill. The arena/recreation center is shown at the corner of Santa Barbara Avenue and Ventura Street, and the performing arts center is situated south, along Ventura Street.

The third option shows a competitive soccer complex and parking garage on the West Campus. The arena/recreation center is also shown at the corner of Santa Barbara Avenue and Ventura Street, and the performing arts center is located south along Ventura Street. Each variation assumes a stormwater detention pond west of the CoGen Plant, a new academic quad north of the Powerhouse, and a maintenance and operations yard directly west of the existing Central Plant.

West Campus North Option B

West Campus North Option C

West Campus - South

All three alternatives for the south end of the West Campus, nestled between Round Mountain and Peanut Hill, include a casual recreation field and a large expansion of student housing. The differences among the three schemes are the proposed designs of the housing. The first and second options recommend very linear building layouts, similar to the historic structures within the campus core, and the third option offers a radial organization, following the contours of Round Mountain and Peanut Hill. Each scheme can accommodate an amphitheater on the south edge of Peanut Hill, close to Anacapa Village. All of the schemes incorporate a series of intimate courtyards and larger open play areas.

West Campus South Option A

West Campus South Option B

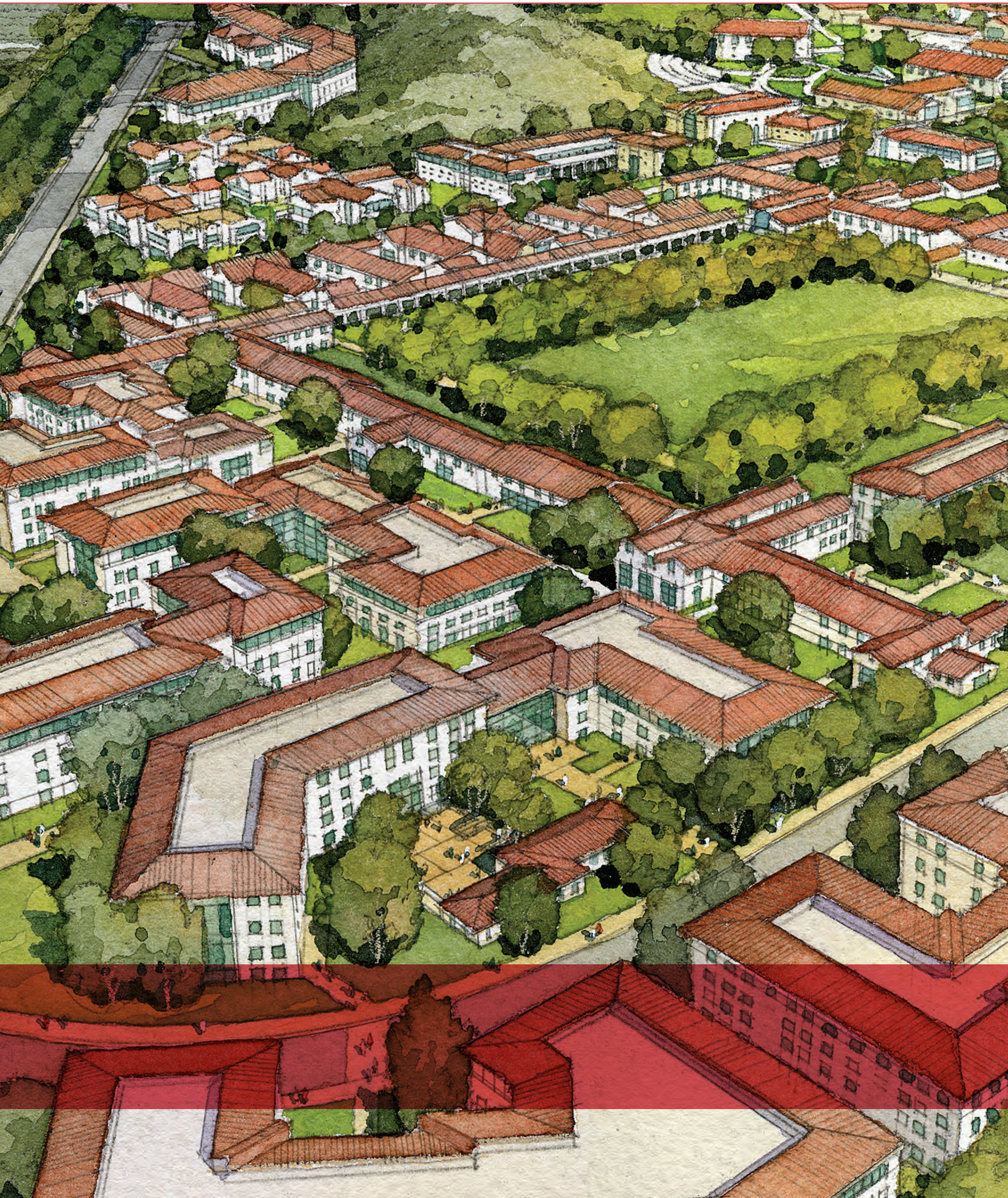
North Campus

The three alternatives for the North Campus show a variety of layouts split between parking and athletic/ recreation fields. The first option places the fields closer to campus and parking farther from campus. The second option shows playing fields lining University Drive and parking positioned behind those fields. The third option places the fields farther from campus and parking nearer the campus core. All of the options assume an improved shuttle system on campus, as well as an improved bike path network.

North Campus Option A

North Campus Option B

North Campus Option C



Campus Vision Plan

The Vision Plan is a refinement of the ideas generated during the preceding phases of the vision planning process. The resulting Plan is highly intentional in facilitating the educational and experiential vision of CI, and it is intended to act as a road-map for implementation over time. The Plan supports the underlying premise of campus integration and innovation, while expanding on the compelling character and identity of the University. The Vision Plan outlines a framework for development in a flexible but disciplined manner that will meet the full programmatic needs of 15,000 students.

The Vision Plan proposes a compact, sustainable campus with academic and residential activities dominating the campus core to stimulate further integrated learning. The formal open space structure of the North and South Quads and the mall will reinforce spatial organization. The north edge of the North Quad becomes the new and notable gateway, assuring a clear arrival and expression of CI's collegiate stature. An outer loop road limits vehicular access to the core and enhances a protected pedestrian and bicycle zone at the heart of campus. Building height in the campus core is limited to protect defining views from and within the campus. Large surface functions, like playing fields and parking, are placed in the North Campus, respecting the role and requirements of the floodplain.

Existing Campus

- *Existing Buildings*
- *University Glen Buildings*

Proposed Vision Plan

- *Existing Buildings*
- *Proposed Buildings*

Existing view from University Drive where it meets Santa Barbara Avenue

Proposed view from University Drive where it meets Santa Barbara Avenue

Existing view of the Central Mall (originally Los Angeles Avenue) looking west

Proposed view of the Central Mall looking west

Existing view north on Ventura Street

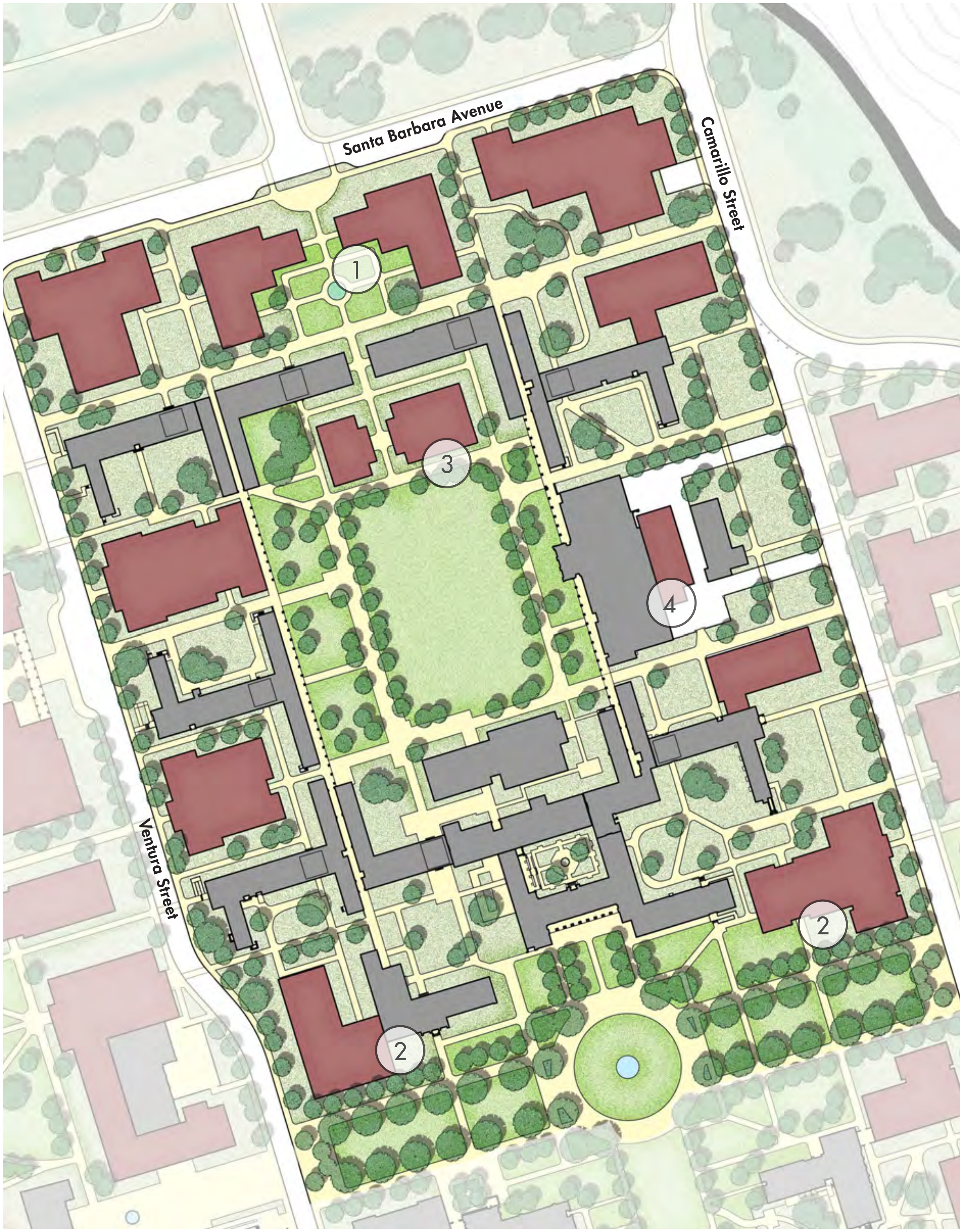
Proposed view north on Ventura Street

North Quad

The North Quad is the formal gateway to the campus core and is one of two primary anchors of the original campus character. By capping building heights in the Quad to three levels, eastward views to the mountains are maintained. Through careful demolition of existing buildings and infill of new ones, the campus can build efficient buildings with footprints appropriate for classroom and lab configurations and reinforce the existing courtyard pattern. Parking is largely removed from North Quad, except for short-term parking along Santa Barbara Avenue.

Highlights

1. New gateway buildings on Santa Barbara Avenue provide an open entry and axial view into campus. They also create space for admissions, academics, and student services. The gateway buildings will be the first stop for prospective students.
2. Two new corner buildings are added on the mall to strengthen edges and anchor activity.
3. The formative north-south axis is reinforced by a new building on axis with Del Norte Hall in the North Quad.
4. A conference/small events center in the North Quad (recently renovated Grand Salon with a proposed new kitchen in the rear) provides space for events and meetings in a location with easy service access.


Santa Barbara Avenue
Camarillo Street
Ventura Street
1
2
3
4
2

South Quad

The South Quad bridges the academic focus of the North Quad with a nexus of academic, student life, and residential activities. The resulting approach maintains the South Quad as an iconic open space, a key contributor to the unique campus identity. Graduated height limits based on the view horizon lines of existing buildings will ensure that the sweeping views to the surrounding mountains continues. A new housing pattern is created by placing new buildings to the south, forming intimate courtyards and spaces. Wide paths can be used by pedestrians most of the year but can be converted to vehicular drives during student move-in and move-out periods.

Highlights

1. A new corner building, opposite the Student Union, is added on the mall to strengthen edges and anchor activity.
2. Salon A is renovated and expanded for additional food service and other student-centric functions.
3. A new two-story building replaces the one-story Topanga Hall.
4. Santa Paula Street is realigned to the south, increasing the contiguous area available for residential housing and the turning radius of the intersection with Camarillo Street.
5. The 150′ agricultural setback from the southern campus boundary is respected.
6. Parking is largely removed except for short-term convenience parking along Santa Paula Street, near the residence halls.
7. The old courthouse and its courtyard are maintained and incorporated into the housing plan.


Ventura Street
Camarillo Street
Potrero Road
Santa Paula Street
1
2
3
4
5
6
7

Library Edge

Closely linked to the North and South Quad, the library edge on the eastern part of campus forms an extension of academic facilities, with Broome Library as its center piece.

Highlights

1. Removing the non-renovated wings of Broome Library allows for larger, academically appropriate building footprints arranged to extend the orthogonal building pattern and maintain campus character.
2. Chapel Drive realigns to the south, against the topography, to enlarge the contiguous academic area south of the library. The realigned Chapel Drive becomes part of the outer loop road.
3. Fillmore Street also becomes part of the outer loop road, allowing portions of Camarillo Street to become a limited-access road for pedestrians, shuttles, and maintenance vehicles.


Rincon Drive
Fillmore Street
Camarillo Street
Chapel Drive
1
1
2
3

West Campus

The northern part of West Campus is largely undeveloped, which makes it a desirable location for large facilities incompatible with intimate campus core. West Campus is also appropriate for modestly tall structures (up to 80'), like the roof of the arena and the fly loft of the theater, as well as structures that may be needed to address the remaining program of the 15,000-student campus. During special events hosted in the arena or theater proposed for West Campus, patrons can access parking via pedestrian bridges and a secondary road over Long Grade Canyon Creek.

The southern part of West Campus is located farthest from the campus core and will be used for student residence halls. Because of its location, the site suggests an organic layout, respectful of adjacent hills and mountains. These residential buildings can be modestly higher than the 60' height limit proposed elsewhere on campus because Peanut Hill and Round Mountain will minimize their scale. The southern part of West Campus benefits from spectacular views of the Pacific Ocean and the Channel Islands, views that can be captured from upper-level rooms. Proposed paths are wide enough to accommodate vehicular use during move-in.

Highlights

1. An Arena/Recreation-Wellness Center at the intersection of Ventura Street and Santa Barbara Avenue takes advantage of long range views to the north and close adjacency to parking. It serves as a nexus for student commuters, residents, athletes, faculty, staff, and the community. It is expected that this building can be built in two phases, along with an outdoor recreation pool.
2. A new, linear quad connects West Campus to the North Quad.
3. A performing arts center on Ventura Street provides a public face on the North Quad but keeps service access to the fly in the West Campus zone.
4. Chaparral Hall is renovated and expanded to form an arts edge along Ventura Street.
5. The side of Peanut Hill is used to form an outdoor amphitheater.
6. A new, formal quad frames the amphitheater and new academic buildings.
7. A soccer/lacrosse stadium is placed near the Arena for dual use of lockers and team rooms and access to nearby parking.
8. A parking structure, located at the western edge of West Campus, screens the adjacent Camrosa Water Reclamation Plant. It also provides additional parking in close proximity to the campus core and easily accessible.
9. A consolidated and relocated operations and maintenance facility is configured around the current central plant and adjacent to the outer loop road. This arrangement will make delivery access easier and will provide space for equipment storage.
10. A potential stormwater detention area handles water flows from portions of North Quad and the large footprint buildings on West Campus.
11. The western portion of the new outer loop road runs through the center of West Campus and keeps vehicles away from the campus core.
12. A new, southern entrance to campus is created where the outer loop road meets Potrero Road.
13. An informal recreation field remains in the southwest part of campus for casual student use.
14. The 150' agricultural setback from the southern campus boundary is respected.
15. Parking is largely removed except for short-term convenience parking.
16. The green edge along Potrero Road provides natural stormwater retention.


Long Grade Canyon Creek
Santa Barbara Avenue extension
Ventura Street
Round Mountain
Peanut Hill
Santa Paula Street extension
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16

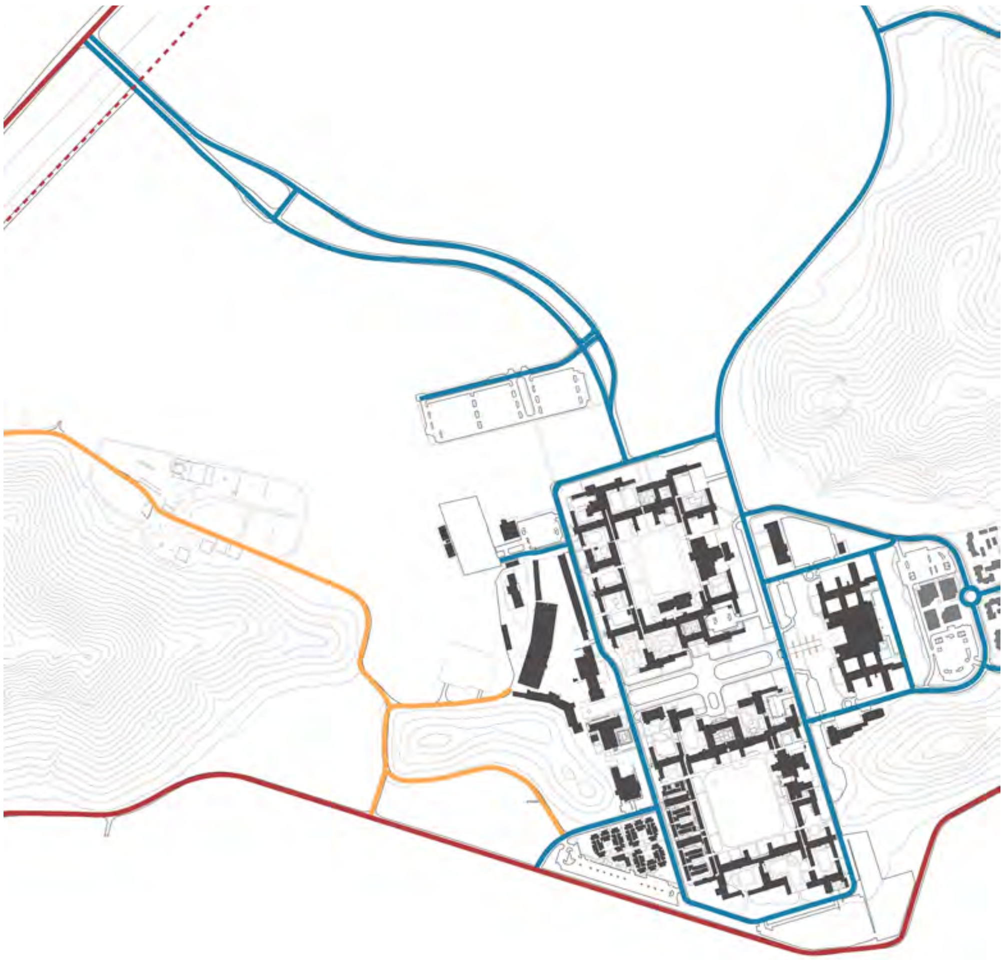
North Campus

The entirety of North Campus is located within a FEMA designated floodplain; therefore, surface parking and recreation fields are some of the few allowable uses for this area. In addition to the University Drive, the campus entry road, and a gateway feature near the intersection of University Drive and Lewis Road, the North Campus will be the primary location for parking on campus. Surface parking in the North Campus has the potential to benefit from canopy-mounted photovoltaic panels that will generate energy for campus and shade the lots from direct sunlight. Pedestrian paths planted with native vegetation and trees will shade routes from the parking lots to the campus. Athletic and recreation fields, including competitive venues, are located on the eastern portion of North Campus. The wetlands, riparian zones, and Long Grade Canyon Creek are maintained and used as curricular resources.

Highlights

1. Bioswales collect and direct stormwater toward Long Grade Canyon Creek, which runs to Calleguas Creek.
2. An additional access road to campus extends south from University Drive. This starts the western segment of the outer loop road, which keeps vehicles out of the core of campus.
3. A gateway feature is located near the intersection of the new University Drive and Lewis Road.


3
Lewis Road
University Drive
1
2
1
Camarillo Street
Long Grade Canyon Creek

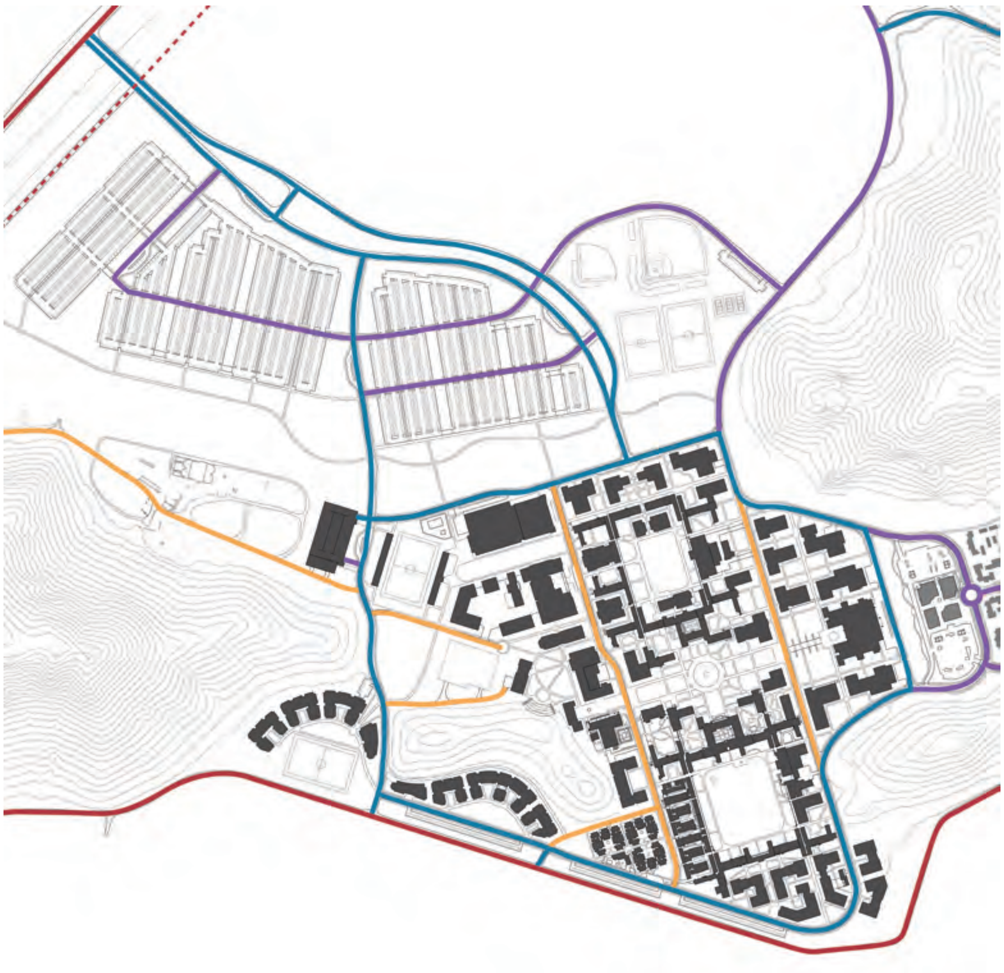


Existing Vehicular Circulation
- *County Roadway*
- *Campus Roadway*
- *Service/Limited Access*

Vision Plan Analysis

Vehicular Circulation and Transit

One of the main goals of the Vision Plan is to eliminate vehicles from the core of campus. This is achieved by creating a primary, two-way outer loop road for general vehicular circulation that loops outside of the campus core. The outer loop road is proposed to run along the northern edge of the campus core, behind Broome Library, along the southern edge of campus, and through the western edge of West Campus. The western edge of the outer loop road also connects University Drive through the edge of campus to Potrero Road. A proposed, one-way inner loop road, consisting of Ventura Street and Camarillo Street, will be limited to daily traffic to make the campus more pedestrian friendly. The Vision Plan also proposes that Oxnard Street to the north of Anacapa Village, a new road accessing the maintenance yard and the CoGen Plant, be limited access as well. Secondary roadways

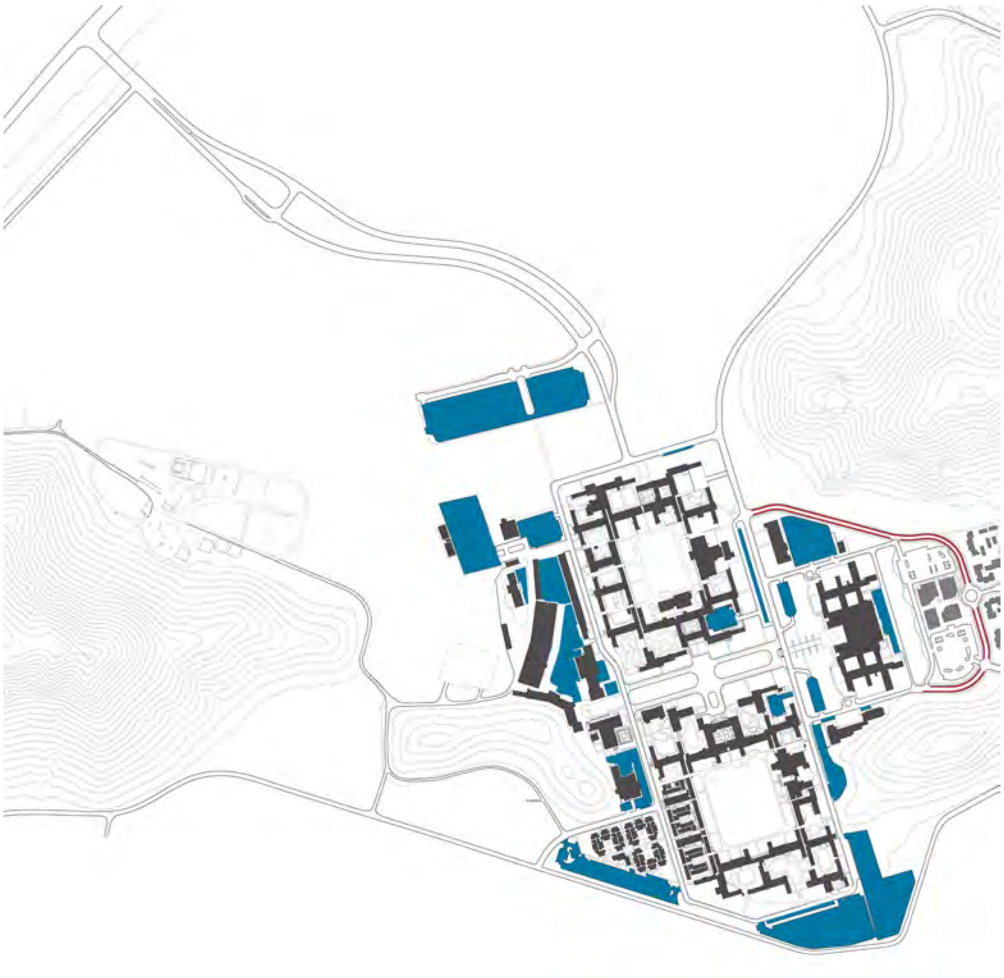


Proposed Vehicular Circulation

- *County Roadway*
- *Campus Roadway*
- *Secondary Roadway*
- *Service Roadway*

are proposed to run through North Campus to access parking and athletic/recreation fields. The Vision Plan also proposes Chapel Drive moving further to the southeast to make more contiguous area south of the library and moving Santa Paula Street parallel to Potrero Road to make more contiguous area north of the road.

While the campus is compact, it is expected that a robust campus shuttle system will be implemented. A campus shuttle system will make it easier to get around campus, especially with the development of North Campus. The Vision Plan assumes that the existing VISTA transit system will be improved and expanded, along with an improved bus stop that coordinates with the campus shuttle system.

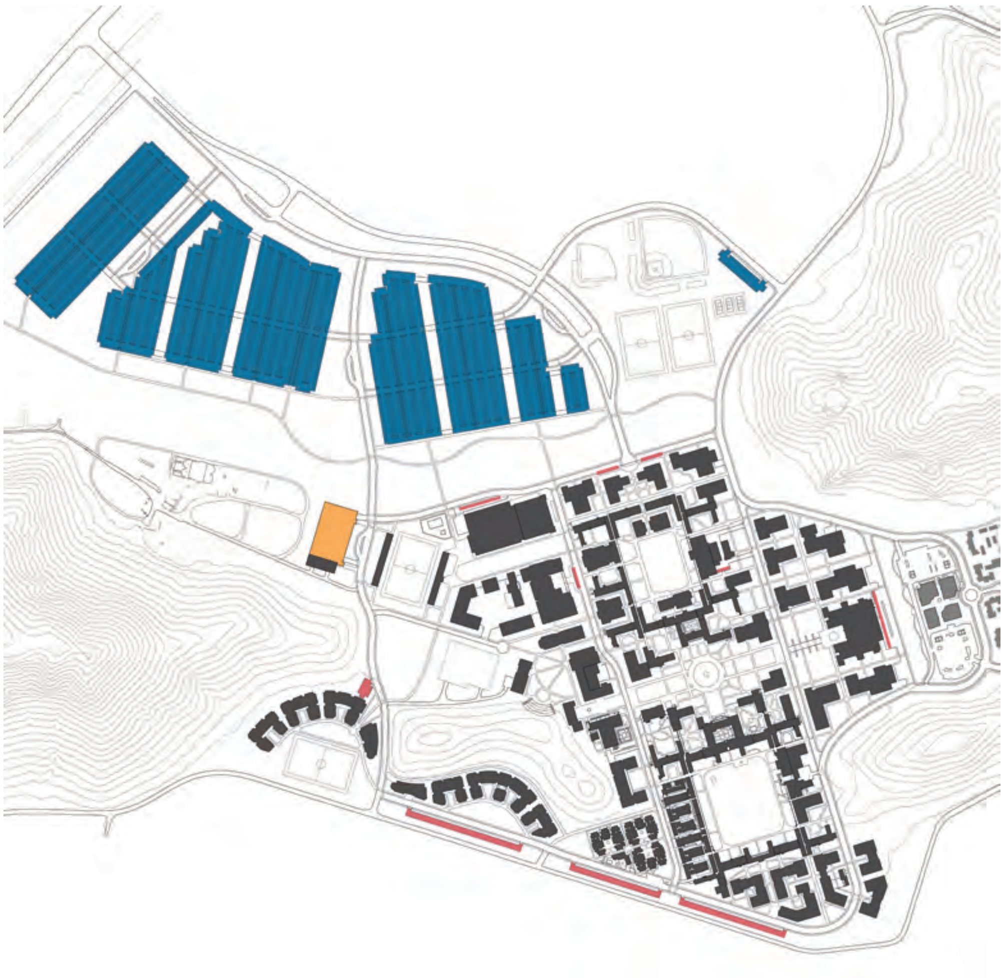


Existing Parking

- *Surface Parking Lots*
- *On-Street Parking*

Parking

As the campus develops, additional surface parking will be developed in the North Campus and parking within the campus core will gradually be closed. In addition to parking in North Campus, the Vision Plan proposes a parking garage on the western edge of West Campus, acting as a buffer between the Camrosa Plant and the campus. The proposed garage is in close proximity to public spaces, such as the stadium, arena, and performing arts center. The parking garage also provides space for additional parking that may not be accommodated in North Campus. Additional short-term parking is proposed throughout the outer edge of campus, for loading and unloading.



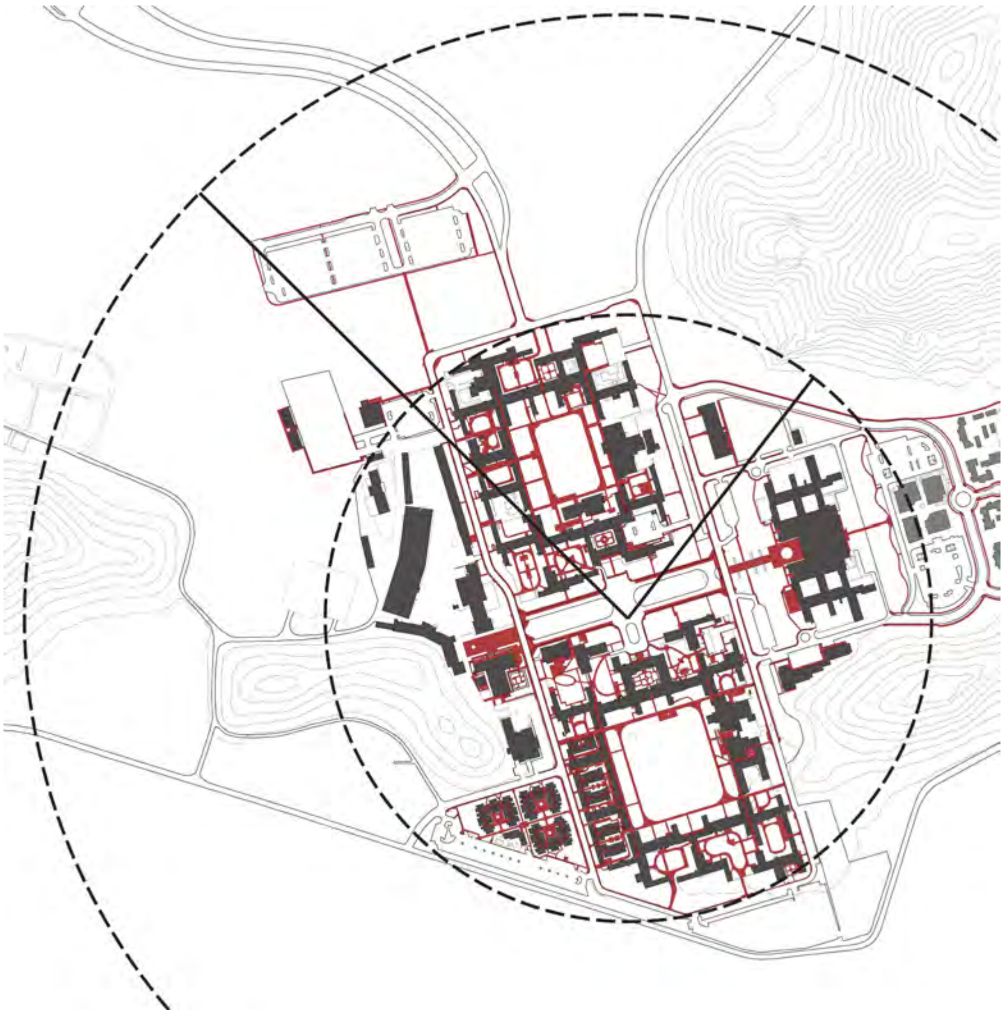
Proposed Parking

Surface Parking Lots

Short-Term Surface Parking

Structured Parking

A goal of the Vision Plan is to reduce the ratio of parking spaces per FTES from 0.56 to 0.35. At full build-out, that equates to 5,250 parking spaces. However, if CI does not reduce the ratio of parking spaces, as suggested in the Vision Plan, the campus will require an additional 4,200 parking spaces. To prevent this, the Vision Plan suggests the gradual reduction in parking demand through aggressive implementation of transportation demand management (TDM) strategies, such as carpool incentives and transit subsidies.



Existing Pedestrian Circulation

Pedestrian Circulation

Pedestrian and Bicycle Circulation

The Vision Plan proposes a very porous campus with easy circulation into and out of the quads. As opposed to the former use of the campus, designed for isolation and containment, the Vision Plan promotes connections and inclusion. The plan suggests that walls and gates protecting the quads will be replaced by beautiful passageways. The Vision Plan also promotes easy access to West Campus and North Campus. By limiting vehicular access to Ventura Street and Camarillo Street, pedestrian flow into and out of the campus core will be easier and safer.

Proposed Pedestrian Circulation

Pedestrian Circulation

The Vision Plan is also a bicycle friendly plan. The plan promotes the use of bicycles by locating dedicated on-street bicycle lanes on all of the streets within the campus, as well as through campus at key locations. Supporting facilities will include bicycle parking and/or bicycle lockers. The Vision Plan also proposes a bicycle sharing program to further promote the use of bicycles for on-campus circulation.

Proposed Bike Access and Improved Transit

Bike Lanes

Potential Campus Shuttle Stop

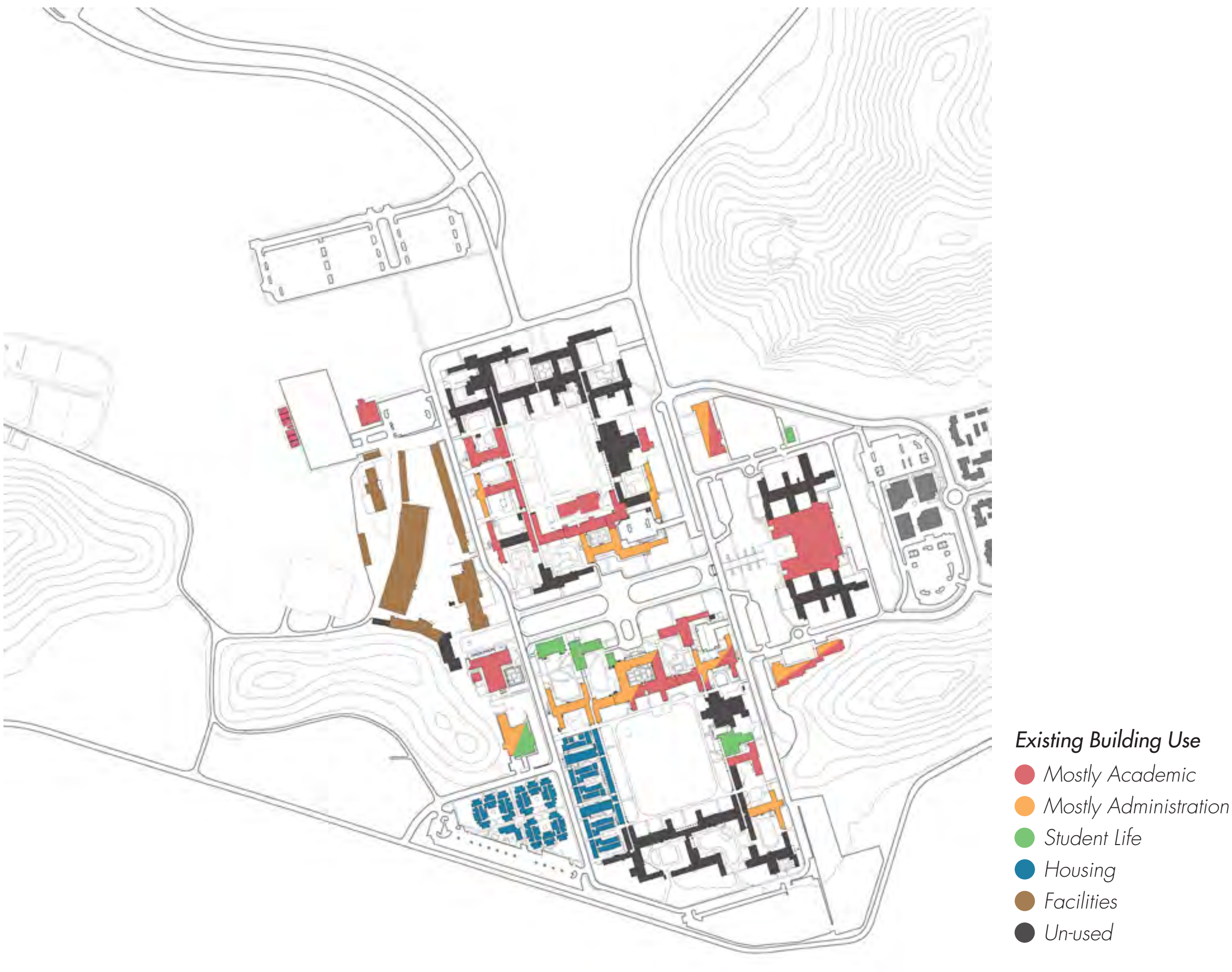
Building Type

The Vision Plan calls for the majority of the buildings surrounding the North Quad and South Quad, in addition to the Powerhouse and Chaparral Hall, to maintain their original character and be renovated. However, the majority of growth in the Vision Plan will come in the form new construction of more efficient, collegiate buildings.

New buildings on campus should respect the original architectural style of the historic campus. However, the proposed parking garage, maintenance facility, and stadium will be more utilitarian in style.

Proposed Building Type

- *Original Campus Building - Renovated*
- *New Campus Building*
- *Utilitarian Building*



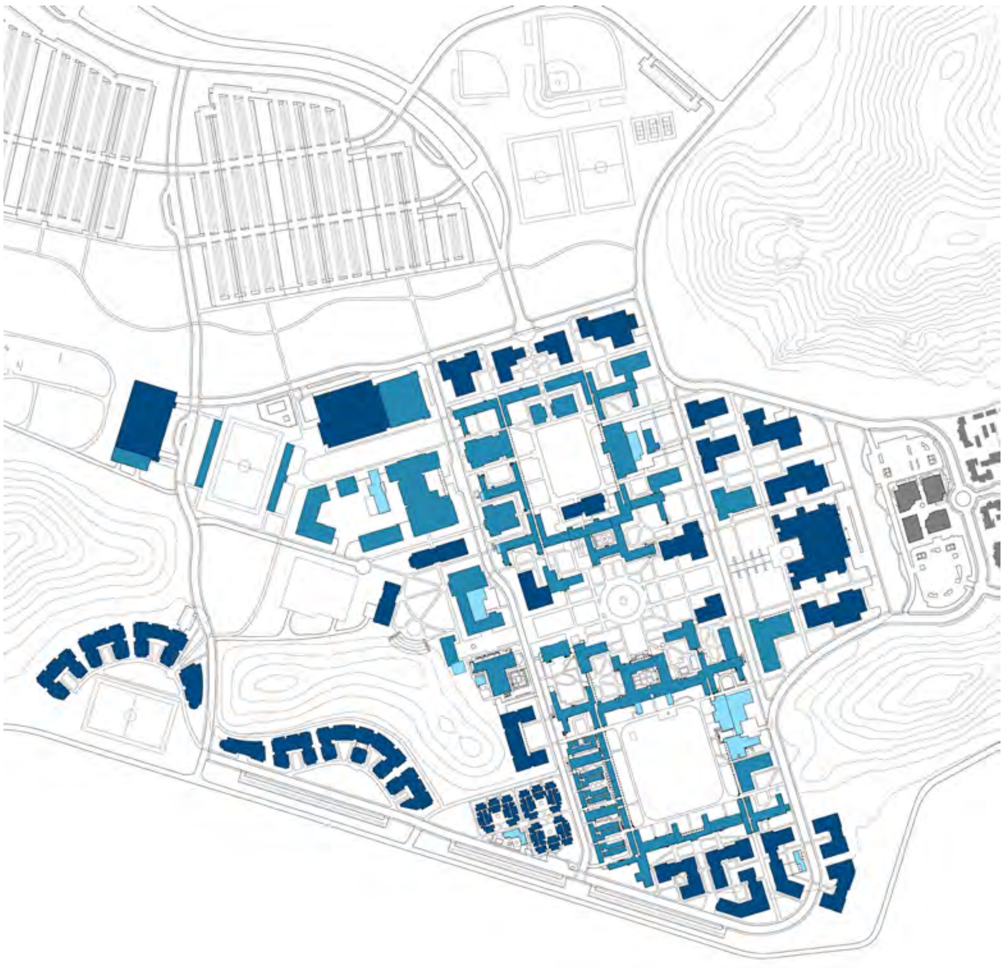
Building Use

The Vision Plan creates a strong network of housing along the entire southern edge of campus, establishing smaller communities that make up the larger on-campus housing community. Within the housing clusters, there will be other student centered amenities in these buildings. The majority of academic and administrative space will be focused around the Broome Library, North Quad, the north edge of South Quad, and around the Powerhouse in West Campus. All of the maintenance and operations functions will be consolidated in West Campus. Larger student life functions, like a stadium, performing arts center, and arena/recreation center will be clustered on the northeastern part of West Campus. Other smaller student life functions, such as student unions, conference space, and food service are sited near the central mall.


Proposed Building Use
Mostly Academic
Mostly Administration
Student Life
Housing
Facilities

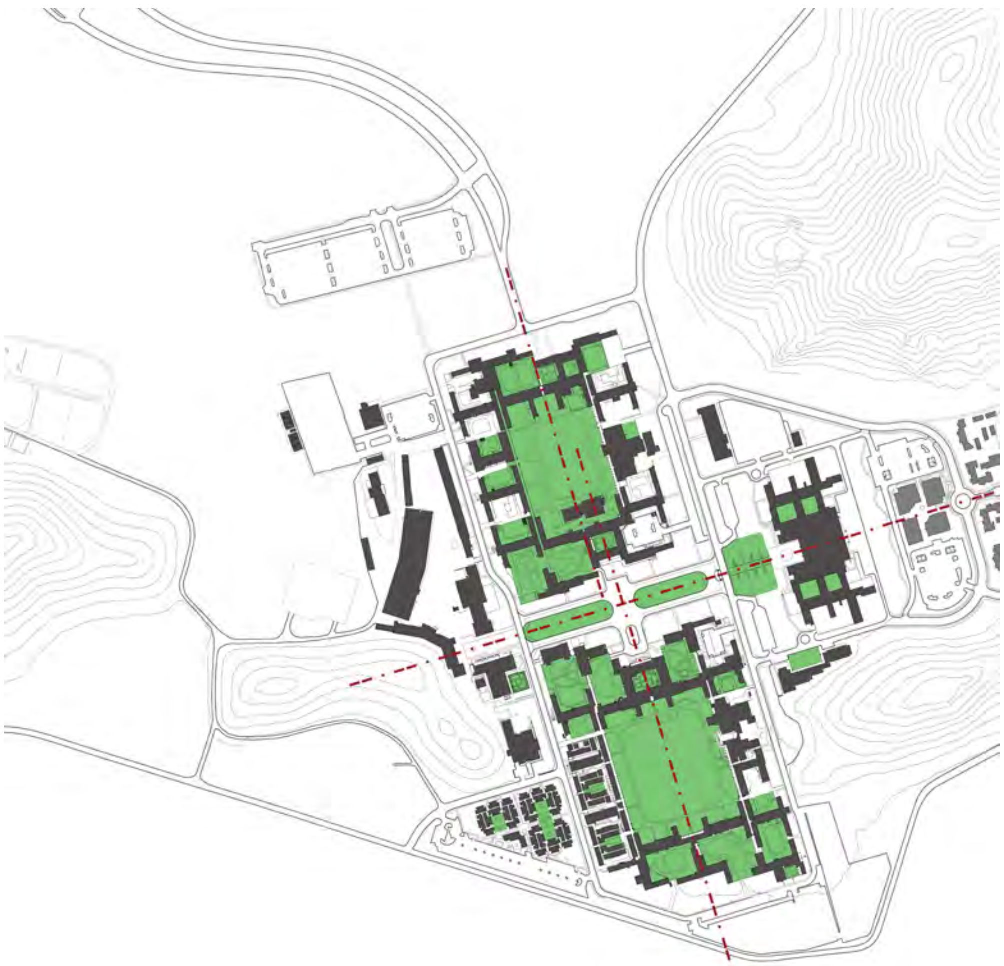
Building Height

To meet the programmatic needs of the campus and maximize the highest and best use of the land, the Vision Plan does propose taller buildings in specific areas of the campus. However, special care was taken so that the views of surrounding mountains that currently exist on campus will not be significantly obstructed by proposed new construction. The building height of infill buildings and new construction will be based on a sloped view line from a standing person in the Quad to and beyond the ridge line of existing buildings. Therefore, all of the buildings immediately surrounding the quads are a maximum of two stories. Buildings along the northern edge of North Quad, along Santa Barbara Avenue, at the four corners of the mall, and surrounding the library are proposed to be three story buildings. The two buildings in front of Broome Library should be two stories, to respect the prominence of the existing library.



Proposed Building Height
- *One Level*
- *Two Levels*
- *Three + Levels*

West Campus has the opportunity to push the building height limits that exist in the campus core. A few functional items, such as a theater fly loft and the roof of an arena/ event venue, will probably push or exceed the 60 foot height limit mandated by the Board of Trustees. However, other buildings in the northern portion of the West Campus will be two- to three stories in height. The proposed parking garage and housing south and west of Peanut Hill will be taller. It is assumed that the parking garage will be at least five levels, and the housing will be a mixture of four and five levels, but staying below the 60 foot height limit. In general, the West Campus is an area of campus where exploration of building heights is suitable.



Existing Open Space

Major Axis

Open Space

Open Space/Landscape

The proposed landscape provides an attractive, healthy, and regenerative campus. A landscape that emphasizes the best qualities of the existing natural and cultural landscape is timeless and contributes to unity throughout the campus. As an example, regionally native plants may be used in the landscape, and early California and agrarian landscape themes will reinforce the sense of place.

The Vision Plan proposes a return to strong visual and axial connections, a timeless landscape tradition. This approach re-establishes the campus landscape as a means to orient, guide, and inform. It acts as both a backdrop as well as main stage for activities, and it contributes to a clear identity. A vital and interesting landscape can also be a valuable learning tool for a campus that emphasizes

Proposed Open Space

Major Axis

Open Space

experiential learning. New landscape will be designed to serve as outdoor laboratories and provide many interactive learning experiences. Building forecourts, gardens, quads, and natural landscapes will serve as outdoor rooms, classrooms, and offices in Camarillo's pleasant climate. The Vision Plan also proposes more shade trees for parking lots to avoid heat island effect.

Hydrology

To address the needs of 15,000 future students on the CI campus, new development in the form of new construction must occur, and this will have an unavoidable impact on stormwater runoff. This poses a challenge because stormwater regulations require that the rate and volume of discharge not change due to development. Fortunately, there are several ways for the campus to retain and detain stormwater on campus to negate the impact of stormwater runoff.

In order to avoid changing the existing drainage characteristics and patterns of the campus, the difference in volume after the campus is fully built out needs to be retained and infiltrated on campus. There is a known volume of water that needs to be retained for infiltration purposes and a known volume of water detained in order to avoid upsizing the existing campus outlets. With this information, a few design recommendations for the overall campus hydrology Vision Plan are available.

The recommended strategy is to provide at least 5 percent of the total campus area as stormwater treatment/infiltration to satisfy the infiltration requirement for each campus area and to provide above ground storage for the volume of runoff above the existing outlet capacity. It is also recommended that all stormwater runoff from impervious surfaces be filtered through landscaping or permeable paving before entering the underground storm drain system. This will not change current campus drainage patterns and existing outlets, or significantly alter the approach to dealing with stormwater.

The following section on sustainability highlights additional opportunities to use the entire campus for effective stormwater management.

Sustainability

Compact Campus

The Vision Plan demonstrates how the campus can continue to grow while maintaining a compact core, resulting in a walkable and bikeable campus. It also results in a campus characterized by effective internal transportation infrastructure with shorter roadways, efficient in utility distribution, and less impervious surfaces. The compactness also increases the potential for students to engage in integrative studies.

Natural and Native Habitats

Under the Vision Plan, the hills and Round Mountain are maintained as natural habitats, some restored to a more purely native environment. Low-care California native plants are used in the core landscape, especially those from the immediate region. Land is available for potential academic classes and landscape staff to cultivate native plants for use on-site.

Site Water

Rain that falls on the site becomes a part of the systems of the campus. New swales, vegetated surface drainage, and recharge areas supplement recently created wetlands and riparian zones associated with Long Grade Canyon Creek. The first tier of water quality treatment begins in the localized areas adjacent to new structures. North Campus continues to serve the natural purpose and urban need of a floodplain.

Energy

On-site energy use and its related carbon footprint continues to be assertively reduced with this Vision Plan. One opportunity to decrease carbon footprint is by ensuring buildings (existing, infill, and new) meet the highest standards for performance. Areas for future on-site, renewable sources are designated in the plan; for example, canopy-mounted photovoltaic panels are proposed over much of North Campus, and PV panels could be discreetly used on the south-facing red tile roofs of new buildings outside of the campus core. The campus also appears to be well-suited for use of ground source / thermal heating and cooling.

Natural Comfort

The people on campus benefit from an attractive, benevolent climate. The Design Guidelines leverage that climate by insisting on creative design for refined natural ventilation and shading. The majority of infill and new buildings have a predominant east-west orientation while staying within the orthogonal patterns of the original campus. The heat island effect is reduced by a compact campus that leaves greater areas of open space and through the use of landscape and trees to shade buildings. Some of the parking areas could be shaded by future PV canopies and others should be considered for more shade trees or a blending of the two.

Vehicles

Vehicle use is reduced through transportation demand management initiatives. On-site parking spaces decrease from the current 56 percent of FTES to a goal of 35 percent, less than the typical 50 percent at many CSU campuses.

Domestic Water

The design and outfitting of buildings will continue to reduce potable water use. Over 97 percent of the irrigation currently uses reclaimed water, and CI is pursuing expanded use of reclaimed water for other acceptable functions.

Campus as Classroom

The campus becomes a classroom for sustainability by making the campus' commitment demonstrable. Proposed design features become a resource for curriculum and class exercises and an object for integrative study.

North Campus undeveloped area

Cultural Landscapes

CI is the recipient of layers of cultural heritage, both within its boundaries and the immediate region. These various layers and their intermingling, whether the native landscape, the Chumash Indians, or early Spanish and Mexican activities in the area, contain "narratives of culture and expressions of regional identity," according to the Washington, DC-based Cultural Landscape Foundation. As a result, the campus will represent and enhance the associated attributes of its place. Its cultural landscape will serve as a valuable learning resource, whether the subject is human geography, social and cultural attitudes, California labor, ethnographic settings, or business history.

Six layers or periods serve as a starting point for this resource (with Channel Islands soon becoming a seventh), as follows:

- Original Landscape / Channel Islands
- Chumash Indians
- Spanish Missions
- Mexican Land Grants and Ranchos
- State Hospital
- Agriculture

There are many ways in which the cultural landscape can manifest itself on campus. In some cases, elements of these already exist as active components of the Vision Plan. This list is only a beginning of ideas for exploration that should be augmented with fresh ones over time.

Original Landscape / Channel Islands
Views of the Channel Islands are offered from the upper floors in buildings in the southern part of the campus and from nearby hillsides and mountains. Interpretation of these vistas could be captured through learning activities as well as through the physical environment. A proposed design for the campus mall, for example, incorporates a map of the Channel Islands in the pavement.

The natural setting of the campus and its environs should be protected and restored to preserve a sense of its origins and physical beauty. These conservation efforts should include restoring the habitat of hillsides and mountains, protecting newly created wetlands and riparian areas along Long Grade Canyon Creek, and preserving significant views to surrounding mountains.

Chumash Indians
The heritage of native people who once inhabited the site will be celebrated through landscapes and original artifacts, as well as new spaces inspired by their culture. Protection of Round Mountain, a significant place within the Chumash culture, and development of the designated Chumash interpretative site in University Glen would provide places to experience tribal traditions firsthand. Siting ethnic artifacts and interpretative art in the landscape, such as a unique plank-built canoe called a Tomol, provides tangible evidence of native cultural practices. Preserving the dolphin fountain near the Powerhouse and planting an ethno-botany garden are others ways of engaging students in the history of place.

Spanish Missions
Supporting the Spanish Colonial Mission Revival character of the campus through renovation of existing structures and new construction serves as a means of enriching the physical setting and teaching students about the architectural history of the campus and region. Interpretative signage about Ventura's Mission Buenaventura, the first of the California missions, could capture the history of Spanish exploration within the region and precedents for the campus architecture.

Mexican Land Grants & Ranchos
The campus boundaries coincide with the boundaries of Rancho Guadalasca, offering the opportunity to erect interpretative signage about the Mexican land grant from which the campus site merged. This signage could also pay tribute to Ysabel Yorba (1836 – 1871), the original grantee from the Mexican government and a pioneering woman "rancho" in what would become California.

State Hospital
The Camarillo State Hospital forms the basis of the campus core with its central mall and the expansive South Quad distinguished by sycamore trees and low buildings. These physical settings form an important legacy for the University, offering an opportunity to build on the hospital's interconnected structures and outdoor spaces, and preserve a sense of the original psychiatric hospital as a learning resource.

Agriculture
Connecting the campus to the rich agricultural activities of the region could be achieved through preserving views of surrounding field and orchards, campus activities linked to gardening and cultivation, and interpretative signage about farmers and migrant workers. Organic and community gardens and indigenous plantings would also provide opportunities for students to become involved in food production and landscaping.

A selected courtyard could support a more artistic representation of nearby fields and orchards. Landscapes, such as the garden at Arroyo Hall, could be planted with citrus trees and rosemary hedges to connect the campus with the region's agricultural traditions.

Phasing & Implementation

The Vision Plan for CI is meant to be a flexible and adaptable plan. The vision planning process produced a long-term plan for development opportunities that can accommodate the needs of the campus without designating specific programs for each building or project.

Phase 1: Short-Term (5,000 students)

Academic		ASF	Housing		ASF	Beds
1	Renovation	9,600	4	New Construction	83,948	365
	New Construction	25,380	5	New Construction	54,860	239
2	Renovation	3,760	6	Renovation	22,330	97
	New Construction	26,640	7	Renovation	14,850	65
3	Renovation	4,120				
	New Construction	7,200	*8*	*Relocated Santa Paula Street*		
Phase 1 Total		76,700	Phase 1 Total		175,988	765
Project Subtotal		502,645 Goal: 450,000	Project Subtotal		347,472 Goal: 345,000	1,590 Goal: 1,500

Phase 2: Mid-Term (7,500 students)

	Academic	ASF		Housing	ASF	Beds
1	Renovation	7,840	9	New Construction	17,420	76
2	Renovation	10,080	10	New Construction	50,960	222
3	New Construction	19,050	11	New Construction	91,780	399
4	New Construction	19,050	12	New Construction	47,060	205
5	Renovation	8,600				
	New Construction	3,300	*13*	*Mall Improvements*		
6	New Construction	19,200	*14*	*Stormwater Detention*		
7	New Construction	36,720	*15*	*Extended Santa Barbara Ave*		
	Demolition	*(22,600)*				
	Phase 2 Total	101,240		Phase 2 Total	207,220	901
	Project Subtotal	603,885 Goal: 600,000		Project Subtotal	554,692 Goal: 520,000	2,491 Goal: 2,250
	Independent Projects	ASF				
8	Arena	42,000				
	Recreation Center	50,400				
		696,285				

Phase 2
Existing Buildings
Proposed Buildings

Phase 3A: Long-Term Phase 1 (7,500 - 15,000 students)

	Academic	ASF		Housing	ASF	Beds
1	New Construction	25,740	13	New Construction	201,825	878
2	New Construction	29,340	14	New Construction	49,530	215
3	New Construction	46,980				
4	New Construction	31,200	*15*	*Recreation Field*		
5	New Construction	15,600	*16*	*West Access Road*		
6	New Construction	38,850	*17*	*West Quad*		
7	Renovation	9,360	*18*	*Extended Santa Paula Street*		
8	New Construction	25,920				
9	New Construction	18,540				
	Demolition	*(41,679)*				
	Phase 3A Total	199,851		Phase 3A Total	251,355	1,093
	Project Subtotal	896,136		Project Subtotal	806,047	3,584
	Independent Projects	**ASF**				
10	OPC/Maintenance	29,040				
11	OPC/Maintenance	20,640				
12	Performing Arts Center	46,800				
		992,616				

Phase 3A

Existing Buildings

Proposed Buildings

Phase 3B: Long-Term Phase 2 (7,500 - 15,000 students)

	Academic	ASF		Housing	ASF	Beds
1	Renovation	3,600	11	New Construction	238,388	1,036
2	Renovation	10,080				
	New Construction	14,520	12	New Quad		
3	New Construction	10,680	13	Amphitheater		
4	New Construction	8,280				
5	New Construction	22,320				
6	New Construction	30,600				
7	New Construction	21,000				
8	New Construction	50,400				
9	New Construction	31,320				
10	New Construction	50,400				
	Demolition	*(49,092)*				
Phase 3B Total		204,108	Phase 3B Total		238,388	1,036
Project Subtotal		1,196,724 Goal: 1,125,000	Project Subtotal		1,044,434 Goal: 1,035,000	4,620 Goal: 4,500

Phase 3B

Existing Buildings

Proposed Buildings

Other Projects

Independent Projects		
1	Stadium	NCAA Competition Field
2	Parking Garage	1,000 cars

Other Projects

Existing Buildings

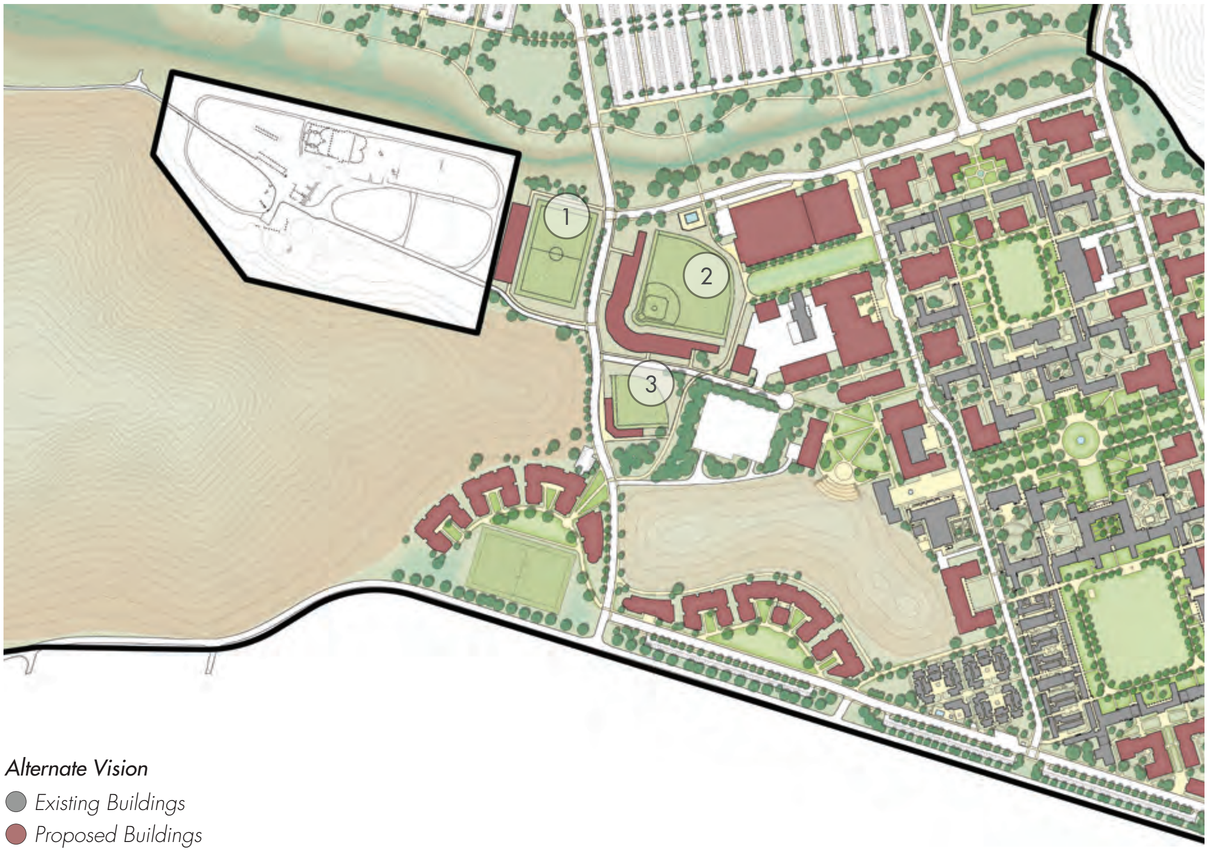
Proposed Buildings

Alternate Vision Plan

An alternative plan is available for consideration if the University decides to partner with a professional (Single A or Double AA) baseball team and builds a baseball stadium in West Campus. If that occurs, a softball stadium and soccer stadium would also be built in West Campus, out of the flood plain of North Campus. Accommodating all three stadiums in West Campus requires a tightly orchestrated layout in the northern portion of West Campus, which limits pedestrian and vehicular movement on this part of campus, as well as limited open space opportunities. This alternate plan would also require further study of stormwater management on the campus, as a detention pond in West Campus cannot be accommodated.

Independent Projects

1	Soccer Stadium	NCAA Competition Field
2	Baseball Stadium	Professional Field
3	Softball Stadium	NCAA Competition Field



Alternate Vision

Existing Buildings

Proposed Buildings

Appendix

Architectural Design Guidelines

The core of the CI campus has a distinct and inviting quality, characterized by a Spanish Mission Revival style, low buildings with red pitched roofs, unique open spaces, and a remarkable setting. The buildings are tightly organized around quads and courtyards in a sometimes regimented way, but this arrangement creates an intimacy of scale and function that CI wishes to retain.

These architectural design guidelines describe concepts and tools that will enable CI to apply and enhance current characteristics to new future infill buildings and expansion areas.

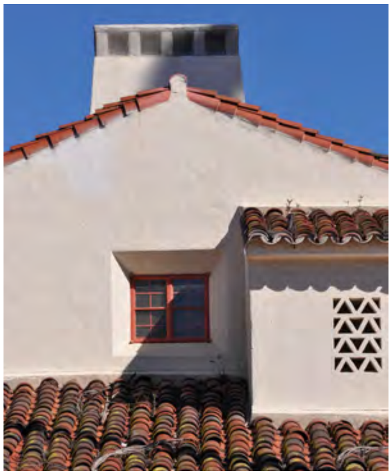
Spanish Mission Roots

With its construction dating to the mid-20th century, the CI campus is characterized by buildings and formal open space patterns based on early Spanish missions in California, a style formally referred to as Spanish Colonial Revival. The original Mission architecture, upon which the Revival style is based, is characterized by pale stucco-covered structures with pitched roofs of red clay tile. Juxtaposed forms or masses are typically asymmetrical. Simple window and door patterns are "punched" deep into thick walls. A variation of the Mission style that is less robust in its construction and detailing evolved in places like the City of Santa Barbara and is referred to as California Mission.

The buildings of the CI campus enclose a variety of courtyards, two iconic internal quads, and an orienting central mall. Long arcades of white columns and red-tiled pitched roofs line the exterior of the buildings to form the two quads and both of the two central buildings on the mall.

While the architectural setting of the campus is stunning, it is notable that its natural setting is equally dramatic, with its location at the juncture of the Santa Monica Mountains and richly cultivated Oxnard Plain.


BELL TOWER



Key Forms

Simple, connected forms

The buildings of the campus are simple, rectilinear forms frequently layered against each other. This technique lends a smaller profile and scale to otherwise large footprints. This occurs in both a parallel and orthogonal manner. The intersections between building forms are frequently asymmetrical in both plan and elevation.

Courtyards and enclosure

Courtyards on campus, created where buildings connect, are partially or entirely enclosed; in certain places, freestanding walls enclose the open spaces. At a larger scale, campus buildings shape three major features: the two large quads and the central mall. This underlying orthogonal grid should remain constant throughout the campus with rare topographic exception.

Pitched, clay-tiled roofs

Campus buildings have simple, pitched roofs of red clay tile. The dramatic contrast between the clay-red roofs and the white walls often give a strong graphic quality to the layering and asymmetry. This style, or a close variation of it, should be replicated in future campus construction.

Façade composition: windows and doors

Simple patterns of recessed windows and doors compose most of the campus building façades. Fenestration placement is often symmetrical within a grouping, but these groupings are sometimes placed asymmetrically on the wall surface. Most buildings are one or two stories in height, with window openings on each level.

Arcades

Arcades line the long walls (north-south) of the two campus quads, as a way to highlight their importance. The arcades supply shade and reduce glare on the building spaces behind the major east and west walls. They also provide shelter from rain. The arcade feature is used again in original buildings to highlight campus significance, in examples such as the Bell Tower Building and the Administration Building, both on the central mall.

Rare embellishment

Architectural embellishments, such as Spanish tiles, exposed wood beams, elaborated window and door openings, window grilles, decorative vents, metalwork and small balconies, are used selectively to denote building significance. The Bell Tower, with its articulated windows and painted coping, is a good example of this ornamentation. Architectural embellishments are used in a very restrained way elsewhere on campus, such as the few prominent portals to the extensive interior corridor system. The entry at the north end of the South Quad is good example. Additional use of this technique should be limited to signifying entry at a campus scale, like the new Gateway buildings proposed at the north end of campus.

Industrial 'steel' sash and railings

The windows and doors of campus buildings constructed in the 1930s and 1940s are formed of industrial steel sash, painted a red-clay color. The steel sash is used consistently and adds an industrial character to this campus' version of the sturdy and robust Mission style. The complementary steel railings reinforce the modern simplicity of the buildings' hardware.

Varied roof top vents

The exhaust chimneys are strong and distinguished, much like the overall architecture.

Connection of inside and outside

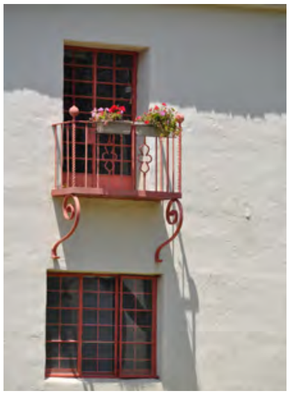
Existing building configurations largely hide the activities occurring within; the exception being Broome Library. The Academic Plan discussions resulted in recommendations to reveal more of the choices offered to students through building transparency and to treat the campus as a learning classroom. At the same time, the attractive climate encourages greater connections between inside and outside spaces as part of the design approach.

Materials


Red clay tile roofs

Thick, white stucco walls

Clay-red industrial steel sash and railings

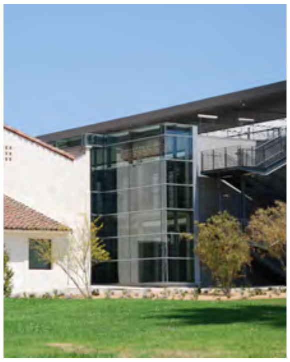



Exposed wood beams

Exposed wood beams are limited to the ceilings of arcades, highlighting their length.


Decorative tile

Decorative tile (Spanish or Moorish) is rarely used in highly public situations. When decorative tile occurs, it is in very small vertical quantities. Some examples include the risers of steps to important buildings, the base of a few decorative fountains in courtyards, and the backsplash for a select few water fountains.

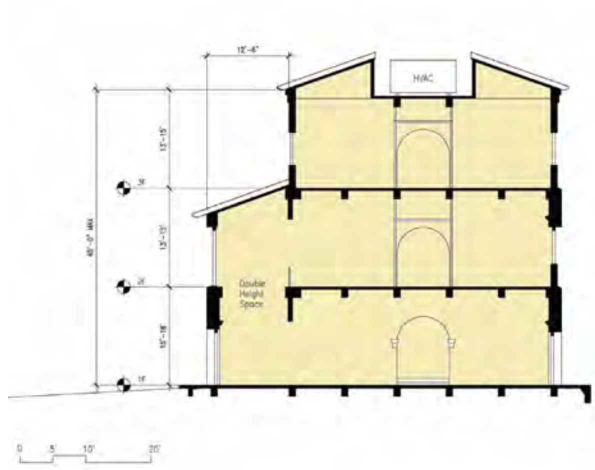



Clear glass

All windows, glass doors, clerestories, and controlled skylights should be in dual-glazed, low-E clear glass, fitting into the character of the existing building style. No colored glass should be used.

Building Heights & Scale

The core of the campus consists largely of one to three story buildings. The stated height limit for the campus is 60 feet. The heights of buildings affect several issues including scale, views and view corridors, building and site capacity, and special functions.



Scale

The campus has an attractive, human scale that is the result of a number of factors, such as building height, arcades, pitched roofs, stepped and staggered massing, and abbreviated façade lengths. These design tools should be applied to both infill and freestanding building projects to maintain the intimacy of scale. They will be especially critical for new buildings that must have large footprints to meet academic functional needs and increase square foot efficiencies.

Because current buildings in the core are typically under three stories in height, additions and new buildings in the core must be compatible to adjacent structures and the character of the core. Effort should be made to extend these same features to new areas of campus outside the core as well.

Views and view corridors

The surrounding mountains and regimented agricultural fields are significant elements of CI's identity. As the campus grows, its development should enhance and, in some cases, protect the views of its setting. A photographic survey was conducted of views from the campus to the mountains, and several key vistas were identified:

- View from the South Quad looking east and south
- View from the North Quad looking northeast from its northern half
- View from Santa Barbara Street looking northeast
- View from Broome Library's upper floors looking east
- View from South edge of campus looking east and south

The following diagram provides guidance on building heights. The areas in green denote no-build areas. The area in red denotes where views from the South Quad should be protected by limiting the height of the building roof tops to within the existing vertical view angle.

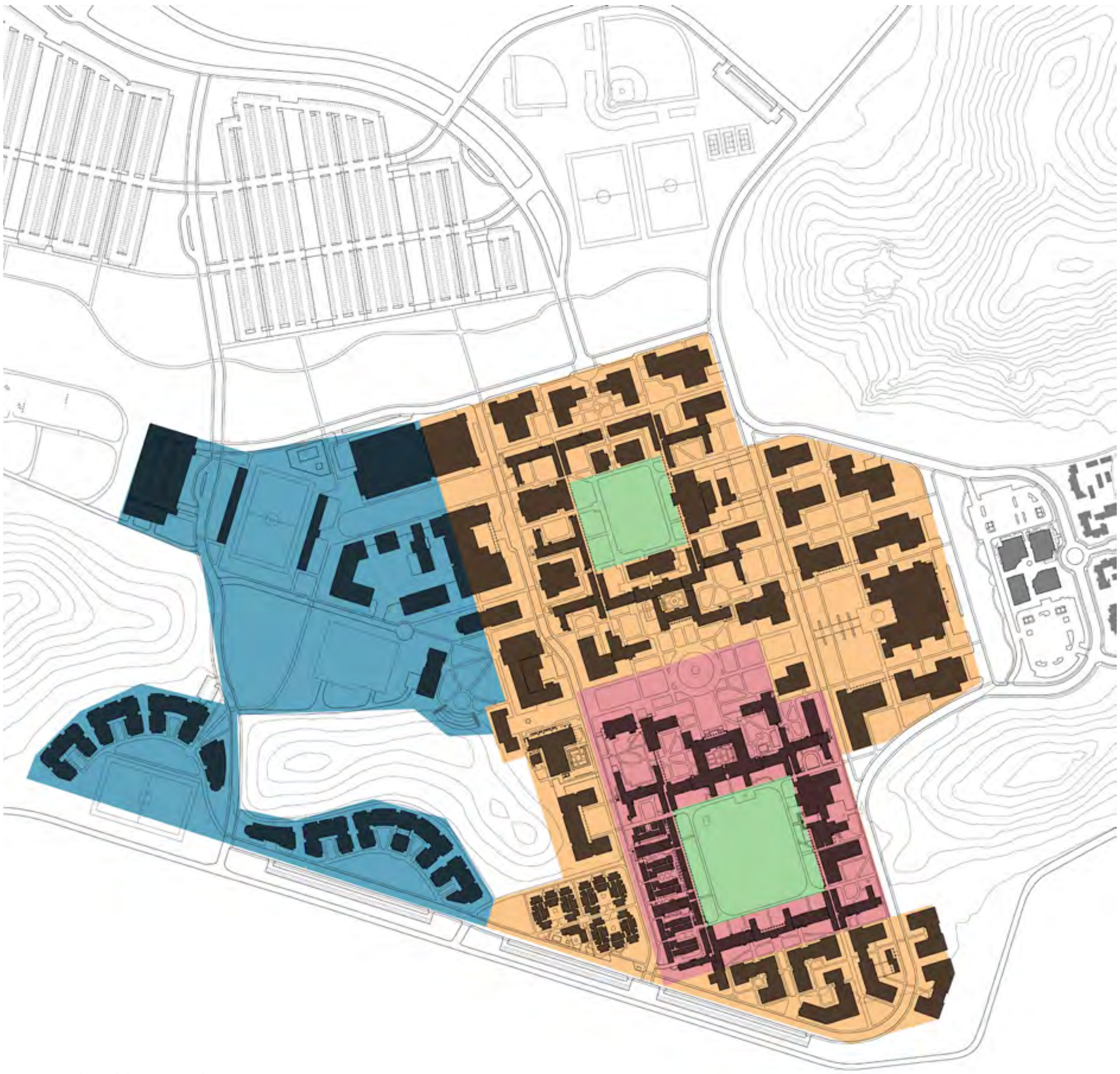
Several areas to the west have been approved for higher building heights; however, new construction should not exceed 80 feet in height. This variance occurs because Peanut Hill and Round Mountain help to screen higher buildings on West Campus. Site capacity and functional requirements influenced decisions pertaining to building height, as explained below.

Site capacity

Some increased height may be necessary in the area west of Ventura Street (West Campus) to meet long-term program goals on limited site area.

Special tall function

Portions of certain buildings, like the fly loft of the theater and the center segment of the arena, may require greater height to meet functional requirements.



Proposed Building Height Restrictions

- *No Build*
- *40 feet*
- *60 feet*
- *80 feet*

Design with Climate

The CI campus is unique from many campuses in that it experiences a very comfortable, mild climate year-round. Future development should take greater advantage of this condition with indoor and outdoor activities that support learning outcomes and student life. Because the campus receives a significant amount of sunlight during the year, natural lighting within buildings is recommended.

The campus is governed by state regulations, CSU System regulations, and CI initiatives to be environmentally responsible. These regulations and initiatives are often specific to the sustainable design of renovations and new construction.

Natural ventilation

The mild climate suggests extensive use of natural ventilation for both thermal comfort and fresh air. The design of new buildings should leverage this opportunity for natural ventilation and find ways to take advantage of prevailing winds. New construction also offers the potential to reinstate the natural flow of air in areas where it has been interrupted by building structures.

Although natural ventilation is generally viewed positively, it can pose potential challenges during certain times of the year. In this region, natural ventilation requires special attention on the days in which there is agricultural dust in the air, usually at the times of tilling and forming of plant beds. For outdoor activities, the landscape should channel the breezes to areas of highest activity. During the afternoon, wind speeds frequently increase, disrupting outside activities. Also, the campus experiences Santa Ana winds from the northeast bringing higher velocities, heat, and dust during specific times of year. For select areas of small scale outdoor activity and gathering, the vegetation should be designed to provide wind shadows that create relative calm.

Heat island effect

The heat island effect is caused when the surfaces of buildings and pavement absorb sunlight and re-radiate heat, raising the temperature of surrounding air. During the summer this effect can increase the demand for cooling and related energy. The portions of buildings that receive the most direct sunlight in summer should be shaded, shadowed, and/or covered with more reflective surfaces to reduce the heat island effect. Low levels of continuous irrigation with reclaimed water will stimulate greater evaporative cooling, a benefit when using natural ventilation.

The character-rich, red-tiled roofs absorb more heat than a lighter colored surface; however, shade trees can help mediate this situation. The white stucco walls are good reflectors of the strong east and west rays of the sun. The south-facing pitched roofs outside of the original campus core can be shaded by solar panels. Green roofs or PV arrays should be installed on the flat portions of broad roofs. Parking surfaces should be shaded by shade trees and in certain locations by solar panels, such as North Campus.

Roof-top solar panels

New buildings provide the opportunity to install solar panels as part of specific projects. To be compatible with the predominant red-tile pitched roofs on campus, they should be placed only on south-facing roof areas, in a manner similar to Stanford University's new buildings. This arrangement should not occur within the original campus core, but only in the expansion areas east of Camarillo Street, south of the original South Quad, and to the west of Ventura Street. On large structures, such as an arena, solar arrays should be placed on the flat roof behind the tiled, pitched sections around the building perimeter.

Cool roofs

Red-clay tile roofs are an important part of the architectural character of the campus. For much of the growth of the campus, this material will be the dominant roof treatment. Being of low reflectance (low albedo), the roof systems should be designed so the tiles' undersides are naturally ventilated to reduce the buildings' heat loads during the summer (and heat spaces during the winter and shoulder seasons).

Some of the larger new buildings will be too wide and too long to support a full, pitched roof. For these structures, it is expected that there will be a pitched, clay-tile segment at the perimeter of what is likely to be a flat roof. This flat surface should be shaded by an array of solar panels or developed as a green roof.

Note: Examples from other campuses

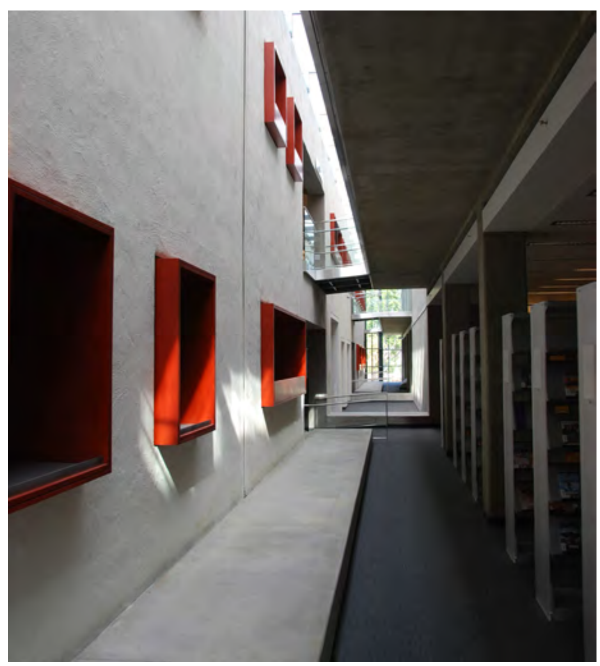
Building orientation

Despite the very attractive campus climate, certain spaces experience glare from the low sun in the morning and evening; at times, the heat gain during summer afternoons and shoulder seasons can become uncomfortable. As a result, new buildings should adhere to a dominant east-west orientation within the overall orthogonal, connected, and courtyard spaces of the campus.

For building segments with east and west exposures, deeply recessed windows should be considered. Exterior plant materials, such as trees, vines on pergolas, or supported walls of vines can limit low sun angles and moderate the southern sun.

Day-lighting

With CI's abundant sunlight, daylighting should be a notable attribute of new buildings. To meet the requirements of CALGreen, California's Green Building Standards Code, the University should consider larger windows, clerestories, and controlled skylights in new construction. However, larger windows are not typical in Mission architecture unless shielded by deep arcades. Fortunately, several of the existing buildings have windows and doors that begin to develop a vocabulary of larger openings compatible with the character of the campus.



Proposed Landscape Framework

Plazas (large gathering spaces; multi-use)
- *Heart of Campus/Formal Plazas*
- *Formal Quads*

Courtyards (medium to small gathering spaces passive or active use)
- *Courtyards (existing or proposed)*
- *Historic Courtyards (existing or restored)*

Open Areas
- *Playfields*
- *Turf Areas*

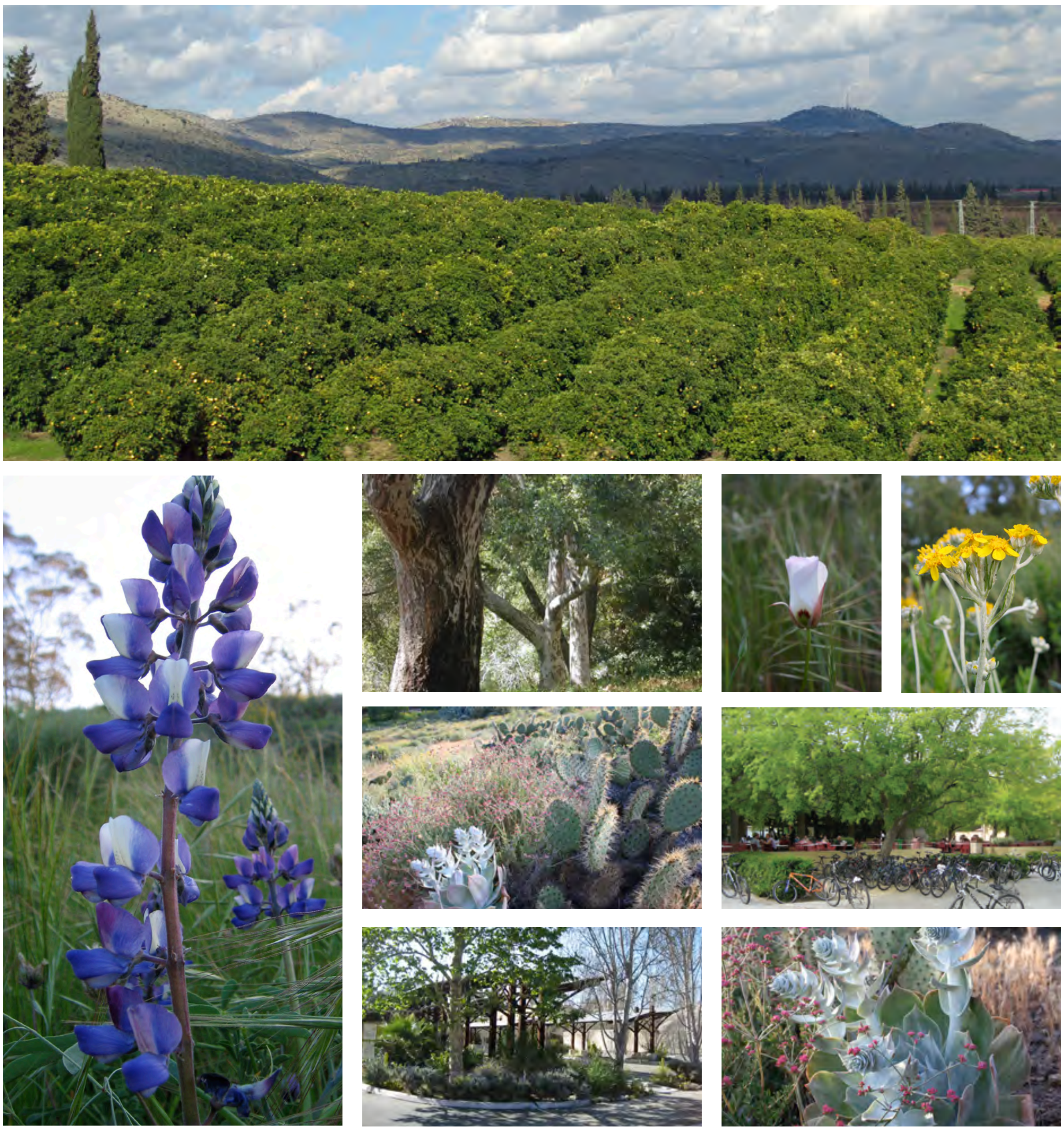
Transitional
- *Orchards at site edges and parking lots*
- *Regional Native Landscape*
- *Native Hillside Habitat (existing or restored)*
- *Riparian Habitat (existing or restored)*

Circulation
- *Boulevards (pedestrian/vehicular/bicycles)*
- *Paseos*
- *--- Trails*

Watershed Management
- *Bioswales/Seasonal Wetlands/Rain Garden*

Landscape Framework

The campus of California State University Channel Islands has a rich, natural landscape and the Vision Plan expands on that existing framework. Large, multi-use gathering spaces on the campus consist of formal plazas and quads, mostly in the center core of the campus on the main axes. Also in the center core of campus are courtyards, which are small to medium sized gathering spaces which have active or passive uses. Some courtyards on the campus are the existing historic courtyards that have been restored and some are new courtyards proposed by the Vision Plan. Open areas, such as playfields and turf areas, surround the campus edges. Transitional landscape areas are made up of orchards at site edges and parking lots, regional native landscape areas, native hillside habitats, and riparian habitats. Circulation across the campus occurs on boulevards, paseos, and trails. Watershed management, an important tenant of sustainability across the campus, is embraced through bioswales, seasonal wetlands, and rain gardens.



Transitional Landscape

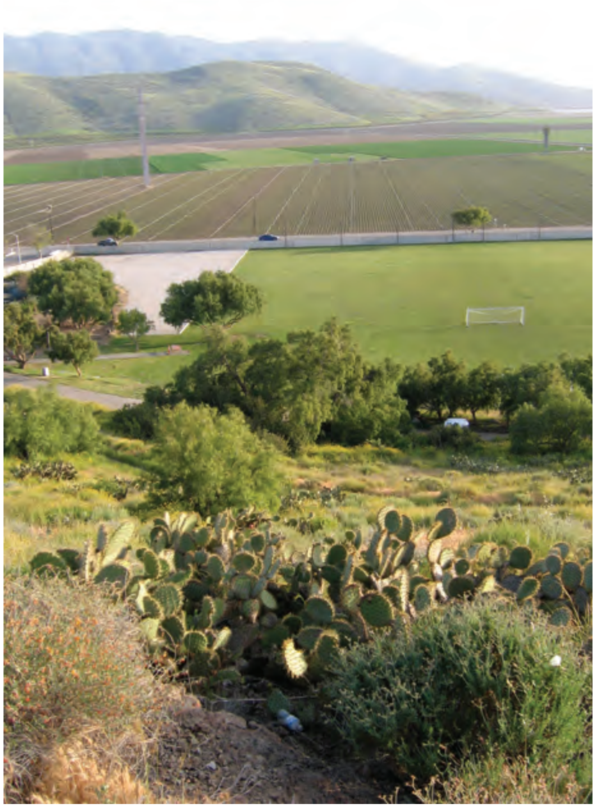
Circulation

Courtyards


Watershed Management



Plazas



Open Areas

Landscapes for Living

Campus community is created in the outdoor spaces, especially in sunny Southern California. Welcoming places can be provided to network, not just electronically, but in person.

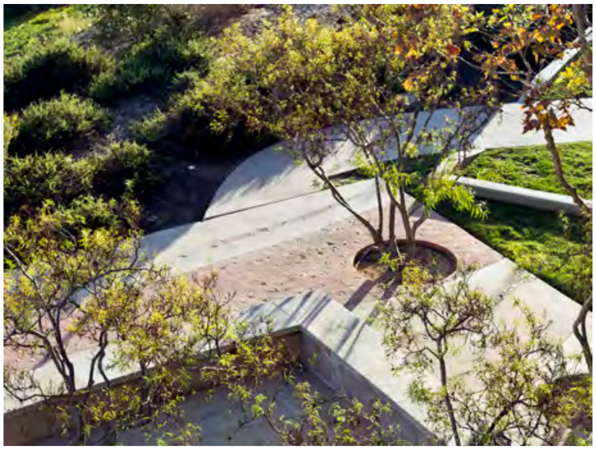
Chance and casual interactions need to be supported with seating, tables, lawn, and other amenities for gathering at a variety of scales, including:

- People watching
- Outdoor classrooms
- Casual games such as bocce, volleyball, and frisbee
- Planned events and activities designed to capture those passing by
- Gathering areas for events and festivals
- Graduation venues

Each academic building needs its own outdoor front porch/living space/waiting room for casual interaction, study, and discussion stimulated by the events occurring inside.

Landscapes for Health

Healthy landscapes create healthy people. Today's students need inspiring outdoor spaces, with the genuine sights, smells, and feel of nature, to balance the time spent in the electronic world. An appreciation of nature contributes to physical and mental health, and stimulates stewardship of our land.



Landscapes for Learning

CI's innovative, interdisciplinary, multicultural, and international perspectives, emphasizing experiential learning and service, requires great outdoor spaces. More than ever, people learn from each other and learning can happen in a variety of settings. Teaching/learning in the landscape stimulates research, facilitates group projects, and encourages personal social networking.

Landscapes for Good

A landscape designed as a model for sustainable or regenerative design stimulates learning on an experiential level. In today's world, environmentally sensitive design is synonymous with quality and provides the opportunity to teach by example by using resources wisely and beautifully, including:

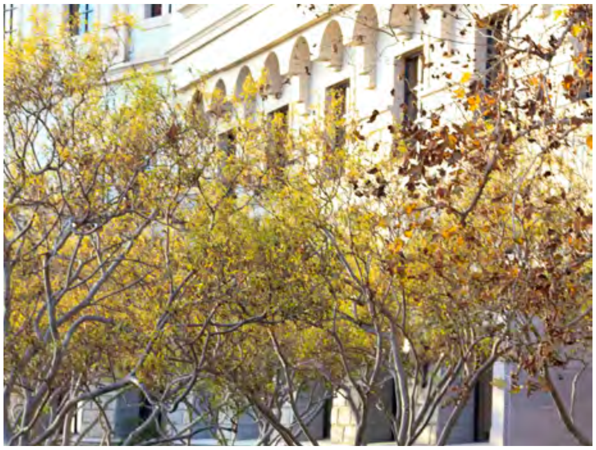
- Using water quality and conservation techniques including rainwater gardens, bioswales, and cisterns.
- Saving energy as a result of planting for climate control.
- Selecting plants to avoid the need for pesticides and fertilizers.
- Planning for on-site composting to replenish the soils and avoid landfill expenses.
- Planting native plants to provide habitat.

Landscapes for the Future

CI benefits from the luxury of generous space. While the campus builds to full enrollment, the astounding open areas can be celebrated and remain for multipurpose and future use. More personal and intimate areas can be created for individuals and small groups in the interim.

The spaces between buildings are the ideal locations to foster learning within and across disciplines. In the ideal Camarillo climate, informal social and meeting areas can easily be provided in the landscape to support the multicultural, international, integrative, and civic engagement pillars of the academic program.

A more specific Landscape Vision Plan and related design guidelines are recommended for the campus in the future.



Suggested Landscape Plant Palette

These plant lists are not meant to limit plant selection but are meant to serve as inspiration for future landscaping on the campus. As with architecture, the plants used throughout time are a reflection of an era's culture, as well as the local environment. Culture, defined by aesthetic and functional values, changes over time. Therefore the landscape at California State University Channel Islands (CI) will continue to evolve as well.

Strong interests in the use of native plants and plants that have practical value (such as fruit production) reflect the current culture. This builds nicely upon the values reflected in two of the historic landscapes of the region, those of the missions and ranchos. All of these landscape themes complement the campus site and architecture and are adapted to the Mediterranean climate.

Plant Selection Guidelines

Incorporate existing specimen trees whenever possible.

The plant list consists of plants with ornamental value:

- Channel Islands Native Plants
- Regionally Native Plants
- Ornamental Native Plants
- Watershed Management Plants
- California Mission Plants
- Rancho Plants
- Turf And Turf Substitutes

Select plants from the Channel Islands, California Mission, Rancho, and Ornamental Native Plant lists for the areas near buildings, plazas, and courtyards.

Regionally Native Plants are appropriate for the transitional and undeveloped portions of the campus. Additional plants not listed may be desirable when habitat restoration is the goal.

The Watershed Management Plants are appropriate for bioswales, riparian areas, and rainwater gardens.




Channel Island Native Plants

	Botanical Name	Common Name
Trees		
	Lyonothamnus floribundus ssp. asplenifolius	Fernleaf Catalina Ironwood
	Quercus tomentella	Island Oak
Small Trees / Large Shrubs		
	Ceanothus 'Ray Hartman'	Ray Hartman Ceanothus
	Dendromecon rigida ssp.harfordii	Channel Island Bush Poppy
	Heteromeles arbutifolia 'Macrocarpa'	Island Toyon
	Prunus ilicifolia subspecies Lyonii	Catalina Cherry
Shrubs		
	Arctostaphylos confertiflora	Santa Rosa Island Manzanita
	Arctostaphylos insularis	Island Manzanita
	Arctostaphylos insularis 'Canyon Sparkles'	Canyon Sparkles Manzanita
	Arctostaphylos tomentosa ssp. insulicola	Island Loving Manzanita
	Arctostaphylos tomentosa ssp. subcordata	Santa Cruz Island Manzanita
	Arctostaphylos viridissima 'White Cloud'	White Cloud Manzanita
	Berberis (Mahonia) pinnata ssp. Insularis	Island Barberry
	Galvesia speciosa	Island Bush Snapdragon
	Garrya veatchii	Island Silktassel
	Quercus dumosa var. macdonaldii	Island Scrub Oak
	Rhamnus pirifolia	Island Redberry
	Ribes thacherianum	Santa Cruz Island Gooseberry
	Ribes viburnifolium	Catalina Perfume

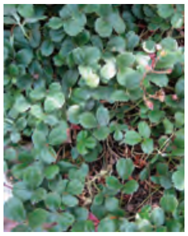


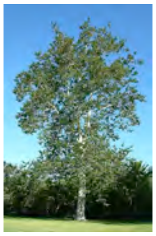
Botanical Name	Common Name
Perennials and Groundcovers	
Achillea 'Island Pink'	Island Pink Yarrow
Artemisia californica 'Canyon Gray'	Canyon Gray California Sage
Epilobium canum ' El Tigre'	California Fuchsia
Eriogonum arborescens	Santa Cruz Island Buckwheat
Eriogonum giganteum var. compactum	Santa Barbara Island Buckwheat
Eriogonum grande var. rubescens	Red-flowered Buckwheat
Erysimum insulare	Island Wallflower
Helianthemum greenei	Island Rush-rose
Heuchera maxima	Island Alum-root
Mimulus flemingii	Island Monkeyflower
Salvia brandegei	Brandegee's Sage
Grass	
Leymus condensatus 'Canyon Prince'	Canyon Prince Wild Rye
Succulents	
Dudleya blochmaniae ssp. insularis	Santa Rosa Island Live-forever
Dudleya candelabrum	Candle-holder Dudleya
Dudleya greenei	Greene's Dudleya
Dudleya nesiotica	Santa Cruz Island Live-forever
Vine	
Calystegia macrostegia 'Anacapa Pink'	Island Morning Glory

Regionally Native Plants

Botanical Name	Common Name
Trees	
Alnus rhombifolia	White Elder
Fraxinus dipetala	Foothill Ash
Juglans californica	California Black Walnut
Platanus racemosa	California Sycamore
Quercus agrifolia	Coast Live Oak
Quercus lobata	Valley Oak
Quercus wislizenii	Interior Live Oak
Umbellularia californica	California Bay
Small Trees / Large Shrubs	
Arctostaphylos glandulosa	Eastwood manzanita
Arctostaphylos glauca	Bigberry manzanita
Cercis occidentalis	Western Redbud
Fremontodendron californicum	Fremontia
Heteromeles arbutifolia	Toyon
Prunus ilicifolia	Hollyleaf Cherry
Sambucus mexicana	Western Elderberry
Shrubs	
Arctostaphylos species	Manzanita
Ceanothus megacarpus	Big-pod Ceanothus
Cercocarpus betuloides	Mountain Mahogany
Dendromecon rigida	Bush Poppy
Encelia californica	Coast Sunflower
Eriodictyon crassifolium	Thickleaf Yerba Santa
Eriogonum cinereum	Coastal Buckwheat
Eriogonum crocatum	Saffron Buckwheat
Eriogonum fasciculatum	California Buckwheat



Botanical Name	Common Name
Lepechinia calycina	Pitcher Sage
Lepechinia fragrans	Fragrant Pitcher Sage
Malosma laurina	Laurel Sumac
Pickeringia montana	Chaparral Pea
Quercus berberidifolia	California Scrub Oak
Quercus dumosa	Coastal Sage Scrub Oak
Rhamnus californica	Coffee Berry
Rhus integrifolia	Lemonade Berry
Rhus ovata	Sugar Bush
Ribes aureum var. gracillium	Golden Currant
Ribes malvaceum	Chaparral Currant
Rosa californica	California Wild Rose
Salvia apiana	White Sage
Salvia clevelandii	Cleveland Sage
Salvia leucophylla	Purple Sage
Salvia mellifera	Black Sage
Styrax officinalis	Snowdrop Bush
Symphoricarpos mollis	Creeping Snowberry

Regionally Native Plants (continued)

Botanical Name	Common Name
Perennials and Groundcovers	
Achillea millefolium ssp.	Yarrow varieties
Aquilegia formosa	Western Columbine
Asarum caudatum	Wild Ginger
Asclepias fascicularis	Mexican Whorled Milkweed
Coreopsis gigantea	Giant Coreopsis
Datura wrightii	Sacred Datura
Eriogonum crocatum	Conejo Buckwheat
Eriogonum parvifolium	Seacliff Buckwheat
Eriophyllum confertiflorum	Golden Yarrow
Fragaria spp.	Strawberry
Helianthemum scoparium	Common Rock-rose
Heuchera 'Canyon Pink' and 'Canyon Delight'	Canyon Pink Coral Bell
Heuchera 'Santa Ana Cardinal'	Santa Ana Cardinal Alum Root
Isocoma menziesii	Coast Goldenbush
Lotus scoparius	Deerweed
Lupinus longifolius	Bush Lupine
Lupinus succulentus	Arroyo Lupine
Mahonia repens	Creeping Barberry
Mimulus aurantiacus	Bush Monkey Flower
Mimulus puniceus	Red Monkeyflower
Monardella lanceolata	Mustang Mint
Saliva spathacea	Hummingbird Sage
Venegasia carpesioides	Canyon Sunflower
Zauschneria californica	California Fuchsia
Ferns	
Adiantum aleuticum	Five-fingered Fern
Dryopteris arguta	Coastal Wood Fern
Pellaea andromedifolia	Coffee Fern
Polypodium californicum	California Polypody
Polystichum munitum	Western Sword Fern
Woodwardia fimbriata	Giant Chain Fern

Botanical Name	Common Name
Grasses and Annuals for Seed Mixes	
Bouteloua gracilis	Blue Gamma Grass
Bromus carinatus	California Brome
Carex barbarae	Santa Barbara Sedge
Carex praegracilis	Clustered Field Sedge
Elymus glaucus ssp. glaucus	Junegrass
Hordeum brachyantherum ssp. californicum	Meadow Barley
Koeleria macrantha	Junegrass
Melica californica	California Melica
Melica imperfecta	Coast Melica
Muhlenbergia rigens	Deer Grass
Nassella lepida	Foothill Needlegrass
Nassella pulchra	Purple Needle Grass
Annual Wildflowers, bulbs and corms	
Bloomeria crocea	Goldenstar
Collinsia heterophylla	Chinese Houses
Clarkia bottae	Hill Clarkia
Dichelostemma capitatum	Brodiaea
Dodecatheon clevelandii	Padre's Super Shooting Star
Eschscholzia californica	California Poppy
Lilium humboldtii	Humboldt Lily
Lupinus nanus	Sky Lupine
Sysrinchium bellum	Blue Eyed Grass
Vines	
Vitis californica 'Roger's Red'	California Wild Grape
Succulents	
Dudleya lanceolata	Southern California Dudleya
Dudleya pulverulenta	Chalk Live-Forever
Dudleya verityi	Verity's Dudleya
Opuntia prolifera	Coastal Cholla
Yucca whipplei	Chapparral Yucca

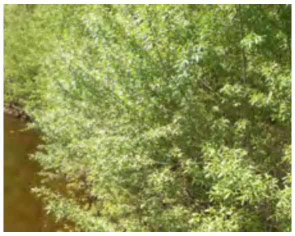
   

Ornamental Native Plants

	Botanical Name	Common Name
Trees		
	Cercidium floridum	Palo Verde
	Chilopsis linearis	Desert Willow
Shrubs/Perennials		
	Calycanthus occidentalis	Western Spice Bush
	Epilobium canum	California - Fuchsia
	Eriophyllum confertiflorum	Golden - Yarrow
	Eschscholzia californica	California Poppy
	Grindelia camporum (as G. robusta)	Coastal Gumplant
	Hazardia squarrosa	Saw-toothed Goldenbush
	Iris 'Canyon Snow'	Canyon Snow Iris
	Lessingia filaginifolia	California Aster
	Mimulus aurantiacus	Sticky Monkyflower
	Penstemon centranthifolius	Scarlet Bugler
	Penstemon heterophyllus	Foothill Penstemon
	Penstemon spectablis	Desert Penstemon
	Phacelia tanacetifolia	Tansy-leaved Phacelia
	Romneya coulteri	Matilija Poppy
	Verbena lilacina	De La Mina Verbena
Annual Wildflowers		
	Clarkia purpurea ssp. quadrivulnera	Wine Cup Clarkia
	Clarkia unguiculata	Elegant Clarkia
	Gilia capitata	Globe Gilia
	Lasenthia californica	California Goldfields
	Limnanthes douglasii ssp nivea	Douglas Meadow Foam
	Madia elegans	Common Madia

	Botanical Name	Common Name
Grasses		
	Bromus carinatus	California Brome
	Carex barbarae	Santa Barbara Sedge
	Elymus glaucus ssp. glaucus	Junegrass
	Festuca idahoensis 'Siskyou Blue'	Siskyou Blue Fescue
	Hordeum brachyantherum ssp. californicum	Meadow Barley
	Koeleria macrantha	Junegrass
	Melica californica	California Melica
	Nassella lepida	Foothill Needlegrass
	Nassella pulchra	Purple Needle Grass
Succulents		
	Agave shawii	Shaw's Agave
	Nolina parryi	Parry Beargrass






Watershed Management Plants

	Botanical Name	Common Name
Trees		
	Platanus racemosa	Sycamore
	Populus fremontii	Fremont cottonwood
	Salix exigua	Narrow-leaf Willow
	Salix spp.	Willow (natives only)
Perennials		
	Anemopsis californica	Yerba Mansa
	Mimulus guttatus	Seep Spring Monkey Flower
Grasses and Rushes		
	Eleocharis macrostachya	Spike Rush
	Epilobium ciliatum ssp. ciliatum	California Willow-Herb
	Juncus acutus	Spiny Rush
	Juncus patens	Spreading Rush
	Juncus textilis	Basket Rush
	Leymus triticoides	Beardless Wild Rye
	Scirpus acutus, S. californicus	Tule, Bulrush
	Scirpus californicus	Bulrush
	Scirpus robustus	Prairie Bulrush





California Mission Plants

	Botanical Name	Common Name	
Trees			
	Catalpa speciosa	Catalpa	
	Ceratonia siliqua	Carob	
	Citrus - Oranges, Lemons, Limes and other fruit trees		
	Cornus stolonifera	Dogwood	
	Cupressus macrocarpa	Monterey Cypress	(Native)
	Eriobotrya japonica	Loquat	
	Ficus carica 'Mission'	Mission Fig	
	Olea europaea	Mission Olive	
	Pistacia chinensis	Pistache	
	Platanus racemosa	California Sycamore	
	Punica granatum	Pomegranate	
	Quercus spp.	Oak	(Native)
	Sambucus mexicana	Elderberry	(Native)
	Schinus molle	California Pepper	
	Umbellularia californica	California Bay Tree	(Native)
	Ziziphus jujuba	Jujube	
Palms			
	Washingtonia filifera	California Fan Palm	(Native)
	Washingtonia robusta	Mexican Fan Palm	

California Mission Plants (continued)

	Botanical Name	Common Name	
Shrubs			
	Acacia farnesiana	Sweet Acacia	
	Agave americana	Century Plant	
	Ceanothus	Wild Lilac	(Native)
	Datura arborea	Angel's Trumpet	
	Heteromeles arbutifolia	Toyon	(Native)
	Juniperus	Juniper	
	Lavatera assurgentiflora	Tree Mallow	
	Musa	Banana	
	Nerium oleander	Oleander	
	Opuntia tuna	Prickly Pear Cactus	
	Prunus illicifolia	Holly-leaved Cherry	(Native)
	Punica granatum	Pomegranate	
	Rosa	Rose of Castile	
Succulents			
	Opuntia littoralis	Coastal Prickly Pear	
	Yucca whipplei	Our Lord's Candle	(Native)

	Botanical Name	Common Name
Herbaceous		
	Alcea rosea	Hollyhock
	Aloysia triphylla	Lemon verbena
	Chrysanthemum frutescens	Marguerite
	Geraniums	Cranesbill
	Jasminum spp.	Jasmine
	Lavendula spp.	Lavender
	Lillium spp.	Lilies
	Lonicera species	Honeysuckle
	Narcissus	Daffodil
	Portulaca grandiflora	Portulaca
	Rosa spp. And varieties	Roses
	Rosmarinus officinalis	Rosemary
	Salvia spp.	Sage
	Tagetes lemonnii	Marigold
	Zantedeschia aetheopica	Calla Lily
Vines		
	Cestrum nocturnum	Night Jasmine
	Clematis lasiantha	Virgin's Bower
	Jasminum grandiflorum	Spanish Jasmine
	Jasminum officinale	White Jasmine
	Mandevilla laxa	Chilean Jasmine
	Passiflora edulis	Passion Fruit
	Rosa banksiae	Lady Bank's Rose
	Vigna caracalla	Snail Vine
	Vitis vinifera 'Mission'	Mission Grape

Rancho Plants

	Botanical Name	Common Name	
Trees			
	Acacia	Acacia	
	Eucalyptus varieties	Eucalyptus	
	Ficus spp.	Fig	
	Morus alba	Mulberry	
	Olea europaea	Olive	
	Platanus racemosa	California Sycamore	(Native)
	Punica granatum	Pomegranate	
	Quercus spp.	Oak	(Native)
	Robinia pseudoacacia	Locust	
	Schinus molle	California Pepper	
	Citrus - Orange		
Palm			
	Phoenix canariensis	Canary Island Palm	
Shrubs			
	Agave spp.	Agave	
	Carissa grandiflora	Natal Plum	
	Ceanothus spp.	Wild Lilac	(Native)
	Rosa spp.	Roses	
	Syringa vulgaris	Lilac	
Herbaceous			
	Agapanthus africanus	Lily of the Nile	
	Aloysia triphylla	Lemon verbena	
	Catharanthus roseus	Periwinkle	
	Hippeastrum varieties	Amaryllis	
	Fuchsia varieties	Fuchsias	
	Kniphofia uvaria	Red-Hot-Poker	
	Eschscholzia californica	California Poppy	

Rancho Plants (Continued)

	Botanical Name	Common Name
Vines		
	Lonicera spp.	Honeysuckle
	Wisteria sinensis	Wisteria


Turf And Turf Substitutes

Botanical Name	Common Name
Bouteloua gracilis	Blue Gramma Grass
Buchloe dactyloides	Buffalo Grass
Carex praegracilus	Field Sedge
Festuca rubra	Red Fescue
Fescue and Bluegrass Mix	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Transportation & Parking

Due to its remote setting, getting to and from the campus is highly dependent on a single occupant vehicle. Getting across the campus is also highly dependent on a car. Therefore, transportation planning and parking management is an important part of the Vision Plan. The Vision Plan aims to reduce the number of vehicles traveling around the campus by making the campus more bike friendly, exploring more transit opportunities, and reducing/managing the number of cars that come and move around the campus.

Note: This report is based on statistics from Fall 2010 and updated parking information from Spring 2013. Future campus decision making should take into account the most recent parking and FTE numbers.

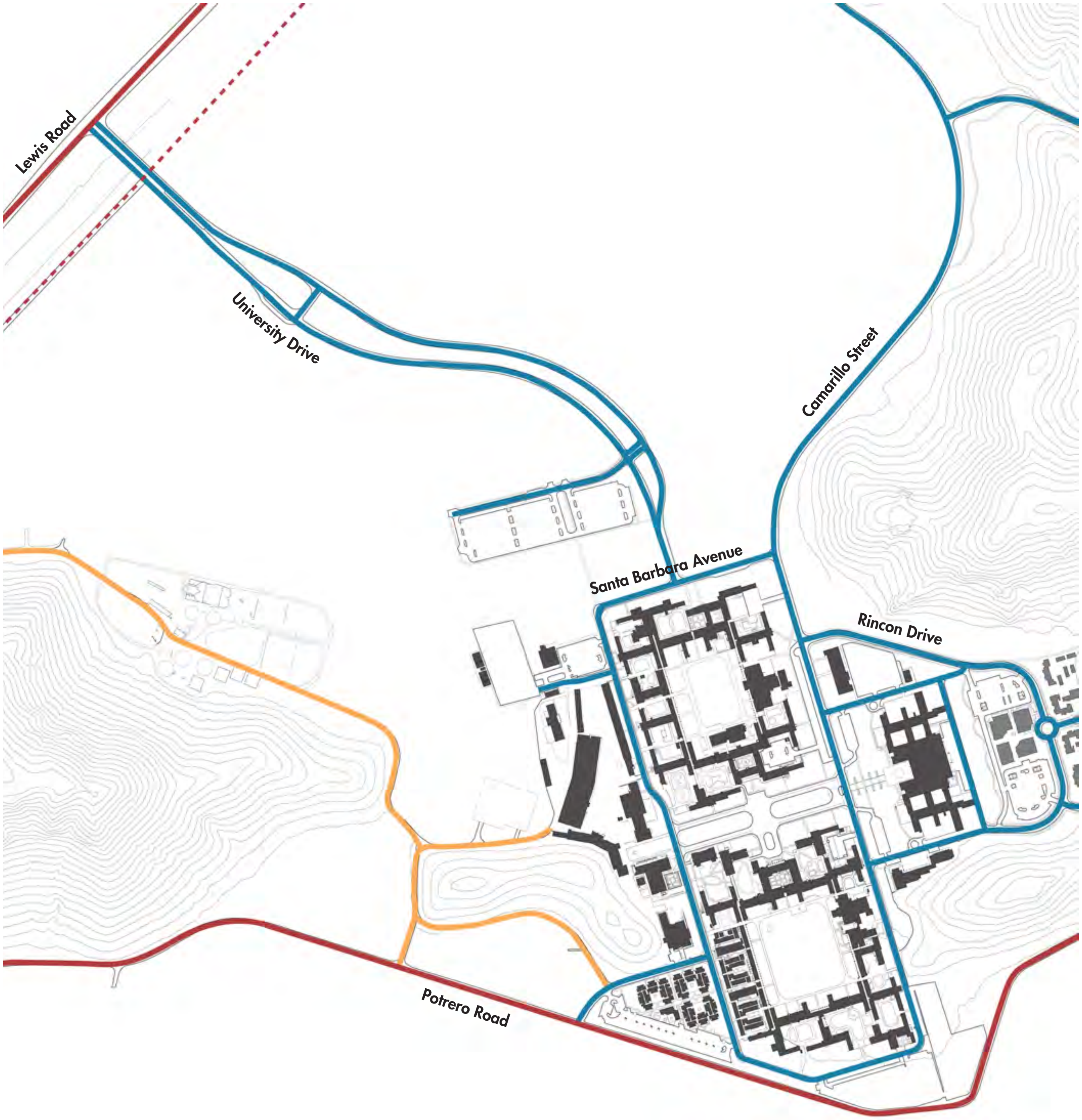


Figure 1: Existing Vehicular Circulation

County Roadway
Campus Roadways
Service/Limited Access Roadway

Existing Circulation System

CI is located between Santa Barbara and Los Angeles, several miles south of the City of Camarillo in Ventura County, California. The campus borders Lewis Road on the north and west and Potrero Road on the south. Directly east of the campus is the unincorporated University Glen community. The University is accessed from the region via US 101 (Ventura Freeway) and Pacific Coast Highway (PCH or SR1). The campus currently has three public entrances, as shown in Figure 1. The major entrance is located to the north at center of campus and is reached via University Drive & Lewis Road. Public access is also available at the northeast corner of campus via Camarillo Street and at the southwest corner of campus via Oxnard Road & Potrero Road. In addition to the three public entrances, the campus also provides a minor service road for University vehicles, which connects Potrero Road to the Central Plant on campus. The three main access points to campus are sufficient to serve current vehicular trip demand.

Internal Streets

Currently the campus roads are united by a two-way roadway loop, comprised of Camarillo Street (on the east), Santa Paula Street (on the south), Ventura Street (on the west), and Santa Barbara Avenue (on the north). This loop serves as the primary circulation system within the core of the campus. The curb-to-curb widths along the loop vary considerably, from 35 feet wide on portions of Ventura Street to as little as 20 feet wide on Fillmore Street and on portions of Camarillo Street and on Santa Paula Street in the southeastern part of the campus. While the narrow width along portions of the loop result in low vehicular speeds, the roadway width is less than would normally be provided for two-way travel.

Los Angeles Avenue has recently been closed to traffic and converted to a pedestrian mall thus beginning the enhancement of the campus into a more pedestrian and bicycle friendly place. Now called the Central Mall, it carries much of the pedestrian traffic through campus, as it connects the Broome Library, University Hall, the Bell Tower, and Aliso Hall, which are some of the most active buildings on campus.

Rincon Drive and Chapel Drive form a loop around the eastern edge of the campus, where Broome Library and the adjacent mixed-use Town Center are located. The portion of Rincon Drive east of Fillmore Street lies in University Glen, outside the campus boundary. San Luis Avenue is configured for one-way travel to facilitate the flow of traffic around the on-campus transit bus stop. Fillmore Street is a minor two-way service road that currently provides service access Broome Library and a small parking lot. Oxnard Street runs between Ventura Street and the external Potrero Road, providing one of the three entries to the campus.

Transit Services

There is one bus stop on the campus, located midway along San Luis Avenue, north of Broome Library. The bus stop has limited signage, lighting, benches, and shelter. (See Figures 2 & 3). VISTA transit is operated by the Ventura County Transportation Commission (VCTC) and provides service to the campus via two routes. Shuttle buses stop at the Camarillo Metrolink station, at Oxnard College, and at a transfer location near the Centerpoint Mall in Oxnard. Service is provided between 7:00 am and 10:00 pm with 30-minute headways on the Camarillo line and 60-minute headways on the Oxnard line. "Headway" is defined as the time that passes between transit vehicles, at a transit stop, serving the same line.

Pedestrian and Bicycle Services

The compact configuration of the campus promotes walking and biking as the buildings are located within reasonable walking distance from one another. A considerable amount of east to west and north to south walking paths are provided, however, field observations show that most of the pedestrians on campus use the Central Mall as the main east-west path, with a key focus of pedestrian traffic being the intersection of the Central Mall and University Drive. Other areas of pedestrian activity occur in the student housing area on the southwest part of campus, Student Union along Ventura Street, and in the areas around the perimeter parking lots along Ventura Street, Camarillo Street, and University Drive. Due to the relatively low level of existing activity on campus, pedestrian-vehicle conflicts in these areas are minor.

Bicycle use on campus occurs on the internal campus streets and pathways, and on the streets within University Glen. While bicycles are permitted to travel on campus streets, there are currently no marked bicycle facilities within the campus. Bicycle lanes are present on the shoulders of Lewis Road, the primary regional access route to the campus.

Figure 2: Shuttle Bus

Figure 3: Bus Stop

INTERSECTION LEVELS OF SERVICE (LOS)

This section presents traffic conditions at three analyzed intersections and the resulting operating conditions, indicating volume-to-capacity (V/C) ratios and levels of service (LOS). The Intersection Capacity Utilization (ICU) methodology determines the intersection V/C ratio. The V/C ratio is then used to find the corresponding LOS based on the definitions in Table 1. Under the ICU methodology, a V/C ratio is calculated for each intersection based on factors such as the one-hour volume of traffic and the number of lanes providing for each turning movement.

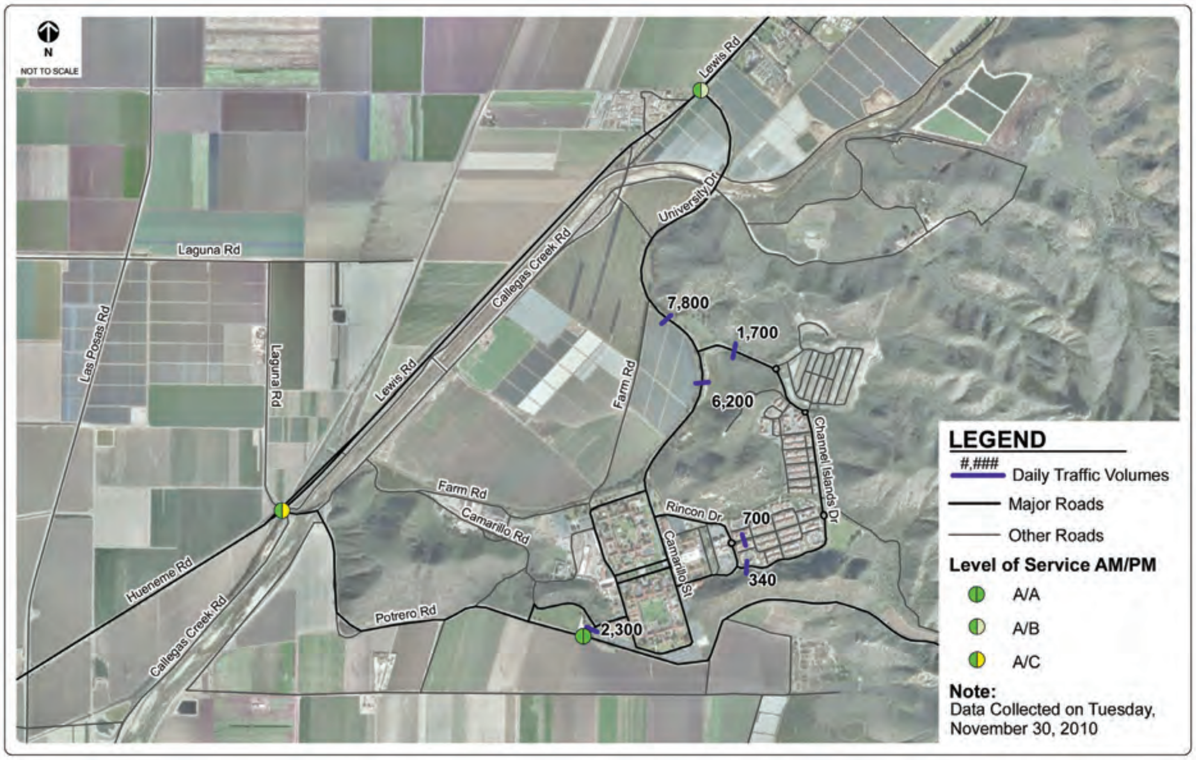
New turning movement traffic counts at the three key intersections adjacent to CI were conducted in November 2010 during the Fall semester. Machine counts were also conducted at several locations within campus to provide information on total daily volumes and on the flow of traffic through the day. Weekday levels of service during the AM peak hour and PM peak hours at these intersections are summarized in Table 2. Figure 4 depicts the traffic conditions, where the daily traffic volumes and LOS per analyzed location is presented.

Table 1. Intersection Levels of Service

Level of Service	Vehicle to Capacity Ratio	Definition
A	0.000-0.600	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.601-0.700	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.701-0.800	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.801-0.900	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.901-1.000	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	> 1.000	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches; tremendous delays with continuously increasing queue lengths.

Source: Transportation Research Circular No. 212,
Interim Materials on Highway Capacity, Transportation Research Board, 1980.

Figure 4. Fall 2010 Traffic Conditions



Note: At the time count data was collected for this study in the Fall of 2010, the recently-opened University Drive was under construction. Therefore no count data is presented for this road.

Table 2. Fall 2010 Intersection Levels of Service

Intersection	Peak Hour	V/C	LOS
Lewis Road and University Drive Signalized intersection	A.M.	0.481	A
	P.M.	0.542	B
Potrero Road and Lewis Road Signalized intersection	A.M.	0.461	A
	P.M.	0.608	C
Oxnard Road and Potrero Road Two-way stop controlled intersection	A.M.	0.210	A
	P.M.	0.222	A

EXISTING TRIP GENERATION

Analysis of the turning movement counts and daily counts collected in November 2010 shows that CI generated approximately 9,550 daily trips, including 922 trips in the AM peak hour from 8:00 to 9:00 AM, and 902 trips in the PM peak hour from 5:00 to 6:00 PM. Figure 5 presents a chart with the hourly pattern of campus trip generation. The baseline conditions analyzed and reflected in the LOS, trip generation estimates, and parking utilization data presented in this report are based on data collected and campus characteristics provided by CI in the Fall of 2010 when this planning process began. Data from the Spring of 2014 indicates an increase in full time equivalent students (FTES) from 3,314 in Fall of 2010 to 4,336 FTES in the Spring of 2014. The analysis presented here is based entirely on the 2010 data and the 2014 data is provided for informational purposes.

Based on the enrollment at that time (3,314 full time equivalent students), the campus is generating 2.882 daily trips per FTES student, including 0.278 trips per FTES student in the AM peak hour and 0.284 trips per FTES student in the PM peak hour. In the AM peak hour 83% of the trips are inbound and 17% are outbound; in the PM peak hour 40% of the trips are inbound and 60% are outbound. These rates are higher than the average trip generation rates for universities found in Trip Generation, 8th Edition (ITE, 2008), which may be due to the auto-oriented nature of the existing campus and the close proximity of the mixed-use Town Center in University Glen, immediately east of the campus. To conform to the requirements of the California Environmental Quality Act (CEQA), new trip generation surveys should be conducted to verify the trip generation characteristics of the University.

Figure 5. Hourly Trip Generation Activity

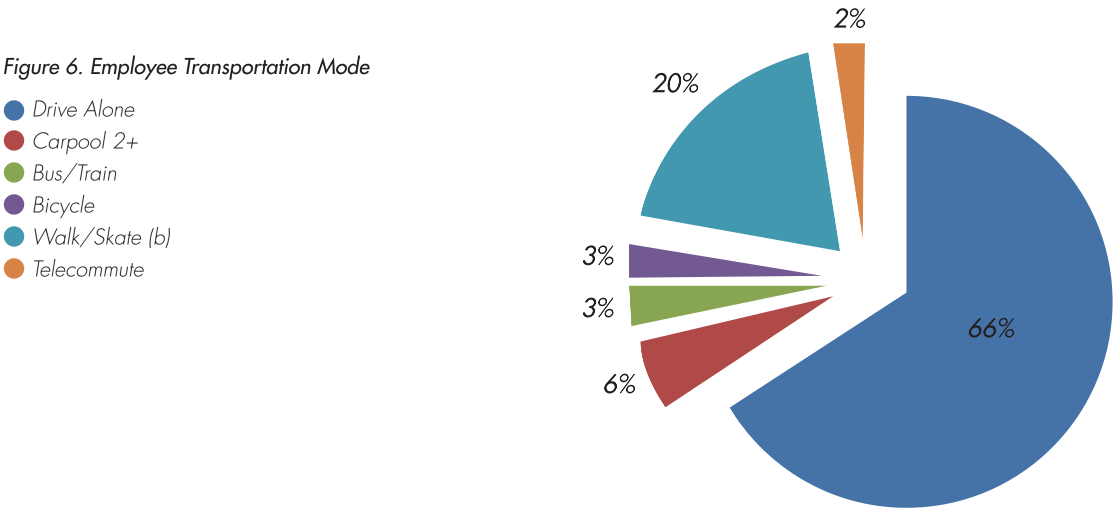
Commute mode split for CI employees was obtained from the October 2009 "Rule 211" survey data. Table 3 and Figure 6 show the mode of travel for employee commute trips conducted during the 5-day survey. Data in the table excludes trip data reported for employees who worked at another site, took vacation or sick time, or worked under compressed work schedules. This data shows that approximately two-thirds of employees drive alone, with relatively little carpooling (6%) of employees. Approximately 3% of employees travel to the campus by transit. Over one-fifth of employees walked or biked to campus, reflecting the close interaction with residences at University Glen.

Table 3. Employee Transportation Mode

Travel Mode	Trips [a]	Mode Split %
Drive Alone	2,032	65.6%
Carpool 2+	186	6.0%
Bus/Train	101	3.3%
Bicycle	90	2.9%
Walk/Skate [b]	609	19.7%
Telecommute	79	2.6%
Total	3,097	100%

[a] 5-day week commute trips (one-way)
[b] Represents workers (or student workers) living on or adjacent to campus

Figure 6. Employee Transportation Mode



Future Trip Generation

At full build-out, the campus will accommodate 15,000 FTES, a 450% increase from the Fall 2010 enrollment of approximately 3,300 FTES (Spring 2014 enrollment approximately 4,300 FTES). Applying the trip generation rates previously described, the planned increase in student enrollment at the campus would result in a total of approximately 4,000 peak hour trips in both the AM and the PM peak hours. The campus community is not static, however, and the travel choices of many students and staff can be affected by incentives or disincentives. The development of additional student housing on campus and aggressive implementation of the transportation demand management strategies can result in some reduction in vehicle trips per student.

Future Circulation System

Major changes to the internal campus circulation system are planned as part of the long-term implementation of this Vision Plan, which builds on previous plans for the campus. The current Vision Plan is intended to enhance the bicycle and pedestrian environment at CI and will limit the amount of general vehicular circulation near the center of campus. To achieve this goal, the overall circulation system will be developed with an outer loop road for general vehicular circulation and an inner loop road with limited vehicular access. The future circulation system is illustrated in Figure 7. Four conceptual roadway cross-sections at key locations on campus are provided in Figures 8 and 9. Detailed design plans for the modified campus circulation system will be developed as implementation occurs. These may include traffic calming devices such as speed humps, speed tables, diverters, and special crosswalk treatments.

The outer loop roadway will be formed by Santa Barbara Street, a new north-south road on the western edge of West Campus, Santa Paula Street, University Drive, Fillmore Street and Rincon Drive. The outer loop road will service two-way vehicular traffic and, wherever feasible, bicycle lanes in each direction.

The inner loop roadway will partly coincide with the outer loop roadway and will be formed by Camarillo Street, Santa Paula Street, Ventura Street and Santa Barbara Street. One-way clockwise traffic circulation is planned on University Drive (southbound) and Ventura Street (northbound), with road space available to also provide for two-way bicycle lanes.

- A new four-lane main access road, University Drive, opened to traffic in May 2012. It provides direct access to the campus and to surface parking and athletic fields in the North Campus area. A new signalized intersection has been installed at University Drive & Lewis Road. The three-legged intersection with Santa Barbara Avenue is stop-controlled. The formerly named University Drive recently reverted to its former name of Camarillo Street, and traffic volumes have declined considerably as it became a secondary access to the campus.
- A new north-south road will be constructed through the North Campus and West Campus, linking the new University Drive with future development in the West Campus, including a parking structure and additional student housing north of Potrero Road. This secondary access road intersects with Potrero Road approximately where the existing minor service road is located.
- Santa Barbara Avenue will be extended westward through the West Campus, terminating at the north-south road described above.

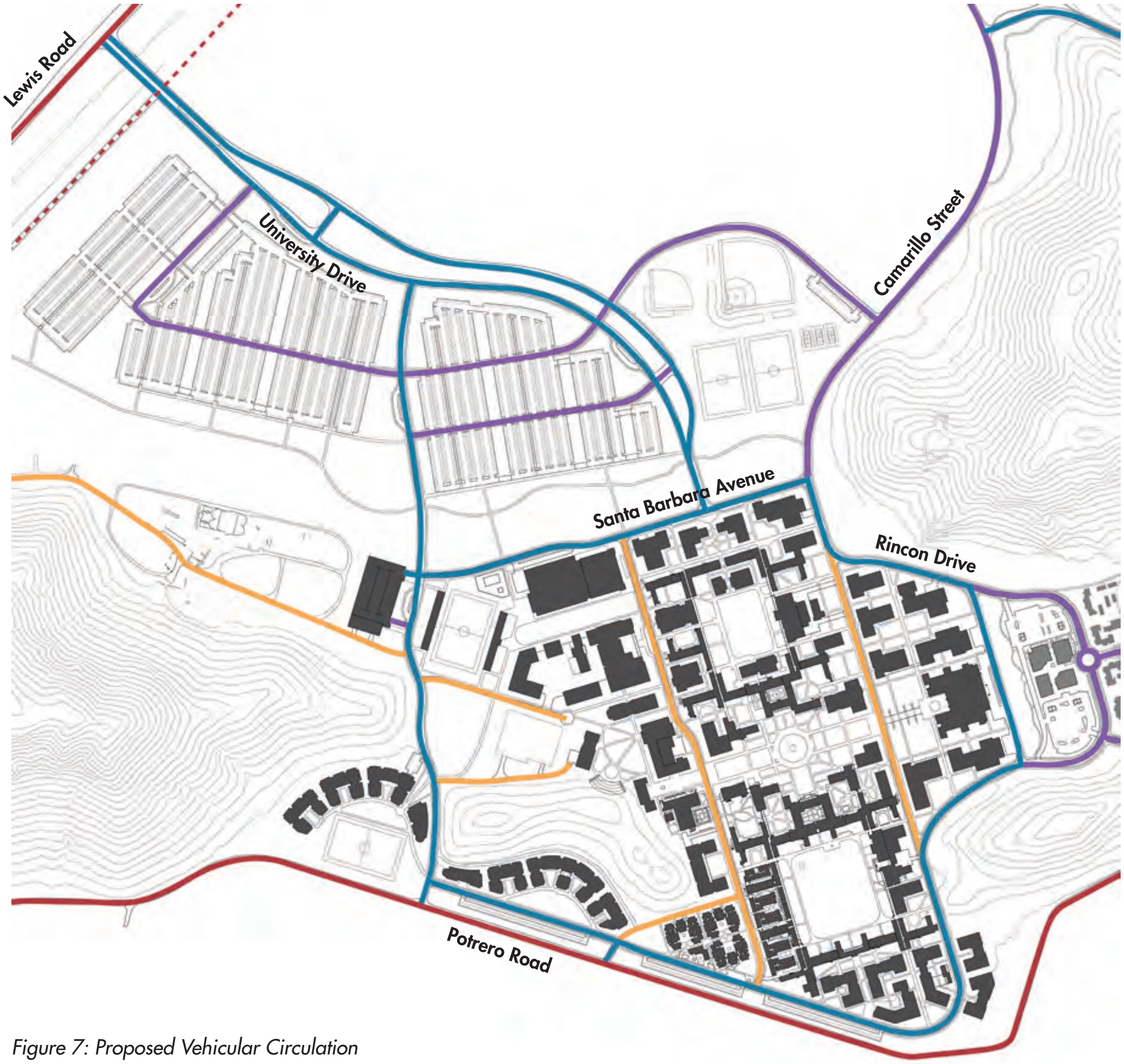


Figure 7: Proposed Vehicular Circulation

- County Roadway
- Campus Roadways
- Secondary Roadway
- Service/Limited Access Roadway

Figure 8. Conceptual Cross-Sections A and B

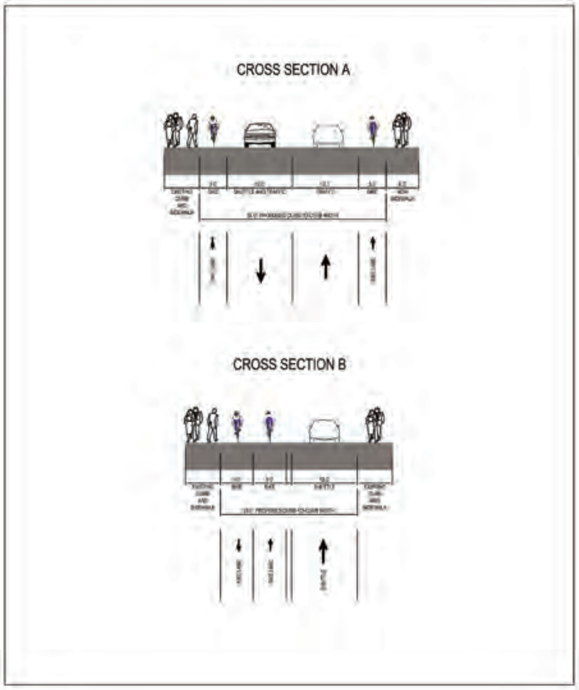
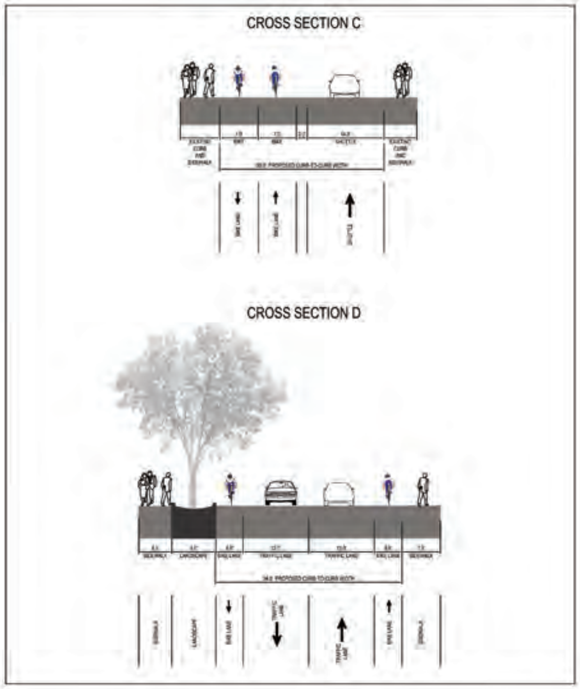


Figure 9. Conceptual Cross-Sections C and D



- Camarillo Street will be extended southward and will transition westward to connect to Santa Paula Street, removing the tight turn that currently exists where those two streets intersect, increasing the area available for new student housing. Cross-section A in Figure 8 applies on the segment of Camarillo Street south of Chapel Drive.
- Throughout its length Ventura Street will be converted to one-way vehicular travel and form part of the inner loop roadway. Cross-section B in Figure 8 applies to the southern segment of Ventura Street. Cross-section C in Figure 9 applies to the northern segment of Ventura Street, where future redevelopment on the campus will allow for widening the roadway.
- Santa Paula Street will be extended westward beyond its current transition to Ventura Street, and will extend past Oxnard Street terminating at the new secondary access road. Cross-section D in Figure 9 applies throughout Santa Paula Street.
- Existing San Luis Avenue on the north side of Broome Library will be removed. Chapel Drive on the south side of Broome Library will be relocated southward to closely follow the contour of the hill adjoining campus and will transition onto University Drive, expanding the buildable area within the Campus Core.
- Fillmore Street will be widened from its current 20′ width to 24′ to 26′ to accommodate general circulation at the eastern edge of campus, a function which will be supplemented by the existing Rincon Drive which runs around the Town Center in University Glen.

The Vision Plan promotes the use of bicycles by locating dedicated on-street bicycle lanes on all of the streets within the campus, as well as through campus at key locations. Figure 10 illustrates the proposed campus bicycle circulation system. Such off-street links include east-west connections between Fillmore Street and University Drive north of Broome Library, along the Central Mall and

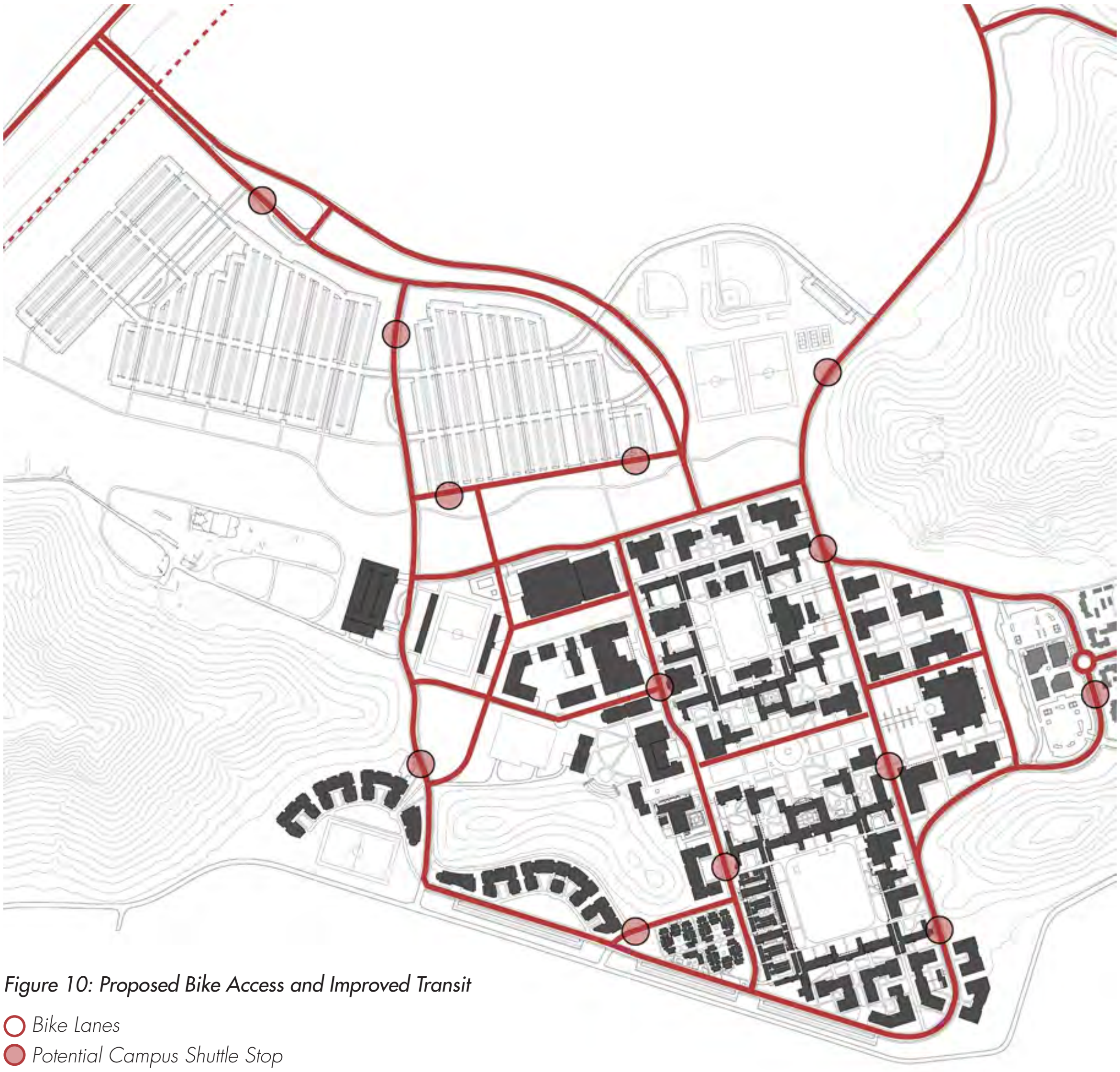


Figure 10: Proposed Bike Access and Improved Transit

Bike Lanes

Potential Campus Shuttle Stop

between Ventura Street, and the new north-south road in the West Campus. Supporting facilities will include bicycle parking and/or bicycle lockers. The potential for developing a bicycle sharing program should be considered to further promote the use of bicycles for on-campus circulation.

As the campus develops, additional surface parking will be developed in the North Campus and parking within the campus core will gradually be removed. While the campus is compact, it is expected that ultimately a campus shuttle system will be implemented. The conceptual location of shuttle stops on the campus is shown in Figure 10.

Existing Parking Supply

The parking system serving the CI campus includes on-campus parking and off-campus parking. This section describes the location, amount, and restrictions of parking at CI. The existing baseline conditions analyzed and reflected in the parking utilization data presented in this section are based on data collected in the Fall of 2010 when this planning process began. Data from the Spring of 2014 indicates an increase in the number of available parking spaces on campus to 2,415 spaces, a difference of 339 spaces from the total supply of 2,076 spaces in Fall of 2010. The analysis presented here is based entirely on the 2010 data. The 2014 data is provided for informational purposes.

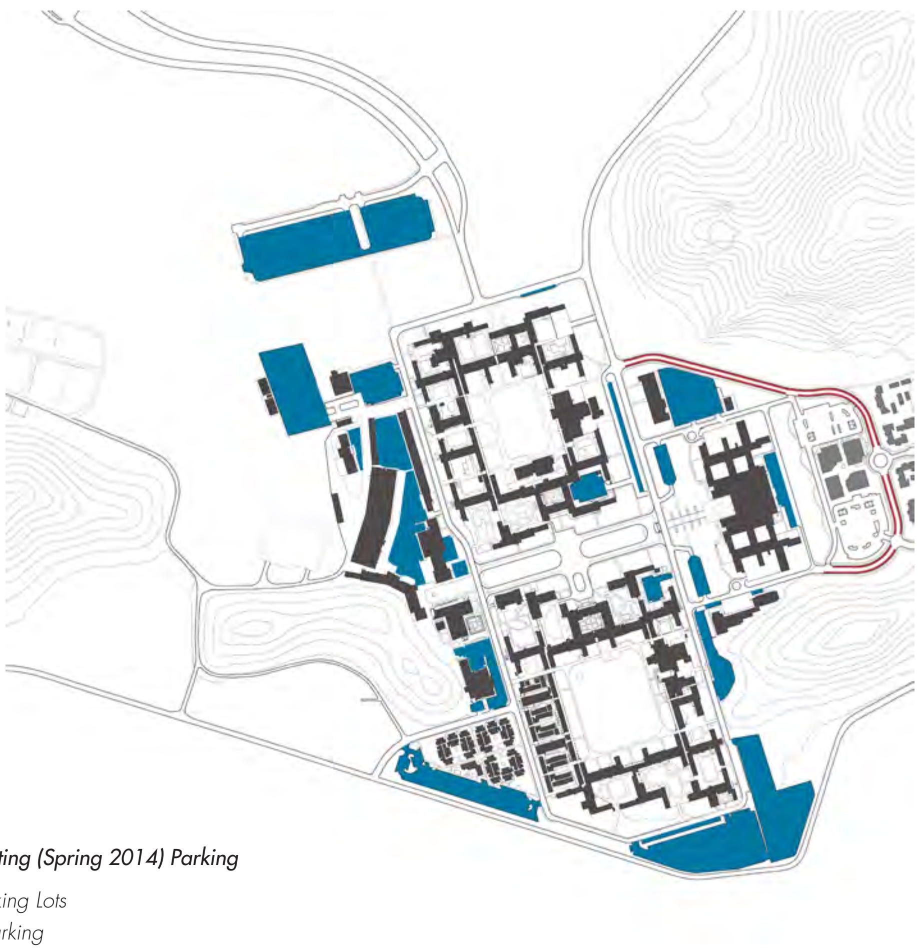


Figure 11: Existing (Spring 2014) Parking

Surface Parking Lots

On-Street Parking

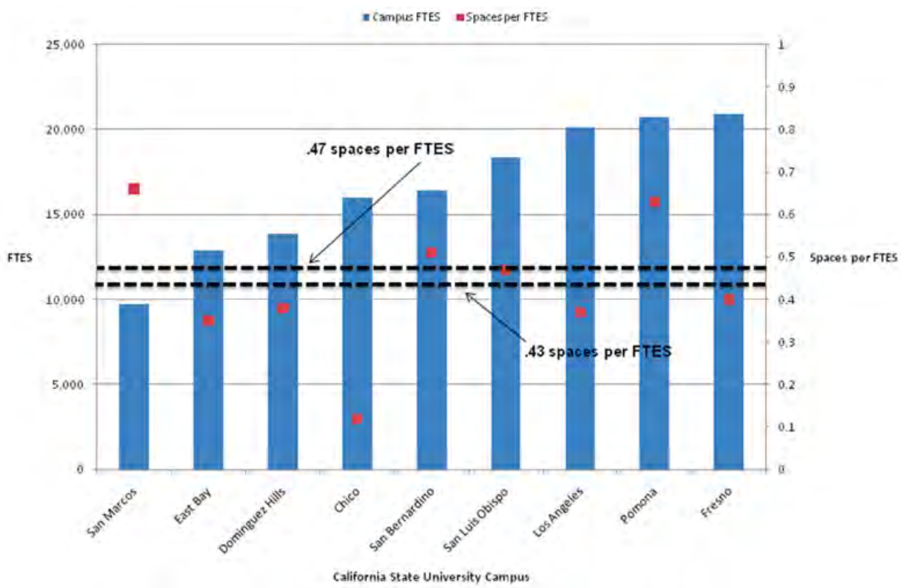


Figure 12. Comparison of Parking Supply Ratios Per FTES on Mid-Sized CSU Campuses (Fall 2010)

On-Campus Parking Supply:

Parking on the CI campus is provided in numerous surface parking lots located throughout the campus. The location of these facilities are illustrated in Figure 11. Table 4 presents the inventory of the Fall 2010 on-campus parking supply by location and Table 5 tabulates the inventory by type. While the amount of parking on campus varies due to ongoing construction projects and changes in allocation, a total of 2,076 parking spaces were available in on-campus parking facilities when parking utilization surveys were done in Fall 2010. These spaces are distributed across a series of parking lots in various locations throughout the campus, ranging in size from 12 spaces to 361 spaces.

Off-Campus and On-Street Parking Supply:

On-street parking is available on most streets in the areas adjacent to the east side of campus, along Rincon Drive and the Chapel Drive Loop. Use of these off-campus parking spaces is shared with residents, employees, and patrons of businesses at the Town Center and residents of the University Glen homes. Due to the shared nature of these spaces, the exact amount of University related parking cannot be determined with certainty.

Based on the student enrollment of 3,314 from Fall 2010 and the parking supply at that time, the parking supply ratio of the campus was 0.63 spaces per student. Now that student enrollment is 4,336 (Spring 2014) and the parking supply is 2,415 spaces, the parking ratio of the campus is now 0.56 spaces per student. The 2010 parking supply ratios at other CSU campuses vary from 0.10 (San Francisco) to 0.66 (San Marcos). Based on Fall 2010 data the average parking supply ratio for CSU campuses is 0.38 spaces per FTES. Information on the actual parking demand ratios at each of the other campuses, as opposed to the parking supply ratios, was not available. For mid-sized campuses in the CSU system (10,000 to 20,000 FTES), similar to the ultimate size of CSU Channel Islands, the parking supply ratio is 0.43 spaces per FTES. Those CSU campuses are San Marcos, East Bay, Dominguez Hills, Chico, San Bernardino, San Luis Obispo, Los Angeles, Pomona, and Fresno. Excluding CSU Chico, which provides only 0.12 spaces per FTES, the average parking supply ratio of the other mid-sized campuses is 0.47, similar to the ratio of 0.50 spaces per student that has been used in previous plans for the CSU Channel Islands campus.

Fall 2010 Parking Demand And Parking Ratio

Based on CI's data from Fall 2010, approximately 23% of students resided on campus (882 students out of 3,862 total students). Approximately two thirds of those students (569 students) purchased parking permits. Approximately five-sixths of the students (84%) residing off-campus purchased parking permits.

Demand for parking on the CI campus was measured through parking occupancy/utilization surveys conducted as part of this study in November 2010. Campus staff identified the midday period as the time when parking is most heavily utilized and utilization surveys were conducted between 10:00 AM and 2:00 PM. Overall peak utilization of the entire

Table 4 - Fall 2010 Parking Supply and Utilization By Location

Lot Name	Location	Total Capacity	10 am - 12 pm Utilization	12 pm - 2 pm Utilization	Average Utilization	Average Utilization (%)
On-Campus Parking						
A1	University Drive @ San Luis	48	37	39	38	79%
A2	Between San Luis Avenue and Rincon Drive	129	120	122	121	94%
A3	Along Santa Barbara Avenue	62	52	58	55	89%
A4	Ventura Street (NW. Campus)	84	79	74	77	91%
A5	Ventura Street & Oxnard Street	64	39	44	42	65%
A6	E. of University, S. of San Luis	31	30	31	31	98%
A7	E. of University, S. of Chapel Drive	12	8	3	6	46%
A8	Fillmore Street	61	57	55	56	92%
A9	Off of Los Angeles Ave, N of South Quad	47	37	40	39	82%
A10	University and Santa Paula	337	297	277	287	85%
A11	West of Ventura Street (NW. Campus)	208	119	107	113	54%
A/E	E. of University, N. of Chapel Drive	29	27	29	28	97%
RA	W. of University Ave, Connected to "A1"	45	23	19	21	47%
SH1	Potrero Road and Oxnard Street	226	214	205	210	93%
SH2	Potrero Road and Santa Paula Street	361	329	314	322	89%
D1	W. of University, N. of Chapel Drive	16	2	10	6	38%
CARDEN	Outside "CHA" on Ventura Street ('M')	20	18	14	16	80%
G8	N. of Chapel	39	23	22	23	58%
G9	E. of Camarillo, S. of Chapel	50	19	36	28	55%
CEN/CHA	Outside IRO, CEN, and SHO	207	108	102	105	51%
	Total On-Campus Parking	2,076	1,638	1,601	1,620	78%

Parking inventory collected by Fehr & Peers in November 2010, when the parking utilization survey was done. Parking inventory varies due to ongoing construction projects on campus.

campus supply on the survey day occurred between 10:00 AM to 12:00 PM, where 1,638 (or 79%) of the 2,076 on-campus vehicle spaces were utilized, as shown in Tables 4 and 5.

At the time of the parking utilization survey in fall 2010 there were 3,314 FTES existing enrolled at the CI campus. Based on the peak parking utilization of 1,638 on-campus parking spaces, the Fall 2010 peak demand is 0.49 spaces per FTES. This does not include university-related parking that may have occurred on the Rincon Drive/Chapel Drive loop or within the Town Center parking lot. Thus, the actual parking demand may be slightly higher than the on-campus ratio of 0.49 per FTES.

Table 5 -Fall 2010 Parking Supply and Utilization by Parking Type

Parking Type	On-Campus Parking				
	Capacity	10 am - 12 pm Utilization	12 pm - 2 pm Utilization	Average Utilization	Average Utilization (%)
General / Student	1,136	929	901	915	81%
Faculty / Employee	24	22	22	22	92%
Disabled	99	21	29	25	25%
Visitor	11	6	6	6	55%
Housing	548	524	501	513	94%
State Vehicles	2	1	1	1	50%
Loading	8	1	1	1	13%
Maintenance	68	37	43	40	59%
Metered	14	1	2	2	11%
Restricted	54	35	27	31	57%
Electric Vehicles	55	25	22	24	43%
Carpool	5	4	3	4	70%
Guest Resident	0	0	0	0	0%
Special Permit	40	23	39	31	78%
Time Limited	2	1	0	1	25%
Motorcycle	8	6	3	5	56%
"Open"	0	0	0	0	0%
Restricted Visitor	2	2	1	2	75%
Total	2,076	1,638	1,601	1,620	78%

Parking inventory collected by Fehr & Peers in November 2010, when the parking utilization survey was done. Parking inventory varies due to ongoing construction projects on campus.

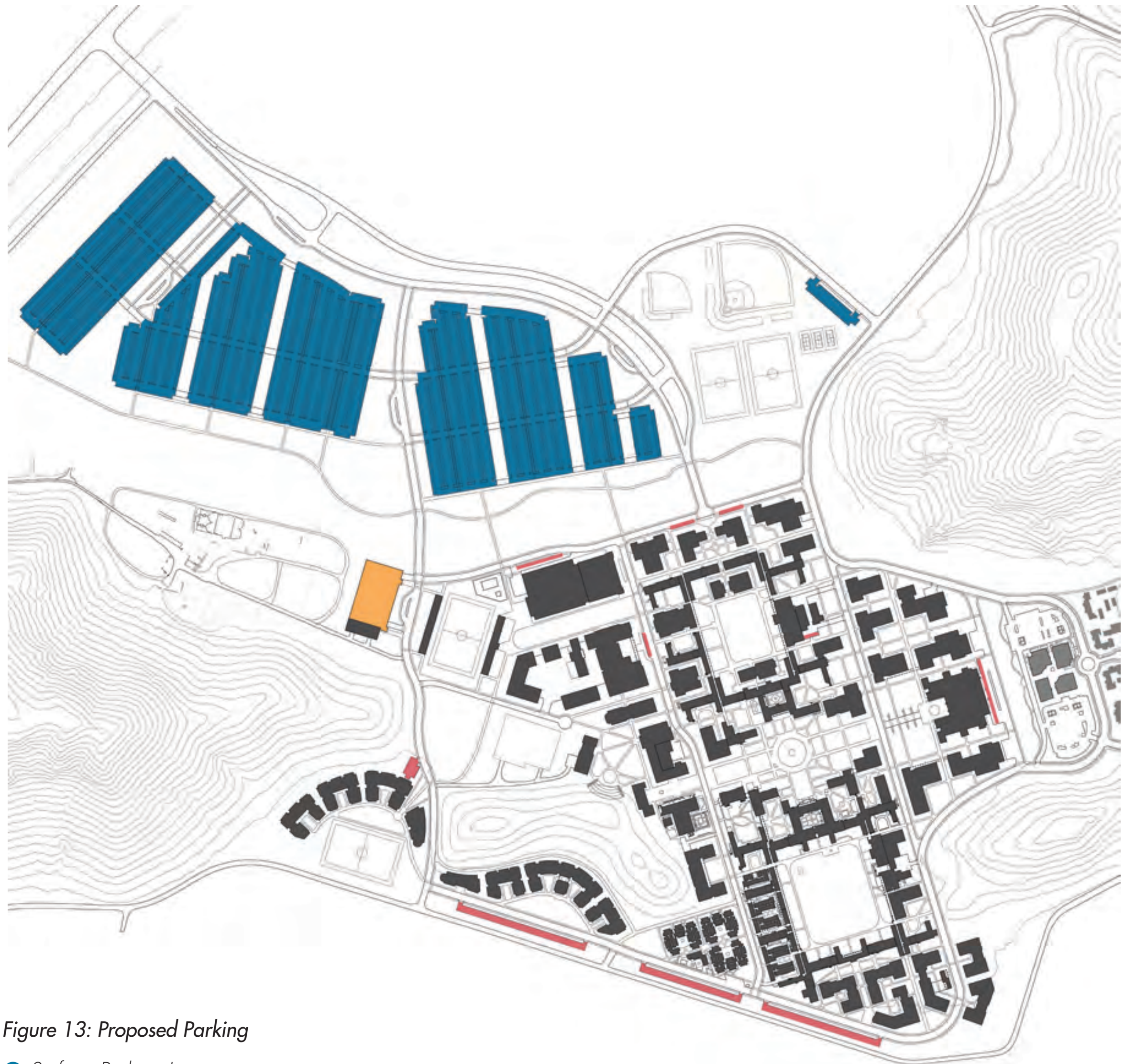


Figure 13: Proposed Parking

- *Surface Parking Lots*
- *Short-Term Surface Parking*
- *Structured Parking*

Future Parking Supply

The Vision Plan for the CI campus anticipated that approximately 20% of students would be taught via distance learning methods, resulting in a decreased need to provide on-campus services for them, including parking. The previous Vision Plan included 5,200 parking spaces for 11,750 on-campus students, resulting in 0.44 spaces per on-campus FTES. This is approximately 10% less than the Fall 2010 demand and less than the 0.50 spaces per student that was included in the initial Vision Plan for the campus. It is presumed that a reduced parking need was based on the anticipated effectiveness of the transportation demand management (TDM) measures planned for implementation.

This Vision Plan provides for a total campus parking supply of approximately 5,250 spaces located at the periphery of the campus core. As shown in Figure 13, the North Campus, where the new main access road (University Drive) was constructed will be devoted to athletic fields and surface parking. Additional short-term surface parking will be located along the southern edge of campus and a parking structure would be located in the West Campus. The parking supply in this Vision Plan supports an enrollment level of 10,500 FTES students based on the current parking demand per student, or 12,000 FTES at the ratio of 0.44 spaces per student. To fully provide for the ultimate 15,000 FTES enrollment level planned for the campus, 7,500 parking spaces would be needed if no changes occur in the current parking demand per student. The current Vision Plan anticipates a gradual reduction in parking demand through aggressive implementation of transportation demand management (TDM) strategies, which are described below. In the short term, 2,750 parking spaces would be provided to serve 5,000 FTES; in the mid term 3,375 spaces would be provided to serve 7,500 FTES; and in the long term 5,250 spaces would be provided to serve 15,000 FTES. The parking supply ratios would subsequently decline from 0.55 to 0.45 to 0.35 spaces per FTES.

At the ultimate enrollment level of 15,000 FTES, the planned parking supply ratio of 0.35 spaces per student is similar to what currently exists at CSU East Bay, CSU Dominguez Hills and CSU Los Angeles. Those campuses are situated in more urban environments than CI, and are better served by public transit. As stated, the long-term parking supply planned for CI represents a substantial decrease (20%) from both the current CI campus parking demand and the previously planned supply in terms of spaces per FTES. Because it is not certain that a reduction of this magnitude can support the campus at its ultimate enrollment level, a two-pronged strategy is recommended: (1) explore options to increase the available parking supply; and (2) develop and implement an aggressive TDM plan to encourage members of the campus community to limit their reliance on private automobiles. The second strategy will also have the benefit of reducing vehicle trips generated by the University.

Strategies to Increase the Planned Parking Supply

The developable area of the CI campus is relatively small (approximately 300 acres) due to the physical constraints of the natural environment. The Vision Plan strategy of locating parking for the campus in several large surface lots and a parking structure will allow users to more easily locate and utilize the total supply than is possible on the campus today, as the parking supply is distributed among many small and medium-sized lots. In the event that the TDM measures previously described, and others that may be identified, are not effective in reducing the demand for parking on campus, several strategies are recommended to increase the parking supply available to serve the campus.

- As Vision Plan implementation and design of individual elements proceeds, consideration should be given to maximizing the amount of surface and structured parking that is provided, while still maintaining campus landscape goals.
- Consider constructing structured parking beneath the playing field and the arena proposed for West Campus.
- Consider options for securing a remote off-campus parking lot specifically for CI and providing a dedicated shuttle service.

Transportation Demand Management Strategies

In order to achieve a dramatic reduction in the need for parking at CI, as well as to reduce vehicle trips generated by the University, significant progress would be needed beyond what has been accomplished to date. The University's ongoing Trip Reduction Program includes maintaining a transportation and parking services website, providing transit information and subsidies, providing ridesharing information, supporting an on-campus car sharing program (with two vehicles initially), providing bicycling directions and supporting facilities, and charging for parking on campus.

The Vision Plan maintains the existing proportion of students living on campus, which maintains a critical mass of students on campus and thus a gradual reduction in trip-making and, potentially, a reduction in the need for parking. An increase in on-campus or near-campus services (Town Center) would reduce the need for off-campus trips. Additional measures that should be considered for implementation to reduce the need for parking on campus and to reduce vehicle trips are listed below. Focus group meetings during the Vision Plan process have shown greatest support for the first five measures.

- Work with VISTA to expand transit route coverage and service frequency, including service to additional park & ride lots in the surrounding area; there are nine park & ride lots within 10 miles of the campus, mostly along the US 101 corridor
- Increase the supply of preferentially-located parking for student and employee carpool participants
- Limit the ability of resident underclassmen (freshmen and sophomores) to purchase resident parking permits
- Continue to pursue a bicycle and pedestrian-friendly campus design, though the potential effectiveness of these measures is limited by the isolation of the campus from outlying developed areas
- Develop a flexible program for students and staff to

combine various transportation management strategies for a monthly fee, such as access to the local transit system, free or discounted parking for carpool participants, discounted daily parking (for a limited number of days), and a merchant discount.

- Periodically survey members of the campus community to determine their travel behavior and needs, and to gauge their preferences in developing additional TDM strategies
- Increase the cost of non-carpool student parking permits
- Increase the cost of employee parking permits
- Reduce the cost of student and employee carpool participants
- Expand the car-sharing program (ZIP Car) as demand increases
- Create a benefits plan to promote and reward part-time non single occupant vehicle drivers
- Consider continuing an increase in transit pass subsidies
- Subsidize the purchase of bicycles and bicycle accessories
- Consider developing a bicycle station on campus and bike sharing service
- Support regional bicycle planning for the Calleguas Creek Trail
- Investigate options to implement distance learning techniques

Energy

The campus is currently served by two primary sources of electrical energy, CI's cogeneration (CoGen) plant and Southern California Edison (SCE). The CoGen Plant, henceforth referred to more accurately as the CHP Plant (Combined Heat and Power), uses natural gas and produces both steam and electric power.

The CHP Plant is located in West Campus on approximately 1.4 acres of land, plus surrounding drainage area, just northwest of Peanut Hill. The electricity supplied to the campus is routed from the CHP to a nearby 10MVA /12kV transformer located at the Campus 12kV Main Substation. The steam is piped to the campus into both the original power house and the new Central Plant some distance to the east. The new Central Plant, completed in late 2010, includes two chillers, heat exchangers for conversion of incoming steam to hot water, and various plant auxiliaries such as pumps and cooling towers. The plant electrical system was designed with provisions for the installation of a second 3750kVA transformer and 4000A 480V secondary switchboard. However, the present plant does not have space to accommodate the required mechanical system equipment required to supply the thermal needs for the long-term build-out of 3.6 million GSF (2.16 million ASF), as is projected in this Vision Plan.

Power distribution within the campus has been upgraded by the Campus Infrastructure Improvement Project completed in 2010. The infrastructure project included provision of new chilled water piping, new hot water piping systems, and conversion from steam to hot water piping. The electrical part of the infrastructure project involved providing 12kV power distribution for more efficient and reliable delivery of power to buildings. The new 12kV service has a maximum capacity of 10MVA/12.5MVA and multiple 12kV loop feeders that are capable of supplying the power required with the full build-out to 3.6 million GSF. The power required at full build-out is estimated to be 9MVA-10.5MVA peak demand.

On-site Production

The CHP was initially designed to provide power to the State Hospital and to sell the remainder on the market. It began operation in 1987; CI took ownership in 2010 and operates the plant, fulfilling the remainder of the 30 year contract with SCE which expires in 2017.

The CHP plant is more efficient in its use of fuel than a plant which produces only electricity. It uses what would otherwise be 'waste' heat to produce steam as a second product. To formally qualify as a CoGen facility, the CHP Plant must meet a minimum of 45% efficiency (percentage of fuel potential energy converted to electricity and useful thermal power), a notable improvement over the average efficiency of 33% for conventional power plants.

CI's plant has a capacity of 28MW. The plant was originally designed to deliver 1.5MW directly to the campus (the Hospital didn't exceed 1.2MW). When the campus needs exceed the 1.5MW, additional power is purchased from SCE. The maximum peak load recently was measured near 2MW. With continued renovations and new construction, the load is expected to grow to peak demands of 5MVA by 2017 and ultimately 10MVA after full build-out.

In addition to receiving electrical power, the campus is obligated to purchase steam at 9,000lbs/hr to assist the CoGen Plant to comply with the Federal PURPA efficiency standards. The State Hospital steam was used for heating, hot water, and laundry. It is now used for heating, hot water, and the production of chilled water for cooling. As part of the infrastructure project referred to above, the campus recently converted from steam distribution to more efficient hot water. (Note: Anacapa Housing is independently heated by natural gas.)

Proposed Campus Energy Use

CI will be required to negotiate a new power purchase agreement contract with SCE prior to the 2017 expiration of the existing agreement. The plant could continue to operate as a qualified cogeneration plant, as a generation merchant plant, or as a peaking plant in the future. For those reasons, the plant could continue in operation for 10, 15, or 20 years. As such, it will continue its use at its current site for some period of time. It is suggested that at the end of its useful life, the site be reserved for a future, newly advanced renewable power generation technology.

Currently, 100% of the on-site CHP operation is based on the use of natural gas. The continued low cost of natural gas and the favorable rates achieved by the SCE contract make near-term alternative sources less competitive. However, both the State of California and the CSU System are committed to a transition to renewable energy for global climate, self-reliance, and energy cost management reasons.

Several specific actions have been taken by the State which includes:

- Assembly Bill 32 California Global Warming Solutions Act (August 2006)
- Executive Order S-3-05 established reduction goals for greenhouse gas (GHG) emissions
    - Reduce to 2000 levels by 2010
    - Reduce below 1990 levels by 2020
    - Reduce to less than 80% below 1990 levels by 2050
    - Plus other Executive Orders on such subjects as biomass and fuel cells
- California Energy Code or Title 24 (part 6, California Code of Regulations; mandatory in 2010)
- California Green Building Standards Code (CALgreen; mandatory in 2011)

In a similar manner, the CSU System has made several specific commitments:

- Executive Order No. 987 – Policy Statement on Energy Conservation, Sustainable Building Practices, and Physical Plant Management for the California State University (subject to the constraints of program needs and standard budget parameters)
  - Reduce energy consumption by 15% by FY2010/2011
  - Increase self-generated energy capacity from 26 to 50MW by 2014
  - Increase on-site renewable energy production from 2 to 10MW by 2014
  - Meet 20% of its electricity needs from renewable resources
  - Strive to meet the equivalent of LEED Silver in all new buildings and major renovations

The Chancellor's Office has also set specific goals of 10% of peak demand be achieved with renewable resources, which can be a combination of both on-site and off-site green power. The significance of this grows as the square-footage buildings grow on campus.

Solar

Because of expected shifts in the energy and fuel markets, the most likely option for renewable production on the campus in the near future will be solar. Photo-voltaic (PV) based, this can occur in two ways. The first is in North Campus where fixed PV's can be mounted on shade canopies over the new parking areas. This could produce up to 10MW based on current fixed-tilt panels. It is also possible that a more concentrated installation could produce a significant amount (for example 5MW) that would both serve the campus and be a revenue stream, a 21st century counterpart to the CoGen success.

The second option is the use of the south-facing, sloped tile roofs of new buildings outside of the campus core. These would not be seen from Lewis Road, the new entry, or on campus when looking in three of the four cardinal directions. A successful example has recently been completed on similar south-facing tile roofs of the character-rich campus of Stanford University. Several of CI's proposed new buildings, like the performing arts center and the arena, will have broad flat roofs with perimeter tiled 'roof' edges, which can screen larger arrays at the centers. Both roof approaches would occur incrementally as each new building is built. These could be either PV or solar hot water panels.

Wind

A second renewable source option that may be possible on the campus is wind. CI has yet to be able to gather the breadth and detail of information specific to this campus to fully understand this option. With its location not far from the ocean and higher elevations this type of source might be feasible. A preliminary analysis with existing climatological data should be considered to further study wind energy on the campus. If there is reasonable wind potential, a more comprehensive study will be needed. This could be assisted by a temporary weather station that records hourly and daily wind and climate conditions for a full year at the potential height of wind turbines. A sustained wind of 25-89 mph is one of the current criteria. However, new wind generation technologies are being developed to perform at lower than typical velocities. The study should also ascertain the potential pattern of a few turbines that could reach a critical mass of near 1MW.

The campus does not have sufficient developable land to meet the 30% goal by solar and wind alone as it grows to 15,000 students, and despite the opportunities, both solar and wind have some downsides. Solar energy is not available at night and in certain weather conditions. Wind energy output differs with weather variations. As a result, the best solution will consist of a mix of renewable types, future storage technology, and off-site partnerships and sources.

At the moment, solar and wind cannot compete with the lower rates of the CHP contract. As long as especially favorable rates hold through the remaining contractual life of the CHP plant, solar and wind will, in the near-term future, be contingent on financial incentives and special support. This may also be contingent on rates from off-site sources as the percentage of CHP power decreases relative to purchase of power to fill the growth need.

Demand Reduction

One of the best opportunities to assist is not production but reduction of demand. Buildings are the greatest means to reduce loads, whether for comfort, operations, or process. The campus has worked diligently to reduce building-related energy use by exhausting the easily attainable modifications, already reducing the demand per square foot by 20% since the campus opened in 2002.

This intention is reinforced by both State and System policy. Executive Order S-20-04 requests that CSU actively participate in the requirements that all subsequent State renovations and new buildings, at a minimum, meet US Green Building Council's LEED (Leadership in Energy and Environmental Design) Silver rating, whether or not it is formally certified by USGBC. (Note: CI's intention is to meet the equivalent of LEED Gold within project budget constraints).

Designers for CI's projects should not only follow these requirements but should give emphasized attention to the specific characteristics of this micro-climate, such as its notable mildness, impact of afternoon sun, quality and potential of daylight, and the remarkable opportunity for natural ventilation. The buildings should also be integrated with the micro-climate effects of surrounding landscape design: reduction of nearby heat island affect, channeling or guiding of breezes and winds, mitigation of ground and adjacent building glare, and creation of external shade.

Ground-source

Another potential means of demand reduction is ground-source thermal characteristics. This is sometimes referred to as geothermal heat pump, not to be confused with high temperature geothermal power as known in the Far West. This source can greatly reduce energy expended in heating and cooling buildings. The thermal transfer process, typically aided by a heat pump, utilizes the relatively consistent thermal conditions below-grade of certain geologies and groundwater at depths of 100 ft. – 300 ft. During especially cool or cold weather, the system transfers relative warmth from the earth. During especially warm weather, the system transfers building heat to the earth. A significant number of colleges and universities are using this with success. This system's greatest capacity occurs in situations where there are greater extremes of temperature, both heat and cold, at the location. However, the mild climate of CI may be well-suited for the low-grade heat transfer of this type of system.

The immediate agricultural activities adjacent to the campus may also fit well with the low-grade heat transfer. This is particularly true for support of functions like greenhouses used for education and research. Ground source rejection of low grade heat from the current cooling towers may also be a plus. This could be an attractive alternative to the current system because of water use and water discharge limitations and the operational complexities of conventional evaporative cooling causes in this particular environment. Soil types, depth of material, surrounding geology, and characteristics of the water-table suggest this is worth further analysis. The nature of the campus' open space system is unusually appropriate for ground-source. For example, both the North and South Quads offer remarkable siting and atypical potential in the heart of the built-up core as renovations and new building infill occur.

Off-site Partnerships

Bio-mass

Due to the limited space on campus and often increased efficiency of larger operations, several renewable energy options should be pursued with surrounding businesses and landowners as partnerships. Bio-mass, in the form of an anaerobic digester, was included in the 2004 and 2007 Vision Plans and related Environmental Impact Reports. The resulting bio-gas would be blended with the natural gas used for the CHP plant, adding a significant renewable component and reducing the use of a fossil fuel. Though very attractive, the variables about the current plant's future and limited buildable land in the remainder of campus suggest a larger effort off-campus may be the better approach to use of bio-mass. With the extensive agricultural production in the area, this is an especially appropriate method for this region. It has the advantage, when properly managed, to be a reliable, consistent source to complement the more variable sources of solar and wind.

Potential collaboration with the adjacent Camrosa Wastewater Treatment Plant was considered. The campus is already using recycled water from the plant for irrigation. However, the treatment plant uses an aerobic process which does not produce methane, in contrast to an anaerobic process which would.

Fuel Cell

Fuel cell based energy has been considered as a possible on-site method for dependable, consistent supply. A very successful installation of such a facility has been made at CSU Northridge. Now producing 1MW of power, it is a good model to test on the CI campus. In doing so, the Northridge model illustrates that the land area required is larger than what can be achieved within the limited, remaining area of the campus. As fuel cell technology advances, this, too, appears to be a method that would lend itself to a partnership with local land owners and businesses. To be a renewable source, it will require that both the fuel and the process energy be from renewable sources.

Tidal Energy

With the site only six miles from the ocean to the south, tidal energy was considered. Tides are more predictable than solar and wind power. Mugu Lagoon would be the likely candidate but has limited capacity due to the limited displacement area. Advancing technology still applies best to tides at much higher latitudes that have significantly greater displacement of water. As a result, this would be a very long-term source, if ever practical.

Geothermal

Geothermal energy, from high heat areas near the surface of the earth, has been considered. Some small use, primarily in minor hot springs, occurs in the Ojai area. Though successfully used in some other places in California, the necessary conditions of high hot rock or sufficiently hot water/steam near the surface are not known to exist in Ventura County.

More information on related executive orders and policy information can be found at www.calstate.edu/cpdc/ae

Academic Plan

The Academic Plan was developed through a systematic and thorough review of documents by the academic planner describing the institution and followed by a series of meetings with appropriate administrators, faculty, staff and students. The first session occurred on November 8-10, 2010 and various groups (114 individuals) were asked to respond to six questions which were then analyzed to inform a Plenary Session. A Plenary Session was held on January 21, 2011 and over 40 individuals worked in small groups to answer a list of questions centered around four themes: Living/Learning Environment, Academic Transformation, Community Engagement, and New Program Development. In addition, those participants were also encouraged to consult websites on living/learning environments, academic transformation, and community engagement, identified by the academic consultant, prior to the Plenary Session.

The initial, interactive workshop included key groups:

- Provost's Office
- Academic Planning Steering Committee
- Faculty Senate Executive Committee
- Center Directors
- Student Academic Policies and Procedures Committee
- General Education Task Force
- School of Education
- Academic Council/Chairs
- Committee on Access, Retention, Success (CARS)
- 2021 Campus
- Research Council

The five questions asked at the workshop were:

1. What should be retained or eliminated if the campus were to grow to 15,000 students?
2. How should the Four Pillar values (multicultural, international, integrative, and civic engagement) link to the Strategic Plan?
3. What are the expectations to create a living / learning environment?
4. How could experiential learning be enhanced?
5. What new course designs are needed?

Throughout the process the academic planner was in constant communication with the Vision Plan consultant team from Ayers/Saint/Gross.

CI is a comprehensive University offering both undergraduate and graduate courses. It is a professional preparation institution with a strong liberal arts and sciences foundation. It has 23 majors and 23 minors for undergraduates, 6 masters programs, 6 credential programs, and 11 certificate programs. There are two schools: the Martin V. Smith School of Business and Economics and the School of Education.

Mission

“Placing students at the center of the educational experience, California State University Channel Islands provides undergraduate and graduate education that facilitates learning within and across disciplines through integrative approaches, emphasizes experiential and service learning, and graduates students with multicultural and international perspectives.”

Vision

“To be a national and international leader in quality higher education, enrolling a diverse student body, offering innovative academic programs that focus on student-centered learning that are enhanced by faculty research, creative activities and community partnerships. The institution will provide strong curricular and co-curricular educational experiences for the ‘whole student’ through a community of faculty, staff and students; graduating students who are prepared for the workforce and prepared to be engaged citizens in the regional and global community. Through community partnerships Cal State Channel Islands will develop a wide base of non-state funding to support excellence in support of the mission.”

Values

- Embrace and promote excellence and innovation in all areas of teaching, scholarly and creative experiences, co-curricular activities, and in business enterprises
- Commit to student success in meeting University academic standards
- Demonstrate respect and civility toward others, reflecting a cooperative and collaborative attitude
- Seek non-state support and demonstrate high levels of entrepreneurship
- Practice fiscal responsibility and be a good steward of resources
- Exhibit the highest levels of honesty and integrity
- Encourage partnerships to support the University mission
- Build opportunities for life-long learning and community enhancement

Background

California State University Channel Islands was founded in 2002, the newest campus in the California State University System. The Vision Plan calls for 15,000 students in the long term but much of this depends on the System's approach to enrollment growth given California's fiscal crisis. Traditional full time students have continued to grow as well as the recruitment of students from a more widespread region. It has 85 tenure-track, tenured faculty and approximately 202 "temporary" (some full-time) faculty.

The campus resides in a beautiful, Mediterranean climate in mission-styled buildings which are unsuited to instruction (being formally a mental hospital). In spite of the limitations of space and facilities, the faculty and staff have developed a strong commitment to interdisciplinary, multicultural, international teaching and learning, and community engagement. The relationship between academic and student affairs is commendable and is reflected in the students' beliefs that CI is a warm and welcoming place where everyone truly puts the students at the heart of the academic enterprise. Residential life is limited but there is a commitment to build more housing, given the growth rate of full time students who need such facilities. Intercollegiate athletics is just beginning to be developed. Wellness for all is an emerging theme in the context of both the academic coursework as well as the need for facilities for recreation and exercise.

Curricular Themes

The curriculum is guided by four themes that are central to teaching and learning:

- Offer courses that reflect interdisciplinary and integrative approaches in all fields of study
- Incorporate multicultural learning opportunities in and out of the classroom as well as foster multicultural research and scholarship
- Promote internationalizing courses and afford students the opportunity to study abroad and recruit students from other countries to study at the University
- Facilitate civic engagement in local and global communities and address social challenges through long-term sustainable partnerships

Strengths And Challenges

As soon as it is reasonable to do so, an in-depth environmental scan should be done by the Academic Planning and Programs Office. For the purpose of providing an academic plan in a short span of time to assist in the Vision Plan, these are a few of the most obvious, central to the development of the Academic Plan:

Strengths

- A founding President who is the champion of the values and four themes (pillars) of the University
- Excellent town/gown relationships and community support
- Strong programmatic relationships between Academic and Student Affairs
- Dedicated faculty and staff, many who have been at the institution since its founding
- A highly diverse faculty, staff, and student body, difficult to achieve in most institutions
- Campus faculty and staff who are respectful and supportive of each other
- Exceptional teachers who are focused on student-centered learning
- A naturally beautiful campus in a location graced by good weather year-round
- Approval for the development of a Vision Plan

Challenges

- Limited resources from the State of California
- Ever-changing direction by the CSU System, particularly around the issues of enrollment
- Significant limitations with facilities, particularly those impacting student life and academics
- Serious understaffing of tenure-track, tenured faculty; over-reliance on temporary faculty
- Limited alumni support (very young institution)
- Open access in admissions, creating a need for substantial freshman academic support
- Insufficient financial aid – both need- and merit-based scholarships
- Limited resources required to launch and sustain programs
- Inordinate workloads for faculty and staff related to teaching, scholarship, and administrative responsibilities
- Insufficient private support for facilities and programs

Macro Trends

Continuous change will dominate the national and international marketplace for higher education, including the proliferation of for-profit institutions who deliver degrees anytime, any place.

Technology will be ubiquitous in all instruction with increased demand for on-line and blended learning.

Globalization and demographics will impact higher education by increasing numbers of multi-lingual students and by 2050, the predominant race seeking four year degrees will be non-whites and first-generation college-going students.

Substantial support by states will dwindle and public higher education will no longer be the recipients of the major share of their revenue from state governments; federal dollars will also shrink, potentially in the form of reduced funding for financial aid.

Strategic Initiatives

Student-Centered Learning

1. Number of tenure track faculty hired
2. Number of Faculty Development Programs on blended learning offered/number of faculty participating
3. Number of pilot courses offered for new models for the delivery of instruction
4. Number of specialized and cross-disciplinary spaces built
5. Number of spaces created to foster wellness
6. Number of courses integrating wellness into the curriculum
7. Number of students involved in research projects with faculty
8. Number of students engaged in community service
9. Number of students winning state, national and international awards
10. Pass rates on licensure exams

Community Engagement

1. Development and completion of needs assessments with community and students
2. Number of programs created that met new community needs
3. Number of students studying abroad
4. Number of foreign students recruited from Asia and South America
5. Number of non-credit students studying on campus
6. Number of internships and externships offered/ number of students enrolled in those experiences
7. Number of bike paths created
8. Number of demonstration models created on environmental sustainability
9. Amount of increased bus service to campus
10. Number of cultural events and conferences developed with the community

Innovative Practices

1. Number of majors that exhibit increased depth in the discipline
2. Number of interdisciplinary offices built to link faculty and staff
3. Development of a child care center option
4. Number of flexible classrooms built for cross-disciplinary work, both indoors and outdoors
5. Development of on-line communication for mentoring, tutoring, advising
6. Development of a stream-lined pathway for community college students
7. Number of students enrolling at CI as their destination school for interdisciplinary experiences
8. Retention rate of first year and transfer students
9. Six –year graduation rates (by race, ethnicity)
10. Progression to 30% of student in university controlled housing
11. Increase in the availability of housing
12. Development of a faculty-in-residence program in housing
13. Development of commuter space in housing
14. Construction of a wellness center
15. Development of a "one-stop shop"
16. Development of intramural spaces

Inclusive Partnerships

1. Development of a comprehensive campaign/annual giving
2. Number of grants and contracts obtained
3. Number of partnerships established with local and regional companies/ number of externships offered at those companies/number of companies contributing to the University
4. Improved student success in PreK-12 schools: graduation rates, percentage of students going to college, test scores
5. Number of graduates meeting the workforce development and professional education needs of the community
6. Percentage of students going to graduate school, particularly in professional programs
7. Amount of increased support from the California State University System

Review Of Relevant Materials

2010-2011 Catalogue, the Admissions Viewbook, Organizational Chart for the Division of Academic Affairs, Enrollment projections for 2010-2011, Dashboard indicators and institutional research data, Institutional and programmatic educational objectives at CI, Economic development work plan from the California Business, Transportation and Housing Agency, Educational Effectiveness Report to the Western Association of Schools and Colleges in 2006 and the response from the Western Association, the Strategic Plan for the Division of Academic Affairs of CI, Program Review Flow Chart, Briefings on Extended Education, Structure, history and philosophy of the Division of Student Affairs, Minutes from the Assessment Council, Economic impact report for CI, Strengths and Challenges of Current Academic Programs, Need for computing and telecommunications services, State report on Biotech in California that defines the needs for workforce development, Description of the four mission-based centers and work accomplished to date, Schedule of classes for 2010-2011, and Description of the new General Education Program.


CSUCI
CALIFORNIA
STATE
UNIVERSITY
CHANNEL
ISLANDS
SPEED LIMIT 35


Area A
Area B
Area C
Area D

Hydrology

Existing Conditions

Existing Systems

The current campus consists of approximately 122 acres of developed land that all drains to three different outlets, which eventually flow to Calleguas Creek.

The first outlet is located on the south side of the campus, to the north of Potrero Road, at the intersection with the campus service drive. This outlet conveys water from approximately 150 acres of on-site and off-site area (Areas A & B), underneath Potrero Road in a round 24" RCP pipe. The pipe eventually outlets, almost a quarter of mile south of Potrero Road, into an irrigation ditch within the existing farmland. Approximately 84 acres of the 150 acres is currently developed.

Area A consists of developed and undeveloped areas. Runoff for the developed areas sheet flows across the campus to the nearest underground storm drain system inlet and continues to flow west. All of the storm drain systems eventually lead to a 24" pipe that outlets west of the chiller plant. At the outlet, there is an existing detention basin with a storage volume of approximately 20 ac-ft. The basin outlet is a 6" pipe which flows south to Potrero Road, where the runoff then flows underneath the road in the existing 24" RCP pipe.

Runoff, for the undeveloped areas of Area A, sheet flows across the existing terrain and either are held in the detention basin west of the Chiller Plant, or sheet flow all the way to the 24" RCP pipe flowing underneath Potrero Road.

Area B also consists of developed and undeveloped areas. The developed areas consist of underground storm drain systems that convey the runoff to a channel that flows west, along the north side of Potrero Road. The channel eventually connects with the existing 24" RCP pipe that flows south underneath Potrero Road.

Runoff, for the undeveloped areas of Area B, sheet flows across the existing terrain and into the channel along Potrero road, where it is also conveyed to the existing 24" pipe.

The second outlet is also located on the south side of the campus, at the southern corner of the southeast parking lot along Potrero Road. This outlet conveys runoff, from approximately 27 acres of on-site and off-site area (Area C), underneath Potrero Road in a 12" elliptical CMP pipe and into the farmland to the south of Potrero Road. Around 16 acres of the 27 acres is currently developed.

Area	Area Ac	Area Ab&c	Area A & B	Area B	Area C	Area D
Pipe/Channel Size	24″	6″	24″	3′ x 20′	12″	24″
Tributary Q (cfs)	124.94	172.36	319.68	84.37	71.19	53.58
Upstream Elev (ft)	36	30	25	25	58	55
Downstream (ft)	33	25	23	25	41.5	52
Length (ft)	1244	747	1,268	856	900	470
Slope (ft/ft)	0.0024	0.0067	0.0016	0.0000	0.0183	0.0064
Pipe Capacity (cfs) (No pressure head)	11.08	0.46	9.05	87.46	4.82	18.1

The runoff from the developed portions of Area C either flows into the existing underground storm drain system or sheet flows into a channel flowing east, north of Potrero Road. Both the overland runoff and underground storm drain system flow to the 12″ elliptical pipe that conveys the runoff south underneath Potrero Road.

The third outlet for site run-off is into Long Grade Canyon Creek at the north side of the site, just east of the school entrance along University Drive. This outlet conveys runoff from approximately 15.90 acres of developed on-site area (Area D) into the creek via a 24″ RCP pipe.

All of Area D is developed. The runoff is collected in an underground storm drain system and flows north until it reaches the outlet into the creek.

Above is a table that shows the design of the existing outlet systems for the campus and the capacity of each system when not under pressure. When the tributary Q and the capacity of the pipe are compared, it is evident that the existing outlets handle less runoff than is generated by the existing campus. This illustrates that the current campus has detention facilities/area (Area A) available in order to detain the runoff in excess of the existing outlet capacity. If there is not adequate detention area, then flooding occurs.

Please refer to the fold-out Existing Conditions Hydrology Map for the areas discussed above and the Hydrology Addendum for the existing outlet system calculations.

Existing Peak Discharges

The stormwater flow for each area and outlet are also shown on the Existing Conditions Hydrology Map. The existing conditions stormwater flows were calculated using the modified rational method in the 2010 Ventura County Watershed Protection District (VCWPD) Design Hydrology Manual.

The modified rational method using the following equation to calculate the peak discharge for a designated storm year:

$$Q = C*I*A$$

Q = Peak discharge in cubic feet per second (cfs)
C = Coefficient of runoff (dimensionless)
I = Average rainfall intensity for a duration equal to the time of concentration of the watershed (in/hr)
A = Drainage area of the watershed (acres)

The total watershed area was split into four different subareas based on which outlet the area drained too. The subareas were then broken down even farther and the acreage for each area was determined.

The runoff coefficient is the percentage of rainfall on a watershed that occurs as runoff and ranges from zero to 0.95 for impervious surfaces. The ratio of runoff to rainfall increases as storm intensity increases and therefore the runoff coefficient is a function of intensity in the VCWPD Design Hydrology Manual method. Once the intensity of the storm was determined by the Tc Calculator, then the runoff coefficient curves for the specific soil numbers were used to determine the value of C; exhibits 6a-g in Appendix A of the VCWPD Design Hydrology Manual.

The rainfall intensity is presented as intensity-duration curves in the VCWPD Design Hydrology Manual for four different zones in the County, Appendix A, Exhibit 4.

The intensity of the storm depends on the time of concentration, which is defined as the time required for runoff to travel from the hydraulically most distant point of a watershed to its outlet. The method in the VCWPD Design Hydrology Manual uses a computer program to compute the time of concentration, the Tc Calculator. The inputs needed for the Tc Calculator area as follows:

- Flood Zone = 3
- Rainfall Zone = K (Appendix E-5, 10-Year, 1-day Rainfall Contours for Ventura County)
- Soil Type = 1-7 (Appendix E-5, 10-Year, 1-day Rainfall Contours for Ventura County)
- Rainfall Frequency = 10 year *
- Fraction of Impervious Area = Impervious Area/Total Area
- Generalized Development Type = Undeveloped, Residential, Commercial, Industrial
- Flow Path Type = Overland, Natural Channel, Channel, Street, Pipe
- Area for Flow Path = Contributing area to the flow path
- Length of Flow Path
- Beginning Elevation = Elevation at the top of the flow path
- Ending Elevation = Elevation at the bottom of the flow path

* The 10-year design storm is used for this analysis since the previous Utility Vision Plan for the University identifies that the current system is inadequate to convey the 10-year flow, as determined by the Ventura County Hydrology data and methods. This means during the 10-year design storm, the stormwater runoff will start to sheet flow across the surface since the underground system is inadequate. The system is too extensive to be upgraded, and so this study focuses on the volume of runoff where the existing system breaks down and makes recommendations on specific system upgrades that will help to mitigate the 10 year-storm.

The Tc Calculator also calculates the rainfall intensity and the coefficient of runoff based on the inputs, which then produces the peak discharge in cfs for the area. The peak discharges for each area are shown below. The Appendices needed from the VCWPD Design Hydrology Manual are located in the Hydrology Addendum, along with the Tc Calculator inputs and output.

Sub-Area	C	I (in/hr)	A (ac)	**Q_{10} (cfs)**
Aa	0.84	3.09	24	**62.95**
Ab	0.73	1.98	33	**47.42**
Ac	0.82	2.68	57	**124.94**
Ba	0.76	2.04	14	**21.61**
Bb	0.84	3.40	22	**63.12**
C	0.85	3.09	27	**71.19**
D	0.91	3.72	16	**53.58**

Existing Volumes

Since the purpose of this Vision Plan is to upgrade the existing system, which includes a detention basin, and propose storm water measures, the volume of runoff produced from the 10-year storm will be needed for design. An increase in the volume of runoff will not be allowed with the proposed new campus development, and it is necessary to know the existing volume in order to determine the amount of volume in the proposed condition that will have to be retained on site.

In order to calculate the volume of runoff produced by each sub-area, a runoff hydrograph was created. In order to develop a runoff hydrograph, the method in the VCWPD Design Hydrology Manual was followed. The method used Appendix A – Exhibit 14a, Appendix A – Exhibit 4d, Appendix A – Exhibits 6a-6e, and Appendix A – Exhibit 13 in order to develop the runoff hydrographs shown in the Hydrology Addendum. The table below summarizes the total volume of runoff for the 10-year storm for each sub-area.

Sub-Area	$Volume_{10}$ (ac-ft)
Aa	2.74
Ab	3.73
Ac	14.23
Ba	1.62
Bb	5.95
C	6.08
D	4.48

Existing Deficiencies

The University representatives have been active in identifying existing deficiencies on campus with the existing storm drain system. One of the surface deficiencies they see is along Ventura Street, from the Central Mall north to Santa Barbara Avenue. The runoff ponds all along this street and does not flow into the existing storm drain inlets.

One of the other deficiencies they described is the detention pond to the west of the Chiller Plant. The water will sit here for days after a large storm event since the outlet pipe is only a 6" pipe and drains 90 acres of developed and undeveloped land.

Other existing storm drain system details that are not deficiencies, but are constraints, are the existing outlets. The University will not be able to increase the rate or volume of flow that is conveyed by the three existing drainage outlets in order to avoid downstream effects on the surrounding properties.

Please see the fold-out Existing Deficiencies Hydrology Map for the deficiencies discussed above.

Recommendations for the Existing System

The ponding along Ventura Street is because of the extreme undersizing of the underground storm drain system for the flow and volume of water the system is supposed to carry. The underground system is very flat, less than a 0.5% slope, and the largest pipe at the outlet is 24" and the pipe along the road is only 12". The flow to be conveyed by this system reaches 125 cfs in the 10-year storm. The existing pipes only have a capacity of 11.8 cfs which is only 9.5% of the expected flow. In order for this system to function as it was intended, the pipes need to be replaced with a larger pipe, a box culvert, and also a steeper slope. A 2' high by 6' wide box culvert at a 1% slope would potentially convey the 10-year storm flow. It would also be possible to split the flow into two pipes heading west from Ventura street, as proposed in the recommendations later in this report. This would decrease the size of the pipes needed.

As for the detention area, the same storage volume needs to be detained and the rate at which the runoff reaches the pipe to the North of Potrero Road needs to be maintained. This means that the detention area west of the chiller plants needs to remain, whether in the same form or another. The existing outlets on site will have to remain at the current locations and the current size in order to keep the rate and volume of runoff the same to avoid changing the effect on the downstream properties. In order to maintain these outlets, the excess stormwater above the outlet capacity will need to be detained on site.

Proposed Conditions

Proposed Peak Discharges

The overall Vision Plan for the campus expands the existing campus and develops a portion of the current undeveloped land. Due to the increase in developed area, total runoff is expected to increase upon complete build-out. In order to determine the proposed peak discharges for the future campus, the same methodology was followed as the calculation of the existing peak discharges (See section 1.b). Since the density and impervious area for some areas will increase with build out, there is a change in C values and the areas are slightly re-distributed from the existing conditions due to the development of the undeveloped areas. Please refer to the fold-out Proposed Conditions Hydrology Map for the proposed drainage sub-areas.

The peak discharges for each proposed drainage sub-area are shown below. The VCWPD Design Hydrology Manual and the proposed Tc Calculator inputs and output are also located in the Hydrology Addendum.

Sub-Area	C	I (in/hr)	A (ac)	Q_{10} (cfs)
Aa	0.87	3.40	24	70.53
Ab	0.86	3.40	18	52.96
Ac	0.83	2.52	72	150.38
Ba	0.83	2.40	14	27.55
Bb	0.85	3.40	22	64.52
C	0.84	3.09	27	70.15
D	0.91	3.72	16	53.86

Proposed Volumes

The proposed Vision Plan increases the impervious area of the campus from the existing condition, which increases the peak discharge. According to the current stormwater regulations, there is to be no increase in the rate of discharge or volume of discharge from future development. The increase in volume will need to be retained and infiltrated on campus and the runoff amount above the existing outlet capacity will have to be detained since the current outlet capacity cannot be increased.

The runoff volume produced by each sub-area in the proposed condition is calculated utilizing the same methodology as was used to calculate the existing volumes. The table below summarizes the total volume of runoff for the 10-year storm for each drainage sub-area. The volume calculations are shown the Hydrology Addendum.

Sub-Area	$Volume_{10}$ (ac-ft)
Aa	4.18
Ab	3.23
Ac	18.94
Ba	2.68
Bb	5.89
C	5.95
D	4.59

Area	Existing Runoff (cfs)	Existing Volume (ac-ft)	Proposed Runoff (cfs)	Proposed Volume (ac-ft)	Runoff Difference (cfs)	Volume Difference (ac-ft)
Aa	62.95	2.74	70.53	4.18	**7.58**	**1.44**
Ab	47.42	3.73	52.96	3.23	**5.54**	**-0.50**
Ac	124.94	14.23	150.38	18.94	**25.44**	**4.71**
Ba	21.61	1.62	27.55	2.68	**5.94**	**1.07**
Bb	63.12	5.95	64.52	5.89	**1.40**	**-0.05**
C	71.19	6.08	70.15	5.95	**-1.04**	**-0.13**
D	53.58	4.48	53.86	4.59	**0.28**	**0.11**

Proposed Design Methodology

Based on the existing and proposed hydrology calculations, there will be a minimal increase in the overall imperviousness of the campus, which means an increase in the rate and volume of runoff. The difference between the existing and proposed runoff rates and volumes are shown in the tables above.

In order to avoid changing the existing drainage characteristics and patterns of the campus, the difference in volume after the campus reaches full build-out needs to be retained and infiltrated on campus. This will be accomplished by different stormwater and infiltration techniques further discussed in the LID section.

Not only is there a requirement for infiltration in order to retain the additional amount of runoff generated by the addition of impervious area, but the rate at which the runoff is outlet off campus must remain unchanged as well. The existing campus outlets are unable to dissipate the runoff as quickly as it is generated and so storage (detention) must be provided on campus for the volume of runoff that is unable to outlet during the storm. This volume is calculated by subtracting the volume of runoff able to pass through the outlet from the total storm volume.

The table below shows the amount of storage volume (detention) needed on campus to detain the additional runoff. Please see the Hydrology Addendum for the volume calculations.

<table>
<tr><th>Area</th><th>Existing Outlet Release Rate (cfs)</th><th>Volume in Addition to Outlet Capacity (ac-ft)</th></tr>
<tr><td>Aa</td><td>9.05</td><td>1.26</td></tr>
<tr><td>Ab</td><td>2.73</td><td rowspan="2">17.12</td></tr>
<tr><td>Ac</td><td>2.73</td></tr>
<tr><td>Ba</td><td>9.00</td><td rowspan="2">1.75</td></tr>
<tr><td>Bb</td><td>9.05</td></tr>
<tr><td>C</td><td>4.82</td><td>1.98</td></tr>
<tr><td>D</td><td>18.10</td><td>0.29</td></tr>
</table>

Proposed Design Recommendations

Based on the two discussions above, there is a known volume of water that needs to be retained for infiltration purposes and a known volume of water detained in order to avoid upsizing the existing campus outlets. With this information, a few design recommendations for the overall campus hydrology Vision Plan are discussed in the following section.

Sub Area	Proposed Runoff Volume (ac-ft)	Infiltration Volume Needed (ac-ft)	Detention Volume Needed (ac-ft)	Infiltration Volume Provided (ac-ft)	Detention Volume Provided (ac-ft)
Aa	4.18	1.44	1.26	**0.39**	**2.31**
Ab	3.23	-0.50	17.12	**1.51**	**19.82**
Ac	18.94	4.71			
Bb	2.68	1.07	1.75	**0.93**	**1.84**
Ba	5.89	-0.05			
C	5.95	-0.13	1.98	**0.46**	**1.39**
D	4.59	0.11	0.29	**0.40**	**N/A**

Recommended Improvements

The campus should provide at least 5% of the total campus area as stormwater treatment/infiltration to satisfy the infiltration requirement for each campus area. The campus should also provide above ground storage for the volume of runoff above the existing outlet capacity. It is also the recommendation of this study that all storm water runoff from pervious surfaces be filtered through landscaping or permeable paving before entering the underground storm drain system. This alternative does not change the current campus drainage patterns and existing outlets or significantly alter the approach to dealing with stormwater.

In the table above is a summary of the area provided for stormwater treatment and infiltration and for stormwater detention. Please see the fold-out Proposed Improvements Hydrology Map for the location of the proposed improvements. The total volume provided with infiltration and detention equals the total volume needed for infiltration and detention.

It is assumed that the detention areas can also provide for infiltration. In the areas where the provided infiltration volume is less than the needed infiltration volume, the difference in volume will be infiltrated in the detention basin. This is accomplished by providing the outlet for the detention above the volume of runoff that needs to be infiltrated, allowing all but the infiltration volume to drain from the detention basin. The volume of runoff for each area to the infiltrated in the detention basin is shown in the table below. Without knowing the infiltration rate of the existing soil, it is assumed that all of the proposed detention basins can drain in less than 72 hours to meet vector control requirements.

Sub Area	Infiltration Volume Needed (ac-ft)	Infiltration Volume Provided (ac-ft)	Infiltration Needed within the Detention Basin (ac-ft)
Aa	1.44	0.39	**1.05**
Ab	4.21	1.51	**2.70**
Ac			
Bb	1.02	0.93	**0.09**
Ba			
C	-0.13	0.46	**0**
D	0.11	0.40	**0**

Area Aa

This area is currently undeveloped and will be developed under the future Vision Plan. Potential permeable paving and vegetated areas have been identified in order to mitigate the increased impervious area. There also is a detention basin proposed to accommodate the volume of water above the capacity of the existing inlet. A proposed drainage channel or swale will need to be constructed at the foot of the existing slope in order to direct the runoff away from the proposed buildings.

Areas Ab & Ac

These two areas are the main drainage areas of campus and currently experience flooding. There is an existing large detention area to detain the runoff from the main campus in order to avoid inundating the farmland to the south. The current detention basin has 6" outlet that will remain.

To resolve the flooding along Ventura Street, it is proposed that the flow be split into two pipes that convey the runoff to the proposed detention basin. These pipes will be approximately 2.5' in diameter where they join with the existing pipe along Ventura Street and will increase to 4.5' in diameter when the two pipes merge to empty into the detention basin. The proposed detention basin is in the same location as the existing basin and will also detain the runoff from the previous undeveloped portion of campus that is to be developed into recreation areas under the proposed Vision Plan.

Due to the increase in pervious surface, permeable paving and landscaped areas are proposed to function as stormwater treatment and infiltration to mitigate for this increase. The old storm drain system will need to be removed in areas where it is in conflict with new buildings and a new storm drain system will need to be constructed.

Areas Ba & Bb

Most of this area is currently developed and will need to be retrofitted with stormwater treatment and infiltration areas when the new buildings are constructed. Permeable paving, infiltration trenches, and bioretention basins are all good options for this area. As with Area Aa, detention will also be needed to retain the runoff above the existing outlet capacity, as well as a swale at the toe of the existing slope in order to direct runoff away from the proposed buildings.

With the new construction, portions of the old storm drain system will need to be removed and a new storm drain system constructed.

Area C

The development of this area is changing under the Vision Plan, but it is actually regaining pervious surface, unlike the other areas. This means that there is no infiltration required. However, stormwater treatment is a must with new construction and so permeable paving and vegetated areas have been proposed. A detention basin will be needed at the existing outlet to retain the volume of runoff that cannot be conveyed by the outlet during the storm. As with the drainage areas, any old storm drain system that conflicts with the new construction will have to be removed and new systems put in place. The major new storm drain system in this area will be the main trunk along Chapel Drive since the road is being relocated.

Area D

Area D is also already developed and so the Vision Plan only minimally increase the impervious area. Permeable paving and landscaped areas are proposed to be stormwater treatment and infiltration facilities. There is a minimal requirement for detention since the existing outlet is unable to convey all of the runoff. However, there is no convenient place for a detention basin in this area, so instead more stormwater treatment areas have been proposed in order to offset the inadequate outlet capacity.

Recommended Improvements- Alternate Plan (Scheme B)

The recommendations for Scheme B are the same as they are for the proposed Vision Plan (Scheme A). However, in Scheme B, the open area west of the chiller plant used for a detention basin in Scheme A, is proposed to be a softball field. This area can still be used as a detention basin, but the softball field and adjacent improvements will be flooded during a storm event. If there are any buildings proposed along with the softball field, they should be constructed in order to withstand the flooding.

All of the following alternatives only differ from the recommended designs for Areas Ab & Ac, the location of the large existing and proposed detention basin. The rest of the areas (Aa, Ba & b, C, and D) will have the same proposed design as for Scheme A.

Alternative 1- Diversion to Long Grade Canyon Creek

In an effort to provide a design solution for the removal of the existing and proposed large detention basin west of the chiller plant, the outlet of the stormwater runoff from Areas Ac & Ab into Long Grade Canyon Creek was investigated. It was found that the storm drain system would be unable to gravity flow due to the elevation of the campus being approximately the same as the bottom of Long Grade Canyon Creek. If the stormwater cannot gravity flow, the next option is to pump the stormwater from the campus into Long Grade Canyon Creek.

The total rate of runoff for Areas Ab & Ac is approximately 200cfs. The pump station does not have to be sized to handle the full runoff rate since an underground reservoir area is provided prior to the pump station. The reservoir area proposed is 100'x150'x10', which reduces the peak flow to only 90cfs.

The infrastructure required for the operation of the pump station is as follows:

1) New pipes from Ventura Street to convey the runoff to the pump station.
2) Two hydrodynamic separator units in order to remove total suspended solids and oil & grease in the stormwater runoff prior to reaching the pump station.
3) 110' x 150' x 10' underground structural reservoir along with piping and appurtenances.
4) 90cfs pump station with above ground architectural structure, piping, appurtenances, maintenance equipment, and back-up power/generator.

The above infrastructure would require around 2,500 sf of area along Long Grade Canyon Creek, close to the shared boundary of Areas Ab2 and Ac4 . Keep in mind that there also will be 16,500 sf of structural reservoir underground, however, this structure is assumed to be able to be constructed over.

There are a few other different pump station alternatives. One of these alternatives could be two separate pump stations on a smaller scale, located in Area Ab2 and Area Ac4. Each of these pump stations would pump 45 cfs instead of 90 cfs. The other alternative is to pump only half of the 200 cfs and detain the rest in an underground storage system just west of the chiller plant. This alternative would divert less runoff to Long Grade Canyon Creek and maybe be a more viable alternative depending on the local agency acceptance of the project.

Potential Permitting for this Alternative:

Routing the flows from the campus to Long Grade Canyon Creek would constitute a diversion from their historical flow path. Under current conditions these flows are outlet under Potrero Road and are conveyed south then west to Calleguas Creek though a series of agricultural drains and ditches. Bringing the flows into Long Grade Canyon Creek would increase the flows in both creeks for the reach between Long Grade Canyon Creek and the current entry point approximately two miles south of Potrero Road.

Permitting for the proposed diversion will require reanalysis of the hydrology and hydraulics of Long Grade Canyon Creek and Calleguas Creek to demonstrate that the proposed diversion does not have adverse impact on the flood protection levels currently provided by either creek. Additionally, depending on the final design of the system, water quality treatment may have to be implemented to insure that there are no adverse impacts on the creek's plant and animal communities. Depending on the final configuration of the diversion, permits may also be required from the regulatory agencies including:

- Ventura County Watershed Protection District
- US Fish and Wild Life Service
- California Department of Fish and Game.
- The US Army Corps of Engineers
- Regional Water Quality Control Board

Alternative 2 – Underground Detention Basin

Rather than providing for an aboveground detention basin, as proposed for the Vision Plan, an underground detention basin could be utilized in the same area. This basin could either be designed to support playing fields above or it could be designed to support structures. If the proposed surface elevation were to be raised to an elevation of 40' from its current elevation, this underground system would be able to outlet using gravity flow. If the current elevation is to remain, then a pump would be needed in order to outlet the system. However, this pump would only have to pump 2.73cfs, which is the current capacity of the existing 6" outlet pipe. Due to the small size of the pump, it would only be a fraction of the cost of the larger pumps needed to pump the runoff to Long Grade Canyon Creek.

Alternative Cost Estimates

To aid in the decision of which alternative will best fit into the overall campus Vision Plan, preliminary cost estimates for the different detention basin and pump station scenarios have been developed. Please note that these cost estimates are very preliminary in nature due to the limited preliminary engineering design. The costs shown in the table below include the construction cost and maintenance cost for the first year and do not include design, permitting, or inspection costs. The maintenance cost is 2% of the overall construction cost. Since the cost estimates are preliminary, a range has been provided. The High range is 40% over the calculated cost and the Low range is 20% below the calculated cost. Please see the Hydrology Addendum for the detailed cost estimates.

Alternative	Total Cost	High Range	Low Range
Recommended Alternative Scheme A & B	$ 3.7 million	$ 5.2 million	$ 3.0 million
Alternative 1 – One Pump	$ 16.0 million	$ 22.4 million	$ 12.8 million
Alternative 1 – Two Pumps	$ 18.7 million	$ 26.1 million	$ 14.9 million
Alternative 1 – One Pump & Detention	$ 11.3 million	$ 15.7 million	$ 9.0 million
Alternative 2 – Non-Structural Detention	$ 7.1 million	$ 10.0 million	$ 5.7 million
Alternative 2 – Structural Detention	$ 13.5million	$ 18.9 million	$ 10.8 million

From the table above, it is easy to get an idea of the cost ranking of the different alternatives. This will assist the University in planning for the future campus stormwater needs.

North Campus & Regional Park Discussion

The North Campus is currently an overflow area for Calleguas Creek as identified on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM). The levees of Long Grade Canyon Creek and Calleguas Creek currently prevent overflows from reentering either creek such that the North Campus area acts as a retention basin on Calleguas Creek. Because of presence of overflows, no habitable structures will currently be allowed in the North Campus area unless they are elevated above the flood flows or if the flood flows are mitigated.

As a detention basin, the North Campus area serves to reduce the peak flow rates experienced downstream of the basin. If at some time in the future, structures are planned for the North Campus area, then the overflows will have to be eliminated either through fill or though improvements to the Calleguas Creek Levee. Either of these options will eliminate the North Campus areas as a flood retention basin thereby increasing peak flows downstream.

In order to mitigate an increase in peak flows an equivalent sized detention basin would have to be implemented on the Calleguas Creek system. Initial discussions have been held with the Ventura County Watershed Protection District on the use of the regional park currently owned by the University as an alternate site for a detention basin. The District has indicated that such a concept would be acceptable, subject to appropriated analysis and design of the proposed detention basin to insure its equivalency with the current detention volume provided by the North Campus area.

Low-Impact Development (LID): Assessment and Siting

The fundamental goal of LID designs for the enhanced CI campus is to approach storm water as an asset to be utilized to enhance the student's relationship with storm flows. In this way, storm flows become part of the campus environment similar to the hills surrounding campus or the nearby ocean. A second goal is the removal of pollutants of concern (POC) that may be generated by the campus and its activities. A final goal is to reduce peak flows through infiltration and retention/detention such that downstream properties are not adversely affected by the proposed campus improvements.

The objective of LID design is to treat and retain stormwater at, or as close to, the point where it is generated (at the source). By capturing (managing) and treating stormwater throughout the built environment, post development hydrology attempts to mimic predevelopment conditions where natural features allowed for infiltration into the earth, biological uptake of rainfall (and its chemistry), and conveyance through the watershed without significant environmental consequence (erosion, sedimentation, watercourse damage, pollution input).

LID philosophies employ microscale and distributed management techniques (IMPs) to achieve desired post development hydrologic conditions. In an urbanized environment, LID is integrated with engineered infrastructure to reduce the contribution of runoff to the conveyance system, reduce stormwater pollutants before discharge downstream, and slow flow through the watershed or drainage area. It manages runoff at the source rather than at the end of the pipe.

Preserving the hydrologic regime of the predevelopment condition may require both structural and nonstructural techniques to compensate for the hydrologic alterations of development. Structural LID solutions, such as bioretention cells, detention basins, and swales are best used to treat small, frequent storm events (2-year return frequency or less). These systems encourage infiltration while slowing water on the landscape. During flood events, it is important that high flows do not scour or damage IMPs. LID seeks to develop efficiencies within urban water streams to restore the water balance of the landscape.

Due to the preliminary nature of the current campus planning cycle, this report does not discuss specific locations for specific types of LID or infiltration facilities. Rather it is a guidance document with a menu of LID facilities that could be associated with buildings or other improvements as the campus develops.

LIST OF ACRONYMS AND ABBREVIATIONS

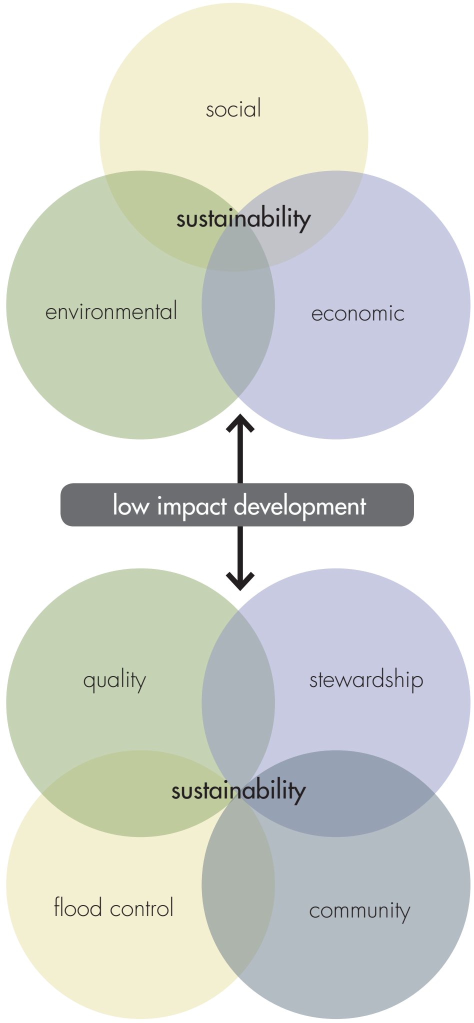
BMP	best management practice
CI	California State University Channel Islands
IMP	integrated management practice
LID	low-impact development
MTBE	methyl tertiary butyl ether
NH_3	ammonia
NH_4	ammonium
OWS	oil/water separators
PAH	polycyclic aromatic hydrocarbon
POC	pollutant of concern
TKN	Total Kjeldahl nitrogen
TSS	total suspended solids

LID IMP Siting Guidance

A wide variety of LID IMPs have been included in this report to provide future planners and designers a broad choice of technologies and strategies to cover a wide variety of possible LID opportunities that arise as the campus develops. Part of determining appropriate stormwater treatment IMPs for CI relies on the professional judgment of practicability and feasibility relative to the proposed improvements and existing conditions in general. The feasibility of siting a given IMP should consider the following elements:

- Available space at drainage area collection points to capture and/or detain/infiltrate the volume of runoff from the corresponding drainage area
- Appropriate soil composition or structure available to promote infiltration opportunity
- Need to treat drainage area pollutant loads or reduce/eliminate their dispersal in stormwater runoff (i.e., erosion control)
- Ability of IMP treatment capabilities for target POCs
- Known future expectations for the area of activity
- Ability to establish vegetation or other similar landscapes for runoff infiltration and evapotranspiration
- Practicality of plumbing modifications needed to integrate into existing facilities (or those proposed in this study)
- Net environmental benefit gained, particularly in reducing receiving water habitat ecological impacts and improving groundwater recharge.

Using these siting concepts will help future designers maximize the efficiency of proposed LID facilities while insuring that they harmonize with surrounding campus facilities and uses.



Benefits and Constraints of LID

LID designs provide benefits that are physical, environmental, and social in nature. LID is recognized as both a tool to manage stormwater, treat water quality, and "green" the landscape by enhancing the aesthetics and watershed function of urban spaces. Conversely, LID design is not without implementation constraints, as shown below.

Benefits

- Hydrological balance: maintains the hydrological balance by using natural processes of storage, infiltration, and evaporation.
- Sensitive resource protection: protects environmentally sensitive areas from urban development.
- Waterway restoration: restores and enhances urbanized waterways and helps to minimize runoff impacts to natural systems.
- Impact reduction: minimizes the impact of urban development on the environment.
- Water quality treatment: reduces pollutants such as suspended solids, nutrients, and hydrocarbons from entering groundwater or downstream receiving waters.
- Groundwater recharge: replenishes aquifers and helps to resist coastal saltwater intrusion.
- Environmental linkages: creates opportunities to connect development areas to adjacent natural landscapes and integrate functional landscapes in urbanized settings.
- Greening the landscape: minimizes impervious surface while providing additional vegetation and canopy within the landscape.

Constraints/Limitations

- Existing regulations and design practices: LID may conflict with local regulations or existing guidance such as contaminated groundwater resource avoidance/protection.
- Topography and erosion: opportunities are limited in areas of deeply dissected terrain and high slopes.
- Perception: nature of integrating LID may be viewed as an unnecessary expense or a maintenance nuisance as it relates to site design and training function.
- Research and standardized procedures: LID is an evolving practice with significant research gaps but lack of design criteria and information exist.
- Maintenance: Required for most IMPs; maintenance program should be established.
- Soils and water table depth: solutions more challenging in areas of poor infiltration; opportunities are limited in areas with high water table.

Integration of Pollutants of Concern into LID Facilities

Integrating LID design practices into existing infrastructure serves to complement flood control, runoff pollution prevention and treatment, consumptive use reduction, and hydromodification impact reduction. In determining appropriate and applicable IMPs for implementation around the future CI campus, designers must first understand the drainage area relative to the pollutants of concern (POCs) such that appropriate IMPs can be identified to target POCs.

Once site conditions are assessed for POCs, IMPs can be identified and their practicality/feasibility of integrating them into the drainage area infrastructure is evaluated. From that evaluation, decisions are then required for actual implementation—most of which will be based on pollution prevention priority, feasibility of implementation, and available funding.

Stormwater Pollutants

Impervious surfaces accumulate a variety of pollutants that can be transported downgradient to sensitive receptors. Stormwater management has historically been viewed from the perspective of flood control, with floodwaters or storm flows being routed to the nearest discharge location with little or no treatment. The potential pollutants identified that follow are anticipated relative to campus-related activities and have not been substantiated with campus-specific stormwater monitoring data.

Solids

- Floatables: e.g., leaves, branches, light plastics, and other trash and debris
- Suspended: sediment measured as total suspended solids [TSS]
- Settleable: sediment measured as coarse sand and grit

Organics

- Oil & grease
- Total organic carbon: detergents, pesticides, fertilizers, herbicides, industrial chemicals, chlorinated organics
- Polycyclic aromatic hydrocarbons (PAHs): processed fossil fuels, tar, various edible oils, incomplete combustion of wood, coal, diesel, fat, tobacco
- Methyl tertiary butyl ether (MTBE): gasoline additive

Metals

- Cadmium, chromium, copper, lead, nickel, zinc

Nutrients

- Total Kjeldahl nitrogen (TKN): sum of organic nitrogen, ammonia ($NH3$), and ammonium ($NH4+$) [sewage treatment plant effluent]
- Phosphorus: explosives, matches, pesticides, toothpastes, detergents

Pathogens

- Bacteria

Understanding the potential sources for the pollutants listed above will assist the future designer in siting and selecting the appropriate LID technology. Common sources of pollutants for a campus environment are shown in Table 1.

Table 1. Potential Campus Activities and Correlating Sources

Area/Activity	Potential Source	Expected Pollutant(s)
Roadways and Parking Lots	Drips, stains, leakage Brake pad wear, tire wear Sediment tracking "Weekend mechanics"	Metals, sediment, hydrocarbons
Food Court, Cafeteria	Food waste (grease traps, OWS, leaking dumpsters) Shipping/receiving spillage Inadvertent hosing or wash down; mop water	Floatables, nutrients, bacteria
Vehicle and Equipment Fueling, Washing, Maintenance	Spills and leakage Hosing or wash down	Hydrocarbons, sediment, metals, hydraulic fluids
Warehousing	Shipping/receiving, container breakage/spills	Various, dependent on inventory
Landscaping	Fertilizers & Pesticides Eroded Soils	Nutrients (Nitrogen, Phosphorus), oxygen demanding substances, sediment, pesticides

Low-Impact Development: Proposed Options

Nonstructural Options

The most effective approach to reducing stormwater infrastructure and its associated maintenance costs is to employ upfront nonstructural conservation and planning measures, which can include the following:

Design and Planning

- Preserve native vegetative cover and natural drainage patterns.
- Treat stormwater as close to its origin as possible by distributing small-scale IMPs throughout the site.
- Cluster development to reduce impervious surface and site compaction.
- Grade to encourage sheet flow to reduce stormwater travel time over the site.
- Integrate stormwater controls into the design as both flood control and site amenities.
- Reduce the reliance on traditional collection and conveyance stormwater practices; minimize curb and gutter infrastructure.
- Minimize impervious surfaces by reducing roadway width and length and dissecting parking areas with vegetated or infiltration runoff treatment options.
- Designate a single access route into new construction areas. Prior to start of construction, fence off protected areas and sign each area clearly. If saving individual trees, protect the root system from compaction.
- Disconnect impervious surfaces by directing runoff into or across vegetated areas to help filter runoff.

Maintenance and Education

- Develop reliable, long-term maintenance programs with clear and enforceable guidelines.
- Educate building owner/operators, local staff, and others as needed on proper operation and maintenance of practices.

Structural Treatment Options

Due to the local topography and evolving landscape changes, structural measures may be necessary to meet both flood control needs and storm water infiltration and water quality goals. The following is a discussion of structural stormwater management options are available to the future designer for incorporating LID features into new development designs or for retrofitting existing systems/ areas.

Structural IMP options include:

- Infiltration Trenches
- Detention Basins
- Bioretention Cells/Basins
- Vegetated Swales
- Dry Swales
- Vegetated Filter Strips
- Green Roofs
- Permeable Paving
- Dry Wells
- Downspout Disconnection
- Inlet Protectors
- Media Filters
- Proprietary (manufactured) Devices:
    - Hydrodynamic Separators
    - Media Chambers

Below are details on each of these structural IMPs:

1. Infiltration Trenches

Typical design of an infiltration trench involves a sufficiently long and narrow trench filled with gravel and rock that captures and stores runoff for infiltration into the underlying soil matrix (whether natural or engineered).

Benefits

- Made of simple materials and construction practices.
- Reduces hydromodification impacts.
- Reduces fine sediment and associated pollutants.
- Offers unobtrusive profile as an underground treatment control.

Limitations

- Needs pretreatment (depending on drainage area sediment load) using vegetative buffer strips, swales, or bioretention cells to protect against clogging. Once clogged, difficult to repair.
- Requires good percolation characteristics in underlying soils (whether natural or engineered), not appropriate at sites with Hydrologic Soil Types C and D (Soil numbers 1, 2&3).
- Not recommended for industrial areas where spill potential poses an unacceptable risk (e.g., percolation to groundwater).
- Not suitable on fill sites or steep slopes.

Water Quality Treatment Capacity

- Capacity is governed by available space, drainage area contribution, and specific needs (infiltration properties, depth of treatment, surface area contact, etc.).

Siting

- Implement in average to high percolation rate soils where distance to groundwater and bedrock is sufficiently deep (> 10 feet). Favor flat topography.
- Place where pretreatment opportunities from vegetation or similar buffer systems can reduce sediment loading.
- Locate at least 20 feet from buildings, slopes, and highway pavement and 100 feet from water supply wells and bridge structures.
- Do not construct in areas prone to chemicals or hazardous material spills unless protective diversion structures are integrated.

Design, Sizing, and Flow Considerations

- Hydraulic conductivity of surrounding soils within 10 feet of the invert should be at least 0.5 inches per hour.

Maintenance

- Generally low maintenance providing sediment load to the system is within acceptable design consideration.
- If clogging occurs, nuisance water may be created that encourages mosquito breeding.

2. Detention Basins

Detention basins act as temporary storage of stormwater runoff to prevent downstream flooding with the primary purpose of attenuating peak flows. Detention basins collect stormwater runoff and allow it to either be slowly infiltrated into the native soil or to be released through a controlled outlet point.

Detention basins are typically designed to drain within a short period of time (6–72 hours), which allows these systems to double, such as park areas, athletic fields, or parking lots.

Benefits

- Offers cost-efficient management of runoff from larger storm events.
- Provide multipurpose space opportunities.
- Gives longer detention times for suspended sediment settling that offers improved discharge water quality.

Limitations

- Often needs special access or protection measures when located near residential areas.
- Ineffective at removing dissolved or soluble pollutants.
- Capture and treatment volume can be limited by slope, depth to bedrock or groundwater, or available footprint.
- Siting and design needs to consider risks to foundations, groundwater, utilities, or slopes if an infiltration device.

Water Quality Treatment Capacity

- Provides moderate water quality treatment capacity.
- Limited capacity relative to available space, drainage area contribution, and specific needs (flow attenuation, residence time, vegetation contact, etc.).

Siting

- Avoid Wellhead Protection Areas.
- Locate far enough down in watershed to most effectively reduce peak flow and capture sediment from development.
- Consider multipurpose basins.

Design, Sizing, and Flow Considerations

- Size to treat 95% of the annual volume for purposes of meeting water quality requirements.
- Design length-to-width ratio of at least 1.5:1, where feasible.
- Provide basin depths optimally ranging from 3 to 6 feet.
- Include energy dissipation in the inlet design to reduce resuspension of accumulated sediment.
- Ensure drawdown time of 48 to 72 hours. Drawdown times in excess of 72 hours may cause vector breeding.

Maintenance

- Dependent on secondary or multipurpose use requirements—generally removal of any trash or debris or accumulated settled sediments.

3. Bioretention Cells/Basins

Bioretention cells and basins are shallow, planted stormwater facilities that rely on plants and soil to treat stormwater through filtration and biological uptake and evapotranspiration (Figure 1). They are often constructed using engineered soils and are specifically designed to maximize water quality improvement and minimize clogging. The plant species must be tolerant of periodic inundation, and some are better than others at removing pollutants.

Bioretention facilities can either allow for infiltration into the native soils or be designed with an underdrain system to pipe treated water to the stormwater drain system or a surface water body. Depending on the soil infiltration rates around CI, these systems may require underdrain piping to promote the desired drainage results. An overflow system should be incorporated into the design for handling storms greater than volume capacity. These systems can take many aesthetic forms or sizes, fitting in with any type of formal or informal landscape. They offer flexible retrofit opportunities.

Benefits

- Physically and biochemically removes pollutants.
- Detains stormwater, reducing peak flow and volume.
- Recharges groundwater.
- Provides aesthetic and habitat enhancing amenity opportunity.
- Offers wide range of size and type of site suitability.

Limitations

- Requires a relatively flat site.
- Needs underdrainage system in noninfiltration areas.
- May create need for tree removal if the soil filter media ever needs to be replaced.

Water Quality Treatment Capacity

- Offers good pollutant-removal capacity.

Siting

- Well suited to integrate into different environments.

Design, Sizing, and Flow Considerations

- Requires pretreatment.
- Sized to treat 95% of the annual volume.
- Suitable for small catchments.
- Vegetation establishment on the basin floor may help reduce the clogging rate.
- Incorporate a drawdown time of 48 hours.

Maintenance

- Maintenance needs are primarily associated with the type of vegetation and the site context—mostly weeding, clipping/mowing, and trash removal.
- Monitoring required for clogging; cleanouts needed if using underdrains.

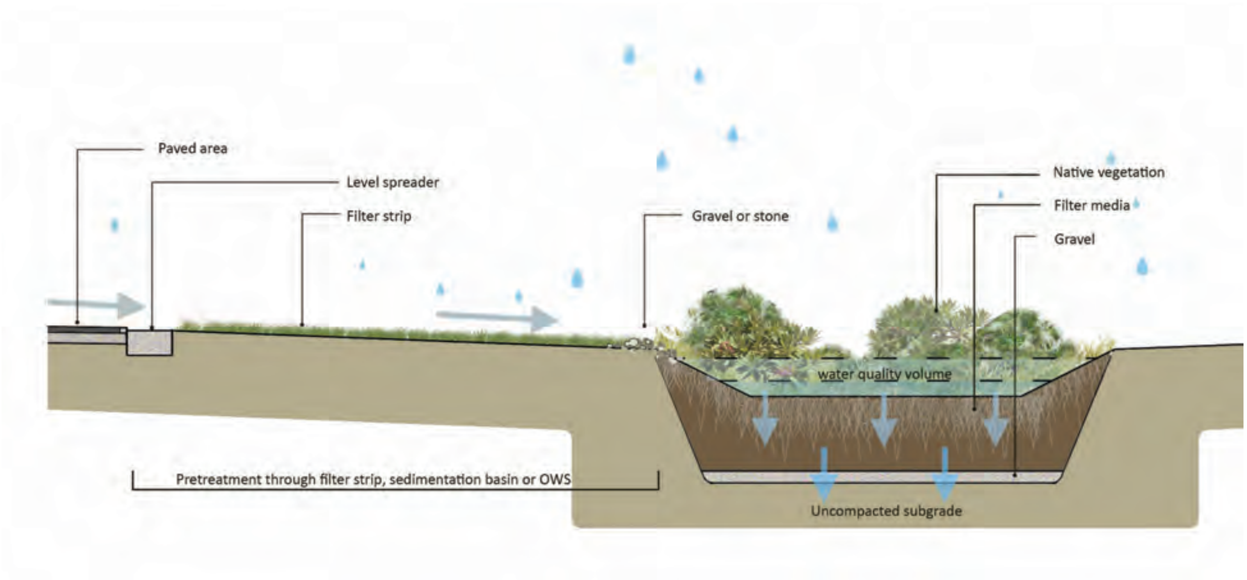


Figure 1 - Bio Retention Cell or Basin Cross Section with Filter Strip as Pre-Treatment

4. Vegetated Swales

These natural or constructed shallow channels are established with suitable ground cover on the bottom and side slopes and to slow, filter, and convey runoff (Figure 2). They can also integrate an engineered underdrain with a subsurface soil matrix that promotes percolation into the underlying soils and conveyance to downstream drainage facilities when soils are saturated. Bottom and slope vegetation filters runoff particulates (sediment and metals) and reduces the flow velocity. As in the 1950s and 1960s suburban and semirural developments, vegetated swales are effective conveyance alternatives to curb and gutter systems.

Benefits

- Aesthetic and potentially inexpensive landscape drainage features that convey stormwater with complementary water quality benefits.
- Swales can be sized as both a treatment device and as a conveyance component.

Limitations

- Must have suitable, established vegetative cover for proper function and protection against rilling.
- Rilling, gullying, and channelization may occur if constructed on grade greater than 4%.
- Suitable for smaller drainage areas; cannot accommodate large flows while adequately treating runoff.
- Relatively good at removing some pollutants but can cause addition nutrients if fertilizers are used.
- Susceptible to problems if not maintained properly.
- Not appropriate for industrial sites or locations where spills are probable.

Water Quality Treatment Capacity

- Flow rate should be sized for 85% of the annual runoff volume or in accordance with local requirements.
- Water levels should not exceed two-thirds full or 4 inches, whichever is less.

Siting

- Use for drainage areas of less than 10 acres, with slopes no greater than 5%.
- Take advantage of naturally depressed drainage courses.
- Longitudinal slopes should not exceed 2.5%.
- Temporary irrigation may be required to establish vegetation and/or prevent dying during extended dry periods.

Design, Sizing, and Flow Considerations

- Drought-tolerant vegetation should be considered especially for swales that are not part of a regularly irrigated landscaped area.
- Trapezoidal channels are recommended but parabolic designs are easier to maintain (i.e., grass mowing, if applicable).
- Swale length should provide a minimum hydraulic residence time of 10 minutes and not be less than 100 feet.
- The bottom width should not exceed 10 feet unless a dividing berm is provided.
- The swale slope profile should not exceed 2.5%; side slopes should be no steeper than 3:1 (horizontal:vertical).
- Grass height of 6 inches is recommended.
- The width of the swale should be determined using Manning's Equation for peak flow using a Manning's n of 0.25.

- If flow is to be introduced through curb cuts, place pavement slightly above the elevation of the vegetated areas. Curb cuts should be at least 12 inches wide to prevent clogging.
- If sod is used, no gaps should occur between the pieces and grass should be staggered to prevent rill formation.
- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.
- Select fine, close-growing, water-resistant grasses (e.g., saltgrass).
- Add check dams every 50 feet to increase swale effectiveness by maximizing retention time, decreasing flow velocities, and promoting particulate settling.

Maintenance

- Install swales to take advantage of seasonal rainfall; temporary irrigation may be necessary for long-term establishment.
- Inspect swales at least twice annually (pre- and post-rainy season) for erosion, damage to vegetation, and sediment and debris accumulation. Inspect after extended periods of heavy runoff.
- Maintain grass height at no less than 6 inches; remove weeds and woody vegetation.
- Remove sediment accumulation over 3 inches.
- Inspect swales for pools of standing water to avoid mosquito breeding.

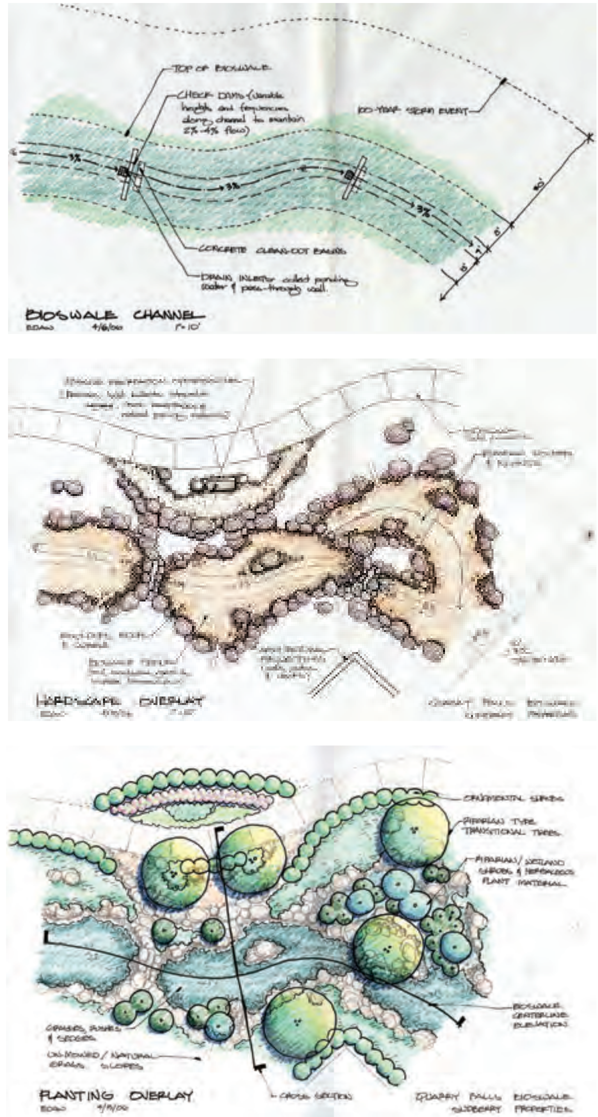


Figure 2 - Typical Planning Elements of Vegetated Swale Layouts

5. Dry Swales

Dry swales are linear and planted open channels, usually designed for stormwater conveyance. However, they can be designed specifically for treatment as well.

Dry treatment swales offer both conveyance capacity as well as water quality enhancement. Dry treatment swales commonly have a lower slope gradient (<1%) than conveyance systems with permeable soil or underdrain systems, or with larger vegetation or check dams to slow the flow of water. Dry swales can also provide conveyance and pretreatment by sediment removal while directing water to a storage, treatment, or infiltration facility.

Check dams (landscaped cobble or structural concrete) may be located within the swale to enhance storage capacity or reduce flow velocities on steep sites (Figure 3). Vegetation should be tolerant of periodic inundation and water velocity.

Benefits

- Transports stormwater aboveground, minimizing piping costs.
- Can improve water quality.
- Can be designed to detain or infiltrate runoff volume and reduce peak flow.

Limitations

- Works best on a sloped site <4%.
- Works best as part of treatment train of facilities.

Water Quality Treatment Capacity

- Moderate treatment capacity depending on design.

Siting

- Requires a certain range of slope—enough to keep water moving, but not so steep as to cause erosion.
- Swales can also be used on flatter sites; however, additional grading and deeper swales will be required to achieve desired results.

Design, Sizing, and Flow Considerations

- If designed for treatment, size to treat 95% of the annual volume.
- If designed for pretreatment or conveyance, size to reduce scour within the channel.
- Velocity within swales should be less than 1 (foot per second(fps) for a 1.5-inch rain event.
- Flood flow velocities should not exceed 6.5 fps to reduce erosion and scour.
- Swale should be designed so that the water level does not exceed two-thirds the height of the vegetation at the design treatment rate.
- Trapezoidal channels are normally recommended but other configurations, such as parabolic, can also provide substantial water quality improvement and may be easier to mow than designs with sharp breaks in slope.

Maintenance

- Maintenance needs are primarily associated with the type of vegetation and the site context—mostly weeding, clipping/mowing, and trash removal.

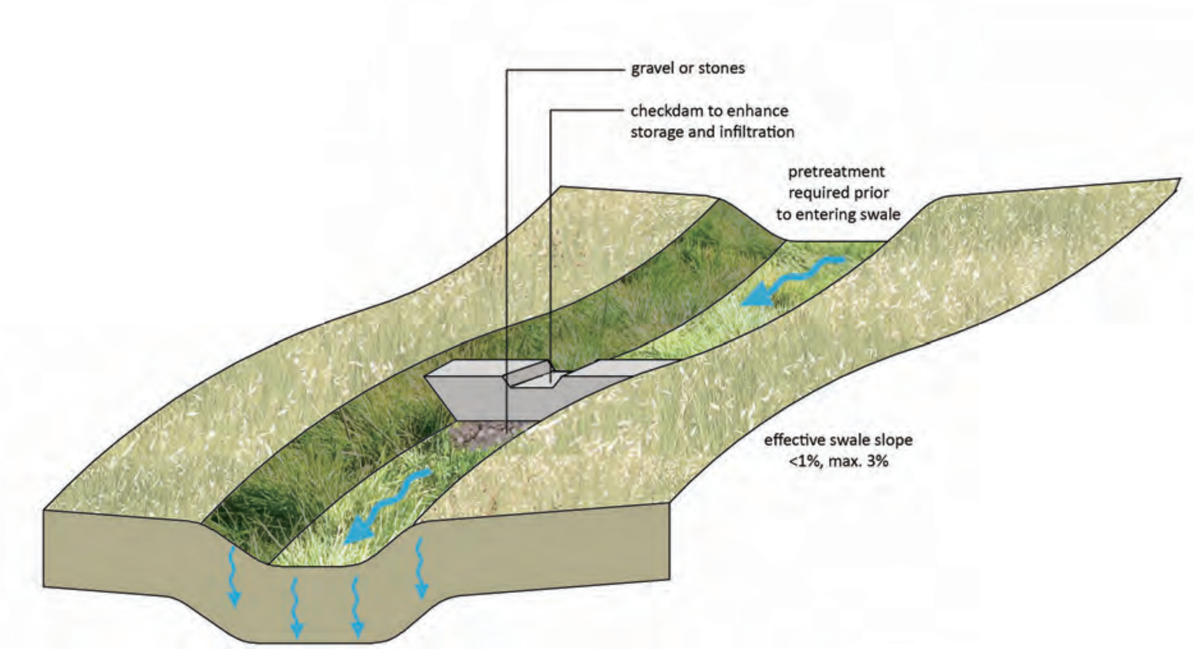


Figure 3 - Dry Swale with Optional Check Dam for Storage and Enhanced Infiltration

6. Filter Strips

Filter strips are vegetated areas (usually turf) with gentle slopes that take sheet flow from adjacent impervious areas (see Figure 4). They provide pretreatment of water moving to a secondary treatment facility by removing sediment and some of other pollutants, and slowing runoff velocity. They should be used in conjunction with another treatment facility.

Benefits

- Transports stormwater aboveground, minimizing piping costs.
- Improves water quality and slows peak flow.

Limitations

- Works best on a sloped site, between 2 to 6%.
- Should be component of a treatment train; limited pollutant removal capability as a stand-alone system.
- Disruption of sheet flow from the development of concentrated flow paths will reduce effectiveness.
- Requires a relatively large footprint (between 15 feet and 60 feet long).
- Requires gentle slope and enough length to be effective.

Water Quality Treatment Capacity

- Pretreatment capacity only.

Siting

- Edging for impervious areas, parkways, medians.

Design, Sizing, and Flow Considerations

- Maximum length (in the direction of flow toward the buffer) of the tributary area should be 60 feet.
- Slopes should not exceed 6%.
- Minimum length (in direction of flow) is 15 feet.
- Width should be the same as the tributary area.
- Either grass or a diverse selection of other low-growing, drought-tolerant, native vegetation should be specified.

Maintenance

- Mowing and trash removal.
- Monitoring for erosion runnels.

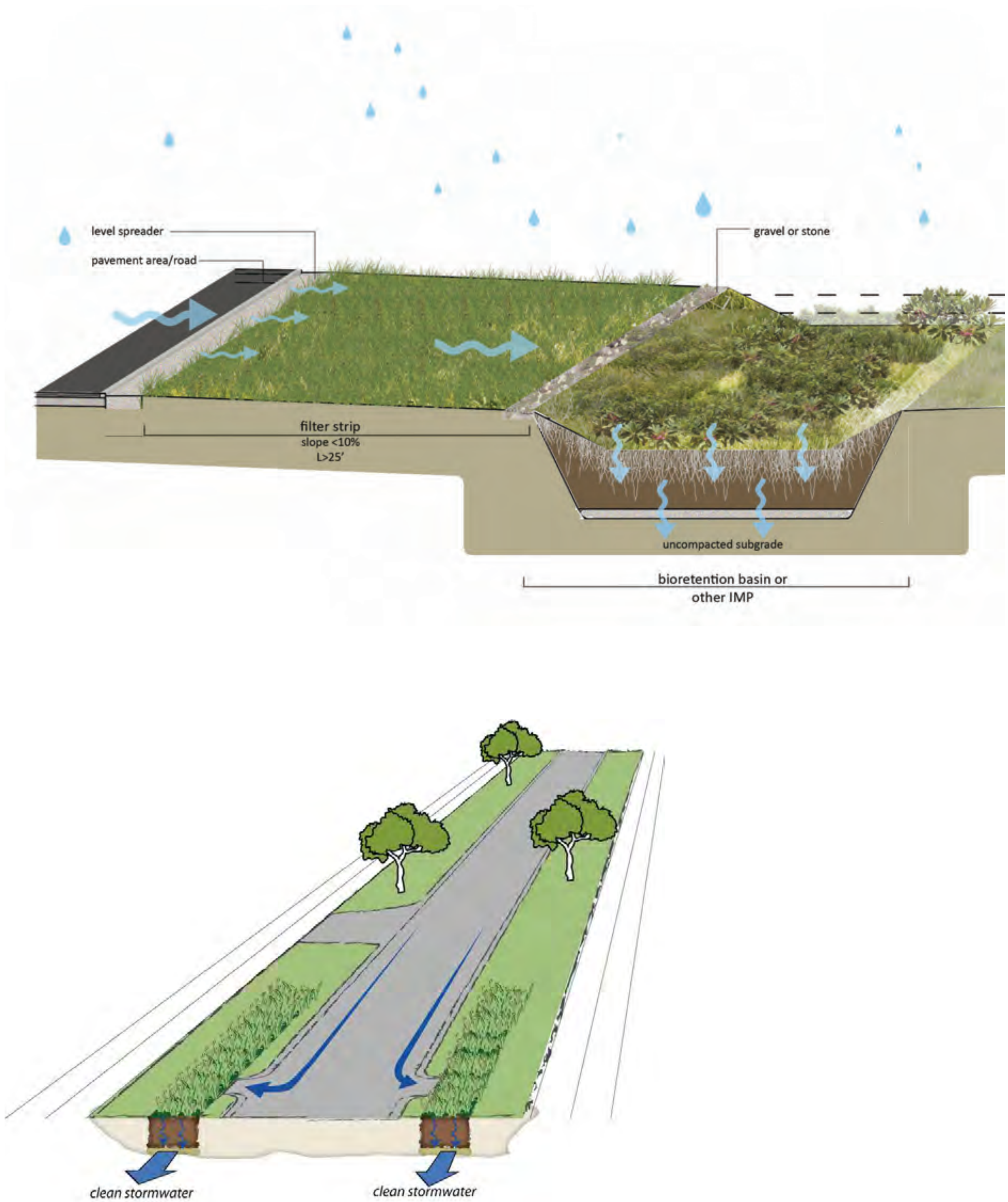


Figure 4 - Cross Section of Bioretention Cell or Basin with Filter Strips as Pretreatment Measure

7. Green Roofs

Roofs of buildings can be designed or converted into green roofs, which can be composed of a uniform layer of planting media and various forms of vegetation (Figure 5) or can be isolated raised garden units retrofitted to an existing rooftop. Green roofs can range greatly in aesthetics, costs, and requirements. Simpler modular systems, which require a much lower roof structural strength, are generally 2 to 6 inches in soil depth that are planted with low-maintenance, drought-tolerant, and low-growing plants. Larger trees can be incorporated but require greater soil depth (e.g., 4 to 5 feet deep) and may challenge the structural capacity of existing buildings. Terraced areas and balconies can also be converted into planted areas for stormwater uptake.

If tall vegetation (trees and large shrubs) are planted on green roofs, their success may be challenged under severe storm conditions. Grouping taller plantings with perimeter support from midlevel shrubs or other wind-screening material can help reduce wind stress by creating a single planting unit rather than a series of separate tray-like units. However, green roofs will likely experience some damage during severe storms, which is not different from ground vegetation.

Green roof assemblies should include a growing medium to hold water for plant material and a subsurface drainage system to allow runoff of excessive rainfall. Filter fabrics and impermeable liners are needed to help protect and extend the life of the structural roof. These elements enhance conventional waterproofing systems by transmitting water into a collection system before it reaches the substrate.

Benefits

- Retain, slow, and cleanse stormwater.
- Insulate against noise and heat-island effect.
- Extend life of roof membrane.
- Can provide aesthetic, habitat, and recreational amenities.
- Can be integrated with rooftop rainwater capture.

Limitations

- Roof and building structure must be designed to handle the additional weight (approximately 17 to 82 pounds/square foot).
- Roof slopes should be less than 3:1 (preferred).
- High cost; around $40 per square foot.
- May be adversely impacted by high wind speeds.

Water Quality Treatment Capacity

- Pretreatment capacity.
- Slows and reduces peak stormwater runoff rate.
- May be integrated into rooftop rainwater capture system.

Siting and Use

- Can be integrated into dense urban environments.
- Can increase carbon sequestration using areas that are otherwise unusable.
- Can improve aesthetics of large roof expanses as viewed from adjacent buildings.

Maintenance

- Generally minimal maintenance required.
- Vegetation establishment period requires temporary irrigation.
- After approximately 3 years of establishment, little or no maintenance with drought-tolerant species.

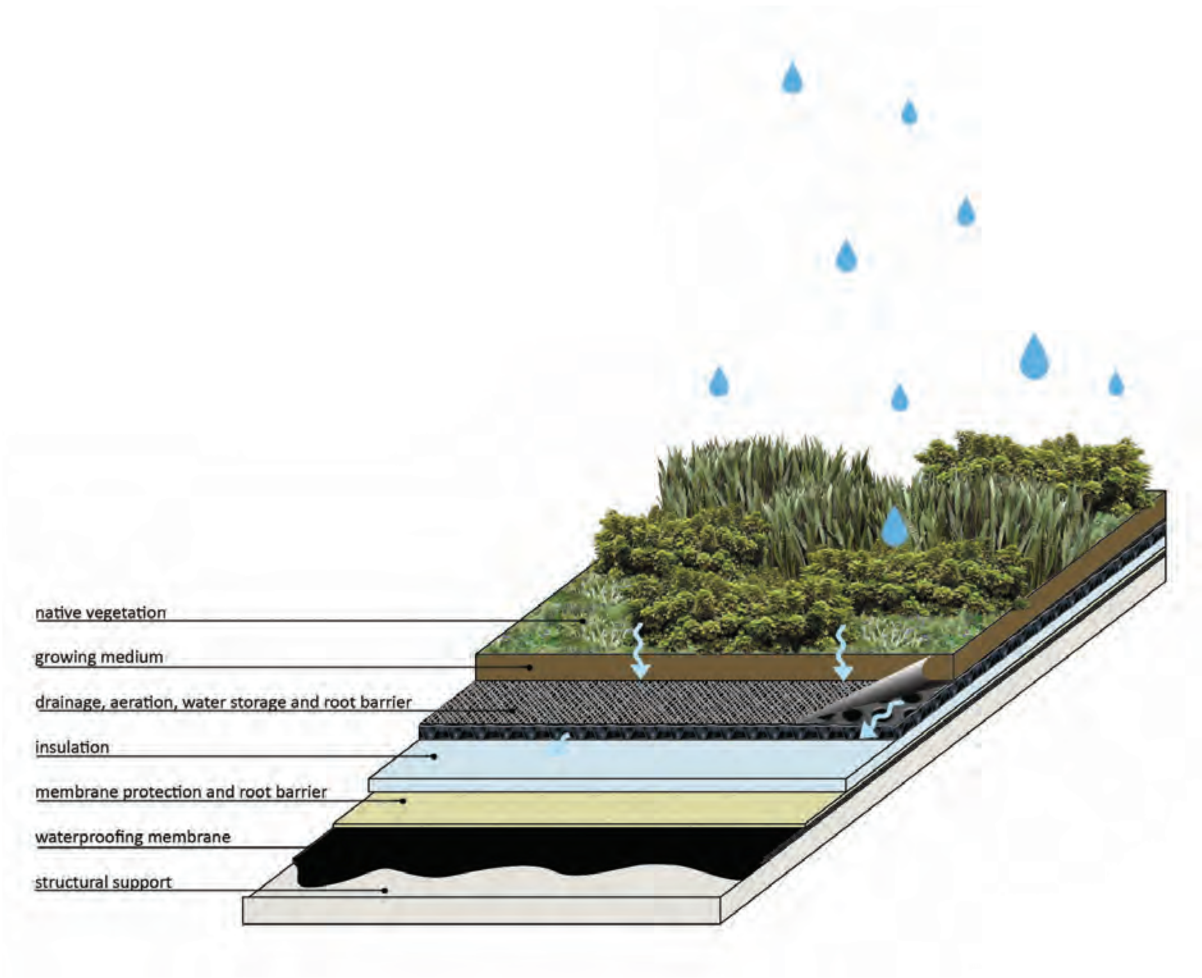


Figure 5 - Typical Layers of a Green Roof Constructed as a Uniform Component

8. Permeable Paving

Permeable paving consists of a porous surface, base, and subbase materials, which allow penetration of runoff through the surface into underlying soils (Figures 6 and 7). The surface materials for permeable pavement can consist of paving blocks or grids, pervious asphalt, or pervious concrete. These materials are installed on a base, which serves as a filter course between the pavement surface and the underlying subbase material. The subbase material typically comprises a layer of crushed stone that not only supports the overlying pavement structure but also serves as a reservoir to store runoff that penetrates the pavement surface until it can percolate into the ground. Depending on the existing soils, a sub-drain system may be needed if all of the runoff is unable to infiltrate.

Limitations

- Can be prone to clogging from sand and fine sediments that fill void spaces and the joints between pavers.
- Should not receive stormwater from other drainage areas, especially any areas that are not fully stabilized.

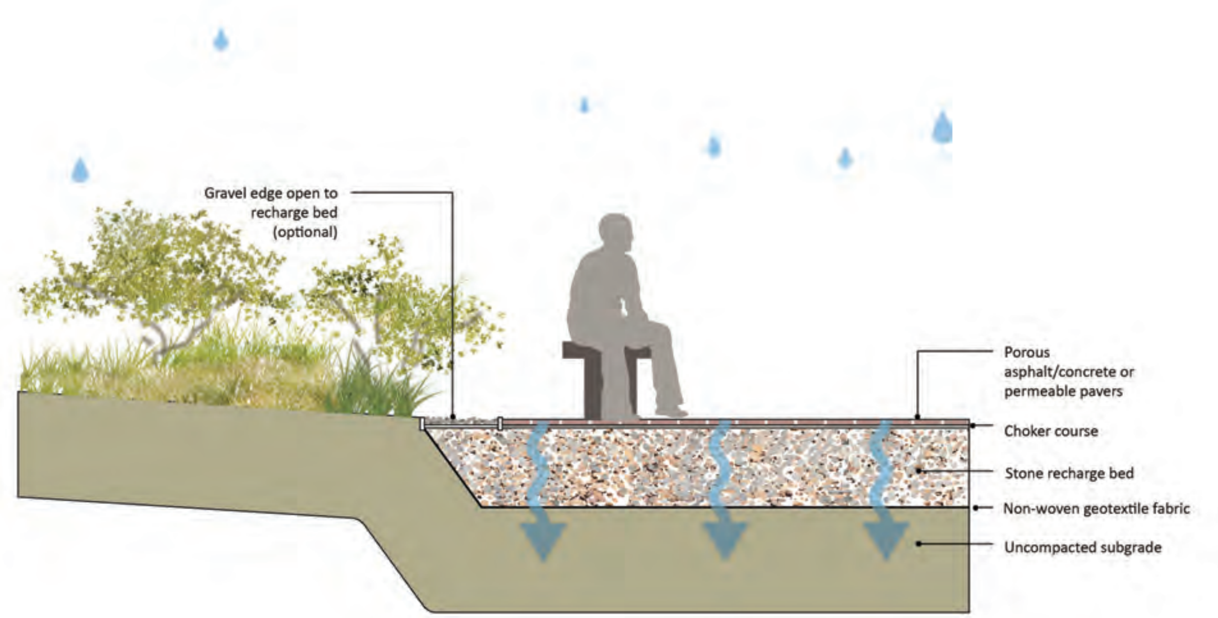


Figure 6 - Conceptual Cross Section of Permeable Paving for Pedestrian Traffic

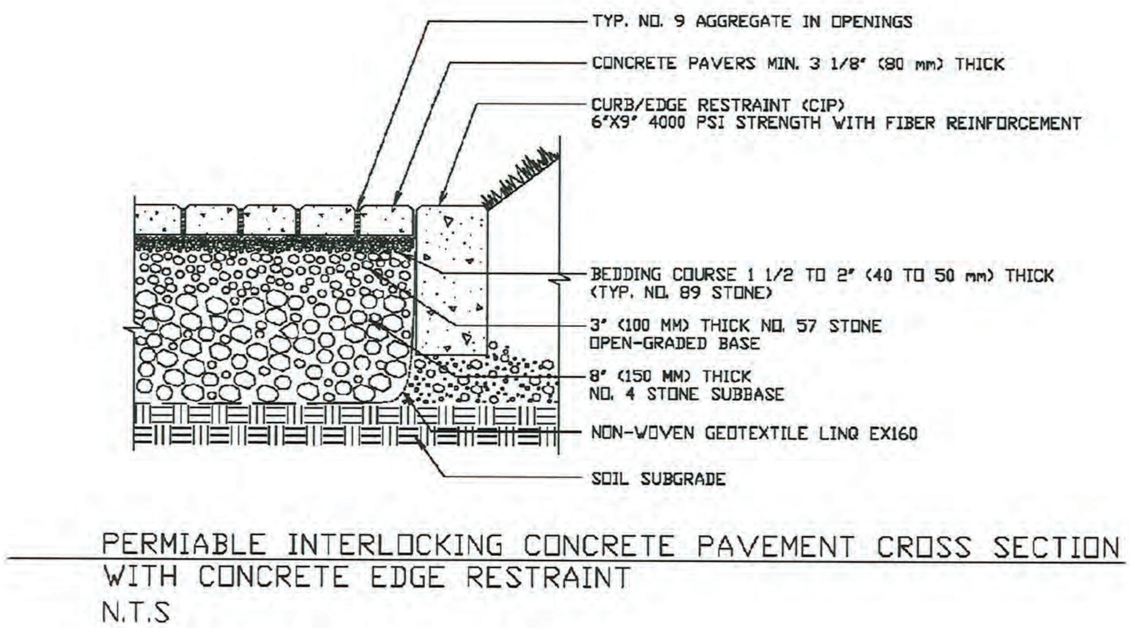


Figure 7 - Example Cross Section of Permeable Paving Design for Parade Deck or Other Heavy Traffic Areas (Weston 2011)

Benefits

- Groundwater recharge and reduces stormwater runoff volume.
- Reduce peak discharge rates significantly.

Permeable paving increases effective developable area on a site because portions of the stormwater management system are located underneath the paved areas.

Water Quality Treatment Capacity

- No pollutant removal capacity.

Siting

- Permeable paving can only be used on gentle slopes (<5%); it cannot be used in high-traffic areas or where it will be subject to heavy axle loads.
- Permeable pavements are generally applicable to low-traffic access ways, residential drives, overflow or low-use parking areas, pedestrian access ways, alleys, bike paths, and patios.

Design, Sizing, and Flow Considerations

- Permeable paving requires a single-size grading of base material in order to provide voids for rainwater storage; choice of materials is a compromise between stiffness, permeability, and storage capacity.
- Pavement type and thickness are selected based on anticipated load (light, moderate, and heavy) and maintenance requirements.

Maintenance

- Inspect annually for pavement deterioration or spalling.
- Monitor periodically to ensure that the pavement surface drains effectively after storms.
- For porous asphalt and concrete, clean periodically (2 to 4 times per year).
- For interlocking paving stones, periodically add joint material to replace lost material.

9. Dry Wells

Dry wells are in-ground systems that temporarily store and infiltrate stormwater runoff from a variety of sources. They can be designed as single well units or be extended as infiltration trenches as perimeter controls for large impervious areas. Water quality from rooftops is generally higher than stormwater quality from surface drainage, resulting in a higher quality of infiltrated water. Roof leaders usually connect directly into the dry well, which is commonly an excavated pit filled with uniformly graded aggregate open to uncompacted native soil (Figure 8). Dry wells discharge the stored runoff via infiltration into the surrounding soils, if the existing soils are capable of infiltration. In the event that the dry well is overwhelmed in an intense storm event, ensure that additional runoff is safely conveyed downstream.

Benefits

- Retain, slow, and cleanse stormwater.
- Provide noise and temperature insulation for the building, as well as cool the surrounding environment, reducing the heat island effect.
- Extend life of roof membrane
- Can provide aesthetic, habitat, and recreational amenities.

Limitations

- Should not be used to treat areas with high pollutant loading.
- Primarily used to treat a small catchment area.

Water Quality Treatment Capacity

- No water quality treatment provided.

Siting

- Can be integrated into dense urban environments.
- Must be set away from buildings as required based on soil type.

Design, Sizing, and Flow Considerations

- Designed to capture and infiltrate 95% annual volume.
- Infiltration system should be fully drained prior to beginning of storm.
- Roof downspouts are attached to the dry well; an overflow pipe is provided for runoff in excess of design volume.

Maintenance

- Debris removal from the rain gutters and dry well surface (or chamber, depending on design).

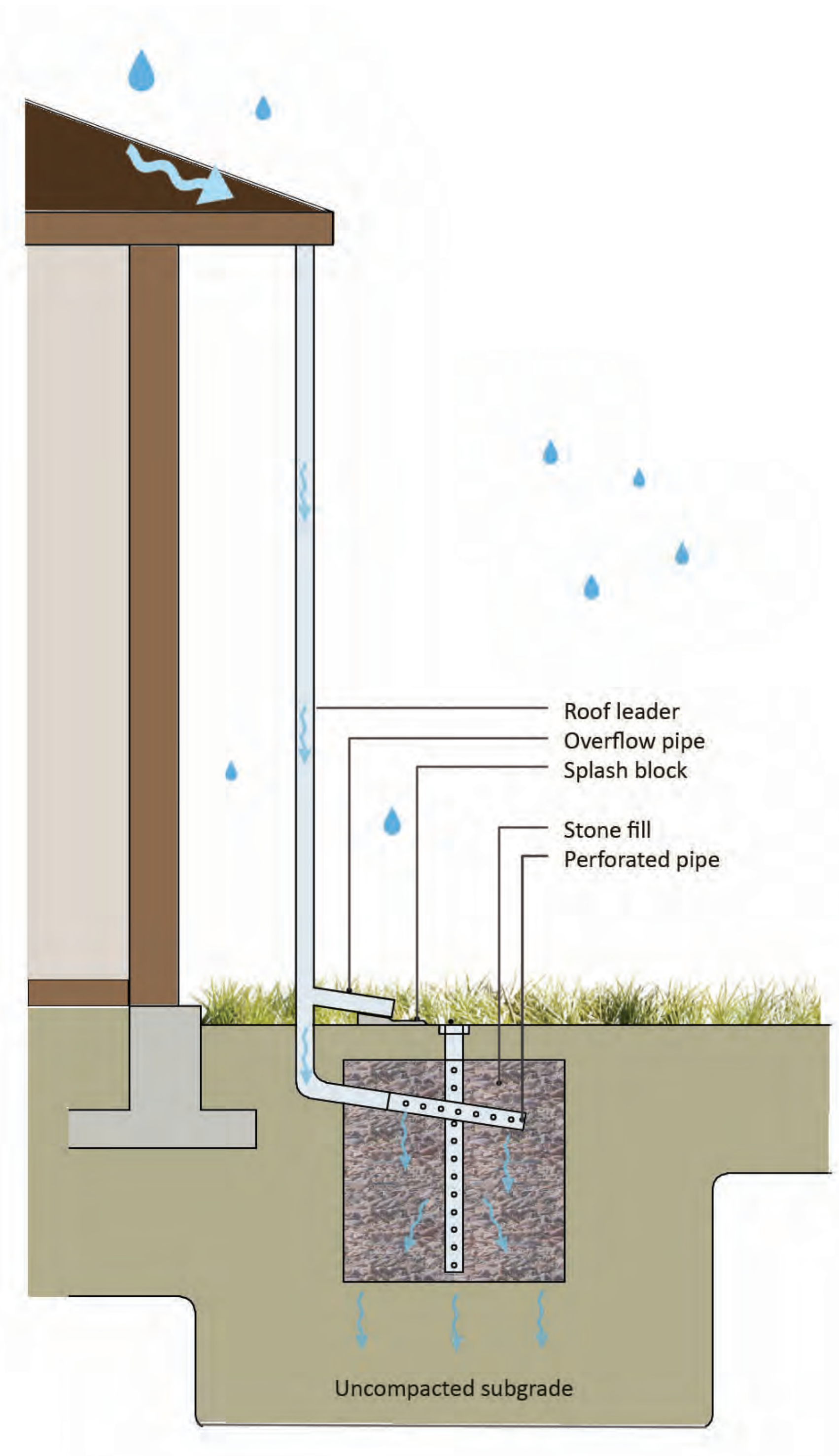


Figure 8 - Conceptual Schematic of a Dry Well for Rooftop Runoff Collection

10. Downspout Disconnection

Throughout much of the campus, roof drainage downspouts have been redirected to grass areas. The cumulative effect of downspout discharge can increase the volume of stormwater entering the stormwater collection system and further burdens the system's capacity. Continued disconnection of this flow path and allowing beneficial use of roof downspout discharge in neighboring landscapes or dry wells reduces irrigation demand and increases groundwater recharge.

Diverting runoff (roof or otherwise) to cistern storage systems provide opportunities for reuse (Figure 9). The size of the storage system (and actual rainfall realized) dictates the amount of water available for dry season needs.

Benefits

- Enhanced infiltrate for stormwater.
- Downspouts can be connected to a cistern, dry well, or lawn area.

Limitations

- Only appropriate for rooftop or elevated plaza areas.
- Does not provide water quality treatment.

Water Quality Treatment Capacity

- No water quality treatment provided. The facility that the downspout is connected to most likely will provide treatment. Examples are bioswales, infiltration trenches, etc.

Siting

- Can be integrated into dense urban environments.

Design, Sizing, and Flow Considerations

- Due to high rainfall patterns, erosion control required at outfall.

Infiltration Maintenance

- Debris removal from the rain gutters.
- Maintain erosion control at discharge location.

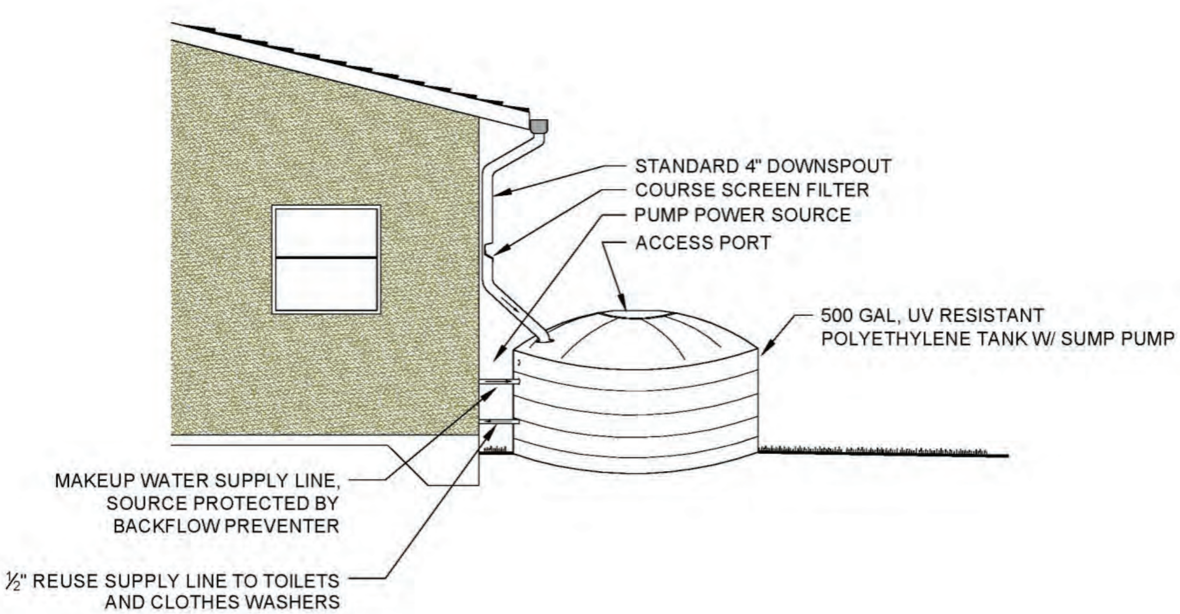


Figure 9 - Schematic of Downspout Capture and Cistern Storage of Rooftop Runoff

11. Inlet Protectors

Inlet protectors can be used as pretreatment to collect rubbish or other solids from stormwater. These systems can provide simple screening of solids or can be manufactured filters or fabric placed in a drop inlet to remove sediment and debris.

Benefits

- Does not require additional space as drain inlets are already a component of the standard drainage systems.
- Easy access for inspection and maintenance.
- A relatively inexpensive retrofit option.

Limitation

- Water quality protection is significantly less than treatment systems such as bioretention basins, ponds, and vaults.
- Usually not suitable for large areas.
- Trash and leaves can plug or block the system.
- Does not protect against damages from larger spills or dumping.

Water Quality Treatment Capacity

- Pretreatment capacity only.

Siting

- Used only for pretreatment where other treatment BMPs (such as an oil/sediment separator) are used.

Maintenance

- Frequent inspections and cleaning.
- Should be cleaned after every storm.

12. Tree Box Filters

Nearly any type of compatible vegetation can be planted in a tree box filter, which is designed to act as a natural filtration system set in an urbanized setting. Tree box filters help to remove sediment and pollutants out of stormwater runoff, slow flow, decrease runoff volume, and reduce heat island effect while adding aesthetics (Figure 10). These box filter designs can be premanufactured or custom designed systems usually made of concrete and installed as part of a curb inlet/catch basin facility. An example cross-sectional schematic of a streetscape tree box filter is presented in Figure 11.

The well vaults are filled with soil filter media and typically planted with trees or shrubs with noninvasive root systems. Outfitted along walkways, patio areas, parking lots, or parade deck perimeters, tree box filters can improve living space aesthetics.

Benefits

- Reduction of stormwater runoff, treatment, and uptake of pollutants.
- Shading to reduce heat island effect and improve aesthetic qualities.
- Easily retrofitted as an inline treatment opportunity.

Limitations

- Species must have noninvasive root systems.
- Filter box size needs to be compatible with tree growth potential.
- Not suitable for hillsides or steep applications.

Water Quality Treatment Capacity

- Infiltration rates up to 133 inches/hour have been recorded (Filterra.com).

Source: http://www.filterra.com

Figure 10 - Examples of Constructed Tree Boxes

Siting

- Compatible with existing inline subsurface streetside conveyance systems.
- Vertical depth must be sufficient to accommodate hydraulic grade of existing conveyance system.

Design, Sizing, and Flow Considerations

- Provide a minimum root zone of 2 feet.
- Favor drought-tolerant species with shallow root zones.
- Temporary irrigation required for plant establishment.
- Compatible with existing inline subsurface streetside conveyance systems.

Maintenance

- Surface accumulation of trash and fine sediment should be periodically removed to promote optimum percolation.
- Planting media may require periodic replacement for smaller shrubs/plants.

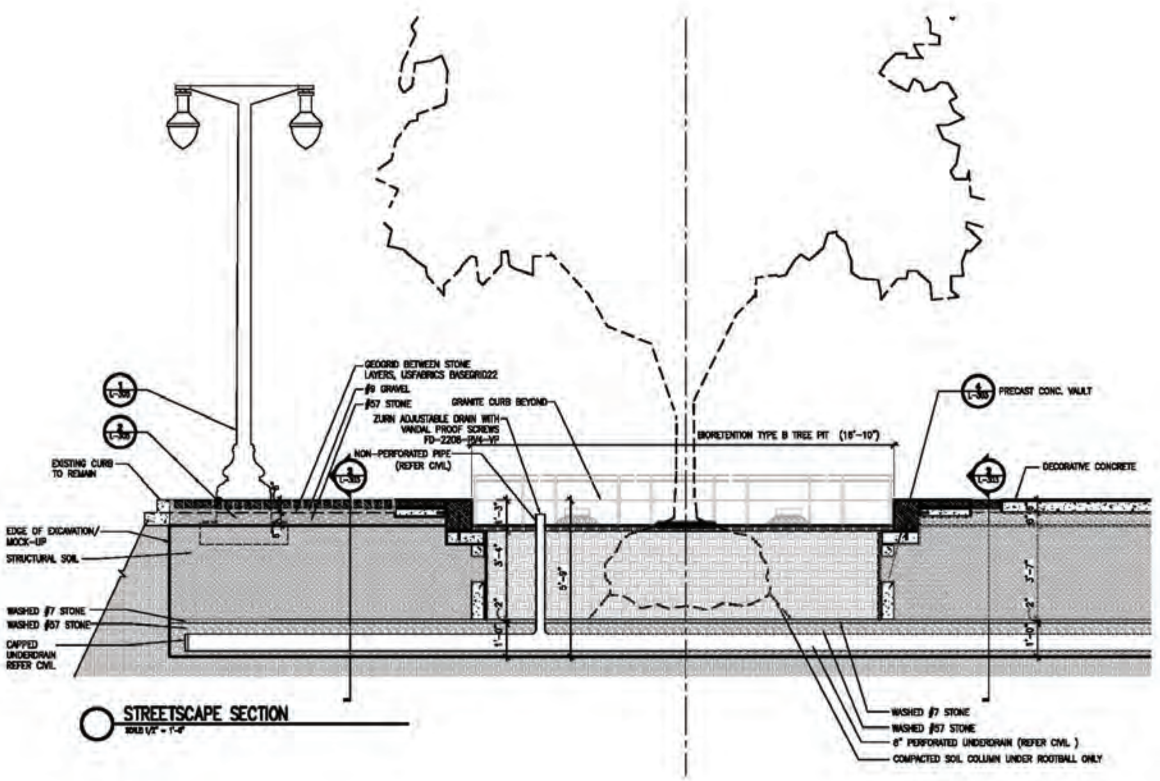


Figure 11 - Example of Tree Box Filters Schematic

13. Hydrodynamic Separators

Most hydrodynamic separators use the physics of a swirling vortex flow of water to promote the settling of heavy sediments and capturing floatable pollutants (trash, leaves, debris, and oil). They reduce runoff velocity but are not effective in removing very fine solids or dissolved pollutants. If allowed to accept flows above their rated capacity, these systems can experience internal scour that causes sediment washout during large storm events. The figure below (Figure 12) provides an example of a commercially available hydrodynamic separator.

Benefits

- Easily retrofitted into existing stormwater conveyance infrastructure.
- Ideal for areas where land availability is limited.
- Good for pollutant "hotspots" treatment applications (e.g., gas stations, industrial yards, and maintenance facilities).

Limitations

- Performance can be sensitive to water temperature in cold climates.
- Pollutant removal rates vary depending on the system.
- Generally low nutrient removal; not effective in removing dissolved pollutants without filter polishing unit.
- Needs appropriate soil depth and stable soil to support the unit structurally.

Water Quality Treatment Capacity

- The Environmental & Water Resources Institute and the American Society for Testing and Materials International are developing comprehensive verification guidelines and standard test methods for assessing the performance of hydrodynamic separators.
- Avoid routing excess flow through the device; use bypass when capacity is reached.

Siting

- Can be sited in streets, sidewalks, shoulders.
- Should be sized based on particle size to be targeted.

Design, Sizing, and Flow Considerations

- Come in a wide variety of sizes for capacity needs; many fit in conventional manholes.
- Designed primarily for removing floatable and gritty materials.

Maintenance

- Not maintenance intensive.
- Maintenance and inspection via typical manhole access.
- Vactor vacuum trucks are typically used for on-site maintenance.

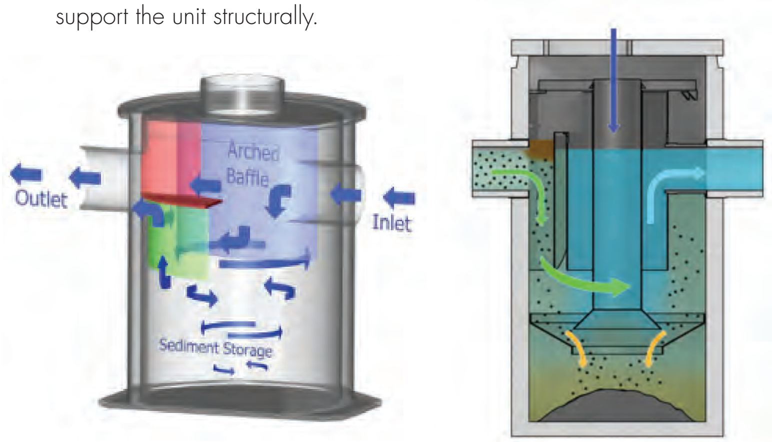


Figure 12 - Examples of Commercially Available Hydrodynamic Separators

14. Media Filters

Stormwater media filters can comprise a variety of designs that incorporate a variety of media for filtering runoff. Media filters are typically combined with a pretreatment component that removes gross solids and heavy sediment to avoid media clogging in the filter. Media can consist of sand, perolite, zeolite, or other absorptive filtering material. These filters generally accept pretreated stormwater runoff from a level spreader or similar flow reduction and spreading element that distributes incoming flow uniformly over the filer media. As runoff percolates through the filter media, it can either be collected by a gravel/percolation pipe (French drain) underdrain system for conveyance to the nearby infrastructure conveyance system or be allowed to naturally percolate into underlying soil formation. Media filters can be made of customized designs (Figure 13) or be purchased as commercially available proprietary systems (e.g., AquaShield, Downstream Defender, CDS, etc.).

Figure 13 - Examples of Constructed and Proprietary Media Filters

Benefits

- Good pollutant removal, especially for fine sediment and associated pollutants (e.g., metals).
- Can be incorporated as landscape or other invisible features (Japanese sand garden, golf course bunkers, and volleyball courts).

Limitations

- More expensive to construct than many other BMPs.
- High solids loads will cause the filter to clog.
- Work best for relatively small, impervious watersheds.
- Certain designs maintain standing water where mosquito breeding may be a concern.

Water Quality Treatment Capacity

- Flow-through capacity is dependent on filter surface area.

Siting

- May be designed as in-line systems for small drainage areas or as off-line systems.
- Filters in residential areas can present aesthetic and safety problems if constructed with vertical concrete walls.

Design, Sizing, and Flow Considerations

- Generally require more hydraulic head to operate properly (minimum 4 feet).
- For off-line applications, flows greater than the design flow should be bypassed.

Maintenance

- May require more maintenance that some other BMPs depending upon the sizing of the filter bed.

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