

## II. Campus Setting

### A. The Campus of the University of Colorado Boulder

#### 1. Regional Setting

The campus is located in the Rocky Mountain Front Range area where approximately two-thirds of Colorado's residents live. Within the Front Range area, the City of Boulder is about 25 miles northwest of Denver, which is the major center of commerce, transportation, and culture for the Rocky Mountain region. The same pioneer spirit that once prompted settlers to come to the area is kept by a new generation of entrepreneurs attracted to Colorado. The natural beauty of Boulder and the quality educational opportunities have attracted scientific research, labs, high technology enterprises, outdoor sports enthusiasts, and cultural activity.

CU-Boulder is the original campus of the University of Colorado system. The system includes four campuses—all located in Front Range communities—of which CU-Boulder is the flagship campus. Two campuses are located in Greater Denver: the University of Colorado Denver and the Anschutz Medical Campus, just east of Denver in the City of Aurora. The University of Colorado Colorado Springs is 90 miles south of Boulder.

Several regional issues affect CU-Boulder:

##### a. Open Space Preservation

The magnificent mountain backdrop attracted settlers to Boulder, helping make it a highly desirable place to live, work, and study. Boulder County and the City of Boulder are committed to preserving the mountain backdrop and acquiring a substantial greenbelt of open space surrounding the city. CU-Boulder has helped to preserve natural open space areas along Boulder Creek on the Main and East Campuses, along Bear Canyon Creek at Williams Village, east of the Foothills Parkway on the East Campus, and at the Mountain Research Station. Open space considerations potentially affecting portions of the campus include trail connections, flooding concerns, water quality concerns, flora and fauna habitat, and wetlands protection.

##### b. Regional Growth and Housing

In recent years, partially due to the physical limits of Boulder's setting, growth has shifted eastward to the nearby communities of Erie, Longmont, Louisville, Lafayette, Broomfield, and Superior. New residents, including university faculty, staff, and students, experience difficulty in finding affordable housing in Boulder, so many choose to reside in these nearby communities or elsewhere in the Denver metropolitan region. Indeed, more than half of the CU-Boulder staff live outside the City of Boulder, primarily in the aforementioned communities. Given the area's attractiveness to new residents,

many communities in the region west of Interstate 25 have instigated policies to control growth. Most new university faculty and staff face longer commutes to work than in previous decades. This is true to a lesser extent for students, most of whom find housing in Boulder or within an adjacent community.

##### c. Regional Traffic

As a consequence of regional growth, traffic congestion in and around Boulder has increased, though stabilized due to city and county efforts to limit vehicle miles traveled (VMT). Refer to section V.E. for further detail and analysis on regional traffic.

#### 2. Campus Properties

The CU-Boulder campus includes three proximate, developed properties, all of which are located within the City of Boulder: the 313-acre Main Campus, the 201-acre East Campus, and 66 acres at Williams Village. In addition, the campus includes the undeveloped CU-Boulder South, 310 acres just southeast of the City of Boulder, and the Mountain Research Station, 190 acres situated in the mountains west of Boulder between Nederland and Ward.

##### a. Main Campus

The university has acquired properties over time, increasing the Main Campus from the original 44 acres of land donated in the 1870s to the current 313 acres. The campus has grown by acquiring houses and lots adjoining the Main Campus, as well as a few larger tracts of land. Property acquisition has occurred through gifts, purchases, and vacation of railroad and street rights-of-way. The Main Campus is generally bordered by Broadway on the west, streets near Boulder Creek on the north, 28<sup>th</sup> Street on the east, and Baseline Road on the south. Private retail and commercial development borders much of the campus. The "Hill" retail area runs from University Avenue to 14<sup>th</sup> Street to the west and the BaseMar Shopping Center is across Baseline Road from the Kittedge residential area and the Wolf Law Building.

Over the years, the number of streets traversing the Main Campus has been reduced in order to maintain the quiet, park-like atmosphere of the campus core and to provide a safer area for pedestrians and bicyclists. Today only two city streets transverse the Main Campus: Regent Drive and University Avenue.

The Main Campus houses academic programs with related research, cultural facilities, student services, some single student and family housing, and some indoor and outdoor athletics and recreation facilities. There are 228 buildings on the Main Campus that contain 8,726,785 gross square feet of space.

The 313 acres include a little over 10 acres north of University Avenue, within a 12-acre area platted as Grandview Terrace. Grandview Avenue and 15<sup>th</sup> Street are city streets. Most campus properties in this area are

used for academic purposes, including research.

The Main Campus also includes the natural areas along Boulder Creek, and student family housing north of the creek.

##### b. East Campus

The East Campus is located two blocks east of the Main Campus. It is generally bordered by 30<sup>th</sup> Street on the west, Arapahoe Avenue on the north, Foothills Parkway (which links to Denver via U.S. Highway 36) on the east, and Colorado Avenue on the south.

The East Campus was purchased in 1955 but was largely undeveloped until the 1990s. It has been reduced in size from the original 220 acres when it was acquired to 201 acres today, due to conveyances of rights-of-way used to construct city streets and Foothills Parkway. All of the East Campus east of Foothills Parkway (4.3 acres) was allocated by the university to the Boulder Open Space Program as a preserve; the university, however, retains ownership of the land.

The East Campus houses some research, support services, student housing, and athletics facilities. Occupying part of the East Campus is the CU-Boulder Research Park, which was intended to enhance the university's research capabilities, provide collaborative opportunities with government and business, and increase technology transfer. In this master plan, the Research Park function is being de-emphasized. Non-university development is no longer being solicited. Two major buildings were constructed by outside agencies: CU-Boulder has recently acquired the Sybase building and has taken over management of the McAllister building through the CU Foundation. Campus research activities now are conducted in those buildings, as well as at the Laboratory for Atmospheric and Space Physics (LASP), the Center for Astrophysics and Space Astronomy (CASA), and the EPO Biology Greenhouse. About 37 acres in the Research Park remain undeveloped. Wetlands near Boulder Creek provide nature study opportunities.

The university owns 63 buildings on the East Campus comprising 1,188,814 gross square feet. The MacAllister building, now managed by the CU Foundation, comprises another 286,260 gross square feet, bringing the total building space to 1,475,074 gross square feet.

Williams Village is located two blocks southeast of the Main Campus, near the end of the Boulder-Denver Turnpike, U.S. Highway 36. The highway serves as the southern boundary of the property. Williams Village is bordered by Williams Village Shopping Center on the west and single-family residential areas to the east and north.

The Williams Village property consists of 66 acres deeded to CU-Boulder by the Williams Foundation in 1964 to be used for student housing and related activities. In 1966, when the first student residences were constructed on this campus, the campus hous-

ing department began making annual payments based on a contractual formula to the Williams Foundation for use of the land. In 1975 the assets of the Williams Foundation were donated to the University of Colorado Foundation, so the annual payments were made to the CU Foundation until 2010.

Some single student housing, recreation areas, and parking lots, as well as the University Residence, are housed on this property. The residence was built as a home for the CU System president, but is now the official home of the Boulder Campus chancellor. There are eight buildings on the campus comprising 829,692 gross square feet. A ninth building, Williams Village North, is currently under construction and will push the total square footage over one million gross square feet in 2011.

##### d. CU-Boulder South

CU-Boulder South is 310 undeveloped acres in unincorporated Boulder County, contiguous to the southeast boundary of the City of Boulder. Louisville, Lafayette, and Superior are located to the east and south. It was acquired for approximately \$11 million in 1997 from the Flatirons Companies, which mined gravel on the property up to the time of acquisition.

When CU-Boulder South was acquired in 1997, Boulder Interim Chancellor Roderick B. Park said:

We have no particular immediate use in mind for the property but view it as a strategic acquisition for university purposes for the long-range future. Long-range planning, including strategic land purchases, is important for the future of the university. CU-Boulder has a history of far-sighted land purchases that have allowed the campus, many years later, to meet the state's evolving needs.

The CU Board of Regents acquired property in order to serve the future needs of Colorado students. The land is being reclaimed from the gravel mining. It is currently undeveloped, except for one warehouse building with office space, a cross-country running course, and a public pedestrian and bicycle trail on the property. Several ponds were created temporarily by the previous owner during gravel mining operations.

##### e. Mountain Research Station

The Mountain Research Station is located at an elevation of 9,500 feet in the mountains west of Boulder, accessed by traveling west via Boulder Canyon on Highway 119 and north along the Peak-to-Peak Highway, Highway 72. It is three miles east of the Continental Divide and six miles southwest of Ward, Colorado. The site contains approximately 192 acres. It is completely surrounded by the City of Boulder Watershed, Indian Peaks Wilderness Area, and Roosevelt National Forest. Development consists of approximately 63 buildings, mostly small seasonal structures. There are laboratory, office, housing, and dining uses. The Marr Alpine Laboratory, about 6,000 square feet, is the focus of activity.

A new hostel for temporary housing was completed in 2004. The total gross square footage of buildings at the station is 31,632 gross square feet

The Mountain Research Station (originally called University Camp, and later Science Lodge) began in 1914 as a recreational retreat for university faculty. It now functions as an interdisciplinary research facility devoted to the study of environmental sciences. It is managed by the CU Institute of Arctic and Alpine Research (INSTAAR), supporting research in biology, geography, atmospheric sciences, and geology. The station is used not only by CU faculty and students but also by researchers from a variety of agencies and institutions around the world. In the last few years, operations that were largely confined to the summer have begun to expand to year-round operations. Some of the research occurs on the adjoining Niwot Ridge, an alpine environment where atmospheric sampling and monitoring stations are located.

The Mountain Research Station is unique in providing these research opportunities within a 45-minute drive of a major university campus.

#### f. Other Properties

The Academy is a 3.7-acre property in the University Hill residential area, several blocks west of the Main Campus, at 10<sup>th</sup> Street between Aurora and Cascade Streets. A private corporation holds a long-term lease on the property, which is not available for university use. Originally a Catholic girls' boarding school, it was purchased by CU from the Sisters of Providence in 1969. For many years it was occupied by the Department of Theatre and Dance, the Division of Continuing Education, and student organizations, until it was extensively damaged by fire in 1980. During 1997-98, the property was privately redeveloped, under long-term ground lease, into a retirement community. The historic Academy Building and Chapel have been fully restored and "recycled" for the new use, and have won several state and national awards for design and preservation.

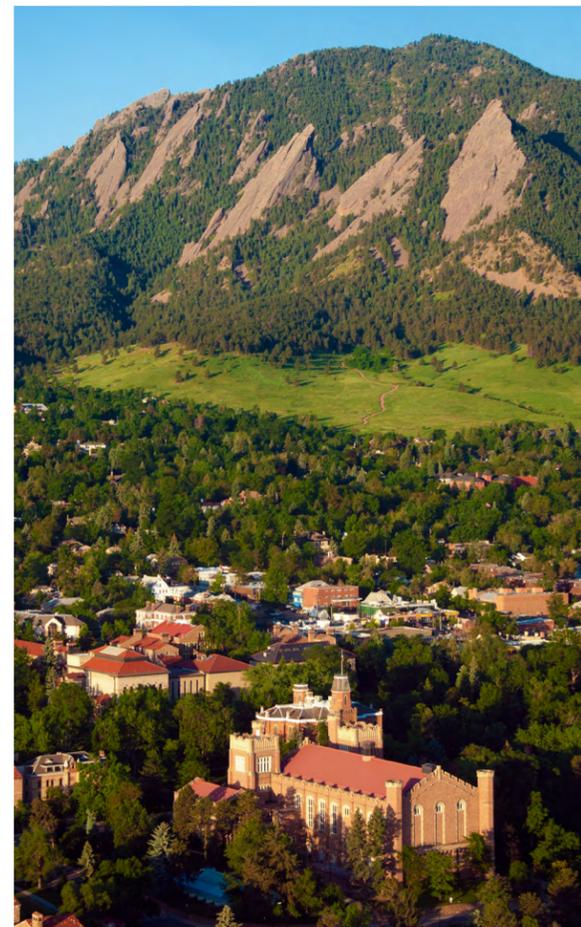
CU-Boulder and associated operations, such as the CU system administration and the CU Foundation, occasionally purchase or lease other properties in Boulder. The Center for Innovation and Creativity (CINC), 1777 Exposition Drive, is a former automobile dealership. It now houses scientific research activities, provides space to the College of Music for stage set construction and storage, and houses fourth-year studio space for the College of Architecture and Planning. This is also the site for the High Performance Cluster (HPC), one of the fastest computers in the world. Nearby, the CU Foundation owns 3300 Walnut Street, home of the Distribution Center, CU-Boulder's warehouse operation for storage, shipping and receiving, and surplus property disposition.

The University of Colorado Foundation Building is located at 4740 Walnut just north of the East Campus. It is close to the CINC building and Walnut Distribution Center. The two-story building is maintained and oc-

cupied by the CU Real Estate Foundation. The International English Center (IEC) leases space at 1030 13<sup>th</sup> Street, located just south of the Hill district adjacent to campus. The IEC offers to students from all parts of the world a unique opportunity to learn the English language in a stimulating academic atmosphere. The year-round program features sessions of intensive English instruction, combined with orientation to university customs, academic preparation, and an introduction to life in the United States.

For many years, the campus operated a parking lot at 13<sup>th</sup> and Pennsylvania Streets, just west of the Main Campus, on the site of a former Continuing Education building. For a decade, this parking lot was managed by the City of Boulder, but management will revert to CU-Boulder in July 2011.

Until recently, the CU system administration leased spaces within two privately owned office buildings located in the Pearl Plaza office park along Pearl Parkway, about a mile northeast of campus. This master plan, however, does not include an analysis of the needs and facilities of the CU system administration and CU Foundation.



## B. Campus Development and Heritage

The University of Colorado Boulder has grown from one building in 1876 into a teaching and research institution of national reputation. The setting and uniform architectural style of the Main Campus contributes greatly to its reputation. The Main Campus has been ranked the fourth most beautiful in the country (according to Thomas Gaines, *The Campus as a Work of Art*, 1991). The campus reflects a history of attention to planning and design that continues to this day.

### 1. Early Years (1875–1917)

After Boulder was selected as the site of the State University in 1872, Boulder citizens rallied to raise \$15,000 in matching funds to construct CU's first building, now known as Old Main, on land donated by three prominent citizens. The result was a fine three-story red-brick building with two towers rising from the treeless plateau around Boulder Creek. Completed in 1876, it contained the living quarters for the president and his family, classrooms, library, laboratories, and rooms for the building custodian and his family.

Eight years later, smaller buildings were added nearby, housing men, women, and the university president. The construction of Woodbury Men's Residence Hall in 1890 and Hale Science in 1892 set the stage for an expanded formal campus. In the next 30 years, the university grew around a large cruciform shaped open space that became Norlin Quadrangle, now listed in the State and National Registers of Historic Places. Significant buildings added during this time include Buckingham Library (now the University Theatre), Guggenheim Law (now Guggenheim Geography), Macky Auditorium, additions to Hale Science, and a Power House for steam generation.

The university's physical growth included more than the construction of buildings. Mary Sewall, wife of the university's first president, was responsible for much of the early landscaping. She beautified the barren surroundings with large green lawns and many trees. In these early years, students requested that sidewalks be laid from Boulder up the steep hill to campus to solve the problem of muddy footpaths. In 1888, faculty members and students started the tradition of planting trees on campus every Arbor Day. In spite of these efforts, the campus lacked coherence in its architecture and landscaping, leading George Norlin, then a classics professor, to observe in 1916 that the campus looked like a "third rate farm."

### 2. Klauder Years (1918–1939)

Campus buildings constructed prior to 1917 represent a variety of Collegiate Gothic, Classical, and Victorian architectural styles. In 1917, the Colorado General Assembly supported increasing CU-Boulder enrollment

from 1,200 to 3,000 students. As a result, the Board of Regents directed President Livingston Farrand to hire an architectural firm to conduct development planning in order to improve the campus appearance.

The Philadelphia firm of Day & Klauder was commissioned to do the work under the direction of George W. Norlin, who had become the interim university president. Day & Klauder had earned a strong reputation by designing buildings for Princeton University and Wellesley College in the Collegiate Gothic style. Architect Charles Z. Klauder's first sketches for Boulder campus buildings were in this style represented by the existing Macky Auditorium, but he ultimately rejected them for a variety of reasons. He wanted to create a unique style that would use the locally quarried sandstone to produce architecture that would blend more harmoniously with Boulder's magnificent mountain backdrop. As it turned out, Norlin (then fully-appointed university president) and the Board of Regents agreed.

The Board of Regents approved the resultant 1919 Campus Development Plan and accompanying scale model. The model, now on display at the CU Heritage Center in Old Main, depicts demolition of many of the previous buildings, new symmetrically designed buildings, refinement of a quadrangle plan, axial alignments between major buildings, and additional buildings in monastic-like clusters. Most buildings shown are narrow to accommodate natural light and airflow, often with wings radiating from a central core.

Hillside villages and rural farmhouses that he had observed as an architect touring the Tuscany area in Italy, and similar styles in Spain, influenced the architectural style that Klauder had in mind. His reinvention of a Mediterranean style for the Boulder campus includes charming building elevations, often with towers and chimneys near the ends that add a picturesque quality to the cascading roofs. Sprawling wings form intimate courts that can be used as outdoor rooms for classes or retreats. The Italian influence is echoed as well by stone details, such as limestone arches framing entrances and windows, carved limestone cartouches, benches, column capitals, and fountains. Many consider Sewall Hall, completed in 1934, to be the best of Klauder's CU work. When viewed in aggregate, the campus is reminiscent of hill towns around Florence and Siena.

Architectural historians categorize the style as Tuscan vernacular. Klauder simply referred to it as "University of Colorado style." It is characterized by multi-hued sandstone walls and tile roofs, off-white from light buff to reddish purple. These split rectangular stones were laid flat face down with the fractured face exposed and offset by limestone-trimmed windows, doorways, and ornamentation in contrast to the sandstone walls to create an overall red and white look. Roofs have various heights, pitches, and forms, complementing the stone walls and nestling hues, combining to create a red or terra cotta appearance.

Dr. Norlin characterized Klauder’s buildings as a physical body complementing the academic soul and spirit of the university. Remarkably, the central ideas of the 1919 Campus Development Plan, notable its distinctive architecture and variety of open spaces, have endured

### 3. War and Postwar Years (1940–1960)

World War II and the postwar period altered demands on university facilities. It was an era when quantity rather than quality was in demand. Klauder died in 1938 after designing his last CU building, the University Club. Following his death, facilities continued to be designed according to his style, but without the same creativity that Klauder had brought to his work. During and after the war, the successor firm to Day & Klauder, Trautwein & Howard, built austere, stripped-down buildings in the Tuscan vernacular style without fine detail or careful configuration seen in the prewar buildings. Examples of buildings from this period include Cheyenne Arapahoe Hall, Wardenburg Health Center, and the High Altitude Observatory building (now housing Speech, Language, and Hearing Sciences).

CU grew rapidly after World War II. In addition to the flood of students funded by the GI Bill came families and older students. Although Klauder’s original plan called for additional buildings along Broadway, growth instead occurred by repeated extensions of the university’s southern and eastern boundaries. Campus growth was facilitated by the elimination in 1932 of a rail line (passing through where Ramaley Biology is now located) that had inhibited eastward expansion. At the same time, the town of Boulder continued to grow and eventually encircle the Main Campus.

In the 1950s and 1960s, the university embarked on a more expansive land acquisition program. It purchased 220 acres of farmland, now known as the East Campus. It also accepted, with fiscal obligations, the Williams Village property as a location for housing students. The University of Colorado Boulder became three campus areas—the Main Campus, the East Campus, and Williams Village—within the City of Boulder.

During this period and into the 1960s, peripheral buildings were built that were not in the Tuscan vernacular style. In-house design staff designed several East Campus buildings, including Litman Research Laboratory, and Research Laboratories 2 and 3 (RL-2 and RL-3). It was increasingly obvious that a change was needed to revitalize building design for the campus.

### 4. Late 20th Century (1961–2000)

In the early 1960s, President Quigg Newton, campus administration, and the Colorado architectural community acted to change the way campus building design occurs. A new campus development plan was created by Sasaki, Walker and Associates, headed by Hideo Sasaki, chair of the Department of Landscape Architecture in the Harvard Graduate School of Design, and

consulting architect Pietro Belluschi, dean of the School of Architecture and Planning at the Massachusetts Institute of Technology (MIT). Their plan sustained Klauder’s design principles, materials, and humanistic spirit but allowed flexibility to incorporate new concepts and forms. For example, concrete became used for exterior walls, and often replaced the use of limestone for trim. Indigenous sandstone walls and clay barrel tile roofs still predominated, but in more flexible ways, continuing to visually link Klauder and post-Klauder building. The institution also severed the tie to a single architectural firm. Instead, depending on who is best suited to the task at hand, a variety of architects are commissioned to design campus facilities, with continuity ensured by campus staff and the university Design Review Board.

CU grew rapidly during the 1960s. New academic and administrative buildings soon surrounded the main student residential area, which had been on the eastern periphery of campus. New student housing, the Kittredge Complex, was built on the southeastern edge of Main Campus in 1963 and 1964. The first major academic building to not slavishly follow the Klauder style, yet be inspired by it, was the Engineering Center in 1965, which, with its extensive use of concrete and introduction of shed roof forms, remains controversial. Stearns and Darley towers, a brick high-rise residence hall complex, were built in 1966 and 1969 on the newly acquired Williams Village campus.

The Soviet Union’s launch of the Sputnik satellite in the late 1950s presaged a new era of campus construction in the late 1960s and 1970s, with the federal government funding science buildings in a race to catch up. The Duane Physics Laboratories complex and the Life Sciences Laboratories complex (Muenzinger Psychology and Porter Biosciences) were among buildings of this period. Scientific research at CU accelerated. Adherence to Klauder’s architectural style during the era meant that CU-Boulder avoided the “modernist” style, often poorly interpreted on college campuses.

In 1971 the State Legislature established an enrollment limit of 20,000 FTE (full-time equivalent) students for the Boulder campus. The capping of enrollment signaled the transition of the campus from rapid growth to maturity, although the enrollment limit was later removed. Campus maturation meant an emphasis on renovating existing facilities where possible and developing new space to support CU’s growing role as a major research institution. The “postmodernist” era, which began in the 1970s, has revalidated creative use of historical styles, with their richness of material and form, and fits neatly with Boulder’s already well-established vernacular style.

In the 1980s and 1990s, attention turned to older buildings needing rehabilitation, such as Old Main, Macky, Hale, the Power House, and the Women’s Cottage, all of which benefited from appropriate renovation, giving the oldest buildings new life while preserving their heritage.

At the end of the decade, the campus added Eaton Humanities, Benson Earth Sciences, Drescher Undergraduate Teaching Laboratory, and the Environmental Health and Safety Center as the second building boom began to take off.

### 5. The New Century (2001–Present)

In the last decade, the CU-Boulder campus has seen development rivaled only by the late 1960s boom. Because of a combination of enrollment growth that exceeded levels anticipated by the previous master plan and research expenditures exceeding the previous decades trending percentages, the campus was in need of new space and existing renovations.

In the beginning of the decade, the campus added the Discovery Learning Center and an addition to the University Memorial Center. A third party developer also financed and built Bear Creek Apartments and Bear Creek Commons on the Williams Village Campus. This property was initially privately run, but was not successful. The university eventually acquired the property and took over ownership and management of the now successful apartment complex.

Athletics built the Club Seats and Suites Addition to Folsom Field, an indoor practice bubble, a Soccer Locker building on the East Campus, and substantial renovations to the basketball offices in the Coors Events Center.

After the 2003 recession, buildings that were on track to be built were losing funding streams. In particular the state could no longer provide funding for academic buildings on campus that would provide necessary teaching space. Because of this, the students on campus voted for a one-time capital construction fee to finance four buildings: Wolf Law, Koelbel Business Building Addition and Renovation, ATLAS, and the Visual Arts Complex. Although sustainability has always been a priority on the CU-Boulder campus, this capital construction fee solidified the idea. The students required that all new buildings funded by the fee meet a minimum of the Leadership in Energy Efficiency and Design (LEED) Silver certification.

Sustainability proved to be more than a buzz word in these years. Although the campus added an additional 1.5 million square feet in facilities (baseline of 2005), total energy use was reduced by 23 percent and carbon emissions remained stable. These statistics prove that building to LEED Gold certification has a positive impact on the local and surrounding communities.

With the more-than-anticipated increase in enrollment, student services and residence halls were a focus of adding space and renovating existing space. Farrand, Sewall, and Libby Halls received dining hall upgrades, while Arnett, Andrews, Smith, and Buckingham Halls all received significant building renovations. These new residence hall renovations added classroom space for

each hall to provide Residential Academic Programs or RAPs. Also, Andrews Hall was the first residence hall to have a faculty member and family move in as the faculty-in-residence, providing students with guidance within their own hall.

The Center for Community, a combination of state-of-the-art dining facility, student services offices, and an underground parking structure, provided additional space and consolidation of space in a Klauder style building. This new building replaced two inefficient dining centers—Cheyenne Arapahoe and Kittredge Commons—and freed up space in Willard and Hallett Halls for additional beds on the Main Campus.

Other major projects include: the new Information Commons in Norlin Library; ADA improvements to the University Theatre and other buildings; life-safety upgrades to the Henderson Museum; renovation of Porter Biosciences and Ekeley Science Building East Wing; additions to LASP, IBG, and CASA on the East Campus; and the groundbreaking for an addition to the Coors Events Center for basketball and volleyball. The Institute of Behavioral Sciences, the first new building in Grandview Terrace, was completed in 2010. Outdoor projects included upgrades to Kittredge and Farrand Fields and redesign of the Dalton Trumbo Fountain Court.

Building acquisitions included the Center for Innovation and Creativity and the Sybase building.

The first decade of the new millennium was riddled with highs and lows, unprecedented increase in research expenditures, increased numbers of students, a higher-level priority of sustainability, two tough recessions, budget cuts, and, by the end of the decade, the elimination of state funding for capital construction.

The CU-Boulder campus benefits from additional space, special care and maintenance for landscape and new gateways, and buildings that carry on the architectural style of Charles Klauder.

Most recently, the challenge again is to accommodate an increase in enrollment, this time for the children of the postwar “baby boomers.” At the same time, CU-Boulder remains committed to preserving its reputation as one of the most beautiful higher education campuses in the nation. In order to maintain a fine campus while accommodating dynamic programs and projected enrollment growth, development will increasingly occur on East Campus, Grandview Terrace, and Williams Village sites, and potentially at CU-Boulder South. The CU living and learning environment is sustained by a campus that speaks, through its architecture and campus planning, about its history and concern for quality.

## C. Natural Setting

This section identifies specific elements of the natural setting that affect campus development: climate, topography, flooding hazards and wetlands, and the subsurface soil conditions.

### 1. Climate

At an elevation of 5,400 feet, Boulder's semi-arid climate is temperate with pleasant days and cool evenings. More than 300 days of sunshine per year and annual moisture accumulation of 20.7 inches<sup>1</sup> allow outdoor activities year-round. But Boulder is also well known for occasional high winds. Winter weather varies from sunshine to snow and hailstorms. Overall, the campus architecture and landscaping are well suited for these climatic conditions. For example, the red tile roofs offer excellent protection against wind and hail, and typically small window openings control the amount of solar gain, preventing overheating of campus buildings and conserving energy.

### 2. Topography

All campus properties, except for the Mountain Research Station, are located in the Boulder Valley, at the base of the Rocky Mountain foothills. This topographic setting affords many fine views and recreational opportunities. The topography of CU-Boulder properties is shown on Exhibit II-C-1.

#### a. Main Campus

The Main Campus slopes gently to the north and east from the highest areas along Broadway near the University Memorial Center (UMC), down toward the bluff overlooking Boulder Creek. At this escarpment, the land drops sharply 70 feet to Boulder Creek. North of Boulder Creek, university property is in the relatively flat floodplain.

Besides the bluff along Boulder Creek, development is influenced topographically by Observatory Hill. This hill is located between Fiske Planetarium and 28th Street, and it is anchored at its east end by the Coors Events/Conference Center. Its slope, rising approximately 40 feet from Regent Drive, provides an obstacle to vehicular and pedestrian circulation in the southeast corner of the campus.

#### b. East Campus

The East Campus slopes very gently about 30 feet from the southwest corner to the northeast corner. Boulder Creek flows diagonally from the west to the northeast, dividing the East Campus into separated areas on the two sides of the creek. Two smaller creeks also flow through the East Campus. Skunk Creek, entering midway along the south property line, flows northeasterly to connect with Bear Canyon Creek, which flows through the portion of the East Campus located east of

<sup>1</sup> Source: <http://www.esrl.noaa.gov/psd/boulder/Boulder.mm.precip.html>, 30 year average for the period 1981 to 2010.

Foothills Parkway.

#### c. Williams Village

The Williams Village property slopes very gently about 25 feet from higher areas on the southwest edge of the property to a low point at the northeast corner. Bear Canyon Creek flows through the property, entering midway along the southwest property line (U.S. 36 right-of-way), flowing across to the northeast corner.

#### d. CU-Boulder South

Most of the CU-Boulder South property also slopes very gently from the southwest to the northeast. The relatively flat area was excavated between 1970 and 1995 for gravel mining, and is several feet lower than the natural elevation. Along the east and south borders is a berm near South Boulder Creek, reducing the flood hazard for the site and other properties. Along the western border, south of the Tantra neighborhood, the land rises more sharply toward houses to the west.

#### e. Mountain Research Station

The Mountain Research Station sits on a heavily forested site just east of the Continental Divide. The developed portion sits on the steeply sloping face of a mountain ridge. The topography is a major form determinant of development and is discussed in more detail in the plan for the property in Section V.B.4.

### 3. Flooding Hazards and Wetlands

The creeks that create beautiful natural areas on campus also have the potential to occasionally flood. The Front Range setting of the campus and the local meteorological occurrence of severe thunderstorms creates the potential for sudden and significant flooding. Information on the flooding potential is one of the major influences on campus land use planning. This section provides an assessment of the potential flooding hazards on campus properties.

Land use planning based on this information is found later in this plan in Section V.D.4: Flood Mitigation. In order to protect lives and property on campus, information from flood engineers and off-campus regulatory authorities is evaluated to assess potential flood hazards on the Boulder campus. Most flood regulations are based on a 100-year flood event. In any year, there is a one percent probability that a 100-year flood will occur. Smaller floods occur more often. Greater floods are possible but are not considered to be frequent or predictable enough to warrant regulation. The 1997 flooding of the Colorado State University campus, which exceeded a 100-year flood event, demonstrated the potential severity of flooding. Land areas inundated are classified as either floodways or floodplains by most regulatory authorities. Floodways are areas of greatest flood hazard and could convey the 100-year flood. During such a flood, waters in floodways will flow at significant depths or at significant velocities. Floodplains are all land areas that will be inundated by a 100-year flood.

Other terminology is also used to identify flooding areas. Beginning in 1989, the City of Boulder opted to define a "conveyance zone," with somewhat stricter criteria than the Federal Emergency Management Agency (FEMA) floodway definition. The City of Boulder also identifies a "high hazard zone," taking into account the combined effect of floodwater depth and velocity on life safety. The university does not use the City of Boulder terminology or regulations, but takes the information into account in accordance with the state Executive Order # 8504.

There are two types of floods that may occur on the campus. The first type was discussed above and occurs when the creeks overtop their banks and flood the surrounding area. The second type is localized flooding events. These may occur for even minor storm events where runoff will seek the lowest elevation and could enter into a building. For most minor storm events, the storm sewer system will convey these flows to the creeks but there could be situations where runoff could flood into a building due to a blocked storm inlet, low pipe conveyance capacity, etc.

#### a. Main Campus

Given the location at the base of the foothills and the climate that includes seasonally high spring runoff due to melting snow and sudden substantial thunderstorms, there is the potential for major Boulder Creek floods with little warning. Boulder County has established a network of rainfall and creek flow measuring stations and a limited flood warning system. Most of the Main Campus is located on a mesa well above Boulder Creek. The potential for major (100-year) flooding on the Main Campus is generally limited to the areas adjacent to Boulder Creek, especially north of the creek. Most of the land from Boulder Creek to Arapahoe Avenue, between 17th Street and Folsom Street, is in the floodplain. CU-Boulder has student family housing units in this area, and there is considerable privately owned residential development in this 100-year floodplain as well.

The City of Boulder has recently begun efforts to re-map the Boulder Creek floodplains. While the flood study is still in draft, the information contained in the studies has been used in the formation of this master plan as the best information available. There are an increased number of buildings on the campus that now have a flood exposure. For example, previously only 10 of the housing buildings north of Boulder Creek were in the 100-year floodplain; however, this new mapping shows all of the housing building north of Boulder Creek in the 100-year floodplain. Several of these buildings are also located in the flood conveyance and high hazard zones, which have the greatest flood risk. Previously, there were 10 buildings in the high hazard zone and now only three are so located due to the possibility of more water being conveyed in city streets.

Recently the campus has studied areas of the Main

Campus for potential locations where localized flooding may occur. Construction has begun to reduce the risk of localized flooding at some of these locations and will continue over the next few years.

#### b. East Campus

The East Campus is affected by flood flows from Boulder Creek, Skunk Creek, and Bear Canyon Creek. Most of the East Campus buildings located north of Boulder Creek are in the floodplain. Recently the campus has begun making minor modifications to these buildings to help reduce flood damage and life safety risks.

Newer buildings in this area, notably the Computing Center and the Housing System Maintenance Center, were elevated above the 100-year flood levels according to information available at the time of the construction of these buildings.

The area developed as a Research Park lies south of Boulder Creek. Major re-grading elevated the building sites from the 100-year floodplain. In one of the most ambitious such projects in the Boulder area, the university re-established and relocated wetlands and ponds with native vegetation in the flood areas. These wetlands were established through an Army Corps of Engineers permit. Access is limited in order to maintain the somewhat fragile environment. Public trails and a rest area are located nearby to permit enjoyment of the scenic resource.

The Skunk Creek floodplain on the East Campus was re-established into a channel, which emulates the natural meandering of a stream, in order to contain a 100-year flood event. Bear Canyon Creek may flood the dedicated open space area of East Campus that lies east of Foothills Parkway, but not building sites.

#### c. Williams Village

The Williams Village campus is bisected by the Bear Canyon Creek floodplain. Some reconfiguring of this floodplain was done as part of the Bear Creek apartments project, but additional work is required as future buildings on this campus are constructed. Land uses currently in the floodplain area are open space; recreational facilities, including playfields and tennis courts; parking; and undeveloped property.

Bear Canyon Creek is considered a regulatory wetlands area and the university has a US ACOE 404 permit for a future bridge/road that will connect the campus owned areas west and east of the creek.

#### d. CU-Boulder South

South Boulder Creek lies east of the CU-Boulder South property. A levee was constructed in the southern portion of the property when the property was mined for gravel. This levee was submitted for approval by FEMA. A wetlands analysis should also be conducted for the property prior to development.

#### e. Mountain Research Station

Como Creek runs through the Mountain Research Station. No floodplain or floodway has been identified. As in all mountain areas, there is the potential of flash flooding along the creek. However, only one small occupied structure is located near enough to the creek to be considered a hazard.

Access to the station crosses the creek and could be affected in the event of a significant flood. Much of the station and adjoining U.S. Forest Service lands are sensitive ecological areas, including steep slopes, wetlands, protected fish habitat, and alpine areas.

#### 4. Subsurface Conditions

Subsurface soils and groundwater are site-specific concerns. Often swelling soils, groundwater levels, and soil quality dictate that remedial measures be undertaken for building construction.

##### a. Main Campus

On the Main Campus, subsurface conditions vary considerably, making it essential that soils tests be conducted before buildings are designed. In general, there are materials (weathered claystone and sandstone) not suitable for building foundations at shallow depths, with dense blue shale at varying depths below these layers. The latter provides good bearing capacity for drilled pier construction.

Soils transition from generally low-swell potential on the west side of campus to highly expansive soils on the eastern edge of campus. The bluff rising immediately south of Boulder Creek has areas of unstable surface and subsurface conditions from filling done over the years. Likewise, there are similar areas of fill around the Coors Events Center. In areas with poor soils, slab-on-grade construction is not recommended and structural slabs have been used for most buildings. The greater costs of these types of construction must be taken into account when establishing construction budgets.

Groundwater conditions vary greatly across the campus. There is a perched water condition at most building sites where campus irrigation creates shallow ground that oftentimes dries up when irrigation is suspended. More permanent groundwater flows have been encountered south of Observatory Hill, along Colorado Blvd. at Fisher Field, and in the area from the UMC to ATLAS. Deep excavations such as were done for ATLAS almost always encounter substantial groundwater conditions.

##### b. East Campus

Soil conditions on the East Campus vary throughout the property. A review of the available soils reports indicates that much of the central and western portions consist of a layer, up to 14 feet deep, of mixed sandy and silty clay over strata of water-bearing sandy gravel, over claystone bedrock. The subgrade condition along the

south boundary appears to be a shale slope. Depending on core sample results, drilled pier and grade beam foundations have been required for multistory buildings in some portions of the East Campus, and basements are not recommended without detailed investigation.

Groundwater is frequently encountered at shallow depths of four to eight feet due to the close proximity to Boulder, Skunk, and Bear Canyon creeks. Most buildings do not have basement levels due to this and significant mitigation would be required to build them.

##### c. Williams Village

The soils investigation conducted for the construction of Stearns Towers, Darley Towers, and Darley Commons indicates 7 to 21 feet of sandy clay over weathered shale to hard blue shale at 27 feet, suggesting a high load-bearing capacity for multistory buildings. The material between this strong layer and the surface is poor material with high swell potential. This has been taken into account when constructing buildings and hard-surface facilities such as tennis courts, and it may prevent slab-on-grade construction.

Groundwater is present in much the same way as it is on the Main Campus. As would be expected, groundwater is much shallower the nearer to Bear Canyon Creek.

##### d. CU-Boulder South

An extensive evaluation of the soil characteristics of the property was undertaken in 2002 as a part of the Conceptual Land Use Assessment. CU-Boulder South is underlain by Pierre Shale bedrock, forming a relatively impervious sub-surface layer. Depth of bedrock varies between outcroppings at surface levels to depths of 10 to 15 feet. This impervious layer restricts groundwater flow or aquifer recharge by limiting or eliminating downward flow. Greater depths to shale generally occur from the central portion of the site to the north and northwest portions of the site. Exposed outcrops or shallow depths to shale occur toward the south portion of the site, as well as isolated areas adjacent to the northeast boundary.

Although shale can be used as a fill material, soil expansion and contraction can occur. Therefore, extra care must be taken with construction to ensure cracking and heaving of structural elements does not occur.

Groundwater is present at shallow depths as a result of the low depth to bedrock. Groundwater is present at depths of one to four feet and studies indicate that there is a general movement from south to north. Surface water is present along the edges of the levee and in wetland areas.



## D. Campus Land Use

A pattern of land uses has developed on the campus over time. CU-Boulder has a long tradition of land use planning, as detailed in the Campus Development History and Heritage section earlier in this chapter. Exhibit II-D-1 maps the existing land use pattern on the three adjoining developed campus properties.

### 1. Land Use Categories

Land use has been divided into six categories, each accommodating a different type of activity. Activities may be both indoors and outdoors:

- Academic land use areas predominantly include buildings housing classrooms, instructional and research labs, faculty and departmental offices, assembly spaces, exhibit spaces, and library spaces.
- Services and administration areas are where administrative offices, student services, and physical plant spaces are concentrated. The University Memorial Center (UMC), which is the student union building, and Wardenburg Health Center are included in this land use category.
- Residential land use areas predominantly include student housing, including the residence halls and family housing units. Also included are conference facilities and recreational facilities operated by the Housing Department. If faculty/staff housing is developed on campus in the future, it will be in this land use category.
- Athletics and recreation land use includes the intercollegiate athletics facilities and the major student recreation spaces.
- Undeveloped areas are unutilized tracts of land.
- Natural areas include floodway, steep slopes, and wetlands, where buildings are not anticipated during the life of this master plan.

Non-institutional agencies, as a land use, have been incorporated into the service and administration land use category due to the acquisition of facilities that were formerly leased to outside agencies or corporations. Only one parcel of land remains leased to an agency not affiliated with the university—a bank located at the corner of Arapahoe Road and 38<sup>th</sup> Street.

### 2. Arrangement of Land Uses

These categories are used throughout this Campus Master Plan. Land uses tend to be clustered, and the pattern has been developed over time for the following reasons:

- Academic uses benefit from the proximity of related disciplines. Student class schedules benefit from the concentration of most classrooms within a 10-minute walking area. This principle will be extended to the East Campus and classes will be offset 30 minutes to facilitate transit between the two campuses.
- Services and administrative uses have been clustered to reduce trips between offices. Services

requiring high in-person student contact have been located just outside the academic core. Services requiring less in-person student contact are on somewhat more remote sites.

- Residential uses are generally peripheral to the academic areas.
- The principal athletics spectator areas have been given prominence just outside the academic core. Intercollegiate Athletics practice areas are more peripheral. Some student recreation areas are located near student housing areas.
- Undeveloped areas have no buildings, but many of these sites are already destined for one of the other land uses through previous planning or current planning.
- Natural areas are inappropriate for buildings because they have some or all of the following characteristics: high flood hazard, steep slopes, large ponds needed for campus drainage, unique flora or fauna, or wetlands. Some natural areas have native vegetation, many have re-established vegetation, and some have irrigated landscape maintained as the rest of the campus grounds are maintained.

Although they are not shown on this map (the map scale would make it unreadable), these same categories generally apply to all campus properties. For CU-Boulder South, there has not been enough planning yet to designate which sites will be used for which of the various land uses, and which portions may be left as natural areas. The one building on the CU-Boulder South site is temporarily being used for both services and non-institutional uses. Much of the Mountain Research Station is a natural area with dense forest cover on steep slopes. Land uses in the developing portion of the Mountain Research Station are shown and discussed in Section V.B.4, the Mountain Research Station Plan.

There is a tremendous capital investment in these land uses, and they are unlikely to change in a major way over the 10-year planning period covered by this plan. It would be undesirable to have major changes, since these land use areas are generally working well for the institution. The exceptions to this principle occur in areas where redevelopment potential exists. The area north of Boulder Creek on the Main Campus is a prime example where residential and recreation/athletics uses will need to be reconfigured to accommodate flood mitigation. Likewise, the East Campus land use patterns will change to reflect the change from a suburban research park into a more traditional campus pattern.

Some of the areas were created when the campus was physically smaller and there were fewer people. For example, if the campus were to be rebuilt today, the student housing area around Farrand Residence Hall might logically be an academic area, since academic areas are now both west and east of it. But the substantial investment in housing is in place, providing convenient and needed student housing. Residential academic

programs have been very successful in this location given the proximity to academic areas where faculty offices are located.

### 3. Land Use Changes

As noted, land in the undeveloped land use category will be developed. The undeveloped sites shown on the East Campus were designated as “pods” (sites) in the Research Park Master Site Development Plan. During this planning period, a new land use plan will be developed for the East Campus, and the existing pod boundaries will likely be changed. At Williams Village, the plan is to use undeveloped property for student and faculty housing and recreation.

The pattern of land use should help to guide future land use decisions. The few specific land use changes intended (further discussed in Chapter V) include:

- Conversion of Prentup Field and Potts Field, the soccer field and track and field facility on East Campus, to academic use.
- Conversion of a portion of Newton Court from residential to athletics and recreation to provide flood mitigation for the redevelopment of the area north of Boulder Creek.
- Elimination of the non-institutional agency land use category as the university regains control over previously leased parcels.

### 4. Outdoor Spaces

By categorizing land use by university activities, the variety of outdoor spaces is not clearly shown on the land use map. Land use zoning maps typically include most outdoor spaces, parking, and other ancillary uses within the major functional land use categories. A categorization by physical character would include: buildings (as shown on most maps in this plan), parking and streets (as shown on maps in the Transportation Plan in Section V.E.), and the remaining outdoor spaces (most of which are landscaped). The wonderful variety of designated outdoor spaces is shown on Exhibit II-D-8. Most of these have been designated with a name. The Board of Regents has in previous actions assured the preservation of the scheduled student recreational fields shown. Most of the other designated outdoor areas shown will remain for at least the next 10 years, but some will not, as noted in the preceding section on land use changes. Enhancement of all outdoor areas is discussed later in this plan (Section V.C).

Before setting forth the land and facilities plan, the facility needs (for the many activities within the land use categories) will be addressed in the next chapter.

