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Central Plant Capacity Study
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Executive Summary

The purpose of the 2005 California State University Northridge Master Plan update is to support and further the educational mission of the University by guiding the development of the University’s physical campus to accommodate growth and change over the next thirty years. The 2005 Master Plan provides a way for the University to describe its intended growth trajectory, identify the needs associated with that growth, and develop a series of strategies that can be used to gradually modify the built and natural environment of the campus to address anticipated growth and change. The 2005 Master Plan addresses the physical assets of the campus in ways that are intended to maintain and enhance campus as an attractive, accessible, safe and functional environment for learning, living, culture and recreation that serves students, faculty, staff and the community.

EXISTING CONDITIONS

California State University Northridge is the largest institution in the San Fernando Valley, and constitutes its only public University. At 356 acres, it is one of the largest of the California State University campuses in both its physical facilities and its large academic community. In the Fall of 2005, there were 25,139 full-time equivalent students, and a total of 33,243 students registered for classes on the California State University Northridge campus during that quarter. The University draws about 70% of its students from Los Angeles County and about 8% from Ventura County.

Enrollments on the California State University Northridge campus are nearing the University’s existing enrollment cap of 25,000 full-time equivalent students (FTES). Current levels of enrollment, along with the faculty and staff needed to provide courses and services to these students, have strained the capacity of existing campus facilities and services, including instructional space and other assignable space, parking, and the broad range of student and campus support services available on the campus.

After consulting with academic units to determine the impact of increasing enrollments, the University asked the Master Plan architects to carry out studies to determine the capacity of the existing campus. On the basis of these studies and input from academic units, it was determined that
the University will need to increase its physical capacity to accommodate an additional 10,000 FTES over the course of the next 30 years. Needs assessment studies identified enrollment-driven facilities required for growth accommodation as well as the preliminary programs for non-state-funded facilities including parking, student housing, faculty/staff housing, and student recreational facilities. An analysis of the opportunities and constraints presented by the physical campus formed the basis of 2005 Master Plan development proposals.

The proposals developed for the 2005 Master Plan update take into account projects from the existing 1998 Master Plan that are currently under development and the current campus conditions with regard to parking and vehicle circulation, open space and pedestrian circulation, building and facilities life-cycle conditions, campus space allocation, and campus landscape.

MASTER PLAN PROCESS

Led by the University's Physical Master Plan Committee, with the support of University President Jolene Koester and her cabinet, the planning process for the 2005 Master Plan extended over an 18-month time period. The process involved full collaboration with the campus and neighboring communities, and comprised four phases: data collection and planning analysis; visioning; development of Master Plan alternatives; and development of the Draft and Final Master Plan documents. Each phase included a public outreach component so that input from campus and community stakeholders could be incorporated into the Final Master Plan.

MASTER PLANNING CRITERIA

The criteria developed for the 2005 Master Plan were based upon observation and analysis of current campus conditions undertaken at the start of the master planning process. Each planning principle generated a series of planning objectives tailored to the California State University Northridge mission, culture and campus.

The six planning principles underlying the California State University Northridge Master Plan are based on the traditional approach to campus planning: the use of open spaces as the primary organizing tool. The principles incorporate the philosophy that the physical campus plays a significant role in the education process by providing the setting for both planned and informal contact among students, staff, faculty and campus visitors in the classroom, at meals and in the course of recreational activities.

Planning Principles

- Campus functional organization shall enhance and improve the existing functional organization of the campus through the placement of buildings in strategic locations while conserving open space and strengthening the pedestrian character of the campus. The planning for new facilities along the boundaries of the campus will focus on appropriate transitions between the campus and the neighboring community.
- Master Plan development shall make use of underutilized and vacant lands rather than
consume campus open space and green areas. The Master Plan shall reinforce the existing campus system of quads, courtyards, and natural areas, creating a series of “outdoor rooms” linked by strong pedestrian pathways. The connections between the campus and the surrounding community will be articulated and strengthened.

- Building placement, scale and massing shall reinforce campus open space and pedestrian circulation systems and shall support efficient land use by being of appropriate size for the building program and functions. The University shall continue to respect its surrounding residential neighbors by using appropriate setbacks consistent with those of existing buildings and by using landscape designed to create screening and modulate scale.

- Enhancements to the campus landscape will reinforce the existing mature landscape by establishing consistent themes and by deploying well-developed palettes of plant and paving materials, light fixtures, and site furniture to emphasize the design of open-space areas and to reinforce key pedestrian connections and gathering areas. Landscape shall be used to create focal points, differentiate formal from informal campus areas, screen unwanted views, soften public edges, and create connections with the surrounding community.

- The design of campus vehicle circulation and parking systems shall focus on safety, accessibility and support of emergency vehicle, service and maintenance functions; reinforce campus functional organization; and support the pedestrian circulation system. Planning for parking facilities shall target an even distribution of parking on the east and west sides of the campus and ready access from major arterial roadways. The development and support of alternative forms of transportation, developed in cooperation with local public transit authorities, will be an important factor in the University’s plan for managing campus parking and circulation.

- Campus planning and development initiatives shall maintain and enhance the University’s positive relationships with the neighboring residential and commercial communities by employing appropriate setbacks, heights and land uses, and by enhancing public access to the campus through re-designed campus entries, visitor parking and information facilities. The master planning process shall make full use of its participatory planning model, taking all possible steps to engage the community in the planning process and incorporating input and suggestions from both the campus and the neighboring communities.

2005 MASTER PLAN

The 2005 California State University Northridge Master Plan is shown in Exhibits E1-E3 and, in more detail, in Chapters 4 - 7 of this report. The 2005 Master Plan is a comprehensive and
coordinated series of proposals that configure and guide the physical development of the California State University Northridge campus over a period of thirty years. It is a phased plan that focuses on preserving and enhancing campus open space while identifying building sites for a wide range of state- and non-state-funded facilities. The Master Plan includes an approach to the development of pedestrian pathways, open-space landscape areas, vehicle circulation systems and parking facilities that will further integrate the campus and reinforce its pedestrian scale.

Thirty specific development sites are identified, along with a series of enhanced campus open spaces, re-configured campus roadways and entries, and a strengthened pedestrian pathway system. These modifications to the campus will accommodate the anticipated increase in student enrollments to 35,000 FTES and the concomitant increases in faculty and staff over a 30-year period. These development proposals, presented in Chapter 4 as the Illustrative Master Plan, help to preserve campus open space by allowing the University to concentrate development on existing surface parking lots and intensify parking in parking structures.

**Master Plan Facilities**

The facilities targeted in the 2005 Master Plan comprise 1,553,430 gross square feet (gsf) of new enrollment-driven academic, administrative and student-support facilities, along with 364,600 gsf of new, non-state-funded facilities and 45.91 acres of playfields for instructional, athletics and recreational use. The plan includes a total of 17,528 existing and new parking spaces by its final phase, accommodated in four new commuter parking structures, two new student residential parking structures, and a small series of surface parking lots. The Master Plan allocates space for up to 2,688 new student residential bed-spaces and up to 600 units of faculty and staff housing.

The 2005 Master Plan builds upon the existing 1998 Master Plan by reinforcing the strong central academic core. The Plan provides sites for expansion of all academic programs. The Plan expands student residential facilities at University Park, and adds student housing, a new dining facility and a new student recreation center within the campus core, south of Halsted Street. Two sites have been provided for faculty/staff housing, a larger one north of Lassen Street, and a smaller one within the campus core at Etiwanda Avenue and Halsted Street. The Plan also includes: a new Transit Center at the western Prairie Street entrance to support the Alternative Transportation Plan; expansion of the campus tram route; a new campus roadway, Matador Drive, that provides campus access from Nordhoff Street; and new or reconfigured campus entries at Prairie Street on the east and west perimeters of the campus. The Master Plan closes campus access roads from Halsted Street at Etiwanda Avenue, Lindley Street and Darby Avenue.

The Master Plan preserves the location of the existing Physical Plant Management facilities and provides for an expansion of the Central Plant to support development in the south-eastern areas of the campus. Also included in the
2005 Master Plan are proposals for expanding and enhancing campus utilities and infrastructure: civil engineering analyses and proposals including domestic water supply, fire protection water supply, sanitary sewer and storm water management; and domestic water, electrical and telecommunications analyses and proposals to support the increase in campus facilities over the 30-year period of development.

LANDSCAPE MASTER PLAN

The 2005 Landscape Master Plan has been developed to complement and reinforce the features and facilities of the 2005 Master Plan. The Landscape Master Plan provides an integrated approach to the design of open space areas and the use of natural and paving materials. In addition to enhancing the natural environment of the campus, supporting the pedestrian circulation system and providing for a diverse series of outdoor spaces for formal and informal uses, the Landscape Master Plan provisions have been developed to unify the appearance of the campus; reinforce the University’s identity by using an integrated approach to landscape at the campus perimeter; and minimize the visual and acoustic impacts of automobiles and parking facilities by screening and softening undesirable features in the environment. Finally, the landscape master plan is focused on conveying both the sense and the actuality of security and safety, and conserving human and natural resources by recognizing the need for economy and ease of maintenance.

The Illustrative Landscape Master Plan presented in Chapter 5 is a conceptual landscape plan for the campus. It provides for the revitalization of the Orange Grove, reinforces new and existing pedestrian corridors to create strong links within the campus, and enhances the vehicle circulation system by proposing a coordinated planting plan along new and reconfigured campus roadways. The Landscape Master Plan includes proposals for the selection and use of plant materials in campus open space areas; proposals for a new landscape character and plant materials that will create a signature landscape for the perimeter of the campus and reinforce campus identity; recommendations for site furnishings, and lighting; and a discussion of sustainability measures recommended for the California State University Northridge campus landscape.

DESIGN GUIDELINES

Campus design guidelines provide guidance over the long term of campus development to ensure that new projects contribute to the University’s over-arching view of the campus. By encouraging a high level of aesthetic quality and supporting a climate of technological and aesthetic innovation, the design guidelines are meant to guide decisions rather than regulate future actions, thereby laying the groundwork for creativity.

Design guidelines address building design, including choice of building site and the relationship of buildings to open space and the
pedestrian circulation system; building form, including the role of ‘signature’, ‘foreground’ and ‘background’ buildings on the campus; building massing and articulation; and building façade materials and colors. Additional guidelines provide guidance on the building envelope, including height limitations, set-backs and ‘build-to’ lines. Design guidelines also address campus circulation and parking, including structured parking facilities, campus roadways and service areas, loading docks and mechanical equipment.

**PHASING AND IMPLEMENTATION**

The 2005 Master Plan has been developed to address the requirements of projected enrollment growth over the next 30 years, and is expected to be implemented over that time period. The implementation strategy for the Master Plan has been divided into four phases and is illustrated in Chapter 7 through a series of four campus diagrams and accompanying tables.

The actual pace of implementation will be determined by the rate of increase in student enrollments, the availability of funding for both state-funded and non-state-funded projects, and changes anticipated by specific academic, administrative, recreational and student life programs that necessitate new or modified facilities. The implementation of the 2005 Master Plan includes the phasing of new academic and residential buildings and new parking facilities; the relocation and expansion of playfields and athletic facilities; improvement and construction of roadways; and the implementation of landscaping. Landscaping is implemented in conjunction with Capital Plan projects for new facilities; some landscape projects may constitute standalone improvements to the campus.
INTRODUCTION AND PURPOSE

California State University Northridge is one of the largest of the 23-campus California State University system universities, with 356 acres and 25,139 full-time equivalent students (FTES) as of Fall 2005. The 2005 Master Plan is a strategy for modifying the physical campus to accommodate growth and change over the next 30 years.

1.1 CONTEXT OF THE MASTER PLAN

Since the most recent Master Plan in 1998, California State University Northridge has seen a steady increase in enrollments, in part due to local and state-wide population trends, and in part because of the wide and growing range of programs offered on the campus.

With a population of 25,139 FTES, the campus has reached its limit of 25,000 FTES. Many of the University’s facilities, including classroom space, faculty offices, parking, and student support facilities, are nearing their capacity. At the same time, the CSU system as a whole anticipates significant growth over the next thirty years, and California State University Northridge is preparing to take on an appropriate share of that growth by addressing ways to expand the Campus’ capacity in accord with the University’s mission and goals.

1.1.1 STATE OF CALIFORNIA MASTER PLAN FOR HIGHER EDUCATION

The State of California Master Plan for Higher Education was passed in 1960 to help guide the expansion of California’s public higher education system. The Plan seeks to guarantee that all California high school graduates who qualify have access to higher education through a tripartite system:

- University of California – Open to the top 12.5% of statewide high school graduates, it is designed as the primary academic research
institution in the system, covering undergraduate, graduate and professional education. It also holds exclusive jurisdiction within the public higher education system for instruction in law, medicine, dentistry, veterinary medicine, and doctoral programs.

- California State University – Open to the top 33.3% of statewide high school graduates, its main mission is to provide undergraduate education and graduate education through masters’ degree programs. Doctorates can only be awarded jointly with UC.
- California Community Colleges – Open to everyone capable of benefiting from instruction, the mission of the community colleges is to provide academic and vocational instruction through the first two years of undergraduate education, and to provide remedial instruction such as language courses, workforce training, and community service courses.

The California Master Plan for Higher Education represents a pact between the government of California and its citizens to support higher education through tax dollars. As the population of California has increased exponentially over the past 45 years, the state systems have worked to keep pace by expanding existing campuses and establishing new ones. The pressure from population growth and the demands placed on higher education for a well-trained workforce are both expected to continue through the next 30 years, prompting all campuses to re-evaluate their resources and potentials.

1.1.2 HISTORY OF THE CAMPUS

The campus first opened in 1956 as an extension of the Los Angeles State College of Applied Arts and Sciences on grounds originally dedicated to farming. In 1958 the university was given autonomy from its parent institution and was integrated within the state’s system for higher education with the name of San Fernando Valley State College. At its founding, the University enrolled about 3,300 students and employed 104 faculty members. In 1972, the university was given its present name, California State University, Northridge.
The University grew rapidly over the ensuing twenty years, adding buildings to its campus to accommodate increasing demand from graduating high school seniors. In January of 1994, the 6.7 magnitude Northridge earthquake caused severe damage to all campus buildings and infrastructure the campus, and damaged five major campus facilities beyond repair. The campus responded immediately to the crisis, and launched a reconstruction effort while at the same time creating temporary facilities to continue its educational mission.

In support of the earthquake reconstruction, the 1998 Master Plan was developed and served as a guide for the development of new facilities. By 2005, the Campus reconstruction had been completed and significant landscape and pedestrian improvements described in the 1998 Plan had been implemented. The purpose of the 2005 Master Plan, under the guidance of President Jolene Koester, who has led the University since 2000, is to move the campus forward toward its future.

The University currently provides education to nearly 33,000 undergraduate and graduate students, employs 2,017 faculty members and 1,964 staff members, and offers bachelors’ degrees in 62 disciplines and masters’ degrees in 42 fields. Over its forty-year history, California State University Northridge has graduated more than 130,000 students.

### 1.1.3 MISSION OF THE UNIVERSITY

The physical campus is a formative tool that reflects the University’s mission and values. The 2005 Master Plan for California State University Northridge carefully seeks to incorporate in its design the solutions that will further the University’s principles and reinforce its goals.

#### California State University Northridge

**Mission Statement and Values**

California State University, Northridge exists to enable students to realize their educational goals. The University’s first priority is to promote the welfare and intellectual progress of students. To fulfill this mission, we design programs and activities to help students develop the academic competencies, professional skills, critical and creative abilities, and ethical values of learned persons who live in a democratic society, an interdependent world, and a technological age; we seek to foster a rigorous and contemporary understanding of the liberal arts, sciences, and professional disciplines, and we believe in the following values:

1. **Commitment to Teaching, Scholarship, and Active Learning.** We demonstrate excellence in teaching. We honor and reward high performance in learning, teaching, scholarship, research, service, and creative activity. Because the quality of our academic programs is central to our mission, we encourage intellectual curiosity and protect the multiple expressions of academic freedom.

2. **Commitment to Excellence.** We set the highest standards for ourselves in all of our actions and activities and support the professional development of faculty, staff and administrators. We assess our performance so that every area of University life will be continually improved and renewed. We recognize and reward our efforts of greatest distinction and through them provide state and national leadership.
3. Respect for All People. We aspire to behave as an inclusive, cooperative community. Our behaviors, policies, and programs affirm the worth and personal dignity of every member of the University community and contribute to a campus climate of civility, collegiality, tolerance, and reasoned debate.

4. Alliances with the Community. We seek partnerships with local schools, community colleges, businesses, government and social agencies to advance the educational, intellectual, artistic, civic, cultural and economic aspirations of our surrounding communities.

5. Encouragement of Innovation, Experimentation, and Creativity. We seek to provide an environment conducive to innovation, experimentation, and creativity. We encourage all members of our community to take intellectual and creative risks and to embrace changes that will enhance the fulfillment of the University’s mission.

In line with the University’s commitment to build alliances with the Community, the process of the 2005 Master Plan, Envision 2035, sought to involve those in the surrounding community as well as the campus community and incorporate their concerns and input into the planning process. In this way, the planning process, described in detail in Section 1.4, reflected the University’s commitment to promoting its values in a democratic society, and its aspiration to operate with respect and cooperation with the larger community.

1.1.4 ENROLLMENT GROWTH

In the earliest stage of the 2005 Master Plan process, the decision was made to extend its planning horizon to 30 years in order to facilitate long-term planning. Regional population projections indicate that the number of graduating high school seniors will significantly increase during that time frame. In light of the enrollment pressures the CSU system is anticipated to face over that 30-year period, California State University Northridge determined that it would need to increase its cap to 35,000 FTES, allowing for the possibility of adding 10,000 new FTES over the course of that 30-year period.

This target to 35,000 FTES represents a 40% increase in enrollments. The 2005 Master Plan sets the parameters not only for the academic facilities that will support that growth, but also for the accommodations needed for faculty and staff facilities, parking, student support, athletics, recreation, and housing.
1.2 PURPOSE OF THE 2005 MASTER PLAN

The 2005 Master Plan offers ways to implement and translate the University’s vision into physical space. It provides a guide for long-term land and building use and serves as a guide for near-term decisions on program planning and implementation, resource allocation, setting priorities and other University administrative matters which influence the student educational experience at California State University Northridge. These daily decisions collectively set a course for the long-term future of the University. The 2005 Master Plan will help ensure that such decisions are consistent with the University’s central mission.

Studies conducted within the context of the Master Plan investigated the capacity of the Northridge campus in order to determine the impact of various levels of enrollment growth. On the basis of those capacity studies, the Master Plan evaluates the effect of anticipated new facilities on the physical campus, and develops an appropriate plan for the campus facilities to accommodate the growth and change to the campus associated with 10,000 additional FTES over the next 30 years.

1.3 GOALS OF THE 2005 MASTER PLAN

The intent of the Master Plan is to map out a trajectory for growth and change that will enhance the physical campus, reinforce the University’s strengths, ameliorate its weaknesses and support the University’s mandate to provide high-quality education to a large student body. Specifically, the Master Plan facilitates the University’s ability to:

- Support faculty and staff with appropriate teaching, research and administrative facilities;
- Reinforce the University’s active learning focus by providing opportunities for interactions and collaborations among students, faculty, staff and University visitors;
- Make efficient use of developable land to preserve a balance between built-up areas and open space;
- Provide appropriate facilities for informal and organized recreation and intercollegiate athletics;
- Provide facilities for student and faculty/staff housing in support of the University’s mission;
- Serve as an accessible, safe and attractive campus for students, staff, faculty and the community;
- Maintain its stewardship of campus landscape and natural resources;
- Adequately maintain and manage all campus facilities;
- Serve as a regional center for intellectual, cultural and life-long learning;
- Continue its good relations with the Northridge community and local governments and organizations.

To achieve these goals, the Master Development Plan provides the University with a framework for development that updates the 1998 Master Plan. The 2005 Master Plan is a strategic approach to the development of the physical campus that provides support for both immediate and long-term decision-making by:

- Documenting and evaluating existing campus conditions;
- Assessing the implications of enrollment growth for expansion of campus facilities;
- Assembling and recording documentation of future campus needs and requirements;
• Identifying appropriate sites for development of new facilities;
• Specifying safe and functional pedestrian and vehicle circulation patterns;
• Quantifying parking requirements and identifying sites for adequate parking facilities;
• Incorporating facilities currently under development and construction into the Master Plan;
• Incorporating landscape concepts into the campus Master Plan;
• Specifying design guidelines to govern height limits, setbacks, building area, connection with campus open space, building materials for new structures, pedestrian pathways, and vehicle access roads; and
• Recommending a phasing strategy for new facilities that preserves campus functions and recognizes funding cycles.

The specific objectives of the Master Plan are detailed in Chapter 3, Master Planning Criteria.

1.4 PLANNING PROCESS

Led by the University’s Physical Master Plan Committee, with the support of the President and her cabinet, the planning process for the 2005 Master Plan extended over an 18-month time period. The process involved full collaboration with the University and neighboring communities, and comprised four phases:

• Phase I: Data Collection and Planning Analysis;
• Phase II: Visioning;
• Phase III: Development of Master Plan Alternatives;
• Phase IV: Development of Draft and Final Master Plan.

Each phase included a public outreach component so that input for campus and community stakeholders would be included in the Master Plan.

To begin the planning process, the University convened a Physical Master Plan Committee, consisting of faculty and staff, along with student, alumni, local business, and community representatives. The task of this Committee was to guide the development of the Master Plan, provide feedback, and evaluate proposals at various stages of the planning process. The Physical Master Plan Committee, led by Professor William Jennings, served as the nucleus for eight working subcommittees which in turn provided information and feedback to the Committee as a whole and to the master plan architects:

• Master Plan Architect/Consultant Selection
• Academic Plan
• Instructional, Intercollegiate Athletics, and Recreation
• Transportation and Parking
• Housing
• Student Services
• Commercial Services
• Community

The Committee was actively involved in the public outreach and communications components of the Master Plan throughout the process.
On the basis of the Committee’s recommendations, the University contracted with a professional planning firm, AC Martin Partners, Inc., to serve as Master Plan architects and assist in the development of the 2005 Master Plan. The Master Plan architects were responsible for leading the planning process, helping the University to create and refine a vision for the Master Plan, identifying planning goals, and illustrating and articulating Master Plan proposals. The Master Plan architects were responsible for coordinating the efforts of the professional consultants, including traffic and parking engineers; environmental analysts; landscape architects; utilities and infrastructure engineers; civil engineers; and communication/outreach experts. The Master Plan architects were also responsible for incorporating input from campus and community stakeholders into the final Master Plan proposals.

1.4.1 PARTICIPATION IN THE PLANNING PROCESS

The planning process was designed to encourage the participation by student, faculty, staff and community individuals and groups. Four campus-wide forum meetings were held over the course of the planning project, with each forum held twice, during the day and during the evening, to encourage a broad range of participation as possible. In addition, the Physical Master Plan Committee, with the assistance of the University’s Office of Public Relations and Strategic Communications, developed a website dedicated to the Master Plan process. All planning materials used in the campus forum meetings were included on the website, and the website provided a readily accessible avenue for input via e-mail. The planning process was also covered by the Daily Sundial student newspaper as well as local newspapers. Articles about the planning process were also included in Northridge, the Alumni magazine and CSUN.edu, the campus newsletter.

During Phase I, the Documentation and Data Gathering phase, students participated in a campus photographic survey organized by the office of the Associate Vice President of Student Affairs to gather information on students’ perceptions and experiences of the campus. Thirty student groups submitted over 2,000 photos along with their comments about the best, the most memorable, and the most problematic places on campus. The information from the survey was incorporated into the development of Master Plan alternatives (Phase III) and the Draft and Final Master Plan (Phase IV).

1.4.2 PHASES OF THE PLANNING PROCESS

Throughout all phases of the planning process, the Physical Master Plan Committee provided direction and input to the planning team. Materials and solutions produced by the planning team were presented at campus/community forum meetings for feedback. During the Master Plan process, a series of parallel studies were undertaken by campus groups and technical consultants; these included a study of student housing; a study of faculty/staff housing; a study of the Central Plant capacity and functioning; a comprehensive parking study; and a traffic study. Also during the phases of the Master Plan process, the planning team consulted with the Los Angeles City Department of Transportation; the
Metropolitan Transit Authority; Metrolink, the regional rail system; and state and local governments.

**Phase I: Review of Documentation and Data Gathering**

During Phase I, the Planning team reviewed all available studies, reports, publications, data and other documents in order to develop an appropriate scope for the Master Plan, comprehensively document current conditions, and identify needs and requirements for future campus development. During the Data Gathering Phase, the first of a series of Campus Forum workshops was held to gather input and information from the campus and neighboring communities.

**Phase II: Vision of the California State University Northridge Campus**

A series of Visioning Workshops conducted in Phase II were designed to articulate the University’s Mission and its vision for future development of the physical campus. The planning team met with the President and her cabinet, and also conducted a series of meetings with the Physical Master Plan Committee’s sub-committees to gather information regarding the needs and requirements of a wide range of University academic, administrative, housing, campus support, and student support programs.

**Phase III: Master Plan Alternatives**

In the third phase of the Master Plan process, the Planning team designed a series of Master Plan Alternatives and created three-dimensional computer models of the campus to illustrate them. These models formed the basis for discussion at campus/community forum workshops and at other meetings with constituent stakeholder groups. Each of the Alternatives accommodated the 35,000 FTES enrollment level that was the basis for the planning process, and each illustrated a distinct way that the facilities required to serve this enrollment level could be achieved on the campus.

**Phase IV: Draft and Final Master Plan**

The draft Master Plan was developed on the basis of the campus and community’s responses to the Master Plan Alternatives, distilling the proposed solutions into one plan. This plan was presented to a third series of campus/community forum meetings for comment and input. The final Master Plan described and illustrated in this report is the product of input from many sources and takes into account the university’s long-range vision as well as the phasing priorities necessary for long-term fiscal planning and integration with the Chancellor’s Office requirements. The final version of the Plan was presented in a fourth campus/community forum.
1.5 SCOPE OF THE 2005 MASTER PLAN

The scope of the 2005 Master Plan embraces three specific areas of concern: facilities for growth accommodation; functional modifications to the campus; and aesthetic enhancements of the campus and its facilities.

Facilities for Growth Accommodation

The Master Plan describes and illustrates how the University will be able to:

- expand academic facilities to accommodate the anticipated growth in student population of 10,000 additional full-time equivalent students over the next 30 years, commensurate with CSU system ratios;
- redistribute and expand parking facilities proportionate to the expansion of student enrollment capacity as determined by parking studies;
- expand student housing and dining facilities to reinforce the University’s living/learning programs and to provide for convenient lodging options for students;
- provide sufficient facilities for student recreation activities; and
- develop faculty/staff housing on campus as an incentive to faculty and staff recruitment.

Functional Modifications to the Campus

The Master Plan provides ways for the University to:

- incorporate ongoing building and development programs by identifying sites for new facilities already in development, including the Valley Performing Arts Center, the Parking/Public Safety Building, and a new Science building;
- develop sites for buildings in a strategic manner to create quads, courtyards and other open spaces that encourage casual social experiences among students, faculty, staff and campus visitors;
- reinforce the pedestrian environment of the campus, conserve campus open space and nurture campus natural areas;
- support the use of public transit by cooperating with city agencies to provide convenient access to public transit routes and systems; and
- make changes to campus entries and roadways that will improve the flow of traffic into campus parking facilities.

Aesthetic Enhancements of the Campus and Its Facilities

The Master Plan identifies ways for the University to:

- enhance the identity of the University and the campus through landscape and identification monuments;
Chapter One: Introduction and Purpose

- develop a campus landscape plan that builds upon and extends the 1998 Master Plan;
- develop view windows into the Campus from the Surrounding Community and reinforce the link to Reseda Boulevard; and
- develop a series of design guidelines that will allow the University to direct the design and development of new facilities and integrate their form and materials with existing buildings and outdoor space.
Existing Conditions and Needs/Opportunities Assessment

2.1 REGIONAL AND COMMUNITY SETTING

California State University Northridge is the largest institution in the San Fernando Valley, a primarily residential community about 22 miles from downtown Los Angeles. The campus is located just one block from the Reseda Boulevard commercial district, and is near to three important Southern California freeways, the 101, the 118 and the 405 freeways [Exhibit 2A].

Originally part of a vast wheat ranch in the late 1800’s, the area known as Northridge was first subdivided for development in 1910 and given the name Zelzah, meaning “oasis.” It was renamed Northridge in 1938 while it was still a primarily rural community. In the 1950’s, like most of the San Fernando Valley, Northridge’s rural character was beginning to change as agricultural land was developed for single-family housing. With increasing development, the area transformed into a satellite community of the Los Angeles metropolitan area.

First opened in 1956 as an extension of the Los Angeles State College of Applied Arts and Sciences on grounds originally dedicated to farming, the university was integrated within the state’s system for higher education in 1958 with the name San Fernando Valley State College. By 1972 the University had become one of the California State University campuses and given its present name, California State University, Northridge.

California State University Northridge, accredited by the Western Association of Schools and Colleges, is the only public university in the San Fernando Valley and is currently the third largest public university in Los Angeles County. The University plays a critical role in the San Fernando Valley’s economic, cultural, technological, and social development. As noted in the CSU system’s Economic Impact Report, California State University Northridge’s economic impact on the Los Angeles region is significant, with annual spending related to the University reaching $487 million annually, sustaining more than 13,500 jobs in the region, and generating nearly $57 million per year in tax revenues1.
The University makes other important contributions to the surrounding community, the state and the country. It is the major producer of K-12 teachers in the region, the state of California and the nation; it is a top producer of students going on to Ph.D. programs in science and other disciplines; it is widely recognized for providing educational services to minority students; it is widely recognized for providing educational services to handicapped and hearing-impaired students; it provides programs for adult education, extended education, and professional continuing education; it runs many programs for children and teens; and it is the primary anchor for athletics, art and culture for the 1.8 million residents of the San Fernando Valley.

2.2 ENROLLMENT

2.2.1 CALIFORNIA STATE UNIVERSITY NORTH RIDGE STUDENT CHARACTERISTICS

The University draws nearly 70% of its students from Los Angeles County and about 8% from Ventura County. About 20% of first-time freshmen come from a California private school or from another state or country, while 80% come from public high schools. Nearly 59% of undergraduates and 66% of graduate students are female. On average, undergraduates are 23.5 years of age and graduate students are 34.4 years old. These statistics, the most recent available, are based on a 2004 analysis of enrollments prepared by California State University Northridge Institutional Research.

2.2.2 ENROLLMENT GROWTH AND CURRENT CAPACITIES

California State University Northridge enrolls students in courses during the Fall, Spring and Summer semesters. As of Fall 2005, there were 25,139 full-time equivalent students (FTES) registered for classes; the total number of students registered for classes on the main Northridge campus was 33,243 (head count).

Enrollments on the California State University Northridge campus are nearing the University’s existing enrollment cap of 25,000, set at the time the campus was established. Currently, the University employs 2,017 faculty members. Exhibit 2B shows the increase in FTES enrollments since 1995. Current levels of enrollment, along with the faculty and staff complement needed to provide courses and services to the students, have strained the capacity of existing campus facilities and services, including instructional space and other assignable space, parking, and the broad range of student and campus support facilities available on the campus.

The University undertook consultation with academic units in preparation for the Master Plan study to address the impact and implications of increasing its enrollment levels (see Section 2.6: Academic Forecast). In the aftermath of that process, the Master Plan architects were asked to carry out studies to determine the ability of the campus to support increased enrollments. The capacity studies conducted in the initial phases of the Master Plan project indicate that the University will need to increase its physical capacity in order to accommodate an anticipated enrollment of 35,000 FTES.

On the 356-acre campus, 39.85 acres are currently allocated to playfields, which serve instructional, recreational and athletic activities. The total campus parking capacity is 12,100 spaces, including the new B2/B3 structure, which opened in the Fall of 2005.

2.3 EXISTING CONDITIONS ANALYSIS

2.3.1 CAMPUS SPACE ALLOCATION

Exhibit 2C shows that campus space comprises a total of 3,417,040 gross square feet (1,774,735 assignable square feet). This space includes all academic/administrative buildings, campus support buildings and housing. The University currently provides on-campus housing facilities for 2,461 residents at University Park and University Village.

Exhibit 2E shows the campus and its existing buildings.

2.3.2 EXISTING 1998 CAMPUS MASTER PLAN

The existing Master Plan, approved in 1998, identified sites for twenty-one new buildings for academic/administrative functions [Exhibit 2D]. These include sites for three parking structures, a series of future building sites meant for
facilities to be determined as campus development moved forward, and four sites with specifically identified uses. Of these latter, University Hall, Manzanita Hall, Sequoia Hall and the B3 and B5 Parking Structures have been developed on or near the sites identified in the 1998 Master Plan. A sixth site at the corner of East University Drive and Nordhoff Street is currently being developed as the Valley Performing Arts Center.

2.3.3 CAMPUS BOUNDARIES AND SURROUNDING CONTEXT

Exhibit 2F shows the existing campus and the surrounding land uses. The campus is bounded by public streets on all sides: its southern boundary is Nordhoff Street, an east-west arterial. To the east, it is flanked by Zelzah, a north-south arterial. To the west, the campus is bounded by Darby Avenue, one block from Reseda Boulevard. To the north of the campus core, Halsted Street forms the campus boundary, while Lindley Avenue is the boundary along the west edge of the northern section of the campus. At the very north of the campus is the Medtronic Mini-Med facility, bounded by Devonshire Street on its northern edge. The northern area of the campus is divided by Lassen Street, an east-west collector street. Etiwanda Avenue runs into the campus from the local residential neighborhood.

Land uses in the areas adjacent to the campus are varied. The predominant surrounding land use is residential: multi-family housing on the west side of Darby Avenue and on the east side of Zelzah Avenue north of Plummer Street; single-family housing along Halsted Street and Lindley Avenue, and along Zelzah Avenue from Nordhoff to Plummer. Nordhoff Street includes commercial and institutional uses, along with some single-family development along this arterial. One block to the west of campus is a major commercial corridor along Reseda Boulevard. The New Valley High School No.1, a public high school, has been developed on a site on Zelzah Avenue just to the south of the University Park student housing complex, as part of a land exchange with the Los Angeles Unified School District that allowed the G3 parking lot area to become part of the campus.

The campus is somewhat isolated from the surrounding areas due to the high-traffic streets bordering it, particularly along Nordhoff Street and Zelzah Avenue. There is a stronger connection with the surrounding context along Darby Street on the west side. This is primarily due to the streets that link Reseda Boulevard to the campus and to the synergies between the University’s large student base, the apartment housing west of Darby Avenue.
Chapter Two: Existing Conditions and Needs/Opportunities Assessment

1. Manzanita Hall
2. Music
3. Nordhoff Hall
4. Science
5. University Hall
6. Sierra Hall
7. Sierra Tower
8. Jerome Richfield Hall
9. Student Services
10. Engineering
11. University Club
12. Greenhouse
13. Volatile Storage
16. Kinesiology
16A. Kinesiology Addition
20. Oviatt Library Addition
22. Science Addition
24. University Student Union
25. Corporation Yard Addition
26. Business Administration/Economics & Education
27. Engineering Addition
28. Support Services
29. Student Housing
30. Sequoia Hall
31. University Village Apartments
35. Conference Center
36. Sierra Center
39. Corporation Yard
40. Planetarium
41. Bookstore
43. Faculty Office Building
44. Jeanne M. Chisholm Hall
45. Art & Design Center
46. Art & Design Center Addition
47. Satellite Union & Recreation Center
51. Western Center for Adaptive Aquatics
61. Athletics Office
71. Central Plant
72. Master Distribution Facility
78. Research & Development Buildings (3)
79. Parking Structure
81. Parking Structure
83. Parking Structure
86. Substation
87. Cooling Tower
92. Monterey Hall
96. Addie L. Klotz Student Health Center
97. Bookstore Addition
98. Children’s Center
115. Delmar T. Oviatt Library
201. Sagebrush Hall
202. Bank Building

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Chapter Two: Existing Conditions and Needs/Opportunities Assessment

Existing Surrounding Land Use

Legend
- Single Family Detached
- Multi-Family
- Commercial
- Public Facility
- Public Open Space
- Congregation/Community Facility
that is largely used by students, and the Reseda Boulevard corridor with its mix of uses and services.

The campus lacks a distinctive identity at its edges, and this increases its isolation from the surrounding community. On the edge along Nordhoff Street, the landscaping is well-detailed, while on other edges there is little to suggest the well-landscaped campus interior that exists just beyond the campus boundary. This is particularly true along the Zelzah Avenue edges where significant portions of land are dedicated to surface parking. Although there are campus identification monuments at some campus entries, overall, in many places the campus presents a somewhat anonymous face to the community.

2.3.4 CAMPUS LAND USE AND FUNCTIONAL ORGANIZATION

Exhibit 2G shows the existing campus land uses. The campus is composed of two joined land masses, the southern one which is nearly square in shape and the northern one which is elongated. The campus is organized with its main academic and administrative functions in the center of the southern portion of the campus, with surface parking lots around the periphery of the site. The academic core is strong, with the Oviatt Library serving as the center of the campus, facing a large open space comprised of the Oviatt Lawn and Sierra Quad. Student support facilities, including the bookstore, the Sierra Center, the University Student Union and the Student Services building, are all well-integrated with the Academic/Administrative core. The campus enjoys considerable expanses of open space. A large area of playfields used for instructional, recreational and athletics purposes connect the southern and northern portions of the campus. The Orange Grove, at the southeastern corner of the campus, and the Botanic Garden to the east of East University Drive constitute important natural resources for the University. The Physical Plant Maintenance, campus infrastructure and campus support services are located between Halsted Street and North University Drive (Plummer Street).

The northern areas of the campus are devoted to student housing, with both University Park and University Village located there; University Village also provides staff housing. Also in this portion of the campus are the Satellite Student Union, and student residential and commuter parking, with a playfield/athletics area at the northern-most sector just south of the Mini-Med facility. Large portions of campus land north of Lassen Street are currently vacant.

2.3.5 ACCESS, PARKING AND VEHICLE CIRCULATION

Campus Entries

Vehicle entries into the campus [Exhibit 2H] are distributed around the campus perimeter, leading from the main access routes to the campus along Zelzah Avenue, Nordhoff Street, Darby Avenue and Halsted Street. Some entries, along Zelzah Avenue and Darby Avenue, lead directly to surface parking lots. Five east-west streets from Reseda Boulevard (Halsted, Plummer, Vincennes, Prairie and Dearborn) give access to the campus from Reseda Boulevard, but there is no signage along Reseda to indicate that these campus entries exist. Visitor information kiosks are located along East University Drive, at Prairie Street, and at Zelzah Avenue. Because the latter two kiosks are not located directly along the main access streets, and because identification signage is lacking, those unfamiliar with the campus may experience some confusion as they seek to enter the campus.
Chapter Two: Existing Conditions and Needs/Opportunities Assessment

Legend
- Academic/Administrative
- Student Support
- Campus Support
- Housing
- Instructional, Athletic and Recreation Fields
- Parking
- Vacant
- Botanical Garden/Orange Grove
- Auxiliary Facilities
Chapter Two: Existing Conditions and Needs/Opportunities Assessment

Legend
- Surface Parking
- Parking Structure
- City Vehicular Circulation
- Campus Vehicular Circulation
- Campus Tram Route
- Tram Stop
- Campus Vehicular Entry/Exit
- Handicap Parking Spaces

Existing Parking and Circulation

California State University Northridge Master Plan | ENVISION 2035 |
Parking

As part of the data gathering and analysis phase of the Master Plan, a parking study was conducted by Kaku and Associates; the report of this study is available under separate cover.

At present there are 12,100 parking spaces on the campus in surface lots and parking structures, including the new B3 parking structure which opened in September 2005. A total of 8,300 of these are reserved for student use. Parking facilities accommodate student, faculty/staff, disabled, visitor, motorcycle, maintenance/service and state vehicle parking. Included in the total are 676 parking spaces along internal and perimeter streets, which are primarily available as City-regulated public parking. Except for on-street spaces on city streets, all campus parking is by semester or daily parking permit.

Vehicle Circulation

Although most vehicle circulation is confined to the campus perimeter, campus streets remaining from the city street grid are used for through-traffic, service and emergency vehicle circulation. These are: East University Drive (formerly Lindley Avenue), West University Drive (formerly Etiwanda Avenue) and North University Drive (formerly Plummer Street). Parking Structure B3 exits onto West University Drive, while the B5 structure exits onto Darby Avenue. As a result of the within-campus vehicle circulation, vehicle and pedestrian circulation routes cross at numerous points on the campus, creating potential hazards in a number of places.

Campus Tram

The campus tram route was initiated in September 2004, and has become a popular way for students to move through the campus. It serves to connect the northern and southern portions of the campus along the east side, starting at University Park and running east of the track and playfields to the University Student Union. Because there are two trams running simultaneously, the trip from one end to another is only about eight minutes. This level of efficiency has served to encourage tram use.

2.3.6 OPEN SPACE AND PEDESTRIAN CIRCULATION

The California State University Northridge campus incorporates a generous component of open space. In addition to the Orange Grove and the Botanic Garden, there are large quadrangles and open areas throughout the campus, including the recreation fields and athletic facilities north of the academic core [Exhibit 2I]. These open space areas form the framework for the pedestrian circulation system and serve a variety of programmed and informal uses. Some open spaces are furnished with seating and function as destination points for students, faculty, staff and campus visitors.

Pedestrian Pathway System

The pedestrian pathway system in the southern campus core is set up as a grid, with paths leading to all the major campus buildings and important destinations. Two pathways connect the southern core to the University Park area, one along Lindley Avenue and the other through the playfields; these do not have designated names. The north-south paths that flank the Oviatt Library, Oviatt Lawn and Sierra Quad, along with the sidewalks along East and West University Drives, are heavily used pedestrian routes.

A series of east-west pathways are distributed through the southern portion of the campus. Magnolia Walk, which travels north of the
Chapter Two: Existing Conditions and Needs/Opportunities Assessment

Legend
- Open Space
- Instructional/Athletics/Recreation
- Natural Resource Areas
- Primary Pedestrian Circulation
- Secondary Pedestrian Circulation

Existing Open Space

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Oviatt Lawn, and runs from West University Drive to East University Drive, will be extended through the University Student Union complex when the current construction there is completed. Jacaranda Way runs north of the Library; Sierra Walk leads from the Sierra Center to the central portions of the campus core, and continues east across East University Drive to surface lot G4; Matador Walk runs between Sierra Quad and the Oviatt Lawn; and Orange Grove Walk connects the Orange Grove with the Music Building and Nordhoff Hall.

**Campus Life and Student Support Services**

Student services are shown in Exhibit 2J; these include the University Student Union (USU), the Satellite Student Union (SSU) at University Park Apartments, the Student Services Building, the Matador Bookstore, and the Student Health Center. The University Club and the Children’s Center comprise University auxiliary services and amenities that are used by students, faculty, staff and community members. Food services are an important factor in creating a dynamic campus community. They are dispersed within the campus core, at the USU, the Matador Bookstore, Sierra Center, and the Exchange. In addition to these, the University Club, in the southeast part of the campus serves lunch and is open to the public. Most of the food venues include an associated outdoor area, and these food service spaces are important to the activation of open space areas. In the northern portion of the campus, the only food service is at the Satellite Student Union within University Park, at the corner of Zelzah Avenue and Lassen Street.

The University has several indoor recreation facilities. At the USU, facilities include weight training, fitness, swimming pool and electronic games. The Matadome and a gymnasium are in Redwood Hall. There are additional facilities in the Matador Bookstore and in the SSU. The University has meeting facilities in Oviatt Library, within the USU and the SSU facilities, within Sierra Center and at the University Club. The campus currently has three performance spaces, at the USU, at Nordhoff Hall and in Cypress Hall.

**2.3.7 BUILDING CONDITIONS AND LIFE-CYCLE**

The majority of campus buildings are in good to excellent condition as a result of the reconstruction efforts that came about in the aftermath of the 1994 Northridge earthquake. The exceptions are Sierra, Cypress, Nordhoff, Santa Susana, Live Oak and Eucalyptus Halls, which are nearing the end of their life cycles. In addition, there are several temporary buildings on the campus, which can be replaced with purpose-built structures.

**2.3.8 LANDSCAPE**

The hallmark of a university campus is the harmonious interconnection among buildings, open space and landscape. California State University Northridge enjoys a mature campus landscape with many large trees and broad lawn and planted areas that are well-maintained and contribute significantly to the campus ambience. The landscape design from the 1998 Master Plan has been largely implemented, resulting in campus roadways lined with palm trees and pedestrian paths named for their signature tree species planted along their edges. That Master Plan also provided for the development of quadrangles, courtyards and plazas resulting from the proper placement of buildings to enclose space. It is these features the 2005 Landscape Master Plan will build upon [Chapter 5].
Chapter Two: Existing Conditions and Needs/Opportunities Assessment

Legend

- Food and Dining Services
- Auxiliary Campus Services
- Student Services
- Meeting Facility
- Outdoor Active Recreation
- Indoor Recreation Facility
- Performance Facility
- Gallery

Existing University Life and Student Support Services
The campus landscape has two distinctive natural areas: both the Orange Grove and the Botanic Garden are assets to the campus that can be enhanced. Each area needs grooming and revitalization to make its special qualities more readily appreciated by campus residents and visitors. The Orange Grove, particularly, should be better integrated into the campus, so that this symbol of the previous campus land use can become a useful asset to the University.

The campus perimeter landscape is inconsistent. Some campus edges are lined with a single species of trees, forming an identifiable boundary, while other edges adhere to no design but appear to have been planted somewhat randomly. Similarly, there has been no thought-out plan for creating views into the campus, to allow visitors and passers-by to have a clear impression of the generous open spaces and intimate courtyards that are such a signature of this large suburban campus. The campus also has the opportunity, not yet realized, to use the campus edges as an identity marker.
### Existing Utilities and Campus Infrastructure

#### Existing Electrical Utilities [EXHIBIT 2K]

**Electrical Service**

California State University, Northridge is currently served from a 34.5kV DWP service originating from the north east side of the campus. The 34.5kV DWP service serves four 5000kVA 34.5kV/4160V substations, Substation 'A', Substation 'B', Substation 'C' and Substation 'D' located on the campus. Each substation is equipped with a dual 34.5kV DWP feed, a metering section and 5kV main switchgear comprised of a 1200A main breaker and feeder breakers. Circuits originating from these substations form multiple loop systems through 15kV selector switches and serve each building on campus. Exhibit 2K is an electrical site plan showing locations of Substations, manholes and routing of circuits throughout the campus. All conduits are sized 4" and are encased in concrete. A table summarizing the installed capacities/demands on each substation feeders is provided in Exhibit 2L. The University owns and maintains the 34.5kV/4160V substations, 15kV distribution network and the substations located in each building. A single line diagram for the campus is included in the Appendix.

#### Electrical Distribution System

The campus main 5kV distribution system is comprised of 15kV, '3' conductor 500kcmil EPR cables installed in concrete encased duct banks that traverse through manholes to serve 15kV selector switches located on campus. Radial feeders originating from these selector switches and sized to individual building loads serve each building's substation.

<table>
<thead>
<tr>
<th>SUBSTATION</th>
<th>FEEDERS</th>
<th>INSTALLED CAPACITY IN KVA</th>
<th>DEMAND IN KVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A1</td>
<td>1,080</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>A2</td>
<td>2,880</td>
<td>1,500</td>
</tr>
<tr>
<td></td>
<td>A3</td>
<td>3,000</td>
<td>1,500</td>
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<tr>
<td></td>
<td>A4</td>
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<td>3,950</td>
<td>2,000</td>
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<td>2,250</td>
</tr>
<tr>
<td>B</td>
<td>B1</td>
<td>4,600</td>
<td>2,200</td>
</tr>
<tr>
<td></td>
<td>B2</td>
<td>4,300</td>
<td>2,200</td>
</tr>
<tr>
<td></td>
<td>B3</td>
<td>2,250</td>
<td>1,100</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>3,500</td>
<td>1,700</td>
</tr>
<tr>
<td>C</td>
<td>C1</td>
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<td>C4</td>
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</tr>
<tr>
<td>D / Central Plant</td>
<td>F2</td>
<td>5,000</td>
<td>2,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>D / Cooling Tower</td>
<td>F1</td>
<td>1,500</td>
<td>750</td>
</tr>
</tbody>
</table>

EXHIBIT 2L: Installed Capacities by Substation/Feeders
2.4.2 EXISTING MECHANICAL UTILITIES [EXHIBIT 2M]

The existing central plant serving the campus was completed in 1998 and currently serves 2.4 million square feet of campus buildings. It consists of primary/secondary chilled water and heating hot water systems. There are three (3) 1200 ton centrifugal chillers located on the south side of the second floor of the central plant. The pumps are located below the chiller room. There are also two (2) 21,000 MBTUH boilers located on the north side of the second floor. All of the pumps and associated expansion tanks and air separators are located on the same floor. The cooling towers to support the water cooled chillers are located in a separate structure located south across Plummer Street. The associated pumps are also located within the same structure.

A 29,000 ton-hour thermal energy storage tank (TES) located just east of the central plant provides chilled water to the campus during electrical peak periods. During off-peak hours, the Central Plant generates chilled water, which is stored in the TES. This allows the campus to meet nearly all of the high peak and low peak cooling demand using the chilled water generated during the base period.
A total of 2.8 miles of underground chilled water and heating hot water piping is distributed throughout campus. The main chilled water and heating hot water systems run in common alignment around the campus. Exhibit 2M is the piping distribution diagram for pipe routing and sizes. The chilled water system is 20” at its largest and 14” at its smallest. The heating hot water system is 10” at its largest and 4” at its smallest.

The Campus has an existing Siemens Building Automation energy management system. This system controls central plant operation, the majority of HVAC within each building, and meters BTU consumption of each building in approximately 80% of the buildings.

2.4.3 EXISTING TELECOMMUNICATIONS UTILITIES [EXHIBIT 2N]

The University has completed a number of projects that have upgraded the telecommunication infrastructure. This included new underground cabling and building distribution.
In 2001 the campus completed construction of a new 4100 square foot Main Distribution Facility (MDF). The MDF houses the voice, data and video equipment that serves the main campus. In 2003, the University completed the Telecommunication Infrastructure Upgraded project that provided for upgrades to the inter-building distribution system including pathways, copper and fiber optic cable backbone systems, as well as intra-building distribution.

The design criteria for the above projects were based on The California State University Telecommunication Infrastructure Planning Standards adopted by the Office of the Chancellor effective July 2003.

2.5 **EXISTING CAMPUS CIVIL ENGINEERING CONDITIONS**

The existing Civil Infrastructure Systems will all need to be upgraded and extended to meet the future demands of the 2005 Master Plan. System upgrades will require close coordination with the various city and county agencies responsible for the off-site utilities serving the campus.

2.5.1 **EXISTING STORM WATER CONDITIONS [EXHIBIT 2O]**

The drainage surface-flows along existing roadways and gutters throughout the campus, eventually exiting the site through curb openings onto the perimeter city streets. Once the storm water flows onto the streets, it is taken into the City drainage system, which ultimately runs into the LA County Flood Control System.

On the Main Campus, the area around the existing Bookstore entrance has historically had drainage problems; existing storm drain pipes on the east side of this facility may conflict with proposed development.

2.5.2 **EXISTING SANITARY SEWER CONDITIONS [EXHIBIT 2P]**

For the North Campus area, the City of Los Angeles Department of Public Works, Bureau of Sanitation (BOS) operates the 8-inch sanitary sewer mains, one in Lindley Avenue and one in Zelzah Avenue.

The sewer main in Lindley Avenue is already utilized beyond capacity. The campus operates several sanitary sewer holding tanks and pumps to retain flow for pumping into the system during off-peak periods, and at least one tank is in need of relocation. In addition, the 15-inch sanitary sewer that crosses Vincennes Street and flows toward Prairie Street would be in conflict with planned buildings.

2.5.3 **EXISTING DOMESTIC WATER CONDITIONS [EXHIBIT 2Q]**

The Campus is served directly by the City of Los Angeles Department of Water and Power (DWP) from distribution mains in Zelzah Avenue. The existing University Village Apartments front east towards Zelzah Avenue and feed directly off this water main.

The North Campus area is served by an existing 12-inch water main in Lindley Avenue and an 8-inch main in Zelzah Avenue. DWP’s mains in this area are sized for multi-unit residential and commercial development. No upgrades should be necessary as these existing mains are sized for high-density development.

The city water main in Plummer is already at capacity, but the balance of existing potable water on the campus are adequate and should not require any modifications.
Chapter Two: Existing Conditions and Needs/Optunities Assessment

Existing Storm Water System

- 15" φ
- 12" φ
- 16" φ
- 54" φ
- 24" φ

18" x 11"

15" φ
18" x 11"

30" φ
12" φ
18" x 11"

20 Existing Storm Water System
Chapter Two: Existing Conditions and Needs / Opportunities Assessment

Existing Domestic Water Conditions

[Map showing existing domestic water conditions]
2.5.4 **EXISTING FIRE WATER CONDITIONS [EXHIBIT 2R]**

The existing Fire Protection system is supplied from the same DWP water mains as the domestic water supply discussed in the previous section, but feeds off the these mains as a completely separate service. On campus the existing fire system functions adequately, primarily at or near capacity.

2.6 **ACADEMIC FORECAST**

The University, led by the Division of Academic Affairs, undertook an Academic Forecast Overview in May 2004, in preparation for the Master Plan project. The Division of Academic Affairs' consultative process made use of a questionnaire developed by the Provost's Council, which was distributed and used as an aid to planning by all colleges and other academic program units, including the Educational Opportunity Program, the Office of Faculty Affairs, Academic Support Services, and technology units.

The Academic Forecast process allowed academic units to take into account the possibility that the campus would grow to 35,000 FTES, and to address the implications of that growth. The process also allowed each unit to reflect upon issues being currently debated within the campus as well as those issues affecting the field of higher education in general. These issues included discussions about California State University Northridge as a learning-centered university, changes in General Education programs that will go into effect in the Fall of 2006, and potential changes in the mix of Lower Division, Upper Division and Graduate students.

The results of the survey are summarized below; the report is available under separate cover.

Although many of the details of the academic units’ recommendations will be addressed in the programming and design of new facilities, these recommendations will also have an impact on the development of the 2005 Master Plan.

The report highlighted the need for flexibility in light of the rapidly changing higher education picture, including changes in pedagogy, technology and instruction delivery methods. Recommendations addressed classroom and lecture space, the use of technology, the need for office and support space, the use of outdoor space, faculty and staff development needs, and the need for meeting and conference facilities.

**Classroom and Lecture Space**

The colleges reported a need for additional instructional and support space, including smaller classrooms accommodating 25-50 and 50-75 students, and classrooms seating 100-150 students. The colleges requested that decisions to use large lecture halls in the range of 300-500 seats should be debated in light of the University's culture and pedagogical model and that these decisions should be made in consultation with academic units. It was noted that all new classrooms should incorporate state-of-the art technology, in order to accommodate the need for faculty to work with students in various locations and in various time-frames.

**Technology**

The report noted that, while technology will play an increasing support role in instruction, the academic units do not anticipate any diminished need for classrooms, offices, gathering spaces and areas for services such as advisement and the library. A separate report on technology was developed, which addressed the need for the
latest technology in new facilities and associated needs. These include adequate power and data connections in computer laboratories; accessible workstations for students with disabilities; increased wireless access; voice, data and video connectivity to all classrooms; and the need for secure telecommunications utility rooms in all buildings.

**Faculty Office Space**

The University currently lacks office space for up to 200 faculty positions, based on existing enrollments. As the University develops to accommodate an additional 10,000 FTES, the report noted the need for additional office space for full-time and part-time faculty, and further noted the increased need for office space if the proportion of part-time faculty increases. The report addressed needs for conference space, particularly rooms for up to 200 people; storage space for hard copy as well as electronic data; and a flexible approach to furniture to make the best use of available space.

**Outdoor Space**

The report noted the need for outdoor instructional space for the University’s Kinesiology program, as well as for space needed to fulfill the commitment to the new high school for outdoor instructional space.

**Faculty and Staff Development Needs**

The Academic Forecast report noted an anticipated need for staff development and training facilities, either centrally located or distributed throughout campus buildings.

**Meeting and Conference Facilities**

The report indicated that the University lacks the facilities needed to host regional and national conferences; these facilities could also be used by instructional and research programs as well as the local community. The need to house visiting scholars or other campus visitors was also noted.

### 2.7 NEEDS ASSESSMENT: IDENTIFIED FACILITIES NEEDS

The analyses, studies and exercises undertaken for the 2005 Master Plan have resulted in a needs assessment that has identified the requirements for physical facilities which California State University Northridge will need to accommodate an enrollment increase from the current 25,000 FTES to 35,000 FTES over the next thirty years. These requirements include state-funded/enrollment-driven facilities, non-state-funded facilities, and campus improvements.

#### 2.7.1 FACILITIES FOR GROWTH ACCOMMODATION

**Academic/Administrative Facilities**

Academic facilities for growth accommodation will be state-funded. At the CSU system average of 115,000-gsf per 1,000 students, an increase of 10,000 FTES represents a need for 1,150,000 gross square feet of new instructional and administrative facilities.

These facilities will include the expansion space for all academic, administrative and student support programs as enrollments increase. In addition to the new academic/administrative buildings, the campus anticipates extending its Central Plant facilities to accommodate new growth and development in the southeast areas of the campus. New facilities will also be required to
replace temporary buildings as well as buildings which have reached their effective life-cycle. (See Chapter 7 for phasing of the Master Plan).

**Facilities Under Development**

Five facilities are currently in the process of development. The Valley Performing Arts Center, scheduled to break ground in Fall, 2007, will be built on the site identified in the 1998 Master Plan, at the corner of East University Drive and parking lot D1, just north of Nordhoff Street. The University Parking and Public Safety building is currently being developed at the corner of Prairie Street and Darby Avenue. A third specifically identified need, which was the subject of a study in the early phases of the Master Plan, is a new science building to comprise approximately 90,000 gsf of space. The Master Plan identifies an appropriate site for this building just south of the Botanic Garden. The new science building is scheduled to break ground in Fall, 2007. The expansion of the University Student Union is under construction at the time of this report. A permanent food service facility at the site of the existing temporary “Exchange” is scheduled to break ground in Summer, 2006.

Instructional programs that use campus playfields have requested an increase of space; these playfields are shared with the university athletics programs and university and student-run recreational programs.

2.7.2 **NON-STATE-FUNDED FACILITIES**

The increase in enrollment to 35,000 FTES also requires facilities which are not state-funded. In addition to the portion of the Valley Performing Arts Center, which is partially non-state-funded, other facilities, such as food service and parking facilities, will be funded under the Campus Non-State Capital Outlay Program.

**Parking and Transportation Management**

Analyses of current facilities and needs assessments indicate that, at the CSU system average of 450-500 parking spaces per 1000 FTES, 4,500 -5,000 new parking spaces will be required to accommodate 10,000 new FTES.

Input from campus and community during the early stages of the Master Plan process identified a need to encourage the use of public transit to and from the campus in order to better manage campus transportation issues and to help reduce parking demand and traffic congestion. This goal will require both new physical facilities and new or strengthened university programs to promote public transit use. The Master Plan includes a site for a new transit center to accommodate city buses and an extension of the current campus tram system to make movement around the campus easier.

**Student Housing**

The University housing program has identified the need for student residential facilities to provide 2,500 new bed-spaces, on the campus to accommodate enrollment increases. A portion of the required new parking will be dedicated to student residential use. These housing facilities, will be financed by the housing fund. Increased student housing will spur the development of a dining facility to accommodate residential students.
Faculty/Staff Housing

The University has also identified a need to create campus-based faculty/staff housing to aid in recruitment and retention, and to create a faculty presence on the campus. This project, spearheaded by the University Corporation, requires space for up to 600 housing units in the form of apartments, condominiums and/or townhouses, with associated outdoor space as appropriate.

University Club

The University Corporation has requested space to expand the University Club and its operations. This is particularly important in light of the new Valley Performing Arts Center, which will bring increased numbers of visitors to the campus. In addition, alumni groups have requested space on campus to house alumni programs.

2.7.3 CAMPUS FUNCTIONAL AND AESTHETIC IMPROVEMENTS

A series of improvements to the campus have been projected that will have both functional and aesthetic impacts. As indicated above, improvements to campus entry and the vehicle circulation system will improve access and safety. At present, campus through-roads make it possible for a significant number of private vehicles to move within the pedestrian zone, creating a hazard for pedestrians who must cross campus roadways to get from parking areas to the campus core. Observations and assessments of the campus during the initial stages of the Master Plan process indicated a need to reduce campus through-traffic where possible and to make campus access and entries more legible for visitors. The needs assessment also identified a requirement for handicap/ADA accessible parking within the campus core.

With the addition of new buildings will come opportunities to enhance the outdoor open space system. In addition to improvements to the Orange Grove and Botanic Garden discussed above, the Master Plan will identify opportunities to reinforce the campus open space system and to use new buildings to reconfigure individual open space areas to accommodate both programmed and informal activities. A conceptual Landscape Master Plan (Chapter 5) will provide direction for decision-making about campus perimeter landscape: landscape for newly created quads, courtyards and pathways; campus identity; and the need for a consistent system of site furnishings such as lighting, seating and trash receptacles.

In addition to these improvements on existing campus aesthetic qualities, the campus anticipates the need for augmenting and/or upgrading some campus utilities infrastructure systems. These alterations will be most efficiently accomplished in conjunction with construction and landscape projects.
2.8 OPPORTUNITIES AND CONSTRAINTS [EXHIBIT 2S]

The California State University Northridge campus provides a broad range of opportunities for developing the facilities identified in needs assessment analyses and master plan-related studies. Similarly, current conditions on the campus pose constraints that can be used to guide the pattern of development.

2.8.1 OPPORTUNITIES

Development Sites

Capacity studies conducted early in the Master Plan process show that land currently owned by the University is adequate for the development of facilities required for the next increment of enrollment growth to 35,000 FTES. The 2005 Master Plan strategy focuses upon identifying areas for development that will have the least impact upon campus open space. Land currently used for surface parking can serve as building sites for new facilities if the density of parking facilities on the remaining parking lots can be increased through the development of parking structures (see below). The sites of several temporary buildings that have reached the end of their useful life-cycle are also potential building sites for new academic, administrative and student support facilities, with the caveat that the functions and programs housed in these buildings must be re-located to other campus facilities. These buildings and facilities are discussed in Chapter 7: Phasing.

An analysis of the campus land available for new facilities shows that the eastern, southeastern and south-western areas of the campus can accommodate increased development without unduly compromising the existing open space system. The siting of buildings to enclose open space areas will make those areas more appealing and better used than they are currently. New structures can be developed that will frame and emphasize campus entries, creating a stronger sense of place and campus identity.

Campus Identity and Connections with the Community

Development of the campus should include ways to increase the visibility of the campus and create better connections with the surrounding community. The local business improvement district has shown an interest in reinforcing a university-based district; this presents an opportunity to the University for joint and coordinated efforts along the Reseda corridor and the smaller streets connecting Reseda Boulevard with the campus.

In addition to the perimeter landscape improvements mentioned above, the campus should develop alliances with the owners and developers of properties along the streets connecting Reseda Boulevard to the campus: Halsted, Plummer, Vincennes, Prairie, and Dearborn. Those streets should be landscaped with the campus signature Washingtonia palms (see Chapter 5: Landscape Master Plan). Streetscape plans may include street lights and banners. These additions to the streetscape will be a highly visible signal of the campus presence. In addition, some of those street corners at Reseda Boulevard, particularly at Plummer Street and Prairie Avenue, should
incorporate signage or other means of identifying that these roadways lead directly to the campus. The University should look for other ways to cooperate with the local business community to create a vibrant University district that will benefit all parties.

Transportation Management, Campus Entry and Parking

Early discussions with the Metropolitan Transit Authority (MTA) yielded agreements to modify existing bus routes in the near-term and long-term if a Campus Transit Center could be sited to provide both fast access to and from Reseda Boulevard and adequate parking and turn-around space. In addition, the MTA was completing plans for their Metro Rapid bus route at the time of this report. The site proposed originally for a Metro Rapid bus stop at Nordhoff Street and Zelzah Avenue was, through negotiation with the MTA, moved closer to the campus core and nearer to the new Valley Performing Arts Center. The location of this bus stop will have to be coordinated with access to Campus entry roadways to avoid vehicle circulation conflicts [Chapter 4].

The land exchange that gave the University the G3 parking areas presents an opportunity to create a new campus entry roadway that will move traffic more quickly off surrounding streets and into campus parking facilities.

Parking capacity can be efficiently increased through the development of several parking structures on land currently used for surface parking. Accessibility to campus facilities will be maximized if parking structures are developed on lots that give ready access to the academic core. These parking structures can be designed to reduce their visual impact and landscaped to provide screening so that the presence of these large buildings is effectively masked.

Student Residences

The University continues to endorse the concept that significant learning takes place in non-classroom settings. Student residences have a substantial role to play in the integration of university students into the campus community, in the support of students’ academic achievement and in their social and personal growth. In order to better integrate lower-division students into campus life, Student Affairs has requested that some portion of the new housing facilities be sited nearer to the campus core than the existing University Park apartments. After an initial study of potential sites for housing, it was also determined that there are in-fill opportunities in the University Park area which can be utilized for near-term development of student housing. Dining facilities developed along with the new housing on the campus core can serve the wider campus community as well as
Chapter Two: Existing Conditions and Needs/Opportunities Assessment

Legend
- Areas with Potential for Future Development
- Temporary Structures (or near the end of their useful life-cycle)
- Landmark Buildings
- Character-defining Open Space
- Linkages to Strengthen
- Activity Nodes
- Street/Roadway Closure
- Location for Campus Identification Elements
the residential students and the University’s learning/living programs. A series of temporary buildings and buildings that will outlive their useful life cycles in the area between Plummer and Halsted Streets provide an opportunity for student housing to be built within the campus core.

**Faculty/Staff Housing**

The northern portion of the campus above Lassen Street, currently under utilized, has been identified as an appropriate site for a faculty/staff housing village. This new development will make best use of this land area, which is separated from the Campus Core by Lassen Street and is bordered by private residences on two sides. The Faculty/staff village is to include open space and park areas, parking integrated with the housing development, and small-scale retail space that will serve the nearby University Park student residents and the surrounding multi-family residents as well as the new residents of the faculty/staff village.

A second area for faculty/staff housing, closer to the campus, can also be developed; this development would be appropriate to accommodate housing for short-term campus visitors, a need identified during the early phases of the Master Plan.

**Facilities Maintenance and Campus Utilities Infrastructure**

The existing sites dedicated to Facilities Maintenance and Plant Operations are to be maintained. A smaller Central Plant extension can be constructed on an existing surface parking lot area in the southeast sector of the campus to serve the new anticipated development.

### 2.8.2 CONSTRAINTS

The local residential community has indicated that changes which reduce campus-bound traffic on their residential streets would be an important way the University can reinforce good relations with the surrounding neighborhood. It may be possible to close some campus entry roads to achieve this. For example, an analysis of campus entries suggests that some campus entries along Halsted Street might be closed without compromising access to the campus.

Significant areas of the existing campus are to be maintained in order to support the functionality and efficiency of the campus plan. The academic core will be maintained, with new academic facilities sited within or adjacent to this precinct. As considerable resources have gone into some of the existing playfields, it will be an aim of the 2005 Master Plan to maintain those fields as much as possible, and to augment them with new areas to be shared by instructional, athletics and recreational programs, as opportunities present themselves. The University Park student housing development will be maintained as existing, with the possibility of in-fill development.
2.8.3 CONCLUSION

A comprehensive analysis of the existing campus suggests that the University will be able, with the allocation of appropriate resources, to accommodate the anticipated enrollment increases to 35,000 FTES over the thirty-year time frame of the 2005 Master Plan. Proposed changes to the campus are described and illustrated in Chapters 4 - 7 of this report, and will be consistent with the Master Planning Criteria described in Chapter 3.
Master Planning Principles

The physical campus is a potent instrument of the educational process. The higher education experience in its fullest sense takes place not only in classrooms, but at meals, in residential areas, in the course of recreational activities, and through informal and chance encounters. The physical campus provides the setting for these experiences to be shared by students, faculty, staff, and campus visitors.

The planning principles underlying the California State University Northridge Master Plan are based on the traditional approach to campus planning: the use of open spaces as the primary organizing tool. This approach informs both the philosophy and the methodology used to develop the Master Plan, and is grounded in the original derivation of the term ‘campus’, Latin for ‘field.’ The traditional concept of a campus, exemplified by Oxford and Cambridge Universities in Great Britain and many American universities, is an arrangement of buildings set within a ground of natural elements. In this approach to campus planning, open space areas are the basic building-blocks of the campus, with structures used to define and delimit open spaces. Interest and complexity are created by varying the size and style of the open spaces throughout the campus and by the form and details of the buildings that surround them.

The California State University Northridge 1998 Master Plan followed this traditional approach, resulting in a campus that makes good use of its physical setting and the open space areas that contribute significantly to campus life. The 2005 Master Plan acknowledges and reinforces this Plan, while enlarging its vision and adapting it to an expanding campus population.

In addition to this traditional campus planning approach, the 2005 Master Plan incorporates contemporary concepts of the broader discipline of Planning. As part of this multidisciplinary approach, the larger urban picture and the University’s role within its neighboring community has been a prevailing consideration throughout the planning process. Thus, the Master Plan addresses ways in which the University can reinforce its connection to and integration with the sur-
3.1 PLANNING PRINCIPLES AND OBJECTIVES

At the start of the Master Planning process, the planning team developed a series of planning principles and objectives tailored to the California State University Northridge mission, culture and campus. These principles and their related objectives are based upon observation and analysis of current campus conditions, and serve two functions: 1) they provide a philosophical and practical framework for preparation of the campus Master Plan; and 2) they provide benchmarks that allow for an evaluation of whether the final Master Plan fulfills its stated goals.

These observations, principles and objectives are discussed below and are referred to in subsequent sections of the report as the basis for Master Plan recommendations.

3.1.1 PRINCIPLE I: CAMPUS FUNCTIONAL ORGANIZATION

Observation

The existing functional organization of the campus serves the University’s mission and purposes well. Academic/administrative, student support, athletic, housing and campus operations areas are well defined and organized to support one another.

Planning Principles

The 2005 Master Plan shall enhance and improve the functional organization of the campus through the placement of buildings in strategic locations. New facilities will serve to expand the University’s capacity while conserving open space and strengthening the pedestrian character of the campus. The planning for new facilities along the boundaries of the campus will focus on appropriate transitions between the campus and the neighboring community.

Planning Objectives for Campus Functional Organization

- Functional precincts (areas of the campus primarily occupied by specific functions) shall be reinforced by new buildings and facilities of similar function.
- New functional precincts shall be created to support the needs of academic, administrative and student support programs and to serve campus life.
- Campus focal points and gathering areas, including facilities of singular use and importance, will support functional precincts and pedestrian circulation.
- Food services facilities shall be distributed throughout the campus to serve student, staff and visitor needs, to activate functional precincts and to reinforce the pedestrian circulation system.
• Increased student residential capacity shall reinforce the University’s active learning programs, support a safe 24-hour environment on campus, include facilities for dining, and incorporate open space to support recreational programs.
• Campus entries shall be clearly defined to reinforce campus identity and convey a sense of arrival.
• Campus identity and connection to the surrounding community shall be improved by planting signature landscaping and, potentially, other site amenities such as lighting and signage, along the campus boundaries and along streets leading to Reseda Boulevard.

3.1.2 PRINCIPLE II: OPEN SPACE AND PEDESTRIAN CIRCULATION

Observation

Open space is as integral and essential a component of the California State University Northridge campus as are its buildings and facilities. The recognition and articulation of open space is the primary framework that determines land use on the campus and creates character-defining features such as the Sierra Quad, the Botanic Garden, and the Orange Grove.

Open space areas, through their landscape and hardscape elements and their site furnishings, provide visual continuity and unity within the campus. Open space also serves to orient users and visitors to the campus, and, in conjunction with identification monuments and markers, demarcates clear entry points and gateways to the University.

The campus has a substantial amount of undeveloped and under-utilized land which will accommodate the majority of the Master Plan’s required new development while also incorporating new quads and courtyards; implementation of the 2005 Master Plan will not consume green space and open areas. Pedestrian pathways successfully interconnect various areas of the Academic Core, but linkages between the core and student housing, as well as linkages between the campus and the surrounding community, are weaker.

Planning Principles

Master Plan development shall make use of underutilized and vacant lands rather than consume campus green areas and open space. The Master Plan shall reinforce the existing campus system of quads, courtyards, and natural areas, creating a series of “outdoor rooms” joined by pedestrian pathways. These open space areas support the University’s Mission by providing spaces for academic, recreational, social and other campus activities, and serve everyday life on the campus. Pedestrian linkages between areas of the campus, particularly student housing and the campus core, shall be strengthened. The connections between the campus and the surrounding community will be articulated and strengthened.

Planning Objectives for Open Space

• Open space areas shall provide a variety of spatial experiences by way of variations
in size, programmed uses, architectural character of surrounding buildings, and landscape.

• Open spaces shall include areas of lawn, landscape and hardscape, shade, and site furnishings (seating, lighting, signage) to reinforce their programmed uses.

• Master Plan development will serve to create and define vistas and view corridors through the strategic location of buildings to frame open space and the use of landscaping.

• Building entries shall be located to address adjacent open space areas. Interior common spaces should be well connected to adjacent outdoor spaces to reinforce casual interaction and support the concept of active learning in “outdoor rooms”.

• Master Plan development will provide for the revitalization and improvement of natural resource areas of the campus, particularly the Botanic Garden and the Orange Grove.

• Master Plan development shall reinforce and strengthen an integrated pedestrian circulation system to support open space objectives, strengthen the links between campus activity hubs, and strengthen spatial legibility.

• The pedestrian circulation system linking University Park and the academic core, as well as pathways within the academic core, and those leading to Reseda Boulevard shall be strengthened and reinforced.

• Food service facilities shall be connected to and reinforce open space areas and gathering areas to encourage and provide the setting for informal interaction among students, faculty, staff and visitors.

3.1.3 PRINCIPLE III: BUILDING MASS AND PLACEMENT

Observation

Building location, scale, and orientation have a significant and direct impact on the qualities and characteristics of open space, pedestrian circulation, and overall campus functionality. Buildings support the University’s mission by serving as the setting for both programmed and informal activities. Buildings serve to modulate the physical environment to human scale, and make a significant contribution to the aesthetic environment of the campus.

Planning Principles

The placement, scale and massing of buildings shall reinforce the campus open space and pedestrian circulation systems and shall support the University’s mission by providing appropriate facilities for academic, social and recreational pursuits, and by creating a congenial environment for human activities.

Planning Objectives for Building Mass and Placement

• New buildings shall be placed and configured to define campus open spaces.

• The placement of new buildings shall not detract from the library as the center of the campus.
• The University shall continue to respect its surrounding residential neighbors by using appropriate setbacks consistent with those of existing buildings and with landscaping designed to create screening and modulate scale.

• New buildings shall not exceed six stories in height above grade and the height of an individual building shall be appropriate to that of other structures in the contiguous open space.

• Buildings entries shall be readily visible, placed to relate to adjacent open space areas, and configured such that activity from buildings may easily flow into nearby open spaces and pedestrian pathways.

• Future buildings shall reflect efficient land use; that is, small single-story buildings shall be avoided in favor of larger, multi-story ones where appropriate to building program and use.

• The design of large campus buildings shall incorporate architectural articulation, window patterns and connections between the building and landscape to moderate their impact on the campus.

3.1.4 PRINCIPLE IV: LANDSCAPE

The California State University Northridge campus enjoys a maturing landscape that is the legacy of its history and location as well as the implementation of the 1998 Master Plan. The quality of the landscape and its component parts contribute significantly to the aesthetic character of the campus by reinforcing the integrative role of open space, creating connections between landscape and structures, and producing a comfortable and human-scaled setting for educational activities.

Planning Objectives for the Design and Development of Landscape

• Landscaping shall be used as visual and connective elements that serve to modulate building scale, create a continuous sequence of outdoor rooms, and provide summer shade.

• Landscaping shall be used to support an aesthetically pleasing and functional pedestrian environment through the use of an effective signage and “wayfinding” system including signs and other visual cues; and through the use of plant materials and building features.

• Landscaping shall make use of consistent themes and characters by deploying well-developed plant palettes, paving materials, light fixtures, and site furniture to
emphasize the design of open-space areas and to reinforce key pedestrian connections and gathering areas.

- Landscaping shall be used to soften the public edges of the campus through the use of plantings in the space between the surrounding public streets and the buildings facing these roads.
- Landscaping shall be used to screen unwanted views, both within and from outside of the campus.

3.1.5 PRINCIPLE V: MANAGEMENT OF PARKING AND VEHICLE CIRCULATION

Observation

The majority of California State University Northridge students commute by private automobile to the campus. Although a significant increase in student residential capacity and the initiation of faculty/staff housing on the campus are goals of this Master Plan, commuters will remain predominant on the campus. The University has a large complement of faculty and staff, whose travel to and from the campus add to the University’s parking and vehicular circulation challenges. The development and support of alternative forms of transportation for students, faculty and staff will be an important factor in the University’s parking and vehicular circulation challenges. The design of campus vehicle circulation systems shall focus on safety, accessibility and support of emergency vehicle, service and maintenance functions. The campus vehicle circulation system shall reinforce campus functional organization and support the pedestrian circulation system. The planning for parking facilities shall target an even distribution of parking on the east and west sides of the campus. Parking shall be easily accessible from major arterials, and conveniently close to the academic core without disrupting its pedestrian character.

Planning Objectives for the Management of Parking and Vehicle Circulation

- The Master Plan shall seek to improve pedestrian safety in the academic core area by emphasizing the use of campus internal roadways for service, emergency and ADA-accessible parking access rather than for routine use by private vehicles. As with current practice, service and emergency vehicles will also use pedestrian pathways as necessary.
- The University shall develop and implement an Alternative Transportation...
Plan to help decrease traffic coming to and leaving the campus and shall monitor the effectiveness of this Plan in reducing parking demand.

- The Alternative Transportation Plan shall incorporate a campus transit center developed in conjunction with existing public transit infrastructure and located on the campus for ease of access via regularly scheduled city buses. Furthermore, a Metro Rapid Bus stop shall be located where it can best serve the campus and its activities. The Transit Center should incorporate bicycle storage and, potentially, shower facilities to encourage and support the use of bicycles.

- The existing campus shuttle system shall be augmented to ease pedestrian movement within the campus and to connect with public transit access points and campus parking facilities.

- Parking capacity shall expand in proportion to campus population growth.

- To use campus land most effectively, parking growth will be accommodated in multi-level parking garages up to six levels in height which distribute parking capacity to both the east and west sides of the campus.

- New campus entries shall be located to maximize straightforward and efficient access to multi-level parking facilities.

- The Master Plan will take into account the need for ready access and parking to support the new Valley Performing Arts Center.

- Campus entries shall be more prominent and visually defined; campus signature landscape will extend west along Dearborn, Prairie, Vincennes, Plummer and Halsted Street to Reseda Boulevard to identify these streets as routes to the campus; the University will work with landowners and tenants along the Reseda corridor to identify locations for California State University Northridge signage.

- Future campus housing development shall include convenient parking sufficient to accommodate the needs of student and faculty/staff residents.

### 3.1.6 PRINCIPLE VI: THE CAMPUS AND THE COMMUNITY

**Observation**

California State University Northridge serves both as a resource for and a partner with the community in developing opportunities for social, educational and economic development. Given the large size of the campus and the diverse character of the Northridge community, the campus has a broad range of neighbors including low-density single-family communities, multifamily condos and apartment buildings, institutional facilities, and commercial uses. Students, faculty and staff patronize local businesses and constitute a significant source of their commercial trade. The connections between the campus and the Reseda commercial corridor are indistinct and should be strengthened to better serve both the campus and the community.

**Planning Principles**

Campus planning and development initiatives shall maintain and enhance the campus' positive relationship with the neighboring
residential and commercial communities. Furthermore, the Master Plan process was developed as a participatory planning model, taking all possible steps to engage the community in the planning process, and incorporating input and suggestions from both the campus and the neighboring communities.

Planning Objectives for Campus and Community

• Campus edges shall respect the University’s neighbors by employing appropriate building set-backs, building heights, land uses and landscaping and screening.
• Pedestrian linkages between the campus and the surrounding areas shall be improved, especially via roads and pathways leading to the Reseda Boulevard corridor commercial venues and services, as discussed under Principles I and V.
• The University will seek to cooperate with the local business improvement organization to emphasize the surrounding area as a university district and to initiate identifying signage and landscape to better connect the campus with the local commercial neighborhood.
• Campus entries shall be well-marked, visitor information facilities will be visible and easily accessed, and visitor parking shall be convenient and readily accessible.
• New, strategically placed campus entries and new, high-capacity parking facilities will be located and managed with the goal of moving traffic off local streets quickly and efficiently.
• The existing campus entry at Etiwanda Avenue and Halsted Street will be closed to help decrease campus-bound traffic on local residential streets to the north and west of the campus.
4

2005 Master Plan: Illustrative Plan

The 2005 Master Plan is a comprehensive and coordinated series of proposals that configure and guide the physical development of the California State University Northridge campus over a period of thirty years on land owned by the University. The 2005 Master Plan, shown in the Illustrative Plan presented in Exhibits 4A, 4B and 4C, the accompanying diagrams and illustrations [Exhibits 4D - 4JJ], and described in detail below, represents a possible and appropriate way in which buildings, open spaces, pedestrian pathways, roadways, parking and other facilities could be built on the California State University Northridge campus as a fulfillment of the needs analyses described in Chapter 2, and in accordance with the Planning Principles and Objectives discussed in Chapter 3 and the Design Guidelines presented in Chapter 6.

This Illustrative Plan represents one of a number of possible scenarios for implementing the Master Plan. Variations on this conceptual Illustrative Plan that respond to emerging needs and specific programs include alternative configurations for building footprints and alternative arrangements of buildings, open space and other campus facilities; these variations are acceptable if the Planning Principles, Planning Objectives and Design Guidelines described in this report are observed. For the remainder of this report, this Illustrative Plan will be referred to as the Master Plan.

4.1 2005 MASTER PLAN SUMMARY [EXHIBITS 4A AND 4B; EXHIBITS 4C-4G]

The 2005 Master Plan is shown in Exhibit 4A, in an artist’s sketch that includes the context of the campus [Exhibit 4B], and in Exhibit 4C, which shows an enlargement of the campus core area. The Master Plan represents land uses and facilities required to accommodate the University as it seeks to accommodate increased enrollments up to 35,000 full-time equivalent students (FTES) and the evolving pedagogic needs and plans developed by the University’s individual academic, student-support and campus-support departments and programs. The Master Plan shows sites for academic/administrative facilities, student support and recreation fa-
The features of the Master Plan are illustrated and discussed in this chapter. Campus Land Use is discussed in Section 4.2.1; Transportation Management, Vehicle Circulation, Campus Entries and Parking are addressed in Section 4.2.2; Open Space and Pedestrian Circulation are described in Section 4.2.3; the 2005 Master Plan is shown in detail for each precinct of the campus in Exhibits 4R through 4JJ and is discussed in Section 4.3.

The Landscape Master Plan, discussed and illustrated in detail in Chapter 5, was developed in close coordination with the planning of the Master Plan facilities. The Landscape Master Plan includes overall concepts and specific recommendations for plantings, lighting and site furnishings to support the Master Plan. Design Guidelines for the development of buildings and roadways to implement the Master Plan are described in Chapter 6.
Phasing for the proposals of the Master Plan is described in Chapter 7. At the time of this report, development had begun on three projects whose sites were identified in early phases of the Master Plan study: the Valley Performing Arts Center, shown as Building O in Exhibits 4A and 4C; Science 1 Replacement, shown as Building V; and the University Parking and Public Safety Building, shown as Building M. The remaining facilities shown in the Master Plan will be brought on line as enrollment increases warrant and as funding is made available.

Features of the 2005 Master Plan

Exhibits 4D-4H provide details of the new academic/administrative, student support, student housing, faculty/staff housing, parking, playfields, and campus support facilities proposed in the 2005 Master Plan. These features and facilities are described and illustrated in greater detail in a series of precinct diagrams and discussion found in Section 4.3.

Exhibits 4D-4H show that the proposed Master Plan facilities comprise a total of 1,553,430 gsf of new enrollment-driven academic and administrative space [Exhibit 4D], along with 364,600 gsf of new, non-state-funded space; 10,004 new commuter parking spaces and 1,296 new residential parking spaces in four new parking structures [Exhibit 4E]; new housing for 2,688 students; and 600 units of housing for faculty and staff [Exhibit 4F]; 45.91 acres of playfields for use by instructional recreational and athletics programs [Exhibit 4G]; and new roadways, transit center and utilities facilities [Exhibit 4H]. These figures include the Valley Performing Arts Center [Building O], Science 1 replacement building [V], and the University Parking and Public Safety Building [B], currently under development.

The 2005 Master Plan includes 30 sites for new academic/administrative and student support buildings. The academic/administrative buildings shown in Exhibits 4A and 4C provide expansion space for all academic and administrative programs and are distributed throughout the campus. New facilities dedicated to student support functions include a new Student Recreation Center, sited near the University Student Union, and a new food service building adjacent to the existing Jacaranda Hall.

New student residential facilities [Sections 4.3.6 and 4.3.7] include four new housing buildings and a residential parking structure within the University Park area [H1 - H4 and PS-F9]; a new housing complex in the Northwest Precinct near Plummer Street and East University Drive, which includes a new dining facility [H5 - H8 and HD]; and a second new housing complex, in the Northwest Precinct, at Plummer Street and West University Drive, which includes residential parking facilities [H9 - H12 and PS-B5-N].

The Master Plan shows sites for faculty and staff housing in two locations: in the Northwest Precinct at the corner of Etiwanda Avenue and Haldsted Street, to accommodate up to 50 units; and on the north campus, north of Lassen Street, to accommodate up to 550 units. Both locations include residential parking. Faculty/staff housing development is described in Sections 4.3.7 and 4.3.8.

The 2005 Master Plan includes 45.91 acres of playfields [Exhibit 4F], representing an increase of 6.06 acres beyond the existing facilities. The Master Plan proposals for new and reconfigured playfields and a new location for the tennis courts are described in Section 4.3.5. All playfield sites are readily accessible from the Redwood Hall.
## Chapter Four: Master Plan

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**Subtotal** 1,553,430 364,600

**TOTAL GSF** 1,918,030

**Notes**

* To be determined during pre-design phase.
## Chapter Four: Master Plan

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**Notes**
- ADA (handicap) Parking is distributed along E. University Drive in pocket lots in different precincts.
- Number of spaces based on 2001 Parking Study covering portions of Bertrand, Darby, Dearborn, Holsteed, Lassen, Lindley, Nordhoff, Prairie and Zelzah Streets.
## Chapter Four: Master Plan

### Student Housing

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**TOTAL** 2,688 168,600 558,400

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**TOTAL** 600

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**TOTAL** 45.91 2,000,000

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**4F Housing Facilities**  
**4G Playfields**
Kinesiology facility and the University Student Union. In addition, a playfield on the north campus is provided.

The 2005 Master Plan proposals for transportation management and parking are described in Exhibits 4D and 4J - 4M, and are discussed in detail in Section 4.2.2. A new transit center has been located on Prairie Street at Darby Avenue, to serve city bus routes.

Consistent with the Planning Principles articulated in Chapter 3, many existing surface parking lots have been eliminated or reduced in size and replaced by parking structures. A net total of 4,891 new commuter parking spaces have been added to the campus supply. These have been distributed throughout the campus in four new parking structures and several smaller surface parking lots. These, along with two new student residential parking structures, existing structures and reconfigured surface parking lots, provide the campus with a total of 17,528 parking spaces (including on-street public parking, included in the notes to Exhibit 4D).

The new facilities under development and those proposed in the Master Plan are integrated into the campus through recommendations for new pedestrian pathways, quads, plazas, courtyards and open space areas that create links within the academic core and connections to campus housing and parking facilities. These proposals, along with proposals for the refinement of the existing landscape, are discussed in detail in Section 4.2.3 (Open Space and Pedestrian Circulation) and in Chapter 5.

### 4.2 KEY MASTER PLAN ELEMENTS AND CRITERIA

#### 4.2.1 CAMPUS LAND USE

Exhibit 4I is a land-use diagram of the 2005 Master Plan. This land-use diagram was developed to observe the Master Plan Planning Goals and Objectives detailed in Chapter 3, which indicate that the Master Plan proposals will:

- Reinforce functional precincts by locating new buildings with those of similar function;
- Increase campus safety and efficiency by separating on-campus vehicle circulation from pedestrian circulation and distributing parking facilities for better access; and
- Maintain the campus academic core as a pedestrian zone by reducing general use of campus through-roads and providing access to through-roads mainly for accessible (Americans with Disabilities Act: ADA) parking, service and emergency vehicles.
2005 Master Plan Approach to Land Use

The fundamental approach of the 2005 Master Plan is to develop needed facilities while preserving campus open space, using new buildings to create open-space areas of congenial scale, and reinforcing existing land uses. To achieve these goals, the Master Plan makes use of new building sites that are currently used as surface parking lots and those areas currently occupied by facilities that will, in the course of the Master Plan’s planning horizon, reach the end of their useful life. In addition, new buildings have been sited to enclose existing campus open space areas and to frame campus entries. Through this approach, campus core open space areas have been conserved and their uses have been enhanced and reinforced.

Academic/Administrative Facilities

The Master Plan provides a strong framework for campus development while permitting alterations to the campus to reflect the needs of changing pedagogy and University priorities over the long term. As shown in Exhibit 4C, new academic/administrative buildings are located within the existing academic core and in adjacent precincts within the southern sector of the campus. The selection of new building sites has been done with an emphasis on the south and east precincts of the campus, in order to balance the use throughout the campus and allowing for more efficient distribution of parking facilities.

The use of these new buildings sites will be subject to the expansion needs of academic and administrative programs, and the building configuration on each site will depend upon, among other things, the programming of the individual facility in the pre-design phase of the project. By identifying a range of building sites, the 2005 Master Plan allows the University flexibility in the final choice of sites for new academic/administrative facilities; the identified sites may not all be used within the 30-year planning horizon of the 2005 Master Plan.

Parking Facilities and Vehicle Circulation

The Master Plan recommendations for parking and vehicle circulation include: intensifying parking on land currently allocated to parking facilities; distributing parking facilities around the campus perimeter; reinforcing the existing strategy of locating parking facilities at the periphery of the campus.

The Master Plan increases campus parking capacity without significantly expanding land needed for parking by recommending the construction of parking structures on existing surface lots. The location of one parking structure [PS-G6], requires the re-location of the existing tennis courts, to a site within the Instructional/Athletics/Recreation precinct. The Master Plan designates sites for parking facilities on the perimeter of the campus, with commuter parking structures located near to the main city streets serving the campus. Dedicated residential parking structures are located within or adjacent to student residential areas. Faculty-staff residential parking is incorporated within the development of faculty-staff housing.

Housing and Dining [detailed description in Sections 4.3.6 and 4.3.7]

Future student housing, dining facilities and related parking facilities are located on three sites, phased in over the Master Plan 30-year time frame. The first new housing facilities will be infill development within University Park, near to existing student housing and parking. A second
Chapter Four: Master Plan

Vehicle Circulation and Parking Plan

Legend

- Existing Parking Structure
- Existing and Proposed Surface Parking
- Proposed Parking Structure
- City Vehicular Circulation
- Campus Vehicular Circulation
- Campus Tram Route
- Tram Stop
- Major Public Transit Stop
- Campus Vehicular Entry/Exit
- Handicap Parking Spaces Location
- Faculty/Staff Housing

See Exhibit 4E for key.
phase of new student housing has been located in the Northwest precinct, sited to bring student housing facilities closer to the campus core. A new dining facility is proposed for the central Northwest Precinct student housing area. A third phase is also located in the Northwest precinct, further to the west.

Faculty-staff housing has been located along Halsted Street, to face similar uses in the adjacent residential community. Similarly, the North Campus Faculty/Staff Village has been sited to address single- and multi-family residential areas across Lindley and Zelzah Avenues, adjacent to the campus. Each of these faculty/staff housing communities incorporate parking.

**Student Recreational and Support Facilities**

Student recreation and support functions continue to be located in the eastern areas of the campus, near to the University Student Union. These facilities include playfields and a new Student Recreation Center. A new student health facility is to be incorporated into one of the new facilities in the eastern area of the campus. The Exchange, a temporary food service building, will be replaced with a permanent building to provide more service for the central areas of the campus core. The bookstore remains in its existing location. These facilities are discussed in more detail in Section 4.3.

**Campus Support**

The Physical Plant Management and Central Plant facilities, including shipping, receiving, mailroom and shops, remain in their existing locations. An extension of the existing Central Utilities Plant is proposed for the southeast area of the campus [Section 4.3.1]. The University Parking and Public Safety building [M] will be constructed on the west side of campus at Darby Avenue and Prairie Street; this complex incorporates 89 surface parking stalls from the reconfigured B3 lot for University Parking and Public Safety staff and other requirements.

**Auxiliary Campus Facilities and Services**

The Master Plan shows Black House, Asian House, and the Women’s Resource Center, currently located along Halsted Street between Darby Avenue and Etiwanda Avenue, eventually being replaced by faculty and staff housing. The Plan also shows a future open green space east of the Juniper Hall, in the location where the Chicano House currently exists. The Master Plan acknowledges the significant legacy of the cultural centers and houses, as well as their role as gateways for the diverse regional populations. Academic Affairs commits to work with the cultural houses to determine their needs for facilities, as the campus expands to 35,000 FTES. The Facilities Planning, Design and Construction Department will assist in this process, with particular attention to the appropriate placement of these facilities. In a similar vein, there will be consideration of an alternative location for the Child and Family Studies Center, currently located adjacent to the cultural houses.

The University Club [W] is shown as increased in size to incorporate an expanded program. This site will also accommodate a new Alumni Center.
Existing Land Uses to be Maintained

Many areas of the plan provide for new development with the intentionally minimal impact on existing uses. For the most part, the instructional fields, athletics venues and recreation facilities remain as existing, with the tennis courts relocated to an area south of the existing track. Two small buildings to be used for recreational support functions (storage, showers/lockers, concession) have been incorporated into these areas. Otherwise, no new buildings are proposed in this area of the campus.

The Orange Grove and the Botanic Garden remain in their current locations. The development of new greenhouse facilities is recommended adjacent to the Botanic Garden. The pond to the south of the Botanic Garden and the Observatory are relocated to the south. As illustrated in Section 4.3.1, and discussed in Chapter 5, a new pathway system through the revitalized Orange Grove will connect the University Club and the new PS-G3 parking structure with the new Valley Performing Arts Center [O].

4.2.2 TRANSPORTATION MANAGEMENT, CAMPUS ENTRY, VEHICLE CIRCULATION AND PARKING FACILITIES [EXHIBIT 4J]

The 2005 Master Plan proposals for transportation management, campus entries, vehicle circulation, and parking facilities are based on the Planning Principles and Objectives discussed in Chapter 3:

- Development and implementation of an Alternative Transportation Plan to decrease traffic coming to and leaving the campus and to reduce parking demand;
- Increase parking capacity and make efficient use of land devoted to parking;
- Provide handicap-accessible parking at convenient locations adjacent to the campus core;
- Improve pedestrian safety;
- Clarify and simplify vehicle circulation patterns;
- Provide for rapid and efficient movement throughout the campus through the use of an expanded tram system; and
- Develop more prominent and visually defined campus entries.

The Master Plan proposals incorporate information provided in the Parking and Traffic Analysis conducted for the Master Plan study by Kaku and Associates; this report is available under separate cover. Exhibit 4J is a diagram of the proposed vehicle circulation system, including campus entries, campus roadways, campus tram routes and parking facilities including handicap-accessible parking. Exhibit 4D summarizes the parking facilities shown in the Master Plan.

Alternative Transportation Plan

One of the goals of the 2005 Master Plan is to reduce vehicle traffic coming to the campus and reduce the need for on-campus parking through an Alternative Transportation Plan that encourages the use of public transit. The Master Plan provides for campus access via public transportation by siting the Transit Center [TC] at the West Gateway campus entry at Darby Avenue and Prairie Street.

Exhibit 4K shows an artist’s sketch of the Prairie Street campus entry and proposed transit center. The Transit Center is sized to provide turn-around space and parking for up to 6 city buses at one time. City buses from a variety of local routes along Reseda Boulevard will enter and exit the campus on Prairie Street.
The Transit Center will also serve as a stop for campus shuttle services to the local Metrolink rail station. The Transit Center is adjacent to the new Circulator Tram route that runs along West University Drive as it encircles the campus core. This tram route connects with the existing tram route, which will continue to operate between Lassen Street and Redwood Hall on the east side of the campus. Tram routes are shown in Exhibit 4J. In addition to these new facilities, a Metropolitan Transit Authority (MTA) Rapid bus stop will be located on Nordhoff Street, at East University Drive [also shown in Exhibit 4J], which will provide access to the Valley Performing Arts Center as well as to the campus as a whole.

It is proposed that the Transit Center development incorporate facilities that will encourage the use of bicycles, such as bicycle storage, lockers and, potentially, showers.

These proposals for facilities that can help to reduce traffic and parking demand can be supported by University efforts to reinforce the use of public transit by students, faculty and staff. The increase in on-campus student housing and the development of faculty-staff housing on the campus are expected to reduce parking demand in commuter facilities. The University may wish to explore the use of incentives that encourage the use of public transit or carpooling and may investigate variable work schedules for staff and/or changes to the class schedule that will help to reduce traffic congestion coming to and leaving the campus during peak periods. The Alternative Transportation Plan will be monitored over the course of the Master Plan time frame to gauge its success in reducing traffic and parking demand.

**Campus Entry**

The Master Plan shows two new campus entry gateways: the East-Side Gateway off Zelzah Avenue at Prairie Street; and Matador Drive, off Nordhoff Street just west of Zelzah Avenue. The Master Plan also shows a newly-configured entry on the west side, off Darby Avenue at
Prairie Street. These campus gateways and other campus entries are shown in Exhibit 4J and discussed in relation to nearby facilities in Section 4.3, Precinct Plans.

The new campus gateways, along with the existing campus entry at East University Drive and campus exit at West University Drive, are to be landscaped with a signature landscape design that will help to identify the entry areas and provide greater visibility for the University within the Northridge community. Exhibit 4L is an artist’s sketch of the campus entry landscape at East University Drive, showing the signature Washingtonia palms, campus identification marker and a small grove of date palm trees, similar to those flanking Oviatt Library [see Chapter 6 for details]. The Master Plan recommends that all campus entries incorporate this signature landscape. Visitor Information Booths will be located along East University Drive, and at the Prairie Street and Matador Drive entries.

The locations for commuter parking structures (discussed below and in Section 4.3) are coordinated with these campus entry roads so that traffic coming into the campus can move off city streets as quickly as possible. Matador Drive, the new campus entry road from Nordhoff Street just west of Zelzah Avenue, is designed to provide direct access to the new east side parking structures PS-G3, PS-G5, and PS-G6, and to surface parking lot L-G2.

The Master Plan recommends reducing the number of campus entries from Halsted Street. In addition, it recommends that Etiwanda Avenue be closed between Halsted and Plummer Streets. Similarly, the Master Plan has eliminated the campus entries shown in the previous master plan at the intersection of Halsted Street and Lindley Avenue and at the intersection of Halsted Street and Darby Avenue. These recommendations will have the effect of reducing campus-related traffic on Halsted Street and Lindley Avenue.
Parking Facilities

The Master Plan strategy for providing parking is consistent throughout the campus: parking structures are placed on the sites of certain existing surface parking lots to yield greater efficiency and greater capacity. Exhibit 4D shows the number of parking stalls each site is expected to yield. The existing and new parking structures, along with the remaining surface parking lots, are all located at the periphery of the campus for ease of access and to help maintain the campus core as a primarily pedestrian zone.

All new parking structures will provide parking in five or six above-grade levels including the roof level. Furthermore, the Master Plan recommends that the University consider a new parking management system that assigns commuters to parking zones throughout the campus rather than the current system of open assignments, which encourages drivers to roam throughout the campus seeking a parking space. Such a management system would reduce vehicle circulation on campus through-roads and would ensure a more even distribution of incoming vehicles to the campus, making best use of the additional campus entries shown in the Master Plan.

Parking structures are sited on the perimeter of the campus to facilitate direct access from city streets. The building set-backs shown in Chapter 6 provide for open space adjacent to parking structures, to allow sufficient space for landscape and to help create and frame view corridors into the campus. The Landscape Master Plan in Chapter 5 and the Design Guidelines in Chapter 6 provide a series of recommendations that will allow the proposed parking structures to enhance the edges of the campus.

The Master Plan parking proposals, taken together, will yield a campus total of up to 17,528 spaces; this total represents an increase of up to 4,891 net new parking spaces for both commuter and student residential use. The parking ratio of FTES to total spaces under the 2005 Master Plan will be about .50. The new parking facilities will be developed as enrollment increases or other considerations require. Chapter 7 includes an analysis and description of the phasing of new parking facilities.

Commuter Parking

Three of the four new commuter structures have been located to on the east side of the campus in order to balance parking on the east and west sides of the campus and to distribute traffic coming to the campus more evenly, with the goal of easing congestion on city streets. Parking structure PS-G4 (2,769 spaces) is sited on the current surface lot G4, and structure PS-G3 (1,994 spaces) is located on surface lot G3. Commuter parking structure PS-G6 (2,769 spaces) is located on the site of the existing tennis courts, which have been relocated. These new parking structures will serve the intensified development of academic, administrative and student support facilities in the south and east precincts. A fourth commuter parking structure PS-B1 (2,215 spaces) has been located on the west side of the campus.

Residential Parking

Two new residential parking structures are recommended in the Master Plan. Parking structure PS-F9 (487 spaces) is sited in the University Park area along with four new student housing buildings. Structure PS-B5-N (809 spaces) is located to provide parking for residents of the two Northwest Precinct student housing com-
plexes. See Sections 4.3.6 and 4.3.7 for a further discussion of student residential parking facilities.

Parking for faculty and staff housing will be integrated into the new faculty/staff housing developments sited on the North Campus and along Halsted Street, west of Etiwanda [Sections 4.3.7 and 4.3.8].

**Americans with Disabilities Act (ADA) Parking**

Each campus parking structure or surface lot incorporates approximately 2% of handicapped-accessible parking spaces, in accordance with California Building Code requirements. In addition, a series of small surface parking lots [Exhibit 4M] provides accessible parking facilities within the interior of the campus. The Master Plan parking recommendations provide a total of 536 ADA accessible parking spaces (3% of the total).

**Visitor Parking**

Visitor parking will be accommodated in the existing B4 surface lot west of University Hall, as currently, and in any of the parking facilities through a permit or payment of a daily fee. Visitor parking for the Valley Performing Arts Center will be accommodated in the new east-side PS-G3 structure, the east-side L-G2 surface parking lot, the south-side L-D1 lot, the west-side PS-B3 structure and proposed PS-B1 structure, all of which are within a five-minute walk of the new Performing Arts Center.

**Campus Vehicle Circulation**

The location of commuter parking structures on the perimeter of the campus is designed to reduce through-traffic on campus internal roadways (East and West University Drives, North University Drive/Plummer Street) and reduce the number of conflict points between vehicles and pedestrians. The University will encourage these interior campus roadways to be used mainly for access to ADA accessible parking, service and emergency access.

**Service and Emergency Access**

Service and emergency vehicle routes and service parking areas adjacent to each building are shown in Exhibit 4N. For the most part, existing service areas have been retained. Wherever possible, proposed new service areas are located so as to serve more than one new or existing building. As with current practice, the major pedestrian pathways through the campus [dia-
Legend
- Campus Support/Service Area
- Proposed Building Service Area
- Proposed Academic Building
- Major Emergency Service Route
- Minor Service Route

4N Service and Emergency Vehicle Access
grammed in Exhibit 4O] will be configured and constructed to accommodate emergency vehicles.

**New East Campus Entry Roadway**

A new campus entry roadway, Matador Drive, has been created on the east side of the campus by re-aligning Bertrand Street and closing Dearborn and Prairie Streets. This roadway, which begins at Nordhoff Street, gives access to the three new east-side parking structures, to the University Student Union, to campus athletic venues and to several proposed academic/administrative buildings on the east side of the campus.

**Campus Tram Routes**

Exhibit 4J shows the existing campus tram route on the east side of the campus, which will continue to run and will provide access between the University Park student housing areas and the campus core. This tram will also give access to the east-side parking structures. This tram will be augmented by a ‘circulator’ tram route that connects with the east-side route at the University Student Union. This tram route will travel along East University Drive, through the existing Lot D1 roadway just north of Nordhoff Street, along West University Drive and along North University Drive (Plummer Street). The circulator tram route provides access to the Transit Center on Prairie Street at Darby Avenue, and to the west-side parking lots and structures.

**4.2.3 OPEN SPACE AND PEDESTRIAN CIRCULATION [EXHIBIT 4O]**

As described in Chapter 3, the Planning Principles underlying the 2005 Master Plan are derived from a philosophy that emphasizes the role of the open space in creating a gracious and functional campus. The Master Plan builds upon the existing campus open space system and proposes changes that provide greater definition to existing campus open spaces and that reinforce a legible and functional pedestrian circulation system. The Planning Objectives of the Master Plan regarding the campus open space and pedestrian circulation system are to:

- Support a well-defined open-space system that creates and define vistas within the campus and views from the outside into the campus;
- Provide a variety of spatial experiences by way of variations in size, programmed uses, architectural treatment of building facades, and landscape;
- Reinforce the role of the existing pedestrian circulation plan to integrate the open space system and strengthen spatial legibility;
- Use buildings and structures to enclose open space and to locate building entries at pedestrian pathway nodes;
- Locate exterior open space areas to be well-connected to compatible adjacent indoor spaces;
Chapter Four: Master Plan

Legend
- Open Space
- Instructional/Athletics/Recreational
- Natural Area
- Signature Perimeter Landscaping
- Primary Pedestrian Circulation
- Secondary Pedestrian Circulation
- Faculty/Staff Housing

Open Space and Pedestrian Circulation
- Design open spaces to include areas of lawn, landscape and hardscape, and site furnishings (seating, lighting, signage) to reinforce their programmed uses;
- Create and reinforce open spaces that incorporate food service and gathering areas to encourage and provide the setting for informal interaction among students, faculty and staff; and
- Promote the use of sustainable landscape and hardscape materials.

Detailed proposals for the major components of the open space system, including landscape and open-space components of the vehicle and pedestrian circulations systems, are described in detail in Chapter 5, the Landscape Master Plan. These proposals are summarized below.

**Campus Open Space System**

Exhibit 4O is a diagram showing the major campus open space areas and pedestrian pathways. The 2005 Master Plan maintains significant campus open space areas including Sierra Quad, Oviatt Lawn, West Lawn (east of University Hall) the Sundial Fountain, Matador Square, the North Academic Quad, Manzanita Courtyard, the Orange Grove and the Botanic Garden. These important cultural and natural resources are significant icons on the campus, and the Master Plan proposals work to more fully integrate these spaces into the fabric of the campus and increase their contribution to campus life.

New buildings and facilities are sited to enclose secondary open-space areas including courtyards, quadrangles, and plazas. Exhibit 4Q shows an artist’s sketch of a new open space and quad along East University Drive which is created by the siting of academic/administrative buildings V, U and parking structure PS-G3. The sketch shows the observatory in its new location, just south of its existing location.

The existing east-west and north-south pedestrian routes shown in Exhibit 4O are reinforced as key connections to existing and proposed new facilities. In the same manner, the open-space areas that comprise the sports and recreation fields north of Redwood Hall and the Brown Center are maintained. New recreation fields along Zelzah Avenue provide view windows into the campus from its eastern boundary.

**Pedestrian Pathway System**

The existing pedestrian pathway system is a well-integrated arrangement of connections across and within the core campus. The Master Plan extends this system toward the eastern areas of the campus where significant new development will take place, and to the north to create stronger pedestrian links between University Park, the North Campus Faculty/Staff Village and the campus core.
The paths shown in Exhibit 4P include six major east-west pathways with their extensions to the east: Orange Grove Walk, Sierra Walk, Matador Walk, Magnolia Walk, and Jacaranda Way, and North University Drive Promenade. These paths not only connect the east and west areas of the campus, but give access to the campus from parking facilities located on the periphery.

Three of the major north-south pathways are sidewalks adjacent to existing roadways. West University Drive Promenade comprises the walkways along West University Drive from Halsted Street to Nordhoff Street. Similarly, East University Drive Promenade consists of the walkways along East University Drive from Halsted Street to Nordhoff Street. East Promenade is the extension of East University Drive Promenade, running along Lindley Avenue from Halsted Street to Lassen Street. East Promenade is proposed to be a major pedestrian route into the campus from the northern student and faculty/staff residential areas with enhanced landscaping and shade trees [see Chapter 5 for discussion of landscape for pedestrian paths]. Matador Drive Promenade also links University Park with the southern areas of the campus, following Matador Drive, the new east-side access road to the west of Zelzah Avenue, and ending at Nordhoff Street. The Campus Esplanade through the center of the campus connects a network of existing pathways, traveling north from the new Valley Performing Arts Center, continuing through Sierra Quad and Oviatt Lawn, around Oviatt Library, passing the Exchange and continuing north to Halsted Street.

4.2.4 CAMPUS LIFE AND STUDENT SUPPORT SERVICES

The campus provides a range of support services and amenities for campus life including student services, food services, meeting facilities, recreation facilities and facilities for performance and the arts. Campus life amenities comprise both indoor and outdoor spaces, and taken together,
these services and amenities create an enriched campus experience for students, faculty staff and campus visitors, and are hallmarks of campus life. The distribution of these services and facilities throughout the campus was a goal of the 2005 Master Plan.

Student services focus on the student advisement services aimed at providing information and support for students’ career goals; the offices and facilities supporting these services are located in the Student Services building at Jacaranda Way and West University Drive Promenade. Student services are also provided in Jerome Richfield Hall. Other services that support student life are located in the Bookstore, at Monterey Hall and within the University Student Union complex on the east side of the campus.

Indoor and outdoor recreation facilities are distributed throughout the campus, forming a variety of activity hubs, including the Matadome and the Satellite Student Union in the University Park student housing area. Meeting facilities are also distributed throughout the campus, providing places for both campus and community events. The campus will benefit from three performing arts facilities, including facilities in Nordhoff Hall, the existing auditorium in the University Student Union, and the new Valley Performing Arts Center, under development at the time of this report. The campus also has an art gallery located in the Art & Design Center.

Dining and food service facilities play an important role on the campus by providing gathering places that serve as the setting for the informal student-student and student-faculty/staff contacts that are such an important aspect of the higher education experience. New food service facilities proposed in the 2005 Master Plan include new dining facilities associated with the new student residential complex in the Northwest Precinct; and the permanent replacement of the Exchange facility within the Academic Core. These are in addition to the existing food services at the Bookstore, the University Student Union, the University Club/Alumni Center, Sierra Center and the Satellite Student Union at University Park.

Campus life services include the University Club which will be expanded to include an Alumni Center, and the Children’s Center in the Northwest Precinct. The University Club will be expanded and will continue to provide facilities for food services, meetings and indoor recreational activities intended for use by both the campus and community. The Master Plan identifies space adjacent to the University Club for a new Alumni Center.
4.3 PRECINCT PLANS

In order to provide greater detail about the 2005 Master Plan, the campus has been conceptually divided into eight geographical precincts. Exhibit 4S is a key map for these campus precincts, whose proposed new facilities are described in detail in Sections 4.3.1 – 4.3.5 and Exhibits 4T - 4KK.

Consistent with the Planning Principles that form the basis of the 2005 Master Plan, the precinct plans show proposed development sites that effectively concentrate the use of land within each precinct and provide expansion space for a broad range of programs. These sites have been chosen to achieve the following goals:

- to efficiently make use of University-owned land currently occupied by facilities that have reached the end of their useful life cycle;
- to avoid using significant campus open space areas for new building sites;
- to reinforce the campus open space system by using building edges to create new open-space areas or delimit the boundaries to existing open spaces; and
- to reinforce the pedestrian pathway system by siting buildings such that building entrances are oriented to campus walkways.

The Master Plan shows a building footprint on each proposed development site and accurately depicts the sizes of the buildings shown in Exhibit 4C. The Master Plan and Exhibit 4C generally assume a four-story building model for academic/administrative buildings and student housing buildings. Specific-use buildings such as the Valley Performing Arts Center, the Student Recreation Center and the parking structures will be designed according to their programs. The precise massing, height and orientation of each building is to be determined during the pre-design and schematic design phase for each project. The building footprints depicted in the Master Plan demonstrate each building’s recommended orientation to the pedestrian system and to the adjoining open space. Recommended building mass and set-backs are included in Chapter 6: Design Guidelines.

4.3.1 SOUTH CAMPUS ARTS PRECINCT [EXHIBITS 4T - 4W]

The Master Plan proposals for the South Campus Arts Precinct [Exhibit 4T] incorporate ten new buildings and two new parking structures. The development in this precinct focuses on the new Valley Performing Arts Center, the Orange Grove, and the existing performance venues in the south areas of the campus.

Valley Performing Arts Center

The South Campus Arts Precinct centers around the Valley Performing Arts Center [Building O in Exhibits 4A and 4T], scheduled to be developed during Phase 1 [see Chapter 7, Phasing]. The Performing Arts Center is set in a landscaped area at the corner of Nordhoff Street and East University Drive. A large plaza between the Performing Arts Center and Cypress Hall serves as a view window into the campus from Nordhoff Street and initiates the southern portion of the north-south Campus Esplanade pedestrian route. Exhibit 4U shows an artist’s sketch of the view along the Campus Esplanade toward Oviatt Library. The plaza at the Performing Arts Center will also serve as break-out and gathering space, providing a congenial and well-sized area for receptions and informal gatherings before, during and after performances and for other campus events.
New Buildings

The placement of new buildings in this precinct creates a series of small-medium-sized and large outdoor open space areas, providing each building with at least one exterior gathering area. Two new academic/administrative buildings at the corner of Nordhoff Street and Zelzah Avenue [Y and Z] reinforce the new Matador Drive campus entry road, while two other new academic/administrative buildings [C and H1] create a visual gateway for the West University Drive campus exit road. Also in this precinct is a small addition to Nordhoff Hall [H2], a new
academic/administrative building [J] to the west of Manzanita Hall, and another one [T] to the east of Manzanita Hall; the latter, which replaces the existing Santa Susana Hall, currently near the end of its useful life, encloses the Manzanita Courtyard and reinforces this outdoor space as a significant contribution to this precinct.

**Vehicle and Pedestrian Access**

Because the South Campus Arts Precinct is focused on performing arts programs and events, the role of access is critical. A new campus entry roadway, Matador Drive, will be created off Nordhoff Street just west of Zelzah Avenue, which will allow vehicle traffic to move quickly off Nordhoff into the campus [Exhibit 4V]. Two new parking structures, PS-B1 on the west side and PS-G3 on the east side, along with the surface parking lot L-G2, provide 4,465 parking spaces for visitors to the campus, students, faculty and staff. In addition, a new Metro Rapid bus stop at Nordhoff and East University Drive will provide public transportation to the campus performance venues [Exhibit 4J]. The existing D1 access road, parallel to Nordhoff Street, will provide a visitor drop-off area and handicap-accessible parking directly in front of the Performing Arts Center. The service/loading area for the Performing Arts Center will be located off East University Drive [Exhibit 4L]. This roadway will also incorporate a campus information kiosk, a vehicle turn-around and passenger drop-off area. The South Campus Arts Precinct is the terminus for the West Promenade, the Campus Esplanade, the East Promenade and Park Promenade.

**Orange Grove, University Club and Orange Grove Arts Walk**

The South Campus Arts precinct is anchored by the revitalized Orange Grove [Chapter 5] and further highlighted by a newly landscaped expansion of Orange Grove Arts Walk through the Grove, linking an expanded University Club
An extension of the Orange Grove Arts Walk gives access to parking structure PS-G3. The Master Plan has relocated the Pond and Observatory just to the north of the Orange Grove, encouraging campus visitors to explore these resources.
4.3.2 ACADEMIC CORE

[EXHIBITS 4X AND 4Y]

Within the Academic Core, the 2005 Master Plan proposes seven sites for new academic/administrative facilities [Exhibit 4X]. These sites will give the University a wide range of flexibility to choose appropriate building sites for new and expanded programs as new facilities are developed to accommodate increasing enrollments. Exhibit 4Y is a bird’s eye view of the Master Plan computer model showing the Academic Core area.

Two sites [K and L] have been identified for buildings to replace the existing Live Oak and
Eucalyptus Halls, which will, over the course of the Master Plan planning horizon, come to an end of their useful life cycles. A site for the Oviatt Library expansion [I] has been identified just to the north of the existing library. This site will accommodate up to 109,500 gross square feet of facilities in a building that can be developed contiguous to the existing library, simplifying issues of access and security for the library program. The loading dock for the library will remain in this area.

North of the Library, a permanent food service facility will be developed where the temporary Exchange facility currently exists. This facility will incorporate a large plaza for outdoor dining and gathering to reinforce the North Academic Quad and serve as a focal point for the north central area of the Academic Core.

At the northern edge of the Academic Core, just south of North University Drive, a site for a new academic/administrative building [F] has been identified which will replace Sagebrush Hall and a series of temporary buildings that have existed in this location. This building encloses new open space areas to both its west and its east, and reinforces the east-west North University Drive pedestrian path.

4.3.3 WEST GATEWAY [EXHIBITS 4Z AND 4AA]

The West Gateway precinct is an important campus entry point. Centered around the existing campus entry at Prairie Street, it provides access to the campus for pedestrians, vehicles, those using public transit, and visitors to the University’s administrative offices in University Hall. This precinct is anchored by the two new facilities which are part of the previous Master Plan: the B3 parking structure, providing parking for 2,068 cars; and the new University Parking and Public Safety building complex on
the corner of Darby Avenue and Prairie Street. The parking structure is completed at the time of this report, and the University Parking and Public Safety building is under development.

Two new facilities are proposed for this precinct: an academic/administrative building [B] at the corner of Darby Avenue and Vincennes Street, and the Transit Center [TC] on Prairie Street. The Transit Center, a cornerstone of the Alternative Transportation Plan [see Section 4.2.2 for details], provides parking for city buses entering the campus, serves as a pick-up/drop off for campus shuttle services, and is adjacent to the proposed circulator tram route.

The Prairie Street entry to the campus will be landscaped with the campus signature plant palette, including a campus identification monument and a small date palm grove. These are described in greater detail in Chapter 5. Exhibit 4K shows a sketch of this signature landscape.
4.3.4 EAST GATEWAY

[EXHIBITS 4BB - 4DD]

The East Gateway precinct features a new campus entry point, designed to provide a readily accessible and legible entry sequence for those coming to the University from the east. The East Gateway is also the focal point for the University Student Union facilities and student support facilities and activities.

The East Gateway precinct is centered around a new campus entry road at Prairie Street and Zelzah Avenue. This entry, shown in an artist’s sketch in Exhibit 4CC, is landscaped with the University’s signature entry landscape, including a date palm grove and campus identification monument, and is described in more detail in Chapter 5. This entry terminates in a turn-around/drop-off area just west of the new Matador Drive, and includes a visitor information booth. All four east-side parking facilities can be accessed from this entry: three parking structures [PS-G3, PS-G4 and PS-G6] and a surface parking lot [L-G2] provide a total of 7,788 parking spaces on this side of the campus.

Exhibit 4DD shows a bird’s eye view of the East Gateway area just to the north of the Zelzah Avenue entry. The East Gateway entry road is flanked by two large playfields [PF-G3 and PF-G4] and provides a large view window into the campus from the east. The proposed new Student Recreation Center [U] is located to the northeast of the existing University Student Union. This site is highly visible from Zelzah Avenue, is directly adjacent to parking facilities, and has ready access to three playfields. Fields PF-G3 and PF-G4 are both large enough to accommodate a soccer field; these fields will be shared by the University’s instructional, athletics and recreational programs. These fields, along with a smaller recreational field [PF-F4] directly south of the new Recreation Center, are meant to provide outdoor recreation space for the USU and other campus programs.
Chapter Four: Master Plan

4BB  East Gateway Precinct

4CC  Artist’s Sketch: Zelzah Entry Gateway, Looking West
Also in the East Gateway area are several academic/administrative buildings. A site for a new classroom/lab building [V] has been identified just across East University Drive from the existing Live Oak and Eucalyptus Halls. This building is in the process of development as this report is being prepared. To develop this site, the existing Pond and Observatory will be relocated just to the south of their existing locations. The site identified for this new building maintains the Botanic Garden. In Phase 2, a second new building [U] will be developed in this area, along with a new greenhouse facility [see Chapter 7 for discussion and illustration of phasing]. These buildings, along with the G3 parking structure, will enclose a new quadrangle for the east side of the campus. When building U is developed, the functions of the Health Center will be moved to a new site, the location for which will be determined at the time of its development. Also in the East Gateway precinct is a new faculty office/lecture hall building [S] located on the site of the existing T, S and O temporary buildings, across East University Drive from Sequoia Hall, and just to the west of the University Student Union.

4.3.5 INSTRUCTIONAL/ATHLETICS/RECREATION PRECINCT

The University facilities for indoor and outdoor instructional space, athletics and recreation programs are accommodated in a large precinct on the east side of the campus, centered around Redwood Hall and the Brown Center. The existing track, baseball, softball and soccer fields in this precinct have not been altered in the Master Plan, nor have the racquetball courts east of Redwood Hall. The existing tennis courts have been relocated to a site just south of the track [PF-F7]. A small building [A1] will provide space for restroom facilities, storage and concession operations and other support needed...
for these outdoor facilities and events. Also in this precinct is a small building providing office and support space for the University housing program [A].

Playfields

The term “playfields” refers outdoor field space shared by the Kinesiology, Athletics and campus recreational programs. In addition to the PF-G3 and PF-G4 fields mentioned above, playfields proposed in the Master Plan for the Instructional/Athletics/Recreation Precinct include the PF-F6 playfield, largely unchanged from its existing status, and a new field, PF-G6. Two parking structures, PS-G4 and PS-G6, are included in this precinct.

Academic/Administrative Buildings

Three new academic/administrative buildings are proposed for the Instructional/Athletics/Recreation precinct: an addition to Redwood Hall [P], located at the southwest corner of
the existing building, an academic/administrative building [G] at the northeast corner of Redwood Hall, and another academic/administrative building [Q], meant to provide office and support space for the Athletics program. The Master Plan also shows space for an enlarged pool in the area of the existing pool just south of the Matadome.

4.3.6 UNIVERSITY PARK STUDENT HOUSING PRECINCT

[EXHIBITS 4FF AND 4GG]

Student Housing in the Master Plan

The primary focus for new student residential facilities is to provide housing for lower-division students in buildings that will support the University’s living-learning programs. The University’s plan to increase campus housing for students will also create a larger base for campus activities by increasing the 24-hour population on the campus. New student housing is planned to be developed in three stages over the planning horizon of the Master Plan.

The first stage of student housing development is planned as in-fill development for the University Park area. The Master Plan shows four new student residential buildings to house 896 new students and a new residential parking structure with 487 residential parking spaces. Additional student housing, to be developed in later stages, is proposed for the Northwest Precinct, described in Section 4.3.7 below.

University Park Housing Infill and Residential Parking

As shown in Exhibit 4FF, four buildings are proposed as infill development for University Park. H-1, H-2 and H-3 are located in the central University Park area; H-4 is shown north of the Satellite Student Union. Exhibit 4GG is a bird’s eye view of the Master Plan computer.
model, showing student housing and parking at University Park. The proposed University Park infill development includes outdoor open space for informal activities that will serve to strengthen the campus residential community as a whole. In addition, a 5-story residential parking structure is proposed on the site of the existing F9 surface lot, providing 487 parking spaces. The new parking structure can be accessed via an existing driveway from Lassen Street.

4.3.7 NORTHWEST PRECINCT [EXHIBITS 4HH AND 4II]

The development proposed for the Northwest Precinct includes two new student housing communities, three academic/administrative buildings, and a new faculty/staff housing community.

Student Housing and Parking

The second stage of student housing development is planned for the central area of the Northwest Precinct, on the site of the existing E6 parking lot. Exhibit 4II is a bird's eye view of the Master Plan computer model for the area. The residential buildings on this site will accommodate 896 students, along with Resident Advisors and support facilities [SH5 - SH8]. A 25,000-35,000 gsf dining facility is included in the development of this site. The dining facility can be used by others on campus for meals and, potentially, for meetings or other gatherings, making efficient use of the space. The residential and dining facilities can also be used for conference and summer programs. The size of the dining facility and its design will be based upon a program developed for the specific population and functions it will serve. It should be integrated with the support functions (reception, recreation, socializing, etc.) needed by this housing Community.

A surface parking lot [L-E6] adjacent to the housing complex will provide parking for some student residents and loading access to the dining facility. Additional parking will be available in two new parking structures within a 5-minute walk from this complex:
PS-G6 to the east, accessed via the North University Drive Promenade, and a new structure PS-B5 to the east; the latter is to be developed during the third stage of student housing described below. Existing structure B5 is also expected to accommodate student residential parking when commuter parking demand shifts to the existing B3 and future B1 parking structures on the west side of the campus. As discussed in Chapter 5, the landscape and lighting for the pathways along North University Drive will become important as pedestrian links for the students residing in Northwest Precinct housing.

The third stage of student housing is planned for the Northwest precinct along West University Drive. Exhibit 4II shows a bird’s eye view of the Master Plan computer model of the area, showing two buildings to the north and two buildings to the south of Plummer Street. The design for the four buildings shown on the Master Plan [SH9 - SH12] will respond to the needs identified at the time of their development. Needs assessment studies will determine whether a new dining facility should also be constructed on this site, or whether students will use the dining facility associated with the first Northwest precinct stage of student housing.

**Academic/Administrative Buildings**

Three academic/administrative buildings are planned for the Northwest Precinct [D, E1 and E2], all of which are sited to face the neighboring residential community across Halsted Street; these are shown in Exhibit 4HH. One or more of these buildings may provide expansion space for the visual arts program, also located in this precinct. The design of these facilities will be determined as the need arises for each; however, the development for these sites should take care to provide a façade along Halsted that is visually congenial and controls for noise. The University may consider a landscape berm along Halsted Street to help control noise coming from campus buildings.

**Faculty/Staff Housing**

The University desires housing for faculty and staff as an aid to recruitment in a highly competitive local real estate market. This hous-
ing is expected to be a mix of rental and purchased properties, with purchase conditions that make these units remain affordable and serve their original purpose.

The Master Plan designates two areas suitable for faculty/staff housing: in the Northwest Precinct south of Halsted Street and west of Etiwanda Avenue, and a larger complex north of Lassen Street, discussed in Section 4.3.8. In the Northwest Precinct, a complex of up to 50 units of faculty/staff is anticipated. Residential parking will be incorporated into the development.
4.3.8 NORTH CAMPUS FACULTY/STAFF HOUSING VILLAGE [EXHIBITS 4JJ AND 4KK]

The area north of Lassen Street will be developed with faculty/staff housing to accommodate the needs of the University. The format and number of units will be determined by the University through a detailed housing study. Similar to the faculty/staff housing development in the Northwest Precinct, this development will include residential parking. Exhibit 4KK shows an artist’s sketch of one potential concept for this housing, which is expected to include dedicated open space areas, and a small retail complex to serve the residents. North of the housing area, a large playfield [PF-G12] will serve the campus. This playfield is supported by a small building [A] to provide restroom facilities, showers and/or storage.

4.4 CAMPUS UTILITIES AND INFRASTRUCTURE

4.4.1 CIVIL ENGINEERING MASTER PLAN

Domestic Water Supply [Exhibit 4LL]

For the Central West Campus water service will be provided from Halsted. DWP’s mains in this immediate area are sized for multi-unit residential and commercial development. No upgrades should be necessary to existing DWP service mains.

For the North Campus area, south of Lassen Street, water service from Zelzah will be upgraded and new connections will be made from the water mains in Lindley and Zelzah. In addition, the on-site system for this entire student housing area will need to be upgraded. In this area DWP’s water mains are sized for high-density development and should not require upgrades.
For new buildings on Plummer between Darby Avenue and East University Drive, new service connections will be required from the existing City water main in Plummer. The concentration of residential units will add significant demand to DWP’s water system, at an average of 60 gallons per minute (GPM). This translates into an increased peak demand of approximately 300 GPM and will require an upgrade of the City’s main in Plummer.

On-Site water lines for both domestic and fire protection water will need to be relocated prior to the construction of buildings on the east side of the main campus. Since these existing lines also serve other buildings, temporary at-grade lines will be necessary during construction.

Existing services are adequate for the balance of the proposed buildings and should not require any modifications.

**Fire Protection Water Supply**

The existing Fire Protection system is supplied from the same DWP water lines as the Domestic Water Supply discussed in the previous section. However, once on-site, the firewater system is a separate dedicated loop.

A total of 12 new fire protection waterlines are being considered for the full build-out in 2035. Nine of these new lines will be to feed additional fire hydrants for future buildings, one line is an upgrade to existing, and the last two are to re-route the existing to avoid new structures.

**Sanitary Sewer [Exhibit 4MM]**

For the North Campus, the City of Los Angeles Department of Public Works, Bureau of Sanitation (BOS) operates the 8-inch sanitary sewer mains in Lindley Avenue and Zelzah Avenue. As with the water lines, the majority of the units will be serviced from new connections in Lindley. BOS will also require upgrade of the existing connections and mains.

For the main campus new sewer services will be taken from Halsted, Lindley, Zelzah and Plummer. Where there are concentrations of new residential units it will add significant demand to the sewer system and an increase in demand similar to that for water can be expected. New connections to the City main and an upgrade of the sanitary sewer will be required.

The main in Lindley is already utilized beyond capacity. The campus operates several sanitary sewer holding tanks and pumps to retain flow for pumping into the system during off-peak periods, and at least one tank will need to be relocated. In addition, the 15-inch sanitary sewer that crosses Vincennes and flows toward Prairie will need to be relocated to accommodate new buildings.

**Storm Drains [Exhibit 4NN]**

No new storm drains are anticipated for the North Campus development. Drainage will continue to be by surface flow and through curb openings into Lindley Avenue and Zelzah Avenue.

For the main campus no new storm drain improvements will be required. Existing drainage courses will be maintained and designed to surface drain to adjacent streets. No net increase in runoff will result.

The Bookstore entrance area historically has drainage problems. Future redevelopment of the site will create an opportunity to correct drainage problems.
Legend

- Existing System
- Proposed New Pipe
- Existing Pipe to be Abandoned or Removed
- Existing Pipe to be Upgraded
Legend

- Dashed: Existing System
- Red: Proposed New Pipe
- Purple: Existing Pipe to be Abandoned or Removed
- Orange: Existing Pipe to be Upgraded

4MM Master Plan: Fire Protection Water Supply System
Legend

- Existing System
- Proposed New Pipe
- Existing Pipe to be Abandoned or Removed
- Existing Pipe to be Upgraded

Master Plan: Sanitary Sewer System
Chapter Four: Master Plan

Legend
- Existing System
- Proposed New Pipe
- Proposed Swale
- Existing Pipe to be Abandoned or Removed
- Existing Pipe to be Upgraded

Master Plan: Storm Water System

California State University Northridge Master Plan | ENVISION 2035
For future buildings on the east side of the main campus, the existing storm drain pipes will need to be relocated.

Along the east side of the main campus at the new north-south corridor be created by new building development, some of the storm water will be redirected to Nordhoff to remove load on the Lindley storm drain.

**Other Significant Issues**

The campus has recently installed a field of photo-voltaic panels in Lot E6 in cooperative agreement with the City of Los Angeles Department of Water and Power. This installation will need to be relocated or abandoned upon development of student housing units on this site.

### 4.4.2 ELECTRICAL ENGINEERING MASTER PLAN

California State University, Northridge is currently served from a 34.5kV DWP service originating from the north east side of the campus. The 34.5kV DWP service serves four 5000kVA 34.5kV/4160V substations, Substation ‘A’, Substation ‘B’, Substation ‘C’, Substation ‘D’ and Central Plant/Cooling Tower Substations located on the campus that currently meet the electrical demand of the campus. Each substation is equipped with a dual 34.5kV DWP feed, a metering section and 5kV main switchgear comprising of a 1200A main breaker and feeder breakers. Circuits originating from these substations form multiple loop systems through 15kV selector switches and serve each building on campus. Radial feeders originating from 15kV selector switches serve substation(s) in each building on campus.

An evaluation of the 2005 Master Plan revealed that a net additional 1.33 million square feet of state funded buildings and an additional 300,000 square feet of non state funded buildings will be added to the existing campus. An analysis of the electrical demands of future state and non-state buildings planned as part of this master plan revealed that the campus would approximately see an increase in its electrical demand by 9.4MW for Academic/Administration/Student Support buildings, 2.2MW for Student/Faculty Housing and 2.3MW on account of Parking Structures. These demands have been calculated based on the proposed square footages of the facilities planned as part of the master plan. Exhibit 4PP shows the 2005 Master Plan Proposed Electrical System. Exhibit 4TT is a spreadsheet showing installed capacities and demand of the proposed facilities.

An analysis of the current 4160V distribution system was conducted to evaluate a) existing spare capacities available in each substations/ feeders b) the impact of the proposed facilities on the existing electrical distribution system and c) modifications required to support the future build-out of the campus. The current electrical distribution was also analyzed for electrical duct-banks/manholes that will be in conflict with the proposed facilities and will require relocation. Exhibit 4QQ is a campus site plan identifying electrical duct-banks/manholes that require demolition/relocation to support the planned facilities.

An evaluation of the long term heating and cooling capacity requirements for the FTE of 35,000 over the next 35 years revealed that an estimated additional 2,500 tons of cooling and 23,000,000 BTU of heating is required to accommodate the growth of the campus. This would also include an additional TES capacity of 24,000 Ton Hours. Due to the long term campus loads, the capacity of the existing central plant, and reasonable redundancy considerations for a campus environment, a satellite central plant facility has been recommended [see
As part of the Satellite Central Plant, the campus is also planning to install a 1MW fuel cell system that will back feed the existing Substation ‘A’. The proposed satellite central plant will be served from this self generated 1MW of power (Substation ‘SCP’) and thus would not have an impact on the existing 4160 distribution system. The current Central Plant will still be served from existing Substations.

The text below and Exhibit 4RR describe phasing recommendations for serving new facilities proposed in the 2005 Master Plan as they affect the existing campus electrical distribution system. Note that electrical service for University Park student housing infill is expected to be planned as part of that development and is not included in the phasing shown here.
Phase 1

This phase would occur from 2006 thru 2010 and includes the state and non-state buildings shown in Exhibit 4RR. The table identifies facilities that are anticipated to be constructed in phase I along with their connected loads and demands. An evaluation of the connected loads and demands of these facilities revealed that the existing substations/feeders can support the power demand of these facilities. Names of substations and feeder designations that will be used to serve these proposed facilities are also provided in Exhibit 4RR. New 15kV selector switches consistent with campus standards will be provided to serve the proposed facilities and complete the existing loop system. These selector switches will provide ease of isolation of loop faults as well as provide a means of isolating building substations. These switches will be served from the nearest existing manhole to the proposed facility as shown in the proposed site plan. The loops will be completed by extending existing duct-banks/feeders using 4” electri-
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<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
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<td>105,000</td>
<td>1,260</td>
<td>504</td>
<td>A / A1</td>
<td>S</td>
</tr>
<tr>
<td>C</td>
<td>Lecture Lab</td>
<td>108,000</td>
<td>1,296</td>
<td>518</td>
<td>C / C3</td>
<td>S</td>
</tr>
<tr>
<td>G</td>
<td>Classroom/Office</td>
<td>55,000</td>
<td>660</td>
<td>264</td>
<td>C / C5</td>
<td>S</td>
</tr>
<tr>
<td>K</td>
<td>Lecture Lab</td>
<td>120,000</td>
<td>1,440</td>
<td>576</td>
<td>A / A4</td>
<td>S</td>
</tr>
<tr>
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<td>Lecture Lab</td>
<td>120,000</td>
<td>1,440</td>
<td>576</td>
<td>A / A1</td>
<td>S</td>
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<tr>
<td>P</td>
<td>Kinesiology</td>
<td>67,600</td>
<td>811</td>
<td>324</td>
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<td>S</td>
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<tr>
<td>PS-B1</td>
<td>Parking Structure</td>
<td>720,000</td>
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<td>432</td>
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<td>PS-B6</td>
<td>Parking Structure</td>
<td>262,800</td>
<td>395</td>
<td>158</td>
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<tr>
<td>T</td>
<td>Manzanita Adj.</td>
<td>66,780</td>
<td>802</td>
<td>321</td>
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<tr>
<td>Y</td>
<td>Classroom/Office</td>
<td>86,400</td>
<td>1,036</td>
<td>415</td>
<td>C / C1</td>
<td>NS</td>
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</tbody>
</table>
cal duct banks with 15kV 3#500kcmil Cu. EPR cables. Radial feeders originating from these selector switches will serve substations in each of the facilities.

Phase 2 / Phase 3

This phase would occur from 2010 thru 2019 and include the state and non-state buildings shown in Exhibit 4RR. The table shows facilities that are provided in phase 2/3 along with their connected loads and demands. An evaluation of the connected loads and demands of these facilities revealed that an additional two feeder sections (‘C5’ and ‘C6’) will have to be provided in Substation ‘C’ to accommodate demands of the proposed facilities. A combination of these new feeders and the existing substations/feeders will support the power demand of facilities being added in Phase 2/3. Names of substations and feeder designations serving these proposed facilities are provided in Exhibit 4SS. New 15kV selector switches consistent with campus standards will be provided to serve the proposed facilities and also complete the existing loop system. These selector switches will provide ease of isolation of loop faults as well as provide a means of isolating building substations. These switches will be served from the nearest existing manhole to the proposed facility as shown in Exhibit 4PP. The loops will be completed by extending existing duct-banks/feeders using 4” electrical duct banks with 15kV 3#500kcmil Cu. EPR cables. Radial feeders originating from these selector switches will serve substations in each of the facilities.

The existing 34.5kV Department of Water and Power (DWP) transformers/services will need to be evaluated by DWP to ensure that the increased demand for each phase is met. It is recommended that the electrical demand of each

<table>
<thead>
<tr>
<th>SUBSTATION</th>
<th>FEEDERS</th>
<th>INSTALLED CAPACITY IN KVA</th>
<th>DEMAND IN KVA</th>
</tr>
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<tr>
<td>A</td>
<td>A1</td>
<td>3,780</td>
<td>1,390</td>
</tr>
<tr>
<td></td>
<td>A2</td>
<td>2,880</td>
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<td></td>
<td>A3</td>
<td>3,580</td>
<td>1,790</td>
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<td></td>
<td>A5</td>
<td>3,950</td>
<td>1,975</td>
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<td></td>
<td>A6</td>
<td>4,200</td>
<td>2,100</td>
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<td>B</td>
<td>B1</td>
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</tr>
<tr>
<td></td>
<td>B3</td>
<td>4,458</td>
<td>2,229</td>
</tr>
<tr>
<td></td>
<td>B4</td>
<td>3,992</td>
<td>1,996</td>
</tr>
<tr>
<td>C</td>
<td>C1</td>
<td>2,860</td>
<td>1,430</td>
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<tr>
<td></td>
<td>C2</td>
<td>4,267</td>
<td>2,138</td>
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<tr>
<td></td>
<td>C3</td>
<td>4,462</td>
<td>2,251</td>
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<td></td>
<td>C4</td>
<td>4,408</td>
<td>2,204</td>
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<td></td>
<td>C5</td>
<td>3,950</td>
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<td></td>
<td>C6</td>
<td>2,700</td>
<td>1,350</td>
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<td></td>
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<td>750</td>
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<tr>
<td>SCP (Proposed)</td>
<td>SCP</td>
<td>1,000</td>
<td>600</td>
</tr>
</tbody>
</table>

4SS  Installed Capacities by Substation/Feeders
Future Electrical Demand (Cont. on next page)

new facility be shared with DWP at the start of design, so that necessary modifications to DWP services can be made to support the new loads.

Phase 4

This phase would occur from 2020 thru 2035 and include the state and non-state buildings shown in Exhibit 4RR. The table shows facilities that are provided in phase 4 along with their connected loads and demands. An evaluation of the connected loads and demands of these facilities revealed that the existing substations/feeder

modified as part of Phase 2/3 can support the power demand of these facilities. Names of substations and feeder designations that will be used to serve these proposed facilities are shown in Exhibit 4SS. New 15kV selector switches consistent with campus standards will be provided to serve the proposed facilities and complete the existing loop system. These selector switches will provide ease of isolation of loop faults as well as a means of isolating building substations. These switches will be served from the nearest existing manhole to the proposed facility as shown in Exhibit 4PP. The loops will be completed
by extending existing duct-banks/feeders using 4” electrical duct banks with 15kV 3#500kcmil Cu. EPR cables. Radial feeders originating from these selector switches will serve substations in each of the facilities.

By the end of this phase, the campus wide electrical demand will increase by 13.5MW. Again the existing 34.5 kV Department of Water and Power (DWP) transformers/services need to be evaluated by DWP to ensure that the increased demand is met. It is recommended that the electrical demand of each new facility be shared with DWP at the start of design, so that necessary modifications to DWP services can be made to support the new loads.

Since the University Park and Faculty/Staff Residential Areas are non-state buildings, the area would be served by a separate DWP service. Connected load and demand of these facilities are shown in Exhibit 4TT. This table provides approximate installed capacities and demand on each substation/feeder after implementation of the 2005 Master Plan.

4.4.3 MECHANICAL ENGINEERING

MASTER PLAN

During September 2004 and July/August 2005, Digital Energy completed a report [Appendix 2] that reflected the long term heating and cooling capacity considerations for an increase to 35,000 FTE over the next 30 years. Their assessments and recommended solutions have been incorporated into this study for a complete overview of the infrastructure requirements. Due to the long term campus loads, the capacity of the existing central plant, and reasonable redundancy considerations for a campus environment, Digital Energy recommended a satellite central plant facility [refer to Appendix 2 for the Digital Energy report].

This satellite plant would provide long term flexibility for the needed cooling and heating requirements that will occur on campus and that cannot be supported by the existing central plant facility. It is estimated that an additional 2,500 tons of cooling and 23,000,000 BTU of heating is required by year 2035 to accommodate the growth of the campus. This would also

<table>
<thead>
<tr>
<th>BLDG LETTER</th>
<th>FACILITY USAGE</th>
<th>FLOORS</th>
<th>TOTAL GSF</th>
<th>TOTAL ASF</th>
<th>LOAD FACTOR W/SF</th>
<th>CONNECTED LOAD IN KVA</th>
<th>INSTALLED CAPACITY IN KVA</th>
<th>DEMAND IN KVA @ 40%</th>
<th>SERVED FROM SUBSTATION / FEEDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Admin Bldg</td>
<td>1</td>
<td>15,000</td>
<td>12,000</td>
<td>10</td>
<td>150.00</td>
<td>150.00</td>
<td>60.00</td>
<td>DWP Services</td>
</tr>
<tr>
<td>UP-1 - UP-2</td>
<td>Student housing</td>
<td>3</td>
<td>172,800</td>
<td>112,320</td>
<td>10</td>
<td>1,728.00</td>
<td>2,000.00</td>
<td>691.00</td>
<td>DWP Services</td>
</tr>
<tr>
<td>SH1 - SH4</td>
<td>Student housing</td>
<td>4</td>
<td>172,800</td>
<td>112,320</td>
<td>10</td>
<td>1,728.00</td>
<td>2,000.00</td>
<td>691.00</td>
<td>DWP Services</td>
</tr>
<tr>
<td>SH5 - SH8</td>
<td>Student housing</td>
<td>4</td>
<td>172,800</td>
<td>112,320</td>
<td>10</td>
<td>1,728.00</td>
<td>2,000.00</td>
<td>691.00</td>
<td>DWP Services</td>
</tr>
<tr>
<td>H-D</td>
<td>Dining</td>
<td>4</td>
<td>25,000</td>
<td>16,250</td>
<td>10</td>
<td>250.00</td>
<td>300.00</td>
<td>100.00</td>
<td>DWP Services</td>
</tr>
<tr>
<td>TOTAL</td>
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<td>558,400</td>
<td>365,210</td>
<td>50</td>
<td>5,584.00</td>
<td>6,450.00</td>
<td>2,234.00</td>
<td></td>
</tr>
</tbody>
</table>

| Parking Structures | | | | |
|--------------------|----------------|--------|-----------|-----------|-----------------|---------------------|------------------------|-----------------|--------------------------------|
| PS-B1              | Parking Structure | 6     | 720,000   | 120,000   | 1.5             | 1,080.00           | 1,500.00              | 432.00         | C / C3                         |
| PS-B6              | Parking Structure | 5     | 262,800   | 112,320   | 1.5             | 394.00             | 500.00                | 158.00         | B / B4                         |
| PS-G3              | Parking Structure | 6     | 648,000   | 112,320   | 1.5             | 972.00             | 1,000.00              | 389.00         | C / C1                         |
| PS-G4              | Parking Structure | 6     | 900,000   | 112,320   | 1.5             | 1,350.00           | 1,500.00              | 540.00         | C / C6                         |
| PS-G6              | Parking Structure | 6     | 900,000   | 112,320   | 1.5             | 1,350.00           | 1,500.00              | 540.00         | C / C6                         |
| PS-F9              | Parking Structure | 4     | 158,400   | 112,320   | 1.5             | 237.60             | 300.00                | 95.00          | -                              |
| PS-F10             | Parking Structure | 4     | 158,400   | 112,320   | 1.5             | 237.60             | 300.00                | 95.00          | -                              |
| TOTAL              |                |        | 3,589,200 | 11        | 5,884.00        | 6,800.00            | 2,354.00              |                        |                                |

4TT Future Electrical Demand (Cont. from prev. page)
include an additional TES capacity of 24,000 Ton Hours.

In order to accommodate the distribution of the increased campus load, the chilled water and heating hot water infrastructure was analyzed. The future campus load distribution was compared to the underground piping distribution. The added capacity breaks down as shown in Exhibit 4WW.

The largest increase in cooling and heating loads is occurring along the south and east loops of the underground piping. After analysis by Digital Energy comparing current load profiles to the future load profile, the existing 14” CHW piping is adequate for the future estimated loads. However, the existing 6” and 4” HHW piping along the west, south, and east loops will be replaced with 8” HHW piping to accommodate the future estimated heating loads. The hot water mechanical engineering plan is shown in Exhibit 4UU. The chilled water mechanical engineering plan is shown in Exhibit 4XX; the hot water demolition plan is shown in Exhibit 4VV, and the chilled water demolition plan is shown in Exhibit 4YY. Also, 10” CHW and 8” HHW piping from the future satellite central
INCREASED COOLING TONS | INCREASED HEATING BTU | LOOP LOCATION
--- | --- | ---
540 | 3,400,000 | North Loop
820 | 7,900,000 | South Loop
365 | 3,400,000 | West Loop
935 | 8,100,000 | East Loop

4VV Hot Water Mechanical System Demolition Plan

4WW Increased Heating/Cooling Capacity
plant location to the existing loop will be piped underground to feed the campus loop.

The construction approach to a satellite central plant would occur over three (3) phases, as shown in Exhibit 4ZZ.

Phase 1

This phase would occur from 2006 thru 2010 and would include reserving the footprint for the future 28,000 GSF plant building in the southeast portion of the campus. Install a new 25,000,000 BTU output boiler in the plant and associated distribution pumps. It would also include the relocation of an 800-ton chiller and cooling tower from existing Science 2, resulting in a total loop cooling of 2,500 tons. This phase would include the installation of the chilled water and heating hot water piping connection to the campus loop as well. The south, southwest, and southeast heating hot water loop would also be upgraded from 6” and 4” to 8” to meet
the long term flow requirements. Under Phase 1, the south loop will be loaded with the New Performing Arts Building and Science 5. The associated building CHW and HHW piping extensions would be completed also under Phase 1 when the buildings are being constructed or renovated. Refer to the table in Exhibit 4ZZ for pipe sizes for each building.

If economics support the opportunity, this phase can also install a 12,500 Ton-Hour TES system at the satellite plant and also accommodate a future TES system of similar size to be installed under Phase 3.

The non-state buildings have been listed to identify estimated heating and cooling loads. However, at this time, the central plant and satellite central plant would not support these non-state buildings and it is assumed that these would be stand-alone hydronic systems that would be self sufficient.
Chapter Four : Master Plan

Phase 2

This phase would occur from 2010 thru 2019 and would include the installation of a new 10,000,000 BTU boiler at the central plant for low load handling and long term redundancy. Two (2) 900-ton chillers would be installed and the existing 800-ton chiller would serve as back-up. The loop chilled water and heating hot water piping would further be expanded to handle the buildings, shown in Phase 2 of Exhibit 4ZZ.

The non-state buildings have been listed to identify estimated heating and cooling loads. However, at this time, the central plant and satellite

---

### Mechanical System Phasing

<table>
<thead>
<tr>
<th>BLDG LETTER</th>
<th>BLDG NAME</th>
<th>GSF</th>
<th>CLC* TONS 60% DIV.</th>
<th>CHW GPM</th>
<th>CHW PIPE SIZE</th>
<th>HTC* BTU 80% DIV.</th>
<th>HHW GPM</th>
<th>HHW PIPE SIZE</th>
<th>STATE-FUNDED / NON-STATE-FUNDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Public Safety</td>
<td>28,000</td>
<td>37</td>
<td>40</td>
<td>400,000</td>
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</tr>
<tr>
<td>N</td>
<td>Exchange Repl.</td>
<td>4,000</td>
<td>8</td>
<td>10</td>
<td>100,000</td>
<td>5</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>O</td>
<td>Performing Arts</td>
<td>98,000</td>
<td>245</td>
<td>270</td>
<td>6&quot;</td>
<td>2,800,000</td>
<td>140</td>
<td>4&quot;</td>
<td>S</td>
</tr>
<tr>
<td>O</td>
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<td>65,200</td>
<td>245</td>
<td>270</td>
<td>2,800,000</td>
<td>140</td>
<td>NS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Science 5</td>
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<td>180</td>
<td>200</td>
<td>4&quot;</td>
<td>1,400,000</td>
<td>70</td>
<td>3&quot;</td>
<td>S</td>
</tr>
</tbody>
</table>

**PHASE 2**

| D           | Art               | 15,000 | 23                | 25      | 2"            | 200,000           | 10      | 1.5"          | S                             |
| E1          | Art / Eng. / Ath. Off. | 10,500 | 16                | 20      | 2"            | 200,000           | 10      | 1.5"          | S                             |
| E2          | Art / Eng. / Ath. Off. | 10,500 | 16                | 20      | 2"            | 200,000           | 10      | 1.5"          | S                             |
| F           | Business/Econ     | 65,500 | 112               | 125     | 3"            | 1,000,000         | 50      | 2.5"          | S                             |
| H1          | Nordhoff Hall Exp | 72,000 | 123               | 135     | 4"            | 1,200,000         | 60      | 2.5"          | S                             |
| H2          | Nordhoff Hall Exp | 5,300  | 9                 | 10      | 1.5"          | 100,000           | 5       | 1"           | S                             |
| I           | Library Expansion | 109,050 | 187              | 205     | 4"            | 1,700,000         | 85      | 3"           | S                             |
| J           | S&S, Humanities   | 140,000 | 240              | 260     | 4"            | 2,200,000         | 110     | 3"           | S                             |
| Q           | Athletics         | 37,000 | 63                | 70      | 600,000       | 30                | NS      |  |
| R           | Student Rec. Ctr  | 120,000 | 208             | 230     | 1,900,000     | 95                | NS      |  |
| S           | Faculty Office    | 49,500 | 85                | 95      | 2.5"          | 800,000           | 40      | 2"           | S                             |
| U           | Science 6         | 150,000 | 300              | 330     | 6"            | 2,400,000         | 120     | 3"           | S                             |
| W           | Univ. Club/Alum   | 24,000 | 48                | 55      | 400,000       | 20                | NS      |  |
| Z           | Hlth. Ctr. / Child Dev. | 86,400 | 148              | 165     | 4"            | 1,400,000         | 70      | 3"           | S                             |

**PHASE 3**

| B           | Edu./Admin./SS    | 105,000 | 180              | 200     | 4"            | 1,700,000         | 85      | 3"           | S                             |
| C           | Lecture Lab       | 108,000 | 185              | 205     | 4"            | 1,700,000         | 85      | 3"           | S                             |
| G           | Classroom/Office  | 55,000  | 94               | 105     | 3"            | 900,000           | 45      | 2.5"          | S                             |
| K           | Lecture Lab       | 50,655  | 87               | 95      | 3"            | 800,000           | 40      | 2.5"          | S                             |
| L           | Lecture Lab       | 26,897  | 46               | 55      | 2.5"          | 400,000           | 20      | 2"           | S                             |
| P           | Kinesiology       | 67,600  | 116              | 130     | 3"            | 1,100,000         | 55      | 2.5"          | S                             |
| T           | Manzanita Adj.    | 38,857  | 67               | 75      | 3"            | 600,000           | 30      | 2"           | S                             |
| Y           | Classroom/Office  | 48,072  | 79               | 90      | 700,000       | 35                | NS      |  |

*The listed cooling loads were provided by the Digital Energy report and based upon campus loading observations made of approximately 550 GSF / Ton at 60% diversified cooling conditions. The listed heating loads were based upon a 16.7 BTU/GSF at 80% diversified heating conditions.

---

4ZZ  Mechanical System Phasing

Phase 2

This phase would occur from 2010 thru 2019 and would include the installation of a new 10,000,000 BTU boiler at the central plant for low load handling and long term redundancy. Two (2) 900-ton chillers would be installed and the existing 800-ton chiller would serve as back-up. The loop chilled water and heating hot water piping would further be expanded to handle the buildings, shown in Phase 2 of Exhibit 4ZZ.

The non-state buildings have been listed to identify estimated heating and cooling loads. However, at this time, the central plant and satellite
central plant would not support these non-state buildings and it is assumed that these would be stand-alone hydronic systems that would be self sufficient.

Phase 3

This phase would occur from 2020 thru 2025 and would include the installation of a new 10,000,000 BTU boiler at the satellite central plant for enhanced redundancy. Also included in this phase would be the installation of the 12,500 Ton Hour TES at the satellite central plant. The loop chilled water and heating hot water piping would further be expanded to handle the buildings shown in Phase 3 of Exhibit 4ZZ.

Buildings K and L would replace the existing Science buildings that are currently served by the central plant and have a 10” CHW and 6” HHW service from the east loop. This service is fed from Science 1 and would remain as part of the campuswide master plan. The existing CHW and HHW would be adequate for the new buildings.

By the end of this phase, the campuswide chiller capacity would be 6,400 tons, the installed campuswide heating capacity would be 80,000,000 BTU with 20,000,000 BTU redundancy, and the total TES capacity would be 54,000 ton hours for full shift of high peak and low peak cooling loads.

4.4.4 TELECOMMUNICATIONS SYSTEM MASTER PLAN

In 2003 the University completed a number of projects that upgraded the telecommunication infrastructure.

In 2001 the campus completed construction of a new 4100 square foot Main Distribution Facility (MDF). The MDF houses the voice, data and video equipment for that serves the campus. In addition, in 2003 the University completed the Telecommunication Infrastructure Upgraded project that provided for upgrades to the inter-building distribution system including pathways, copper and fiber optic cable backbone systems.

The University recently implemented the new V.O.I.P. technology for providing voice and data services over a common switching network. This technology will also be implemented in all new buildings that will result in voice and data services transported over fiber optic cables throughout the backbone and riser cable networks. A small copper cable system will also be installed to provide for non-switched circuit requirements for services such as alarms, elevator phones, payphones, or direct lines ordered from SBC Communications.

In 2005 the University completed a major telecommunications infrastructure upgrade project that provided new conduit and cable systems from the MDF building located south of Plummer Avenue and west of Lindley Drive to serve the existing campus buildings. The new buildings will be served from the existing ductbank that originates at the MDF, extends eastward to Lindley Drive, and south from Lindley Drive serving all campus buildings in the south eastern portion of the campus.
The design criteria for the above projects were based on The California State University Telecommunication Infrastructure Planning Standards adopted by the Office of the Chancellor effective July 2003.

The existing technology infrastructure includes the fiber optic and copper backbone systems that support the telecommunications, voice, data, video multimedia, fire alarm and EMS systems.

The 2005 Master Plan Telecommunications engineering diagram is shown in Exhibit 4AAA; the demolition is shown in Exhibit 4BBB. The 2005 Master plan state funded projects for telecommunication are shown on the attached outlet and cable schedule [Exhibit 4CCC]. Number of outlets and entrance cable sizes were based on the following criteria.
1. Total ASF @65%
2. (1) Information outlet per 100 sq. ft.
3. (3) Cables per information outlet.
4. Entrance cable copper pairs 11/2 pairs per outlet.
5. Entrance cable fiber optic stands based on building GSF.

The new building south of the MDF will need to avoid CMH 020 and the (56) 4” conduits that feeds all existing to the southwest. The new building along Plummer will need to avoid the (28) conduit from the MDF to the north. These conduits also are where the SBC feeder cables enter the campus.

The Student and Faculty/Staff housing design criteria is based on ANSI/TIA/EIA-570-A residential telecommunications cabling standard Grade Level 1. Number of outlets and entrance cable size were based on the following.
### Telecommunications Outlet and Cable Schedule (Cont. on next page)

<table>
<thead>
<tr>
<th>BLDG LETTER</th>
<th>FACILITY USAGE</th>
<th>FLOORS</th>
<th>TOTAL GSF</th>
<th>TOTAL ASF@65%</th>
<th>NUMBER OUTLETS</th>
<th>TOTAL CABLES</th>
<th>COPPER PAIRS ENT CABLE</th>
<th>SM FIBER OPTIC ENT CABLE</th>
<th>MM FIBER OPTIC ENT CABLE</th>
</tr>
</thead>
<tbody>
<tr>
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**TOTAL**

| 1,918,030 | 1,246,720 | 12,467 | 37,402 | 15,100 | 774 | 486 |

**Student Housing:**
1. (1) Information outlet per bed.
2. (2) Cables per information outlet.
3. Entrance cable copper pairs 11/2 pairs per outlet.
4. Entrance cable fiber strands based on CSU minimum standard.

**Faculty/Staff Housing:**
1. (4) Information outlets per unit
2. (2) Cables per information outlet
3. Entrance cable copper pairs 6 pairs per unit.
4. Entrance cable fiber strands based on CSU minimum standard.
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<th>FLOORS</th>
<th>TOTAL GSF</th>
<th>TOTAL BEDS</th>
<th>NUMBER OUTLETS</th>
<th>TOTAL CABLES</th>
<th>COPPER PAIRS ENT. CABLE</th>
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4CCC Telecommunications Outlet and Cable Schedule (Cont. from prev. page)
The California State University Northridge campus enjoys a maturing and well-integrated landscape which is the legacy of its history and location. It is also the beneficiary of its 1998 Master Plan, which gave particular attention to a new landscape plan that focused on demarcating pedestrian pathways, developing tree-lined campus roadways and creating new quadrangles, plazas and courtyards. Currently, the quality of the campus landscape and its component parts contribute significantly to the aesthetic character of the campus by reinforcing the integrative role of open space, creating connections between landscape and structures, and producing a comfortable and human-scaled setting for educational activities.

Some specific areas of the campus still require attention to bring them up to the level of the campus landscape as a whole. The existing Orange Grove along Nordhoff Street, one of the last remaining groves in the San Fernando Valley, is a signature natural resource area for the campus. At present, it is not well-maintained and is not well-integrated with the rest of the campus. The Botanic Garden, another important natural resource for the campus, also needs maintenance and revitalization to enhance its contribution to the campus. The campus edges do not convey a strong sense of identity for the University; rather, the landscape at campus edges includes a wide variety of plant materials, and in some areas, the landscape is non-descript.

The 2005 Master Plan proposes a program of new buildings, facilities, pedestrian paths and roadways [see Chapter 4], and includes new open-space areas that are created by the siting of the existing and new campus features. The 2005 Landscape Master Plan has been developed to complement and reinforce the features of this Master Plan. The Landscape Master Plan addresses the natural and paved materials located within campus open space, with the objective of providing an integrated approach to the design of open space areas and to the use of these materials. Specifically, the Landscape Master Plan is intended to:

- Unify the appearance of the campus while creating a diverse assemblage of trees, shrubs and groundcovers on the campus;
• Focus attention on buildings, open-space areas and other features of the campus through the effective deployment of plant and hardscape materials;
• Provide a hierarchy and diversity of outdoor spaces and develop or reinforce the recognizable character of the major campus open space areas;
• Reinforce the University’s identity by using an integrated approach to landscape at the campus perimeter;
• Support the existing pedestrian circulation system and establish pedestrian circulation in areas currently not well-served;
• Establish human scale in the pedestrian environment;
• Respond to climatic considerations by establishing comfortable micro-climates and providing shade along walkways and in outdoor seating and gathering areas;
• Convey both the sense and the actuality of security and safety;
• Minimize the visual and acoustic impacts of automobiles and parking facilities and soften and/or screen undesirable features in the environment; and
• Conserve human and natural resources by recognizing the need for economy and ease of maintenance.

By addressing the objectives presented above, the 2005 Landscape Master Plan emphasizes the proper relationship between open space and pedestrian circulation, buildings, parking, and roadways, and will not only enhance the quality of the campus environment and reinforce the identity of the University, but also establish a framework for future growth and development of the campus.

5.1 ILLUSTRATIVE LANDSCAPE MASTER PLAN (EXHIBIT 5A)

The Illustrative Landscape Plan shown in Exhibits 5A through 5Y is a conceptual landscape plan for the campus. It was developed to fulfill the purposes outlined above and is based upon specific guiding principles that are consistent with the master-planning principles that underlie the 2005 Master Plan (see Chapter 3). The Illustrative Landscape Master Plan represents one of a number of possible ways in which natural and hardscape materials can be deployed on the campus in support of the 2005 Master Plan. Variations on this conceptual Illustrative Landscape Master Plan are acceptable if the planning principles, objectives and guidelines in this report are observed. For the remainder of this report the Illustrative Landscape Master Plan will be referred to as the Landscape Master Plan.

The Landscape Master Plan includes:

• proposals for the selection and use of plant materials for campus open space areas, including redeveloped and new quadrangles and courtyards created by the siting of new buildings; [Section 5.2.1];
• recommendations for the development and reinforcement of the pedestrian circulation system, including recommendations for plant and paving materials [Section 5.2.2];
• proposals for the landscape character and plant materials to create a signature landscape for the perimeter of the campus and reinforce campus identity [Section 5.2.3];
• concepts for landscape and hardscape at the new and reconfigured campus entries [Section 5.2.4];
• concepts for landscape at new and reconfigured roadways [Section 5.2.5];
• a discussion of sustainability measures that are recommended for the California State University Northridge campus landscape [Section 5.3]
5.1.1 LANDSCAPE MASTER PLAN APPROACH

The existing campus landscape is characterized by a series of quads, courtyards and plazas linked by a network of tree-lined promenades. These features provide a strong pedestrian-oriented framework to the campus. The Campus quads and courtyards vary in their size, character and use. The role of trees in providing shade along walkways and in seating areas is particularly important, given the hot, dry climate of the Northridge area. The existing landscape approach makes use of signature tree species in some open-space areas and along some pathways.

Landscape Master Plan Concepts

Over a period of years, and similarly to many established campuses, the existing campus landscape has taken on a somewhat “manicured” character of trees, shrubs and turf grass that require high levels of irrigation and maintenance. In recognition of the fact that existing landscape planting is, in many areas, highly maintenance- and irrigation-intensive, the University has adopted a more “sustainable” palette in recent landscape projects. The goal of the Landscape Master Plan is to reinforce this recent approach. The recommendations focus on maintaining the more formal landscape character of the campus’ primary courtyards and quads that serve as gathering places and activity areas for the University, while encouraging the use of a more sustainable and informal landscape approach for the campus edges and other open space areas.

The intent of the Landscape Master Plan is to preserve and reinforce the unique, distinctive qualities of these two types of landscape and to avoid hybridizing or mixing them. Conceptually, the courtyards and quads thus become pedestrian-oriented oases within the overall campus landscape, connected by a system of tree-shaded pathways. This concept is reinforced by ensuring that the courtyards and quads are well-planted with shade trees and have convenient seating, appropriate lighting and other site amenities. Exhibit 5B shows Campus formal and informal open space areas as covered by the Landscape Master Plan. Open space is addressed in Section 5.2.1.

In contrast to the lush, irrigated nature of the quads and courtyards, the Landscape Master Plan recommends that campus edges and informal open spaces be characterized by a more “pastoral” landscape reminiscent of the natural landscape of Southern California. The intent is to provide a more sustainable landscape palette of long-lived, low-maintenance, drought-tolerant plants for the campus that also serves to reinforce the University’s identity where the campus meets the community. Native trees, such as Oaks, Sycamores and Pines should be the primary “background” trees, with select plantings of native accent and flowering plants and shrubs. The ground cover will consist of “natural” grasses, establishing a “signature” landscape for the campus. Select use of native accent ground covers and shrubs are recommended, while the use of turf grass should be avoided in these edge areas and less formal open spaces.

Section 5.2 is a discussion of the features of the Landscape Master Plan, including discussion and illustration of open spaces, pedestrian pathways, landscape character at campus edges, and campus roadways. Section 5.3 addresses Sustainability, and Section 5.4 includes specific palettes of plant materials to be used on the campus.
5.2 FEATURES OF THE 2005 LANDSCAPE MASTER PLAN

5.2.1 OPEN SPACE AND LANDSCAPE CHARACTER

Fundamental to a University’s identity is the landscape character of its open spaces. Currently the California State University Northridge open space areas can be characterized as a series of well-tended, geometrically-shaped courtyards, quads and greens planted as verdant, irrigated areas, intermixed with more informal open spaces. Some of these areas are recognized with specific names, while others do not have a formal designation [Exhibit 5B and 5C]. As indicated above, it is recommended that the more formal open space areas be treated differently from informal areas and edge conditions.

Courtyards, Quads and Greens

The campus system of formal courtyards, quads and greens in the Academic Core focuses on the University’s main quad: Oviatt Lawn and Sierra Quad, which together form the largest campus open space, and which serve as its symbolic and ceremonial heart [Exhibit 5C]. This quad area is used for passive recreational activities and for scheduled events such as graduation ceremonies, and is characterized by drifts of canopy trees, formal plantings of Canary Island Palms and long vistas. The bordering pedestrian pathways have the effect of reinforcing this large central open space area. The Landscape Master Plan does not recommend any changes to this area of the campus.

In contrast to this large quad area, a series of smaller, but still significantly sized, courtyards, quads and greens are formed by building edges or defined by specific landscape elements. These are situated to accommodate the diversity of activities that comprise campus life, including informal gathering, solitary pursuits, eating, studying and resting. These formal quads, courtyards and greens, shown in Exhibits 5B and 5C, are intended to be open and inviting, and accessible from multiple directions. In addition to areas directly adjacent to or between buildings, bosques of flowering and canopy trees planted in select locations throughout the campus also form important secondary open-space areas, such as the West Lawn adjacent to Oviatt Lawn.

New and reinforced courtyards and quads should be developed to provide for a diversity of uses, including interactive gathering areas such as dining terraces and outdoor classrooms, passive/informal recreational areas, and quiet personal spaces such as reading gardens. The proposed character of an open space should reflect and be in concert with the proposed uses for the adjacent building(s). Open spaces can be activated through the selective location of program elements such as cafes, lounges and building entries. It will be important to provide seating in courtyards and quads. Small gathering
areas should be provided at key building entries and key pedestrian intersections to encourage increased social interaction between students, faculty and staff.

Landscape character for courtyards and quads will continue with the manicured, somewhat more formal character of these open spaces. The plantings will consist of trees, shrubs, ground-cover, and lawn, with plants set in either a formal or informal manner. Additional bosques of flowering and canopy trees should be planted as appropriate to create focal areas within the courtyards and quads. A palette of landscape materials for courtyards and quads is included in Section 5.4. The use of turf grass is generally reserved for these more formal locations. Special accent planting, such as flowering trees and shrubs, should be used to highlight building entries and add visual interest to outdoor gathering spaces. The use of walls and other special landscape elements is also encouraged in order to define spaces and create focal points.

The landscape of courtyards and quads should respond to the San Fernando Valley climate of hot summers and mild winters. Planting of deciduous trees provide shade in the summer and light, sunny spaces that take advantage of mild winter days. Selected and limited use of water in key gathering areas can provide a cool retreat or oases in hot summer months. Low shrubs and groundcovers should be planted adjacent to buildings to soften the edges of the structures.

The Orange Grove

The eight-acre orange grove in the southeast corner of the campus is a remnant of the early agricultural heritage of the San Fernando Valley. The 2005 Master Plan and Landscape Master Plan recommendations emphasize the Orange Grove as a campus focal point and natural resource. Landscape Master Plan recommendations integrate the grove into the daily life of students, faculty, staff and campus visitors by rejuvenating the citrus trees and their surrounding plant materials and creating a pathway that connects the grove to other nearby campus facilities and events. Exhibit 5D shows a plan view of the Landscape Master Plan for the Orange Grove area.

The existing grove shall be maintained and revitalized as a tribute to the agricultural history of the San Fernando Valley. Trees at the end of their life cycle will be replaced, existing trees will be trimmed to allow space beneath them. The Orange Grove Arts Walk will extend through the Orange Grove. This will provide a key connection between the new Valley Performing Art Center, the University Club/Alumni Center, and the parking structures that serve these facilities. Orange Grove Arts Walk and its landscaping are discussed in greater detail in Section 5.2.2.

5.2.2 PEDESTRIAN CIRCULATION

The existing pedestrian circulation of the California State University Northridge campus is focused on a hierarchy of walkways and paths characterized by a series of named east-west pedestrian walks. These are augmented by a more informal system of secondary walks and paths. Master Plan development proposed in Chapter 4 calls for some additional primary pathways and for the reinforcement of some existing pathways to maintain pedestrian connectivity.
throughout the campus. Exhibit 4D in Chapter 4 is a diagram of existing and new proposed pathways, showing the existing or proposed names for each.

**Primary Pedestrian Promenades**

The Landscape Master Plan highlights the Main Campus pathways as promenades. Promenades are distinguished from the less formal “secondary” network by a distinctive formal planting of canopy and flowering trees and a wider width, (15’ to 20’) Promenades form the pedestrian framework for the campus. Exhibit 5E shows a pathway section through a typical primary pedestrian promenade.

Primary pathways should be treated with a consistent quality of landscape, hardscape, signage and lighting. Pedestrian-scale lighting and formal plantings of canopy and flowering trees should be used to reinforce the hierarchy of the Promenades within the pedestrian network and orient pedestrians to the circulation network.

The practice of using specific tree species for each Promenade to create a unique character and identity for each corridor should continue. [Recommended tree species are included in Section 5.4.] Openings in the Promenade planting shall be permitted at building edges and entries. Seating areas should be located at key intersections and primary building entries, with trees providing shade.
To further enhance the pedestrian experience, it is encouraged that thematic concepts be developed for a number of the promenades; recommendations made below for the Orange Grove Arts Walk can be extended to other primary pathways throughout the campus.

**East Promenade** is proposed as a re-landscaped pedestrian route along Lindley Avenue between the campus core and the northern student and faculty/staff residential areas [Exhibit 5F]. This newly landscaped pathway, an extension of the pathway along East University Drive, responds to the increasing campus growth to the north. It is particularly important that the pedestrian pathways between the campus core and the northern areas be shady and inviting in order to encourage pedestrian traffic. The Landscape Master Plan proposes that this pathway be planted with a double row of canopy trees. This pathway should have signature grass plantings at the campus edge along Lindley Avenue [Section 5.2.3].

**West, East and North University Drive Walkways** are also very important primary pedestrian routes. The details of the landscape recommendations for these paths are included in Section 5.2.4. These promenades should be approximately 10’ wide where possible in order to accommodate groups of students traveling between classes, as well as emergency and service vehicles. As discussed below in Section 5.2.4, when the signature Mexican Fan Palm trees are introduced into these areas, care should be taken to create planting areas within the walkway that do not unduly interfere with the requirements of pedestrians or service/emergency vehicle operation.

**Orange Grove Arts Walk**, the southern-most pathway, connects Cypress Hall, Nordhoff Hall and the new Valley Performing Art Center with new parking structures and with the University Club and Alumni Center [Exhibit 5G]. Exhibit 5H is a section diagram showing the pathway ‘streetscape’ for this important new formal pedestrian route as it moves through the Orange Grove toward the University Club and Alumni Center. The landscape design incorporates hedges or low walls, canopy trees and lighting fixtures and banners.
The formal section of the Arts Walk will terminate at a dining terrace or special events plaza associated with the University Club and Alumni Center. The Orange Grove Arts Walk will become more informal as it creates the connection between the Valley Performing Arts Center and the proposed parking structures G3 and B1. Exhibit 5I shows an artist’s sketch of this route looking west toward West University Drive and parking structure B1. This sketch illustrates how the Orange Grove Arts Walk can be developed using banners or other devices to carry its signature “art theme.” The commemoration of the San Fernando Valley’s citrus heritage, through use of engravings or tile mosaics of citrus packing house crates, for example, is encouraged.

To further develop this pathway as an “Art Walk,” the University should seek opportunities for sculptures or perhaps for tributes or recognition of famous composers and artists, including distinguished Northridge alumni. These tributes or commemoration could take many forms, such as engraved panels, tile mosaics or banners that are changed periodically throughout the year. Similar theme programs could be developed for the other promenades focusing on significant events in the history of the University, the San Fernando Valley, the City of Los Angeles, or State of California. Other topics could include literary quotes from significant authors or tributes to famous University alumni. Implementation of the theme program could involve donation from University alumni and supporters.

**Matador Drive Promenade** is the walkway along the new Matador Drive campus roadway [Exhibit 5J]. It should be treated with thematic landscape to reinforce this new campus roadway, with a specific canopy tree chosen for this walkway.

**Secondary Pedestrian Pathways**

Secondary walks are meant to be more informal in character, and are based on a loose “network” of walks and paths that are narrower than the primary pathways. These secondary walks, shown in Exhibit 4O, frequently diverge from the campus grid to reinforce diagonal desire lines. Exhibit 5K is a section diagram for sec-
Secondary walks, which are designed to be only as wide as necessary to accommodate passing students, generally 8’ to 10’ wide. These walks should be planted informally with trees to provide interest and shade.

**Accessibility along Pedestrian Paths**

Pedestrian walks shall be designed in a manner that promotes Universal design. Walks providing universal access, with a maximum slope of 1:20, are preferred over ramps or stairs. The unavoidable length of ramps should be incorporated into site design, with stairs provided at the sides as complementary elements.

**5.2.3 EDGE AND IDENTITY**

**Existing Conditions**

The Campus landscape has a significant role to play in the establishment of a strong visual identity. Although the California State University Northridge campus occupies a large land area and is bounded by well-traveled arterial roadways on all sides, the University’s identity along its edges is weak. In spite of a new program of campus identification monuments, the campus lacks the strong presence and visual identity appropriate to its size and role within the Northridge community. This problem is compounded by the fact that the adjacent land uses vary significantly in character from one edge to another and incorporate single- and multi-family residential, institutional and low-rise commercial uses. These facts, in addition to the current placement of surface parking lots at campus edges, particularly along Zelzah Avenue and Darby Avenue, create a nondescript campus boundary that lacks the appearance of a well-considered landscape plan.

Equally important as the contiguous campus boundaries, the Reseda Boulevard commercial corridor, one block west of the campus itself,
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Campus Identity Framework

Legend
- Informal Landscape Edge
- Signature Nordhoff Streetscape
- Signature Entry Roadway & Main Campus Circulation
- Signature Palm Bosque
- Faculty Housing

(Campus map with the above-mentioned features marked)
constitutes a conceptual boundary for the campus. It is notable that there are no significant indicators along Reseda Boulevard that the California State University Northridge campus exists immediately to its east. Similarly, the smaller streets leading east from Reseda Boulevard to the campus reveal almost no sign or signal of the presence of the campus.

**Recommendations for Edge and Identity**

The 2005 Landscape Master Plan incorporates a comprehensive identity framework that addresses campus edge, entry and streetscape treatments. Exhibit 5L is a diagram that shows which elements of the campus landscape are involved in this identity framework. This framework encompasses specific species of plant materials as well as their placement and is focused on creating a landscape scheme that will serve as a signature for the campus. Discussion of campus entry landscape is included in Section 5.2.5. The specification of plant species for each area is included in Section 5.4.

The 2005 Landscape Master Plan responds to the unique characteristics of the surrounding environment. The recommendations below create a harmonious relationship between neighboring land areas and University facilities and functions at the perimeter of the campus. The campus edge landscape addresses each of these areas with specific planting programs which, taken together, create a consistent edge treatment that will enhance the identity of the University, provide views into the campus, and screens unwanted views with landscape.

In order to establish a strong sense of identity, the Landscape Master Plan proposals for campus edges make use of plant materials currently being used to good advantage within the campus interior. Along campus edges, existing mature tree plantings will be maintained and reinforced with new trees of similar species. Signature tree species will be combined with campus identification monuments to call attention to the campus entrances and create a similar look for all campus vehicle entries [Section 5.2.5]. Existing plantings will be augmented with trees where necessary to fulfill the purposes of the Landscape Master Plan. Landscape will be used to screen unwanted views, while in other areas, trees should be planted and trimmed in ways that allow views into the campus across open space and areas of interest.

**Nordhoff Street**, an arterial roadway owned and maintained by the City of Los Angeles, serves as the “front door” to the campus. This front door will become even more important when the Valley Performing Arts Center, under design at the time of this report, is completed. Existing landscape along Nordhoff Street consists of mature Sycamore trees at the eastern and western ends of the campus frontage, anchored by the signa-
ture “CSUN” logo sculpture at the corner of Nordhoff Street and Zelzah Avenue. While the existing Sycamores establish a strong and readily identifiable edge along the ends of the frontage, the majority of the frontage, from East University Drive to West University Drive, consists of less significant canopy tree plantings. Existing overhead power lines and a narrow parkway between the street and adjacent parking area further detracts from the overall character of this landscape.

Consistent with the Identity Framework shown in Exhibit 5L, the Landscape Master Plan recommendations work to reinforce the California State University Northridge identity along its southern boundary. As shown in the street section diagram in Exhibit 5M, the parkway along Nordhoff Street will be widened and the Sycamore plantings extended along the entire frontage, using a double row of trees to create an inviting walkway and frame for the campus. In order to develop the more sustainable and natural landscape character proposed for the campus edges, and as further described later in this report, the ground plane planting will consist primarily of "ornamental" grasses, with taller grasses used to screen adjacent parking areas. Existing power lines along Nordhoff Street should be placed underground as part of the development of the Valley Performing Arts Center.

An additional component of the Landscape Master Plan for this area of the campus is the creation of a 'view window' into the campus that begins at the plaza west of the Performing Arts Center and provides a view toward Oviatt Library. Exhibit 4U is an artist's sketch of this area, and Exhibit 5N shows how plantings of canopy trees, palms and turf grass may be used to create a formal open space area in this important new precinct of the campus.

**Zelzah Avenue** will become a more significant campus edge under the 2005 Master Plan. The new campus entry at Prairie Avenue and two new parking structures on the west side of campus will make this a well-used entry area by students, faculty, staff and visitors. As shown in Exhibit 5L, the signature identity edge treatment will be extended along Zelzah Avenue, ending at the new campus entry at Prairie Street. This formal planting of Sycamores along the Zelzah Avenue set-back will be back-dropped where necessary by informal drifts of Pines and Sycamores to screen parking structures and any other adjacent uses which do not present a visually pleasing view into the campus. Exhibit 5O is a street section diagram that shows how landscape materials can be used to screen unwanted views. In other areas along the Zelzah Avenue frontage, the trees should be planted and trimmed to permit views into the campus across playfields and open space areas sited along Zelzah Avenue, as shown in Exhibit 5P.

It is recommended that the University initiate discussions with the high school administration and the LAUSD with the aim of extending the signature campus landscape across the high school frontage along Zelzah Avenue.

**Lindley Avenue** is a unique campus edge because it serves as an important pedestrian connection between the campus core, the University Park student residential precinct, and the faculty/staff
village to the north. Here the campus edge will be defined primarily by a pedestrian pathway planked with the double row of canopy trees as discussed in Section 5.2.2 and illustrated in Exhibit 5E. The campus signature low ornamental grasses will be used as underplanting along the Lindley Avenue perimeter to carry the campus identity theme.

Darby Avenue, Halsted Street and the remaining edges of campus will consist primarily of informal drifts of Pines and Sycamores. Parking lots and service areas will be screened with denser plantings of pines, and more open drifts of Sycamores and Pines will be used in key view corridors and open spaces; these are illustrated in Exhibits 5C and 5D. The proposed signature ornamental grasses [Section 5.4] should be planted along all campus edges. As feasible, berms and taller grasses should be used to screen parking and service areas. To integrate the new faculty/staff housing development and the existing Mini-Med facility at the north into the overall campus landscape, it is recommended that the University extend the perimeter landscape along Lindley and Zelzah Avenues north of Las-sen Street and along Devonshire Avenue. This will create a comprehensive landscape signature around all campus edges.

5.2.4 CAMPUS ROADWAYS

Campus roadways present another opportunity to reinforce the campus identity and, through their landscape, serve as part of the campus way-finding system. The 1998 Master Plan made use of Mexican Fan Palm allées as a landscape motif along West University Drive. The 2005 Landscape Master Plan recommends extending this signature motif to new and reconfigured campus roadways and campus entries in order to reinforce campus identity and create a consistent visual quality to the campus.

The University Drive System serves as the primary internal roadway for the campus and the paths lining these streets are important components of the pedestrian pathway system. Originally part of the Northridge city street grid, these roadways have been renamed within the campus: West University Drive was originally Etiwanda Avenue; East University Drive was originally Lindley Avenue; and North Univer-
A goal of the Landscape Master Plan is to integrate these three roadways and make University Drive an identifiable campus route along its East, West and North segments. Currently West University Drive is planted with a row of Mexican Fan Palms in the median and canopy trees along the parkway [Exhibits 5Q and 5R]. The Landscape Master Plan recommends extending this signature planting to the East and North segments. The campus signature ornamental grass should be planted in all medians along University Drive. To enhance wayfinding and to help support pedestrian safety, special pavement is proposed at key pedestrian crossings.

**East University Drive** has utility constraints which prevent planting of palms within the newly created median. Instead, the signature planting of Mexican Fan Palms is proposed along the parkway [Exhibit 5C]. The existing sidewalk will be widened to better accommodate pedestrian traffic, with a parkway introduced as a planting strip [Exhibit 5S]. Where it is not feasible to widen the sidewalk sufficiently, palms may be planted in square planter areas cut out of the existing walkways.

**North University Drive** is currently a two-lane roadway with no median. Where possible, the existing sidewalk will be widened and a parkway introduced as a planting strip for the Mexican Fan Palms in a manner similar to East University Drive. In places where the sidewalk cannot be sufficiently widened, square planters can be cut into existing walkways for the palm trees. To complete the signature campus roadway landscape, a new median is proposed for North University Drive, to be planted with ornamental grass plantings.

**Matador Drive**, the new campus entry roadway off Nordhoff Street, incorporates the realigned campus road B in its northern segment. The new roadway should be planted with one species of canopy trees along its median, or along its parkways. Because this road is meant to be an auxiliary roadway that serves the new parking structures along Zelzah Avenue, the Landscape Master Plan refrains from using the signature Mexican Fan Palms here. It is recommended that ornamental grass will be used to enhance this roadway.

### 5.2.5 CAMPUS ENTRIES

Campus entries are part of both the campus roadway system and the city street system.
Campus entries are a critical wayfinding signal for campus visitors and also constitute those visitors' first experience of the campus. Entries present a particularly important opportunity to signal the University’s presence in the community and to reinforce the landscape-based identity framework. The 2005 Master Plan features reconfigured campus entries at Prairie Street on the west side of the campus, a reconfigured entry at East University Drive, a new entry gateway off Zelzah Avenue, and the new Matador Drive entry road off Nordhoff Street.

The new Zelzah Avenue entry [Exhibit 5T] and the reconfigured Prairie Street entry on the west side of the campus [Exhibit 5U] will be planted with allees of Mexican Fan Palms and signature low grass plantings to create a visual connection with the campus entries at East and West University Drive. Exhibit 5V shows the street section at the Zelzah Avenue entry. The Prairie Street entry is similar; the Mexican Fan Palms may be integrated with the Transit Center structures that will be constructed for the use of bus passengers.

The Landscape Master Plan recommends the addition of a highly visible identity feature at campus entries: a small bosque of Canary Island Date Palms to be planted at campus entries, along with the campus brick and stone identification monument, as a visual signal and entry icon. The Canary Island Date Palm was chosen for this role because it is perhaps the most noteworthy “signature” tree on the campus, currently being used to flank the lawn areas in front of Oviatt Library [Exhibit 5W]. At campus edges these bosques will include campus identification markers and will be augmented with low-maintenance and low-water-using ornamental grasses,
shrubs and low plantings. The palm bosque can be seen in Exhibit 4L, an artist’s sketch showing signature plantings at the East University Drive campus entry. See Section 5.4 for images of recommended plant species.

It is recommended that Canary Island Date Palm bosques be planted at the main campus entries and at other important areas within the campus:

- East University Drive at Nordhoff Street;
- West University Drive at Nordhoff Street;
- new campus entry on Zelzah Avenue at Prairie Street;
- Zelzah Avenue intersection with Lassen Street;
- Lassen Street intersection with Lindley Avenue;
- Pedestrian plaza at the East Promenade pedestrian entry at Lindley Avenue and Helped Street;
- Prairie Street at Darby Avenue, the location of the new campus transit center; and
- arrival court of the Valley Performing Arts Center.

These locations are shown in Exhibit 5L.

The Date Palm bosque at the Performing Arts Center is meant to reinforce a new view window into the campus between the Valley Performing Arts Center and Cypress Hall, creating a visual connection from the campus “front door” to Oviatt Library [see Exhibit 5N]. Existing campus identification monuments at the intersections of Nordhoff Street with East and West University Drives and at the intersection of Zelzah and Nordhoff Streets. These shall be retained and similar elements should be provided at Nordhoff and Darby and at the new University gateway off Zelzah Avenue. Because Mador Drive is not meant to be a major campus entry for visitors, the landscape will not include a Date Palm bosque at its corner.

Reseda Avenue Corridor

Reseda Boulevard serves as the primary approach to the campus from the north and west, but the University lacks a presence along this arterial roadway. The University should work with the local business community to enhance the image of the existing commercial corridor and estab-
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5.2.6 LANDSCAPE AT PARKING FACILITIES

Surface parking lots and parking structures should be landscaped to adequately screen undesirable views, provide visual relief from large expanses of paving, and reduce excessive solar gain. Exhibit 5O shows how campus edges can be landscaped to provide screening and views. Drought-tolerant, natural planting styles are best suited for parking areas; recommended species are listed in Section 5.4. As feasible, “bioswales” which handle the first flush of storm run-off and discharge should be incorporated in the design of parking areas.

5.3 SUSTAINABILITY

The cost of installation and the efficiency of on-going maintenance and care for the pavement, planting and site furniture are critical ingredients in the creation of a successful cam-
pus landscape. These considerations should be implemented in a phased manner as each new building, open space and pedestrian component is developed. [Chapter 7: Implementation and Phasing includes a description and illustration of the 2005 Master Plan’s proposed phasing.]

The trees, shrubs, grasses and groundcovers described and illustrated in Section 5.4 are plant materials that are suitable for the Northridge climate and weather conditions. These plants and trees can be grown successfully without extraordinary maintenance procedures or excessive amounts of water.

The primary planting strategy proposed throughout the campus is to concentrate more maintenance-intensive landscapes in the formal courtyards and quads, while encouraging a more sustainable landscape around the campus perimeter and within secondary open spaces. The grasses described in Section 5.4 are proposed within this more informal or “pastoral” landscape due to their low maintenance and irrigation requirements. Where shrubs are used, species that require ongoing pruning and care to maintain their form have been avoided, in favor of more sustainable varieties.

Selection of hardscape materials can also contribute to the sustainability of the Master Plan designs and recommendations. For the bulk of the pedestrian network, natural gray concrete with simple broom finishes are proposed [Exhibit 5Z]. The use of this material allows simple repairs and patches, reducing the contrast between new and old concrete, and allowing contiguous projects, that occur over an extended period, to have a consistent look and feel. Integral color pavement or pavers [Exhibit 5AA] should only be used in special accent areas, such as building entries and courtyards. Special attention should be given to the selection of paving materials for pedestrian crossings within the campus [Exhibit...
The look and texture of these materials can help alert vehicle operators that they are driving in pedestrian areas and need to use particular caution.

**Proposed Paving Materials**

**University Loop:**
- Asphalt street paving
- Raised crosswalks at key pedestrian crossings of precast concrete pavers

**Pedestrian Promenades:**
- Natural color concrete paving with sandblast finish and sawcut joints

**Secondary Walks:**
- Natural color concrete paving with broom finish

**Parking Lots:**
- Concrete paving – heavy broom finish
- Porous turfblock filled with gravel
- Asphalt paving in main drive isles and parking spaces
5.4 LANDSCAPE DESIGN GUIDELINES

The Landscape Master Plan design guidelines include recommended plant materials for areas of the campus described earlier in this chapter. Some of these plants are illustrated here.

5.4.1 LANDSCAPE IN OPEN SPACE AREAS

Campus open spaces shall be planted to reinforce the contrast between formal quads, courtyards and greens and informal, more naturalistic secondary open space areas. The following plant list is intended to identify plant materials that will contribute to the overall landscape character; it is not intended to be all-inclusive. Additional plant materials may be considered if they are consistent with the principles of sustainability and ease of maintenance and if they are suitable for the Northridge landscape zone.

Formal Open Space: Courtyards, Quads and Greens

Courtyards, quads and greens shall be landscaped with canopy, evergreen and flowering trees that provide structure to an open space, that provide shade, and that relate to the existing mature plantings. Shrubs and groundcovers in these areas shall be plant species reflective of a more manicured landscape and will tend to be more ornamental than plants used in informal landscape areas.

Trees:
- *Albizia julibrissin*/Mimosa
- *Cassia leptophylla*/Gold Medallion Tree
- *Cedrus deodara*/Deodar Cedar
- *Cinnamomum camphora*/Camphor Tree
- *Fraxinus uhdei*/Evergreen Ash
- *Ginkgo biloba* (male)/Ginkgo Tree
- *Koelreuteria bipinnata*/Chinese Flame
- *Lagerstroemia indica*/Crape Myrtle
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- Gleditsia triacanthos/Honey Locust
- Koelreuteria bipinnata/Chinese Flame Tree
- Lagerstroemia indica/Crape Myrtle
- Liquidambar styraciflua/Sweet Gum
- Phoenix dactylifera/Date Palm
- Pinus canariensis/Canary Island Pine
- Pinus pinea/Stone Pine
- Platanus acerifolia/London Plane Tree
- Podocarpus gracilior/Fern Pine
- Prunus cerasifera/K. Vesuvius Plum
- Pyrus kawakamii/Evergreen Pear
- Quercus virginiana/Southern Live Oak
- Tipuana tipu/Tipu
- Zelkova serrata/Sawleaf Zelkova

Shrubs:
- Abelia grandiflora/Edward Goucher'
- Acanthus mollis/Bear's Breech
- Agapanthus specis/Lily of the Nile
- Alyogyne huegellii/Blue Hibiscus
- Brunfelsia pauciflora/Calycina
- Calliandra inaequilateral/Pink Powder Puff
- Calliandra tweedii/Brazilian Flame Bush
- Camellia sasanqua/Camellia
- Cistus sp./Rockrose
- Clivia miniata/Kafir Lily
- Cycas revoluta/Sago Palm
- Dicksonia antartica/Tasmanian Tree Fern
- Euonymus sp./Euonymus
- Ilex sp./Holly
- Juniper sp./Junipers
- Magnolia soulangiana/Saucer Magnolia
- Nandina domestica/Nandina
- Osmanthus sp./Osmanthus
- Phoenix roebillini/Pygmy Date Palm
- Photinia sp./Photinia
- Pittosporum sp./Pittosporum
- Rhaphiolepis indica/Indian Hawthorne
- Strelitzia sp./Bird of Paradise

Groundcovers:
- Ajuga reptans/Ajuga
- Bougainvillea/Bougainvillea
- Cyrtomium falcatum/Holly Fern

- Liquidambar styraciflua/Sweet Gum
- Podocarpus gracilior/Fern Pine
- Boston ivy/P. canariensis/Canary Island Pine
- Prunus cerasifera/K. Vesuvius Plum
- Phoenix dactylifera/Date Palm
- Platanus acerifolia/London Plane Tree
- Pinus pinea/Stone Pine
- Pyrus kawakamii/Evergreen Pear
- Quercus virginiana/Southern Live Oak
- Tipuana tipu/Tipu
- Zelkova serrata/Sawleaf Zelkova

- Dietes hybrids/African Iris
- Liriope muscari/Lily Turf

- Clivia miniata/Kafir Lily
- Strelitzia reginae/Bird of Paradise
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• *Dietes hybrids*/African Iris
• *Hemerocallis hybrids*/Dalylily
• *Liriope muscari*/Lily Turf
• *Lonicera japonica*/Honeysuckle
• *Ophiopogon japonicum*/Mondo Grass
• *Potentilla verna*/Spring Cinquefoil
• *Rosmarinus officinalis*/Rosemary
• *Trachelospermum jasminoides*/Star Jasmine
• *Vinca major*/Periwinkle

**Informal Landscape Areas**

Informal landscape areas shall be planted primarily with native or drought-tolerant plant materials, including plant material which has naturalized to the region and which are reminiscent of the agricultural heritage of the San Fernando Valley region.

**Trees:**

- *Arbutus unedo*/Strawberry Tree
- *Chitalpa tashkentensis*/Chitalpa
- *Eucalyptus sp.*/Eucalyptus species
- *Geijera parviflora*/Australian Willow
- *Juglans nigra*/Black Walnut
- *Platanus racemosa*/California Sycamore
- *Quercus agrifolia*/Coast Live Oak
- *Quercus englemanni*/Mesa Oak
- *Quercus lobata*/Valley Oak
- *Schinus molle*/California Pepper

**Shrubs:**

- *Agave sp.*/Agave
- *Aloe sp.*/Aloe
- *Anigozanthos hybrids*/Kangaroo Paw
- *Anisodontea sp.*/Cape Mallow
- *Arctostaphylos hybrids*/Manzanita
- *Carpenteria californica*/Bush Anemone
- *Ceanothus sp.*/Ceanothus
- *Cercis occidentalis*/Western Redbud
- *Convolvulus cneorum*/Bush Morning Glory
- *Cotoneaster sp.*/Cotoneaster
- *Elaeagnus pungens*/Silverberry
- *Lavatera bicolor*/Tree Mallow
5.4.2 LANDSCAPE FOR PEDESTRIAN CIRCULATION

Primary and secondary pedestrian promenades should be planted with a double row of high flowering canopy trees similar to the existing treatment along Magnolia Walk and Jacaranda Way. The ground plane should reflect the landscape treatment of adjacent areas.

Trees:
- Catalpa speciosa/Western Catalpa
- Koelreuteria bipinnata/Chinese Flame
- Metrosideros excelsus/New Zealand Christmas
- Pistacia chinensis/Chinese Pistache
- Tabebuia avellanedae/Pink Trumpet Tree
- Tipuana tipu/Tipu Tree

5.4.3 LANDSCAPE AT CAMPUS EDGES, ENTRIES AND ROADWAYS

The landscape at campus edges, entries and roadways is meant to create a consistent and identifiable character. This
same landscape treatment at key vehicular entries will help to clarify the perimeter and establish strong identity for the University.

**Nordhoff Street/Zelzah Avenue Identity Edge**

[LExhibit 5L]

Landscape for the campus identity edges will extend along Nordhoff Street and along Zelzah Avenue between Nordhoff Street and the Prairie Street east campus entry drive. This landscape will consist of an extension of the existing mature planting of London Plane trees on the west and east ends of Nordoff, as well as the introduction of a more sustainable ground plane of native and ornamental grasses.

Trees:
- *Plantanus occidentalis*/American Sycamore

Ground Plane:
- *Carex tumilicaola*/Berkley Sedge
- *Pennisetum spathiotum*/Slender Veldt Grass

**Darby Avenue/Halsted Street/Lindley Avenue/Zelzah Avenue (North of Entry Drive) Identity Edge**

These campus edges will take on a more informal character with drifts of canopy and evergreen trees. The signature grass planting will continue as the proposed ground plane treatment.

Trees:
- *Pinus elderica*/Afghan Pine
- *Pinus halapenis*/Aleppo Pine
- *Plantanus occidentalis*/American Sycamore

**Campus Entries**

Campus entries are proposed at key vehicular entries and will be marked by a formal planting
of Canary Island Date Palms. Campus monumentation, consistent with existing monumentation along Nordoff Street should be integrated into the overall design of the campus entries.

Trees:
• *Phoenix canariensis*/Canary Island Date Palm

**Campus Roadways**

East and North University Drive will reflect an extension of the existing signature Mexican Fan Palm planting that has been utilized along West University Drive. On these streets, palms will be planted along the parkways due to utility constraints associated with the medians. Medians (including the existing University Drive West median) shall be landscaped with the signature grass planting.

Trees:
• *Washingtonia robusta*/Mexican Fan Palm

**Ground Plane:**
• *Carex tumilicaola*/Berkley Sedge
• *Pennisetum spathiotum*/Slender Veldt Grass

**Parking Lots**

Parking lots should be planted with low maintenance, wide-spreading shade trees.

• *Agonis flexuosa*/Peppermint Tree
• *Chitalpa tashkentensis*/Chitalpa
• *Geijera parviflora*/Australian Willow
• *Quercus ilex*/Holly Oak
• *Rhus lancea* (male)/African Sumac
• *Zelkova serrata*/Sawleaf Zelkova
• *Gleditsia triacanthos*/Honey Locust
5.4.4 HARDSCAPE, SITE LIGHTING AND SITE FURNISHINGS

Hardscape, landscape and site lighting play an important role in establishing a safe and secure environment for students, staff, faculty and visitors. These materials should be utilized in ways that promote actual as well as perceived safety of campus areas, including parking structures and surface lots, pedestrian pathways, campus open spaces and building entries.

Lighting is a key component of the campus landscape that contributes to campus identity, safety and ambiance. Lighting should provide illumination for campus entries, parking areas and pedestrian corridors. Outdoor lighting should be designed to minimize light spilling onto adjacent, non-University property, to enhance natural color rendition, and to provide the required illumination for safety. Lighting in open areas should create balanced illumination such that both perception and actuality of safety is assured.

The uses of consistent site furnishings, lighting and signage will help to unify the campus as a whole and enhance architectural and open space character. Site furnishings consist of bicycle racks, loose and fixed seating, tables, benches and trash receptacles. Bicycle racks should be located along pedestrian promenades and pathways at key building entries, preferably to the side of buildings. Care should be taken to ensure that these racks do not impede entry to the building or create a visual blight at the building entrance.

Fixed seating includes benches and seating of comfortable height incorporated into planters, low dividing walls, and or incorporated into the façade of buildings. Appropriate site furnishings support pedestrian activity throughout the campus open space and should be designed, chosen...
and located to reinforce the programmed uses of the open space area: including eating, assembly for outdoor classrooms, solitary relaxation or study, and social interaction. Recommendations for seating, benches, trash receptacles, bicycle racks and tables are described below.

**Proposed Site Amenities**

All site amenities shall be permanently attached to fixed surfaces.

**Campus Bench:**
- Cast concrete bench, as shown in Exhibit 5EE

**Seatwall Courtyard Bench:**
- Concrete seatwall as shown in Exhibit 5GG

**Waste Container/Ash Urn:**
- California Series (Precast Concrete) by Quick Crete Products

**Bicycle Rack:**
- Original Cycloops (Steel Pipe) by Columbia Cascade, painted white

**Campus Light Standard:**
- Metal standard with half-dome light fixture, dark bronze as shown in Exhibit 5HH

### 5.5 LANDSCAPE GLOSSARY

- **Allée:** A vehicular or pedestrian way, usually straight, that is primarily defined by matching rows of trees or palms, symmetrically planted about the centerline of the walk.
- **Arterial:** A main vehicular route.
- **Bosque:** Trees planted on a regular spacing in two horizontal directions at 90 degrees to each other.
- **Massing:** A group of trees or shrubs of like kind, informally planted in close proximity, to create a volume.
- **Underplanting:** To plant shrubs or groundcover plants beneath the canopy of trees and/or large shrubs.
- **Understory:** The area beneath the canopy of trees and large shrubs typically planted with shrubs or groundcover.
- **Wayfinding:** Particular elements of a design, such as directional signage, paving, types of planting, that help to provide a sense of orientation to both pedestrians and motorists.
The campus environment is a reflection of the quality of architectural design of its buildings and facilities. These built structures, along with the campus landscape design and natural materials, are a significant factor in creating a campus environment and image that expresses and serves California State University Northridge’s mission. The design of any individual campus building is both a part of and a contribution to the overall fabric and framework of the campus.

Campus design guidelines provide guidance over the long term of campus development to ensure that the projects proposed in the Master Plan are designed and built in a manner that contributes to the University’s overarching vision of the campus. Whereas a given building’s design is the work of an individual architect, to be created under the direction of the University in response to a specific program and site, the Master Plan design guidelines make manifest the Planning Principles articulated in Chapter 3 and provide a framework that will inform the design of all new buildings proposed in the 2005 Master Plan. Equally important, design guidelines point out the way those structures relate to existing buildings, to the campus open space system, and to the pedestrian circulation system.

Design guidelines are not meant to dictate the architecture of a building or constrain university planning committees or the architects hired by the University; on the contrary, they are meant to guide decisions rather than regulate future actions, and as such, they lay the groundwork for creativity. Similarly, design guidelines are formulated to encourage a high level of aesthetic quality within the campus while simultaneously promoting a climate in which the aesthetic and technological innovation needed to create a stimulating and supportive learning environment can thrive.

The Master Plan campus design guidelines provide a framework for future design decisions that will be made about building site, form and materials; the building envelope; the way the building relates to its site; and the way the building relates to the campus as a whole. Building form guidelines address the means of establishing a hierarchy of structures on the
campus. Building envelope guidelines concern height limitations, set-backs and ‘build-to’ lines; these are discussed and illustrated as they relate to specific structures in each campus precinct. Building height limitations, particularly, are a function of the type of building as well as the building’s location on the campus. Building set-backs and ‘build-to’ lines relate to the way the building addresses adjacent or contiguous buildings and grounds, including walkways, roadways and campus edges. Design guidelines for vehicle circulation and parking facilities are also included in this chapter. Design guidelines for landscape and open space development, including guidelines for site furnishings are incorporated in Chapter 5, Landscape Master Plan. Campus signage is addressed in a separate document.

6.1 BUILDING DESIGN: SITE, FORM AND MATERIALS

The goals of the Master Plan building design guidelines are:

• to assure a high quality of architectural design appropriate to the status of California State University Northridge;
• to ensure that new buildings harmonize with existing campus structures;
• to encourage development that results in a hierarchy of campus buildings; and
• to reinforce visual unity throughout the campus while supporting appropriate architectural variation.

Building design considerations include the siting of the building vis-à-vis neighboring buildings, campus open space, and the pedestrian pathway system; the overall building form and massing; and the materials used to construct the building. Each of these factors contributes to the quality of the buildings which, in turn, create the overall quality of the campus.

6.1.1 BUILDING SITE

Choice of Development Site

The Illustrative Master Plan [Exhibits 4A and 4C] shows sites for twenty-eight new buildings on land owned by the University; some of these projects are currently under development. The building sites identified in the Illustrative Master Plan provide the University with flexibility to make choices based upon a wide range of circumstances, including future changes in existing academic programs; the development of new programs; considerations of pedagogy that may benefit from co-locating particular programs; and inevitable changes in technology. Consistent with the Master Planning principles [Chapter 3], the majority of the sites identified were chosen to reinforce existing functional precincts by siting new buildings in the vicinity of existing buildings of similar function. In the case of student and faculty/staff housing, the future plans of specific University programs led to decisions that create new functional precincts by proposing the development of new buildings types in precincts which did not previously contain such facilities.

Relationship to Open Space

As discussed in Chapter 5 (Landscape Master Plan), the relationship between a building and its adjacent open space is of critical importance in the development of the campus. Guidelines for the siting of new buildings in relation to open space are based on the Master Planning Principles expressed in Chapter 3, and are discussed in more detail in Section 6.2 with reference to specific buildings and precincts. Future development on the campus should acknowledge the following general viewpoints:

• New buildings should be sited to enclose open space and, in concert with adjacent
buildings, form congenially-sized and well-proportioned open space areas throughout the campus.

• Open spaces between buildings should be of varying size and should accommodate a variety of programmed activities.

• Open spaces enclosed by the mass of a building may include courtyards, patios, building entry forecourts, lawn areas, landscape areas, seating areas and areas that provide seating for nearby food services.

The programming effort that forms the start of any new building project should include an account of the activities that will take place in the open space that adjoins the building. This will allow outdoor spaces to be well-connected to compatible adjacent indoor spaces. The form, articulation and building materials employed in a structure have significant impact upon the adjacent open space areas; these are discussed in more detail in Section 6.1.2 and Section 6.2 below.

**Relationship to the Pedestrian Circulation System**

Although buildings may seem to be separate categories of development from pathways, buildings and their entries function as components of the pedestrian circulation system. Consistent with the master-planning principles articulated in Chapter 3, new buildings should reinforce the campus pedestrian system by being sited adjacent to the pathway and by having their major entries directly accessible from the pathway. This not only provides assistance with wayfinding, but also encourages engagement and interaction: individuals are more likely to enter a building or join an activity if they have visual access as they approach.

Consideration of natural paths of travel from one building to adjacent buildings via the pedestrian network should also be a factor in decisions about the siting of a new building and the location of building entries. Buildings may address more than one pathway and are likely to have more than one entry point. The way lobbies or common spaces within a building relate to the adjacent exterior space will be an important consideration in the evaluation of a building’s design.

**Relationship to Food and Beverage Services**

Food services are not incidental to the development of campus facilities. On the contrary, they play an important role in the planning for any large space by serving as a “draw” for and a catalyst of social activity. When a campus serves a largely commuting constituency, as California State University Northridge does, the role of food and beverage services is even more important. Food services on the campus as a whole (including those within the residential areas) provide the opportunities for informal social interaction among students, faculty and staff. These interactions form the basis for the development of social and intellectual ties that create a campus community. Food and beverage services can also help to activate the open-space areas adjacent to new and existing buildings while at the same time fulfilling basic needs.

Food services should be distributed throughout the campus. They should be located where those entering the campus will pass as they move from parking facilities into the campus core. Exhibit 4R shows the existing and proposed new food service venues on the campus. If the University desires it and sees the need for it, these venues may be augmented by informal services such as coffee or food carts distributed in areas where more complete food services may be distant.

Particular consideration should be given to the incorporation of informal food and beverage
service areas when decisions are made about the sites and massing of proposed buildings used by evening students and faculty who need fast access to food on their way to classes. Food services in proposed buildings should include interior and exterior areas adjacent to the pathway system for take-out and/or seated snacks and dining.

6.1.2 BUILDING FORM

A building’s form and level of architectural distinction are related to its functions and its role in the visual development of the campus. Building form—a structure’s massing, articulation and deployment of architectural features—has as much to do with an individual building’s location on the campus and its position within the campus spatial hierarchy as it does with the program of activities the building is constructed to house.

The 2005 Master Plan proposals are consistent with the existing campus hierarchy established in the 1998 California State University Northridge Master Plan. As with the previous Master Plan, academic/administrative buildings, along with open space and pedestrian pathway systems, create a legible academic core which forms the heart of the campus. The support functions of student recreational activities, student housing, faculty/staff housing, athletics, plant and facilities maintenance, and parking are sited to form recognizable precincts at the campus periphery.

Signature, Foreground and Background Buildings

To further articulate the role buildings play on the campus, the design guidelines make a useful distinction between ‘signature’, ‘foreground’ and ‘background’ buildings. These three categories have been developed to provide cues about the design of the building’s form and the way the building fits into the overall architectural and aesthetic fabric of the campus. The use of these three categories will help to create a hierarchy for campus buildings that will increase the use and enjoyment of the physical campus while at the same time helping to break down the scale of the campus to better serve human activities and functions.

The identification of a foreground or background building, as opposed to a signature building, is not meant to imply that such a building has an unimportant role on the campus or that its architecture should not be treated with a high level of attention and care. It is expected that all new buildings on the campus will be designed and built with the utmost consideration of their aesthetic contribution to the campus environment.

Signature buildings are those which serve as campus landmarks, those whose functions are singular or unique, or those whose sites place them at important points of visual access from the outside of the campus. These features dictate that signature buildings should be architecturally distinctive and serve as dramatic focal points on the campus. Their form should serve to punctuate the physical campus environment and capture visual attention as a person moves through the campus. Signature buildings are meant to be readily identifiable even by those not familiar with the campus and to contribute special qualities such as dignity or dynamism to the overall campus ambiance.

The massing of a signature building may be articulated with expressive or architectural features and large public space areas that may be identifiable on the exterior of the building. A signature building will have one significant entry among potentially multiple entries; the main entry should address an important pedestrian
path and should give access to important public spaces within the building. An example of a signature building on the California State University Northridge campus is the Oviatt Library, which serves a singular function and defines the heart of the campus. Buildings expected to serve as signature buildings in the 2005 Master Plan include the new Valley Performing Arts Center [O], because it will occupy a very important and visible site on the campus and because it will house singular functions which require particular building forms. Similarly, the Student Recreation Center [R] will be a signature building because it will house functions which require a distinctive form and it will be sited at an important new entry to the campus.

Foreground buildings include those located at public entries or highly visible points on the campus, and those accommodating a use directly related to the University’s mission. Foreground buildings form the campus fabric by upholding a high level of aesthetic quality. Foreground buildings may be distinguished from background buildings by their size, their form and massing, their architectural features, their building materials and their detailing. Foreground buildings are those meant to emerge, to serve as points of reference on the campus, and to incorporate a significant level of architectural distinction. Foreground buildings are expected to define campus edges or enclose open space to form courtyards, plazas and quads.

Examples of existing foreground buildings are University Hall, which houses administrative functions and is the destination for many campus visitors; Redwood Hall, which contains the Matadome and is the location of programs used by those from outside the campus; academic buildings such as Manzanita Hall, the Education Building and Sequoia Hall; and the buildings within the Art and Design Center, whose forms signal the unique functions within. The designers of foreground buildings have an obligation to acknowledge and address the design of neighboring or nearby buildings which serve as partners in enclosing shared open space, quads or courtyards. Although the design for a new foreground building should not attempt to match the form or details of adjacent buildings, the design should skillfully accommodate those forms and details rather than ignoring or clashing with them.

Background buildings are those which are subordinate to the larger campus, whose function is duplicative rather than singular, or whose sites are in less public or visible areas of the campus. Background buildings may tend to be smaller than foreground buildings; depending upon their function, they may be more rectilinear in form, with few or subdued architectural features. Taken as parts of the whole, the buildings will help to unify the general architectural ambiance of the campus. The categorization of a building as a background building does not suggest that such a building is less valuable to the campus or that it should lack architectural features or distinction. Rather, these are buildings whose features and functions are not showcased. Examples of background buildings on the campus are the housing buildings which make up University Park, and the proposed new building which will house campus plant facilities [X].

Building Form, Function and Location

Certain considerations with regard to the building form relate specifically to the location of the building.

Buildings in the Academic Core are generally larger, more visually dominant, and more architecturally distinctive than buildings in other campus precincts. Due to their location on the campus and their importance to the essential purpose of the University, academic buildings
are foreground buildings whose collective form and relationship to open space are meant to create a pleasing integrative whole in the academic core.

Although the building configurations shown in the Master Plan are for illustrative purposes only, many academic buildings are shown as L-shaped in plan view for two reasons. First, L-shaped buildings are highly adaptable for academic purposes, allowing large-format laboratories, classrooms or lecture halls to occupy one wing, for example, while standard classrooms and offices occupy the second wing. Second, L-shaped buildings more fully define the campus open space system and contribute to campus ambiance by enclosing courtyards, patios or forecourts that can serve functional and aesthetic purposes. This is consistent with the planning principles articulated in Chapter 3, and with the dictum of Christopher Alexander that buildings should be placed to define open space rather than simply placed within an open space area. Proposed building set-backs and 'build-to' lines shown in Section 6.2 are meant to reinforce the open-space system; building profiles on the Master Plan illustrations suggest the appropriate orientation for individual buildings.

Buildings at major campus gateways occupy an important place in the campus hierarchy: they are foreground buildings that function as the ‘front door’ to the campus. These buildings [M at the Prairie Street West entry; C and H1 at the West University Drive entry; O at the East University Drive Entry; Z and Y at the highly visible corner of Zelzah Avenue and Nordhoff Street; and U at the new Prairie Street East entry] serve as the backdrop at the campus entries and project a symbol of the University to both the campus community and visitors. Buildings at campus gateways may be signature buildings if their functions are significant enough to warrant special distinction. If not, a building in
this position will be a foreground building. Because a building in this location forms a campus gateway, its design should incorporate a singular and recognizable architectural feature facing the campus entry. This will allow the building to serve as an anchor to the gateway and to highlight campus identity. This recognizable feature may or may not also serve as a building entry. Buildings at campus gateways should incorporate lighting and landscaping to guide vehicles into the campus and to highlight their role as a welcoming campus feature.

Building Massing and Articulation

Building massing, whether for signature, foreground or background buildings, should be articulated to create a comfortable relationship between the scale of a person and the scale of a building. The articulation of a building elevation may be accomplished through a variety of visual effects, each of which can visually "break up" the façade into several elements or otherwise give the impression of a change in plane. This is particularly important for buildings large in scale, such as parking structures; design guidelines for these are found in Section 6.3.

The majority of the existing campus buildings tend toward a mid and late-century Modernist style, incorporating clean rectilinear and geometric forms. For the most part, visual effects on existing campus buildings are created from architectural components such as window patterns [Exhibit 6A], or from surface texture through deployment of surface materials [Exhibit 6B]. Some of the newer campus buildings, such as Manzanita Hall [Exhibit 6C], use structural or architectural elements such as roof forms to create articulation and add a dynamic appearance to the building. Others, such as the Sierra Hall Tower [Exhibit 6D] make use of surface materials to create interest on the building elevations.
Existing buildings also make use of architectural articulation to ‘break up’ the mass of the building elevation; this is particularly effective in rectilinear buildings, as it avoids a box-like effect. New buildings on the campus should employ architectural articulation to create visual interest: horizontal articulation divides the building elevation into two or more zones [Exhibit 6E]; vertical articulation incorporates changes in the vertical plane of the face of the building, such as areas that emerge or recede from the elevation’s main plane [Exhibit 6F]. New and existing open-space areas should be unified through the use of a common or related architectural features or elevation strategies for the buildings facing the same plaza, lawn or courtyard.

The design of new signature buildings is expected to incorporate varied massing and articulation of the buildings’ component parts, to provide aesthetic interest on the campus and to highlight the importance of these buildings. The building elevations can be brought into pedestrian scale by the use of more articulated or open ground floor elevations, often with the building entrance recessed from the primary plane of the building.

New foreground buildings are good candidates for moderately articulated massing, which will help to create a sufficient variety of form while still adhering to the architectural traditions of the campus. Foreground buildings may benefit from the restrained use of dynamic forms for architectural elements such as roof overhangs [Exhibit 6G] or stair towers [Exhibit 6H], by using architectural features such as sun-shades [Exhibit 6I], by employing materials that emphasize transparency or texture [Exhibit 6J] or by using restrained decorative effects of a scale and subtlety consistent with the campus architectural style [Exhibit 6K].
Background buildings are expected to employ moderate articulation in order to avoid taking on a box-like appearance. Background buildings may employ more subtle changes in plane than foreground buildings, or may rely primarily, but not solely, upon surface effects to create interest.

**Massing, Linking and Framing** strategies currently in use on the campus form important cues for those who will design future buildings. A number of existing campus buildings are designed such that two buildings or two component parts of a building create a gateway or entrance to a quad, courtyard, precinct or area of the campus. This device is deployed in a variety of ways on the existing campus and, because it serves as a deliberate engagement of the pedestrian pathways system, is an object lesson for future architects. For example, University Hall incorporates a breezeway between the two wings on the lowest level of the building [Exhibit 6L], giving access from the B4 parking lot to the core of the campus via Magnolia Walk. Within the campus core, second-story bridges connect Live Oak, Eucalyptus, Citrus and Magnolia Halls in ways that articulate the negative spaces between the buildings and highlight the Matador Walk pathway as it leads to the eastern campus precincts [Exhibit 6M]. The roof overhangs on two buildings within the Art and Design Center form a gateway to that area [Exhibit 6N]. In a similar manner, the pathway from Sierra Center to the core of the campus passes under an extension of the Sierra Hall Tower and forms a gateway to Sierra Quad. Such massing strategies should be incorporated into the design of new campus buildings. It will be particularly important to look for opportunities for such linking and framing strategies when the designs for closely adjacent structures are planned, for example, buildings K and L, buildings P and S, buildings Q and R, and buildings Y and Z.
Surface Effects

The patterns created by the arrangement of windows within the façade [Exhibit 6A] or from the creative use of surface or façade materials are devices used to articulate many campus building façades; for example, Exhibit 6O shows the creation of patterns made by modular building components.

New buildings should incorporate surface effects in ways that are consistent with existing adjacent structures. Changes in material, texture, color or applied architectural features on the building façade can be used within a single plane or on adjacent planes to visually articulate or activate the building elevation [Exhibits 6G and 6P].

Building Entries

The Master Plan locates buildings with reference to the pedestrian circulation system. Primary building entries should be located to address or face on to the pedestrian walkway adjacent to the building, or onto the quadrangle, lawn, or courtyard. This will help reinforce the campus open-space system and provide a primary visual focal point on important building façades. Secondary building entries should also address the pedestrian circulation system. Building entries should employ transparency and/or other distinctive architectural forms and building materials in order to make them readily identifiable and welcoming.

Buildings should be designed to allow service and delivery at a point that is shielded from the pedestrian system. Programming for new buildings should take into account the need to share service and delivery access with other buildings whenever possible. Exhibit 4N shows the recommended locations of service access areas for existing and proposed buildings.
Residential building entries should address the pedestrian pathway system, and should be placed so as to reinforce the residential community of which the building is a part. Subject to the programming phase of residential building development, considerations of security may dictate that each building or building complex have a single entrance which can be monitored by reception desk staff.

6.1.3 BUILDING FAÇADE MATERIALS AND COLORS

Building Façade Materials

Building façade materials can be used to provide visual interest and variety throughout the campus. Existing campus buildings are predominantly brick, concrete, plaster and/or architectural block; some buildings incorporate surface ceramic tiles or metal component parts. The skillful use of façade materials should produce both a level of visual consistency throughout the campus and sufficient variety from building to building. The use of sandblasting and exposed aggregate, or the use of burnished block will be consistent with the materials on newer campus buildings. New and existing open-space areas should be unified through the use of a common or related materials palette for the buildings facing the plaza, lawn or courtyard.

The campus standard palette of existing façade materials can be augmented with secondary materials to break up visual expanses. Signature buildings should employ materials that create a distinct identity and distinguish them from foreground and background buildings, as is appropriate to their role and functions. Industrial materials such as concrete masonry units (CMU), ribbed CMU or ‘slump block’ will not be used for buildings with public visibility.

Student Residential Buildings

New student residential buildings should adhere to pedestrian scale and should be well-articulated to avoid an institutional appearance. These buildings serve as "home base" for students, particularly lower-division students who are making the transition from living within their families to greater independence. Housing buildings should be more residential in their massing although not in their detailing. Although they are duplicative rather than singular in function, their design should employ articulated façades and architectural features in order to distinguish them from academic, administrative or larger-scale recreational buildings. Window patterns will relate to indoor functional space and should give views over common outdoor open-space areas. Windows should be used to provide natural light to indoor meeting and gathering areas. Residential buildings should be placed on their sites to enclose open space in ways that provide places for organized and informal recreational and social activities and to create a welcoming appearance. Building set-backs and ‘build-to’ lines shown in Section 6.3 are meant to ensure that the adjacent open space areas are sufficiently large to be usable for these purposes.
Building Colors

Existing campus buildings are primarily warm colors with white or off-white detailing. The campus color palette takes its primary cue from the façade of Oviatt Library [Exhibit 6Q]. The signature campus brick color is a light, sandy terra cotta [Exhibit 6R]. Some buildings are white [Exhibit 6K] grey-white or off-white [Exhibits 6T and 6U], and in some areas, such as the Arts and Design Center, strong colors are used to good effect [Exhibits 6V and 6W].

Proposed new buildings and facilities should be light in color and warm in tone to harmonize with the existing campus. New buildings may add to the existing color palette sparingly by using a second color for detailing or accent where appropriate. Residential buildings may use an expanded color palette but should use light colors to maintain a consistency within the campus.

A caution should be noted with regard to color. The campus brick color is associated with the brick material. Designers should refrain from attempting to re-create or translate this color into plaster, paint or tiles, but should look to white, off-white and grey-white instead. This allows the campus brick to create a singular visual contribution to the campus palette.

6.1.4 BUILDING DESIGN AT PUBLIC EDGES

Special design attention and investment should be made for buildings at the public frontages. Issues to be addressed in the design of buildings at public frontages should include:

- The use of articulation and façade modulation to reinforce pedestrian scale;
- Screening through use of architectural elements and/or landscape to respect neigh-
boring uses without turning their backs to the adjacent community;
• Privacy of ground floor uses and screening from public view, particularly for student residential buildings;
• Use of landscape in setback areas;
• The potential need for noise-reducing glass or other sound insulation; and
• The need for building design to contribute to security and personal safety.

6.2 BUILDING ENVELOPE: HEIGHT LIMITATIONS, SETBACKS AND “BUILD-TO” LINES

6.2.1 PURPOSE OF BUILDING ENVELOPE DESIGN GUIDELINES

Building heights and setbacks, along with the characteristics of campus open spaces, campus edges, architecture and landscape, create and determine the campus ambience. Building height limitations, defined set-backs and ‘build-to’ guidelines play an important role in creating the physical framework of the campus and should serve as a reference for siting buildings when new additions to the campus are developed. The height of a building has an impact upon both the interior and exterior environments, and plays a role in the graceful enclosure of exterior space. A building whose height is out of proportion with the adjacent open space tends to overshadow that open space, both figuratively and literally, undermining its role as a comfortable gathering area. Similarly, very large spaces that are enclosed by low-rise buildings lack a sense of place.

The precise height, siting and massing for each new building will be determined on the basis of the program which is developed at the time the building is conceived, and will respond to the functions to be housed within. The building
envelope guidelines articulated below are based upon the planning principles articulated in Chapter 3 and comprise generalized principles for individual buildings and selected building types. Design guidelines for building height limitations, setbacks, and build-to lines are described below for each of the Master Plan precincts.

Where new development is proposed at campus edges, building envelope design guidelines are formulated to respect neighboring uses, to create distinctive and pleasing campus edges, to articulate campus entries, and to contribute to a gracious campus ambiance. Guidelines for parking structures are presented in Section 6.3.

Building envelope guidelines for the interior of the campus are intended to reinforce the campus open space system and support the existing hierarchy of buildings that reflects buildings’ roles, functions and importance on the campus. Building height recommendations have been developed to ensure that new structures properly enclose and delimit the open space areas. Building set-backs and build-to lines serve to further define specific open space areas by creating distinct boundaries to those spaces and to strengthen the pedestrian circulation system by placing campus functions along the edges of the pathways.

6.2.2 ACADEMIC CORE

Academic/Administrative Buildings

Sites for six new academic/administrative buildings are proposed for the Academic Core. These new buildings should create harmony with existing buildings through their size and relationship to new and existing open space areas. Academic buildings are foreground buildings due to their role on the campus, and their architectural features should emphasize their important position in the campus spatial hierarchy. Building characteristics are listed in Table 4-1.

With the exception of building F, academic/administrative buildings are expected to be 4 levels throughout the campus; building F is proposed to be 3 levels, to create an appropriate relationship with Jacaranda Hall. This 4-level height is optimal because it allows classrooms and other instructional facilities to occupy the first two or three floors of the building, discouraging the use of elevators for general circulation and increasing opportunities for casual interaction. Faculty offices would occupy the top one or two floors, providing a degree of privacy for faculty members. Where appropriate to the program, and depending upon the specific characteristics of the site, academic buildings may incorporate a basement level.

Floor-to-floor heights in academic buildings average about 14 feet; in buildings that incorporate special uses (e.g., laboratories, performing arts space, physical education functions, assembly halls), this may rise to as much as 24 feet. Using the existing average as the basis for height recommendations, four-story standard-use academic buildings would be a maximum height of 60 feet above grade.

Administrative and office functions in the Academic Core are expected to be incorporated within academic buildings. If these functions are accommodated in stand-alone buildings, they would fall within the category of background building whose materials and massing should create a visual appearance that is well-integrated with surrounding structures. Administrative/office buildings should be no more than three stories or 45 feet high; this restriction is recommended to ensure that these buildings take their appropriate place in the campus hierarchy and do not detract from the academic buildings.
Building set-backs and build-to lines for new buildings in the Academic Core are shown in Exhibit 6X, which illustrates the recommended set-backs from existing buildings and the minimum size standards for new open-space areas.

6.2.3 SOUTH CAMPUS ARTS PRECINCT

Ten new buildings are proposed for the South Campus Arts Precinct; six of these are academic/administrative facilities. As shown in Exhibit 6Y, building heights for these academic buildings shall be a maximum of four stories and 60 feet above grade, as in the Academic Core. The height of the small addition to Nordhoff Hall [H2] should be no taller than Nordhoff Hall itself. Buildings C and H1 should be of similar height because they work together to form the West University Drive gateway. Similarly, the similarity of heights of buildings Y and Z will be important to the development of the courtyard open space between those buildings.
The Valley Performing Arts Center [O] will incorporate a variety of heights in response to the special functions to be housed within the building. The Master Plan does not recommend any specific height restrictions for the building, which is under development at the time of this report. The height of building W, which is meant to house an expansion of the University Club and an Alumni facility will respond to the program and functions; this building is expected to be a relatively low-rise building and is meant to respond to the Orange Grove itself. It should be no more than 2 stories in height. Building X, an extension of the campus plant facility, should be no more than 2-3 stories in height.

The South Campus Arts precinct includes parking structure PS-B1. This parking structure, which is phased to occur in Phase 4 of the 2005 Master Plan, will be sized to respond to the existing need for parking at the time it is developed. As shown in Exhibit 4E, this structure should not exceed 6 levels including roof level, approximately 62 feet above grade.

Building set-backs and build-to lines for the South Campus Arts Precinct have been developed to ensure that open space areas are sufficiently well-sized greens, plazas or courtyards, and to provide a consistent alignment among buildings.
6.2.4 EAST GATEWAY PRECINCT

The East Gateway precinct [Exhibit 6AA] will be developed with four new facilities; one, building V, is under development at the time of this report. Buildings U and S are meant to be academic/administrative buildings and should not exceed 4 stories or 60 feet above grade. Building R, a student recreation center, is a special-purpose building whose height will vary in response to the special functions and activities to be accommodated by the building. The height of this building should respond to the height of the University Student Union, its nearest neighbor. Build-to lines as shown in Exhibit 6Z are meant to accomplish adequate set-backs from Matador Drive and Jacaranda Way, and to ensure well-sized open areas for informal recreation purposes south of this building.

This precinct includes parking structure PS-G3, which is planned to incorporate 6 levels including roof, approximately 62 feet above grade.

6.2.5 WEST GATEWAY PRECINCT

The West Gateway area [Exhibit 6Z] includes only two structures and the new Transit Center. Building M, the Parking and Public Safety...
building, is under development at the time of this report. Building B is an academic/administrative building which will not exceed 4 stories or 60 feet above grade. The Transit Center itself [TH1] is an open-air shelter that should be characterized by a distinctive roof design; however it should not exceed one story or 15 feet above grade.

6.2.6 INSTRUCTIONAL/ATHLETICS/RECREATION PRECINCT

The development proposed for the Instructional/Athletics/Recreation precinct includes two academic/administrative buildings, athletics fields, small athletic support facilities and parking structures [Exhibit 6BB]. Building P is an extension of Redwood Hall; its height should not exceed that of Redwood Hall. Similarly, the height of Buildings G and Q, immediately east of Redwood Hall, should not exceed 2 stories each or 30 feet above grade.

The two small buildings [A and A1] will be single story buildings of no more than 15 feet above grade. Parking structures PS-G6 and PS-G4, will conform to the standards for campus parking structures and will not exceed 6 levels including the roof, bringing them to a maximum height of approximately 62 feet above grade.

Building set-backs and build-to lines are meant to create a congenial campus edge and allow for sufficient landscape to screen the parking structures. Similarly they are meant to ensure that the space for playfields between the two structures is sufficient for their intended purposes. Buildings G and Q, along with Redwood Hall, are expected to enclose a plaza to be used for student rallies and other informal recreation purposes.

6.2.7 NORTHWEST PRECINCT

The Northwest Precinct is devoted primarily to student housing and faculty/staff housing [Exhibit 6CC]. The three academic/administrative buildings in this precinct [D, E1 and E2] should not exceed two stories or 30 feet above grade because of their proximity to the campus edge and the nearby residential community.
In the 30-foot set-back from Halsted Street, there may be a landscape line separating the campus buildings from the street. Student housing buildings [SH5 - SH12] should not exceed 4 stories or 60 feet above grade. A dining facility [HD] is also planned for this precinct. In addition to ground-floor dining and dining patio, food preparation and food-service areas, this building may accommodate offices, meeting rooms and other facilities on a second or third level. This building should have a maximum height of 3 stories (45 feet above grade). The siting of this building will be based upon the program developed for the facility; the need for a service area and loading dock must be taken into consideration when building HD is sited.

The northwest corner of this precinct is dedicated to the development of a small faculty housing community. Access to this development should be through Halsted Street. There will be no vehicular access to the campus roadways from this housing development. However, a system of pedestrian pathways linking it to the campus should be incorporated. The heights for faculty/staff housing are to be determined as this area is developed. These buildings are not expected to exceed three stories. Parking Structure PS-B5-N will be 6 levels or lower, therefore a maximum height of approximately 62 feet above grade.

Build-to lines and set-backs are meant to ensure that playfields adjacent to student housing are of sufficient size to be functional as well as to provide enough distance in between buildings (40 feet minimum) to allow for sufficient natural light and ventilation.

6.2.8 UNIVERSITY PARK STUDENT HOUSING

Student Housing development at University Park is planned to be infill development on land currently utilized as surface parking [Exhibit 6DD]. As in the Northwest Precinct, student residential buildings are expected not to exceed 4 stories in height or 60 feet above grade. The proposed residential Parking Structure PS-F9 is planned at 5 levels including the roof, and not to exceed 51 feet above grade.

Residential buildings should not turn their backs on the buildings around them and should place their entries in convenient locations that help promote the use of open space and strengthen pedestrian linkages between the east and west portions of University Park. The architecture should emphasize the connection between interior and exterior space by framing different types of open spaces for different types of activities and by providing views to outdoors, natural light, natural ventilation, and convenient access to adjacent open space.

6.2.9 NORTH CAMPUS FACULTY/STAFF HOUSING VILLAGE

The development of faculty/staff housing on the north campus area will respond to the parameters developed for the type of housing that will
best suit the anticipated market. In general, it is expected not to exceed three stories in height in order to be compatible with the nearby residential areas. Small-scale retail development on this site is expected to be limited to three stories and 45 feet above grade. The small athletic support building in this precinct should be 1 story in height or a maximum of 15 feet above grade.

The design of parking structures should acknowledge the following guidelines:

- The exterior of above-grade parking structures within public view should avoid a utilitarian appearance and should be integrated with the architectural design of the campus in terms of scale, materials and appearance. Considerations of façade articulation and the selection of façade materials will be particularly important for the design of these buildings. The design of parking structure elevations should acknowledge campus entry points and public roadways and should be commensurate with other public architectural statements made at campus edges and entries.
- Specific design elements should be used to integrate parking structures with the campus. These elements may include: intensive planting of screening trees or other vegetation at the exterior of the structure, use of exterior cladding and patterns similar to those of adjacent buildings, creation of areas of accent and architectural focus such as entry and vertical circulation area points, and articulation of the façade.
- Sloping floors should not be expressed on the exterior of the building.
- The visual presence of automobiles in parking structures should be minimized as seen from public view, through architectural or landscape screens. Because the parking structures are located at the campus edges, “public view” refers to views from within and outside the campus.
- The pedestrian entry/egress should be deliberately connected to the pedestrian circulation system in such a way that diminishes the need for pedestrians to cross vehicular traffic in order to access the campus pathway system. Stair/elevator cores should be well articulated, well-lighted and tall enough to serve as visible wayfinding signals.

6.3 CAMPUS CIRCULATION AND PARKING

The Master Plan recommends changes to the campus vehicle circulation system and strategies that concentrate parking in structures, freeing campus land for academic/administrative buildings, playfields and open space.

6.3.1 PARKING FACILITIES

Four commuter parking structures are planned for the perimeter of the campus. Although parking structures are background buildings, they serve a variety of functions which dictate that their design should fulfill specific requirements. Parking structures are in essence folded roads whose scale is often incompatible with that of the pedestrian; special and deliberate design treatments are usually needed to visually integrate them with neighboring structures intended for human occupancy. Similarly, although these buildings are primarily utilitarian in nature, they serve as gateway elements on the campus because they are among the first buildings visitors encounter when coming to the campus. Finally, they operate as the first component of the pedestrian pathway system, and they must convey both the actuality and the perception of safety. Finally, because the parking structures are located at the campus perimeter, special care must be taken to ensure that they do not visually intrude on the residential scale of the adjacent neighborhoods.
• The design of parking structures should make good use of daylighting and must incorporate sufficient artificial lighting to ensure safety within and outside of the structure. Landscape and screening via plant materials should be applied such that pedestrian entry/egress points have clear visual sightlines in order to increase actual and perceived personal safety. Stair towers and elevator enclosures should be clad in transparent materials to increase personal safety.

• Existing Parking Structure B5 [Exhibit 6EE] provides an example of an excellent approach to the design and siting of a parking structure. Its use of materials ties it into the campus palette, and its design renders it part of the campus architecture rather than a utility building. Furthermore, the landscape strip adjacent to the structure [Exhibit 6FF] provides a congenial pathway with large trees used for shade. These trees also modulate the difference in scale from the building to the pedestrian area.

• All university parking facilities will incorporate designated disabled parking spaces.

Surface Parking Lots

Several of the existing campus surface parking lots have been left intact by the Master Plan; these lots are mainly in the West Gateway precinct; a small surface lot remains on the eastern edge of the campus. Striping for crosswalks and crossing areas should acknowledge the campus pathway system and natural desire lines to increase pedestrian compliance with crossing points. Landscaping for surface parking lots will continue as at present, with the intention of concentrating vegetation at the transition points between the surface lot and the pedestrian pathway.
Visitor parking will be accommodated in the parking structures and in surface lots. Visitor kiosks will issue parking passes and provide information at the Prairie Street West entry, at the East University Drive entry and at the Prairie Street East entry from Zelzah Street.

6.3.2 CAMPUS ROADWAY TYPES

The Master Plan recommends a new campus roadway, Matador Drive, which will lead from Nordhoff Street into the campus, providing access to three parking structures on the east side. This roadway should be planned to be 28 feet wide, with a planting strip of 12 feet on either side. The landscaping of this campus circulation road is discussed in Chapter 5. Roadway characteristics and landscape for the new East Gateway entry road are also illustrated and discussed in Chapter 5.

6.3.3 SERVICE AREAS, LOADING DOCKS AND MECHANICAL EQUIPMENT

The Master Plan locates new service areas adjacent to proposed buildings; these are shown on Exhibit 4N. Most existing service areas are retained. Access to some service areas will be along pedestrian pathway routes, as described in Chapter 4.

Service areas are to be screened with opaque fencing or decorative masonry fences, similar to those existing on the campus [Exhibits 6GG & 6HH], incorporating lockable gates where appropriate. Masonry fences or screens should be softened by landscape, particularly where service areas are in prominent locations or locations visible to the public.
Implementation and Phasing

The 2005 Master Plan has been developed to address the requirements of projected enrollment growth over the next 30 years, and is expected to be implemented over that time period. The implementation strategy for the Master Plan has been divided into four phases; the first three comprise 4-year spans, and a final phase comprises a 15-year time span:

- **PHASE 1**: 2005-2009 (Exhibits 7A and 7B)
- **PHASE 2**: 2010-2014 (Exhibit 7C and 7D)
- **PHASE 3**: 2015-2019 (Exhibit 7E and 7F)
- **PHASE 4**: 2020-2035 (Exhibit 7G and 7H)

It should be noted that the actual pace of implementation will be determined by the rate of increase in student enrollments, the availability of funding for both state-funded and non-state-funded projects, and changes anticipated by specific academic, administrative, recreational and student life programs that necessitate new or modified facilities.

The implementation of the 2005 Master Plan includes the phasing of new buildings and new parking facilities; the relocation and expansion of playfields and athletic facilities; improvement and construction of roadways; and the implementation of landscaping. Exhibits 7A through 7H show the planned development in tables and diagrams. Development over each of the four phases is discussed below.

Faculty Housing is proposed in the 2005 Master Plan as a general land use. The areas of the campus to be developed with this land use is tracked in the tables and diagrams shown in Exhibits 7A - 7H.

Landscaping is implemented in conjunction with Capital Plan projects for new facilities; some landscape projects may be stand-alone improvements to the campus.
7.1 PHASE 1: 2005-2009
(EXHIBITS 7A & 7B)

The details of Phase 1 projects are shown in Exhibit 7A and illustrated in Exhibit 7B.

Phase 1 includes projects from the 1998 Master Plan which were under development or under construction at the time the 2005 Master Plan was being developed. These projects are: the Parking & Public Safety Building on Darby Avenue and Prairie Street (labeled M in Exhibit 7A and 7B); the Exchange replacement [N]; the Valley Performing Arts Center [O]; and the new Science Building [V].

The first Phase also includes the development of three main transportation infrastructure projects presented in the 2005 Master Plan: a transit Center [TC] on Prairie Street at Darby Avenue; a new parking structure on the southeast part of campus [PS-G3]; construction of the southern portion of Matador Drive, east of East University Drive; and a new campus entry on the east side of the campus at Prairie Street, off Zelzah Avenue.

Housing and support facilities are also planned for this Phase, with the development of the first student housing project in the Master Plan on an infill site in University Park [SH1], along with a new Housing Administration Building [A] adjacent to University Park. During this Phase, one component of Faculty/Staff Housing is scheduled to be developed in the northern section of the campus, north of Lassen Street [FH1].

7.2 PHASE 2: 2010-2014
(EXHIBITS 7C AND 7D)

In Phase 2 five academic/administrative buildings will be developed on infill sites located on the eastern part of the Academic Core and shown in Exhibit 7C as buildings Q, S, U and Z. Building J will be developed to the west of Manzanita Hall.

In addition to these facilities, Phase 2 includes the construction of the northern section of Matador Drive, along with a new parking structure [PS-G6] northeast of the Academic Core. These roadway/parking improvements require the relocation of the Tennis Courts to a site immediately south of the existing Track [PF7]. During this Phase, building A1 will be constructed to provide storage and support for instructional, athletic and recreational programs, and will serve as a site for concessions for the athletics program.

During Phase 2, a new Student Recreation Center [R] will be developed to the east of the existing University Student Union. At this time, a new playfield [PF4] will be constructed just to the south of the Student Recreation Center to provide physical space for instructional, athletics and recreational programs.

Two student housing buildings are to be developed in this Phase, both of them located on infill sites at University Park, and shown in Exhibits 7C and 7D as projects SH2, and SH3. In conjunction with these housing projects, a parking structure [PS-F9] is planned to serve the parking demands of the new student residents. During this Phase, two additional components of Faculty/Staff housing are scheduled to be developed, FH2 and FH3, shown on the northern section of the campus, north of University Village.

Also in the northern section of the campus, a new playfield [PF12] is to be completed, as well as a facility for Instructional/Athletics/Recreation Support and Storage [A2].
An expansion of the University Club is planned for this Phase, along with facilities for an Alumni Center [W]. At this time, surface parking lot L-G2 will be reconfigured.

7.3 PHASE 3: 2015-2019  
[EXHIBITS 7E AND 7F]

In Phase 3, six academic/administrative buildings are planned. Projects D, E1 and E2 will be developed along Halsted Street; Project F will be constructed along North University Drive and buildings H1 and H2 will be developed to the west of Nordhoff Hall [Exhibits 7E and 7F]. An addition to the Oviatt Library is also planned [I]. A parking structure on the east side of campus will be completed during this Phase [PS-G4]. Space on the east side currently replaced by surface parking lots will be occupied by open green space and playfields [PF-3, PF-4 and PF-5]. The last infill Student housing development at University Park [SH4] and another component of Faculty/Staff Housing, replacing University Village, are also scheduled for this phase [FH4].

An expansion of the Central Plan will be developed on the southeast side of the campus (X).

7.4 PHASE 4: 2020-2035  
[EXHIBITS 7G AND 7H]

Phase 4 completes the projects in the 2005 Master Plan. During this phase eight new academic/administrative buildings are planned (B, C, G, K, L, P, T, Y).

Student Housing in the Northwest Precinct is to be completed on this phase. Four housing buildings south of Halsted Street [SH5-SH8] and a new dining facility [HD] will be the first student housing development within the campus core. As need for student housing increases, four additional housing buildings [SH9-SH12] will be developed west of West University Drive (Etiwanda Avenue).

Two parking structures are also to be developed on this phase: PS-B1 is intended to serve general use and PS-B5N will serve as student residential parking for student housing in the Northwest Precinct.

The last component of faculty/staff housing [FH5 and FH6] will be developed in Phase 4 along Halsted Street at the northwest corner of the campus.

7.5 TEMPORARY FACILITIES

Exhibit 7I shows the facilities that will be removed over the course of the four Phases of the Master Plan. The potential replacement facility for each is also shown in this exhibit. The replacement facility may not be located on the site of the original building being removed; rather, the functions that are housed will be relocated to the replacement facility.
### Phase 1 Development Plan

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Facility Type</th>
<th>State Funded</th>
<th>Non State Funded</th>
<th>Floor Plate</th>
<th>Levels</th>
<th>Total Gsf</th>
<th>Capacity/Secondary Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Administration: Parking/Public Safety</td>
<td>-</td>
<td>-</td>
<td>14,000</td>
<td>2</td>
<td>28,000</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Exchange Expansion: Food Service</td>
<td>-</td>
<td>-</td>
<td>4,000</td>
<td>1</td>
<td>4,000,000</td>
<td>Existing trailers to be kept in services and relocated to the south during construction.</td>
</tr>
<tr>
<td>O</td>
<td>Perf. Arts Venue</td>
<td>-</td>
<td>-</td>
<td>163,000</td>
<td>*</td>
<td>163,000</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Academic/Admin</td>
<td>-</td>
<td>-</td>
<td>22,260</td>
<td>4</td>
<td>90,000</td>
<td>Existing pond and observatory need to be relocated to allow construction. Also, some encroachment into the south end of Botanical garden may be required.</td>
</tr>
<tr>
<td>PS-G3</td>
<td>Parking Structure</td>
<td>-</td>
<td>-</td>
<td>108,000</td>
<td>6</td>
<td>648,000</td>
<td>Parking Spaces: 1,994</td>
</tr>
<tr>
<td>Matador Drive (South)</td>
<td>Roadway (Nordhoff to Prairie)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Required to access the PS G3 parking structure</td>
</tr>
<tr>
<td>E. Prairie St. Entry</td>
<td>Roadway (Zelzah to Bertrand)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TC</td>
<td>Transit Center</td>
<td>-</td>
<td>-</td>
<td>27,500</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Housing Admin.</td>
<td>-</td>
<td>-</td>
<td>12,150</td>
<td>4</td>
<td>48,600</td>
<td>Student Beds: 252</td>
</tr>
<tr>
<td>SH-1</td>
<td>Student Housing</td>
<td>-</td>
<td>-</td>
<td>12,150</td>
<td>4</td>
<td>48,600</td>
<td>Student Beds: 252</td>
</tr>
<tr>
<td>FH-1</td>
<td>Faculty/Staff Housing</td>
<td>-</td>
<td>-</td>
<td>12,150</td>
<td>3</td>
<td>290,500</td>
<td>Housing Units: 250</td>
</tr>
</tbody>
</table>

**NOTES**

- * To be determined in Schematic Design.
## Phase 2 Development Plan

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<tr>
<th>Project Code</th>
<th>Facility Type</th>
<th>State Funded</th>
<th>Non State Funded</th>
<th>Floor Plate</th>
<th>Levels</th>
<th>Total Gsf</th>
<th>Capacity/Secondary Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Athletics/Rec. Support</td>
<td>•</td>
<td>6,400</td>
<td>1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>Athletics/Rec. Support</td>
<td>•</td>
<td>10,200</td>
<td>1</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>Academic/Admin</td>
<td>•</td>
<td>35,000</td>
<td>4</td>
<td>37,000</td>
<td>140,000</td>
<td>Demolition of F5 faculty parking is necessary. Campus road “B” realignment to the east is required. Existing Athletics office may remain until construction is complete.</td>
</tr>
<tr>
<td>Q</td>
<td>Academic/Admin</td>
<td>•</td>
<td>18,500</td>
<td>2</td>
<td></td>
<td>4,950</td>
<td>Requires demolition of the O, S and T buildings and relocation of Athletic staff. Construction staging at PAC loading area or Kinesiology south lawn.</td>
</tr>
<tr>
<td>R</td>
<td>Student Recreation Center</td>
<td>•</td>
<td>60,000</td>
<td>2</td>
<td>120,000</td>
<td></td>
<td>Campus road “B” realignment to the east is required. Impacts to the USU/PAC operations during construction.</td>
</tr>
<tr>
<td>S</td>
<td>Academic/Admin</td>
<td>•</td>
<td>16,500</td>
<td>3</td>
<td>49,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>Academic/Admin</td>
<td>•</td>
<td>37,500</td>
<td>4</td>
<td>150,000</td>
<td></td>
<td>City of LA vacation of Prairie, Bertrand and Dearborn ROW required. Boiler house demolition requires provisions for PPM/receiving storage. Existing green house demolished and replaced.</td>
</tr>
<tr>
<td>W</td>
<td>Dining/Meeting</td>
<td>•</td>
<td>12,000</td>
<td>2</td>
<td>24,000</td>
<td></td>
<td>Allows operation of existing University Club during construction.</td>
</tr>
<tr>
<td>Z</td>
<td>Academic/Admin</td>
<td>•</td>
<td>28,800</td>
<td>3</td>
<td>86,400</td>
<td></td>
<td>Monterey Hall can be maintained through construction.</td>
</tr>
<tr>
<td>PS-F9</td>
<td>Parking Structure</td>
<td>•</td>
<td>39,600</td>
<td>5</td>
<td>198,000</td>
<td></td>
<td>Parking Spaces: 609</td>
</tr>
<tr>
<td>PS-G6</td>
<td>Parking Structure</td>
<td>•</td>
<td>150,000</td>
<td>6</td>
<td>900,000</td>
<td></td>
<td>Parking Spaces: 2,769</td>
</tr>
<tr>
<td>Mata- dor Dr. (N.)</td>
<td>Roadway (Prairie to PS-G6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>L-G2</td>
<td>Parking Lot</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td>Constructed concurrently with the Building “Z” project</td>
</tr>
<tr>
<td>SH2</td>
<td>Student Housing</td>
<td>12,150</td>
<td>4</td>
<td>48,600</td>
<td></td>
<td>Student Beds: 252</td>
<td></td>
</tr>
<tr>
<td>SH3</td>
<td>Student Housing</td>
<td>12,150</td>
<td>4</td>
<td>48,600</td>
<td></td>
<td>Student Beds: 252</td>
<td></td>
</tr>
<tr>
<td>FH2</td>
<td>Faculty/Staff Housing</td>
<td>*</td>
<td>*</td>
<td>-</td>
<td></td>
<td>Housing Units: 100</td>
<td></td>
</tr>
<tr>
<td>FH3</td>
<td>Faculty/Staff Housing</td>
<td>*</td>
<td>*</td>
<td>-</td>
<td></td>
<td>Housing Units: 50</td>
<td></td>
</tr>
<tr>
<td>PF-F4</td>
<td>Playfield</td>
<td>36,350</td>
<td>1</td>
<td>0.8 acres</td>
<td></td>
<td>Constructed after building R.</td>
<td></td>
</tr>
<tr>
<td>PF-F7</td>
<td>Tennis</td>
<td>103,000</td>
<td>1</td>
<td>2.4 acres</td>
<td></td>
<td>Relocation must be completed prior to PS G6</td>
<td></td>
</tr>
<tr>
<td>PF-G12</td>
<td>Playfield</td>
<td>285,300</td>
<td>1</td>
<td>6.5 acres</td>
<td></td>
<td>Must be completed prior to groundbreaking for PS G4. Field can be used for soccer practice when tennis is relocated to PF-F7.</td>
<td></td>
</tr>
</tbody>
</table>

### NOTES

* To be determined in Schematic Design.
Legend

Existing

- New Academic/Administrative Facility (this phase)
- New Academic/Administrative Facility (previous phase)
- New Parking Structure (this phase)
- New Parking Structure (previous phase)
- New Housing Facility (this phase)
- New Housing Facility (previous phase)
- New Playfield (this phase)
- New Playfield (previous phase)
- New Roadway
- Info Booth

Phase 2 Development Plan

Matador Drive North
# Phase 3 Development Plan

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Facility Type</th>
<th>State Funded</th>
<th>Non State Funded</th>
<th>Floor Plate</th>
<th>Levels</th>
<th>Total Gsf</th>
<th>Capacity/Secondary Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Academic/Admin</td>
<td>•</td>
<td></td>
<td>15,000</td>
<td>1</td>
<td>15,000</td>
<td>Requires removal of Art Dept. sea trains, temp. building, welding area.</td>
</tr>
<tr>
<td>E1</td>
<td>Academic/Admin</td>
<td>•</td>
<td></td>
<td>10,500</td>
<td>1</td>
<td>10,500</td>
<td>Parking at D6/E6 lots removed.</td>
</tr>
<tr>
<td>E2</td>
<td>Academic/Admin</td>
<td>•</td>
<td></td>
<td>10,500</td>
<td>1</td>
<td>10,500</td>
<td>Challenge course relocated.</td>
</tr>
<tr>
<td>F</td>
<td>Academic/Admin</td>
<td>•</td>
<td></td>
<td>25,000</td>
<td>3</td>
<td>75,000</td>
<td>H Complex and Bank building must be demolished.</td>
</tr>
<tr>
<td>H1</td>
<td>Academic/Admin</td>
<td>•</td>
<td></td>
<td>24,000</td>
<td>3</td>
<td>72,000</td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>Academic/Admin</td>
<td>•</td>
<td></td>
<td>5,300</td>
<td>1</td>
<td>5,300</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Library</td>
<td>•</td>
<td></td>
<td>36,350</td>
<td>3</td>
<td>109,050</td>
<td>Cooling tower north of building to be relocated. Stone Pine grove north of building would need to be demolished.</td>
</tr>
<tr>
<td>X</td>
<td>South Campus Central Plant Expansion</td>
<td>•</td>
<td></td>
<td>10,000</td>
<td>1</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>PS-G4</td>
<td>Parking Structure</td>
<td>•</td>
<td></td>
<td>150,000</td>
<td>6</td>
<td>900,000</td>
<td>Parking Spaces: 2,769</td>
</tr>
<tr>
<td>SH4</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>6,750</td>
<td>4</td>
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<td>Student Beds: 140</td>
</tr>
<tr>
<td>FH4</td>
<td>Faculty/Staff Housing</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td>58,100</td>
<td>Housing Units: 50</td>
</tr>
<tr>
<td>PF-G3</td>
<td>Playfield</td>
<td></td>
<td></td>
<td>115,000</td>
<td>1</td>
<td>2.6 acres</td>
<td>Constructed after PS G4</td>
</tr>
<tr>
<td>PF-G4</td>
<td>Playfield</td>
<td></td>
<td></td>
<td>195,000</td>
<td>1</td>
<td>4.5 acres</td>
<td>Constructed after PS G4</td>
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<tr>
<td>PF-G5</td>
<td>Playfield</td>
<td></td>
<td></td>
<td>161,000</td>
<td>1</td>
<td>3.7 acres</td>
<td>Constructed after PS G4</td>
</tr>
</tbody>
</table>

**NOTES**

* To be determined in Schematic Design.
Legend

- Existing
- New Academic/Administrative Facility (this phase)
- New Academic/Administrative Facility (previous phase)
- New Parking Structure (this phase)
- New Parking Structure (previous phase)
- New Housing Facility (this phase)
- New Housing Facility (previous phase)
- New Playfield (this phase)
- New Playfield (previous phase)
- New Roadway
- Info Booth

7F Phase 3 Development Plan
## Phase 4 Development Plan

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Facility Type</th>
<th>State Funded</th>
<th>Non State Funded</th>
<th>Floor Plate</th>
<th>Levels</th>
<th>Total Gsf</th>
<th>Capacity/Secondary Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>35,000</td>
<td>3</td>
<td>105,000</td>
<td>Requires removal of President's trailer and 2 Mgmt. Trailers.</td>
</tr>
<tr>
<td>C</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>27,000</td>
<td>4</td>
<td>108,000</td>
<td>Requires demolition of Live Oak and Eucalyptus Halls.</td>
</tr>
<tr>
<td>G</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>27,500</td>
<td>2</td>
<td>55,000</td>
<td>Requires demolition of Live Oak and Eucalyptus Halls.</td>
</tr>
<tr>
<td>K</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>30,000</td>
<td>4</td>
<td>120,000</td>
<td>Requires demolition of Live Oak and Eucalyptus Halls.</td>
</tr>
<tr>
<td>L</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>30,000</td>
<td>4</td>
<td>120,000</td>
<td>Requires demolition of Live Oak and Eucalyptus Halls.</td>
</tr>
<tr>
<td>P</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>33,800</td>
<td>2</td>
<td>67,600</td>
<td>Requires relocation of the current campus tram turn-around/pick-up south of Redwood Hall.</td>
</tr>
<tr>
<td>T</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>22,260</td>
<td>3</td>
<td>66,780</td>
<td>Requires demolition of FOB building.</td>
</tr>
<tr>
<td>Y</td>
<td>Academic/Admin</td>
<td>*</td>
<td></td>
<td>28,800</td>
<td>3</td>
<td>86,400</td>
<td>Requires demolition of Monterey Hall.</td>
</tr>
<tr>
<td>PS-B1</td>
<td>Parking Structure</td>
<td>*</td>
<td></td>
<td>120,000</td>
<td>6</td>
<td>720,000</td>
<td>Parking Spaces: 2,215 Loss of B1 and B2 lots during construction.</td>
</tr>
<tr>
<td>PS-B5-N</td>
<td>Parking Structure</td>
<td></td>
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<td>52,560</td>
<td>5</td>
<td>262,800</td>
<td>Parking Spaces: 970</td>
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<tr>
<td>SH5</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224 Requires removal of support services building and completion of building Q.</td>
</tr>
<tr>
<td>SH6</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
</tr>
<tr>
<td>SH7</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
</tr>
<tr>
<td>SH8</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
</tr>
<tr>
<td>SH9</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
</tr>
<tr>
<td>SH10</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
</tr>
<tr>
<td>SH11</td>
<td>Student Housing</td>
<td></td>
<td></td>
<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
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<tr>
<td>SH12</td>
<td>Student Housing</td>
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<td>10,800</td>
<td>4</td>
<td>43,200</td>
<td>Student Beds: 224</td>
</tr>
<tr>
<td>HD</td>
<td>Dining</td>
<td></td>
<td></td>
<td>25,000</td>
<td>1</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>FH5</td>
<td>Faculty/Saff Housing</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>Faculty Housing Units: 32</td>
</tr>
<tr>
<td>FH6</td>
<td>Faculty/Saff Housing</td>
<td>*</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
<td>Faculty Housing Units: 50 Requires relocation of cultural houses and child development.</td>
</tr>
</tbody>
</table>

**NOTES**

* To be determined in Schematic Design Phase.
## Buildings to be Removed

<table>
<thead>
<tr>
<th>Phase</th>
<th>Existing Buildings With Temporary Designation</th>
<th>Levels</th>
<th>Total Gsf</th>
<th>Potential Replacement Facility</th>
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<tbody>
<tr>
<td><strong>Phase 1</strong></td>
<td><strong>Bldg. T</strong></td>
<td>1</td>
<td>3,920</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td><strong>Bldg. S</strong></td>
<td>1</td>
<td>2,880</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td><strong>Bldg. O</strong></td>
<td>1</td>
<td>2,880</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td><strong>The Exchange</strong></td>
<td>1</td>
<td>1,520</td>
<td>M</td>
</tr>
<tr>
<td><strong>Phase 2</strong></td>
<td><strong>Student Health Center</strong></td>
<td>2</td>
<td>27,257</td>
<td>Y or Z</td>
</tr>
<tr>
<td></td>
<td><strong>Intercollegiate Athletics Offices</strong></td>
<td>1</td>
<td>4,330</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td><strong>University Club</strong></td>
<td>1</td>
<td>4,540</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td><strong>Greenhouse</strong></td>
<td>1</td>
<td>7,200</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td><strong>Boiler House</strong></td>
<td>1</td>
<td>5,275</td>
<td>X</td>
</tr>
<tr>
<td><strong>Phase 3</strong></td>
<td><strong>Bank Bldg.</strong></td>
<td>1</td>
<td>2,933</td>
<td>“J” for state-funded lecture functions, “Z” or “Y” for non-state-funded functions</td>
</tr>
<tr>
<td></td>
<td><strong>Support Services Building</strong></td>
<td>1</td>
<td>9,100</td>
<td>Q</td>
</tr>
<tr>
<td></td>
<td><strong>Science 1, 2</strong></td>
<td>3</td>
<td>169,659</td>
<td>K and L</td>
</tr>
<tr>
<td></td>
<td><strong>HA-HG</strong></td>
<td>1</td>
<td>7,689</td>
<td>J</td>
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<tr>
<td></td>
<td><strong>Nautilus Center</strong></td>
<td>1</td>
<td>1,497</td>
<td>G or P</td>
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<tr>
<td></td>
<td><strong>AA (Asian)</strong></td>
<td>1</td>
<td>1,850</td>
<td>R</td>
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<tr>
<td></td>
<td><strong>BL</strong></td>
<td>1</td>
<td>2,575</td>
<td>R</td>
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<tr>
<td></td>
<td><strong>LS1 (Child/Fam Studies)</strong></td>
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<td>2,200</td>
<td>Y or Z</td>
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<tr>
<td></td>
<td><strong>LS2 (Child/Fam Studies)</strong></td>
<td>1</td>
<td>2,971</td>
<td>Y or Z</td>
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<tr>
<td></td>
<td><strong>Sagebrush Hall</strong></td>
<td>2</td>
<td>11,307</td>
<td>J</td>
</tr>
<tr>
<td></td>
<td><strong>N. Campus Team Room</strong></td>
<td>1</td>
<td>13,100</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td><strong>CH (Chicano)</strong></td>
<td>1</td>
<td>1,830</td>
<td>R</td>
</tr>
<tr>
<td><strong>Phase 4</strong></td>
<td><strong>Faculty Office Building</strong></td>
<td>4</td>
<td>27,923</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td><strong>Monterey Hall</strong></td>
<td>3</td>
<td>40,328</td>
<td>Y or Z</td>
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<tr>
<td></td>
<td><strong>Women’s Center, 18344 Plummer</strong></td>
<td>1</td>
<td>1,391</td>
<td>Y or Z</td>
</tr>
<tr>
<td></td>
<td><strong>Trust Building (Youth Services), 9527 Etiwanda Ave.</strong></td>
<td>1</td>
<td>1,628</td>
<td>Y or Z</td>
</tr>
</tbody>
</table>

**Temporary Facility Total** 357,783
Appendix A2

Central Heating & Cooling Plant Evaluation

Study Update Based On

Campus Master Plan (2035)

California State University, Northridge

July 2005
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Executive Summary

Digital Energy, Inc. had previously prepared a central plant evaluation study for the CSUN campus during September 2004 based on a master plan FTE of 25,000. CSUN has just developed its most recent master plan (CSUN Envision 2035) through AC Martin Partners, Inc. This latest plan is based on an FTE of 35,000 and envisions development of a net additional 1.33 million square feet of state funded buildings and an additional 300,000 square feet of non-state funded buildings. The implication of this development on the long term heating and cooling loads is presented in this study update, along with a recommended strategy for future infrastructure development.

The existing central heating and cooling plant was installed during the late 90’s and has 3,690 Tons of installed chiller capacity, 40 MMBtuh (output) of heating capacity and a chilled water storage capacity of 29,000 Ton Hours at 19 degree F differential between supply and return. Long term building growth per the master plan could impose a total campuswide (state funded) load of 6,400 Tons of cooling and 62 MMBtuh of hot water heating on the central heating and cooling systems. In addition, estimates show that if all of the high-peak and low-peak cooling loads are to be shifted to the night time period using a thermal energy storage system, long term TES capacity will need to be increased to approximately 53,000 Ton hours.

Considering a variety of factors including space limitations, proposed growth timeline, potential integration of fuel cell powered distributed generation systems at the campus, geographical disposition of future loads, and minimum redundancy requirements, it is reasonable to conceptualize a satellite plant that could be used to provide all or a portion of the added long term capacity. In addition, existing heating and cooling systems would require some upgrades. The study recommends a phased approach for developing the heating and cooling system infrastructure such that (a) existing resources can be used to the maximum extent possible, and (b) maximum flexibility is retained in the design of infrastructure systems for accommodating future growth.

Under the proposed phased approach, the study recommends the following.

Heating System:

1. Upgrade the southern segment of the heating system loop in the immediate future (by 2010) to accommodate master plan related loads using a combination of the central plant and a satellite plant.

2. Provide a satellite plant designed to deliver 25 MMBtuh of heating capacity by 2010. This would increase overall campus heating system delivery capacity to 65 MMBtuh.

3. Consider installing a small, 10 MMBtuh boiler at the existing central plant in the immediate future (by 2010) for handling low heating loads and to provide minimal redundancy.

4. As loads build up over time over the next 20-years, add another 12.5 MMBtuh boiler to the satellite plant for assuring long term redundancy. This measure would ensure that the peak campus load of 63 MMBtuh is assured in the event one of the larger boilers fail.
**Cooling System:**

1. Continue use of the existing in-building chillers in the near term for providing redundancy in cooling capacity. Also provide necessary piping modifications in the immediate future to provide complete push-pull capability for each of the existing in-building chillers, with a combined capacity of at least 1,400 Tons.

2. Add two, 900 Ton chillers in the satellite plant, as in-building chillers reach the end of their useful life in the next 10-15 years. The satellite plant and the central plant would serve the same central campus loop and TES system(s). Operationally, the newer and more efficient chillers could serve as lead chillers, with the older chillers remaining as peaking or backup chillers as needed.

3. Subject to economics at the time of development, add TES capacity at the satellite plant location by an estimated 24,000 Ton Hours.

4. If building development continues as planned beyond the next 20-years, add another 900 Tons of cooling capacity at either the central plant or at the satellite plant.

For planning purposes, the study recommends a 28,000 GSF building space to accommodate the long term satellite plant vision. This area would include approximately 12,000 GSF of space for accommodating 1 MW of fuel cells.

It is recommended to conduct a detailed engineering study at each phase of the project to establish specific project scope, design parameters and budget estimates. For the immediate term, an engineering feasibility study is recommended to determine the scope of the initial configuration of the satellite plant that will provide the initial heating capacity requirement of 25 MMBtu/h. This study must also address cost comparison (a) converting all existing in-building chillers to serve as push-pull systems in their present location, or (b) relocate them to the new satellite plant, along with newer or relocated auxiliary equipment and cooling towers. In contemplation of a possible consideration of fuel cell technology at the campus, heat recovery systems can also be incorporated into such a plant concept. Also, specific infrastructure modifications required on the existing heating hot water loop needs to be established. At the minimum, it is recommended to design the loop to deliver the ultimate heating capacity of 62 MMBtu/h through a combination of the existing central plant and a future satellite plant.
1.0 MASTER PLAN IMPACT ON LOADS

1.1 Background

During September 2004, Digital Energy, Inc. had prepared a central plant evaluation study for the Cal State Northridge campus. This study included impact of long term heating and cooling capacity considerations based on the 2003 campus master plan which reflected a student enrollment of 25,000 FTE. Very recently, this master plan has been updated by AC Martin Partners, Inc. based on a revised FTE of 35,000 during the next 35-years. Accordingly, this document presents an updated assessment of long term loads and central plant capacity issues and recommends possible infrastructure development strategies for meeting long term loads.

1.2 Summary of Master Plan Related Campus Growth

Table -1 summarizes the latest (July 2005) campus master plan related building additions. The list is arranged in the chronological order, with Phase-1 shown first. Phase-1 represents development from 2005-2009, Phase-2 from 2010 to 2014, Phase-3 from 2015-2019, and Phase-4 represents the long term outlook from 2020-2035.

Key observations from this table are:

- A net of 1.36 million GSF of state-funded academic, administrative and support buildings are anticipated in the latest master plan. In addition, Non-State funded buildings planned total approximately 296,000 GSF.

- Considering that the total area of existing building connected to the central plant is approximately 2.4 million GSF, the master plan additions represent approximately 56%, over existing total area served.

- Phase-1 and 2, which together represent approximately 613,000 GSF could be developed in the next 10-years. Phase-3, which immediately follows thereafter involves an additional 288,000 GSF of state buildings. The total state building addition over the next 15-years is approximately 38% over existing GSF.

- Long term diversified cooling load will increase by approximately 2,468 Tons for State funded buildings. Likewise, heating load will increase by approximately 23 MMBtuh, and building electrical demand will increase by approximately 3.8 MW.

The following footnotes and assumptions apply to Table-1
All proposed additions total 1,553,430 GSF per the Master Plan for State Funded buildings.

Proposed additions total 364,600 GSF per the Master Plan for Non-State Funded buildings.

These are existing buildings that need to be demolished to accommodate new buildings. See Master Plan for details.

See definition of campus zone below in section 1.4 under the discussion of cooling demand.

The current observed Central Plant load is approximately 603 GSF/Ton (based on 3,990 Tons actual peak serving 2.41 million GSF). The projected diversified load at an average 60% diversity factor is equivalent to approximately 550 GSF/Ton.

The current observed central plant heating load is approximately 16 Btuh/sft. based on actual peaking load of 39 MMBth serving 2.41 million GSF. The projected diversified heating load at 80% diversity factor is approximately 16.7 Btuh/sft.

Based on typical trend of loads observed for similar buildings at the campus.

Detailed projection of cooling and heating demand are shown later in this section, with focus on expected future increases for each campus zone.
Table 1

Summary of Master Plan Building Additions and Load Estimates
Listed in Chronological Order

| Potential Building | Facility Type               | Phase | Campus Zone [b] | Potential use (Department/Programs) | NET STATE [SF] | NET NON-STATE [SF] | Best Estimate - Building peak Cooling Load (BTU/HR) | Central Plant Cooling Demand (MMBtu/h) Based on 80% Diversity - State Funded Only [d] | Central Plant Cooling Demand (MMBtu/h) Based on 80% Diversity - Non-State Funded Only [d] | Building Peak Heating Demand (MMBtu/h) @20Fubm/ft2 | Central Plant Heating Demand (MMBtu/h) Based on 80% Diversity - State Funded Only [d] | Central Plant Heating Demand (MMBtu/h) Based on 80% Diversity - Non-State Funded Only [d] | Building Electrical Demand without including chillers, at assumed diversified load of 2.84 watts/sf... Non-State |
|--------------------|----------------------------|-------|-----------------|-------------------------------------|----------------|-------------------|-----------------------------------------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| M                  | Office                     | 1     | SW              | Public Safety/Parking               | -              | 28,000            | 480 82 - 37 0.8 0.9 0.4 0                          | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| N                  | Food Service               | 1     | N               | Exchange Replacement               | 4,000          | 300 13 - - 0.1 0.9 0.1 0                          | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| O                  | Architecture               | 5     | SE              | Science 5 Building                 | 90,000         | 300 180 - - 1.8 1.4 0 256                          | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| P                  | Performing Arts Center     | 5     | S               | Performing Arts Center             | 97,800         | 8,000 243 243 1.3 2.8 2.6 278 188                 | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| S                  | Faculty offices, classrooms| 2     | SE              | Extended Learning, Health Center, Child Development | 49,000         | 350 141 85 - - 1.0 0.5 0.5 0                      | 141                                                                                | 0                                                                                     |                                                                                                               |                                                                                                        |
| Z                  | Classroom/office           | 2     | SE              | Extended Learning, Health Center, Child Development | 56,000         | 350 141 141 141 1.7 1.4 0 245                    | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| J                  | Infrastructure            | 2     | SE              | SANS, Communications, Humanities, general lecture | 140,000        | 300 400 240 - - 2.3 2.2 0 390                     | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| G                  | Classroom/office           | 2     | SE              | Athletics                            | 37,000         | 350 106 - - 0.7 0.5 0.5 0                        | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| R                  | Recreational               | 2     | SE              | Student Rec Center                  | -              | 125,000 350 543 - - 258 2.4 1.9 1                 | 0                                                                                   | 541                                                                                | 0                                                                                                               |                                                                                                        |
| U                  | Work areas                 | 2     | SE              | Science 6                           | 150,000        | 300 360 - - 3.0 2.4 0 450                         | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| V                  | Designing                 | 2     | SE              | Jim Clark/Alumni Center             | 24,000         | 300 85 - - 0.5 0 0.5 0                           | 0                                                                                   | 68                                                                                 | 0                                                                                                               |                                                                                                        |
| W                  | Library                    | 3     | N               | Library Expansion                  | -              | 105,050 350 117 - - 2.2 1.7 0 180                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| E1                 | Mathematics                | 3     | N               | Math                                | 15,000         | 300 23 - - 0.3 0 0.5 0                           | 0                                                                                   | 45                                                                                 | 0                                                                                                               |                                                                                                        |
| E2                 | Mathematics                | 3     | N               | Math                                | 16,000         | 400 26 - - 0.2 0 0.2 0                           | 0                                                                                   | 30                                                                                 | 0                                                                                                               |                                                                                                        |
| H1                 | Classroom/office, Science  | 3     | S               | North Hall, Science                | 72,000         | 350 206 123 - - 1.4 1.3 0 204                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| H2                 | Classroom/office, Science  | 3     | S               | North Hall, Science                | 5,000          | 300 15 - - 0.3 0 0.3 0                           | 0                                                                                   | 15                                                                                 | 0                                                                                                               |                                                                                                        |
| F                  | Classroom/office, Business | 3     | N               | Business/Economics, Engineering    | -              | 65,500 350 112 - - 1.3 1.2 0 188                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| K                  | Laboratory                 | 4     | S               | Lecture Lab                         | 69,345         | 50,000 145 87 - - 1.0 0.8 0 144                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| Y                  | Classroom/office, Lecture  | 4     | SE              | Laboratory, Lecture                | 49,528         | 46,072 350 132 - - 0.9 0.5 0.7 0                  | 0                                                                                   | 131                                                                                | 0                                                                                                               |                                                                                                        |
| L                  | Laboratory                 | 4     | SE              | Lecture Lab                         | 63,193         | 53,807 77 46 - - 0.5 0.4 0 76                    | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| G                  | Classroom/office, Lecture  | 4     | SE              | Lecture Lab                         | 55,000         | 350 157 84 - - 1.1 0.9 0 156                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| T                  | Classroom/office, Classroom| 4     | N               | Classroom/Office, Classroom         | -              | 350 111 67 - - 0.6 0.6 0 112                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| B                  | Classroom/office, Business | 4     | S               | Business/Economics, Administration | 106,000        | 350 308 185 - - 2.1 1.7 0 258                  | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| P                  | Classroom/office, Lecture  | 4     | SE              | Lecture Lab                         | -              | 165,116 116 - - 1.4 1.1 0 192                   | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| S                  | Classroom/office, Lecture  | 4     | S               | Lecture Lab                         | 109,000        | 350 209 185 - - 2.2 1.7 0 207                   | 0                                                                                   |                                                                                     |                                                                                                               |                                                                                                        |
| A                  | Not used                   | 3     | SE              | -                                    | -              | 800 17 17 - - 0.1 0 0.7 0                        | 31                                                                                 | 0                                                                                                               |                                                                                                        |
| X                  | See road utility section   | 3     | SE              | Potential Central Plant expansion   | -              | -                                                                                   | 4.767                                                                               | 2,465 669 22 23 0 3,872 041                                                           |                                                                                                               |                                                                                                        |
| TOTAL              |                            |       |                 |                                      |                |                                                                                   | 249,109 1,362,569 1,362,569 4.767 2,465 669 22 23 0 3,872 041 |                                                                                     |                                                                                                      |

<table>
<thead>
<tr>
<th>COIRRMSRs</th>
<th>HEATING MIRRUS</th>
<th>BLDG ELECTRIC DEMAND, EXCLUDING CHILLER PLANTS</th>
</tr>
</thead>
</table>
1.3 Long Term Geographical Distribution of Campus Buildings

The existing central plant at the campus is situated adjacent to Plummer street, which borders the northern segment of the core campus. Presently, 57% of the buildings served by the central plant are situated such that they can be served by the northern portion of the central loop. However, as shown in Table 2 below, this distribution could change noticeably with the full development of the master plan. Nearly 64% of the future building additions are proposed to be situated such that they would be served by the southern segment of the loop. This would shift the overall distribution of cooling and heating loads on the loop such that they are nearly the same for both the northern segment and the southern segment.

The shift has the following significance.

- Because the existing chilled water loop is oversized (20" at the northern segment, reducing to 14" at the southern segment), the increased long term demand placed on the southern segment is unlikely to have any significant impact on the ability of the loop to serve long term loads.

- However, the heating loop is not oversized. Rather, its size drops from 8" at the northern segment to only 4" at the southern segment. Therefore, increased load concentration along the southern segment will likely necessitate upsizing of the loop leading to and serving the southern portion.

Table – 2
Comparison of Future State Funded Building Distribution with Current Situation

<table>
<thead>
<tr>
<th></th>
<th>GSF</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Bldgs. South</td>
<td>1,030,446</td>
<td>43%</td>
</tr>
<tr>
<td>Current Bldgs. North</td>
<td>1,387,607</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td>GSF</td>
<td>%</td>
</tr>
<tr>
<td>New Additions - South</td>
<td>675,909</td>
<td>64%</td>
</tr>
<tr>
<td>New Additions - North</td>
<td>487,650</td>
<td>36%</td>
</tr>
<tr>
<td></td>
<td>GSF</td>
<td>%</td>
</tr>
<tr>
<td>Long Term campus - South</td>
<td>1,906,355</td>
<td>50.4%</td>
</tr>
<tr>
<td>Long Term campus - North</td>
<td>1,875,257</td>
<td>49.6%</td>
</tr>
</tbody>
</table>

1 Northern segment refers to all buildings north of Prairie and extending up to Halsted; Southern segment refers to all buildings from Nordhoff to Prairie. The North-east portion of the campus from Halsted to Devonshire, which is mainly used for parking lots, structures and residential facilities, is not considered in this study.
1.4 Impact on Cooling Demand

Figure 1 depicts the potential State funded growth in cooling demand based on the master plan building additions. Plotted are estimated diversified tons for each major campus geographical segment. The “+” on the legend indicates that each zone is superimposed on the previous. The sequence in which zone loads are superimposed is: west, east, north, and finally south. Thus, the last zone in the sequence shown (“south”) represents the aggregate campuswide load. The specific zone definitions are as follows.

North – Located between Prairie and Halstead along North-South and between Etiwanda and Lindley along East-West

South - Located between Nordhoff and Prairie along North-South and between Etiwanda and Lindley along East-West

Both the North and South regions are currently served by the existing central plant, at a historical observed peak diversified load of approximately 3,990 Tons.

East – Generally east of Lindley, an area currently not served by the existing central chilled water loop

West – Generally West of Etiwanda, an area currently not served by the existing central chilled water loop

Figure 1
A summary of the key observations from the above are:

- Key impact of the latest master plan (2005/35) is that the long term diversified cooling demand will increase by approximately 2,500 Tons.

- The West side growth is not likely to occur in the immediate future. Therefore, there is no short term need to plan for chilled water infrastructure in that zone. Long term estimates are that approximately 365 Tons of capacity will be needed in that zone.

- The East side however, will need to gear very soon up for approximately 750 Tons of cooling capacity in the next 8 years. Long term capacity addition in this zone is estimated to reach approximately 933 Tons.

- The next 8-years will generally impose greater cooling demand in the core part of the campus as evident from the above. Most buildings in the core part of the campus are currently served by the existing central plant. The combined North and South portions will see an added diversified demand of approximately 500 Tons in the next 8-years. Long term combined capacity addition in this zone is estimated at 1,170 Tons. More loading (~70% of this addition) is expected on the southern part, which is further away from the existing central plant. In the absence of additional thermal energy storage capacity, this would make it more difficult for the plant to offset low-peak chilled water demand. Therefore, average cost for production of chilled water will increase.

1.5 Impact on Heating Hot Water Demand

Figure 2 depicts the potential State funded growth in heating hot water demand based on the master plan building additions. Plotted are estimated diversified heating load (Output) for each major campus geographical segment. The superimposition sequence of zone loads and zone definitions are the same as that described previously under the discussion of cooling loads.
A summary of the key observations from the above are:

- Key impact of the latest master plan (2005/35) is that the long term diversified heating hot water demand will increase by approximately 23 MMBtuhs. The current peak load at the plant is approximately 39 MMBtuhs output. Therefore, the long term addition is a significant percentage of historical loads.

- The West side growth is not likely to occur in the immediate future. Therefore, there is no short term need to plan for heating system infrastructure in that zone. Long term estimates are that approximately 3.4 MMBtuhs of heating output capacity will be needed in that zone.

- The East side however, will need to gear very soon up for approximately 6 MMBtuhs of heating output capacity in the next 8 years. Long term capacity addition in this zone is estimated to reach approximately 8.1 MMBtuhs.

- The next 8-years will generally impose greater heating demand in the core part of the campus as evident from the above. Most buildings in the core part of the campus are currently served by the existing central plant. The combined north and south portions will see an added diversified demand of approximately 4.8 MMBtuhs in the next 8-years. Long term combined capacity addition in this zone is estimated at 11.3 MMBtuhs. More loading (~70% of this addition) is expected on the southern part, which is further away from the existing central plant. Currently, the campus has already experienced capacity limits in serving southern most portions of the heating loop.
1.6 Peak Cooling and Heating Load Profiles

Based on historical trends\(^2\), Figure 3 and Figure 4 present the typical peak cooling day and peak heating day load profiles respectively. The long term profiles are compared in these figures to existing load profiles. As shown, annual performance simulations considered a typical day, Saturday, and a Sunday for each month in a year. In addition, a cooling design day and a heating design day profiles were modeled, bringing the total number of load profiles to 38.

Peak day cooling demand is typically observed during late spring and early fall. Peak heating is generally observed during winter due to space heating requirement. Typically, low-peak cooling demand is approximately 70\% of the high-peak cooling demand.

\[\text{Fig 3. - Peak Cooling Demand (Tons)}\]

\[\begin{array}{c}
\text{Time} \\
0 & 2 & 4 & 6 & 8 & 10 & 12 & 14 & 16 & 18 & 20 & 22 & 24 \\
\end{array}\]

\[\begin{array}{c}
0 & 1,000.0 & 2,000.0 & 3,000.0 & 4,000.0 & 5,000.0 & 6,000.0 & 7,000.0 \\
\text{Current} & \\
\text{Master Plan} & \\
\end{array}\]

During September 2004, highest recorded central plant cooling load was 3,280 Tons at an OSA temperature of 95 degree F. July OSA temperatures peaked at 100 degree F during a late afternoon. However, due to low building occupancy, July cooling load was below 2,500 tons. Likewise, during an October early morning, recorded heating load peaked at 32 MMBtuh at an OSA temperature of 49 degree F. Higher loads at a January low temperature of 40 degree F were not recorded due to momentary instrumentation error. The current (year 2005) estimates of 3,900 Tons of peak cooling and 39 MMBtuh of peak heating loads are conservative extremes derived based on these recorded observations. Electronic files of recorded loads during 2004 are available at the campus central plant.

\(^2\) During September 2004, highest recorded central plant cooling load was 3,280 Tons at an OSA temperature of 95 degree F. July OSA temperatures peaked at 100 degree F during a late afternoon. However, due to low building occupancy, July cooling load was below 2,500 tons. Likewise, during an October early morning, recorded heating load peaked at 32 MMBtuh at an OSA temperature of 49 degree F. Higher loads at a January low temperature of 40 degree F were not recorded due to momentary instrumentation error. The current (year 2005) estimates of 3,900 Tons of peak cooling and 39 MMBtuh of peak heating loads are conservative extremes derived based on these recorded observations. Electronic files of recorded loads during 2004 are available at the campus central plant.
Fig. 4 - Peak Heating Demand (MMBtuh)
2.0 LONG TERM CAPACITY REQUIREMENT

2.1 Existing In-Building Chiller Capacity

Besides the three, 1,230 Ton York centrifugal chillers in the central plant, the campus has the following in-building chillers shown in Table 2.1 that could be potentially used to contribute to the central chilled water loop. Not counted in this table are small chillers dedicated for computer rooms campuswide.

Table 2.1
Capacity and Status of Campus In-Building Chillers

<table>
<thead>
<tr>
<th>Location</th>
<th>In-Building Chiller</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science-2</td>
<td>Trane Centravac, CVHE 710, 650 Nominal Tons, 4160 V, 60 Amp.</td>
<td>15-Years old. Currently is able to deliver capacity to the campus chilled water loop. Cooling tower is less than 5-years old.</td>
</tr>
<tr>
<td>Library</td>
<td>Trane Centravac, CVHE 450, Nominal 450 Tons, 460 V, 360 Amp York Millenium reciprocating chiller, 100 Tons, 460 V, 81 Amp. each of the two compressors</td>
<td>Approximately 18-years old. Pump and piping reconfiguration is needed to enable these chillers to deliver cooling capacity to the loop. The York chiller is normally used for off hours and winter time cooling of book retrieval area.</td>
</tr>
<tr>
<td>Speech &amp; Drama</td>
<td>Air cooled Reciprocatcing chiller, 150 Tons.</td>
<td>10-Years old. Pump and piping reconfiguration needed to enable the same to deliver capacity to the loop.</td>
</tr>
<tr>
<td>Jerome Richfield/Sierra Hall</td>
<td>170 Ton Screw Chiller</td>
<td>20-years old. Pump and piping reconfiguration needed to enable the same to deliver capacity to the loop.</td>
</tr>
</tbody>
</table>

Current practice is that the in-building chillers are generally operated mostly at part load for a short duration each day morning from building start-up to 10:00 AM, which represents commencement of the low-peak period. Chillers are programmatically disabled during both the low-peak and high-peak periods. This limited operation helps in minimizing the load on the larger central plant chillers and also assists the campus in exercising the old chillers, towers and pumps. Not including the Library chiller which is dedicated for book retrieval area, it is therefore possible to provide nearly 1,400 Tons of cooling capacity to the central loop using these in-building chillers.

2.2 Long Term Additions to Cooling and Heating Production Capacity

Table 2.2 summarizes the long term loads as discussed previously and compares the same to existing capacity available at the central plant and in some of the campus in-building mechanical rooms.
Table 2.2

Summary of Loads and Production Capacity

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling (Tons)</td>
<td>3,900</td>
<td>2,500</td>
<td>6,400</td>
<td>3,690</td>
<td>1400</td>
<td>5160</td>
</tr>
<tr>
<td>Heating (MMBtuh)</td>
<td>39</td>
<td>23</td>
<td>62</td>
<td>40</td>
<td>0</td>
<td>40</td>
</tr>
</tbody>
</table>

Key observations from the above are:

1. There is currently adequate redundancy in the chiller capacity, especially considering storage. Total installed chiller capacity including the backup in-building chillers is 33% over the observed peak load of 3,900 Tons. If available storage capacity is considered, redundancy is in excess of 33%.

2. Based on the master plan loads, a conservative estimate of additional cooling production capacity without considering the old in-building chillers or TES is approximately 2,710 Tons (6,400 – 3,690). Since long term represents the next 20-30 year window, the existing in-building chillers, which will be 30-50 years old in that time frame, has not been considered in deriving this additional capacity requirement.

3. The existing TES system provides capacity redundancy for short intervals on peak load days. For example, the existing 29,000 Ton Hour TES system can provide as much as 6,300 Tons over a 4 ½ hour period using two of the existing 4,000 GPM distribution pumps. Over a 10-hour average low peak and peak window, the existing TES can provide an average capacity of 2,900 Tons.

4. With the potential addition of 2,700 Tons of cooling capacity in the long run and the availability of 2,900 Tons hours of average capacity from the existing TES, overall cooling delivery capacity will have a 45% redundancy over the peak load of 6,400 Tons.

4. There is hardly any redundancy in the heating system capacity. Even under present load conditions, failure of one boiler will limit the heating system capacity to approximately 50% of current peak loads. The minimum required long term additional production capacity is 22 MMBtuh (62 – 40). However, if redundancy is desired, capacity may need to be augmented by a total of 40 MMBtuh of heating.

2.2 Long Term Additions to Chilled Water Storage (TES) Capacity

Per the LADWP rate structure, the high peak period has the highest demand charge at $8.52/kW for usage during 1:00 PM to 5:00 PM. The Low peak demand charge is approximately half, at $4.10/kW for usage during 8:00 AM to 11:00 AM and 5:00 PM to 8:00 PM. The energy charges for both the periods are nearly identical at approximately 5.7 cents/kWh.

---

3 Based on 19 degree F differential temperature across chilled water supply and return
Typically, average cooling demand during the low peak period is always lower (65-70%) than the average cooling demand during the high peak period. Because of considerable demand charges, there is an incentive to provide sufficient storage capacity such that chiller use can be completely avoided during both the high peak and low peak periods. Accordingly, Table 2.3 and Table 2.4 below provides an estimate of current and long term TES capacity requirements.

When the existing TES was originally installed, it served the campus as a full storage system with capability to completely shift both the high peak and low peak cooling loads to the base period. However, with the addition of approximately 0.6 million square feet of buildings to the loop over the last 5-6 years, TES system is currently unable to shift all of the low peak loads to the base period.

Table 2.3 identifies current shortfall in TES capacity, which makes it necessary to run the chillers on a limited basis during the low peak period on warm days. Table 2.3 provides similar estimates corresponding to the master plan loads. As shown, the existing TES capacity of 29,000 Ton Hours is adequate to shift all of the long term high peak loads. However, to shift both the high peak and low peak long term loads to the base period, it will be necessary to add an additional TES capacity of 24,000 Ton hours.

### Table 2.3

**Current Shortfall in TES Capacity Based on 2005 Loads**

<table>
<thead>
<tr>
<th></th>
<th>Tons</th>
<th>Hours</th>
<th>Total Period Load (Ton Hours)</th>
<th>Existing TES capacity (Ton Hrs)</th>
<th>Existing Shortfall in Storage (Ton Hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Peak</td>
<td>3900</td>
<td>4</td>
<td>15,600</td>
<td>15,600</td>
<td>-</td>
</tr>
<tr>
<td>Low Peak (70% of High peak)</td>
<td>2730</td>
<td>6</td>
<td>16,380</td>
<td>13,400</td>
<td>2,980</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>31,980</td>
<td>29,000</td>
<td>2,980</td>
</tr>
</tbody>
</table>

### Table 2.4

**Shortfall in TES Capacity Based on Master Plan**

<table>
<thead>
<tr>
<th></th>
<th>Tons</th>
<th>Hours</th>
<th>Total Period load (Ton Hours)</th>
<th>Existing TES capacity (Ton Hrs)</th>
<th>Added Capacity Required for Long term (Ton Hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Peak</td>
<td>6,400</td>
<td>4</td>
<td>25,600</td>
<td>25,600</td>
<td>-</td>
</tr>
<tr>
<td>Low Peak (70% of High peak)</td>
<td>4,480</td>
<td>6</td>
<td>26,880</td>
<td>3,400</td>
<td>23,480</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td>52,480</td>
<td>29,000</td>
<td>23,480</td>
</tr>
</tbody>
</table>
2.3 Non-State Building Loads

A factor that has not been considered in the load and capacity estimates presented in this document deals with potential cooling and heating loads in non-state buildings. Currently the central plant is used for serving state-funded buildings only. There are potentially many non-state buildings (both existing and new additions) representing a combined GSF of nearly 500,000 that could also be served by the central plant or future central plants on a recharge basis. Such considerations will require greater plant capacity additions than what is estimated above. For the purposes of site planning and space allocation, it is recommended in this document to consider the possibility that at some time in the future, central plant(s) could be potentially required to serve such loads on a recharge basis. Therefore, design flexibility must exist to expand capacity as necessary.
3.0 CENTRAL PLANT INFRASTRUCTURE STRATEGY

3.1 Capacity Objectives

The long term cooling and heating capacity objectives were identified in the previous section as follows for a total state building connected area of 3.7 million GSF (2.4 million GSF existing, plus 1.3 million GSF of future additions).

Cooling: 6,400 Tons of installed capacity (2,700 Tons over existing)
Heating: 62 MMBtuh of output capacity (42 MMBtuh over existing) + spare capacity
TES: 53,000 Ton Hours (24,000 Ton hrs over existing level of 29,000 Ton Hours)

This section presents a possible development strategy for providing the above capacity.

3.1 Basic Considerations/Constraints

The following presents some basic factors that were considered to evolve the long term infrastructure concept.

Space Restrictions

The existing central chiller plant which has now three chillers has been designed to accommodate another 1,250 Ton chiller. The condenser pump house with four pumps and the current four cell cooling tower are also designed to accommodate this added chiller. Adding this fourth chiller would therefore lower the existing condenser pumping system redundancy as well as cooling tower capacity redundancy. Additionally, there is no more room in the condenser pump house to accommodate additional pumps over and above the original design capacity. Therefore, to push the existing chiller plant to accommodate more capacity than the original design capacity of 5,000 Tons would entail locating one or two additional cooling tower cells and finding another spot to house the additional condenser pump(s). From a layout standpoint, it is less than an ideal situation to cram 6,200 Tons of cooling capacity in the existing central plant.

The area immediately surrounding the existing TES tank is used by the Physical Plant department for material storage and other department functions. It is not practical to house another TES above ground tank in the same property to provide an additional 24,000 Ton hours of chilled water storage. Below grade tanks could be considered, but have an associated penalty related to ease of long term maintenance and tank life.

These suggest that it is reasonable to conceptualize the need for a satellite plant to supplement the long term capacity of central plant cooling and heating systems.

Chiller and TES Adjacency Preferences

It is not necessary to have a TES system located immediately adjacent to a chiller plant. However, it will help in reducing the pumping power requirements when an adjacent location is possible. With an adjacent location, a single (primary) pump can be used to drive chilled water through the chiller and deliver it to the TES system. With a remote location for TES, it becomes necessary to have a primary pump for the chiller and a booster pump at the TES location to discharge the tank. Since it is conceivable that the campus could add TES capacity at a different location, it follows that it would be better to
plan such that the remote TES is located adjacent to supplemental chiller capacity to improve overall pumping system efficiency.

From the above logic, it follows that if a 24,000 Ton hour TES system in planned in the long run, it would be advantageous to consider a chiller capacity at that location that could charge that capacity in 10-12 hours. Therefore, it is entirely possible to conceptualize a satellite plant with 2, 900 Ton chillers designed to charge the TES at the satellite plant location.

Continued use of In-Building Chillers in Multiple Buildings

The existing in-building chillers are 10-18 years old. The largest of the two chillers at the Science and Library buildings are 15 years and 18 years old respectively. While they could be relied upon to serve as back-up for another 10 years, reliability beyond that time span will likely reduce. Also, each in-building chiller installation has its own set of auxiliary equipment such as towers, pumps, water treatment systems, refrigeration leak detection systems, etc. that need to be continuously inspected and serviced. Too many cooling towers also represent a maintenance burden. Therefore, the long term scenario of providing a substantial portion of cooling capacity using a combination of the existing central plant and one satellite plant is more appealing in comparison with continued use of older in-building chillers for ever.

Minimization of Facilities Demand Charges

The existing central plant is served by Sub-D, whose facilities demand charge is substantially resulting from the use of the central plant at night time (Base period). Currently, all three of the existing chillers operate at full load at night times to charge the TES system. Should a fourth chiller be added in this plant and operated at night time for charging a future additional TES tank, the highest facilities demand will exceed by a number corresponding to the capacity of the new chiller. However, if the same chiller capacity is provided at a satellite plant location and is served by a substation that is already servicing building loads (such as Sub-C, whose day time demand already exceeds 2 MW), the facilities demand resulting from added chiller use at night time will not increase. At current LADWP rates, the facilities demand charge is approximately $21,000 per MW of load per year.

Load Distribution Across the Campus

As mentioned previously, the load distribution of the central plant loop is such that 57% of the load is on the north side of the loop. However, with the proposed building additions per the master plan, the overall distribution will shift to a nearly a 50/50 split of the loads between the north and south portions of the loop. However, the loop is designed such that piping runs on the hot water side narrow down from 8” on the north side to only 4” pipe on the extreme south portion. Likewise, chilled water pipes narrow down in size from 20” on the north side to 14” on the extreme south portion. While the chilled pipe capacity appears reasonably sufficient, the heating loop capacity will need to be increased in view of the increased concentration of the loads on the south side of the campus. To minimize distribution energy requirements, it is also more energy efficient to distribute energy from a satellite plant located closer to the points of use on the south portion of the campus.
Future Fuel Cell Considerations

CSUN has always taken a proactive role in the integration of emerging renewable energy technologies as part of its central plant systems and energy supply diversity. The campus has already installed over 400 kW of photovoltaic systems and 180 kW of micro-turbines. It is conceivable that future efforts could focus on the installation of fuel cell based distributed generation systems also. The fuel cell units take considerable room and also impose a significant weight on the structure. For example, a 250 kW molten carbonate cell plant could weigh 90,000 lbs. A project as large as 1 MW in size could require an estimated 12,000 GSF of foot print. It is impossible to locate such a plant in the existing central plant. Consideration of a satellite plant gives the campus future flexibility in accommodating such a project at the satellite plant location.

Site Options

CSUN campus has an old boiler house, which is currently available as a possible satellite plant site. Both electric service and gas service to this location are already available. The only limitation is that this building area is situated right in the midst of other prominent academic buildings. Therefore, it is possible that the master plan may eye this space for a future academic building. One other site that has been identified as an option for a satellite plant is at the northwest side of Lot L-G2 on the master plan.

While the satellite plant concepts offers a number of merits based on the discussion presented above, the key hurdle in the concept deals with supporting the higher initial cost of providing the building and infrastructure necessary to support a plant of that type and complexity.

Flexibility to Accommodate Future Growth

Increasing student enrollment and proportionate increase in building growth is quite imminent at the CSUN campus. It is likely that both the central plant and the satellite plant will likely see demands higher than what is presently envisioned by the master plan. For example, a decision to serve the non-state funded buildings could add nearly 500,000 GSF of buildings to the load. The preparedness to consider a satellite plant now gives the campus an opportunity to reserve a site and increased flexibility at a future time to efficiently accommodate such load increases between the existing central plant and the new satellite plant.

Heating System Redundancy and Low Load Handling Capability

Operational experience indicates that the existing boilers are not ideally suited for handling very low loads which can be less than 15-20% of the rated boiler capacity. Rather than utilize the third boiler space for another 20 MMBtuh boiler, it may be more appropriate to consider installation of a smaller boiler rated at 10 MMBtuh output capacity. This strategy could (a) provide partial redundancy, and (b) allow the plant to handle low heating loads better than how they can be handled by the larger boiler. So long as this capacity is reserved for the purposes of serving as spare or for low load handling, there is no need to boost the pumping capacity or the header pipe sizes at the central plant.
3.2 Recommended Development Strategy

Based on a need to accommodate long term chiller capacity, boiler capacity, possibly storage capacity, and make provision for approximately 1 MW of fuel cell power generation, a 28,000 GSF plant satellite building may be needed as shown in the preliminary layout presented in Figure 5. The suggested phases of development are described below. Figure 6 and Figure 7 show the new state funded buildings in relation to the existing chilled water and hot water loops. Figure 8 shows the proposed addition of a small boiler to the existing boiler room area in the central plant.

The proposed layout is based on the following assumptions.

1. A single storey structure is considered for preliminary layout estimates.
2. Boiler room capacity is provided for accommodating two boilers, one sized at 25 MMBtuh output and the other sized at 10 MMBtuh.
3. Chiller room is assumed to have space to accommodate 3, 900 Ton chillers. If a decision is made to provide part of the future additional chiller capacity at the existing central plant, space required herein at the satellite plant will be reduced by that extent.
4. The fuel cell area is assumed to house four, Phosphoric acid fuel cell banks (200 kW each). The same layout could also accommodate a molten carbonate cell type of fuel cell (250 kW each). However, the heat recovery systems would need to be rearranged.
5. Each fuel cell unit is assumed to require its own radiator/cooler for dissipating part of the low grade heat that can not be converted to heating hot water required for the campus.
6. A common bay of nitrogen tanks are assumed for fuel cell purging requirements.
7. Each chiller is assumed to require its own cooling tower cell.
8. All electrical switchgear and transformers are situated at one side of the building whereas the towers and coolers are situated on the other side of the building.
9. Potential chilled water tank additions are shown as two cylindrical tanks. These could take other forms, including below grade rectangular tanks.
10. Minimal office and storage areas are assumed as part of the overall plant as shown.
Figure 5
Possible Satellite Plant Layout Concept Through Year 2035 – (1 MW Fuel cell; 3, 900 Ton chillers, 2 boilers)

BUILDING AREA = 28,144 sf.  SITE AREA = 66,782 sf.  FUEL CELL AREA = 11,818 sf.

LEGEND:
1. CHILLER
2. PUMPS
3. EXPANSION TANK
4. CHEMICAL INJECTION TANK
5. BOILER
6. CHILLED WATER STORAGE TANK
7. PHOSPHORIC ACID
8. HEAT EXCHANGER
9. MCC
10. TRANSFORMER
11. COOLING TOWER
12. COOLER FOR FUEL CELLS
Figure 7

<table>
<thead>
<tr>
<th>BLDG. NO.</th>
<th>BUILDING NAME</th>
<th>GSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B Education/Administration, student services</td>
<td>190,000</td>
</tr>
<tr>
<td>B</td>
<td>C Lecture/student services</td>
<td>100,000</td>
</tr>
<tr>
<td>C</td>
<td>D (AV)</td>
<td>15,000</td>
</tr>
<tr>
<td>D</td>
<td>E1 (AV) or Eng, high bay or Athletics offices</td>
<td>18,500</td>
</tr>
<tr>
<td>E</td>
<td>E2 (AV) or Eng, high bay or Athletics offices</td>
<td>18,500</td>
</tr>
<tr>
<td>F</td>
<td>F Business/Economics or Engineering</td>
<td>75,000</td>
</tr>
<tr>
<td>G</td>
<td>G Classroom/Office</td>
<td>92,000</td>
</tr>
<tr>
<td>H1</td>
<td>H1 (Norloff Hall Exp.)</td>
<td>72,000</td>
</tr>
<tr>
<td>H2</td>
<td>H2 (Norloff Hall Exp.)</td>
<td>5,300</td>
</tr>
<tr>
<td>I</td>
<td>I Library Expansion</td>
<td>109,050</td>
</tr>
<tr>
<td>J</td>
<td>J EAB, Communication, Humanities, general lecture</td>
<td>140,000</td>
</tr>
<tr>
<td>K</td>
<td>K (Lecture, lab)</td>
<td>120,000</td>
</tr>
<tr>
<td>L</td>
<td>L (Lecture, lab)</td>
<td>120,000</td>
</tr>
</tbody>
</table>

LEGEND:
- Existing Buildings
- Proposed New Buildings
- Existing Piping
- Proposed Piping

<table>
<thead>
<tr>
<th>BLDG. NO.</th>
<th>BUILDING NAME</th>
<th>GSF</th>
</tr>
</thead>
<tbody>
<tr>
<td>O</td>
<td>O Performing Arts Center</td>
<td>163,080</td>
</tr>
<tr>
<td>P</td>
<td>P Kinesthetics</td>
<td>67,600</td>
</tr>
<tr>
<td>S</td>
<td>S Faculty Office</td>
<td>65,500</td>
</tr>
<tr>
<td>T</td>
<td>T Marzotto adjacent</td>
<td>66,780</td>
</tr>
<tr>
<td>U</td>
<td>U (Science)</td>
<td>100,000</td>
</tr>
<tr>
<td>V</td>
<td>V Science 5 Building</td>
<td>90,000</td>
</tr>
<tr>
<td>X</td>
<td>X South Campus Central Plant Expansion</td>
<td>10,000</td>
</tr>
<tr>
<td>Z</td>
<td>Z Extended Learning, Health Center, Child Development</td>
<td>86,400</td>
</tr>
</tbody>
</table>
Figure 8

Proposed Long Term Addition of a Small Boiler to Existing Boiler Room at Central Plant

PROPOSED BOILER ROOM LAYOUT
3.3 Development Phases

Development timeline must consider the lead time involved in building the required capacity as well as the planned development timeline for the new buildings. Based on the load growth presented earlier in Figure 1 and Figure 2, the following phasing may be considered.

It must be recognized that during a substantial portion of the year, cooling loads are lower than the installed capacity in most chiller plants. Therefore, it is to be expected that the added chiller capacity is used minimally, mainly during peak load days and for back-up duty when one or more of the base loaded chillers are down for maintenance. Because the satellite plant and the central plant will be serving the same loop, operational strategy would always attempt to run the most efficient chillers first, with the older chillers intended for peaking/backup function.

The phasing concept below shown below in Table 3.1 assumes dependence on the present in-building chillers for the immediate term, followed by a gradual migration to a satellite plant Option as campus loads increase and existing in-building chillers become older and less reliable. Note that under the proposed phasing plan, the decision to build out existing plant fully or to provide all of the additional capacity in the satellite plant can be deferred until 2021.
### Table 3.1

**Infrastructure Development Strategy**

<table>
<thead>
<tr>
<th></th>
<th>Phase-1</th>
<th>Phase-2</th>
<th>Phase-3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Begin design</strong></td>
<td>2006</td>
<td>2011</td>
<td>2021</td>
</tr>
<tr>
<td><strong>End construction</strong></td>
<td>2010</td>
<td>2015</td>
<td>2025</td>
</tr>
</tbody>
</table>

**Suggested infrastructure development strategy**

- Reserve foot print for eventual build out of the satellite plant based on largest foot print (Option-3, approx. 28,000 GSF[^4] of building and 67,000 square feet site)
- Upgrade heating loop at south campus based on meeting long term flow in southern segment of the campus
- Extend cooling loop or provide branch lines as required to serve new buildings
- Start with a small satellite plant foot print to house a new 25 MMBtuh output boiler and heating distribution pumps as well as TES pumps. Connect the satellite plant to the central plant loop.
- If economics support, provide a TES system at the satellite plant with an initial capacity of 12,500 Ton Hours. Provide space for future addition.
- Relocate the existing in-building chillers to the satellite plant or deploy all of them fully in their respective existing locations as push-pull systems to provide approximately 1,400 Tons of "virtual satellite" plant capacity
- With in-building chillers mostly 20-years or older, consider replacing the same with 2, new chillers, each rated at 900 Tons at the satellite plant. Run the newer chiller as the lead chiller, with older chillers serving as backup/peaking.
- Use satellite plant chillers to serve satellite TES capacity, if added by that time
- Provide a 10 MMBtuh boiler at the central plant for low load handling and for long term redundancy
- Expand cooling and heating loops to cover new buildings
- Provide an additional 900 Tons of cooling in the satellite plant for redundancy or expand the existing central plant by providing a new chiller at 1,250 Tons. Run newer chillers as lead chillers for meeting overall campus loads.
- Provide an additional 900 Tons of cooling in the satellite plant for redundancy or expand the existing central plant by providing a new chiller at 1,250 Tons. Run newer chillers as lead chillers for meeting overall campus loads.
- Augment TES capacity at the satellite plant by an additional 12,500 Ton Hours, subject to economics.
- Provide an additional 10 MMBtuh boiler at the satellite plant for enhanced redundancy of heating system.
- By the end of this phase, campuswide chiller capacity would be 6,400 Tons; heating installed capacity would be 80 MMBtuh (with 20 MMBtuh as spare), and TES capacity would be 54,000 Ton Hours for full shift of high peak and low peak cooling loads.

[^4]: Fuel cell related area is approximately 12,000 GSF
3.6 Impact of Proposed Phasing on Redundancy

Table 3.2 and Table 3.3 below present estimates of heating system and cooling system capacity redundancy associated with the proposed phasing plan. As shown, if implemented as recommended, long term cooling capacity redundancy is a minimum of 45% even without the proposed additional TES capacity. Likewise, addition of boiler capacity as shown will achieve a heating capacity redundancy of a minimum of 37% in the long run.

### Table 3.2

Estimation of Heating System Redundancy

<table>
<thead>
<tr>
<th>Phase</th>
<th>Current</th>
<th>Phase-1</th>
<th>Phase-2</th>
<th>Phase-3</th>
<th>Phase-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year (End of Phase)</td>
<td>2005</td>
<td>2010</td>
<td>2015</td>
<td>2025</td>
<td>2035</td>
</tr>
<tr>
<td>Heating Load (MMBtuh)</td>
<td>39</td>
<td>44</td>
<td>52</td>
<td>59</td>
<td>62</td>
</tr>
<tr>
<td>Age of existing central plant</td>
<td>6 yrs.</td>
<td>11 yrs.</td>
<td>16 yrs.</td>
<td>21 yrs.</td>
<td>31 yrs.</td>
</tr>
<tr>
<td>New boilers added to Satellite plant (MMBtuh)</td>
<td>25</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New boilers added to existing central plant (MMBtuh)</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proposed total heating capacity added (MMBtuh)</td>
<td>25</td>
<td>35</td>
<td>35</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Central plant capacity (MMBtuh) [2]</td>
<td>40</td>
<td>40</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Satellite Plant capacity (MMBtuh)</td>
<td>0</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>35</td>
</tr>
<tr>
<td>Total Capacity Available (MMBtuh)</td>
<td>40</td>
<td>65</td>
<td>75</td>
<td>75</td>
<td>85</td>
</tr>
<tr>
<td>% Redundancy [1]</td>
<td>3%</td>
<td>48%</td>
<td>44%</td>
<td>27%</td>
<td>37%</td>
</tr>
</tbody>
</table>

[1] Redundancy is calculated as % by which average delivery capacity exceeds peak load

[2] Not counted is the small heating capacity (< 2 MMBtuh) available from the Capstone micro-turbines.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Current</th>
<th>Phase-1</th>
<th>Phase-2</th>
<th>Phase-3</th>
<th>Phase-4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year (End of Phase)</strong></td>
<td>2005</td>
<td>2010</td>
<td>2015</td>
<td>2025</td>
<td>2035</td>
</tr>
<tr>
<td><strong>Cooling Load (Tons)</strong></td>
<td>3900</td>
<td>4400</td>
<td>5400</td>
<td>5900</td>
<td>6400</td>
</tr>
<tr>
<td><strong>Age of in-building chillers</strong></td>
<td>10-15 yrs</td>
<td>15-20 yrs</td>
<td>20-25 yrs</td>
<td>30-35 yrs</td>
<td>40-45 yrs</td>
</tr>
<tr>
<td><strong>Age of existing central plant</strong></td>
<td>6 yrs</td>
<td>11 yrs</td>
<td>16 yrs</td>
<td>21 yrs</td>
<td>31 yrs</td>
</tr>
<tr>
<td><strong>New chillers added (Tons)</strong></td>
<td>0</td>
<td>1800</td>
<td>900</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Proposed total cooling capacity added (Tons)</strong></td>
<td>None</td>
<td>1800</td>
<td>2700</td>
<td>2700</td>
<td></td>
</tr>
<tr>
<td><strong>In-Building chiller capacity [1]</strong></td>
<td>1,450</td>
<td>1,450</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Central plant capacity (Tons)</strong></td>
<td>3690</td>
<td>3690</td>
<td>3690</td>
<td>3690</td>
<td>3690</td>
</tr>
<tr>
<td><strong>Satellite Plant capacity (Tons) [2]</strong></td>
<td>0</td>
<td>0</td>
<td>1800</td>
<td>2700</td>
<td>2700</td>
</tr>
<tr>
<td><strong>TES capacity (Ton Hrs)</strong></td>
<td>29000</td>
<td>29000</td>
<td>29000</td>
<td>29000</td>
<td>29000</td>
</tr>
<tr>
<td><strong>Average TES capacity during High Peak and Low peak (10-hrs.)</strong></td>
<td>2900</td>
<td>2900</td>
<td>2900</td>
<td>2900</td>
<td>2900</td>
</tr>
<tr>
<td><strong>Total Capacity Available (Tons)</strong></td>
<td>8040</td>
<td>8040</td>
<td>8390</td>
<td>9290</td>
<td>9290</td>
</tr>
<tr>
<td><strong>% Redundancy, including original TES and in-building chillers [3]</strong></td>
<td>106%</td>
<td>83%</td>
<td>55%</td>
<td>57%</td>
<td>45%</td>
</tr>
<tr>
<td><strong>Increased Redundancy with added 12,000 Ton Hr. TES</strong></td>
<td>64%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Increased Redundancy with added 24,000 Ton Hr. TES</strong></td>
<td>83%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[1] Only counted until the satellite plant is provided with new chillers
[2] New chillers in the satellite plant could serve as primary; with older central plant chillers serving as back-up or lag chillers
[3] Redundancy is calculated as % by which average delivery capacity exceeds peak load
3.7 Annual Cost Comparison

The existing TES system is large enough to provide high peak and low peak and storage capacity on most moderate load days. It is only during a very small part of the year (late spring, summer and early fall) when one can expect the TES to be limited in capacity in relation to the loads. Therefore, the incremental financial savings associated with adding new TES capacity is not as high as the savings associated with the original 29,000 Ton Hour TES system.

These are illustrated in the following Table 3.5, along with detailed performance estimates. A summary of TES related savings is provided below in Table 3.4.

Table 3.4
Summary of TES Related Cost Savings

<table>
<thead>
<tr>
<th>TES Related Project Savings</th>
<th>Cost Savings ($)</th>
<th>$/Ton Hr. Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ Saved by existing 29,000 Ton Hr. TES, under existing loads</td>
<td>$223,570</td>
<td>$7.7</td>
</tr>
<tr>
<td>$ Saved by Additional 12,000 Ton Hr/ TES under 30% increase in loads</td>
<td>$5,966</td>
<td>$0.5</td>
</tr>
<tr>
<td>$ Saved by Additional 24,000 Ton Hr. TES under 60% increase in loads</td>
<td>$40,289</td>
<td>$1.7</td>
</tr>
</tbody>
</table>
### Table 3.5
Summary of Performance Simulations

<table>
<thead>
<tr>
<th></th>
<th>Current Loads</th>
<th>Current Load</th>
<th>+ 30% Increase in Loads</th>
<th>+ 30% Loads + Add 12,000 Ton Hr TES</th>
<th>+ 60% Increase in Loads</th>
<th>+60% Loads, Add another 12,000 Ton Hr TES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Charges ($)</td>
<td>$228,442</td>
<td>$178,454</td>
<td>$225,979</td>
<td>$229,487</td>
<td>$277,271</td>
<td>$262,037</td>
</tr>
<tr>
<td>Monthly Time of Day Demand Changes ($)</td>
<td>$204,702</td>
<td>$34,249</td>
<td>$44,572</td>
<td>$36,970</td>
<td>$71,486</td>
<td>$28,026</td>
</tr>
<tr>
<td>Facilities Related Demand ($)</td>
<td>$57,821</td>
<td>$53,691</td>
<td>$53,905</td>
<td>$61,033</td>
<td>$54,073</td>
<td>$61,067</td>
</tr>
<tr>
<td>Net Electricity Charges ($)</td>
<td>$430,954</td>
<td>$267,395</td>
<td>$324,456</td>
<td>$318,498</td>
<td>$402,029</td>
<td>$362,540</td>
</tr>
<tr>
<td>Fuel Charges ($) - Boiler</td>
<td>$298,792</td>
<td>$298,792</td>
<td>$288,450</td>
<td>$268,430</td>
<td>$478,068</td>
<td>$478,068</td>
</tr>
<tr>
<td><strong>TOTAL ENERGY COST</strong> (2009 $)/Year</td>
<td><strong>$789,757</strong></td>
<td><strong>$566,187</strong></td>
<td><strong>$712,886</strong></td>
<td><strong>$706,920</strong></td>
<td><strong>$880,897</strong></td>
<td><strong>$840,068</strong></td>
</tr>
<tr>
<td>Facilities Related Demand (kW)</td>
<td>2,692</td>
<td>2,590</td>
<td>2,519</td>
<td>2,841</td>
<td>2,517</td>
<td>2,871</td>
</tr>
<tr>
<td><strong>Purchase Summary:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-Month Sum of High peak kW</td>
<td>16,870</td>
<td>785</td>
<td>892</td>
<td>892</td>
<td>1,067</td>
<td>962</td>
</tr>
<tr>
<td>12-Month Sum of Low Peak kW</td>
<td>12,241</td>
<td>1,125</td>
<td>3,434</td>
<td>796</td>
<td>9,198</td>
<td>991</td>
</tr>
<tr>
<td>12-Month of Base Demand</td>
<td>6,004</td>
<td>29,747</td>
<td>29,875</td>
<td>33,851</td>
<td>29,936</td>
<td>33,957</td>
</tr>
<tr>
<td>12-Month Sum of High peak KWH</td>
<td>1,497,288</td>
<td>60,027</td>
<td>67,967</td>
<td>67,967</td>
<td>96,554</td>
<td>74,067</td>
</tr>
<tr>
<td>12-Month Sum of Low Peak KWH</td>
<td>1,190,283</td>
<td>198,117</td>
<td>375,104</td>
<td>389,159</td>
<td>871,017</td>
<td>92,168</td>
</tr>
<tr>
<td>12-Month of Base KWH</td>
<td>1,659,276</td>
<td>3,752,582</td>
<td>4,434,291</td>
<td>4,664,825</td>
<td>4,990,184</td>
<td>5,598,260</td>
</tr>
<tr>
<td><strong>PERFORMANCE Highlights</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling Load (Tons)</td>
<td>4,627,148</td>
<td>4,627,148</td>
<td>6,015,293</td>
<td>6,015,293</td>
<td>7,403,437</td>
<td>7,403,437</td>
</tr>
<tr>
<td>Building Heating Load (MMBFt)</td>
<td>33,294</td>
<td>33,294</td>
<td>43,282</td>
<td>43,282</td>
<td>53,270</td>
<td>53,270</td>
</tr>
<tr>
<td>Building Electric Load (kW) - (Not considered)</td>
<td>4,336,849</td>
<td>3,921,227</td>
<td>4,877,363</td>
<td>4,833,242</td>
<td>5,960,767</td>
<td>5,764,483</td>
</tr>
<tr>
<td>TES Charge Volume (Tons)</td>
<td>3,328,625</td>
<td>3,999,646</td>
<td>4,365,145</td>
<td>4,449,666</td>
<td>5,372,486</td>
<td>5,372,486</td>
</tr>
<tr>
<td>TES Discharge Volume, Mid Peak (Tons)</td>
<td>-</td>
<td>1,459,244</td>
<td>1,459,244</td>
<td>1,459,244</td>
<td>1,310,310</td>
<td>1,254,963</td>
</tr>
<tr>
<td>Chiller Production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiller Production - High peak</td>
<td>1,947,785</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>24,948</td>
<td>-</td>
</tr>
<tr>
<td>Chiller Production - Low Peak</td>
<td>1,936,786</td>
<td>32,681</td>
<td>365,581</td>
<td>-</td>
<td>918,723</td>
<td>-</td>
</tr>
<tr>
<td>Chiller Production - Base</td>
<td>1,269,247</td>
<td>4,597,989</td>
<td>5,649,711</td>
<td>5,615,293</td>
<td>6,480,817</td>
<td>7,403,437</td>
</tr>
<tr>
<td>Total Chiller Production (Tons)</td>
<td>4,627,148</td>
<td>4,630,830</td>
<td>6,015,293</td>
<td>6,015,293</td>
<td>7,403,134</td>
<td>7,403,437</td>
</tr>
<tr>
<td>Production - 1</td>
<td>3,696,672</td>
<td>2,416,569</td>
<td>3,219,628</td>
<td>2,917,922</td>
<td>3,894,594</td>
<td>3,284,440</td>
</tr>
<tr>
<td>Production - 2</td>
<td>776,780</td>
<td>1,158,918</td>
<td>1,484,576</td>
<td>1,423,490</td>
<td>1,990,595</td>
<td>1,936,051</td>
</tr>
<tr>
<td>Production - 3</td>
<td>240,466</td>
<td>1,054,952</td>
<td>1,329,097</td>
<td>1,284,729</td>
<td>1,530,314</td>
<td>1,639,641</td>
</tr>
<tr>
<td>Production - 4</td>
<td></td>
<td>459,342</td>
<td>459,342</td>
<td></td>
<td>643,965</td>
<td></td>
</tr>
<tr>
<td>Production - 5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Production - 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Production - 7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
3.8 Recommendations

Based on consideration of long term campus loads, the capacity of the existing plant systems, and reasonable redundancy requirements, this study makes the following recommendations related to heating and cooling systems.

1. It is reasonable to conceptualize a satellite plant for providing long term flexibility to the campus to provide the needed cooling and heating capacity that can not be satisfied by the existing central plant. A phased build out is the recommended approach for developing such a satellite plant. This study recommends consideration of three phases.

2. Due to the nature of cooling loads that peak only during a small fraction of the year, no new chiller capacity is recommended in the short term (Phase-1) as part of the proposed phased build out approach. Existing in-building chillers (with a combined capacity of 1,400 Tons) can be used to provide the desired peaking capacity on those days when loads exceed existing plant capacity. For convenience in operations and maintenance, these chillers could be moved to the satellite plant. As part of Phase-1, a 25 MMBtuh boiler may be provided in the satellite plant.

3. For improved low load handing, consider adding a small, 10 MMBtuh boiler in the existing central plant, with its associated pump.

4. Under the proposed phasing plan, it is recommended that if the existing in-building chillers reach the end of their useful life in the next 10-15 years (Phase-2), they be replaced by new chillers. Based on load distribution and sub station loads, it may be cost beneficial to provide the required capacity at the satellite plant as opposed to adding a chiller at the central plant. In the recommended scheme, two, 900 Ton chillers could be added to the satellite plant in Phase-2.

5. For the purposes of site selection, it is recommended to estimate area and footprint requirements based on a full build out capacity (Phase-3) involving 2,700 Tons of cooling and 35 MMBtuh of heating and 1 MW of fuel cell generated power. Based on preliminary layout considerations, such a building is estimated to be approximately 28,000 GSF of which, 12,000 GSF is for accommodating 1 MW of fuel cells. Excluding parking, site area would be approximately 67,000 square feet for a 1-storey building.

6. A feasibility study is the recommended next step to determine the initial configuration of the satellite plant that will provide the initial heating capacity requirement of 25 MMBtuh. This study must also address cost comparison of (a) converting all existing in-building chillers to serve as push-pull systems in their present location, or (b) relocate them to the new satellite plant, along with newer or relocated auxiliary equipment and cooling towers. Also, specific infrastructure modifications required on the existing heating hot water loop needs to be established. At the minimum, it is recommended to design the loop to deliver the ultimate heating capacity of 62 MMBtuh. Furthermore, in contemplation of a possible consideration of fuel cell technology at the campus, heat recovery systems can also be incorporated into such a plant concept.

7. The incremental benefits of adding more TES capacity is marginal in relation to the cost of the TES system. During most moderate load conditions, the existing TES capacity is adequate to provide part of the capacity. However, it can be pursued if the campus has a desire to offset all low peak and high peak chiller usage under extreme load conditions.
8. The satellite plant development (with TES) must incorporate power source selection strategies that would avoid the expensive facility related demand charges associated with chiller system operation. This can be accomplished by serving the plant from a substation that is already meeting comparable or higher building loads during day time.