



**P H A S E 1**





**Fig. 6.1**  
Phase 1: Approach to  
Academic Core, with the  
Library and Library Grove  
Beyond

## PHASE 1

The land use and circulation plans described in the previous pages establish a framework for the full development of the UC Merced campus. This chapter describes the first phase of development. The character of the campus and its circulation and utilities networks will be established by the layout of Phase 1.

### Site Description

The site of Phase 1 is a portion of an existing golf course that was built at the southwest corner of the Virginia Smith Trust lands in 1994. The Phase 1 project has been designed on the existing golf course site to avoid wetlands and special status species. The site is bounded on the north by the fence enclosing the undeveloped grazing lands of the Trust and County land, and on the south by an irregular line, which is located outside of the watershed of existing vernal pools and swales. This creates a buffer between the Phase 1 development and wetlands resources. Approximately half of the existing golf course is available for development in Phase 1. The Fairfield Canal bisects the site and demarcates a change in elevation of about 30 feet between the south and north portions of the site. The lower portion contains a small lake that serves as a water feature in the existing golf course.

## Establishing a Sense of Place

While the constraints of Phase 1 require that the campus begin in one corner of the Main Campus site, its layout provides for the creation of a sense of place and completeness on opening day. The location of streets and major buildings is intended to make a seamless transition to subsequent phases as the campus grows.

The primary access to the campus in the future will be on University Drive from the extension of the Campus Parkway (See Figure 4.22). Initial access to the campus will be from Lake Road. Visitors, cyclists, and commuting students will enter on Main Street. A second entry, corresponding to the existing golf course entry, will be used by construction and service vehicles and access to faculty parking. The visitor entry will be clearly marked at Lake Road, and commuter parking near the entry will be screened by berms and heavy landscaping (Figure 6.4). Landscaping selected for spring and fall color will highlight the curve of Main Street as a visitor passes the first campus housing and turns toward the Academic Core (Figure 6.2).

Main Street will continue past the small existing lake (Figure 6.5) and across the Fairfield Canal (Figure 6.1). Visitors in cars will park to the left of the library. Main Street will continue as a pedestrian enclave at this point (Figure 6.3). The character of Main Street will be established from the beginning by distinctive planters and groupings of trees. (Compare Figure 5.7 which shows Main Street in front of the Phase 1 Classroom Building with Figure 5.8, which shows the future Main Street at the “social heart”). As part of Phase 1, the Library Grove will anchor this end of Main Street (See Figure 5.31) just as the Old Barn Park will eventually anchor the other end at some point in the future.

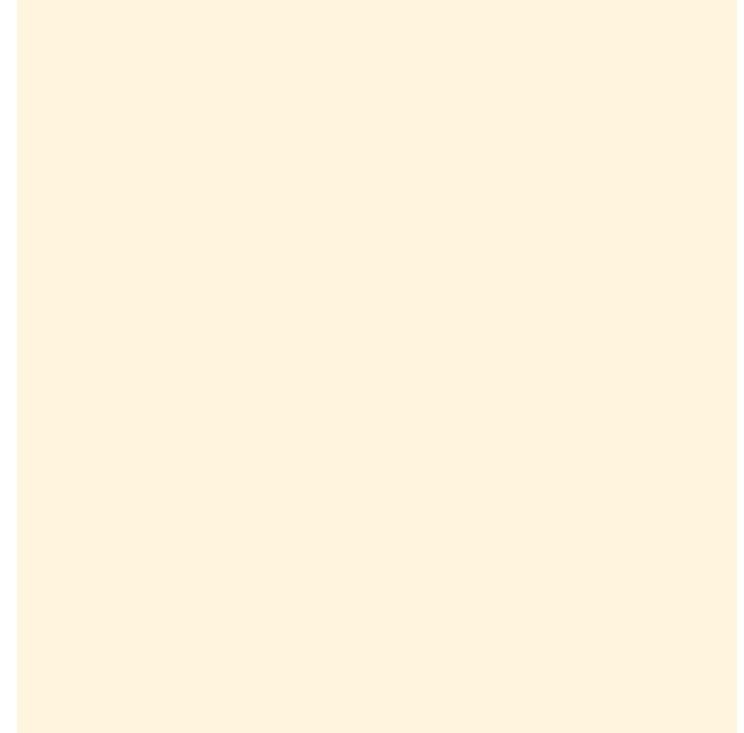
**Fig. 6.2** (left)  
Main Street at Phase 1  
Adjacent to Housing  
Looking East



**Fig. 6.3** (right)  
Main Street at Beginning  
of Pedestrian Zone



**Fig. 6.4**  
Phase 1 Entry  
from Lake Road



### Program for Phase 1

Phase 1 will accommodate all the buildings needed for the campus from opening day in 2004 to the 2007/08 school year. It is anticipated that permits for development outside the Phase 1 area will become available no later than 2004. Thus parking and construction of most complex building facilities needed after 2007/08 will be outside the Phase 1 site.

On opening day 2004, the campus will consist of the following elements (square footage figures are approximate and subject to final design):

- A library/information technology center of 120,000 assignable square feet. This facility will also include campus administrative offices and student services.
- A science and engineering building of 100,000 assignable square feet. This facility will accommodate the Divisions of Engineering and Natural Sciences and will incorporate teaching and research laboratories and faculty offices for both divisions.
- A classroom building of 60,000 assignable square feet. This facility will accommodate the Division of Social Sciences, Humanities and Arts and will include small and large classrooms for the entire campus and faculty offices.

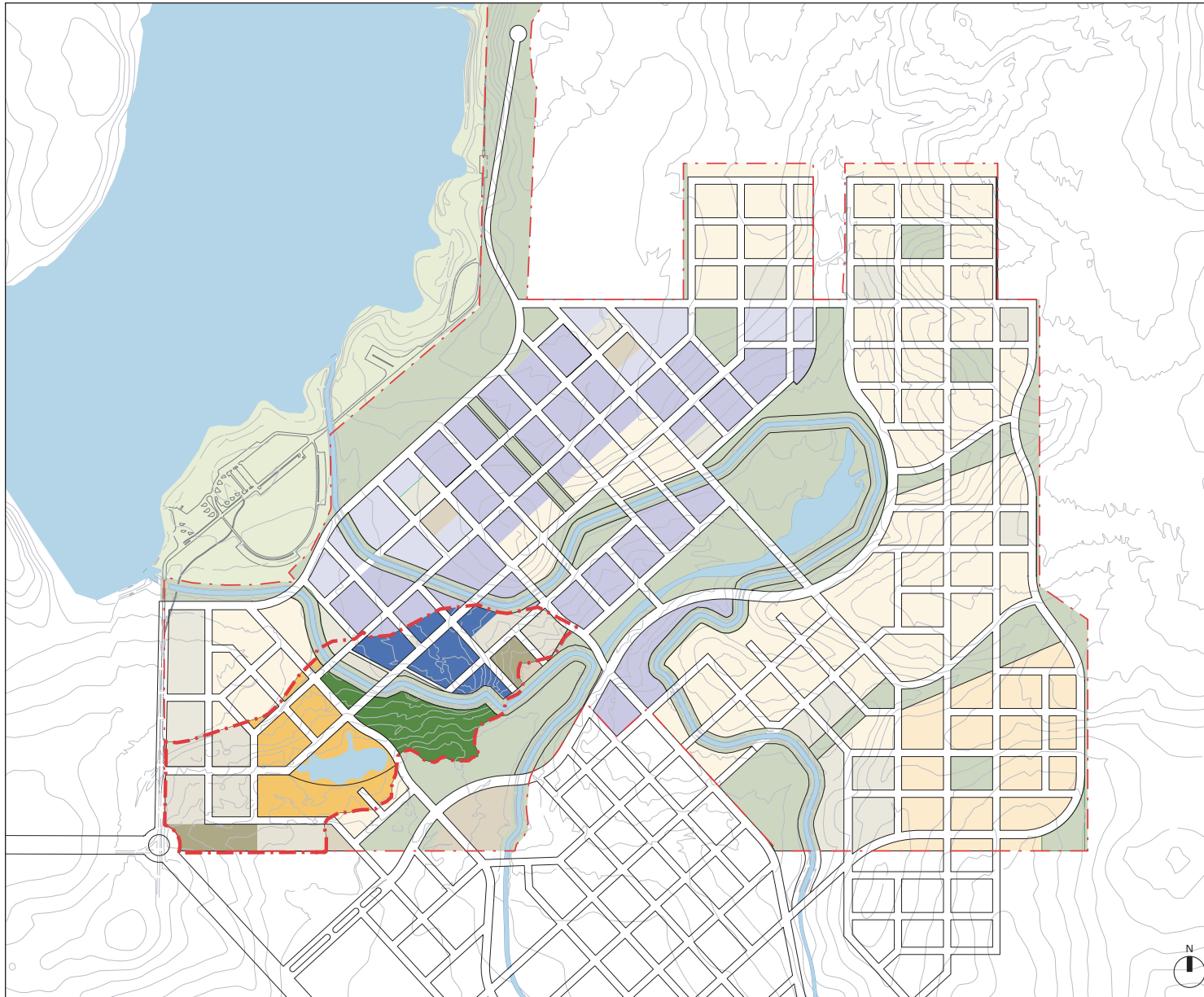


**Fig. 6.5**  
Main Street at Student  
Housing and Dining  
Commons Facing Lake and  
Meadows






- A central plant of 20,000 gross square feet which will provide heating for all academic buildings and chilling for the entire campus and will include a thermal energy storage tank for maximum energy cost savings and one-quarter reduction of the campus load on the state energy infrastructure.
- An energy performance monitoring system to optimize campus operations, inform the design of future buildings and infrastructure, and make the campus physical facilities part of a “living laboratory” for the study of energy engineering and resource conservation.
- Housing for approximately 600 students in buildings of up to three-stories with a variety of units, including apartments and suites.
- Food service facilities to serve the student housing and for daytime use by commuter students, faculty, staff and visitors.
- Recreational and athletic facilities to meet the needs of students in the first years of campus operation.
- Parking in surface lots. To the extent feasible initial lots will be developed on permanent sites with a heavy canopy of trees. Temporary parking will be provided on some future building sites in the initial campus core.
- Roads, bridges and utilities systems connecting all facilities including a utilities tunnel connecting the central plant and science and engineering building.

By 2007/08, when Phase 1 construction will be complete, the following additional facilities will have been built.

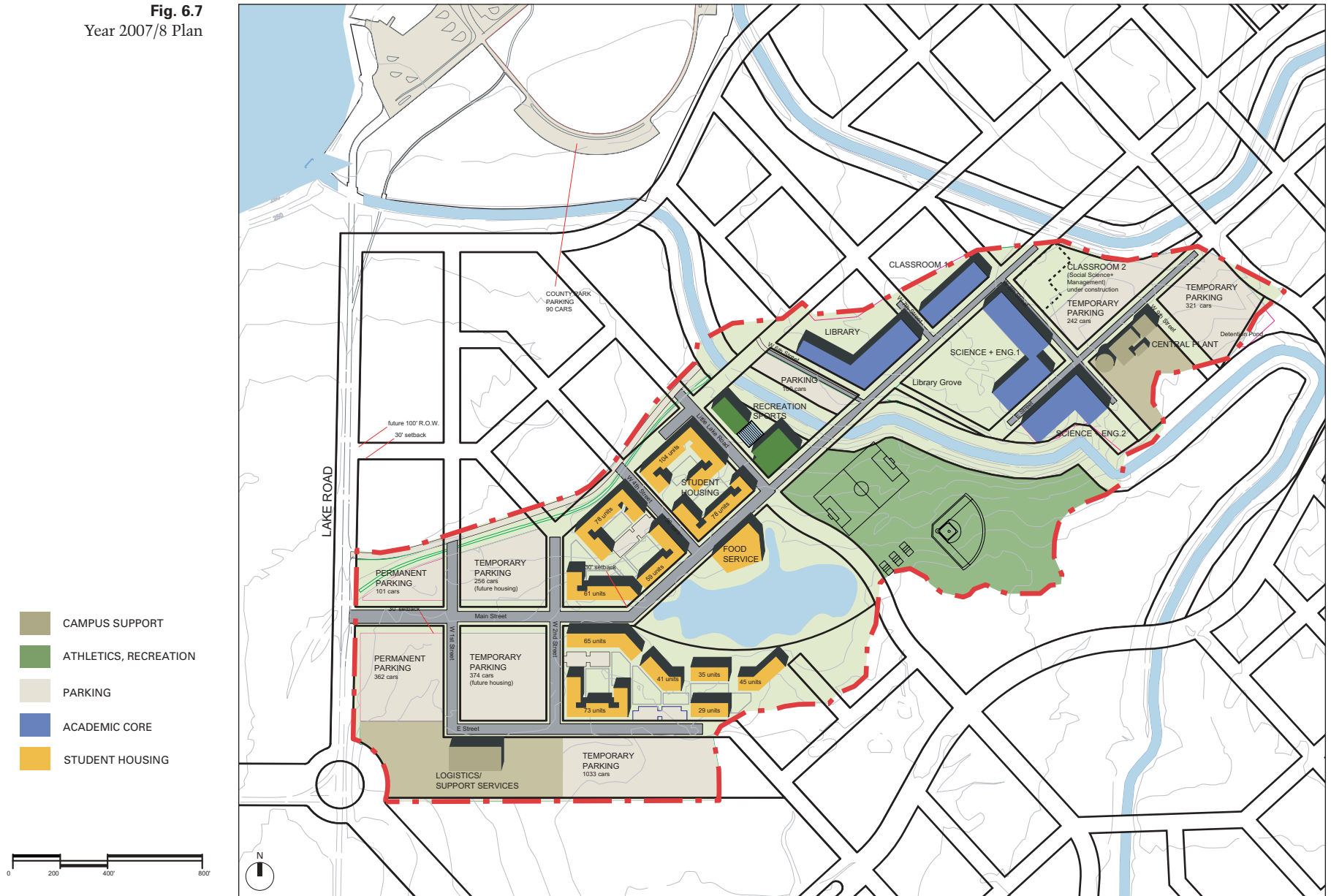
- A second science and engineering building of around 67,000 assignable square feet. A social sciences building of about 60,000 assignable square feet.
- A campus logistical/support services facilities building of 20,000 assignable square feet for environmental health and safety, police and fire, physical plant, facilities and grounds maintenance, mail services, purchasing and material management.
- Additional playing fields and recreational facilities.
- Additional housing for approximately 1600 students to be built in phases as is feasible to maintain the campus goal of 50% of students housed.
- Additional permanent parking in landscaped surface lots.



**Fig. 6.6**  
Phase 1 Land Use Plan

-  **ACADEMIC CORE**
-  **STUDENT HOUSING**
-  **CAMPUS SUPPORT**
-  **ATHLETICS, RECREATION & OPEN SPACE**
-  **PARKING**

**Fig. 6.7**  
Year 2007/8 Plan



## Circulation and Parking

Only the initial stages of the ultimate transportation plan will be implemented on the Phase 1 campus. During Phase 1, access to the campus will consist of the north Lake Road/Main Street route and the existing golf course road. Approximately 25% of the commuter parking supply will be located in areas that require travel through the campus core and housing areas. However, as the University grows, access to the campus core will be distributed among the full array of significant routes, and intercept parking and campus support will be accessed via peripheral routes.

Bicycle access to campus during Phase 1 will be provided primarily via the existing Lake Road off-street bike path connecting to Main Street. Bike lanes will be provided along the full length of Main Street. Secure bicycle parking will be provided adjacent to the Phase 1 academic buildings and within the student housing areas. Because Main Street will serve as the primary access to campus core parking during Phase 1, an off-street multi-use trail will also be considered for the Phase 1 campus, traveling parallel to Main Street to connect the campus core with student housing.

It is anticipated that County Transit will provide service to the Phase 1 campus core from various parts of the county. Bus schedules should be designed such that bus arrivals and departures at the campus core coincide with class-change times. UC Merced will work with the County to design and coordinate transit sched-

ules. All buses (whether their routes extend beyond campus or not) should stop at the Lake Road intercept parking lots and at the student housing area to provide frequent parking-to-campus and housing-to-campus transit service. It is also anticipated that negotiations will soon be underway between the County and University concerning a discounted or student-fee-subsidized transit pass program.

The Phase 1 enrollment level and campus layout does not implement all of the long-range policies nor achieve all of the long-range transportation goals (such as protecting the core from auto traffic through maximum intercept parking or full implementation of effective TDM programs). However, the Phase 1 campus configuration does not preclude implementation of all of the recommended LRDP transportation policies and achievement of the full set of LRDP transportation goals during further evolution of the campus. Furthermore, it does attempt to promote key elements of the UC Merced cycling and transit cultures early in campus development.

Fueling for natural gas and electric vehicles will be integrated into the energy infrastructure and parking. Parking preference will be used to encourage efficient gasoline hybrid, electric, and natural gas vehicles. The campus service vehicle fleet will lead the way as a model for the use of such low-polluting vehicles.

## Utilities and Infrastructure

### Water Supply and Distribution

Phase 1 will obtain water from the City of Merced's municipal water system. The point of connection will be at the intersection of Lake Road and the Phase 1 entrance. A backup line will be provided. A master metering station and dual backflow preventers will be installed at this point of entry in accordance with the City's design requirements. From this point of connection, a water transmission main will feed a water storage tank and booster pump station located in the Campus Support area. An interconnected network of water pipelines that are fed by the booster pump station will be installed under the roads. The network will provide potable and fire protection with service to each of the Phase 1 buildings. The network will have required line valves, fire hydrants, backflow preventers, water meters and other appurtenances needed to meet the operational requirements of the campus water distribution system.

### Wastewater Collection and Treatment

The wastewater from Phase 1 will be conveyed to and treated by the City's Municipal Wastewater Treatment Facility. The point of connection to the City's municipal sewer system will be at the intersection of Lake Road and Bellevue Road. From this point the likely off-site connection will be along Bellevue and G Street to the existing City line. This gravity flow sewer will have capacity to convey the sewer flows of Phase 1 and future phased additions of the campus. This main sewer will be extended beyond Phase 1 as part of future phased campus additions. Smaller diameter gravity sewers will be installed in the secondary roads. The sewers will collect wastewater from the buildings and convey it to the main sewer. Manholes, clean-outs and other appurtenances

will be installed to meet the operational requirements of the campus wastewater collection system. Wastewater meters will complement potable and reclaimed water supply meters to help inform design of future on-site treatment and reclamation facilities, as well as contribute to the use of the campus facilities as a "living laboratory" for environmental engineering and resource conservation.

### Recycled Water Supply and Distribution

Phase 1 will not have a source of recycled water, but it is anticipated that one will be available in a future phase of campus development. Recycled water mains and laterals, therefore, will be installed for Phase 1 concurrently with the other underground utilities. Recycled water will be metered to complement the potable and wastewater systems, adding to the capability to use the campus facilities as a "living laboratory" for environmental stewardship.

In the interim, irrigation water could be supplied from the City of Merced or from the existing sources used by the golf course until recycled water treatment facilities are installed. The golf course meets its irrigation needs through a combination of MID surface water and groundwater that feeds the golf course storage pond. An existing irrigation pump station takes water from the pond and distributes it to the existing golf course irrigation system. The recycled water system would be fed from this pump station. The pump station would be modified to feed the new recycled water distribution system installed to serve the various landscaped areas and athletic areas.

### **Stormwater Management**

Stormwater will be conveyed to the existing golf course pond and to an on-site detention basin. Stormwater going to the pond would be available for irrigation reuse. Stormwater going to the detention basin would be then released to the Fairfield Canal at a controlled rate in accordance with MID requirements. A network of drain inlets and underground pipelines will compose the bulk of the stormwater system and will be sized to convey a 10-year storm. Stormwater drains will primarily be located in secondary streets. Wherever possible, grassy swales, filter strips and natural drainage paths will be utilized to reduce times of concentration and to improve storm water quality. The sizing of the detention basin system is based on the post-development runoff from a 100-year, 24-hour storm event. However, the maximum discharge rate to Fairfield Canal is still limited to the rate for a 10-year, 24-hour storm released over a 48-hour period.

### **Natural Gas Supply and Distribution**

Phase 1 will be supplied natural gas from the metering and pressure regulating station at the terminus of the PG&E transmission main in the Campus Support area. From this point of connection, a natural gas pipeline will feed an interconnected network of gas mains installed under the roads. These mains will be located to serve the Phase 1 Central Plant and other buildings needing natural gas service. The gas main network will have capacity to meet Phase 1 needs and the needs of future phased campus additions. This network of gas mains will be extended beyond the Phase 1 as part of future phased campus additions. The gas main network will have the required line valves, pressure regulators, meters and other appurtenances needed to meet the operational requirement of the campus natural gas distribution system.

### **Communication Systems—Voice and Data**

Phase 1 will be served by one or more communication providers via independent fiber optic cable lines connecting the campus with the carrier infrastructure in the Highway 99 corridor. A minimum of two independent service lines will be required. It is anticipated that these off-site fiber optic lines will be carried in underground duct banks that terminate at communication vaults located in the Campus Support area or in the Central Plant. These lines will be sized to meet the existing and future needs of the campus.

From the vaults at the Campus Support area, the service provider(s) will extend fiber optic cable in on-site underground duct banks to the Minimum Point of Entry (MPOE) in the communication room (Telecom Building) at the Phase 1 Central Plant. It will serve as the initial point of concentration for the Campus off-site and on-site communication systems. Additional points of concentration will be added as the campus expands. The two independent service cables will be carried in separate duct banks routed along different streets in Phase 1 to the MPOE.

The communication cables connecting Phase 1 buildings to the outside services and each other will run through an interconnected network of underground communication duct banks, the Central Plant utility tunnel and communication vaults. Redundant cables will be provided to each Phase 1 building or facility. The duct banks, utility tunnel and vaults will form a ring around Phase 1. Lateral duct banks and communication manholes will be used to connect each building to the ring. The duct banks will be located under roadways and pedestrian paths. Vaults and manholes will be located so that access to them does not block traffic.

An important feature of the Phase 1 communication system is the network services that are to be provided for the campus. Network services entail the approach that the campus will take to supplying voice and data communications within and between campus buildings and facilities. The technology employed in these services is rapidly changing. The selection and design of technology based communication equipment will, therefore, be performed towards the end of the construction phase of the Phase 1 development. This will allow UC Merced to select the most up-to-date equipment and take advantage of the most recent advances in the technology. For voice communications, however, it appears that the currently viable alternatives are the use of a campus-owned traditional PBX system or the selection of a voice communication service provider that will furnish, install, maintain and service a voice communication system.

### **Central Plant**

The first central plant node will be located near the Science and Engineering Building. This node will deliver chilled water and heating hot water to these core buildings, and chilled water to the student residence and other support buildings. Remote and widely distributed heating loads like housing, recreation, and support buildings can usually be served more efficiently by local systems.

The plant node equipment will be expandable to service approximately twice the 2008 load. After this first plant node is at full capacity, a second plant node will be initiated to the north-east, adjacent to the main research buildings. The utility tunnel will connect the two plant nodes. The concept is to keep chilled water generation and other centrally supplied laboratory services close to the high-load buildings, to reduce distribution costs.

Utilities to each building will be metered. This will allow central monitoring of energy usage, to provide baselines for future projects as well as to monitor the overall health of the building systems. Energy performance monitoring will contribute to the academic program as a part of a “living laboratory” for the study of energy engineering and resource conservation. The energy performance monitoring system can also allow engineering laboratory courses to utilize data from campus operations. A backcharge rate may also be introduced in the future.

### **Chilled Water**

An advantage of centralizing chilled water generation is that thermal energy storage can be incorporated with relative ease. An approximately 85 foot tall, 30,000 ton-hour stratified chilled water storage tank will be incorporated into the initial phase of this project. Combined with efficient building design, the tank will provide complete coverage of peak chilled water demand through 2008. Estimated chilled water peak demand for 2008 at the central plant is 2,000 tons. However, the chillers will not generally be used to directly meet the high daytime demand. Instead, they will charge the chilled water thermal energy storage (TES) tank at night, with the required off-peak charging demand being as high as 2,500 tons. The Node I Central plant will have 3 chillers of 1,250 tons each which along with the TES tank will provide both a margin of safety in firm capacity and redundancy in the event of equipment failure. Space will be provided to add two additional 1,250 ton chillers to meet the eventual peak demand on the first plant node.

The chiller plant will be designed for high efficiency, utilizing all economic options for effective heat exchange and heat rejection. Stratospheric ozone-depleting refrigerants (HCFCs) will not be used.

To maximize the thermal capacity and performance of the tank, the system will generate chilled water at 40° F. Building design standards will require that coils be selected to return water at roughly 75° F on the peak summer design day. This large temperature difference between supply and return will assist stratification within the tank, while reducing the chilled water flow rate, saving pump energy and piping costs.

### **Heating Water**

Gas fired boilers located in the central plant will deliver hot water to the core academic buildings. Expected demand for all campus facilities is 14 million Btu per hour in 2004 (FY 2005) and 23 million Btu per hour in FY 2008. Because of concerns for regional air quality, campus environmental stewardship goals may require that all heating boilers exceed current emission requirements.

### **Other Central Plant Utilities**

Certain utilities funded by the science building budget will be located in the central plant because of the building's proximity to the Central Plant. These include a steam system sized to meet the process steam requirements, a central nitrogen storage tank, and laboratory air compressor. If laboratory emergency generators are required, they will also be located at the Central Plant.

### **Site Electrical Generation Options**

Several environmentally-preferred electric generation systems that have the potential for use at the campus are described below. Some of these are not yet ready for deployment but may be by the time development occurs. The options and the potential timing for their use are described. These options are not mutually exclusive and may be used in combination or with off-campus providers.

Current estimate of electricity base load for 2008 is 1.6 MW and the peak load is 3.5 MW. Options under consideration are as follows:

- 1.5 MW gas turbine
- 5 MW combined cycle gas turbine
- 200kW Phosphoric Acid Fuel Cells (PAFC) added incrementally 2004 through 2008. Thereafter 1 MW increments of Solid Oxide Fuel Cell/Gas Turbine Hybrid units.

The gas turbine options have significantly lower first cost but increase the emissions on site. Larger gas turbine units may be more efficient and/or have lower emissions, but could preclude the eventual adoption of better technology. Also, the thermal load will likely be better matched to smaller cogeneration units, with higher overall system efficiency. Fuel cell options have inherently low emissions and do not need special emission reduction equipment.

Photo-voltaic (PV) panels may be cost-effective in many applications with current subsidies. They will become even more desirable as power costs rise and production costs decline. In later buildings photo-voltaic panels may be integrated into the buildings thereby offsetting some of the cost with displaced building components.

#### **Electric Power Supply and Distribution**

The maximum electric demand on campus opening day is projected to be 2.1 megawatts (MW) that is projected to grow to about 3.5 MW by 2008. Electric service reliability will be provided either by multiple independent grid connections or by a grid connection and a reliable stand-alone cogeneration system with sophisticated campus switching capability. Photovoltaic systems and smaller cogeneration systems may also contribute to the campus electricity supply. In addition, the Merced Irrigation District Fairfield Hydroelectric Plant (FHP) may directly serve part of the campus needs.

The science and engineering buildings will also be provided with their own source of emergency backup power in the form of an engine-driven generator set(s) to be housed in the Central Plant or within the building.

The point of connection to the off-site power grid feed(s) will be a metering and switching station to be located in the Campus Support area.

#### **Fire Suppression Services**

The Phase 1 campus will contract with either the City of Merced's fire Department or the California Department of Forestry for its fire protection services.

#### **Police Services**

Phase 1 will contract for its police services with the County Sheriff's Office or the Merced Police Department. The University will create its own police department in a future phase of development.

