STEAM AND CHILLED WATER SUB-ELEMENT

Inventory and Analysis of Existing Conditions (Steam)

1.a Existing Steam Production Equipment

Steam production equipment consists of large, dual-fuel fired, water tube, high-pressure steam boilers. Steam is generated and distributed at approximately 120 psi in the winter and 80 psi in the summer.

Boiler No. 1 and Boiler No. 3 are each rated for 70,000 lbs/hr. Boiler No. 2 is rated for 39,000 lbs/hr. Total current plant capacity is approximately 179,000 lbs/hr of steam or approximately 172 million Btuh.

Boiler No. 1 and Boiler No. 3 (70,000 lbs/hr) were replaced in 1994 and are in good working order. Boiler No. 2 was replaced in 1989 and is in good operational condition.

Existing Steam Production Support Systems

The existing desecrator system and chemical treatment system were replaced.

The old rock salt water softening system was replaced with a new brine solution system.

A new fuel oil heating system was purchased and is currently being installed. The existing fuel oil tanks were cleaned, inspected and re-certified.

1.b Existing Steam Distribution Equipment

The east campus distribution system consists of two 8" mains. An 8" normally open cross section connection creates a loop east campus network. The west campus distribution system consists of a 12" main and an 8" main. An 8" normally closed cross connection creates the potential to have a looped west campus network. The northwest main continues as a 10" main after the cross connection. Approximately 5,000 ft. of tunnel contains most of the larger steam main piping. The more recently installed mains and the individual building run-outs are typically direct buried.

1.c Steam Metering and Monitoring

Building steam metering has been upgraded by campus maintenance. Reliable and accurate vortex shedding meters are installed in all buildings.

1.d Steam Production Capacity Evaluation

Based on comparison of steam demand and plant capacity, there appears to be adequate central plant equipment to handle substantial future additional loads with the three boilers operable.

The chart below summarizes peak load totals, estimated steam demand, and current steam plant capacity.

TABLE 10.1.1 Existing Steam System Connected Loads

Year	Diversified Demand (lbs/hr)	Plant Equipment (lbs/hr)	Capacity Shortfall (lbs/hr)	Capacity Surplus (lbs/hr)
2005	121,900	179,000	---	57,100

1.e Steam Distribution System Analysis

The steam distribution piping system was analyzed in a previous study by a computer modeling of the system. The utility is divided into east campus and west campus distribution systems. The analysis is likewise divided into east and west campus systems. Both the existing and the future cases were analyzed.

Inspection of flow diagrams in the study indicated that the system was generally adequate for planned expansion. Utility connections though must be made with regard to downstream impact. In addition, extensions to the system are necessary to serve the new classroom complex and the new student union expansion as well as new areas near the Fine Arts Building.

A significant portion of the steam and condensate piping is installed in steam tunnels. However, the majority of the steam piping is direct buried.

Leaking pipes in the steam tunnels and leaking piping or valves in manholes are easily detected since visible steam will be present. However, leaking buried piping is not readily apparent until the leak becomes fairly severe.

Future Needs/Requirements (Steam)

2.a Steam Distribution System Analysis

The steam distribution piping system was analyzed in a previous study by computer modeling of the system. The utility is divided into east campus and west campus distribution systems. The analysis is likewise divided into east and west campus systems.

2.b Piping System Capacity

Inspection of flow diagrams in the study indicated that the system was generally adequate for existing loads.

2.c Piping System Condition

A significant portion of the steam and condensate piping is installed in steam tunnels. However, the majority of the steam piping is direct buried.

Leaking pipes in the steam tunnels and leaking piping or valves in manholes are easily detected since visible steam will be present. However, leaking buried piping is not readily apparent until the leak becomes fairly severe.

Approximately 2,000 feet of existing underground steam and condensate piping has been replaced.

Seven steam manholes were rebuilt. Improved safety was a key element of this project as the new steam and condensate valves designation to be operated by personnel standing above grade.

Inventory and Analysis of Existing Conditions (Chilled Water)

1.a General Description

Construction of the University's central chilled water utilities was first completed in 1977. Until that time, primary cooling equipment consisted of individual building chillers.

1.b Existing Chilled Water Production Equipment

Chilled water production equipment consists of large, well water-cooled, electric-driven, multistage centrifugal water chillers. Four 1100-ton chillers originally installed in the Central Plant in 1977 were replaced with four new 1200-ton high efficiency chillers in 1999. The R-11 refrigerant was saved for use in other existing chillers as required. A fifth chiller, having a rated capacity of 1250 tons was installed in 1988, bringing the chilled water plant capacity to 6050 tons.

Two additional 1200-ton chillers were added to the Central Plant in 1990. Therefore, the total Central Plant chilled water production capacity is now 8450 tons.

A satellite chilled water plant was constructed in 1994 on the west side of the campus. This plant had initial capacity of 2400 tons using two 1200-ton chillers. Four additional 1200-ton chillers have been added in 1996 for a total present day capacity of 7200 tons.
A third utility plant was constructed as part of the University Center Complex. Four 550-ton chillers were installed in the University Center chilled water plant in 1994 for a total capacity of 2200 tons. These chillers serve Buildings A, B, and C in the University Center and the Coyle Moore Athletic Facility.

A new 300-ton chiller replaced the existing chiller in the B. K. Roberts Law Building. In addition, piping is currently being installed so that this chiller can serve the Law Library as well. It is expected that the Law Rotunda will also be connected to this chiller in the future. This chiller is currently not connected to the campus chilled water distribution loop.

A second satellite chilled water plant will go on-line in the Spring 2007. The plant will initially have two 1500-ton chillers. Expansion space is built into the plant for four additional 1500-ton chillers. These chillers will be added as campus growth requires.

1.c Existing Chilled Water Distribution Equipment

Plant pumping systems consist of a primary chiller pumping loop and a secondary distribution system loop with by-pass to decouple the loops. Original Central Plant distribution system pumps consisted of two pumps operating at approximately 4500 gpm and one operating at 2250 gpm. The total original (1977) distribution system pumping capacity was approximately 11,250 gpm. An additional large distribution pump was added in 1988 bringing plant total distribution capacity to approximately 15,000 gpm. The distribution system was completely renovated in 1991 with the installation of six 200-horsepower pumps with variable speed drives. Each pump is rated at 4000 GPM 140' head.

The conversion of chilled water pumps from constant flow to variable flow in individual buildings is now complete.

In addition, the satellite chilled water plant has six pump capable of a total of 30,000 gpm. The new Satellite Chilled Water Plant II will initially have two 6000-gpm distribution pumps with room for four additional 6000 gpm pumps.

1.d Existing Chilled Water Distribution Piping

The majority of the existing chilled water distribution piping (approximately 17,000 linear feet) was installed in the late 1970's. This piping was constructed of transite that is a non-corrosive material with excellent flow characteristics. All of this piping is in excellent condition with many years of remaining service life. Unfortunately transite contains asbestos fibers and is not acceptable for future installations.

As long as this pipe remains covered by the earth it is not considered a health hazard. However, caution must be exercised whenever new taps are made and care must be taken to avoid accidental breakage of this pipe when new utility trenches are constructed.

The remainder of the existing chilled water pipe (approximately 4,000 linear feet) is schedule 40 black steel with foamglass insulation. This pipe is also in excellent condition as it has been in service only a few years. This piping is expected to have a minimum 30-year service life. Recently, the campus standard has been revised to allow re-insulated pipe that also uses schedule 40 steel carrier pipe.

1.e Chilled Water System Loads

General

Existing building design loads were taken from reliable and accurate turbine insertion meters.

TABLE 10.2.1 Existing Chilled Water Loads

	Peak Loads Demand (total for all plants)	
Year	**tons**	**gpm**
2006	15,275	29,660

The summation of individual building design peak loads is not the demand experienced by the central utility. Based on historical data the actual demand at the Central Plant is expected to be about 75% of the individual peak loads for each building.

Future Needs/Requirements (Chilled Water)

2.a Chilled Water Production Capacity Evaluation

Plant Capacity and Demand Comparison

The existing capacity for the Central Plant and the Satellite Plant is 15,600 tons. The current policy requires the chilled water production system to have enough capacity to meet the peak load with one chiller not operational. Therefore, the available plant capacity of the main plan and the satellite plant is 13,200 tons. With the addition of the following new buildings: College of Medicine, Department of Psychology Building, Classroom Building, Life Science (Biology) Building, Chemistry Building and two new residence halls, the peak load is expected to be about 14,500 tons. Therefore the new Satellite Chilled Water Plant II will need to have the initial phase with two 1,500 ton chillers on line prior to the completion of these projects. Additional projects will require additional chillers to be installed in the new Satellite Chilled Water Plant II prior to the opening of new buildings.

2.b Chilled Water Distribution System Evaluation

In order to assure adequate distribution capacity as new buildings come on line, computer modeling of the system is analyzing the chilled water distribution piping system annually.

ELECTRICAL POWER AND OTHER FUELS SUB-ELEMENT

1. Inventory and Analysis of Existing Conditions

1.a Existing Electric Power Supply and Distribution System

The existing electrical distribution system on the Florida State University Campus primarily consist of 12.47kV circuits with one 4.16kV circuit for mechanical purposes at the West stands. FSU is dual-fed 12.47kV from the City of Tallahassee Substation No. BP-13 at the Main Substation south of the Central Utilities Plant. There are two lines of 15kV switchgear to provide the 12.47kV service to the facilities throughout the campus. The circuits are routed in underground duct banks to facility transformers.

1.b Other Fuels Distribution

There is no other fuels distribution system on campus.

1.c Electric Service to the University

The City of Tallahassee added a new transformer in 1992 to go with the existing transformer in their portion of the substation serving FSU. Both transformers are 18,000 kVA with two stages of fan cooling that will provide 24,000 kVA and 30,000 kVA. The original transformer serves FSU through the West Main Breaker and the new transformer serves FSU through the East Main Breaker. The peak demand within the last fiscal year to the University was approximately 22 MW as recorded by the campus Apogee control and monitoring system.

2. Future Needs/ Requirements

Projected Electric Power Supply and Distribution System

A study of the electrical distribution system entitled “Electric Utility Survey Report” was provided to FSU under Phase I of Utilities Improvements, BR-286, dated June 9, 1999.

Electrical one-line diagrams of the campus primary electrical distribution system were verified and updated as a part of the report. The report listed recommended projects for improvements to the system with the main goal to provide electric service to new construction and increase reliability of service to new construction and increase reliability. All recommendations have been incorporated.

Most projects considered over the next 10 years (through 2015) can be reasonably served off existing feeder circuits in close proximity to their proposed locations. The "courts" facility being considered approximately one block north of Gaines Street will require extension of duct bank systems from near Jefferson Street. Proposed construction of either classrooms or a new Union complex at the existing Mendenhall site will require substantial circuit load analyses to provide adequate circuitry to serve the proposed 400,000 square feet. The analyses must determine circuit load balances and redundancy through loop feeds.

The peak electrical demand required by the University has increased from 18,600 kilowatts in 1993 to 22,000 kilowatts in 2006. This has been an average increase of 1.3% per year. At that rate, within 20 years the peak electrical demand will be approximately 25,000 kilowatts in 2020.

The two City of Tallahassee transformers will be able to provide for the demand. However, as the demand approaches 30,000 kilowatts, the ability to handle the service through one transformer in emergencies is in jeopardy.

TELECOMMUNICATIONS SYSTEMS SUB-ELEMENT

Inventory and Analysis of Existing Conditions

Review of FSU Office of Telecommunications Strategic Plan

The Florida State University, Office of Telecommunications strategic plan for fiscal years 1995 to 2000 outlines an aggressive strategy to provide technologically advanced, innovative telecommunication resources in an efficient, service-oriented environment in support of the University's mission of providing nationally recognized education, research and service.

In its current role, the Office of Telecommunications (OTC) is the University's coordinator and provider of all telecommunications transport services on and off of campus. This includes, but is not limited to: all infrastructure of copper, coax, and fiber optic wiring within and between campus, calling features, CATV, consulting and operator services, local dial tone, directed moves, emergency telephones, frequency coordination, outside plant, pay telephones, telephone instrumentation, voice and video conferencing, wireless technologies, voice mail, long distance services, paging, 2-way radio, and continuously upgrading the central office software for their Northern Telecom digital switch .

The OTC's goal is to manage, coordinate and provide all telecommunications transport services in a manner that promotes the overall University mission from a short term (1-3 year) perspective to a long term (5-10 year) perspective. It is also OTC's goal to provide technologically advanced, innovative telecommunication resources in an efficient, service oriented environment in support of the entire University community. This includes, but is not limited to installing fiber optic cabling which could support Synchronous Optical Network (SONET), voice, data, and video communications. This would help decentralize the present system that is currently being used.