Chapter 1 - Executive Summary

Background and Scope

California State University, Long Beach, the largest campus with in the 23 – campus CSU system was founded in 1949 and is home to over 30,000 students. The University is composed of over 87 buildings, totaling almost 4.3million square ft of building space, 3.8million sqft of which is conditioned and occupied. Located near the ocean, the 324-acre campus offers a beautifully landscaped and garden-like setting. With a strong commitment to high-quality undergraduate and graduate programs, CSULB is positioned to become one of the premiere urban universities in the country and seeks students interested in an exciting and rewarding collegiate.

The proposed University Facilities Master Plan will provide the campus with improved and expanded facilities and resources over the next thirty years and proposes to increase the current figure of 25,000 full time equivalent students (FTES) to 31,000 FTES. A total of approximately 370,000 square feet is planned to be added to the campus inventory as part of this proposed Facilities Master Plan excluding parking structures. To meet these growing needs of the campus, existing campus utilities need to be evaluated and upgraded as necessary to accommodate the expansion. A campus map showing the proposed facilities that are being added under the Facilities Master Plan is enclosed at the end of the chapter. The map also indicates buildings that are being replaced under the Master Plan.

P2S Engineering Inc. was contracted by CSULB to evaluate the existing utilities currently serving the existing Campus, consider alternatives for improvements, and make specific recommendations to alter/upgrade/modify the existing utility infrastructure to support new buildings, major renovations, and building replacements that form part of the proposed University Facilities Master Plan.

The utilities within the campus boundaries comprise of domestic and fire water, sewer, storm drain, irrigation water, chilled and hot water distribution, gas, electrical and telecommunications systems, and are all owned and operated by the campus. Southern California Gas Company and Southern California Edison Company provide gas and power to the campus respectively. Verizon is the local exchange carrier (LEC) for the telecommunication services.

The University has its own electrical distribution system which receives 66kV transmission service from Southern California Edison and purchases its electric supply directly from an energy service provider.

The University also has a central heating and cooling plant with a thermal energy storage that provides heating and cooling to majority of the buildings on campus. The thermal energy storage system reduces the peak electrical loads and saves the University substantial costs by shifting the cooling production to off peak hours.

CSULB has a combined electric and gas expenditures of nearly $5.2million. The University's total energy consumption is approximately 50,000,000kwh with a total energy usage of 77,000BTU's per sqft each year.

The total domestic water and sewer costs at the University total to about $295,913 and $36,000 respectively per year. The reclaimed water costs are approximately $70,000 per year.

Since the majority of the campus was built in the 1950's, the campus has certain aging utilities that are in need of repairs and upgrades. With the exception of power, telecommunications and chilled water and heating hot water distribution, majority of the wet utilities date back to campus inception and are over 50 years old.

Objective

The objective of this utility master plan study is to evaluate the existing utilities currently serving the existing CSULB Campus, consider alternatives for improvements and make cost-effective and specific recommendations as necessary to alter/upgrade/modify the existing utility infrastructure to support new buildings, major renovations, and building replacements that form part of the proposed University Facilities Master Plan.

Methodology

The following methodology was adopted in formulating our utility infrastructure master plan.

- A critical aspect in the evaluation of the existing utility systems serving a facility is a detailed and accurate field investigation of the current systems. A detailed survey of the existing utility systems that currently serve the facilities at the CSULB campus was undertaken, and existing conditions, together with potential problems, were identified. The surveyed information was verified through available record drawings and meetings with the campus facilities staff.
- Each utility system was then evaluated for capacity, functionality, reliability, ease of maintenance, age, and its ability to serve the present and future needs of the campus.
- Alterations/upgrade/modifications necessary to support new buildings, major renovations, and building replacements that form part of the proposed University Facilities Master Plan were identified.
- Costs associated with each of the required utility upgrades were then developed based on our recommendations.

Report Overview

Our following Utility Infrastructure Master Plan report provides an analysis of the present utility systems currently serving the facilities, identifies potential problems associated with each of these utility systems, defines future requirements, outlines recommended solutions and phasing plans, and costs to implement them. The utility systems that were evaluated and included in our report are: Domestic and Fire Water System, Sewer System, Storm Drain System, Irrigation Water, Natural Gas System, Chilled and Heating Hot Water Systems, Electrical Systems and Telecommunication Systems.

A description of each utility system, including current conditions and identified problems, is presented in Chapter 2. Information on each utility system was obtained through field surveys, existing documents and records, and discussions with campus staff knowledgeable with utility systems.

Chapter 3 includes a description of planned growth of the campus, as well as a description of how each utility system is positioned to handle future growth. Chapters 2 and 3 of the report thus identify potential problems for each of the utility systems associated with both existing conditions and planned growth.

Chapter 4 provides recommendations and modifications necessary to each of the utility systems to accommodate present and future needs of the campus.

Chapter 5 provides an implementation and phasing plan for each of the utility systems.

Chapter 6 provides cost estimates for the proposed recommendations.

Appendices 'A' 'B' 'C' and 'D' include modeling information for the various utilities and fire flow test reports.

Summary of Our Findings and Recommendations

The following section summarizes our findings and our recommended solutions for each of the existing utility systems that were evaluated as part of our study. Estimated cost to upgrade each of these systems is also included following our recommendations.

Domestic and Fire Water System:

Findings

- An evaluation of the existing Water System revealed that portion of the existing water system comprises of old transite and ACP mains pipe. In addition the existing water pipes on the south side of the campus are undersized. The evaluation also revealed that some lines will have to be relocated due to proposed buildings located on top of the existing lines.

Recommendations

- Replace existing transite and ACP mains with PVC class 900 plastic pipe in phases and allow for upsizing pipe where necessary. This can be achieved by replacing lines adjacent to new construction projects to bring portions of the campus to a more functional level.
- Relocate lines that are in the site of proposed buildings.

Cost

- $980K

Sewer System:

Findings

- An evaluation of the existing Sewer System revealed that it is adequate in size to support the present and future needs of the campus. However, portions of the existing system has roots intrusion and few of the lines were found to have cracking and joint replacement. The evaluation also revealed that some lines will have to be relocated due to proposed buildings located on top of the existing lines.

Recommendations

- Replace existing lines that are affected by root intrusions and have cracks and joints displacement.
- Relocate lines that are in the site of the proposed buildings.

Cost

- $700K

Storm Drain System:

Findings

- An evaluation of the existing Storm Drain System revealed that it is adequately sized for campus storm water flows and can accommodate a 10year storm event. Repairs will need to be made to pipes that have deteriorated due to age. In addition, some lines will have to be relocated due to proposed buildings located on top of the existing lines.

Recommendations

- Replace deteriorated pipe and relocate lines that are in the site of the proposed buildings.

Cost

- $460K

Irrigation water

Findings

- An evaluation of the existing irrigation water system revealed that the south portion of the campus is connected to the domestic water system and the north portion of the campus connects to a reclaimed water system. The south portion of the irrigation lines are connected to the potable water mains by atmospheric pressure breakers which are not compliant with the local health department regulations.

Recommendations

- The reclaimed water networks on the north side of the campus are recommended to be connected together to form a single network. Combining the two networks into one would provide redundancy to the system in case repairs are ever needed and would help improve pressure and flow.
- A thorough study of the non backbone system components is warranted to verify code compliance on the south side of the campus. Any non-compliant components should be considered for upgrade to backflow preventor systems.

Cost

- $175K

Chilled and Heating Hot Water Systems:

Findings

- An evaluation of the existing Heating Systems serving the buildings at the campus revealed that the boilers and their associated pumps are adequate to support proposed buildings provided under Phase 1. However, additional heating capacity of 10,800mbh will be required to support the balance facilities proposed as part of the facilities master plan.
- An evaluation of the existing Cooling Systems serving the buildings at the campus revealed that although the system is adequately sized to meet the current demands of the campus, an additional 10,000ton-hours of Thermal energy storage will be required to support the full build out.

Recommendations

- Provide additional heating capacity of 10,800mbh to the existing Central Plant
- Provide additional 10,000ton- hours of TES to the existing Central Plant.
- Implement energy efficiency measures provided in our Energy report dated January 31, 2006.

Cost

- $3 million

Gas System:

Findings

- An evaluation of the existing Gas System revealed that the system has adequate capacity to serve proposed buildings. However, majority of the campus distribution system is composed of PVC pipe with some portions retrofitted with P.E. or steel pipe. PVC pipe is not the recommended plastic pipe material to be used for a natural gas distribution system. In addition, the existing PVC pipes are connected with glue and are breaking down causing gas leaks through out the distribution system.

Recommendations

- Replace existing PVC pipe with P.E. pipe.
- Provide modifications to the existing distribution system to accommodate the proposed buildings as detailed in the report.

Cost

- $570K

Electrical System:

Findings

- An evaluation of the existing Electrical System revealed that the main switchgear and the distribution system are in good condition. However, some feeders are not balanced and need to have loads shifted to balance them. Base of few 15kV selector switches that form part of the electrical distribution system were found to be corroded.
- One of the main 66kV-12kV transformers is old and has past its useful life. In addition, the configuration of the existing system allows both transformers to trip in event of a fault.
- A few lines were found to be in conflict with the proposed buildings and need to be relocated.

Recommendations

- Balance loads on existing feeders.
- Replace existing 66kV-12kV transformer and provide a 66kV breaker in SCE portion of campus substation to allow independent operation of transformers.
- Relocate lines to accommodate new buildings.
- Replace 15kV cables at the end of their life span.

Cost

- $3 million

Telecommunications System:

Findings

- The telecommunications infrastructure was recently upgraded to CSU Standards for the interbuilding pathways, media, and spaces that serve state-owned buildings. It is in good condition and has sufficient capacity to meet the University's requirements for the next twenty-five years. Some ductbanks and cables systems will be extended in order to serve new campus building sites.
- The proposed locations for some proposed building projects are in conflict with existing telecommunications ductbanks. The locations of the proposed building sites will require minor revisions to avoid the ductbanks or the existing ductbanks with cables will require rerouting in order to maintain service to adjacent buildings.
- The type of station cables are Category 5e and will require replacement with Category 6 type cables, recently adopted CSU standard, as new technology is implemented in the buildings.
- The infrastructure in the majority of non-state buildings including spaces, pathways, and media are congested, obsolete, and do not meet current CSU Standards. The infrastructure inside the non-state buildings will need to be replaced in order to continue service from the University's data network.

Recommendations

- Adjust boundaries of the proposed building sites to avoid or minimize relocation of existing telecommunications ductbanks.
- Adopt Category 6 type copper cables as the campus standard. Implement Category 6 type cables for all new/renovation building projects.
- Upgrade the telecommunications infrastructure in all non-state buildings including new and dedicated telecommunications rooms, pathways, and media. Cutover all working voice, data, and video services to the new cable systems and remove the existing obsolete cables from the existing conduit system.

Cost

- $1.35 million

A spreadsheet summarizing our findings, our recommendations and our total costs to upgrade each of the utility systems follows the chapter.

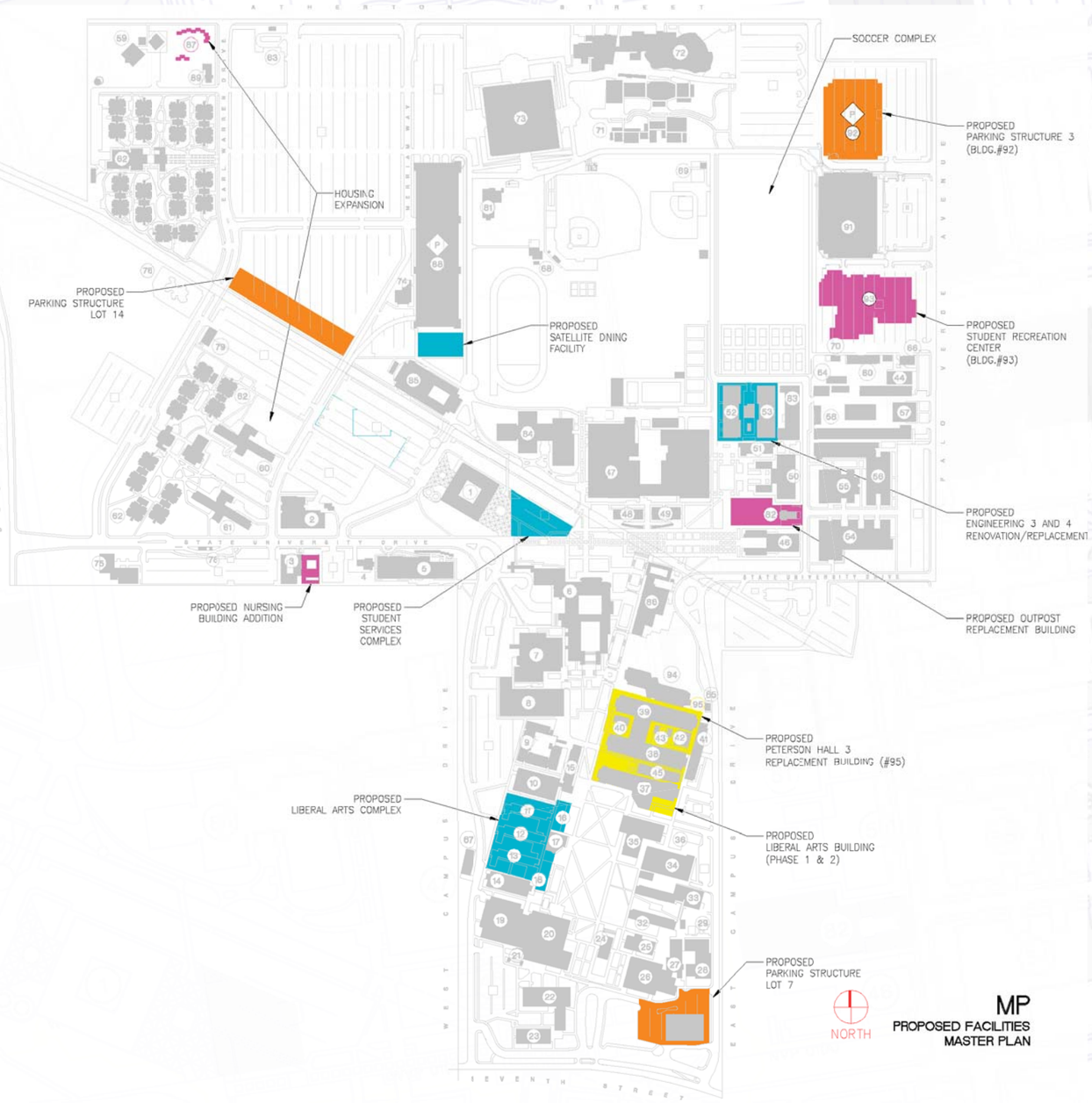
Utility	Findings	Recommendations	Cost
Domestic Fire and Water	• An evaluation of the existing Water System revealed that portion of the existing water system comprises of old transite and ACP mains pipe. In addition the existing water pipes on the south side of the campus are undersized. The evaluation also revealed that some lines will have to be relocated due to proposed buildings located on top of the existing lines.	• Replace existing transite and ACP mains with PVC class 900 plastic pipe in phases and allow for upsizing pipe where necessary. This can be achieved by replacing lines adjacent to new construction projects to bring portions of the campus to a more functional level. • Relocate lines that are in the site of the proposed buildings.	$980,000
Sanitary Sewer	• An evaluation of the existing Sewer System revealed that it is adequate in size to support the present and future needs of the campus. However, portions of the existing system has roots intrusion and few of the lines were found to have cracking and joint replacement. The evaluation also revealed that some lines will have to be relocated due to proposed buildings located on top of the existing lines.	• Replace existing lines that are affected by root intrusions and have cracks and joints displacement. • Relocate lines that are in the site of the proposed buildings.	$700,000
Storm Drain	• An evaluation of the existing Storm Drain System revealed that it is adequately sized for campus storm water flows and can accommodate a 10year storm event. Repairs will need to be made to pipes that have deteriorated due to age. In addition, some lines will have to be relocated due to proposed buildings located on top of the existing lines.	• Replace deteriorated pipe. • Relocate pipes that are in the site of the proposed buildings.	$460,000
Irrigation Water	• An evaluation of the existing irrigation water system revealed that the south portion of the campus is connected to the domestic water system and the north portion of the campus connects to a reclaimed water system. The south portion of the irrigation lines are connected to the potable water mains by atmospheric pressure breakers which are not compliant with the local health department regulations.	• The reclaimed water networks on the north side of the campus are recommended to be connected together to form a single network. Combining the two networks into one would provide redundancy to the system in case repairs are ever needed and would help improve pressure and flow. • A thorough study of the non backbone system components is warranted to verify code compliance on the south side of the campus. Any non-compliant components should be considered for upgrade to backflow preventor systems.	$175,000
Chilled and Heating Hot Water Systems	• An evaluation of the existing Heating Systems serving the buildings at the campus revealed that the boilers and their associated pumps are adequate to support proposed buildings provided under Phase 1. However, additional heating capacity of 10,800mbh will be required to support the balance facilities proposed as part of the facilities master plan. • An evaluation of the existing Cooling Systems serving the buildings at the campus revealed that although the system is adequately sized to meet the current demands of the campus, an additional 10,000ton-hours of Thermal energy storage will be required to support the full build out.	• Provide additional heating capacity 10,800mbh to the existing Central Plant • Provide additional 10,000ton- hours of TES to the existing Central Plant. • Implement energy efficiency measures provided in our Energy report dated January 31, 2006.	$3,000,000
Natrual Gas	• An evaluation of the existing Gas System revealed that the system has adequate capacity to serve proposed buildings. However, majority of the campus distribution system is composed of PVC pipe with some portions retrofitted with P.E. or steel pipe. PVC pipe is not the recommended plastic pipe material to be used for a natural gas distribution system. In addition, the existing PVC pipes are connected with glue and are breaking down causing gas leaks through out the distribution system.	• Replace existing PVC pipe with P.E. pipe. • Provide modifications to the existing distribution system to accommodate the proposed buildings as detailed in the report.	$570,000
Electrical	• An evaluation of the existing Electrical System revealed that the main switchgear and the distribution system are in good condition. However, some feeders are not balanced and need to have loads shifted to balance them. Base of few 15kV selector switches that form part of the electrical distribution system were found to be corroded. • One of the main 66kV-12kV transformers is old and has past its useful life. In addition, the configuration of the existing system allows both transformers to trip in event of a fault. • A few lines were found to be in conflict with the proposed buildings and need to be relocated.	• Balance loads on existing feeders. • Replace existing 66kV-12kV transformer and provide a 66kV breaker in SCE portion of campus substation to allow independent operation of transformers. • Relocate lines to accommodate new buildings. • Replace 15kV cables at the end of their life span.	$3,000,000
Telecommunications	• The telecommunications infrastructure was recently upgraded to CSU Standards for the interbuilding pathways, media, and spaces that serve state-owned buildings. It is in good condition and has sufficient capacity to meet the University's requirements for the next twenty-five years. Some ductbanks and cables systems will be extended in order to serve new campus building sites. • The proposed locations for some proposed building projects are in conflict with existing telecommunications ductbanks. The locations of the proposed building sites will require minor revisions to avoid the ductbanks or the existing ductbanks with cables will require rerouting in order to maintain service to adjacent buildings. • The type of station cables are Category 5e and will require replacement with Category 6 type cables, recently adopted CSU standard, as new technology is implemented in the buildings. • The infrastructure in the majority of non-state buildings including spaces, pathways, and media are congested, obsolete, and do not meet current CSU Standards. The infrastructure inside the non-state buildings will need to be replaced in order to continue service from the University's data network.	• Adjust boundaries of the proposed building sites to avoid or minimize relocation of existing telecommunications ductbanks. • Adopt Category 6 type copper cables as the campus standard. Implement Category 6 type cables for all new/renovation building projects. • Upgrade the telecommunications infrastructure in all non-state buildings including new and dedicated telecommunications rooms, pathways, and media. Cutover all working voice, data, and video services to the new cable systems and remove the existing obsolete cables from the existing conduit system.	$1,350,000

NO.	BUILDING DESIGNATION
1	Brotman Hall
2	Student Health Services
3	Nursing
4	Soroptomist House
5	Family & Consumer Sciences
6	University Student Union
7	Cafeteria
8	University Bookstore
9	Psychology
10	Liberal Arts 5
11	Liberal Arts 4
12	Liberal Arts 3
13	Liberal Arts 2
14	Liberal Arts 1
15	Faculty Office 3
16	Faculty Office 2
17	Lecture Halls 150-151
18	Faculty Office 1
19	Library
20	Academic Services
21	Multi-Media Center
22	Education 1
23	Education 2
24	McIntosh Humanities Building
25	Language Arts Building
26	Studio Theatre
27	University Theatre
28	University Telecommunications
29	Art Annex
32	Fine Arts 1
33	Fine Arts 2
34	Fine Arts 3
35	Fine Arts 4
36	Faculty Office 4
37	Peterson Hall 1
38	Peterson Hall 2
39	Peterson Hall 3
40	Science Lecture Halls
41	Microbiology
42	Animal House
43	Greenhouse 1&2
44	Electrical Substation (North)
45	Faculty Office 5
46	Social Sciences & Public Affairs
47	University Gymnasiums
48	Health & Human Services Classrooms
49	Health & Human Services Offices
50	Vivian Engineering Center

NO.	BUILDING DESIGNATION
51	Engineering 2
52	Engineering 3
53	Engineering 4
54	Design
55	Human Services & Design
56	Engineering Technology
57	Facilities Management
58	Corporation Yard
59	Patterson Child Development Center
60	Los Alamitos Hall
61	Los Cerritos Hall
62a	Residence Commons
62b	Parkside Commons
63	Recycling Center
64	Greenhouse 3
65	Electrical Substation (South)
66	Reprographics
67	Main Distribution Communications Facility MDF A
68	Restrooms/Storage
69	Softball Field Restroom
70	Main Distribution Communications Facility MDF B
71	University Music Center
72	Carpenter Performing Arts Center & Dance Center
73	Mike and Arline Walter Pyramid
74	Parking Transportation Services
75	International House
76	Earl Burns Miller Japanese Garden
78	Visitor Information Center
79	Main Distribution Communications Facility MDF C
80	University Police
81	Parking Office Building
82	Outpost Food Service
83	Engineering / Computer Science
84	Steve and Nini Horn Center
85	College of Business
86	Central Plant
88	Parking Structure No. 1
89	Housing & Residential Life
91	Parking Structure No. 2
92	Parking Structure No. 3
93	Student Recreation Center
94	Molecular and Life Sciences Center
95	Peterson Hall 3 Replacement Building

Building / Boundary Legend

- EXISTING BUILDING
- FUTURE PARKING STRUCTURE
- POTENTIAL BUILDING SITE
- FUTURE BUILDING
- PLANNED BUILDING SITE



MP
PROPOSED FACILITIES MASTER PLAN