

A spreadsheet summarizing our findings, recommendations and total costs to upgrade each of the utility systems is provided below.

Utility	Findings	Recommendations	Cost
Domestic Fire and Water	An evaluation of the existing Water System revealed that portion of the existing water system utilize 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 that will be located on top of the existing lines.	Replace the existing transite and ACP mains with PVC class 900 plastic pipe in phases with necessary isolation valves and allow for upsizing of pipes 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. Provide meters at each building to monitor consumption.	\$1,728,300
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 have roots intrusion and few of the lines were found to have cracking and joint displacement. The evaluation also revealed that some lines will have to be relocated due to proposed buildings that will be 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.	\$804,810
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 10 year 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 that will be located on top of the existing lines.	Replace deteriorated pipes. Relocate pipes that are in the way of proposed buildings.	\$708,750
Irrigation Water	An evaluation of the existing irrigation	The reclaimed water networks on the	\$2,289,470

	<p>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.</p>	<p>north side of the campus are recommended to be connected together to form a single network/looped system. 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. Looped systems are often used to maximize the pressure and redundancy in water networks. It is recommended to develop a looped system by connecting to the existing reclaimed water system at two locations, northeast of the Safety and Risk Management building and southeast of the Residence Parking Lot 14D.</p> <p>Develop a second looped system, shown as Loop #2 in the exhibit, to provide reclaimed water service to the southern portion of the Campus.</p> <p>Construct booster pumps at lateral locations where there is inadequate pressure (conservatively below 60 psi) to increase the water pressure to the necessary design static pressure. A typical 1.5 or 2 horsepower booster pump would raise the water pressure to the needed 30 to 50 psi.</p> <p>It is required that all reclaimed water piping be purple colored and stenciled pipe. All area systems and laterals shall be replaced with purple pipe if connected to the reclaimed water backbone.</p> <p>The ability to isolate reclaimed water system will be addressed by providing valves for each zone.</p>	
<p>Chilled and Heating Hot Water Systems</p>	<p>An evaluation of the existing Heating Systems serving the buildings on the campus revealed that the boilers and</p>	<p>Provide additional heating capacity 10,800 mbh to the existing Central Plant</p>	<p>\$4,543,000</p>

	<p>their associated pumps are adequate to support proposed buildings provided under Phase 1. However, additional heating capacity of 10,800 mbh will be required to support the new facilities proposed as part of the facilities master plan.</p> <p>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 6,000ton-hours of Thermal energy storage will be required to support the full build out.</p>	<p>Provide an additional 6,000 ton- hours of TES tank capacity to the existing Central Plant.</p> <p>Replace existing non compliant AQMD boilers.</p> <p>Provide metering of CHW and HHW system at each building.</p>	
Natural Gas	<p>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 throughout the distribution system.</p>	<p>Replace existing PVC pipe with P.E. pipe.</p> <p>Provide modifications to the existing distribution system to accommodate the proposed buildings as detailed in the report.</p> <p>Provide meters at each building to monitor consumption</p>	\$1,247,732
Electrical	<p>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 their loads shifted to balance them. The bases of few 15kV selector switches that form part of the electrical distribution system were found to be corroded.</p> <p>A few lines were found to be in conflict with the proposed buildings and will need to be relocated.</p>	<p>Balance loads on existing feeders.</p> <p>Relocate lines to accommodate new buildings.</p> <p>Replace 15kV cables at the end of their life spans.</p> <p>Provide meters at each building to monitor consumption</p>	\$3,439,700

<p>Telecommunications</p>	<p>The telecommunications infrastructure was recently upgraded to CSU Standards for the interbuilding pathways, media, and spaces that serve state-owned buildings. They are in good condition and has sufficient capacity to meet the University's requirements for the next twenty five year. Some ductbanks and cables systems will need to be extended in order to service new campus building sites.</p> <p>The proposed locations for some of the proposed building projects are in conflict with existing telecommunications ductbanks. The locations of someproposed building sites will require minor revision to avoid the ductbanks or existing duct banks with cable will require rerouting in order to maintain service to adjacent buildings.</p> <p>The type of station cables are Category 5e and will require replacement with Category 6 type cables, that have recently been adopted as the CSU standard, as new technology is implemented in the buildings.</p> <p>The infrastructure in the majority of the 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.</p>	<p>Adjust boundaries of the proposed building sites to avoid or minimize relocation of existing telecommunications ductbanks.</p> <p>Adopt Category 6 type copper cables as the campus standard. Implement Category 6 type cables for all new/renovation building projects.</p> <p>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.</p>	<p>\$1,109,200</p>
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Total: \$15,870,962