

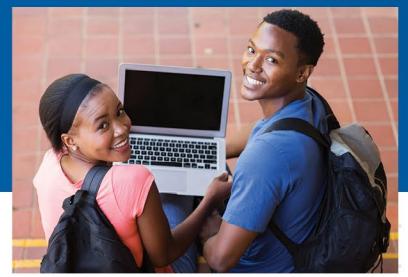

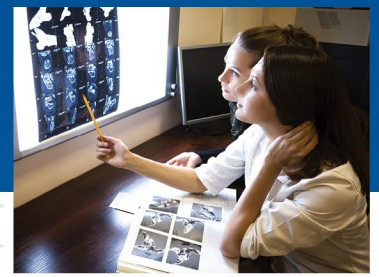

Request for Proposal #218
Construction Manager at Risk

Exhibit C
Central Plant Upgrades – Brenham Campus

Central Plant Master Plan Study 2023

EXECUTIVE SUMMARY

SUMMARY

This executive summary presents the findings and proposed solution from the analysis conducted on the existing central plant. The assessment revealed several issues affecting the performance of the existing central plant, including little to no redundancy, strained capacity, and high head pressures on Loop #3. To address these concerns and ensure the central plant can meet future demands, a two-phase upgrade plan is proposed.

Phase 1 of the upgrade focuses on addressing the immediate issues and improving the operational performance of the central plant. The primary objective is to enhance the pump system, correct the central plant's current capacity shortcomings, and resolve the head loop problems in Loop #3. By upgrading the essential equipment and optimizing the distribution network, the central plant will operate more efficiently and will work towards creating more redundancy in the system.

Phase 2 of the upgrade plan adopts a forward-looking approach to support the campus' master plan through 2040. This phase focuses on two key objectives: replace outdated equipment and address the crucial element of redundancy. The integration of redundant equipment will allow for uninterrupted cooling of the campus buildings in the event of a pump or chiller failure.

The proposed two-phase upgrade approach allows for a well-structured implementation plan, minimizing disruptions and shut-down times during central plant upgrades and all future master plan construction projects.

CENTRAL PLANT TODAY

No redundancy:

The absence of redundancy poses a significant operational risk for the central plant. In the event of a pump or chiller failure, the HVAC system serving the buildings connected to the affected loop will cease to function, leading to potential discomfort and disruption for occupants.

Strained Capacity:

Additionally, the analysis identified that the central plant is operating at or over its capacity during part of the peak season. This strained capacity could compromise its ability to maintain optimal environmental conditions and support occupants' comfort.

Loop #3 Head Pressures:

Furthermore, the analysis revealed high head pressures specifically on Loop #3, indicating imbalance within the distribution system. This imbalance places undue strain on the pumps and associated equipment, leading to decreased efficiency, increased energy consumption, and potentially unsatisfactory indoor conditions.

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Central Plant Master Plan Study 2023

EXECUTIVE SUMMARY

FUTURE CENTRAL PLANT

An analysis was conducted on all three phases of the master plan to determine the central plant's future needs. Upon analysis, it was concluded that the master plan campus build-out does not drastically affect the overall capacity of the central plant. While new buildings are proposed, the demolition of existing buildings will offset the capacity requirements of the new buildings. Rather, the challenge that became evident was the need for flexibility in loop capacity to align with the shift in building locations on campus.

It was concluded that the primary focus of the new central plant should address the identified issues in the existing system, optimize space utilization, establish a more flexible infrastructure, and replace aging equipment that is approaching the end of its operational lifespan. The proposed solution and implementation are outlined in the Phase 1 and Phase 2 scope of work sections below.

The future central plant will feature new, energy efficient equipment

Central Plant Master Plan Study 2023

EXECUTIVE SUMMARY

PHASE 1 SCOPE OF WORK

Phase 1 will include essential equipment changes, pump replacement, central plant piping infrastructure upgrades, adjustments to the campus loop distribution system, and the necessary controls and electrical infrastructure to support the upgraded systems.

The key equipment modifications of Phase 1 consist of three pivotal components: the introduction of a new 250 ton chiller, properly re-connecting an existing 250 ton chiller to the new piping infrastructure, and the refurbishment of an existing 250 ton cooling tower. These strategic enhancements directly tackle the under capacity challenge that the central plant currently faces, while re-utilizing existing equipment to manage cost.

The existing chilled water supply/return pumps will be replaced with four (4) new pumps and re-connected to the existing central plant systems. The pumps will be headered together to provide redundancy to the pumping system. This redundancy ensures that the central plant can continue operating if one of the pumps malfunctions or requires maintenance.

Phase 1 will also involve extensive piping work within the central plant. This piping work will be designed to prepare the central plant for Phase 2 of the upgrade plan. By implementing the necessary pipe work in Phase 1, the subsequent installation and integration of additional equipment and systems in Phase 2 will be quicker and more efficient, minimizing downtime and interruptions to the campus' operations.

Example of pumps with common header

The final key component to Phase 1 includes re-balancing the campus loops in order to reduce the strain on campus Loop #3. An existing lateral connection pipe between Loops 1 and 3 will be utilized to achieve this. By changing position of a few existing valves, three (3) campus buildings will be moved from Loop #3 to Loop #1, providing a more balanced system. This solution offers significant advantages as it eliminates the need for extensive construction or modifications to the underground campus distribution system.

Central Plant Master Plan Study 2023

EXECUTIVE SUMMARY

PHASE 2 SCOPE OF WORK

Phase 2 of the central plant upgrade is dedicated exclusively to introducing new equipment, capitalizing on the groundwork laid with the extensive piping adjustments during Phase 1.

In Phase 2 of the upgrade, the focus will be on replacing the three existing chiller - two at 500 tons each and one at 140 tons. These units, which remained untouched during Phase 1, will be upgraded with new 500 ton chillers, effectively enhancing the central plant's chiller capacity. While the existing cooling towers will be retained, the installation of a new 500 ton concrete cooling tower is planned to accommodate the increased chiller capacity. This updated configuration will provide the desired N+1 redundancy, meaning that in the event of a 500-ton chiller failure, the campus's cooling needs can still be adequately met.

Lastly, for streamlined installation and efficient utilization of the central plant space, the upgraded systems will be installed in the location previously occupied by the old ice system. This will allow the existing equipment to remain in operation during the installation of the new equipment with minimal downtime for equipment switchover.

Upon the conclusion of Phase 2, the central plant will emerge as a modernized and optimized facility. This enhancement readies the central plant to provide excellence in performance and reliability through the year 2040.

Proposed location of future central plant

Central Plant Master Plan Study 2023

EXECUTIVE SUMMARY

CONCLUSION

The existing central plant faces a critical challenge as much of its equipment is aging and approaching the end of its useful life. To ensure a reliable and operational central plant for the campus, upgrading this equipment is imperative in the near future. The central plant upgrade plan, comprising Phase 1 and Phase 2, offers a comprehensive solution to address immediate issues, improve system performance, provide long-term reliability, and support the future needs of the campus.

The proposed plan emphasizes the utilization of existing equipment and infrastructure wherever possible, while simultaneously upgrading outdated components to new and more efficient technologies. This approach ensures a cost-effective solution without compromising the quality and reliability of the central plant.

Existing Equipment: Outdated and Ready for Replacement

Existing Equipment: Outdated and Ready for Replacement

Existing Equipment: Re-use for Cost Savings

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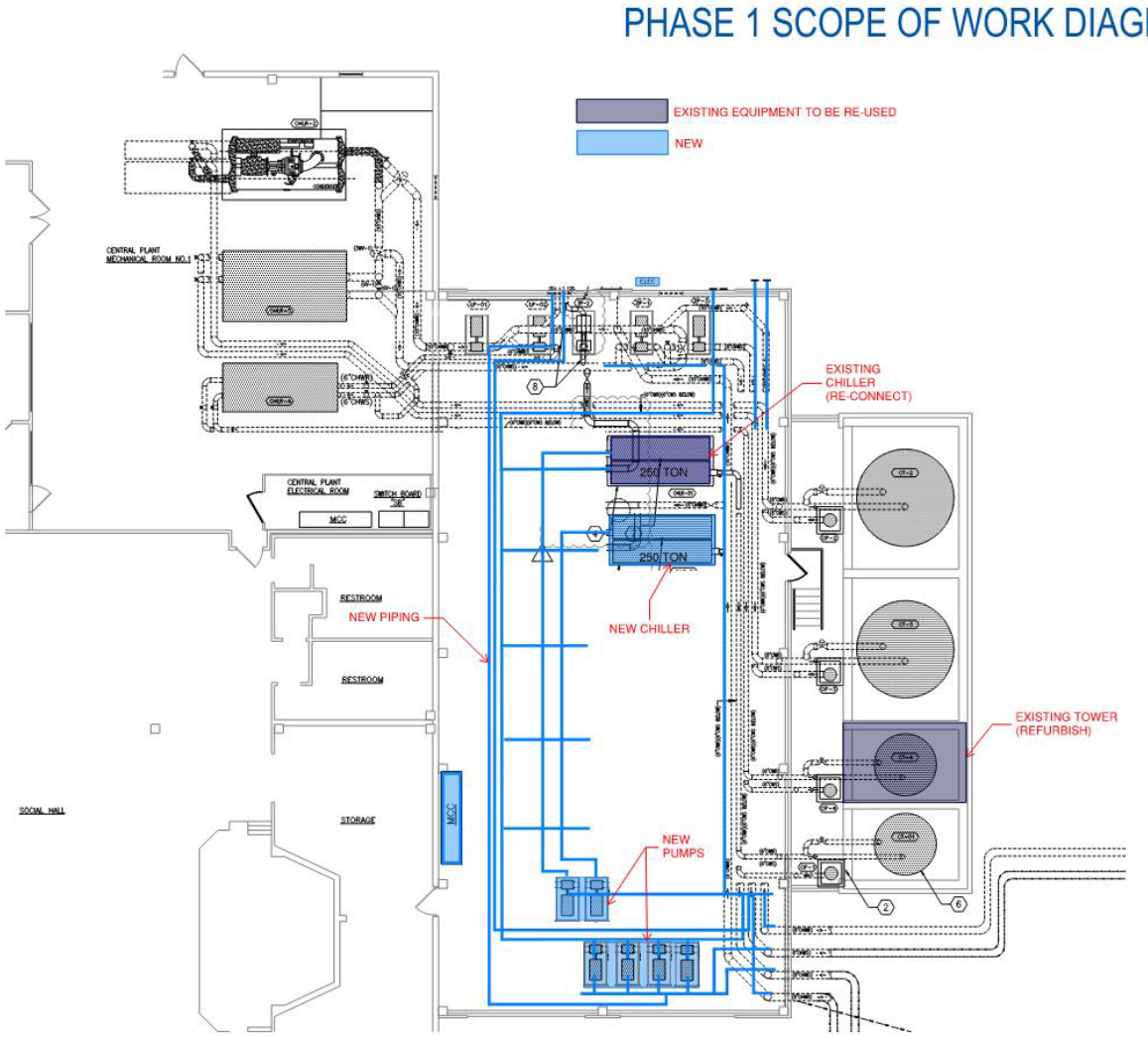

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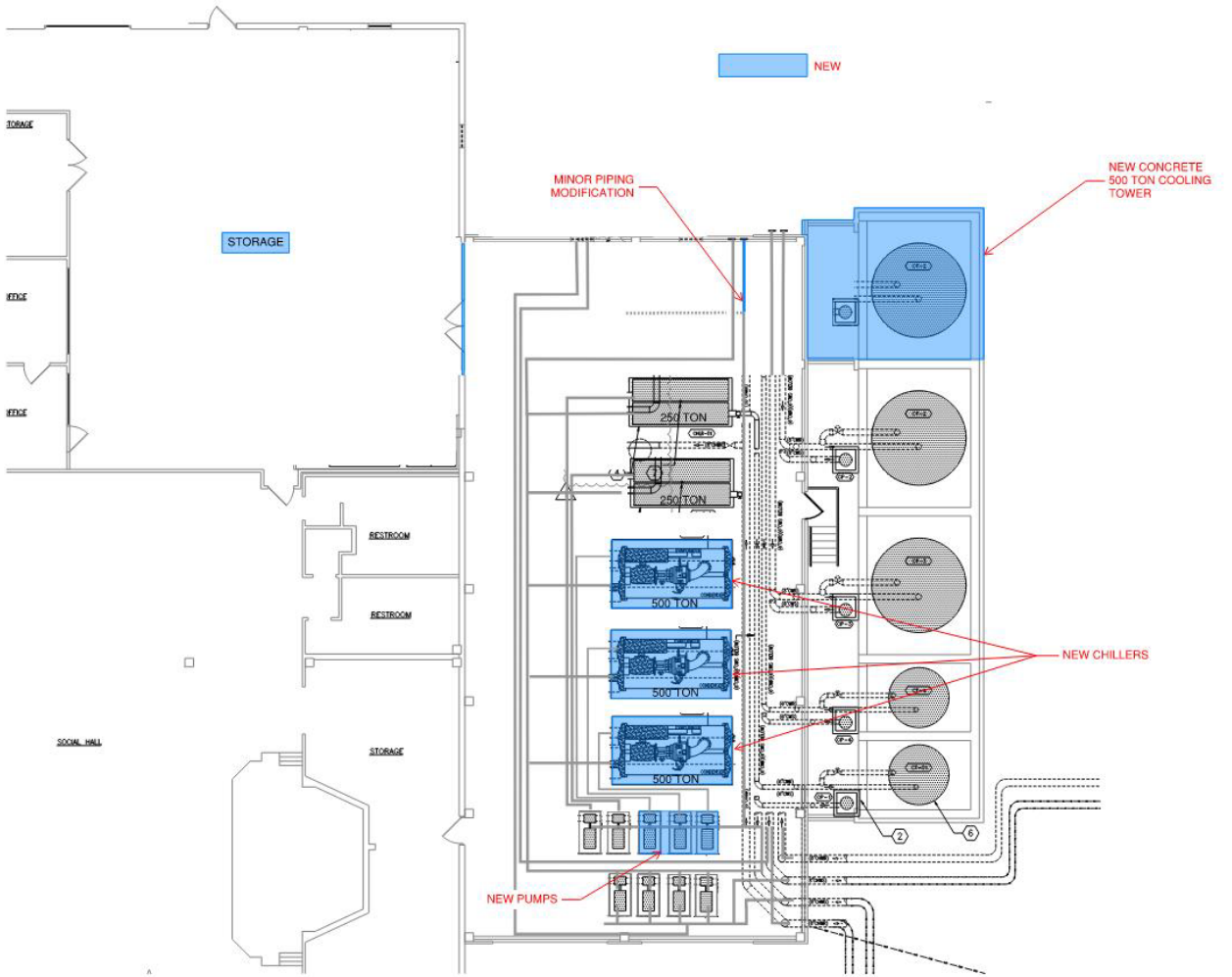
PHASE 2 SCOPE OF WORK DIAGRAM



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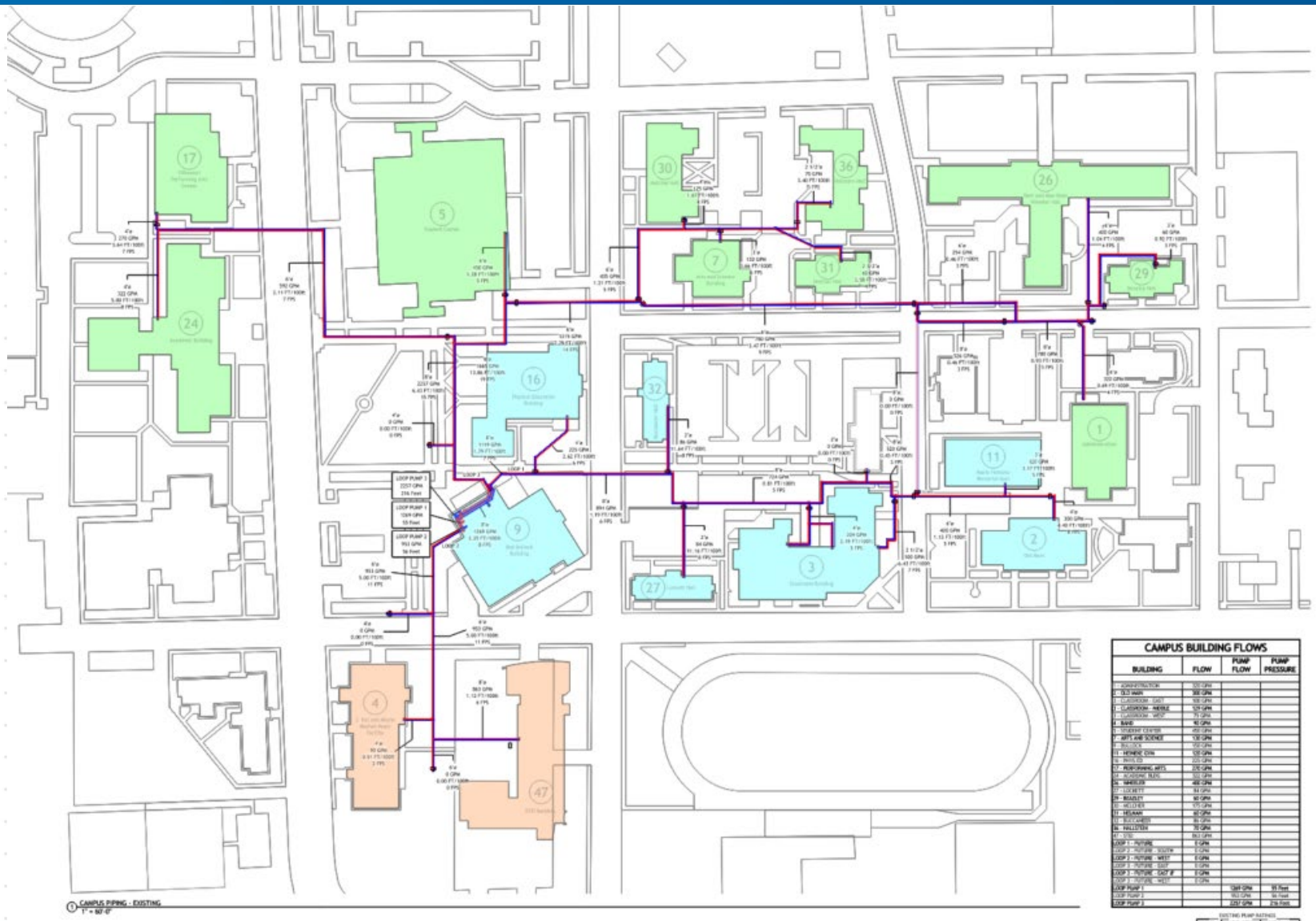

CAMPUS BUILDING FLOWS			
BUILDING	FLOW	PUMP FLOW	PUMP PRESSURE

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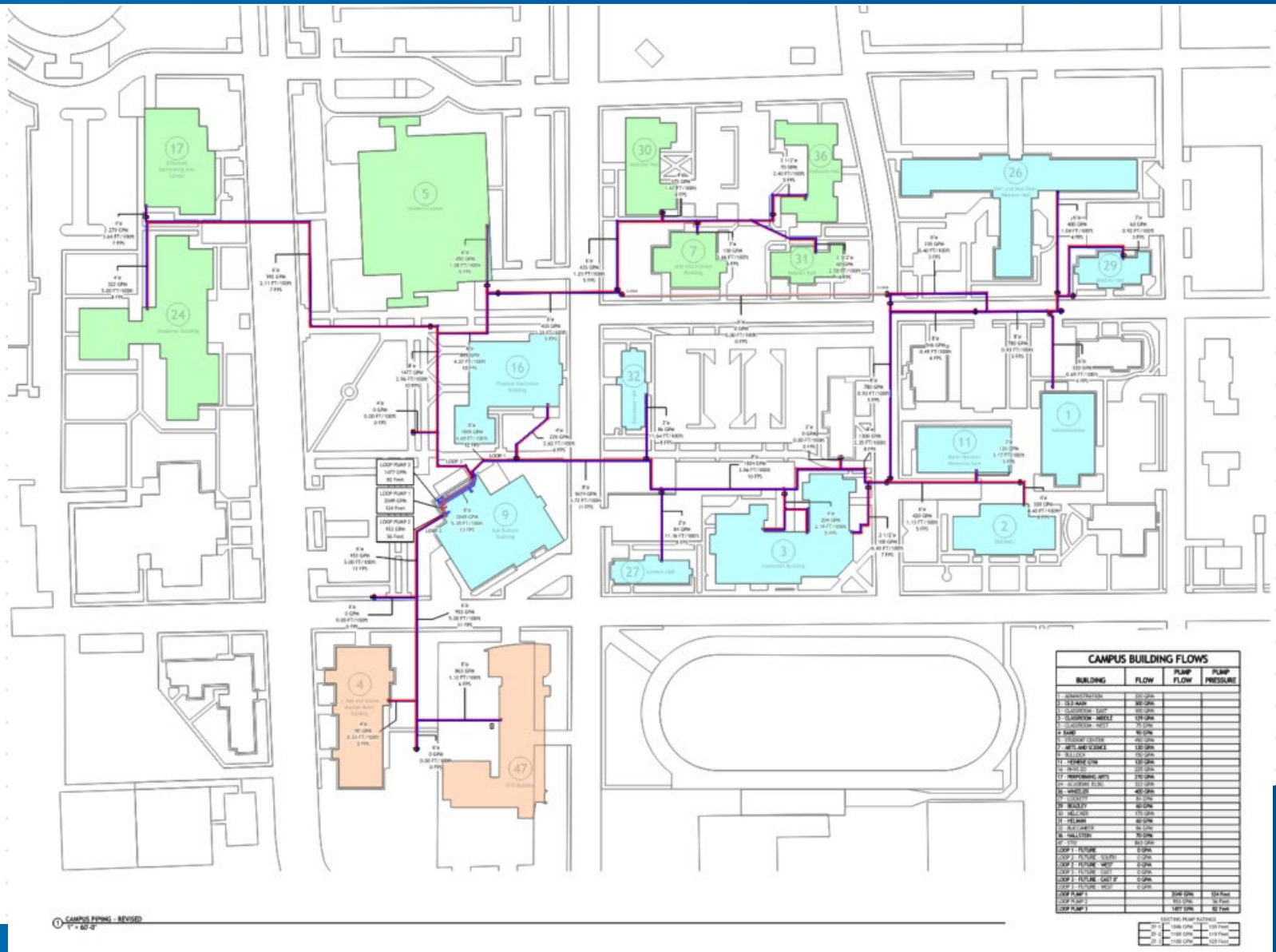

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