

Scott Arboretum
Unique HVAC approach
The Total Campus perspective, aka the TC system

The building includes two primary areas: the greenhouse and workroom which are governed primarily by process requirements, and the regularly occupied areas which are governed primarily by comfort requirements. The process areas are heated by a high efficiency boiler, humidified by a fogging system, and ventilated by operable windows and staged exhaust fans, with direct digital controls to achieve the required environments for growing.

The TC system

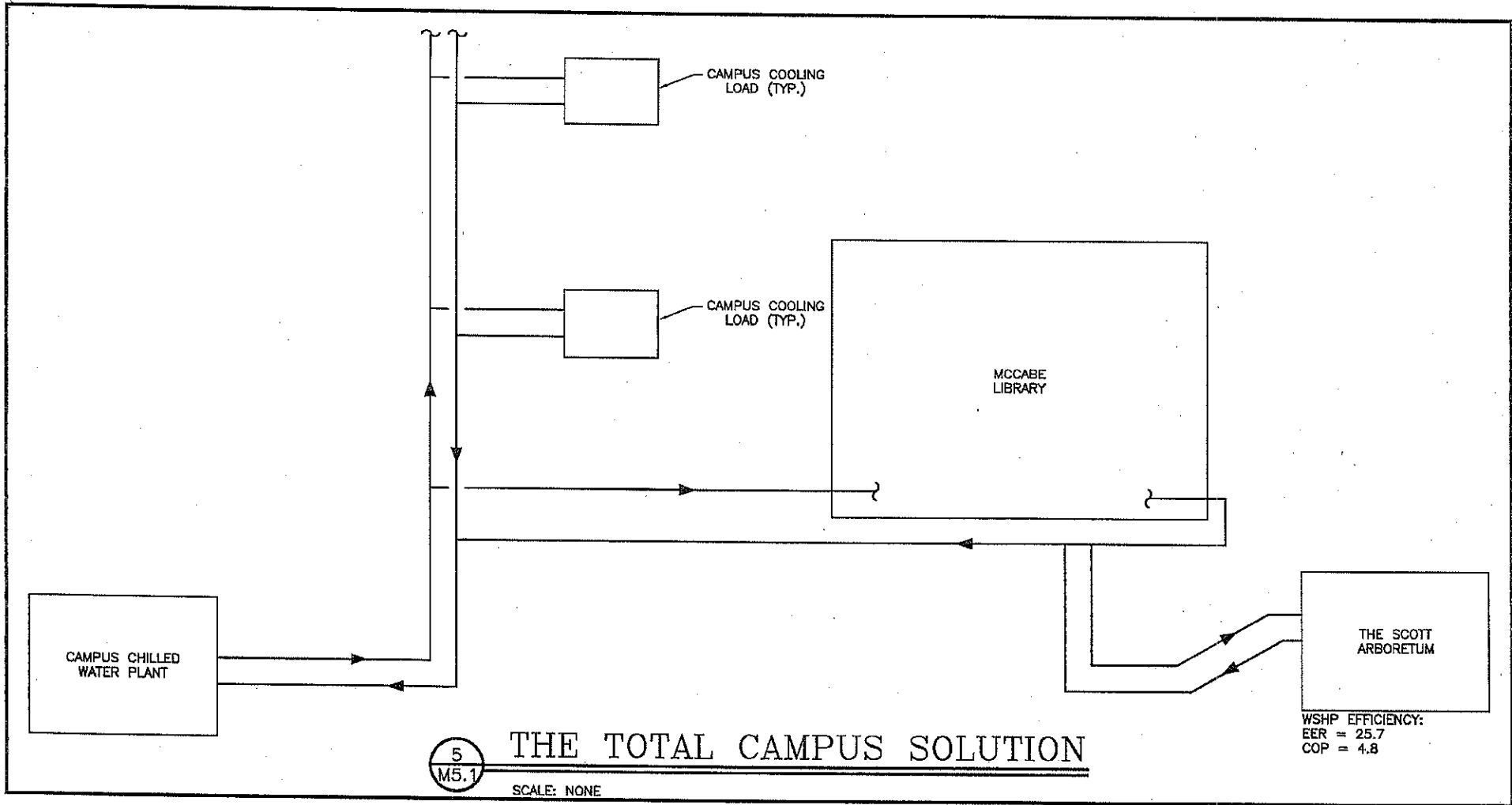
The regularly occupied areas (offices, conference room, volunteer area, etc.) are conditioned with high efficiency, extended range, water source heat pumps. These are served by a horizontal ground loop that also connects to the campus chilled water loop. The connection is made on the return side after the chilled water has been "used" in the library (McCabe Library). This provides a temperature, year-round, in the range of 55 to 65 degrees for the water source heat pumps in the Arboretum building.

In the winter season the system uses the campus chilled water loop to transfer excess heat from other locations on campus where cooling is required (such as computer rooms and labs) to the Arboretum building where heat is desired. As a byproduct of this approach, there is a further benefit in offsetting the central plant chiller operation that would otherwise be required for these relatively small year-round loads. The (variable speed) campus chilled water loop pumps need to operate in any case so there is no energy penalty associated with the chilled water circulation.

In the summer season the Arboretum building cooling load in series with the library cooling loads slightly increases the temperature differential for an improvement in efficiency of the central plant chillers.

The resulting operating temperatures are very favorable for highly efficient heat pump operation and we predict ??% efficiency improvement over ground-coupled heat pumps, and a ??% improvement over a traditional boiler/chiller system.

By looking at the needs of the Total Campus, and how this building fits into the overall energy use picture, the team arrived at a synergistic solution that is truly a benefit to both the building and the campus.



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THE SCOTT ARBORETUM
OF SWARTHMORE COLLEGE
EDUCATION CENTER AND GREENHOUSE

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