DESIGN GUIDELINE 4.6
UTILITIES FOR UNIVERSITY BUILDINGS

Scope

This section discusses building utilities associated with U-M facilities; both utilities that are provided by the University from central sources, and utilities that are provided by non-University sources.

Related Sections

Special Building Areas:
5.9 SBA-H Tunnels

Design Guideline Technical Sections:
220010 Plumbing Specialties
230050 Chilled Water Systems

Utility Distribution Overview

The University distributes electricity to the Central, Medical, and North Campuses and parts of the Athletic/ South Campuses.

Central Campus Utilities provided by the University's Central Power Plant (CPP) include:

- Electricity
- Low Pressure Steam (ranges 6 psig to 12.5 psig (saturated steam)). See discussion below.
- Medium Pressure Steam: (60 psig (saturated steam))
- Steam Condensate (pressure varies throughout the system, consult with U-M steam distribution modeler (AEC Mechanical Dept.) though the U-M Design Manager for backpressure design requirements)
- Compressed Air (90 psig. Dewpoint: Under revision as of 2019. Consult UM Design Manager.)
- Domestic Hot Water (50 psig, 125°F, un-softened, pressure varies throughout the system, consult with AEC Mechanical Group though U-M Design Manager for design requirements).

The utility properties described above are guaranteed at the point the utility enters the building.

In parts of the Athletic and South Campus, high pressure (60 psig) steam with condensate return is provided from the University's Hoover Street Heating Plant.

Other facilities may have regional or local steam systems capable of providing adequate capacities. Steam pressures may vary for these systems. Where these capacities exist, the proposed facility shall utilize them. Coordinate facility loads and intent with the U-M Design Manager. Utilities and O&M Engineering, through the U-M Design Manager, will determine and provide the locations and capacities of existing systems.

University Provided Utilities

Steam - Central Campus

Low pressure steam (LPS) should be used for building heating and humidification loads and for absorption chiller cooling, because of the economy of generation and cogeneration in the Central Power Plant. Refer to Design Guideline Technical Section 230050 Chilled Water Systems and consult with U-M Design Manager before deciding on chiller type (absorption or electric).

LPS pressure varies depending upon the distance from the CPP. For preliminary sizing LPS can be assumed to operate within the pressure range given above; connections closer to CPP should assume pressure in the upper end of the range, far from the CPP in the lower end of the range. For final sizing, consult the U-M steam distribution modeler (AEC Mechanical Dept.) through the U-M Design Manager for precise information. Designs for extremely critical loads should take into account that unplanned (unusual) service interruptions could result in total loss of steam.

Because of power plant economy, Central Campus High Pressure Steam (60 psig) use is generally limited to the following applications:

- For critical buildings such as research labs and medical clinics, where sufficient HPS capacity is available, HPS via a pressure regulating valve should be used to provide redundancy to the building low pressure steam supply during interruptions. Refer to Special Building Areas 5.9 Tunnels for additional discussion on requirements for PRV's and back-up steam.
- Special equipment requiring higher temperature source steam, such as sterilizers.
- Multi-zoned application of "clean steam" humidifiers. "Clean steam" is defined as the steam generated from campus steam via a heat exchanger, using high purity water for makeup. Single zone clean steam shall be generated from LPS, but where multiple and separately controlled building zones must be fed from a single steam generator, HPS may be used.

HPS steam shall not be used to boost existing nominal LPS pressure to higher pressures.

Steam Condensate

Central Campus condensate from low pressure steam shall be vented to atmosphere and pumped to the campus distribution system at minimum 30 psig pump discharge pressure. Condensate from high pressure steam shall be routed to a flash tank prior to connection to condensate receiver unit. Consult with U-M steam distribution modeler (AEC Mechanical Dept.) through the U-M Design Manager for required backpressure at point of connection to tunnels. South/ Athletic Campus condensate shall be similarly returned to the Hoover Street Heating Plant.

Domestic Hot Water – Central Campus

New domestic hot water (DHW) connections on Central Campus should not make use of the central campus domestic hot water return (DHWR) system. Provide DHWR and return water re-heating system internal to the building, typically using low pressure steam and a shell and tube heat exchanger. Refer to Special Building Areas 5.9 Tunnels. Provide backflow prevention via a

UL approved double check valve assembly on DHW as it enters the building. Refer to DG Technical Section 220010 regarding type of backflow prevention.

Chilled Water - Regional Plants

Chilled water from regional chilled water plants is available at some locations on North Campus and Central Campus. Where regional chilled water is available and suitable for the intended loads (temperature, reliability, seasonal variability etc.), it should be utilized. Contact the U-M AEC Mechanical Department through the U-M Design Manager for direction.

Non-University Provided Utilities

Within the City of Ann Arbor service area, potable/ city water shall be connected to City of Ann Arbor water system. Coordinate with U-M Design Manager on City of Ann Arbor review process and requirements.

Storm/ Sanitary Sewer: Coordinate with U-M Design Manager on City of Ann Arbor review process and requirements.

Natural Gas: Coordinate with DTE and U-M Design Manager on new or modified natural gas load or pressure requirements.

Utility Corridors

The U-M has defined Utility Corridors in many areas on campus. Wherever possible, new underground utilities shall stay within established corridors. Coordinate with U-M AEC University Planners Office via U-M Design Manager.

Easements

Non-University provided Utilities on University property and University provided Utilities on Non-University property (including City of Ann Arbor or M-DOT controlled property; sidewalks, streets and Right of Way) require an easement.

The review process and process of securing easements can often be lengthy. In addition to any City, State or Non-University Utility review processes, U-M AEC University Planners Office (U-M UPO) must approve all requests for easements and right of way agreements. All documents (excluding permits) will be processed through the U-M AEC Real Estate Office (U-M REO) Coordinate with U-M UPO and REO via U-M Design Manager

Metering

The following utilities shall be metered in accordance with methods and means specified in other sections of the Design Guidelines:

- Electricity.
- Central Campus Steam Condensate.
- Steam, where humidification loads are greater than 500 pounds of steam per hour.
- Chilled water from regional plants – flow and BTU metering.

- Domestic Cold Water
- Fire Protection Water (bypass only)
- Natural Gas

Recharge metering (Plant level)

All regional plants (providing energy to more than one building), including steam generation and thermal energy source/utility plants, are to be metered at plant level to show total production of the plant. The commodities used to create the regional plant energy, such as electricity and steam, are also to be metered at a plant only level. Regional plant level metering shall include all subsystems, such as cooling towers, condenser water pumps, plant distribution circulation pumps, etc., at the plant level.

Recharge metering (Building level)

Any building tied into a regional plant shall be metered at the building level. This applies to steam, steam condensate, chilled water, and heating hot water utilities.

Buildings utilizing steam for humidification are required to have meters for both steam and steam condensate. Buildings not using steam for humidification only require steam condensate meters.

Domestic Cold Water, cooling tower make-up water and cooling tower blow down, irrigation water and fire protection backflow prevention bypass (detector check bypass) shall be metered separately in accordance with the City of Ann Arbor standards. Refer to Design Guideline 220010 Plumbing Specialties.

Domestic Hot Water (from Central Campus system) does not require metering as it enters the building.