(campus name)
Campus Mechanical and Electrical Standard Requirements
For New Construction and Renovation Capital Projects

Campus Mechanical Standards

The following section documents the current campus standards with respect to mechanical equipment, energy efficiency and connections to the central utilities.

Campus Climatic Data:

The closest climatic data in the ASHRAE Region X Weather Data is City (Enter text), CA. The campus mean elevation above sea level is Elevation (XX) feet.

Summer Design Day Temperatures

0.1% - (XX) °F DB / (XX) °F MCWB – used only for critical facilities

0.5% - (XX) °F DB / (XX) °F MCWB – used for most campus buildings

0.5% - (XX) °F WB – used for sizing cooling towers

Winter Design Day Temperatures

0.2% - (XX) °F DB

Chilled Water System:

The campus utilizes a central plant with CHW thermal energy storage and … to meet the campus cooling requirements.	
Plant CHWS Temperature:	(XX) °F
Plant CHWR Temperature:	(XX) °F
Available CHW ΔP:	(XX) PSID
Building Connection:	Design team shall design the chilled water piping distribution system (piping, valves, fittings, coils, etc.) within the building to a maximum pressure drop of Pressure (XX) feet head, whenever possible. If it is proved that this is not feasible, a variable speed booster pump arrangement should be designed to maintain differential pressure at the hydraulically remote location in the building loop. A bypass with a check valve shall be provided to allow the building to operate without the booster pump when the central plant differential pressure is adequate to supply the building loop. Pump head calculations should be provided for all booster pumps. (Refer to attached building connection schematic)

Building Metering Requirement:	CHW BTU meter that will operate reliably down to 0.(X) fps velocity. Refer to CSU Metering Guidelines at www.calstate.edu/cpdc/ae/
Underground Piping Material and Fittings:	

Heating Hot Water System:

The campus utilizes a central plant/distributed boilers (EB, LA) to meet the campus heating requirements. CA policy requires carbon neutrality no later than 2045. The CSU desires to reduce its reliance on fossil fuels for heating so heat recovery and electric sources should be evaluated.	
Plant HHWS Temperature:	(XX) °F
Plant HHWR Temperature:	(XX) °F
Available HHW ΔP:	(XX) PSID
Building Connection:	Design team shall design the heating hot water piping distribution system (piping, valves, fittings, coils, etc.) within the building to a maximum pressure drop of Pressure (XX) feet head, whenever possible. If it is proved that this is not feasible, a variable speed booster pump arrangement should be designed to maintain differential pressure at the hydraulically remote location in the building loop. A bypass with a check valve shall be provided to allow the building to operate without the booster pump when the central plant differential pressure is adequate to supply the building loop. Pump head calculations should be provided for all booster pumps. *(Attach building connection schematic)*
Building Metering Requirement	HHW BTU meter that will operate reliably down to 0.(X) fps velocity. Refer to CSU Metering Guidelines at www.calstate.edu/cpdc/ae/
Underground Piping Material and Fittings:	

DHW and IHW:

All new domestic and industrial water heating shall be achieved with dispatchable, low carbon fuel sources.…

Air Handling System:

Air handling units should be located inside the building whenever possible. If the units are located exposed to the weather on the roof these units should be of double wall construction. Ductwork and piping for these units should be located within the attic space. Roof mounted ductwork and piping should be minimized.

Filters shall be MERV 13, extended media filter (Aerostar FP mini-pleat V-Bank or equivalent) with no pre-filter for most applications.

Airflow monitoring shall be provided for outside air flow measurement

Define any exterior corrosion protection requirements

Air handling units should be provided with a convenience electrical outlet for maintenance. Power shall be available for servicing when power to the unit is shut off.

Control valve and balancing valve preferences [*Design consultant shall contact the campus project manager for this information*]

Fan Coil Units:

The use of fan coil units (FCU) is discouraged because excessive sound is transmitted into the space from the fan coil units and it is not cost effective to provide an economizer on a fan coil unit. When a fan coil unit must be used on a project, measures shall be taken to reduce the transmission of the noise from the unit into the occupied spaces.

Off-Hour Cooling:

Spaces requiring routine weekend or holiday ventilation cooling and / or heating requirements, or spaces of such a critical nature as to necessitate redundant cooling and / or heating provisions shall be provided with …

Chilled Water Coil Selection:

The chilled water system utilizes a thermal energy storage (TES) tank to store chilled water during off-peak periods. It is critical that all cooling coils connected to the chilled water system be designed to be compatible with the thermal storage system temperature differential utilized on the campus. [*If the campus does not have a TES system then this paragraph should be deleted*]

The campus standard coil construction is aluminum [copper (*when the campus is within 5 miles from the ocean*)] fins on copper tubes with the following parameters.

<u>New Construction Coils</u>

5 tons and larger	Minimum XX °F CHW ΔT, XX °F to XX °F. The coil shall be sized for maximum XX FPM, minimum XX -row, and maximum XX fins per inch.

< 5 tons	Minimum XX °F CHW ΔT, XX °F to XX °F. The coil shall be sized for maximum XXX FPM, minimum XX -row, and maximum XX fins per inch.

Replacement Coils

5 tons and larger	Minimum XX °F CHW ΔT, XX °F to XX °F. The coil shall be sized for maximum XX fins per inch.
< 5 tons	Minimum XX°F CHW ΔT, XX °F to XX °F. The coil shall be sized for maximum XX fins per inch.

Heating Hot Water Coil Selection:

HHW coils should be selected with maximum 130°F HHWS temperature and minimum 20°F ΔT to be compatible with future low temperature hot water reheat system. This typically requires 2-row coils.

Motors:

All new motors used throughout the facility shall meet premium efficiency motor requirements.

Control System:

Controls contractor contact information

Does campus have standard control devices it prefers?

Define any specific campus control requirements?

See CSU BAS Procurement Guide at Calstate.edu/cpdc/ae

Water Chemical Treatment:

Water Chemical Treatment company contact information

Campus Electrical Standards

The following section documents the current campus standards with respect to electrical power and lighting systems.

Electric Power Service and Site Distribution:

The campus receives electric power service from (utility) at (voltage) through the (name) substation. Power is distributed on campus at (voltage) kV through a (loop) (radial) distribution system that includes (sectionalizing selector switches).

Campus Electric Power Distribution System:

Service Voltage: (XX) kV

Circuit Ampacity: (XX) A to (XX) A

Allowable Voltage Drop to Building Transformer: 2.5%

System Short Circuit Duty

The design engineer shall request the short circuit duty design criteria from the campus and be provided with the latest version of the campus electrical power system study. The design engineer shall calculate equipment and interrupting device rating requirements. The design engineer shall provide data files for use by the campus to update the campus power system study.

Protective Device Coordination

The design engineer shall obtain the protective device coordination study and coordination criteria from the campus. Protective device coordination shall comply with IEEE Standard 242, Recommended Practice for Protective Device Coordination. The design engineer shall provide data files for use by the campus to update the campus power system study.

Loop and Radial Feeders

Loop feeders shall be sized to match existing loop feeders and have the capacity to serve all connected building loads connected to the loop feeder. Radial feeders shall be sized to serve the building load(s). Both radial and loop feeder conductors shall be sized to limit voltage drop to 2.5% and be capable of withstanding the worst-case short circuit study duty without sustaining thermal damage. The distribution cable conductor can be copper (or electrical grade aluminum) and shall be UL MV-105 rated.

Building Service Transformer

The building service transformer rating shall be determined after the 50% CD design is complete and the building load is known. The kVA rating shall be based on application of a demand factor to optimize the kVA rating. The demand factor will be based on building occupancy. The transformer should have a minimum of 25% spare capacity after application of the demand factor. The building transformer shall be sized initially for the maximum or ultimate load where the building, buildings, or loads to be supplied by the transformer are constructed in phases.

Building Electrical System:

Building Metering Requirement

A revenue grade power meter that is compatible with the building EMS and campus energy management system shall be provided. The power meter current transformers (CT's) shall be sized to match the peak load and have a rating factor of 2.0. The building meter shall have communication capabilities that allow for remote data retrieval and be compatible with the building EMS, BMS and campus utility management systems and software.

Building Wiring

Conductors shall be copper. The voltage drop within a building shall not exceed 5% total from the service switchboard to the load. Voltage drop calculations shall be provided.

Feeders and branch circuits shall be installed in conduit. The use of armored cable (AC) or metal clad cable (MC) shall be reviewed with the campus on a case-by-case basis.

Building Power Transformers

Transformers installed indoors shall be lower temperature rise (115ºC max) and shall be high efficiency type with low losses compliant with CEC and ASHRAE requirements. Transformers supplying non-linear loads shall be K-rated. Harmonic studies shall be performed in accordance with IEEE Standard 519.

Building Lighting System

The building indoor and outdoor lighting systems shall comply with Title 24 requirements and provide for additional energy savings beyond Title 24. Additional energy savings shall be achieved through the use of energy efficient lamps and ballasts, occupancy sensors, daylight control of dimmable ballasts, and programmable controllers to reduce energy on demand and through programming. The design engineer shall be provided with campus lighting standards and campus control requirements.