UNIVERSITY OF CALIFORNIA, IRVINE, MEDICAL CENTER, CENTRAL UTILITY PLANT EXPANSION

CATEGORY 3: INFRASTRUCTURE

The University of California, Irvine Medical Center, Central Utility Plant Expansion project consisted of two new plants which provide central cooling and backup power generation for the OSHPD and Non-OSHPD functions at the medical campus. The new plants consolidate several existing rooftop systems and provide chilled water for cooling of the existing campus as well as several future expansion projects.

The total project construction cost was roughly $52 million and the infrastructure will provide services to a campus that serves over 400 hospital beds and 600,000 patient visits per year. Although the RFP outlined a plan to leave the existing chillers in place and supplement the system with new “chiller in a box” plants, the design-build team quickly realized that this would present challenges and inefficiencies in the system. Therefore the team proposed a creative solution to abandon the existing, inefficient equipment yard and replace the outdated systems with new equipment in two new buildings.

While the lateral systems and the code allowable drifts differed for each structure, both buildings were designed with a 1% drift limit in order to avoid large post-earthquake residual drifts and limit damage to deformation sensitive non-structural components. Considering these items in design should provide a higher level of confidence in the functional recovery of these plants following an earthquake.

DESIGN-BUILD PROJECT TEAM

Owner: University of California, Irvine Medical Center

Structural Engineer: Degenkolb Engineers

Architect: Devenney Group, Ltd.

General Contractor: Kitchell Contractors Inc.

MEP Designer: TK1SC

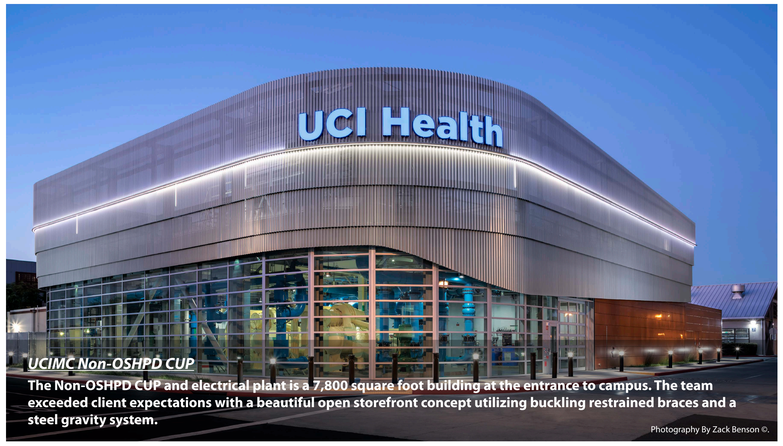
Mechanical Sub-Contractor: Control Air Conditioning Corporation

Electrical Sub-Contractor: Morrow-Meadows Corporation

Site Focal Points

While most Central Utility Plants (CUP) are industrial, back-of-the house facilities, each of these buildings serves an aesthetic focal point for the UCIMC campus.

- **A** The **OSHPD CUP** is located in a more industrial part of the medical campus, it is directly adjacent to the I-5 freeway and is highly visible to hundreds of thousands of daily commuters.
- **B** The **Non-OSHPD CUP** is located at one of the major entrances to the campus and thus there was a focus on drawing attention to the building and its contents, rather than hiding elements behind a solid wall.



UCIMC Non-OSHPD CUP

The Non-OSHPD CUP and electrical plant is a 7,800 square foot building at the entrance to campus. The team exceeded client expectations with a beautiful open storefront concept utilizing buckling restrained braces and a steel gravity system.

Photography By Zack Benson ©.

UCIMC OSHPD CUP

The OSHPD CUP is an 4,200 square foot Special Reinforced Concrete Wall building with a steel framed gravity system. The new plant will serve the campus’s 400 hospital beds and other imperative functions of the hospital.

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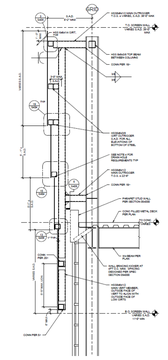
1 BRBF Enhancements

- An exposed lateral system at the Non-OSHPD plant allowed for an open storefront concept to highlight the building contents.
- Deep columns and beams typical of a moment frame system were avoided by incorporating the braced frame system into the aesthetics at the front of the building.
- BRBF system was designed to 1% drift limit for enhanced seismic performance to aid functional recover post-EQ.

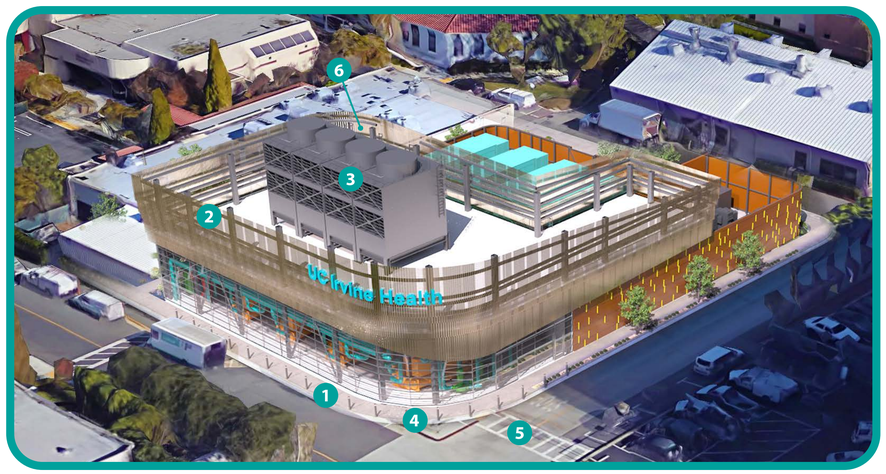
2 Aesthetic Roof Screens

- Degenkolb extended the perimeter building columns above the roof to support the 25 foot tall perimeter roof screen.
- A bolted HSS wind girt solution was proposed to ensure that the structural solution was efficient, constructible, and would provide tolerances in the system for proper panel installation.
- The front of house Non-OSHPD structure utilizes a screen with steps in the face of wall, large sweeping curves, and varied elevations at the top and bottom of the screen.



3 Rooftop Cooling Towers

- Four large (~50,000 lb each) cooling towers installed on each building’s roof.
- Creative design freed up valuable real estate for other campus programming.
- Platform for two future cooling towers at the Non-OSHPD building required careful consideration of the the building’s torsional response pre and post installation.



4 Chillers and Distribution System

- Existing infrastructure equipment was replaced with new, highly efficient equipment and insulated piping.
- New systems will increase plant efficiency helping future projects achieve LEED certification and lower operating costs for the campus.
- Additional space provided to increase the CUP capacity for future expansion and development of the campus.

5 Deep Foundations

- CIDH piles were used in lieu of the shallow foundations proposed in the RFP.
- The team was able to minimize the overall building footprint and maximize the interior space on the tightly constrained site.
- Deep foundations allowed the building to be constructed close to the adjacent OSHPD tunnel without surcharging the tunnel and requiring supplemental strengthening.

6 Roof Access Stairs

- Exterior stairs were provided at each building to allow easy roof access for the facility maintenance teams.
- The Non-OSHPD building required a seismically independent stair system due to site constraints.
- Stair system was designed to “float” above the building roof by utilizing a cantilevered stringer to maintain structural independence.

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