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HEALTHCARE

## PROJECT EXPERIENCE

## Healthcare

### Sacred Heart Medical Center – Women’s Services & Surgery Center, West Wing Addition

Spokane, Washington

Mechanical engineering services for a 235,000 s.f. eight-story addition and 88,500 s.f. remodel to an existing medical center located on a bluff above the downtown area of Spokane. The addition included 24 operating suites, central processing and sterilization department, birthing center, neonatal intensive care (NICU), laboratories, and physician clinics. New boiler plant and emergency generator plant were provided to support the new facility. Existing chiller plant was upgraded and replaced to provide the additional 1,500 tons of chiller capacity, additional medical vacuum plant equipment, and steam boiler plant accessory replacements. New medical gas manifolds were also provided to support the new facility. High-rise stairwell and elevator shaft pressurization systems and fire sprinkler systems were provided for life safety.



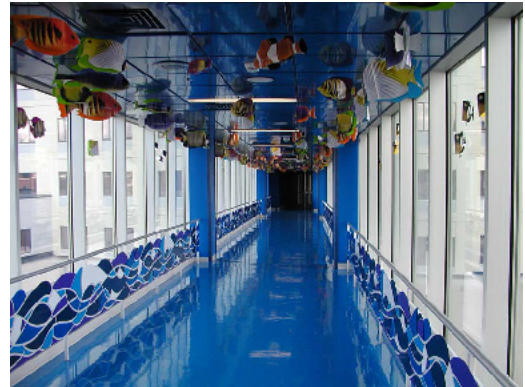
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## PROJECT EXPERIENCE

## Healthcare

### Sacred Heart Medical Center – Children’s Hospital, East Wing Addition Spokane, Washington

Mechanical engineering services for a 62,000 s.f. two-story pediatric services addition. The addition consisted of two floors constructed above an existing nine-story wing of the medical center and includes a pediatric oncology floor and an administrative and clinic floor. Mechanical design includes rooftop custom-built air handling units that are provided chilled water and heating water from the existing boiler and chiller plants of the medical center. High-rise stairwell and elevator shaft pressurization systems and fire sprinkler systems were provided for life safety.



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## PROJECT EXPERIENCE

## Healthcare

### Sacred Heart Medical Center – Chiller Plant Upgrade Spokane, Washington

Mechanical engineering services for the upgrade and expansion of the existing chiller plant as a portion of the work for the West Wing Addition – Women's Services & Surgery Center project. One existing 400-ton water-cooled centrifugal chiller was replaced with a 1,480-ton centrifugal chiller and an existing 1,100-ton chiller was relocated and modified to increase the cooling capacity to 1,198 tons. An existing 1,100-ton water-cooled chiller remained. The new total capacity of the plant is 3,778 tons. The existing primary pumping/piping arrangement was replaced with a new secondary/primary arrangement. All chilled water and condenser water piping was replaced within the plant with welded piping. All chilled water, condenser water, and secondary pumps were replaced with new vertical in-line pumps with variable frequency drives provided for the three secondary chilled water pumps. Two existing cooling towers were replaced with one 1,480-ton tower and one 1,198-ton tower. The existing chilled water distribution system was analyzed for proper flow control that resulted in the change-out of existing 3-way control valves to 2-way valves and the installation of hydronic balancing valves at existing cooling coils throughout the healthcare facility.

## PROJECT EXPERIENCE

### American Hospital Dubai – Outpatient Clinics Building Dubai, United Arab Emir- ates



## Healthcare

Mechanical engineering services for the new Outpatient Clinics and Administration Building located in Dubai. American Hospital is a 120-bed acute care, general medical/surgical hospital which aims to provide high quality American standard healthcare for Dubai and the UAE. It is the first hospital in the Middle East to be accredited by the Joint Commission International Accreditation (JCIA), a subsidiary of the U.S. based Joint Commission on Accreditation of Healthcare Organizations (JCAHO). The new outpatient clinics building is a four-story structure with a full basement covering 190,000 s.f. of floor area with a full-height, fully-enclosed, glass atrium. Due to an extremely high water table, the basement was designed as a “bath tub” to resist the hydrostatic forces thus requiring the utilities to enter the building above grade level. Mechanical systems include rooftop mounted air-cooled chillers, floor-by-floor air handling units, variable-air volume terminal units, dedicated outside air units for humidity control of ventilation air, domestic water treatment system, smoke removal system for atrium, and fire protection systems throughout the facility.



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## PROJECT EXPERIENCE

## Healthcare

### Children's Hospital and Medical Center – A and B Wings Remodel & Expansion Seattle, Washington



Mechanical engineering services for the remodel of A and B wings 31,300 s.f. on Level 1 and 10,200 s.f. of basement infill. Remodel consisted of converting Hospital Administration offices on Level 1 to patient care areas and patient rooms, isolation rooms, nurse stations, and treatment rooms; and providing Hospital Administration offices, conference rooms and work stations in new basement infill. Design included the upgrade of the existing supply air cooling system. The upgraded air system was converted to a full outside air supply system with heat recovery, constant volume terminal units for patient care areas and variable-air volume terminal units for administration and support areas. Design provided HVAC air flow controls for patient isolation rooms to allow for the manual selection of air pressure relationship (positive or negative) with the corridor and adjacent rooms. Medical gas and vacuum systems were extended to rooms throughout the patient care area. Elevator shaft pressurization fans were provided for two of the Hospital elevators for life safety operation.

### Children's Hospital and Medical Center – Clinical Research Center Seattle, Washington

Mechanical engineering services for the remodel of I wing on Level 7. Remodel consisted of providing exam rooms, procedures room, nurse station, and offices for the Clinical Research Center. Design included the redistribution of HVAC supply air with new reheat boxes, exhaust air ductwork revisions, extension of lab gas and vacuum systems, and HVAC upgrade for exit corridor fire/smoke requirements.



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## PROJECT EXPERIENCE

## Healthcare

### Children's Hospital and Medical Center – Dialysis Treatment Center

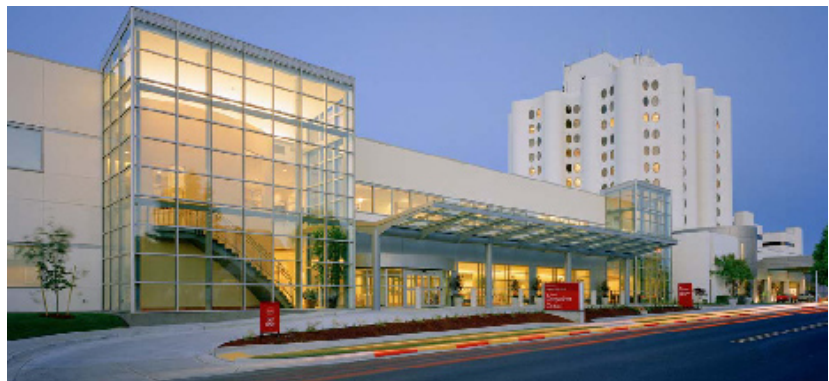
Seattle, Washington

Mechanical engineering services for a complete remodel design of the dialysis areas on Level 2 of the A and B wings. Mechanical design included a dialysis piping loop with customized valve and drain wall boxes for five dialysis stations, Reverse Osmosis water generating equipment room, patient isolation room, medical gas and vacuum system extension, and HVAC revisions with new zone reheat boxes.



### St. Joseph Medical Center – Outpatient Center

Tacoma, Washington



Mechanical engineering for a new 152,000 s.f. outpatient center. Project also included expansion of the central chiller plant and revisions to the piped utilities .

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## PROJECT EXPERIENCE

## Healthcare

### St. Joseph Medical Center – Chiller Plant Study Tacoma, Washington



Mechanical engineering services and energy analysis for the evaluation of existing chilled water plant and chilled water distribution system capacities and configurations for comparison to the future cooling needs of the 580,000 s.f. hospital and health care center. Evaluation included the computer simulation of the entire facility and calculation of life-cycle cost analyses based on energy efficiency, reliability, economics, and environmental concerns. Chiller plant study also analyzed alternative equipment to replace the existing electric powered centrifugal chillers, such as electric rotary chillers, steam absorption machines, direct-fired gas chillers/heaters, gas engine driven centrifugal chillers, cogeneration, and thermal storage systems. Energy efficient measures were identified to be included in the subsequent design of an upgraded chiller plant.

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## PROJECT EXPERIENCE

## Healthcare

### Kootenai Medical Center – Health Park Post Falls, Idaho

Mechanical engineering for peer review of the construction documents for an Emergency Communications and Operations Center (911 Call Center). The facility is a two-story, 42,500 s.f. total area of command center and office space for the Long Beach emergency response teams. The mechanical systems are provided with a fully-redundant N+1 system for the critical equipment loads and a 60 percent redundant N+1 system for the support spaces. The critical equipment room is provided cooling with two (primary/standby) computer room air conditioning units. Remainder of building is provided cooling from packaged rooftop variable-air volume HVAC system with electric resistance heating in air terminal units.

### Stevens Memorial Hospital – Major Expansion Edmonds, Washington

Mechanical engineering services for new four-story, 113,000 s.f. addition and 15,000 s.f. facility remodel. Addition includes Women's Center, LDRP suites, nursery, 12 operating rooms, and central services space. Mechanical systems included gas-fired high pressure boilers, high efficiency water-cooled centrifugal chillers, three dedicated outside air HVAC units with high efficiency filters, central humidifiers, sound attenuators, and heat recovery coils. Medical gas systems include oxygen, nitrous oxide, nitrogen, medical air, and medical vacuum.



## PROJECT EXPERIENCE

## Healthcare

### McKenzie Willamette Medical Center – Main Building Renovation and Expansion Springfield, Oregon

Mechanical engineering services for a major renovation and expansion of the original wing for this health care facility located in Oregon's Willamette Valley. Project included the mechanical design for a new physical therapy addition including a therapy pool using exhaust air heat recovery for pool water preheating, a new incinerator, replacement of all HVAC systems in the remodeled areas with new variable-air volume systems using waste heat for space heating from a heat recovery chiller, new HVAC and exhaust air systems for the existing laundry area using heat recovery from industrial dryers, and replacement and upgrade of medical gases and vacuum piping.

### Valley Medical Center – Kent Clinic Kent, Washington



Mechanical engineering services for a 19,700 s.f., single floor medical clinic in Kent for Valley Medical Center's satellite clinic program. Clinic included departments for Pediatrics, Internal Medicine, Family Practice, Obstetrics/ Gynecology, Radiology, and Pharmacy and laboratories for hearing, X-ray film

processing and blood tests. Clinic consisted of various treatment rooms, exam rooms, offices, laboratories, classroom, and staff lounge. Mechanical design included a variable air volume rooftop air conditioning unit with high efficiency air filtration, natural gas heating, fire sprinkler system, direct digital control (DDC) building automation system with remote monitoring at VMC's main hospital, and plumbing system with hospital quality plumbing fixtures. A separate rooftop air conditioning unit was provided for the classroom and staff lounge to allow for the night and weekend operation of the rooms without operating the main air conditioning unit.

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## PROJECT EXPERIENCE

## Healthcare

### Valley Medical Center – Covington Clinic Covington, Washington

Mechanical engineering services for a 22,000 s.f., two-story medical clinic in Covington for Valley Medical Center's satellite clinic program. Clinic included departments for Pediatrics, Internal Medicine, Family Practice, Obstetrics/Gynecology, Radiology, and Pharmacy and laboratories for hearing, X-ray film processing and blood tests. Clinic consisted of various treatment rooms, exam rooms, offices, laboratories, classroom, and staff lounge. Mechanical design included a variable air volume rooftop air conditioning unit with high efficiency air filtration, natural gas heating, fire sprinkler system, direct digital control (DDC) building automation system with remote monitoring at VMC's main hospital, and plumbing system with hospital quality plumbing fixtures.



### Loma Linda University Medical Center – HVAC Masterplan Loma Linda, California

Principal-in-Charge of the mechanical engineering efforts for the design, scheduling, coordination with regulatory agencies, and construction cost estimating to upgrade and renovate the existing HVAC systems in the facility to meet current codes as required by OSHPD. Project involved identifying all major system deficiencies from a code compliance perspective and establishing a logical sequence of corrective actions.