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COMMERCIAL

## PROJECT EXPERIENCE

## Commercial

### 1616 Eastlake – Office and Biomedical Building Seattle, Washington

Mechanical engineering services for new five-story 167,500 s.f. office and biomedical facility located on Lake Union in Seattle. Project includes two levels below grade parking and laboratory space for biotech research and development. Mechanical systems included rooftop air conditioning units with variable-air volume distribution system for office spaces and biomedical labs and separate packaged cooling units for retail spaces. Special design requirements included condenser water system for cooling tenant 24-hour/7-day equipment and underslab drainage system for continuous dewatering of site. Life-cycle cost analysis performed for comparing various HVAC systems for determining most cost-effective system.



### Carroll Distributing Distribution Facility Rockledge, Florida

Mechanical engineering services for a 158,000 s.f. distribution facility with a temperature controlled warehouse, truck loading area, sales offices, hospitality room, and administrative office areas. Carroll is a distributor of Anheuser-Busch products. Mechanical systems include two packaged rooftop heat pumps with variable-air volume terminal units and supplemental electric heat. Warehouse temperatures are maintained by multiple split-system direct-expansion units. Project included three ancillary structures for truck maintenance, fuel distribution and recycling.



Truck maintenance is a 10,200 s.f. building that contains a truck wash, prefabricated paint booth and three service bays.

## PROJECT EXPERIENCE

## Commercial

### Delaware North Parks and Recreation – Shuttle Launch Simulation Facility Kennedy Space Center, Florida

Mechanical engineering services for a 40,000 s.f. attraction at the Kennedy Space Center Visitor Complex. The facility provides for visitors to explore first-hand the excitement and jarring thrills of a shuttle launch experience. Project includes prelaunch area for visitor instruction, an astronaut “walk of fame,” four cabin simulators, retail store, administrative offices, equipment rooms, and support spaces. Mechanical systems include rooftop air handling units provided chilled water from an air-cooled chiller yard located a few hundred feet away from the facility, compressed air for cabin simulator door operations and simulator enhancements, and fire protection throughout the facility.



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## PROJECT EXPERIENCE

## Commercial

Vought Aircraft  
Industries, Inc. –  
Training Center  
North Charleston, South  
Carolina

Mechanical engineering services for a 13,000 s.f. training and cafeteria facility to support the manufacturing plant for the new Boeing Dreamliner 787 aircraft. Project includes training rooms, autoclave, offices, and support spaces with a 4,200 s.f. dining/kitchen area. Mechanical systems include four packaged rooftop heat pumps zoned for the occupancy of the building, total of 50 nominal tons of cooling capacity. Facility is for employee training in the production process pertaining to composite air frame manufacturing and assembly.



Microsoft Corporation  
Buildings 34, 35  
& Cafeteria  
(St. Andrews Office  
Complex)  
Redmond, Washington

Mechanical engineering services for shell and core and tenant improvement designs and construction administration for a new office building complex consisting of 465,000 s.f. of office and cafeteria spaces plus underground and above grade parking structures to accommodate 2,100 vehicles. Project consists of multiple office buildings, ranging in height from three to five stories, a 525-person capacity cafeteria, and a new 3,480-ton central chiller plant for campus style distribution to the office buildings and cafeteria. Mechanical systems include custom packaged rooftop air handling units; ventilation and fire sprinkler systems



for parking structures; plumbing, HVAC, natural gas; exhaust and equipment connections for kitchen; and design of fire protection systems including electric driven fire pumps.

## PROJECT EXPERIENCE

## Commercial

McLaughlin Research  
for Biomedical  
Sciences, Inc. –  
Animal Resource  
Center Renovation  
Great Falls, Montana

Mechanical engineering services for the renovation of existing laboratory and animal vivarium spaces. Project included the remodel of existing lab support space to the transgenic Animal Hold Room and the adjacent lab area converted to a Transgenic Lab. Lab included the installation of lab air, lab vacuum, lab gas, and deionized water. Lab space and Animal Hold Room were provided with positive pressure with a common vestibule maintaining negative pressure for both rooms in relationship with the corridor. Humidification was provided for the Animal Hold Room. Relative humidity, room temperature and room pressurization displayed electronically outside room. Standby power generator was provided for backup power to both rooms and the exhaust air and supply air systems. Project included the installation of a pass-through type autoclave (sterilizer).

Vivarium equipped with rodent holding racks with individually ventilated cages for isolation and containment. Design was in accordance with the National Institutes of Health "Guide for the Care and Use of Laboratory Animals" as published by the Institute of Laboratory Animal Resources. Project was funded by a Federal grant from the U.S. Department of Health and Human Services.



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## PROJECT EXPERIENCE

## Commercial

Microsoft Corporation  
Canyon Park Data  
Center (High-Density  
Mission Critical  
Facility)  
Bothell, Washington



Mechanical engineering services for a new expansion facility to support the existing data center located on the Microsoft Redmond Corporate Campus. The new facility is 41,000 s.f. with a 20,000 s.f. data center. The non-data center space is for administrative areas and mechanical and electrical systems infrastructure. Design eliminated single point failures and included the Owner's requirement that all equipment be maintainable in an off or de-energized state. Mechanical system was selected after an extensive life-cycle cost analysis was performed on five potential systems. The selected mechanical system is a rooftop air handling system with full air-side economizers. The cooling medium is a conventional chilled water system, enhanced to accommodate the N+1 method of redundancy and extensive DDC controls. The total chilled water tonnage provided was 1,000 tons. Humidification was provided to maintain a minimum 30 percent relative humidity during the colder, dryer days of the year. The maximum relative humidity is at 45 percent using the dehumidification from the chilled water



cooling coils. The space temperature of the 20,000 s.f. data center is maintained at 70°F. Battery room is maintained at a fixed 77°F. Relief air from the space is routed into the mechanical and electrical rooms to provide moderate temperature control as heat recovery.

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## PROJECT EXPERIENCE

## Commercial

Microsoft Corporation  
Canyon Park Data  
Center (High-Density  
Mission Critical  
Facility), First Floor  
Conversion  
Bothell, Washington

Mechanical engineering services for a 5,000 s.f. expansion of Microsoft's data center. Expansion space was provided with only a 12-inch high raised floor and cooled with a combination of air handling units with full outside air capabilities and floor-mounted chilled water CRAC units. Raised floor area was designed to be clear of cabling and power feeds, allowing for a mostly free area for the large quantity of airflow under the floor. Cabling was provided with overhead cable trays and power conduits were buried beneath the floor slab. Existing chilled water system was originally provided with space and connections to accommodate the additional conversion. Fourth water-cooled centrifugal chiller of 480-ton capacity was located on the roof of the facility with a fourth cooling tower. Fourth chiller, cooling tower and associated pumps were sized to match the existing chillers and cooling towers for the facility, allowing for additional redundancy and backup for the mechanical chilled water system. Fourth standby generator of 2 MVA capacity was installed to accommodate the new expansion. All work was performed with the facility fully operational. Full-load functional testing was provided during the commissioning phase at the end of the project with the mechanical and electrical systems exceeding expectations for performance and maintainability.

## PROJECT EXPERIENCE

Safeco Insurance  
Company –  
Aliso Viejo Office  
Aliso Viejo, California

## Commercial



Mechanical engineering services for tenant improvements of approximately 110,400 s.f. in a new office building in Aliso Viejo, California. Project was on the first three floors of a five-story building and included a full-service kitchen/cafeteria, large training rooms, and locker/shower facilities on the first floor. Lighting design included indirect fixtures in work areas with daylight controls and art lighting in dining area, cafeteria lobby, and common areas by training rooms. Mechanical design consisted of single-duct variable air volume terminal units and roof-mounted grease exhaust fan with welded ductwork from first floor to roof.

Exterior grease vault provided for kitchen sinks, floor drains and dishwashing machine waste pipes.



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## PROJECT EXPERIENCE

## Commercial

### Capital One – Call Center, Building B Federal Way, Washington

Mechanical engineering services for a 105,000 s.f. two-story call center in second building located on Capital One's East Campus Corporate Park. Building includes full-service cafeteria, 1,500 s.f. data center, battery room, static UPS system, and critical systems standby generator as utility power backup. Rooftop air conditioning units provided with variable-air volume distribution system. Special design requirements included fuel transfer piping system, battery room ventilation and spill containment, remote monitoring and alarm system, and both pre-action fire sprinkler system and chemical agent fire suppression system for data center, battery room and UPS room.

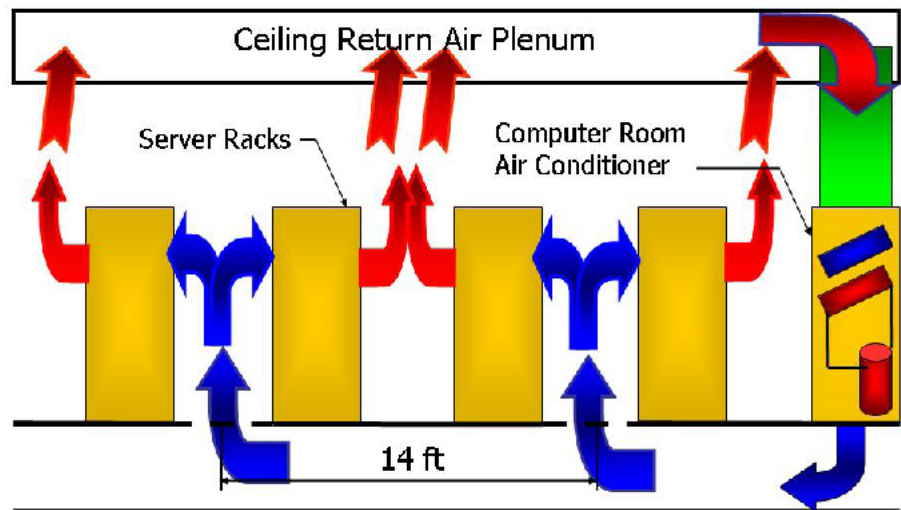


## PROJECT EXPERIENCE

## Commercial

Microsoft Corporation  
msn Migration  
Saturn Lab  
(High-Density Mission  
Critical Facility)  
Redmond, Washington

Mechanical engineering services to support relocation and expansion (to 30,000 s.f., raised floor) of msn development lab from an existing campus building to Building E at the Redmond West Campus. Mechanical systems include a chilled water system using computer room chilled water units to provide cooling to computer rooms and cable rooms. The existing central plant chilled water system will be utilized with modifications to the building chilled water distribution. Large plasma screens were provided for the network monitoring of the msn system. A feature of this project was the high power density requirement per equipment rack which required unique design solutions for electrical distribution and cooling for these loads.



Cold Aisle/Hot Aisle Layout

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## PROJECT EXPERIENCE

## Commercial

Microsoft Corporation  
Building 11 (Corporate  
High-Density Mission  
Critical Facility), Risk  
Mitigation  
Redmond, Washington

Mechanical engineering services to identify and repair weak links in the existing building systems which have resulted from increased demands on the mechanical and electrical systems in the labs and data centers. Areas updated included expansion of the standby generation system to an “N+1” configuration, provision of local water storage, and improvements to the condenser water system with N+2 pumping arrangement and piping replacement. Existing mechanical system is primarily a water-cooled heat pump system with compressorized computer room heat pumps located throughout the raised floor areas. Work was performed over a 36-hour period that kept the critical equipment for the facility online throughout the construction phase.

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High-Density Mission  
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## PROJECT EXPERIENCE

## Commercial

### Microsoft Corporation Silicon Valley Campus Mountain View, California



Peer review, commissioning agent and mechanical engineering services for a new office campus consisting of five buildings totaling 516,000 s.f. to serve the needs of Web-TV and Hotmail. Buildings include a data center, laboratories, satellite communication facility, programmer modules, atriums, and cafeteria. Peer review services consisted of reviewing documents prepared by the local Project Design Team submitted at the schematic design, design development, and construction document phases of the design. The reviews were performed to monitor the design in accordance with customer group infrastructure requirements, Microsoft design guidelines, project deliverables at various phases of the design, infrastructure master planning strategies, Microsoft campus development philosophy, industry best practices, and governing codes, ordinances, regulations, and private contracts. Primary role as engineering support was to aide in communication/coordination between Web-TV, Microsoft's Information Technology Group, and the design team by driving decisions and deliverables from the design team in accordance with Microsoft Guidelines and the construction schedule. As the Commissioning Agent, directed the team during the implementation of the plan and worked in conjunction with the Commissioning Team to orchestrate, observe, and gather data during the functional tests.

### Microsoft Corporation Buildings 8, 9, and 10 Redmond, Washington

Mechanical engineering services for 360,000 total s.f. of renovations to three office buildings at Microsoft's corporate headquarters campus. Each building has an underground parking garage; one building includes the addition of a cafeteria/serving area. Project includes a complete remodel of the HVAC system with the addition of six new roof-top package air handling units for each building with ties to the new Building 10P central plant. Additionally, a new complete ductwork system and chilled water distribution within the building was retrofitted into the existing facility.

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## PROJECT EXPERIENCE

## Commercial

### Microsoft Corporation Buildings 16, 17, and 18

Redmond, Washington

Mechanical engineering services for 440,000 total s.f. of renovations to three buildings at Microsoft's corporate headquarters campus. Each building has an underground parking garage and includes a common cafeteria/serving area. Project includes a complete remodel of the HVAC system with the addition of two new roof-top package air handling units for each building. A new chiller plant will be installed to serve comfort cooling and lab fan/coil units.

### Safeco Insurance Company – Tower Building O, Levels 2 and 3

Seattle, Washington

Mechanical engineering services for the complete demolition and remodel of Level 2 and Level 3. Total floor area is over 36,400 square feet for both levels. Both levels were renovated to open workstations, private offices, training rooms, conference rooms, and restrooms. Existing HVAC system was a constant-air volume single-zone system with chilled water and electrically-generated heating water from central plant. HVAC system was replaced with a new variable-air volume system that utilized variable frequency drives and variable air volume terminal units. All plumbing and fire sprinkler systems were re-worked to fit with new ceiling heights. Sound attenuation components were provided for the HVAC system to reduce fan system noise from transferring into the occupied spaces.