

Fire Station #8 Analysis
BUILDING SYSTEMS ANALYSIS

ENERGY ANALYSIS

Owner/Client:

City of Salem
Salem Fire Department
370 Trade Street
Salem, OR 97301
Don Reinke (503) 588-6181

Project Start/Finish: November 1984

Facility Type: Fire Station

Building Age: Built 1982

Engineering Fees: \$300

Project Size: 3,000 square feet

EESI Staff Involved: Fred Shaub.

Project Description: Analysis of innovative energy efficient design building to evaluate deficiencies and recommend upgrades. Found in assessment that the thermal storage wall was the only energy design which worked. Analysis included evaluation and recommendations of the following:

- # Undergrade rock bed heat storage. Found groundwater problem due to lack of vapor barrier. It was cost prohibitive to repair and report recommended adding air conditioner due to abandoned rock bed heat sink.
- # Fireplace heat exchanger did not allow proper draft plus creosote buildup causes excessive flue fires. Recommended removal and add air outside combustion air.
- # Replace electric furnace with gas fired furnace.
- # Upgrade HVAC controls to automatic controls.
- # Solar panels were abandoned due to high maintenance.

**Chemeketa & Liberty Square Parkades
ASSESSMENT & HVAC UPGRADE**

Owner/Client:
City of Salem
555 Liberty Street SE
Salem, OR 97301
Woody Blaizer (503) 233-4541

Project Start: February 1993
Project Finish: February 1999
Facility Type: Commercial
Building Age: Built 1981
Construction Cost (EESI Portion): \$150,679
Engineering Fees: \$15,000
Project Size: 38,173 square feet

EESI Staff Involved: Fred Shaub, John Balaam, & Ron Phelps.

Project Description: EESI was commissioned to perform an analysis on the mechanical systems for the Chemeketa Parkade and the Liberty Parkade in Salem, Oregon. After the analysis was complete, EESI then was commissioned to proceed with design and implementation.

The Chemeketa and Liberty Parkades were built in 1981. Parkade facilities consisted of:

Clothing Shop
Antique Shop
Record Shop
Restaurant

Hair Salon
Community College Outreach
Offices
Appliance/Kitchen Outlet

Jeweler
Broker
Sporting Goods Shop

The measures recommended where:

Replace tenant thermostats and controls with new electronic devices.

The existing are older pneumatic controls which drifted from control setpoint and thus required high maintenance. Full DDC Automation controls were installed.

Re-zone air diffusers and re-locate temperature sensors.

There are diffusers which supplied air to tenant spaces where thermostats are in different tenant spaces. In addition thermostats are typically ceiling mounted at 12 to 14 feet high. Controls needed to reference temperature at about 5 feet, and heated/cooled air needed to be properly distributed to correct tenant areas. Redistribution of diffusers and ductwork, plus wall sensors and air balancing, were done.

Upgrade fan and ductwork.

The air pressure control is not working and had caused ductwork to break

apart. The broken inlet vanes were removed and replaced with newer variable frequency drives and static pressure controls. This provided lower maintenance than inlet vanes, and use less (energy) fan motor power. Also, the fan's economizer cycle was manually controlled. This will be tied into the building automation system, further reducing energy consumption.

McGrath's upgrade.

A portion of the restaurant dining area is on the same air system as the clothing store. McGrath's required cooling even during cooler weather, when the store did not. An independent HVAC unit was installed to separate the two systems. In addition, the new unit for McGrath's was ducted to extract heat from the atrium area, providing better temperature control.

This HVAC upgrade involved replacing pressure dependant VAV boxes and fan inlet vanes with new Building Automation System (BAS) and variable speed drives. Also involved reducting air distribution system for tenant space configuration which were different than original open shop environment.

Commissioning involved scheduling work around occupied tenant spaces.

**Salem Civic Center (City Hall)
LIGHTING & HVAC UPGRADE**

ENERGY UPGRADES

Owner/Client:
City of Salem
555 Liberty Street SE
Salem, OR 97301
Woody Blaizer (503) 233-4541

Project Start: May 1993
Project Finish: April 1995
Facility Type: Government Offices
Building Age: Built 1973
Construction Cost (Total): \$748,631
Engineering Fees: \$75,590
Project Size: 81,000 square feet

EESI Staff Involved: Fred Shaub, Tim Thatcher, Ron Phelps, John Balaam, & Randy Boyd.

Project Description: The building consists of police headquarters, the 911 station, the mayor' s offices, the city courtroom, code authorities offices, a cafeteria, locker rooms/showers, council chambers, and various offices such as treasury, assessors, and purchasing. This building was built in the early 1970' s. The air distribution system was comprised of high pressure (eight inches of static pressure) ductwork with terminal reheat units. The system was never properly commissioned and various areas were installed with undersized ductwork. In addition, the system was installed with an underground fan system and air intake with a capacity of less than ten percent fresh make-up air.

EESI was commissioned to provide an energy study and HVAC assessment due to lack of temperature comfort and fresh air. All study recommendations were approved for design by EESI. EESI was responsible for overseeing full scheduling and project tracking and financial tracking.

This project was an extensive HVAC renovation of the entire facility including:

- ⊘ Increasing the size of the main ductwork throughout the building.
- ⊘ Replacing inefficient light troffer diffusers with new adjustable blade ceiling diffusers.
- ⊘ Adding new 100 percent relief fan and 100 percent air intake for full economizer cycle.
- ⊘ Upgrading to full building automation system with variable speed drives (VSDs).
- ⊘ Replacing the pressure dependant volume boxes with new DDC (Direct Digital Control) variable air volume boxes.
- ⊘ Replacing chiller with new 120 ton, non-CFC, reciprocating chiller.

The lighting retrofit portion of the project involved retrofit of "U" tube fluorescent fixtures with T-8' s and electronic ballasts throughout the facility. Also added dimmable ballasts for daylight control.

The project involved extensive demolition throughout all occupied areas of the building complex. EESI was closely involved with the City staff to pre-determine exact methods to do the construction work with minimal impact on building occupants. Since the city was unable to move staff out of construction areas, the work was done in the evening during low occupancy periods. Work was closely monitored on a daily basis by EESI team members to assure that adequate dust control and clean-up was provided daily. Mr. Shaub, lead construction manager, organized weekly construction meetings and observed installations to assure compliance to bid documents and performance standards. Weekly inspections were done so that corrective action could be done before contractor's left an area and moved to another. Each terminal unit performance was verified as the job progressed. This method was very successful and avoided having to come back to an area and disrupt the occupants twice.

The project has been a great success. Input from City staff relates that air quality has improved, and areas that had insufficient air, or were excessively hot or cold, have been eliminated. Mr. Blazier was pleased that with a project of this size and the potential for things to go wrong, this project was executed with very few problems.

**Fire Station #1 Air Conditioning System Replacement
MECHANICAL DESIGN**

RENOVATION

Owner/Client:

City of Salem
1580 20th Street SE
Salem, OR 97302
Woody Blazier (503) 588-6418

Project Start:

August 1994

Project Finish:

December 1994

Facility Type:

Fire Station

Building Age:

Built 1971

Construction Cost:

\$49,074

Engineering Fees:

\$1,600

Project Size:

9,880 square feet

EESI Staff Involved: John Balaam and Ron Phelps.

Project Description: EESI provided design service for air conditioning system replacement for Fire Station # 1. Design included upgrading central HVAC with new and addition of infrared heating system in vehicle garage.

**City Hall Air Intake Addition
MECHANICAL ANALYSIS & DESIGN**

RENOVATION

Owner/Client:

City of Salem
555 Liberty Street SE
Salem, OR 97301
Craig Orlob (503) 588-6199

Project Start:

March 1995

Project Finish:

February 1996

Facility Type:

Governmental

Building Age:

Built 1973

Construction Cost:

\$13,000

Engineering Fees:

\$1,000

Project Size:

81,000 square feet

EESI Staff Involved: Fred Shaub.

Project Description: Analyze way to bring fresh air into basement level. Design included a concrete ground cut and outside grade level grate to achieve fresh air opening to the lower level.

**City Hall/Civic Center
MECHANICAL DESIGN**

REMODEL

Owner/Client:

City of Salem
1580 20th Street SE
Salem, OR 97302
Gary Larson (503) 588-6359
Chuck O'Neal (503) 588-6359

Project Start:

September 1996

Project Finish:

December 1997

Facility Type:

Governmental

Building Age:

Built 1972

Construction Cost:

\$4,000

Engineering Fees:

\$1,200

Project Size:

~1,500 square feet

EESI Staff Involved: Fred Shaub, Ron Phelps, and John Balaam.

Project Description: From assessment of HVAC capacity, EESI provided HVAC design services for office remodel for Room 325 at Salem Civic Center/City Hall.

EESI also provided HVAC modification design for remodel of office walls in Rooms 315 & 320 at Salem City Hall.

**City Hall Duct Revision
MECHANICAL DESIGN**

RENOVATION

Owner/Client:
City of Salem
1580 20th Street SE
Salem, OR 97302
Gary Larson (503) 588-6359

Project Start: May 1997
Project Finish: January 1998
Facility Type: Governmental
Building Age: Built 1972
Construction Cost: \$1,000
Engineering Fees: \$500
Project Size: 81,000 square feet

EESI Staff Involved: Fred Shaub and Ron Phelps.

Project Description: Analyze air deficiency and design new duct. Design new ductwork for main fan to reduce high pressure drop to improve air flow quality.