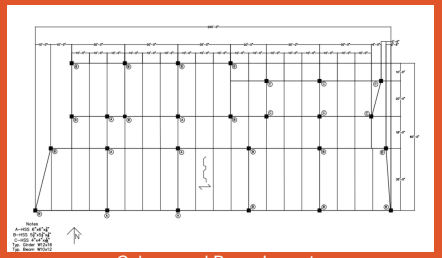
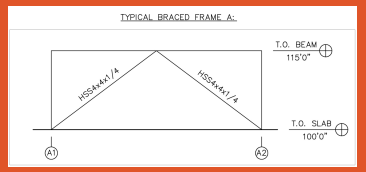
Chemeketa Community College Agriculture Complex

STRUCTURAL DESIGN

- Gravity Force Resisting Elements
  - Steel Columns and Beams
- Lateral Force Resisting Elements
  - Steel Braced Frames
- Steel vs Wood vs Concrete
- Goals
  - Efficient, Sustainable, Satisfies code



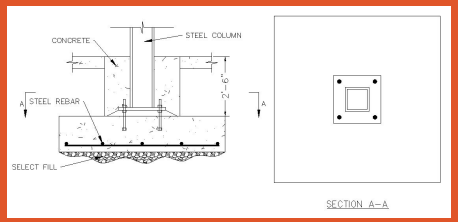
Column and Beam Layout



Typical Braced Frame Elevation

GEOTECHNICAL DESIGN

- Foundation Elements
  - Square concrete footings
- Goals
  - Cost effective, Easy to construct



Typical Column Footing

Oregon State University

PROJECT DESCRIPTION

The Chemeketa Community College is located in Salem, OR on the Chemeketa Community College Campus. The building a home to classrooms, laboratory space, and faculty offices. The building also has flexibility to host larger events like career fairs or symposiums. In addition, the building aimed to limit its carbon emissions, in line with Chemeketa building standards. The project team designed the structural, geotechnical, water resource, mechanical system, and building envelope components of the building.

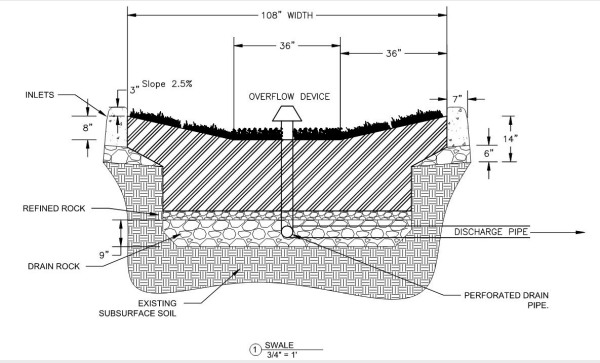
DESIGN OBJECTIVES

- Energy efficiency to limit carbon footprint
- Form a comfortable and pleasing space for the community
- Cost efficient design
- Meet or exceed all building codes and standards

A photo of the Chemeketa Community College Agriculture Center
(Image From FFA Architecture and Interiors)

WATER RESOURCES

- Bioswale with vegetation along entire length
  - Has filtration material with perforated piping to prevent overflow
- Site has drains throughout entirety
  - All drains lead to the swale to allow filtration
- Entire pipe system is gravity fed
- Goals
  - Efficient and cost effective
  - Sustainable
  - Aesthetically pleasing



MECHANICAL SYSTEMS

Design Objectives

- Provide thermal comfort to the building occupants
- Provide adequate ventilation air to the building spaces.
- Design an energy efficient system to limit the building's carbon footprint

System Selection

Heating & Cooling - A radiant floor system that pumps hot or cold water through piping in the flooring, conditioning the space. The water will be heated by a boiler and cooled by a chiller. This type of system is significantly more efficient than a forced air system.

Ventilation - A designated outdoor air system (DOAS) will provide ventilation air as required by Oregon Mechanical Specialty Code.

Energy Efficiency Measures

- Incorporation of Carbon Dioxide sensors to minimize ventilation demands based on occupancy.
- Use of louvered windows to naturally ventilate the building when environmental conditions allow, cutting energy usage.
- High-efficiency equipment was selected in the design.

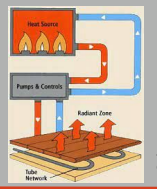


Diagram of a radiant floor system.
(American Hardwood Information Center)

BUILDING ENVELOPE

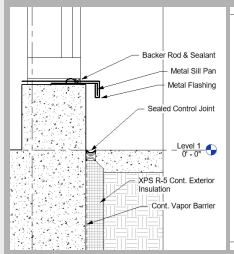
Objectives

- Provide climate control and comfort conditions for the user with a minimum of energy consumption
- Use of sustainable materials

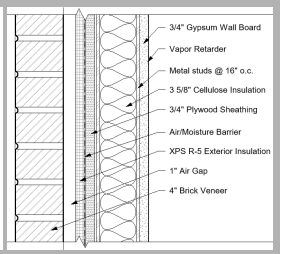
Alternatives Considered & Decision Matrix

Criteria	Fiberglass	Mineral wool	Hemp wool	Cellulose
Thermal Performance	●●	●●●	●●●●	●●●
Cost	●●●●	●●	●	●●●
Global Warming Potential	●●	●	●●●●	●●●
Embodied Energy	●	●●	●●	●●●
Water Resistance	●	●●●	●●	●
Sound Absorption	●●	●●	●	●●●

- Design of two wall assemblies and slab on grade waterproofing and insulation
- Exceeds requirements of ASHRAE code by 25%, resulting in passive solar effect and reduced energy cost



Slab On Grade at Storefront



Brick Wall Assembly