Customer Requests
- 2600 ft² house
- Be able to incorporate domestic hot water and/or space heating using flat plate collectors
- Master bedroom on 1st floor
- Office and two bedrooms on 2nd floor
- No basement due to the location

Structural
- Douglas Fir: τ_{max}=1668psi, σ_{max}=1700psi
- 32' Span, 1' overhangs
- 6 in 12 pitch (26.5°)
- 27 Trusses for house, 7 for garage
- 10.23lb/ft on each rafter
- Howe Truss with Shingle Roof
- τ_{max}=54.1psi, σ_{max}=32.6psi
- Factor Of Safety=30

Bill of Materials
<table>
<thead>
<tr>
<th>Material</th>
<th>Quantity</th>
<th>Price Per Unit</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Douglas Fir 2x4</td>
<td>748 feet</td>
<td>$0.25/foot</td>
<td>$187.00</td>
</tr>
<tr>
<td>Douglas Fir 2x6</td>
<td>2516 feet</td>
<td>$0.30/foot</td>
<td>$754.80</td>
</tr>
<tr>
<td>Truss Joining Plates</td>
<td>272</td>
<td>$10 each</td>
<td>$2720.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td><strong>$3661.80</strong></td>
</tr>
</tbody>
</table>

Foundation
- Dimensions: Slab plus garage—68ft x 30ft x .5ft
- Slab of house—54ft x 30 ft x .5ft
- Footer Design: T-Shaped
- Footer Dimensions:
  -2.5 ft deep from top to bottom
  -10 ft wide at the bottom
  -3 ft wide at the top
- Materials:
  - Poured Portland Cement at a thickness of 6in for slab
  - Compressive stress of Portland Cement—8400psi
- The factor of safety is: 2
- Frost line: 6in
- Footer depth: 2.5 ft
- Soil type: Silty Clay Loam—30%-40% Clay and 60% to 70% Silt
- Soil Bearing Pressure—3135 lb/ft²
- Soil Density: 79.9 lb/ft³
- Cost
  - Concrete $5,818.80

Architectural

Weather
- Temperature Range—55°F-75°F
- Average yearly rainfall—16in-20in

Architectural Side Elevation View (down)
- A=8ft
- B=1ft
- C=15°
- D=26.5°
- E=17.5°

2nd Floor Layout (down)

1st Floor Layout (up)
Fluids System

Hydronic System Schematic

- General
  - Close loop system
  - Low maintenance
  - Water as working fluid
  - Less dense
  - More efficient heat transfer

- Tank
  - 120 gallons
  - Glass lining with 2" Foam insulation (R=17.3)
  - Internal heat exchanger for efficient heat transfer

- Pump
  - Grundfos UP26-116F
  - Overcomes max head at desired flow rate of 4.15 GPM

- Controller
  - Turns pump off at set temperature high
  - Turns pump on at set temperature low

- Total Cost
  - $2365.76

- Space
  - Tank, pump, and lines take up approximately 8ft by 4ft space in garage