Concept
Construction Process
Main Structural System

Corner Post
(4) 2"x2"x72"

Floor Diaphragm:
Frame-(2) 1"x3"x48";
(2) 1"x3"x46.5"; Joists-
(3) 1"x3"x46.5" spaced 12" apart oc.; 3/8"x48"x48" plywood decking.
Identification of Components

Chevron
Diagonal Cross Bracing
Corner Gusset
Shear Wall
Connection Description

All connections were made using wood screws. Lengths varied from 1” to 2.5”. 
Diaphragm Design I – Material Choice

- Sturdy.
- Expensive.
- Special joint between beams needed.

- Weaker than left one.
- Cheaper.
- Easy Construction
- Screw Analysis needed
Diaphragm Design II – Bending Moment

360 lb (2people)

Requirement:
Bending Strength > Bending Stress

Bending Strength
= 3,900 lb / in² (Northern White)

Bending Stress
= \frac{M_{\text{max}}}{S}\text{ (section Modulus)}
= \frac{2160 \text{ lb in}}{1 \times 3^{2} / 6}
= 2880 \text{ lb / in}^2

» 3,900 > 2,880
Diaphragm Design III – Material Choice

We used #9 Screw

Shear force at the joint = 180 lb

Shear Strength of 2 – Screw = about 360 lb
Lateral Resisting Systems

System 1: Shear Wall

Effect of lateral Load if shear wall is removed

Shear wall carries in plane forces.
Resists torsional deformation.
Lateral Resisting Systems

System 2: Diagonal Cross Brace

Effect of lateral Load if diagonal bracing is removed

Applied Lateral Load
Lateral Resisting Systems

System 3: Corner Braces

Effect of lateral Load if corner gussets are removed

Applied Lateral Load

Note:
We found that having only the top two corners reinforced that it was Not as stable as when All four corners were Secure.
Lateral Resisting Systems

System 4: Chevron

Effect of lateral Load if chevron is removed

Applied Lateral Load
Fixed Frame Load Tracing

Bracing causes the beam and column to act as one at the corner.

Fixed bracing resists overturning and twisting.
Diagonal Support Load Tracing

No moments develop
Chevron Load Tracing

One member in tension, one in compression.

Resists twisting and torsional deformations.
Expense Summary

$43 for this?

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**Tax:** $3.31
**Invoice:** $43.99

**Balance Due:** $43.99

**Cash:** $16.00
**Debit Visa:** $27.99

**Debit Visa:** 7994  AUTOCODE 023900
**Purchase Cash Back Total Debit:**

**0103 TERMINAL: 56  11/28/04  19:17:25**

Sources
