

Design team:  
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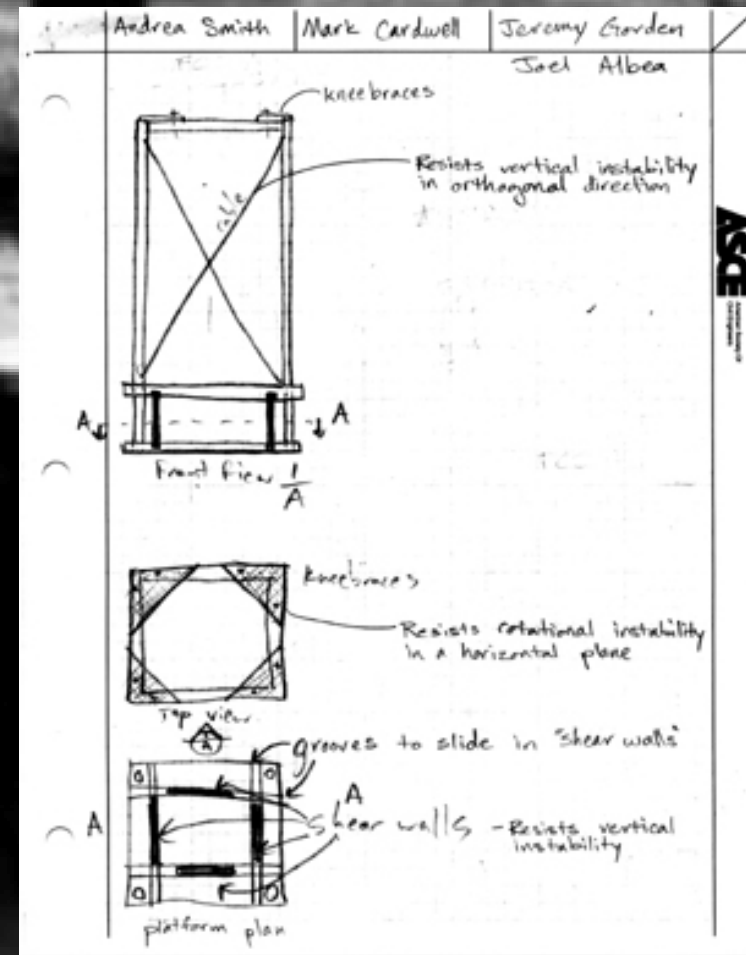
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# Concepts

## Three Stabilizing Systems

- Shear Walls
- Diagonal Bracing
- Rigid Connections

Each system provides stability in a different way. When combined, all three systems work together to provide a completely stable structure.



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# Shear Walls

The shear walls, used on four sides, are used in conjunction with a diaphragm provide lateral stability of the base.

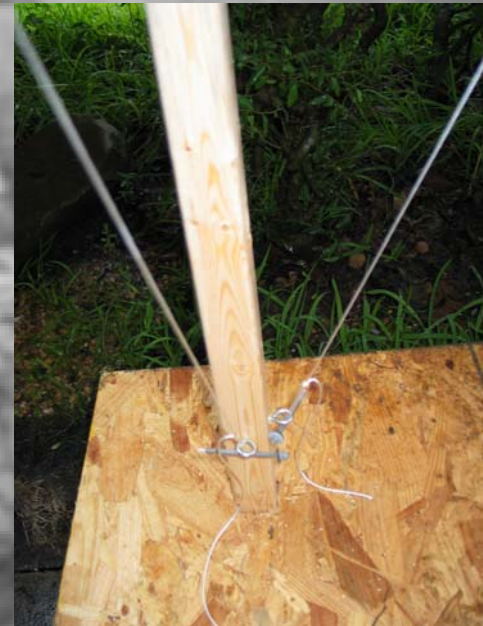


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# Diagonal Bracing

The diagonal bracing creates an "X" pattern on all four vertical faces. This geometry is used to resist displacement of the frame from lateral loads.



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# Diagonal Bracing

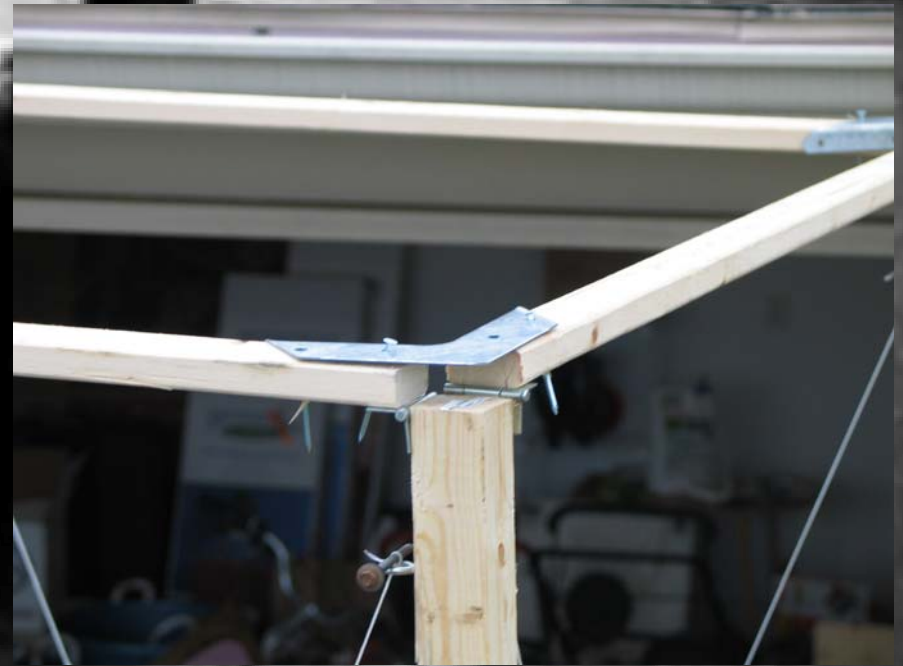


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# Rigid Connection

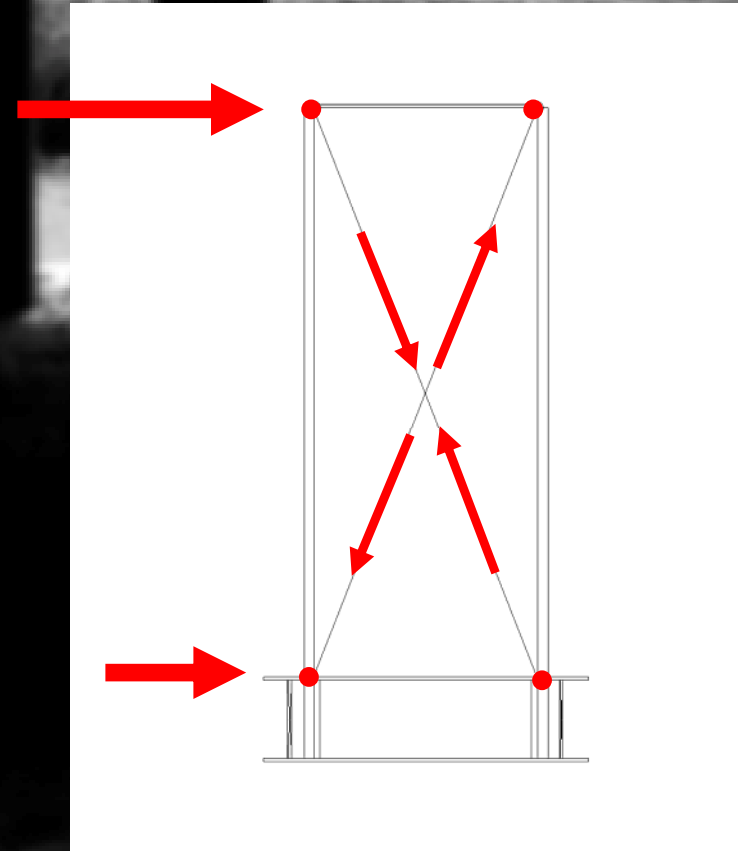
Because of the hinged connections at the top of the frame, metal braces can be connected to the top of the frame to resist torsion.



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# Forces

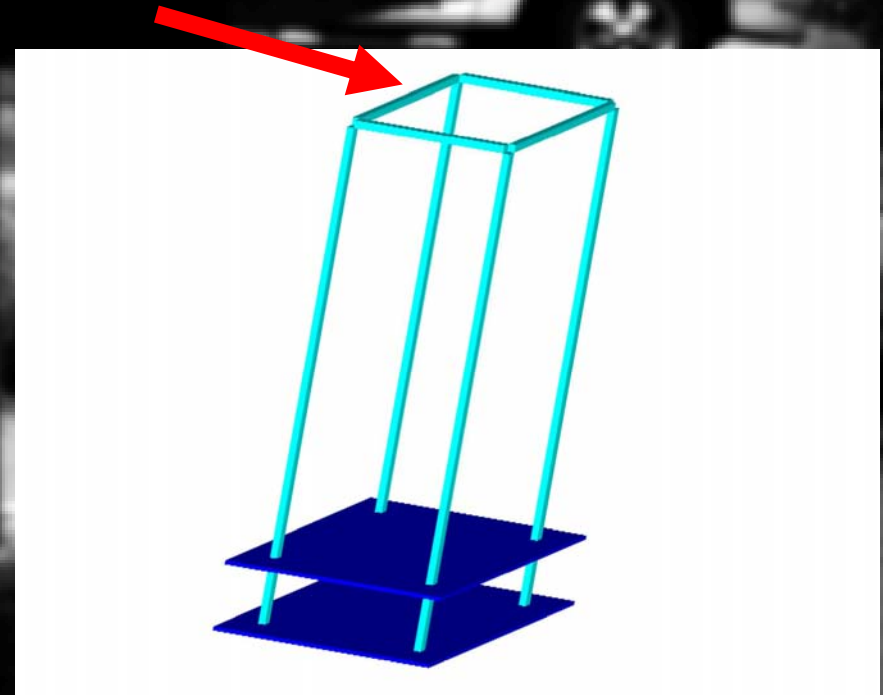
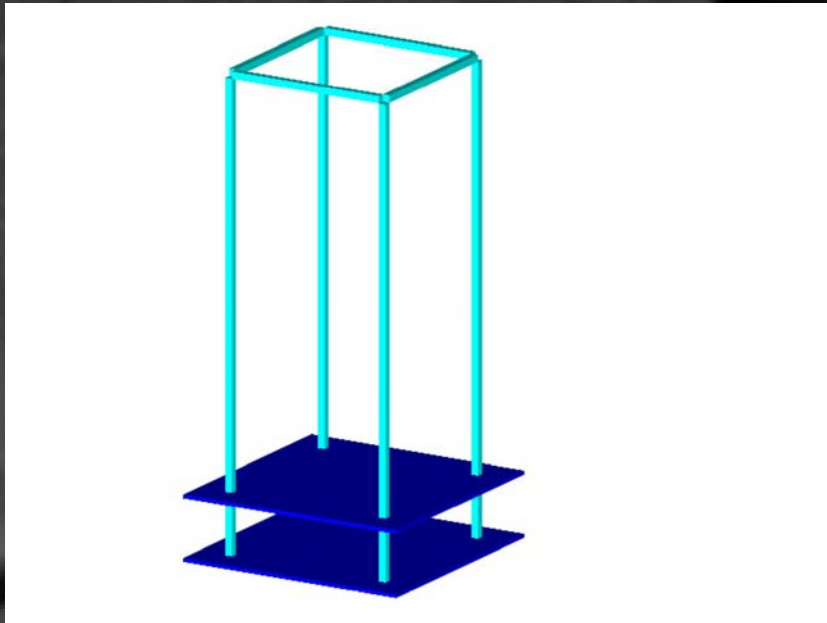
With the lateral load applied, these are the actions of the structure.



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# Forces

With no lateral bracing, the structure is free to rotate because there are no resisting moments.

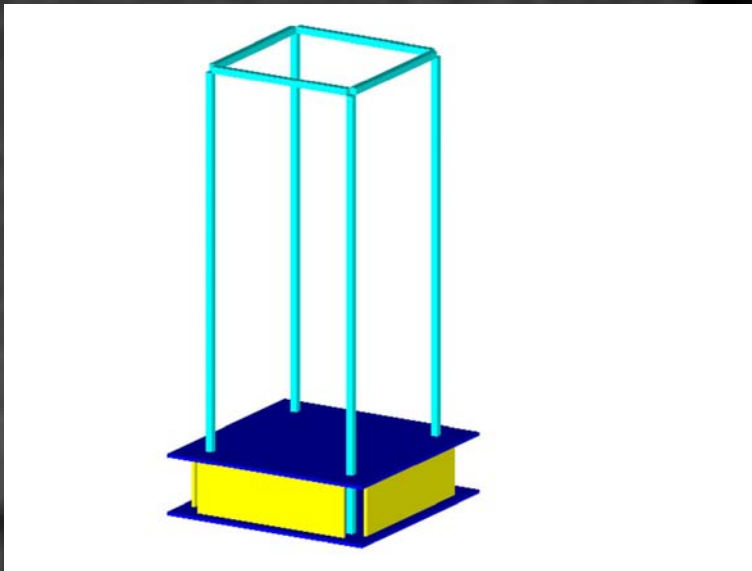
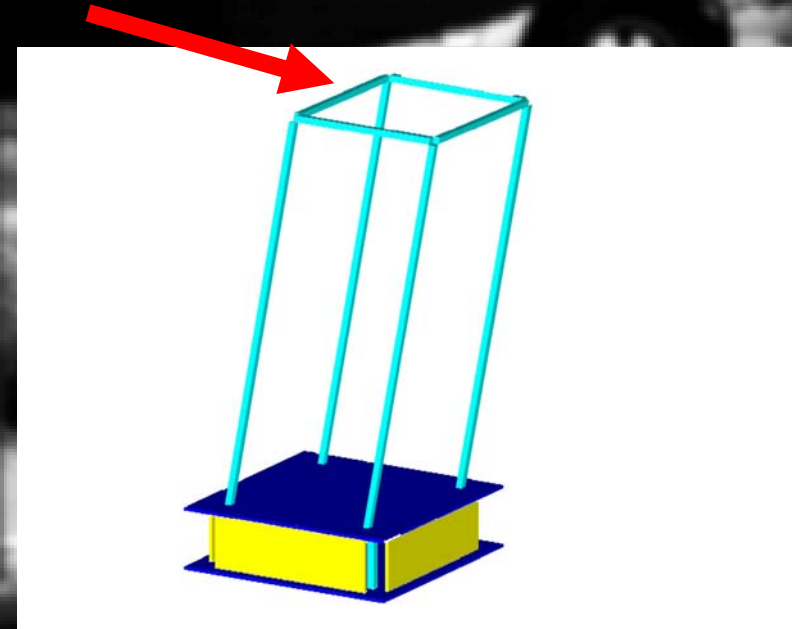


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# Forces

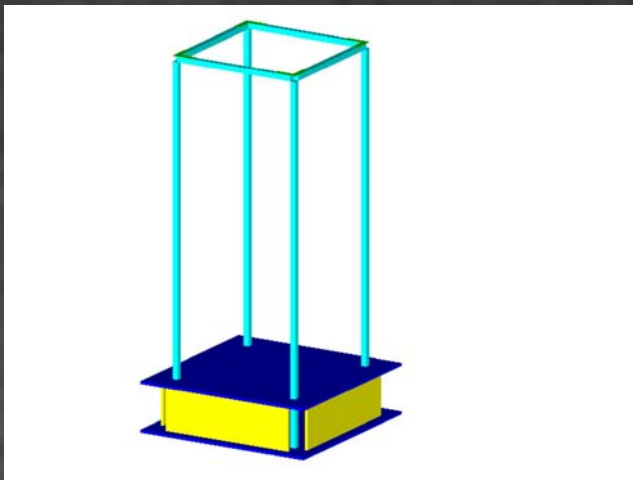
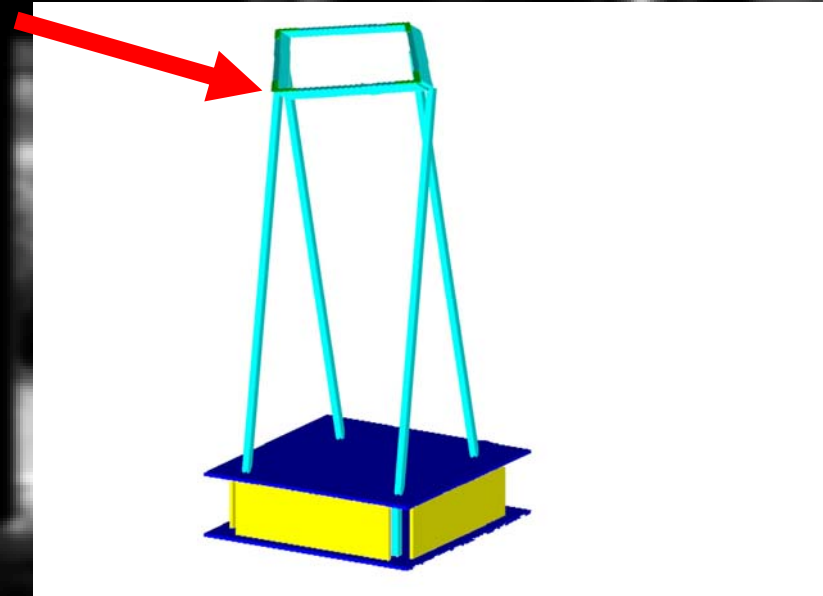
When the shear walls are added, a diaphragm action takes place, which provides lateral stability in the base. The upper frame is still free to rotate.



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# Forces

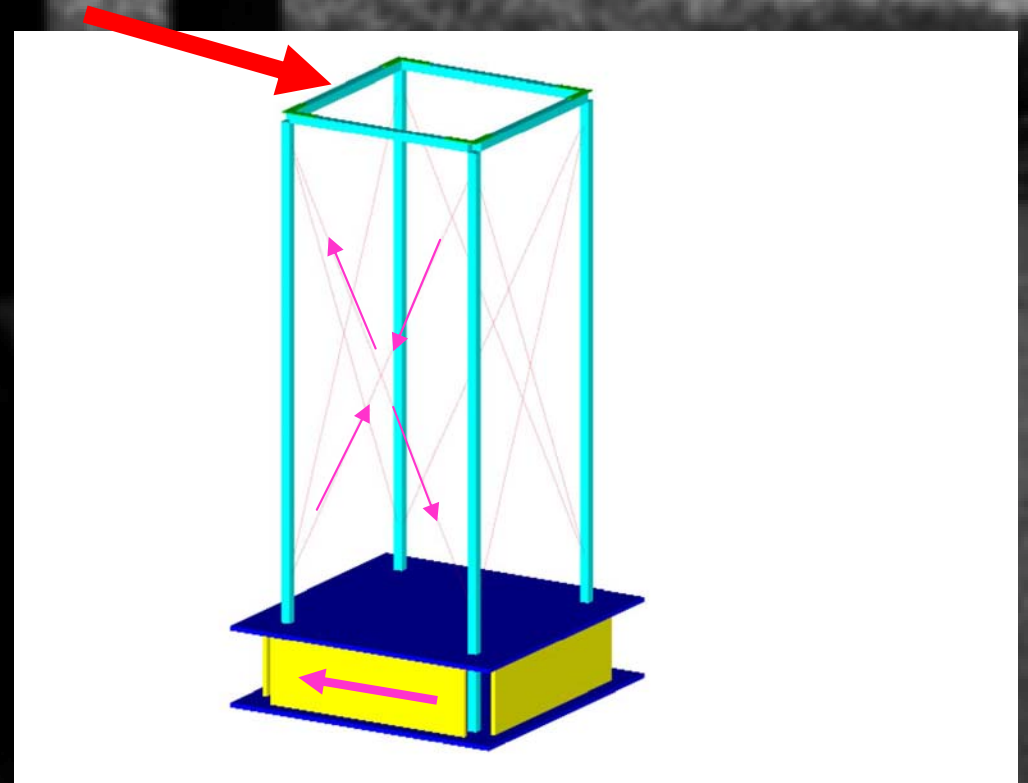
The metal braces at the top of the frame keep the top connections rigid at right angles when asymmetrical loading is applied. However, the columns of the frame are still free to twist.



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# Forces

Once the diagonal bracing is added, the frame will be laterally stable in all directions. When all the bracing systems are added, the structure will see minimal deformation.



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# Construction Sequence

The shear walls and platform were constructed first.



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# Construction Sequence

Joel and Mark discuss where to find a saw to cut the "rails" for the shear walls.



They stumble upon a saw from Santa's workshop.



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# Construction Sequence

Four holes were made in the top platform for the frame to slide into.



Jeremy is happy the base with the shear walls seems to be working.



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# Construction Sequence

Next, the hinged frame was put together.



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# Construction Sequence

Jeremy and Joel calmly demonstrate the movement of the frame.



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# Construction Sequence

The diagonal bracing consists of twine connected to the frame with simple loop and pin connections.



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# Construction Sequence

Finally, the knee braces were added to the top of the hinged frame by Joel, who wouldn't let anyone else use the drill.



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Final Testing

Our sturdy  
structure  
holds not  
one...



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# Final Testing



Not two...



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Final Testing...

Not three...



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But Four!!!

# Cost Analysis

Since we only used 10 percent of the string, the cost of the string should be 20 cents, making our total with tax \$49.22.

LOWE'S	
BRYAN, TX (979)774-4141 -SALE-	
SALES #: S0103BJ1 21335	11-16-04
4513 2X2X8 TOP CHOICE	7.88
4 @ 1.97	
4511 1X2X8 TOP CHOICE	2.18
2 @ 1.09	
1379 5/8X12X6 PARTICLE	5.94
2 @ 2.97	
74515 RTA12-R 1X2 RIBID	2.56
4 @ 0.64	
12212 7/16 0-S-B	10.95
83092 10 SCREW EYE ZN	1.86
2 @ 0.93	
91114 NYLNN SEI TWN WH#	1.97
22436 1-1/2 LP HINGE ZN	7.92
4 @ 1.98	
22488 1X1/2 COR IRON ZN	5.84
4 @ 1.46	
SUBTOTAL: 47.10	
TAX 32094 :	3.89
INVOICE 56623 TOTAL:	50.99
BALANCE DUE: 50.99	
CASH : 34.00	
DISC : 16.99	
DISC XXXXXXXXXXXX3870	016525
AMOUNT:	16.99
0103 TERMINAL: 56 11/16/04 15:40:29	



# Shear Enjoyment 2004



# THE END

