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Building a STS/Geothermal House

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 Sean Kelly Custom Homes, Inc.
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<http://www.seankellycustomhomes.com/>

Building a Sun Tempered/Superinsulated/Geothermal Home

- A sun-tempered, superinsulated house combines passive solar and super-insulation.
- It features solar orientation, increased insulation, effective air/vapor barriers, controlled ventilation and improved windows.
- Design is flexible and fits a variety of architectural styles.
- It doesn't require a lot of attention for its operation
- Over its life, considerable savings in monthly operating costs will result.



Looks the same on the outside...



What we did

- Modifications to house plan
 - Orientation (E/W long axis)
 - Window placement (S facing)
 - Wall construction (2x6)
 - r 11 vs. r 19+

Houseplans.com
 Buy Online or Call 1-888-765-1300 [PID: 208-S]

26,706 House Plans—The Largest Collection of Exceptional House Plans Online

Featured House Plans

Plan Quick Search | Power Search

Plan Type: Any

Square Footage: 0 to 0

Levels: 1, 2, Multi-Level

Bedrooms: 1, 2, 3, 4, 5+

Baths: 1, 1 1/2, 2 1/2-3, 3+

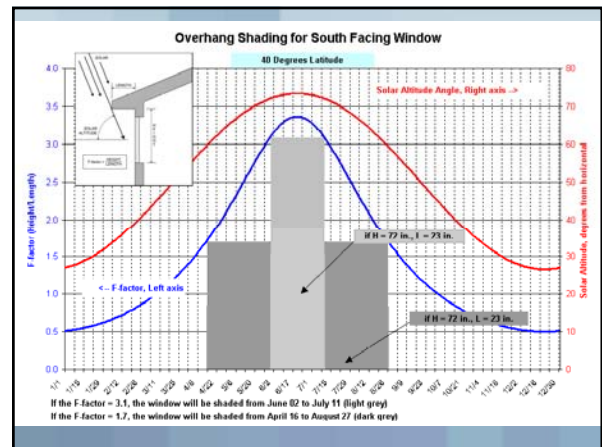
Garage Stalls: 0, 1, 2, 3+

SEARCH

Search by Plan Number: [] GO

Popular Plan Searches

Important Resources



Sun Tempered/Passive Solar



What we did

- Greening the building
 - Window coatings (*SHGC & U*)

| | Window A | Window B | Window C | Window D | Window E |
|----------|--------------|---------------------|--|--|--|
| Glazing | Single Clear | Double Clear | Double Clear | Double High-Solar-Gain Low-E | Double Low-Solar-Gain Low-E |
| Frame | Aluminum | Aluminum with Break | Wood, Wood clad, Vinyl, Hybrid/Composite | Wood, Wood clad, Vinyl, Hybrid/Composite | Wood, Wood clad, Vinyl, Hybrid/Composite |
| U-Factor | 1.16 | .63 | .49 | .37 | .34 |
| SHGC | .76 | .62 | .56 | .53 | .30 |
| VT | .74 | .62 | .58 | .53 | .50 |

Window Choice

U-Factor: A measure of heat transmission through a wall or window. The lower the U-Factor, the better the insulating value.

ENERGY PERFORMANCE RATINGS
 U-Factor (U, U-F, U-FI) **0.35** Solar Heat Gain Coefficient **0.32**

ADDITIONAL PERFORMANCE RATINGS
 Visible Transmittance **0.51** Air Leakage (A, U, U-FI) **0.2**

Manufacturer disclaimer: These ratings apply to specific window products. For more information on window performance, visit www.nwac.org.

Source: Sustainable Home Blog

| Windows & Doors | | | Skylights | | |
|-----------------|----------|------|--------------|----------|------|
| Climate Zone | U-Factor | SHGC | Climate Zone | U-Factor | SHGC |
| 1 | 0.30 | 0.50 | 1 | 0.30 | 0.50 |
| 2 | 0.30 | 0.40 | 2 | 0.30 | 0.40 |
| 3 | 0.30 | 0.30 | 3 | 0.30 | 0.30 |
| 4 | 0.30 | 0.20 | 4 | 0.30 | 0.20 |
| 5 | 0.30 | 0.10 | 5 | 0.30 | 0.10 |
| 6 | 0.30 | 0.05 | 6 | 0.30 | 0.05 |
| 7 | 0.30 | 0.05 | 7 | 0.30 | 0.05 |
| 8 | 0.30 | 0.05 | 8 | 0.30 | 0.05 |
| 9 | 0.30 | 0.05 | 9 | 0.30 | 0.05 |
| 10 | 0.30 | 0.05 | 10 | 0.30 | 0.05 |

<http://sunhomedesign.wordpress.com/2007/05/03/low-e-glass-a-nation-divided/>

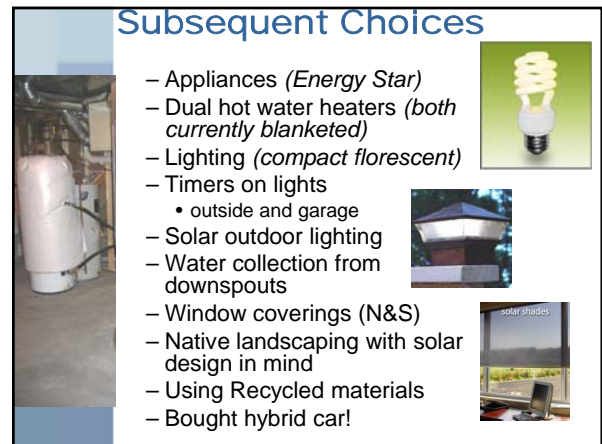
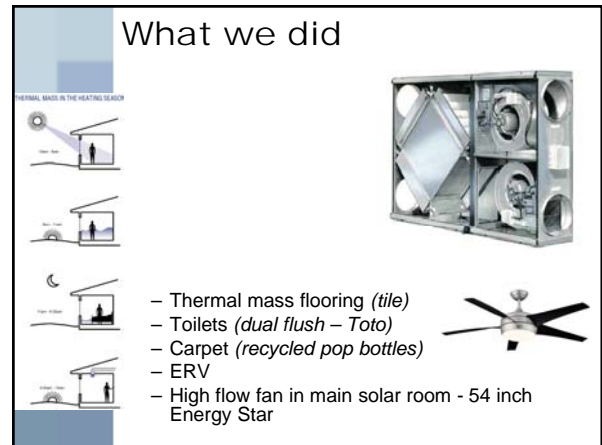
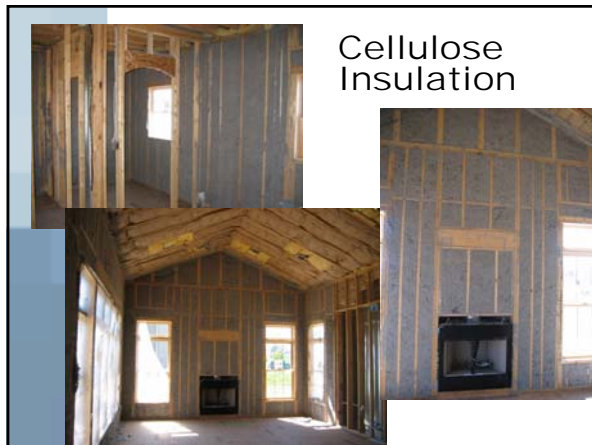
What we did

- Greening the building
 - Heating/Cooling system
 - Geothermal
 - Hot water assist

Geothermal Factoids!

- Today there are more than 1,000,000 geexchange installations in the United States.
 - Elimination of more than 5.8 million metric tons of CO₂ annually
 - Equivalent to taking close to 1,295,000 cars off the road
 - Represents planting more than 385 million trees
 - Reduces U.S. reliance on imported fuels by 21.5 million barrels of crude oil per year.
 - In general they have the lowest emissions of all heating and cooling systems.

Source: Geothermal Heat Pump Consortium and EPA



Rain Collectors/Rain Butt



(x2 now)

Added Costs = 10%

| | |
|-------------------------|--------|
| • Geothermal system | \$\$\$ |
| • Insulation | \$\$ |
| • 2x6 wall construction | \$ |
| • Extra windows | \$ |
| • Tile flooring | \$ |
| • Toilets | \$ |
| • Carpet | \$ |

Toto Aquia™ Dual Flush Toilet, 1.6 GPF / 0.9 GPF

Economic Incentives

- Rebates
- Savings \$\$\$
 - We have no official calculation
- ComEd (*electric heating rate*)

Some Websites of Interest

- **Passive solar design:**
 - <http://www.greenbuilder.com/sourcebook/PassSolGuide1-2.html>
 - <http://www.nesea.org/buildings/passive.html>
 - <http://www.nahbrc.org/greenguidelines/overhangcharts.pdf>
- **Window choice:**
 - <http://www.efficientwindows.org/energystar.cfm>
- **Geothermal Heating/Cooling:**
 - How it works:** <http://www.geoexchange.org/about/how.htm>
 - <http://www1.eere.energy.gov/geothermal/heatpumps.html>
 - <http://www.waterfurnace.com/>
 - <http://www.geoexchange.org/residential/res.htm>
- **Sun tempered Superinsulated House:**
 - <http://www.ext.colostate.edu/PUBS/CONSUMER/09936.html>
 - <http://www.ornl.gov/~roofs/Zip/ZipHome.html> - R value by zip
- **General Websites**
 - http://www.eere.energy.gov/consumer/your_home/
 - <http://www.illinoisrenew.org/index.html>
 - http://www.energystar.gov/index.cfm?c=cfls.pr_cfls