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April 10, 2006

Attention: Rod Hadrian, TRIDIPANEL Representative

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Panel@Tridipanel.com

CC: File

**Subject: Heat Transfer Properties of TRIDIPANELS versus Contemporary Wall
Construction (HConsultants Project # 200607)**

Mr. Hadrian,

As per our telephone conversation, I have reviewed my energy calculations for the TRIDIPANEL System used on Suzy Brown's Casa Simpatica Project. I utilized EnergySoft's EnergyPro Computer Program to calculate the heat transfer properties of your walls and compared them to the California Title-24 Standard Construction. I have included some sample outputs for your reference (see attached). Even though the wall construction of your product includes metal bracing (which acts as a high thermal conductor), the thermal conductivity of the Styrofoam more than compensates and the wall actually produces a better overall thermal resistance.

Heat transfer takes place through conduction, convection and radiation. For opaque solid objects, such as walls, thermal conduction is the significant heat transfer mechanism. Contemporary wall construction consists of wood 2x4's framing a structure with mineral fiber insulation in the voids between the wood frame members. Heat is transferred through the outer surface and then partially through the wood frame and partially through the insulation material. The heat is then transferred through the interior surface material. Contemporary walls have been thoroughly studied and documented and various insulation values for wood frame construction standardized.

The TRIDIPANEL System utilizes Styrofoam as the insulating material. Styrofoam comes in various densities, and possesses excellent properties for thermal conduction. Styrofoam is too weak to provide support for a building, so a metal webbing is included in the TRIDIPANEL System to provide rigidity. Metal transfers thermal energy at a substantial rate and at first glance appears to compromise the overall thermal resistance of the wall. To compare the two construction methods, a construction "unit" was modeled in both systems and then applied to the computer energy load program.

For any type of construction, there are several variables that must be considered:

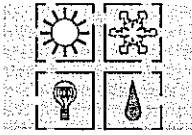
Material Type

Material Thickness

Material R-Value (This is dependant upon material density, thermal conductivity, etc.)

Material Presence in the Framing and the Cavity of the Wall

Once these values are determined, a comparison can be made. The attached sheets indicate the Overall R-Values and Overall U-Factors for various wood wall constructions as accepted by the State of California Energy Commission. This information is documented in the Title 24 Building Energy Efficiency Standards.



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On the Casa Simpatica Project, several TRIDIPANEL System wall thicknesses were modeled (see attached). Here is a summary of the different wall constructions:

WALL CONSTRUCTION TYPE	OVERALL U-FACTOR	OVERALL R-VALUE
5" Polystyrene (TRIDIPANEL)	0.0373	26.8
4" Polystyrene (TRIDIPANEL)	0.0459	21.8
2x6 Wood with R-19 Mineral Fiber Insulation	0.0655	15.3
2x4 Wood with R-13 Mineral Fiber Insulation	0.0885	11.3

Here is a list of the referenced attachments:

- Drawing SK-01 – Wood Frame & TRIDIPANEL Walls
- EnergyPro Construction Assembly Summary – 5" Polystyrene (TRIDIPANEL Wall)
- EnergyPro Construction Assembly Summary – 4" Polystyrene (TRIDIPANEL Wall)
- EnergyPro Construction Assembly Summary – R-13 Wall (2x4 Frames at 16" on center)
- EnergyPro Construction Assembly Summary – R-19 Wall (2x6 Frames at 16" on center)

At your request, I can produce similar documentation for future projects and for alternate construction methods for a nominal fee.

I am looking forward to working with you on future projects. Please call if you require any additional information.

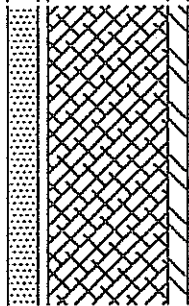
Respectfully,

George W. Hubbell, P.E., C.E.M.

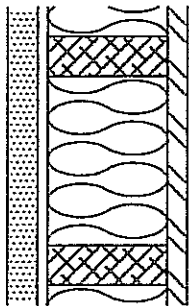
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DIAGRAMTICAL DETAIL OF STANDARD R-13 WOOD FRAMED WALL

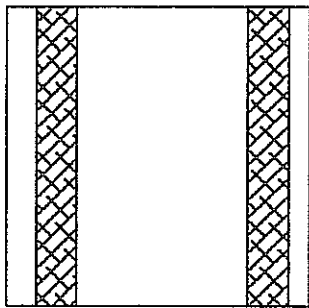
Stucco
Felt Membrane
R-13 & Framing
Gypsum Board



SIDE VIEW



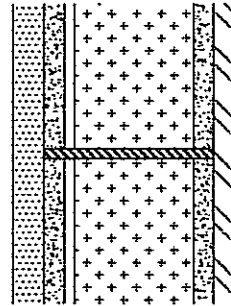
TOP VIEW



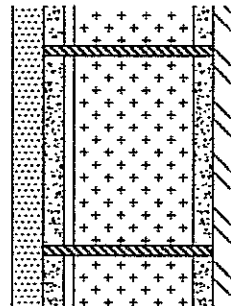
FRONT VIEW

DIAGRAMTICAL DETAIL OF STANDARD TRIDIPANEL WALL

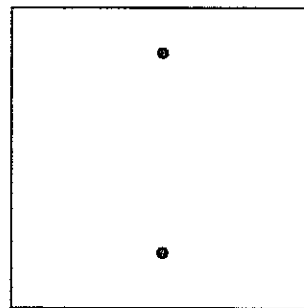
Stucco
Concrete
Felt Membrane
Polystyrene & Framing
Concrete
Gypsum Board



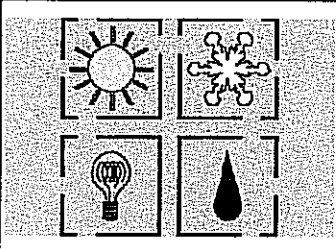
SIDE VIEW



TOP VIEW



FRONT VIEW



WOOD FRAME &
TRIDIPANEL WALLS

HUBBELL CONSULTANTS

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REF. DRAWING
NO. —

JOB NAME TRIDIPANEL	
JOB NO. 200607	DATE 05/06/06
SCALE NONE	
DWG NO. SK-01	

Construction Assembly



Component Description

Assembly Name: Custom Wall - 5 in. Polystyrene

Assembly Type: Wall Default

Tilt: 90 Absorptivity: 0.70

Roughness: Stucco, Wood Shingles

Framing Type: Metal Framing Fraction: .0001

Construction Components

Material	Thickness	R-Value		
		Cavity	Framing	
Outside Surface Air Film		0.170	0.170	
Stucco	0.875	0.175	0.175	Insert
Concrete, 120 lb	1.500	0.135	0.135	
Membrane, Vapor-Permeable Felt	0.010	0.060	0.060	Add
Insulation, Polystyrene, Smooth Skin	5.000	25.000	25.000	
Concrete, 120 lb	1.500	0.135	0.135	Delete
Gypsum or Plaster Board	0.500	0.450	0.450	
Inside Surface Air Film		0.680	0.680	
Weight: 41.3 lbs/ft ²		Subtotal	26.805	26.805
Heat Capacity: 8.5 Btu/ft ² ·°F		Overall U-Factor:	0.0373	
		Overall R-Value:	26.8	

OK

Cancel

Component Description

Assembly Name: Custom Wall - 4 in. Polystyrene

Assembly Type: Wall Default

Tilt: 90 Absorptivity: 0.70

Roughness: Stucco, Wood Shingles

Framing Type: Metal Framing Fraction: 0.00

Construction Components

Material	Thickness	R-Value		
		Cavity	Framing	
Outside Surface Air Film		0.170	0.170	
Stucco	0.875	0.175	0.175	Insert
Concrete, 120 lb	1.500	0.135	0.135	
Membrane, Vapor-Permeable Felt	0.010	0.060	0.060	Add
Insulation, Polystyrene, Smooth Skin	4.000	20.000	20.000	
Concrete, 120 lb	1.500	0.135	0.135	Delete
Gypsum or Plaster Board	0.500	0.450	0.450	
Inside Surface Air Film		0.680	0.680	
Weight: 41.2 lbs/ft ²		Subtotal	21.805	21.805
Heat Capacity: 8.4 Btu/ft ² ·°F		Overall U-Factor:	0.0459	
		Overall R-Value:	21.8	

OK

Cancel

Component Description

Assembly Name: R-13 Wall W.13.2.4.16

Assembly Type: Wall Default

Tilt: 90 Absorptivity: 0.70

Roughness: Stucco, Wood Shingles

Framing Type: Wood Framing Fraction: 0.15

Construction Components

Material	Thickness	Framing	R-Value		
			Cavity	Framing	
Outside Surface Air Film			0.170	0.170	
Stucco	0.875		0.175	0.175	<input type="button" value="Insert"/> <input type="button" value="Add"/> <input type="button" value="Delete"/>
Membrane, Vapor-Permeable Felt	0.010		0.060	0.060	
Insulation, Mineral Fiber, R-13	3.500	X	12.999	3.465	
Gypsum or Plaster Board	0.500		0.450	0.450	
Inside Surface Air Film			0.680	0.680	
Subtotal			14.534	5.000	
Weight:	123	lbs/ft ²			
Heat Capacity:	2.9	Btu/ft ² -°F			
			Overall U-Factor:	0.0885	
			Overall R-Value:	11.3	

Component Description

Assembly Name:

Assembly Type: Default

Tilt: Absorptivity:

Roughness:

Framing Type: Framing Fraction:

Construction Components

Material	Thickness	Framing	R-Value		
			Cavity	Framing	
Outside Surface Air Film			0.170	0.170	
Stucco	0.875		0.175	0.175	Insert
Membrane, Vapor-Permeable Felt	0.010		0.060	0.060	
Insulation, Mineral Fiber, R-17.8	5.500	X	17.800	5.445	Add
Gypsum or Plaster Board	0.500		0.450	0.450	
Inside Surface Air Film			0.680	0.680	Delete
Subtotal:			19.335	6.980	
Weight:	13.2 lbs/ft ²		Overall U-Factor: 0.0655		
Heat Capacity:	3.2 Btu/ft ² ·F		Overall R-Value: 15.3		

OK

Cancel