

Creating Culturally Relevant, Affordable, and Sustainable Homes

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What is your **name**, **role** and most **effective sustainability measure** or **biggest sustainability challenge? Why?**



HUD - “A systems-based approach to achieving sustainable buildings that incorporates environmental considerations into every phase of the building process – design, construction, operation, maintenance, renovation, and deconstruction/demolition.” Notice PIH 2008-25 (HA)

What is missing?

People



How to Measure Sustainability



U.S. Green Building Council - “*healthier, more comfortable*, more durable, and more energy efficient and have a much smaller environmental footprint than conventional homes.”

Energy Star – Great for energy efficiency – Not about People





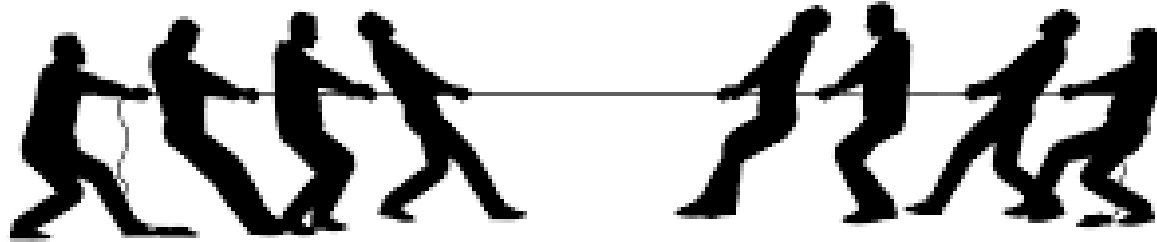
Sustainability is all about People

Who has a stake in
sustainable housing?
How do they define
success?



How do they define Success? Q&A

- What will make people living there proud and feel like it is HOME?
- What keeps them up at night?
- What makes them smile?
- What behavior changes will they commit to?
- Comfort
- Function/Accessibility
- Cultural relevance
- Annual Cost
- Appearance
- Maintenance requirements
- Turnover



Sustainability vs. Affordability

- “The dilemma between more housing and better housing can undermine the desire for sustainable construction.” Final Report, Sustainable Construction in Indian Country, U.S. Department of Housing and Urban Development, May 2011-May 2013



Balance

Design – Focus on fastest return on investment first

Load Reduction – Lowest hanging fruit

Energy Efficiency – Only after load reduction

Energy Generation – Typically the longest payback

Construction

Readily available materials

Building practices - panelization

Standardize plans

Renovate versus new construction

Operations

Keep it simple

Reduce maintenance Costs

Behavior

Education and incentive - 3-5% reduction

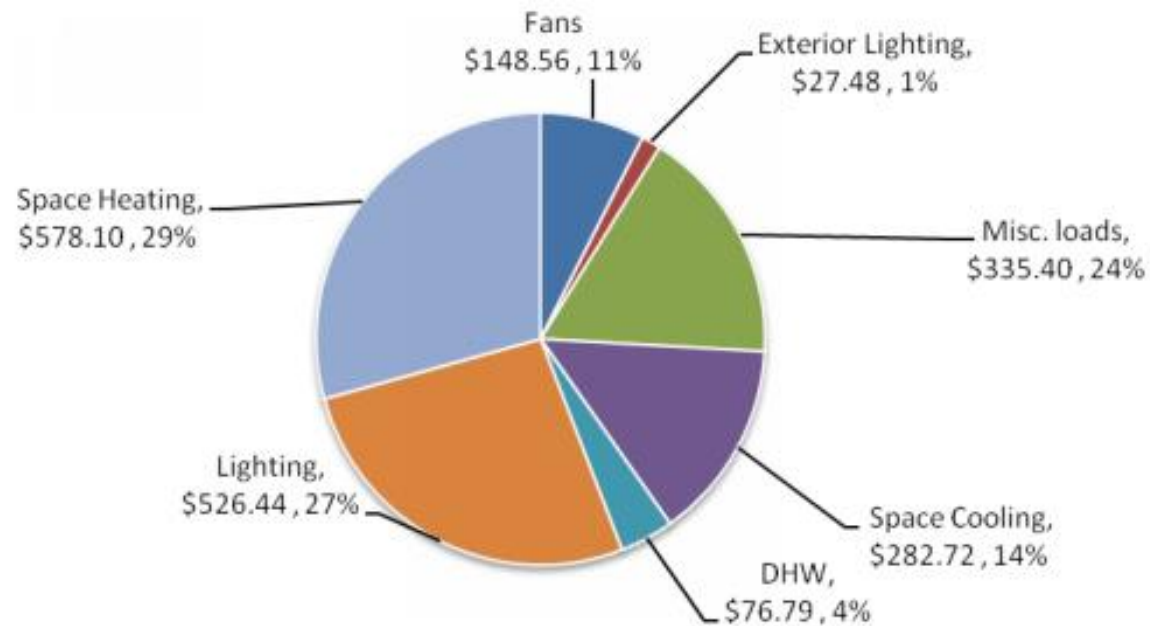


Figure 4. Energy Cost Breakdown

SUSTAINABLE CONSTRUCTION in INDIAN COUNTRY



Energy Evaluation and Recommendations Pokagon Band of Potawatomi Indians

Elder Housing
Kekyajek Odanek
Dowagiac, MI 49047

August 6, 2012

Leverage

- Utility Rebates
- Grants
- Build a Cohesive Team
- Scoring Criteria



Lessons from New Orleans

Make it Right 9

The Musicians Village











MAKE IT RIGHT

Donate Now



NEXT HOME

\$46,855 OF \$150,000

SPONSORED HOMES

81 OF 150



MAKE A CASH DONATION

Your donation to Make It Right is guaranteed to get to the people who need it most - the victims of Hurricane Katrina.

There is no minimum, give what you can. With your help, we can Make It Right again.

Brad Pitt,
MIR9 Donor

\$5 [Enter Amount](#)

All donations are tax-deductable and will be accompanied by a printable receipt for tax purposes.

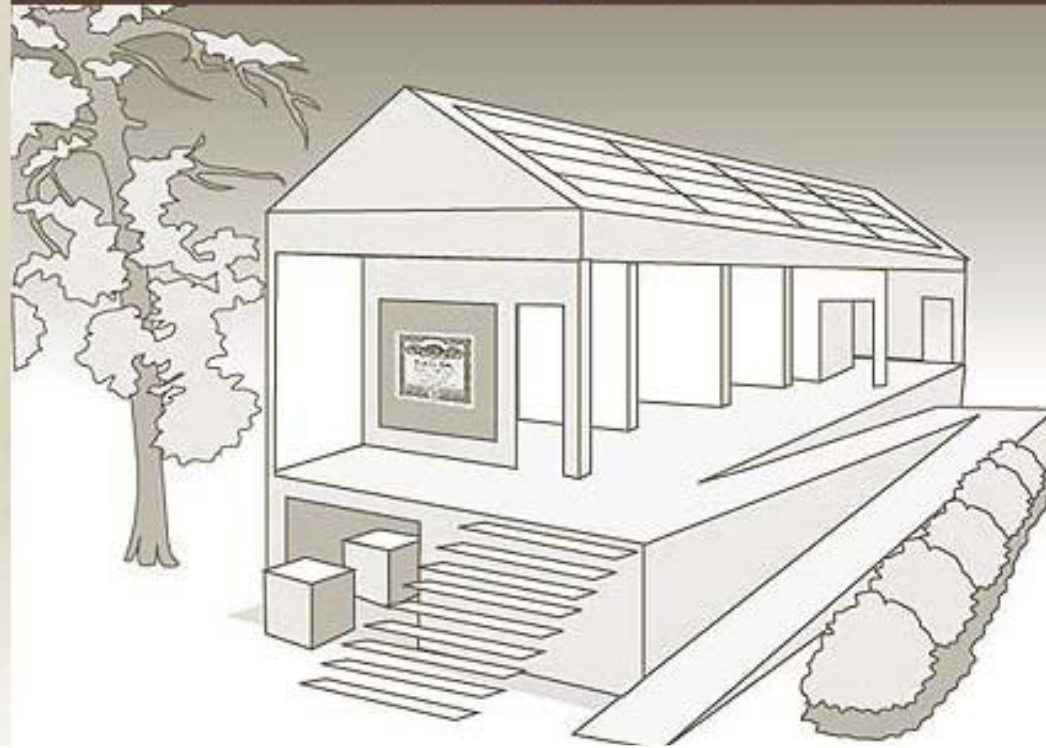
[MAKE DONATION](#)

MOST RECENT DONORS:

Mr. Paul Trefonas

HELP REBUILD THE LOWER 9TH WARD

Enter the Donation House and select items to donate to families in need. Select as many items as you like. Click below to begin:



PRODUCTS AND SERVICES



Donated products and services can contribute to the work of Make It Right in a variety of ways.

Click below to learn more about the benefits of becoming a Make It Right donor.

[HELP MAKE IT RIGHT](#)

FEATURED DONORS:



Lighting

Donation covers cost of installing efficient compact fluorescent and LED bulbs in all light fixtures in 1 house.

DONATION AMOUNT:
\$500

[ADD TO DONATION](#)

ROLLOVER ROOMS TO HIGHLIGHT. CLICK TO NAVIGATE.



ALL DONATABLE ITEMS: Kitchen/Living Room

- Thermostat (programmable) – \$100
- Linoleum floor (for kitchen) – \$250
- Lighting (Energy efficient) – \$500
- Washing machine (Energy star rated) – \$1,000
- Refrigerator (Energy star rated) – \$1,500
- Tankless water heater – \$1,500
- Low VOC Paint – \$25
- Ceiling fan – \$200
- Sponsor full house – \$150,000
- Cash donation

YOUR CURRENT DONATIONS

Currently empty.



BATHROOM

Showerhead

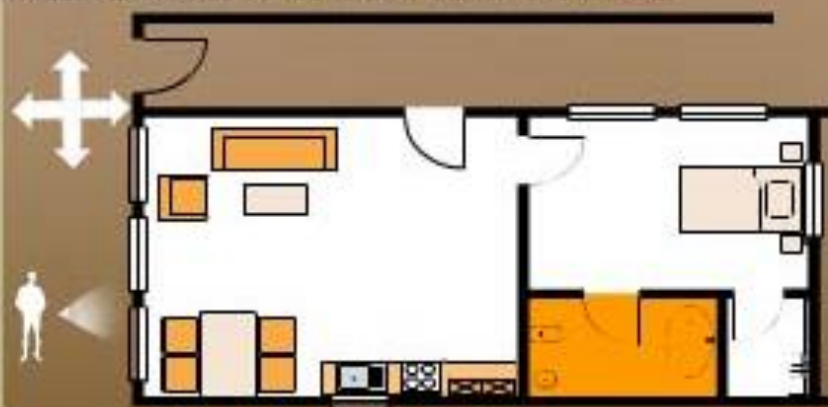
Donate a low-flow fitting which reduces potable water usage by 40% compared to conventional models.

DONATION AMOUNT:

\$40

ADD TO DONATION

ROLLOVER ROOMS TO HIGHLIGHT. CLICK TO NAVIGATE.



ALL DONATABLE ITEMS: Bathroom

Faucet aerators – \$5
Showerhead (low flow) – \$40
Toilet (dual flush) – \$250
Low VOC Paint – \$25

Sponsor full house – \$150,000
Cash donation

YOUR CURRENT DONATIONS

Currently empty.











What were the results 10 years later?

Make it Right 9

- Built 109 Homes, 21 designs
- Homes sold at a loss with a price point of \$150,000 each
- Buyers must be below 120% median income for New Orleans
- Documented 70% less energy use than similar homes

Musicians Village

- Built 70 Homes
- Same Plan, 7 facades
- Sweat Equity – Habitat for Humanity
- Average Home Value: \$157,000
- Sense of Community







Culturally Relevant Architecture

Expressing
Culture
through
Architecture

Orientation, Landscape

Shape, Form, Massing

Language

Values

Color & Patterns

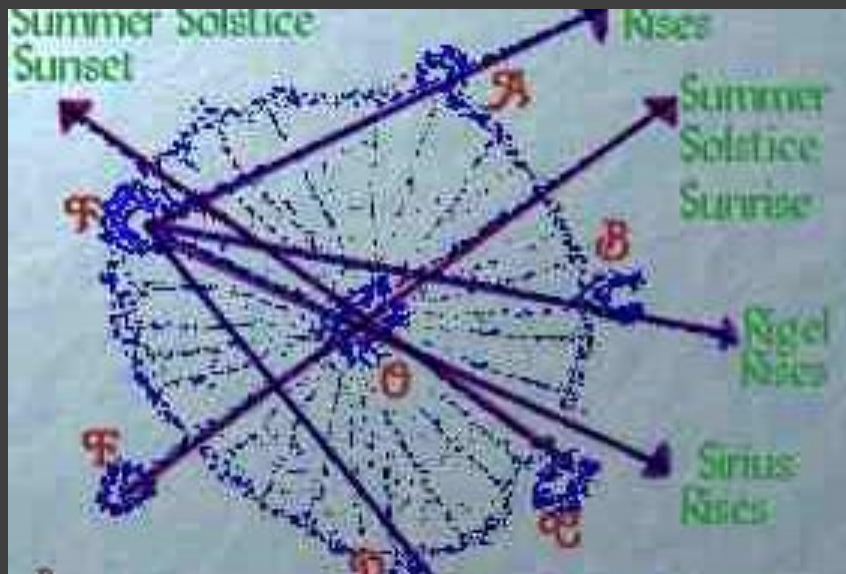
Symbols

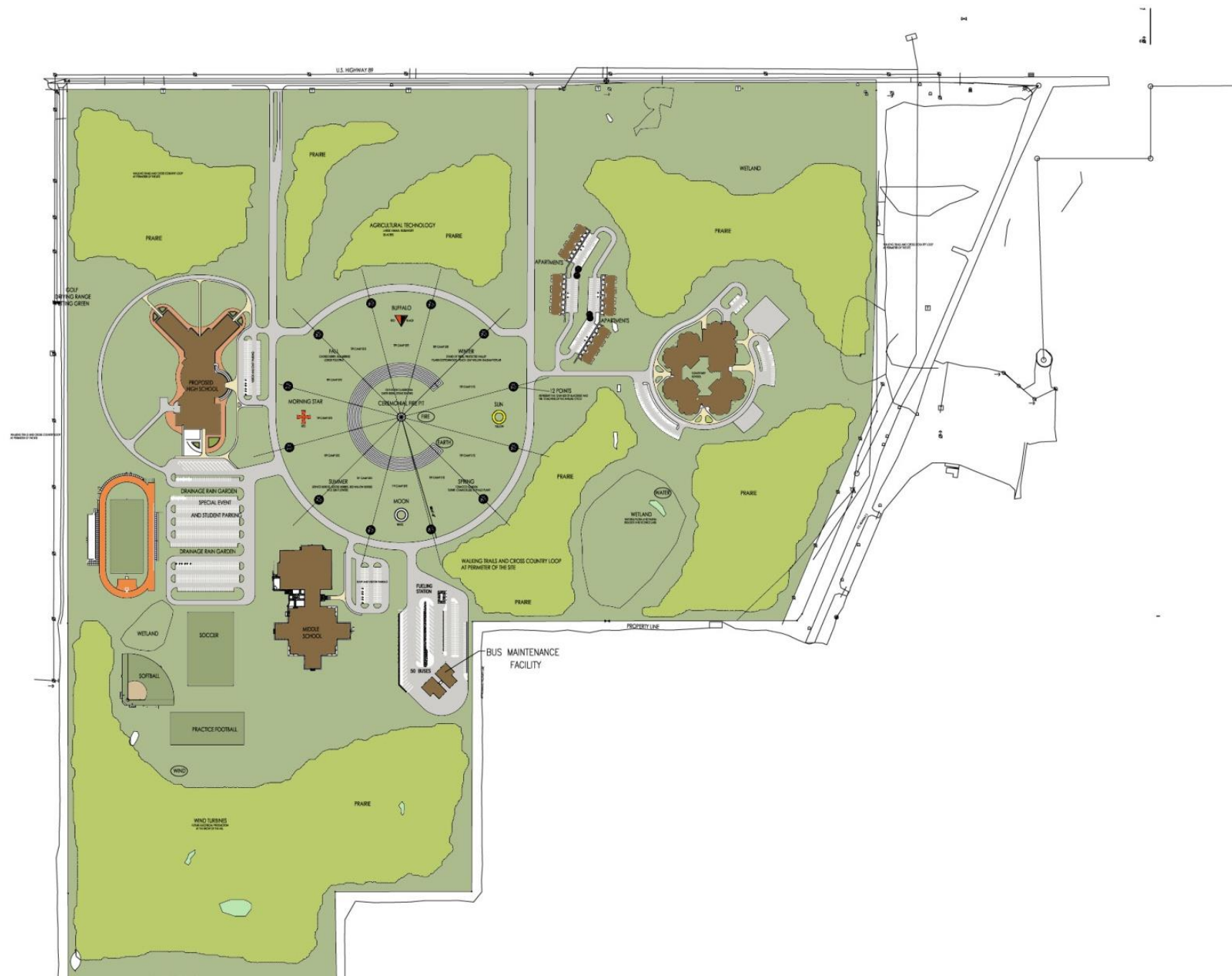
Experiences













BUILT-UP ROOF

1:12 AND 3:12

SUN SCREENS

METAL CLADDING

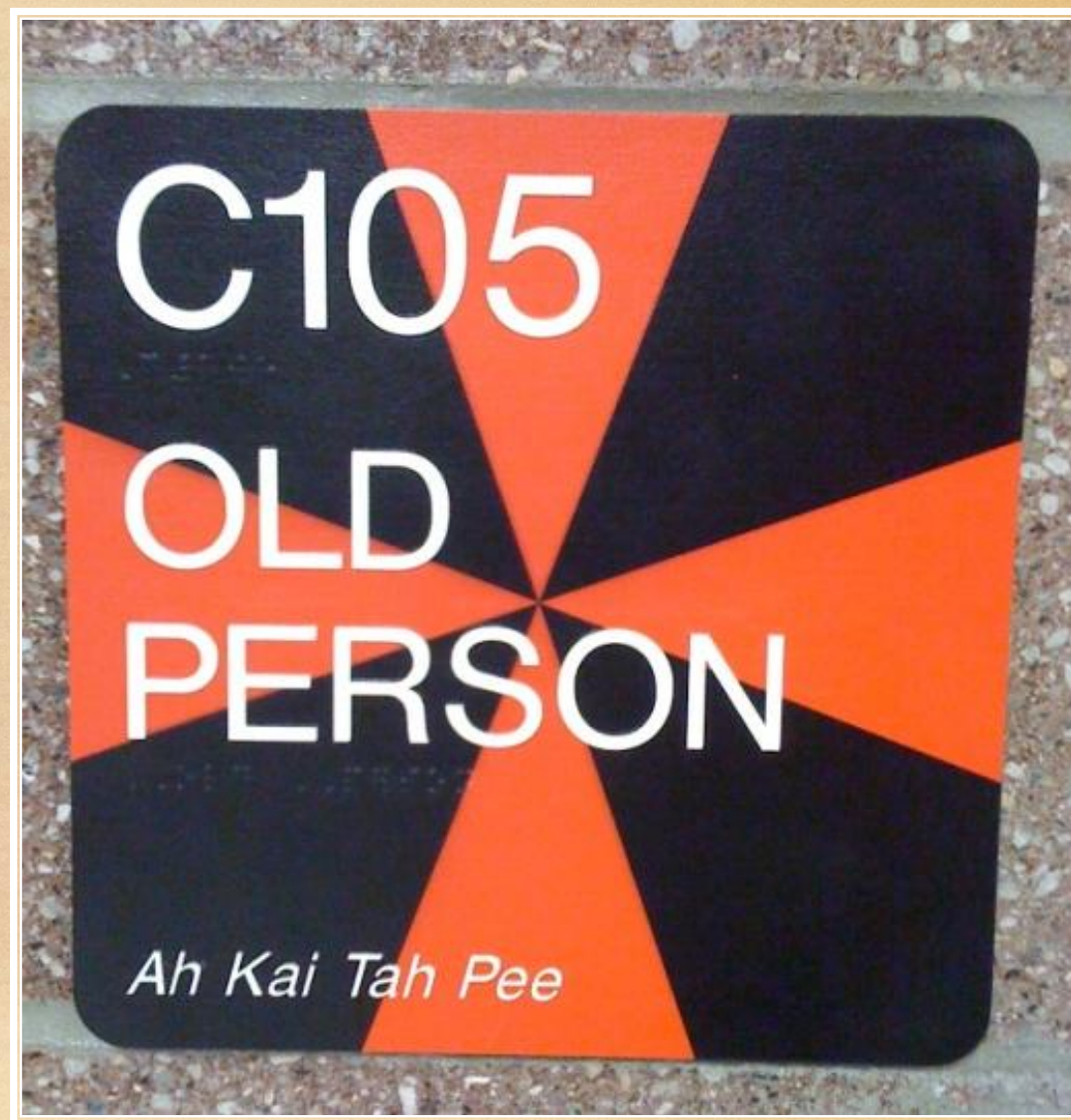
CLERESTORY FOR

DAYLIGHTING

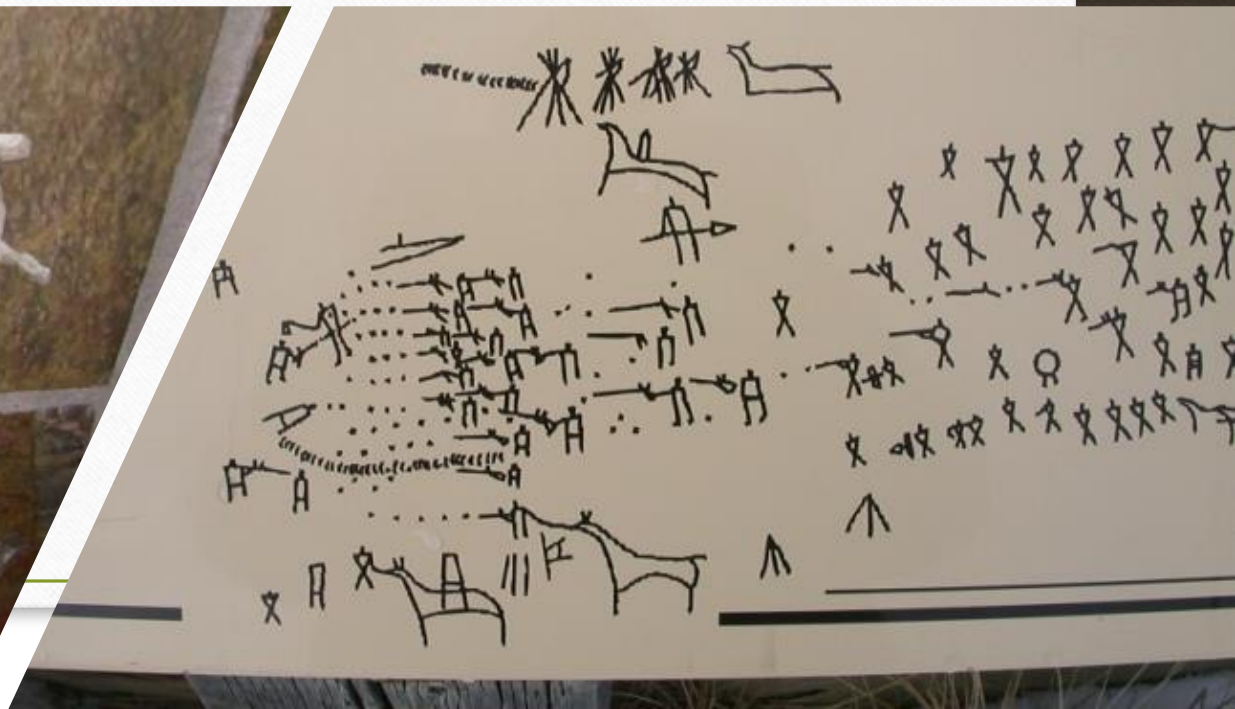
EARTH BERM

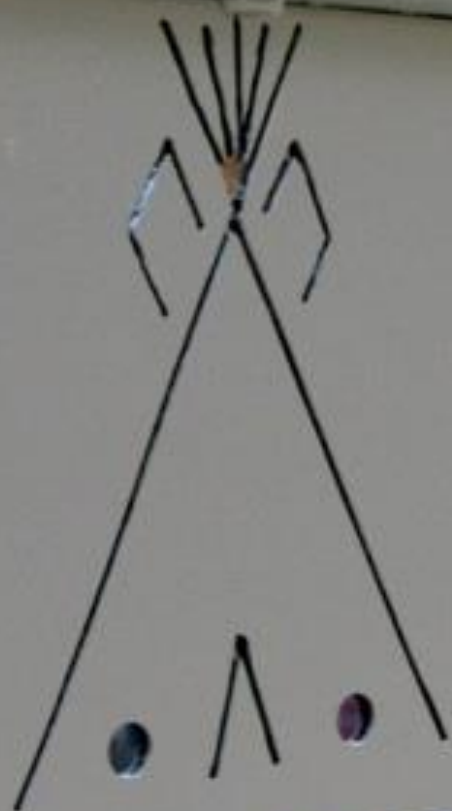
NATURAL STONE

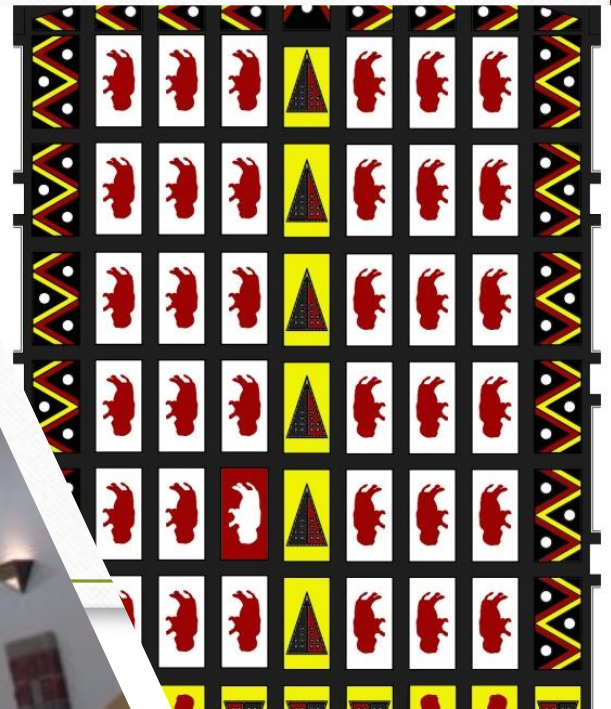












Learning from SIPs

S **I** **P**^S
structural insulated panels

Structural Insulated Panels (SIPs) offer multiple properties, all-in-one, to help build high performance homes.

EPS
Expanded Polystyrene
Foam

+

OSB
Oriented Strand
Board

+

High Pressure
Lamination

=



SIP
Structural Insulated Panel

Community Action of Allegan County

Mission

Community Action of Allegan County will serve, advocate, and engage individuals, families and communities to overcome the effects of poverty and encourage self-reliance



Values

- Collaboration
- Continuous Improvement
- Quality Service
- Stewardship
- Hope
- Dignity

Dual Community Development Program

The Dual Community Development Program addresses the need for affordable housing and workforce development in Allegan County. Through this program, CAAC will connect high schools students and adult learners to career opportunities in building trades and construction; one of the fastest growing industries in the State of Michigan.



Through a partnership with CAAC, Michigan Career and Technical Institute (MCTI) will begin hosting Pre-Apprenticeship Construction Training (PACT). PACT delivers core construction training, and provides advanced learning in eight skilled trades:

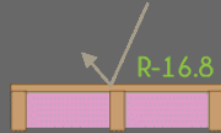
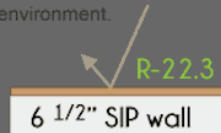
Weatherization	Carpentry	Maintenance
Plumbing	Masonry	Electrical
Landscaping	Painting	



R-Value

Effective R-Value:

The R-value of a whole-wall or roof system, in a real environment.



Stud Wall w/ R-20 batt

R-Value Measures:

A material's Resistance to thermal energy transfer.

SIP Thicknesses:

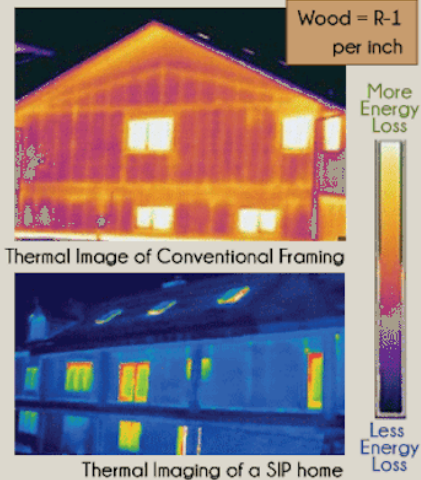
6 1/2"	Effective R= 22.3
8 1/4"	Effective R= 29.2
10 1/4"	Effective R= 35.8
12 1/4"	Effective R= 40.8

As outside temperatures cool, the R-value of fiberglass insulation decreases while ridged EPS foam increased from 4.2 per inch to 4.4.

- Source: Studies conducted by the DOE's Oak Ridge National Laboratories

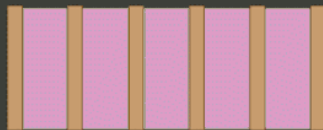
Thermal Bridging?

Thermal bridging is caused by breaks in insulation where energy can be conducted through other materials, such as stud walls.



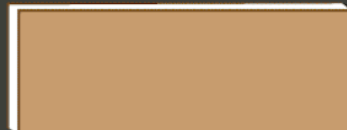
Air Tight

Combating Energy Lost via Convection
(air moving through the envelope)



Conventional Stud Wall

- Insulation breaks every 16 inches
- Effectiveness is reliant on proper installation
- Gaps can form if insulation falls or degrades



SIP Wall

- SIP walls come in solid panels up to 8' x 24'
- The rigid EPS foam is a continuous wall of insulation
- EPS insulation does not change or off-gas leaving gaps

Structural Insulated Panel Construction



Less Waste

Building a conventional new house generates an average of **7,000 lb.** to **12,000 lb.** of waste. About **40%** of that is **wood**.

- Source NAHB

Pre-Fab Advantage

- Panels arrive on-site ready for installation.
- Waste created during manufacturing is recycled or reused in the facility

Fast Construction

Time = Money

Average time to Build
6 months* **5 months**

Conventional on-site construction

Home with Panelized SIP Envelope

* 2015 Census Bureau

FAQ's



How are windows cut?
Windows & doors are pre-cut and bucked with lumber for easy install later in the field.

What about plumbing?
Plumbing never goes in exterior walls therefore it is not a concern.

Where does the electrical go?

Wire chases are bored into the EPS with heat at optimal heights for switches and plugs. They can be customized as well.

Structural Insulated Panels



www.siphomesystems.com

SIPs Comparisons

SIPs Pros

- Up to 30% less waste on site
- Up to 60% more Energy Efficient
- Better Indoor Air Quality
- Acoustics – Quiet
- Fast Build On Site
- RS Means study - reduce on site labor by up to 55%

SIPS Cons

- Industrial in nature - Epoxy
- High Embodied Energy in Manufacturing
- Transportation Costs
- Attractive to Pests - Rodents
- Customization significantly increases costs

SIPs Costs of Panels

SIPs Price Calculator - Choose panel size and quantity.

PANEL THICKNESS (inches)	R-VALUE	PRICE (per SQFT)	PANEL SIZE (feet)	QTY
			4 X 8 ▼	1 ▼
4.5	16	\$5.08	\$162.56	\$162.56
6.5	24	\$5.52	\$176.64	\$176.64
8.25	32	\$5.98	\$191.34	\$191.34
10.25	40	\$6.43	\$205.76	\$205.76
12.25	48	\$6.87	\$219.84	\$219.84

SIPs Costs of Panels – ACME Panel

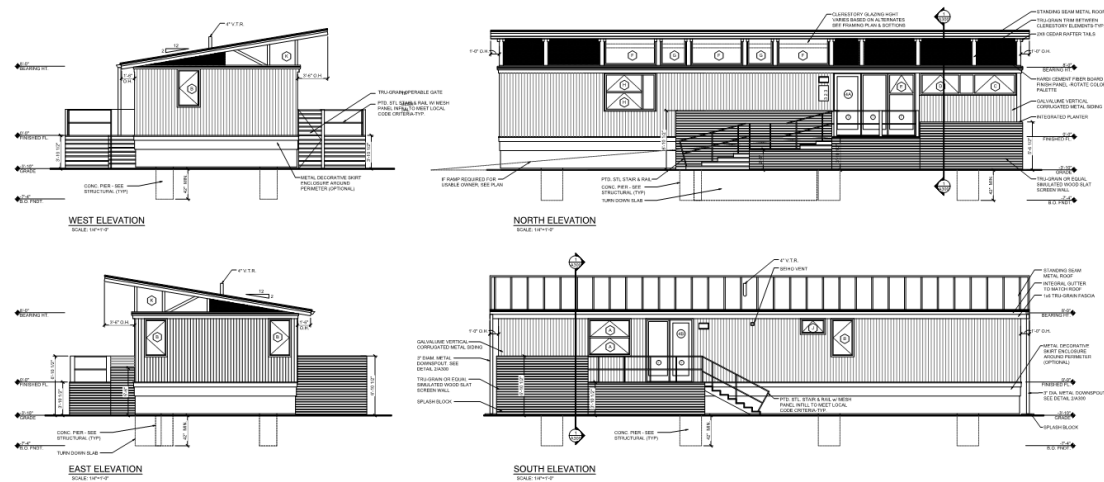
Available Size Chart with Pricing

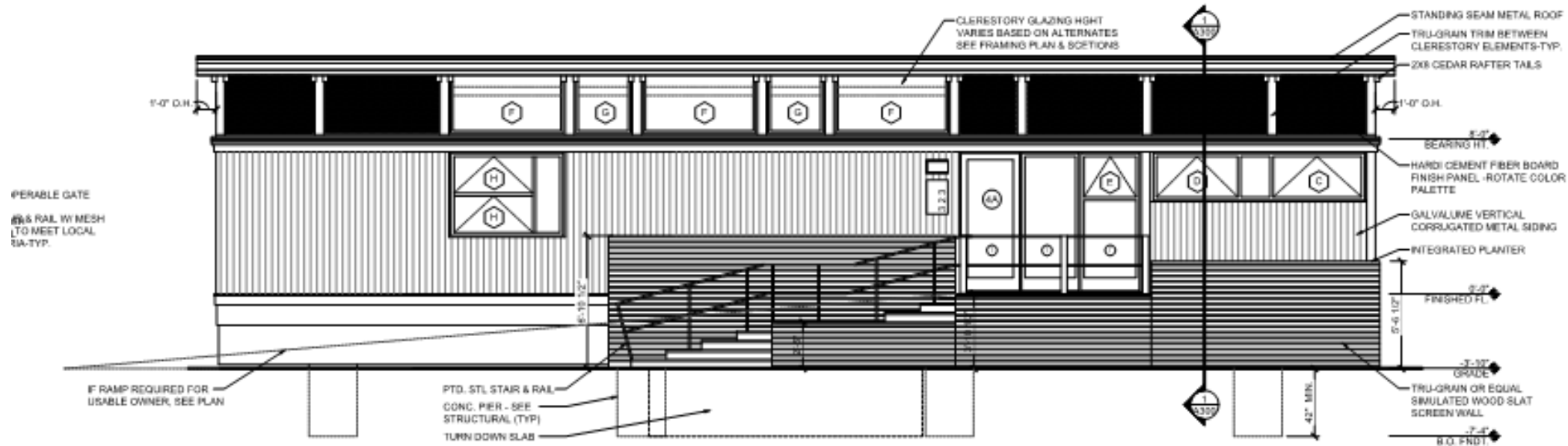
PANEL THICKNESS (inches)	R-VALUE	PRICE PER SQFT	PANEL SIZE (feet)							JUMBO 8' x 24'
			4' x 8'	4' x 10'	4' x 12'	4' x 14'	4' x 16'	4' x 20'	4' x 24'	
4.5	16	\$5.08	\$162.56	\$203.20	\$243.84	\$284.48	\$325.12	\$406.40	\$487.68	\$975.36
6.5	24	\$5.52	\$176.64	\$220.80	\$264.96	\$309.12	\$353.28	\$441.60	\$529.92	\$1059.84
8.25	32	\$5.98	\$191.36	\$239.20	\$287.04	\$334.88	\$382.72	\$478.40	\$574.08	\$1148.16
10.25	40	\$6.43	\$205.76	\$257.20	\$308.64	\$360.08	\$411.52	\$514.40	\$617.28	\$1234.56
12.25	48	\$6.87	\$219.84	\$274.8	\$329.76	\$384.72	\$439.68	\$549.60	\$659.52	\$1319.04

Prices subject to change without notice. Please call to confirm current pricing. Last updated 8/4/2017.



- 2 Bedroom House
- Outdoor Patio
- 1080 SF
- Target Cost \$120,000
- Plan to Build 6-8 Units
- Includes Student Labor





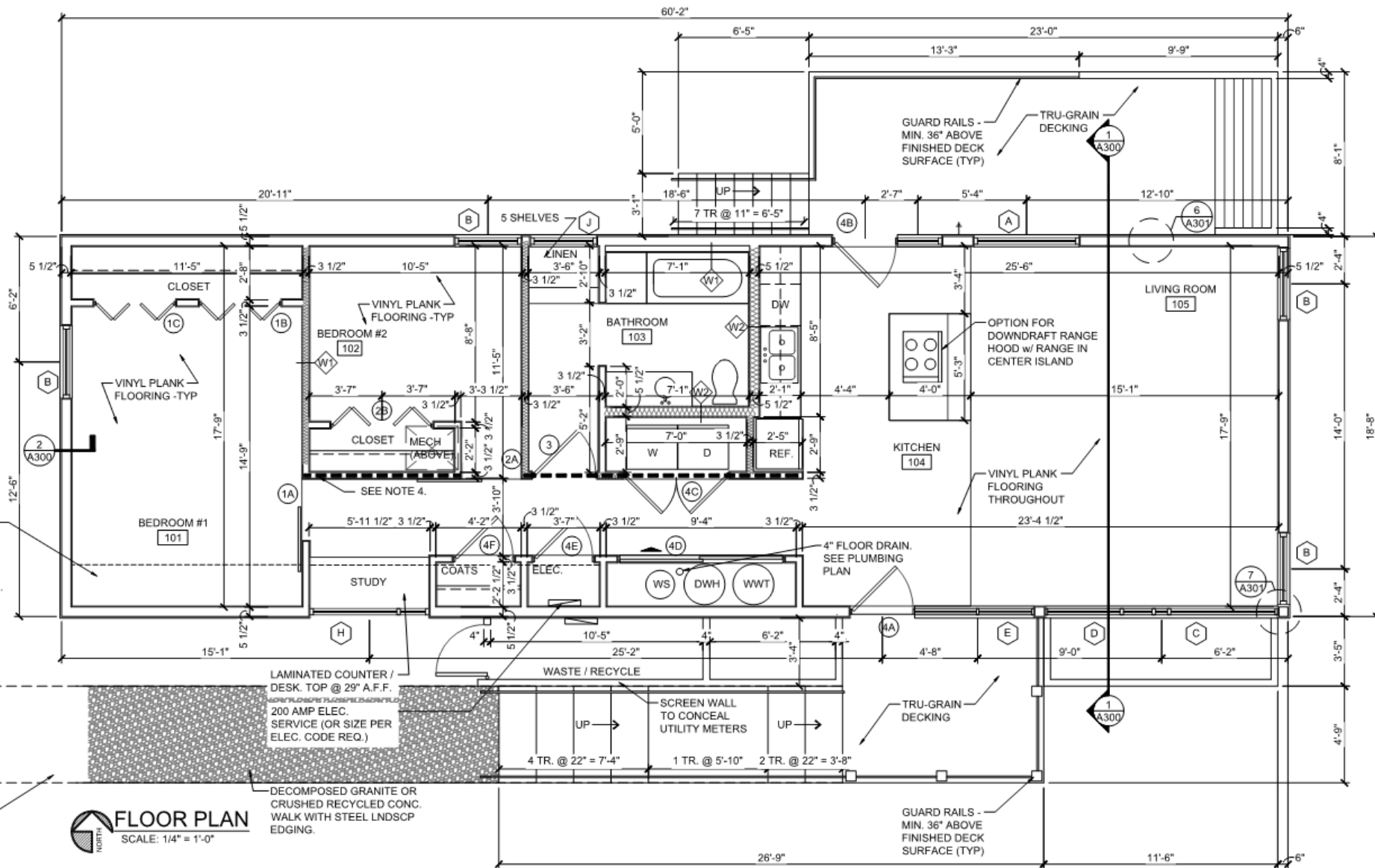
NORTH ELEVATION

SCALE: 1/4"=1'-0"

CL. HT. A.F.F.	NOTES
SLOPED	
SLOPED	BULKHEAD @ 8'-0"
SLOPED	BULKHEAD @ 8'-0"
SLOPED	BULKHEAD @ 8'-0"
SLOPED	

LINE OF OPTIONAL FRAMED STORAGE SHELF. PAINT TO MATCH ADJACENT WALLS. PROVIDE CENTER SUPPORT SECURED TO CEILING STRUCTURE IN BEDROOM #1. REFER TO SECTION 1/A300

IF RAMP REQUIRED FOR USABLE OWNER ACCESS- PROVIDE 1:12 8% RAMP UP TO ENTRY WAY IN LIEU OF STAIRS SHOWN.



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ASSOCIATES, INC.
AMERICAN COUNCIL OF ENGINEERING COMPANIES
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Portage, MI 49002
Phone: (269) 327-3532

264 Western Avenue
Allegan, MI 49010
Phone: (269) 673-8465

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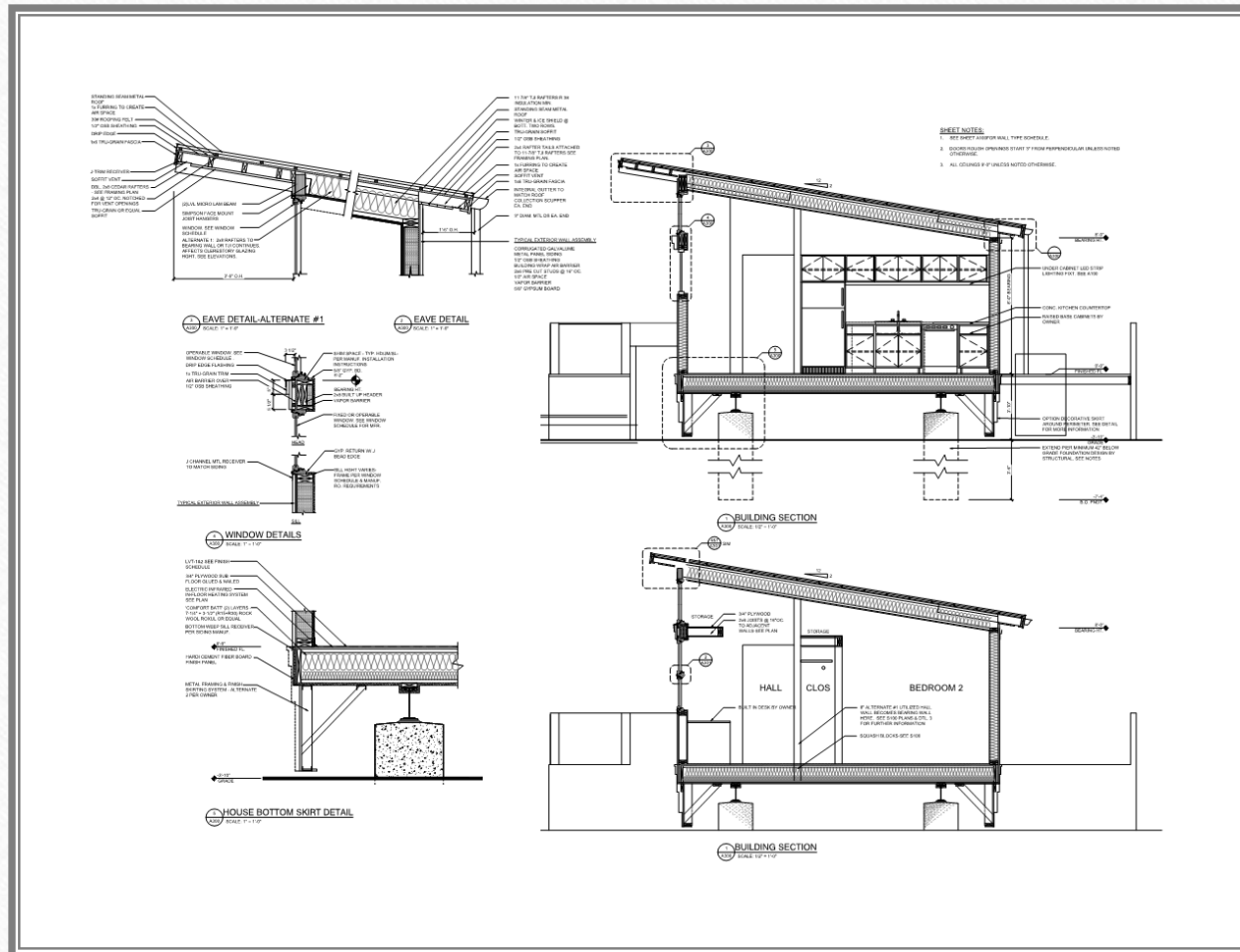
PROJECT NAME:
**SIPs 1 PROTOTYPE
HOUSE DESIGN**

**CHRISTIAN M.
DEUEL**
323 WATER STREET
ALLEGAN, MI 49010



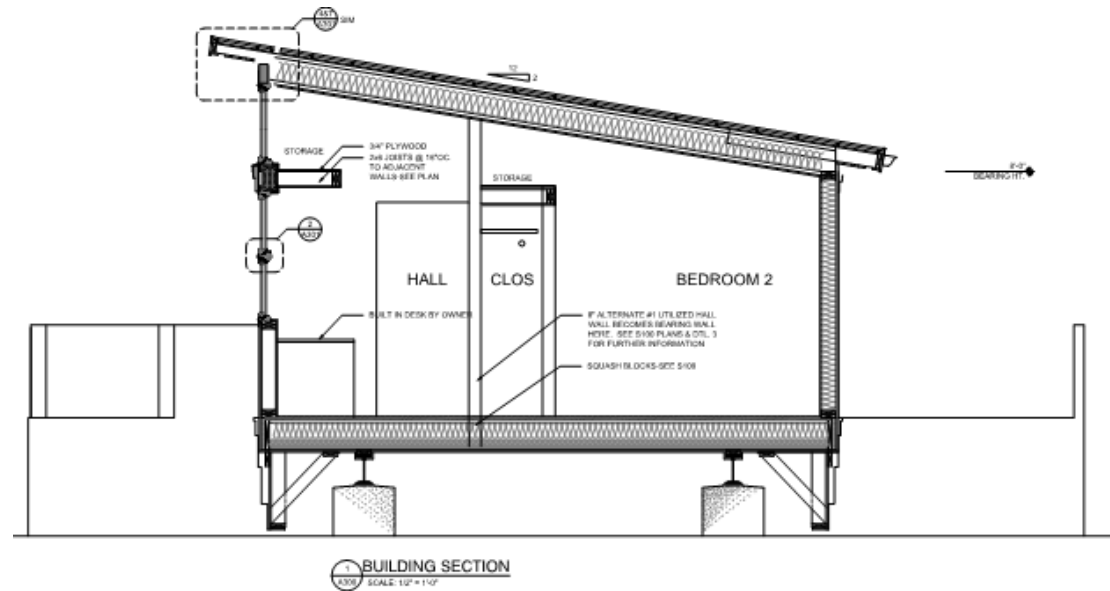
CAAC SIPS House

- Electrical wiring is pulled through precut channels
- No need for a vented attic below roof
- Some recommend venting between roofing material and insulation above- as a “Cold Roof”





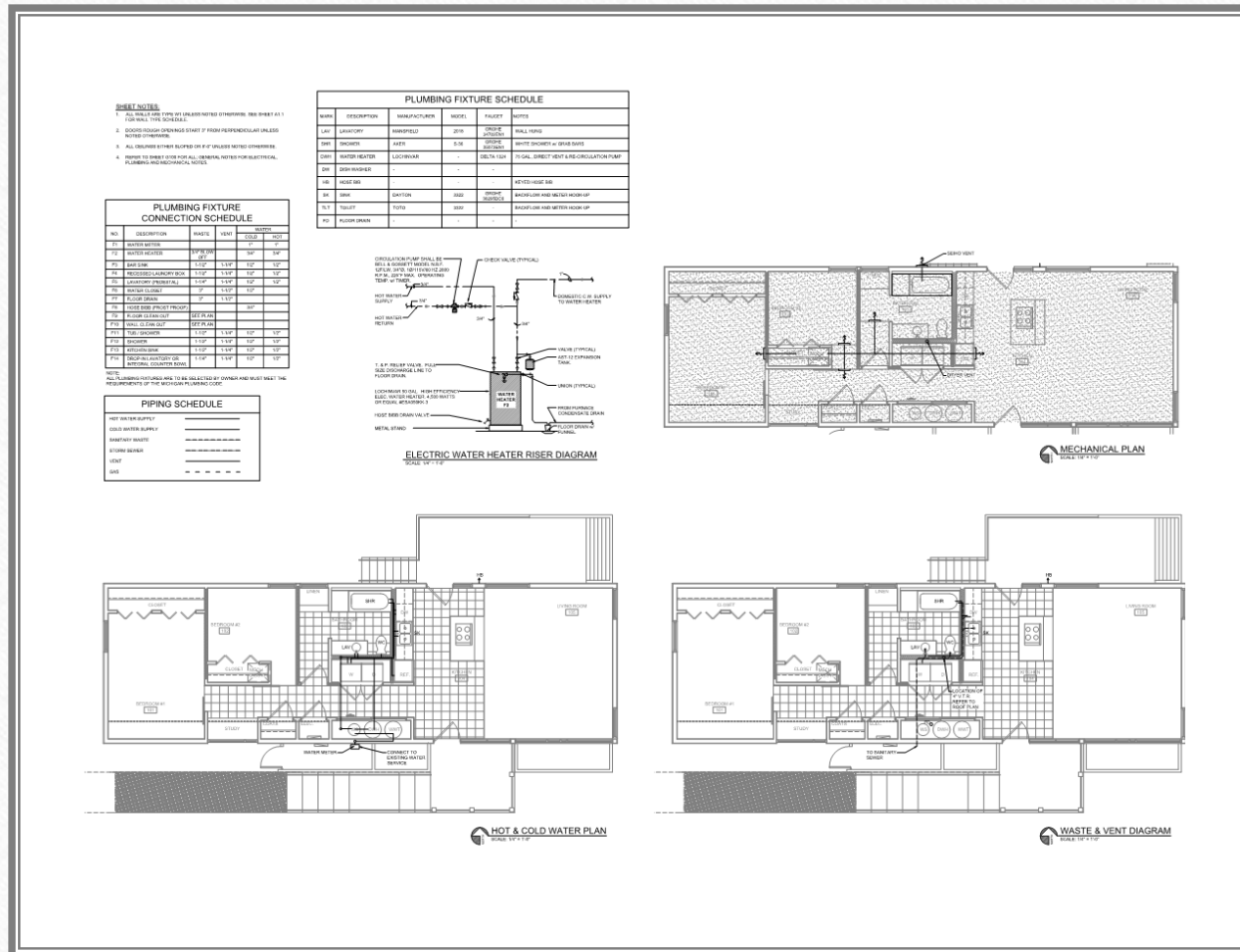
CAAC SIPS House



- Mechanical ventilation critical due to weather tightness of construction
- Easy to control humidity level inside house
- Panels are sized to match dimensional lumber

CAAC SIPS House

- Energy Star Appliances
- Water Efficient Fixtures
- High Efficiency Gas Furnace
- Programmable Thermostat
- LED Lighting



- SIPs Panel are very strong, handle in plane compressive loads very well.
- SIPs house designed on concrete pier foundations
- Could be relocated





Questions and Answers

Have you learned anything **new**?

