



# Thunder Valley House

## Participant information

Enercept  
Charlie Ewalt, Roberta Bartel  
3100 9th Ave SE  
Watertown, SD 57201

Phone: 605-882-2222  
Email Address: [enercept@enercept.com](mailto:enercept@enercept.com)  
Website: [www.enercept.com](http://www.enercept.com)

Category  
Affordable Housing

High Performance: No

Project information  
Thunder Valley CDC (Regenerative Community) House  
290 Empowerment Drive  
Porcupine, SD 57772

Date Completed: July 2018

Total cost of project (exclusive of land): \$110,000

Dimensions of building (all floors of multi-story building): First and second floors: 26' x 26' with attic bonus space for storage

Asking price/purchase price (Affordable Housing only): \$130,000

Total sq. ft. of conditioned space: 1,448 sq. ft.  
Built By (if different than applicant)

Thunder Valley CDC and homeowners  
Enercept  
290 Empowerment Drive  
Porcupine, SD 57772  
Panels Manufactured By

Company Name (members only): Enercept, Inc.

## Thunder Valley House



Designed By (if different than applicant - SIPA will only recognize members)  
Pyatt Studios  
Rob Pyatt  
1445 Pearl St #209  
Boulder, CO 80302

## Thunder Valley House



Total sq. ft. of conditioned space: 1,448 sq. ft.

Describe the end use of the building: The home is part of the Thunder Valley Regenerative Community located on the Pine Ridge Indian Reservation. Each unit is a single family home for low to moderate income Native American families.

How did SIP construction help you get this job? The developers are creating climate change resilient homes. SIP construction fit well because of the improved energy efficiency they offer. Thunder Valley CDC has limited construction crews and wanted a building system that would go up quickly and that the homeowners could participate in. Rural utilities are generally more expensive, by building energy efficient housing ownership becomes more affordable.

SIP wall thickness and core material: 6" walls with EPS solid insulating core  
SIP roof thickness and core material: 12" roof with EPS solid insulating core

Describe the benefits of using SIPs on this project. Did SIPs help save time, labor, construction costs, or energy? Using SIPs allowed a very inexperienced crew and homeowners the ability to frame up the house and create an air-tight exterior shell.

Describe any innovative design elements or structural engineering involved: The home was designed to maximize passive and active solar potential. The roof pitch has been adjusted for ideal solar gain and equipped with solar panels. The covered porch proves passive cooling.

Please list any certifications the project received, such as ENERGY STAR, LEED, National Green Building Standard, WELL, Passive House, Green Globes or local green building programs. Only list certifications that are completed: None completed at this time

HERS Index (required only for High Performance Category and recommended for residential projects): Projected calculations indicate

Blower door test results (ACH50) (required only for High Performance Category and recommended for residential projects): The airtightness target of this

Energy use intensity in kBtu/ft<sup>2</sup> (required only for High Performance Category and recommended for commercial projects): 14,500  
kwh/year x 3.412 = 49,474

Describe the HVAC system used on the project: High performance integrated space and water heating system with inverter heat pump for cooling/ dehumidification, energy recovery ventilator, and high-efficiency filter - all delivered through a small duct distribution system.

## Thunder Valley House



Describe any other energy-saving materials used in the building envelope other than SIPs. List U-values of windows used and the U or R-value of any insulation materials. (judged only for High Performance Category) Windows: 0.27 U-Value 0.20 SHGC; Slab and Foundation Insulation = R-12; 6 KW PV System; Covered Porch for Passive Cooling & Sun Protection; High SRI standing-seam metal roof for reduced heat gain

Please list any energy-efficient products or design features, such as lighting, hot water heating, appliances, passive solar (judged only for High Performance Category): LED lighting; Hydronic floor heat; Energy Star appliances; Low Flow Water Fixtures

Were any solar panels installed on the project? If so, indicate the size of the system (judged only for High Performance Category): Yes, 6KW PV system

Please list any sustainable materials or design features not listed above, such as recycled materials, low-VOC finishes, landscaping, etc. (judged only for High Performance Category): Low or no VOC finishes were used.  
The shared space and yards are seeded with native prairie grasses and shrubs.

Any additional comments on the project: This house is one of seven units supplied. The homes were designed to be built through a sweat- equity and training model that resulted in between 15- 30% cost savings for low income Native American families living in the development.

Each home comes with a 'Homeowner's Guide' that include instructions on keeping the home safe, healthy, and green.





















Site view

Thunder Valley House



## Elevations and floor plans

## Thunder Valley House

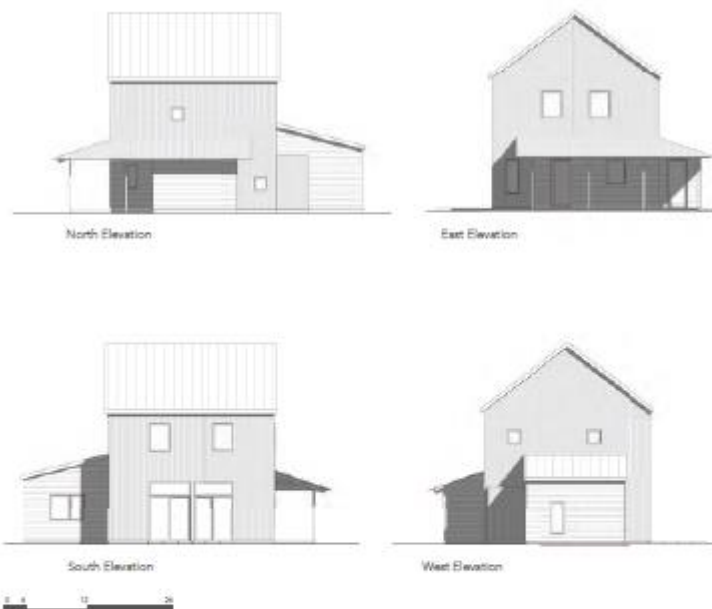


FIGURE 11 Elevations Diagram by Pyett Studio

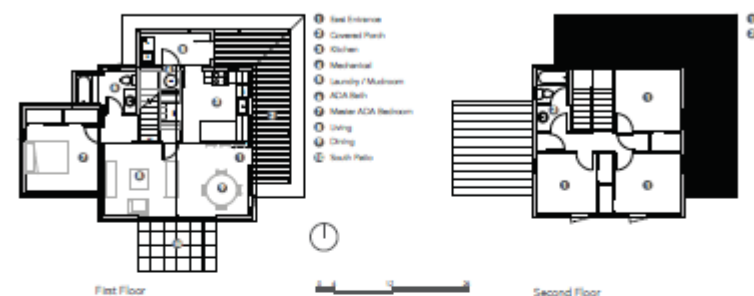


FIGURE 8 Floor Plan Diagram by Pyett Studio

### FLOOR PLANS

- East Facing Entrance
- Passive Solar
- Wheelchair Accessible + Bedroom & Bath on Ground Level
- Bedrooms, Full Bath, and Flex-space on Second Floor for Maximum Sleeping/Working Capacity
- Covered Porch for Passive Cooling and Sun Protection
- Storm Shelter Option
- Public (Communal) & Private Orientation
- Ease of Access to and from Carport



FIGURE 9 HERS Index Diagram by Pyatt Studio

FIGURE 10 Building Energy Modeling by Pyatt Studio

-The National Institute for Building Sciences, 2015  
-US Environmental Protection Agency

## Housing Design Development

Pyatt Studio utilized energy modeling and analysis to develop the wall assemblies, materials and building systems for the homes to ensure that all project goals were met.

### DESIGN STRATEGY AND KEY POINTS

- Enclosure: Durable and robust building systems using Structural Insulated Panels (SIP's), conditioned attic, high performance windows, exterior foundation insulation, and airtight construction.
- HVAC: High-performance integrated space and water heating system with inverter heat pump for cooling/dehumidification, energy recovery ventilator, and high-efficiency filter – all delivered through a compact, small duct distribution system.
- IAQ: Design strategy focused on pollution avoidance, source-point exhaust, continuous ventilation, and consistent distribution of fresh and filtered air to habitable rooms.

### PROJECT DATA

- Location: Pine Ridge Indian Reservation, Porcupine, South Dakota
- 2009 IECC Climate Zone: 6
- Square Feet: 1448
- Number of Stories: 2
- Number of Bedrooms: 4
- Number of Bathrooms: 2
- HERS Score: 40, with 6 KW PV System: 0
- Estimated Monthly Energy Costs: \$98; \$20 with PV

### TECHNICAL SPECIFICATIONS

- Slab Insulation = R-12; Foundation Insulation = R-12
- Wall Insulation = R-32; Roof Insulation = R-50
- Airtightness Target = 1.0 ACH@50Pa
- Windows = 0.27 U-Value; 0.20 SHGC
- Heating/Cooling/DHW Specifications = 95%
- CAE; 17 SEER
- Energy Recovery Ventilation = 60 to 120 cfm w/70% SRE

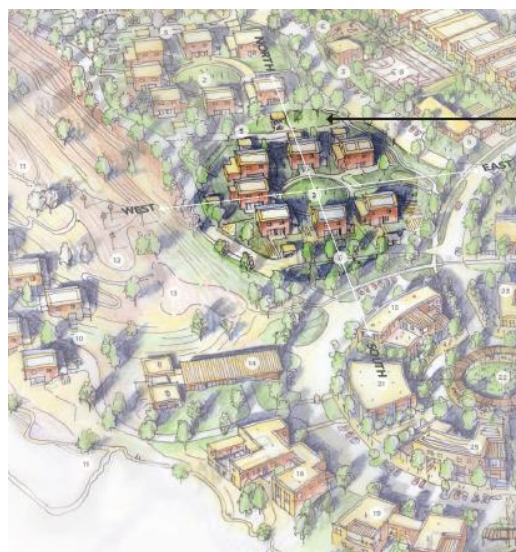
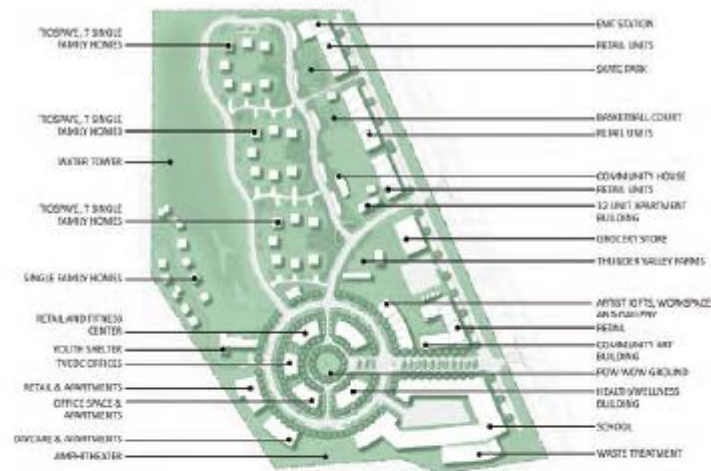


FIGURE 1 Site Plan Diagram by BNIM