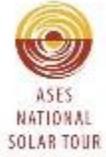




Building Climate Solutions 2016 Sustainable Building Tour



*Part of Flagstaff Festival of Science and the
ASES National Solar Tour*



Saturday, October 1st

10AM—2PM

12th Annual Tour

**Beginning at Willow Bend
Environmental Education Center**



Tour Features: ~Net Energy Zero ~Net Water Zero ~Rainwater Harvesting ~Greywater
~Solar PV ~Solar Thermal ~Passive Solar ~Trombe Walls ~Strawbale Construction ~Local
Materials ~ICF Construction ~Advanced Framing ~Heat/Energy Recovery Ventilation ~Air
Sealing & Advanced Insulation Methods ~Innovative Materials and Methods ~Retrofitting

Willow Bend Environmental Education

703 E Sawmill Road,
Flagstaff, AZ 86001



Sustainable features:

+ **Strawbale building:** energy efficient, renewable and high source of insulation value, straw is also a waste by-product from grain harvesting

+ **Passive solar design:** south facing windows, **Trombe walls:** passive solar heat collection, heat stored and radiated at night

+ Native plants and **xeriscaping** to help reduce watering demands supporting healthy ecosystems

+ **Solar PV** panels: grid tied 6.2 kWh per day, donated by **Prometheus Solar**

+ **Rainwater harvesting** system collects and distributes to low-water garden

+ Energy efficient: blown-in fiberglass in ceiling (R-50) & CFL lighting with natural day lighting

Award Certification Level: *Advanced*

Architect/Designer: *PWMA, LLC*

Builder: *Solar Design & Construction*

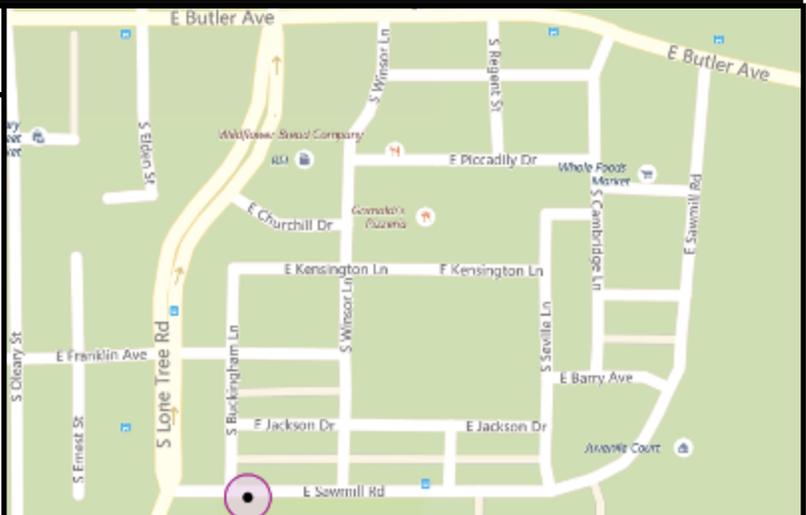
Sign in at Willow Bend to receive a tour packet with location addresses to start the self-guided tour!

Willow Bend Environmental Education Center's mission is to provide educational outreach services that build environmental awareness and an ethic of responsible stewardship of our natural and cultural resources. The non-profit organization was founded in 1978 by the Coconino Natural Resource Conservation District and found a permanent home in 2002 when this building was constructed. The building provides the public with a model for sustainable building and living. Willow Bend leads by example, with their **passive solar**, strawbale education center, as well as by their low-water native gardens, on-demand water heater, **Energy Star** office equipment, energy-efficient lighting, composting, and more.

In addition to serving as a center that practices sustainability, Willow Bend offers environmental education for kids and adults, such as hands-on learning, workshops, field trips, and events for the community. For more information about Willow Bend, visit their [website](#).

Directions to Willow Bend

Willow Bend is off of Butler Ave in the vicinity of Aspen Place behind the Sawmill shopping establishment. Go south on E Sawmill Rd., pass the County Jail. Willow Bend will be on your left. Or go south on S Lone Tree Rd., take a left on E Sawmill Rd. Destination will be on your right.



Passive Solar House on Ash



Sustainable features:

- + [Passive solar design](#)
- + [Low Impact Development](#) strategies incorporated during construction
- + Active [radon](#) mitigation system
- + [Heat Recovery Ventilator](#)
- + Advanced framing
- + [Rainwater harvesting for domestic use](#) with 10,000 gallons of storage
- + Advanced framing
- + Cold roof and walls– 2 X 6 framing filled with batt [Roxul mineral wool insulation](#)-> roof sheathing -> rigid stone wool insulation-> water proof membrane-> 2-3/4" air gap-> metal roofing
- + Wiring for future solar = [Solar Ready](#)
- +Waste reduction plan

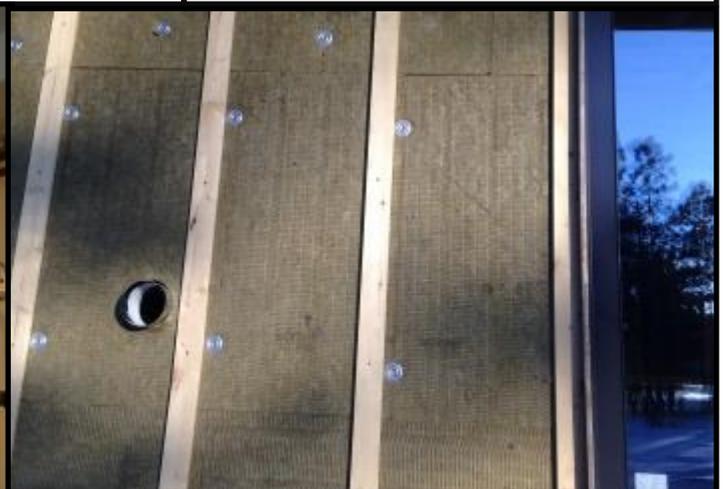
Award Certification Level: Advanced Plus

Owners: Julie & Jeff Leid

Builder: [Jirsa Construction Inc.](#)

Architect/Designer: [LightVox Studio PLLC](#)

The Passive Solar House on Ash is a custom-designed passive solar residence with a focus on durability of finishes as well as long-term operation and maintenance. The skin is a combination of steel panels, metal roofing and glass. It has a “cold” roof- there is a continuous air space between the underside of the roof and the insulation. Located in the City Limits and in the Wildland Urban Interface, the design and material choices exceed the requirements for the most extreme fire hazard zone designation. Additional sustainable features include: LED lighting throughout, hydronic in-floor radiant heat, optimized glazing for solar heat gain, salvaged spruce ceiling material, and low/no VOC paints and adhesives.



Pine Project Remodel

12—2 pm Only



The extensive retrofit and renovation of this home made it more efficient, durable, comfortable, healthy, and beautiful, all of which are key aspects in sustainable building. Interior changes included opening up the floor plan, improving insulation, use of eco-friendly materials, replacing old appliances with [Energy Star](#) ones, replacing the old water heater with an efficient on-demand model, and the furnace with a high- efficiency unit. An Heat Recovery Ventilator was added to ensure adequate air exchange and the windows were upgraded to exceed current Energy Code standards. Exterior modifications included durable siding, rainwater harvesting system, native landscaping, solar-ready wiring and 50-year roof shingles.

Sustainable features:

- + New 95% efficient furnace with [Heat Recovery Ventilator](#), and [Rinnai on-demand hot water heater](#)
- + New high efficiency windows installed throughout
- + [Rainwater harvesting](#)
- + Reconfigured and opened up the interior space for improved function, ventilation, and efficiency
- + Low flow toilets and fixtures
- + [Forest Stewardship Council](#) certified cabinets
- + Zero VOC paints, stains, and glues
- + Ceiling and floor tile asbestos was mitigated
- + House is [solar-ready](#) wired

Award Certification Level:

Advanced Plus

Owner: *Melissa Shaw and Marc Granat*

Architect/Designer: *Carl's Drafting & Estimating Service*

Builder: *Evolution Construction*



Miles Residence & Bici-Mundo



Sustainable features:

- + [Passive solar design](#)
- + Solar photovoltaic system
- + Two story [Trombe wall](#)
- + Southern windows provide direct solar heat gain and natural day-lighting
- + Bicycle shop that recycles bikes is located on premises
- + Recycled materials used throughout

Owner/Builder: Elson Miles

Solar PV Installer: [Rooftop Solar](#)

The home/shop that houses [Bici-Mundo bike shop](#) was one of the first buildings certified by the Sustainable Building Program. It was certified in 2004 and has a two-story combination of windows and trombe wall on its south side, affording great solar heat gain. The building also features extensive reuse of building materials and the bike shop is known for its recycling of bikes. Solar PV was added to the building after certification.



Linwood Contemporary Farmhouse



Sustainable features:

- + Spray foam insulation in walls and lid
- + Rigid insulation on exterior to prevent thermal bridging
- + Lighting LED throughout
- + Material reuse– barn wood used throughout
- + [Energy modeling](#) and [performance testing](#) done
- + High efficiency [Navian](#) on-demand gas water heater
- + Energy Star appliances
- + [Heat Recovery Ventilator](#)
- + Low flow fixtures
- + Smaller house size for the subdivision

Award Certification Level: Pending

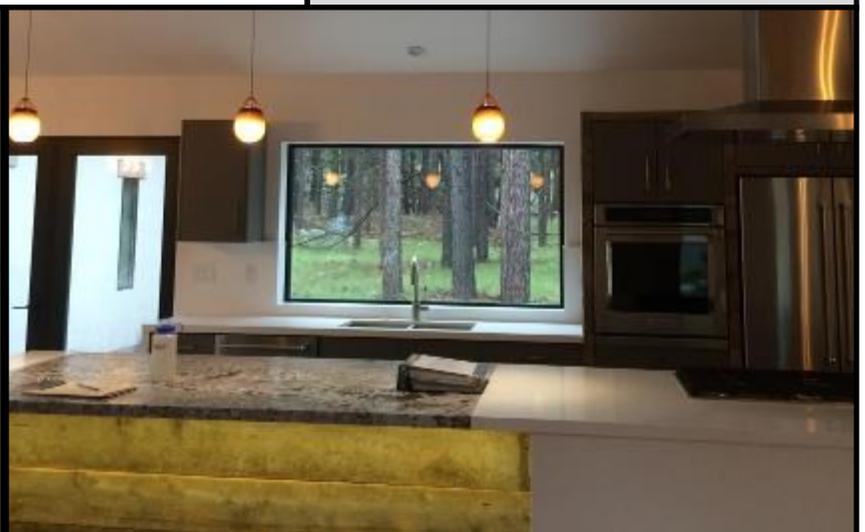
Owners: David and Ann Actor

Designer: [Architectural Design Studio](#)

Builder: [Green Mountain Construction](#)

Energy Modeling & Performance Testing: [Building Energy Performance](#)

The Linwood Contemporary Farmhouse is the smallest home in its neighborhood. Advanced framing with spray foam insulation and rigid foam on the exterior give superior insulation value, and extensive air sealing was done. Due to the air-tightness of the house, a Heat Recovery Ventilator was installed in the main part of the home, and a spot Energy Recovery Ventilator was installed in the master bedroom. This home is Energy Star certified, with a HERS rating of 56. The Energy Star appliances and low flow fixtures will also reduce water usage. Finishes were low VOC, including a beautiful unpainted Venetian plaster. Reclaimed barn wood accents throughout give this project its name.



J.E.P. Model Home



Sustainable features:

- + **J.E.P. system** (patented) for walls and ceiling, provides superior efficiency with an R-32 value for the walls and R-64 in the lid and no thermal bridging from durable steel framing
- + Energy Star certification
- + 12 solar PV panels
- + **Indoor Air Plus** certification
- + Rainwater collection and distribution systems
- + Pre-plumbed for greywater irrigation system

+ **HERS** certified with a rating of 25

+ Small house design, with durable finishes inside and out

Award Certification Level: *Advanced Plus*

Owner/Designer/Builder: *High Caliber Construction*

Energy Modeling and Performance Testing: *E3 Energy LLC*

The **J.E.P. building envelope system** uses a light structural steel frame, expanded polystyrene foam core, and a synthetic blend plaster system that is all patented. It has high thermal efficiency, fire resistant and helps lower energy cost.

The interiors have exposed steel ceilings. Two bedrooms have wood ceilings from local **AP Sawmill**, with low VOC finish. Also beautiful concrete tubs, showers and counter tops.



High Caliber's Pulse Home



Sustainable features:

- + [J.E.P. system](#) (patented) for walls and ceiling, provides superior efficiency with no thermal bridging
- + 100% of home's energy needs will be supplied through photovoltaic power
- + Rainwater collection system for domestic use
- + Greywater system planned
- + Heating through high efficiency electric boiler powered by solar PV
- + [Energy Recovery Ventilator](#) will provide balanced ventilation without heat loss
- + Zero VOC materials are used in flooring, adhesives, sealants, paints, and finishes

Award Certification Level: Pending

Owner/Designer/Builder: [High Caliber Construction](#)

Energy Modeling and Performance Testing: E3 Energy LLC

Like its neighbor, The J.E.P. Model Home, this home employs the [J.E.P. system](#), but this time with wood framing rather than steel. The walls and roof are insulated with 7" of rigid foam. This home is shooting for net energy zero and will supply all its energy needs with solar PV. Heating will be through radiant floor heating from an electric boiler; they plan on using Aquatherm in the walls for cooling- a system similar to radiant floor heating, using cold water circulation in the walls to lower room temperature. They are also going for net water zero through the use of greywater for irrigation and rainwater catchment for domestic use.



Mother Road Brewing Co.

12—2 pm Only



Sustainable features:

- + Local builders and sub contractors were utilized for renovations. Local purchasing.
- + Fire damaged Ponderosa pine milled and finished in Flagstaff for the bar top and rail
- + Reuse of existing building materials such as conduit, wood, plumbing fixtures, concrete, and pipes. Security screens for windows used for patio fencing.
- + Natural lighting and ventilation
- + City infill redevelopment reduces the footprint and revitalizes the neighborhood
- + Durable and easy to clean materials were sourced to reduce chemical usage and labor
- + Brewery's public areas are ADA accessible
- + Large bike rack to encourage biking. A third of employees bike to work.

[Mother Road Brewing Company](#) is a locally owned and operated brewery and taproom here in Flagstaff. Their mission is “to hand craft and distribute distinguished beers with respect for history, our community, and the environment.” Most of the brewing equipment and structure was recycled and Mother Road prides itself in conserving water while brewing beer. Therefore, this is the perfect last stop on the tour, so put your feet up, relax, and enjoy this local gathering place.

Award Certification Level: Intermediate

Architect: PWMA, LLC

Contractor: Vance Peterson, ReGroup Performance Contracting, LLC

Founders: Alissa and Michael Marquess

