



Youth Employment Program
Dillon, Montana 59725
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Conservation Employment



Prepared by Nolan Salix
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Trades Building Methods with a focus on Conservation Certificate

Earthship Construction taught by Youth Employment Program in collaboration with University of Montana-Western

The traditional trades are taught with modern goals giving the students meaningful purpose in implementing these principles. Conservation Building Methods will reduce the resources needed to approximately: construction materials reduction (40%), water (capture and reuse up to 400% reduction). Greatly reduce energy needed for heating. No energy needed for cooling. Local materials are used for construction when available. These courses will be taught as part of the construction process. This is experiential learning. This Certificate demonstrates the student has demonstrated the capacity to understand and solve problems through the creation of a domestic residence. They are part of the solution to keeping our rural landscape biologically intact during this challenging time of human migration and climate change. We will study the architect Michael Reynolds techniques for home building. 12 credits for certification

Currently we do not have the capacity to teach this course. We are looking to hire a new employee who is a Masters in Environmental Management candidate to bring a specialty degree in sustainable community development from Western Colorado University to develop our capacity to teach this course. We are also looking to send other YEP Staff to training.

The Youth Employment Program will provide Instruction. The main instructors will be Nolan Salix and YEP staff.

- Trade Journeyman will support education when needed.
- Nolan Salix Program Manager of Youth Employment Program
- YEP is actively recruiting from Western Colorado University graduate (Masters in Environmental Management)

Conservation Building Methods brief course descriptions and credits

1) The basics of construction: Learn the fundamentals components of a domestic house build -3 credits

Taught by YEP staff



Course Description: This course is designed to give an overview to the building process. The build is broken into 7 different processes. Students will learn and demonstrate how to use hand power tools safely. Students will learn to read and understand how to read blueprints and will be able to relate these spatial dimensions on the ground.

Learning Objectives

- 1) Prepare for a build: permitting, finances , material staging, equipment acquisition, personnel, scheduling, heavy equipment
- 2) Foundation: slab foundation and bond beam wall footing
- 3) Understand wall components
 - Doors
 - Windows
- 4) Understand roof components
 - ceiling finish
 - structure
 - installation
 - Waterproofing
 - finish
- 5) Interior finish
- 6) Kitchen
- 7) Bathroom
 - Understanding how to use the following tools:
 - (1) Read and understand blueprints
 - (2) Ability to read and use a tape measure
 - (3) ability to safely use hand and electrical tools such as drills, hammer circular saw, reciprocating saw, jig saw, angle grinder, hand planners etc.
 - (4) ability to read blueprints
 - (5) Understand how to use different types of leveling tools
 - (6) Demonstrate ability to make 90 degree angles 3-4-5 method
 - (7) Meet with inspector and understand the reasons for codes and inspections
 - (8) Water Well and traditional septic system
 - (9) ability to reason through the next several step of the building process
 - (10) Thermal mass vs insulation

2) Transforming Waste to Art: Repurposing of discarded materials: 1 credit



i.
Both of these photographs include work accomplished by Youth Employment Program

Course Description: Students will learn the processes and tools needed to safely integrate waste products into a domestic house. The integration of these materials will reduce the needs of resources. The students will create designs in architecture that will use glass bottle bricks and can walls. They will demonstrate the advantages of borrowed light in their designs. This course will then teach the traditional techniques of brick and mortar. Students will then demonstrate the knowledge they have gained by installing both a can and bottle wall.

- 1) Tires are ideal for creating thermal mass.

Thermal/Solar Heating and Cooling
concepts explaining the following:

- Using stable earth temperature below the frostline to provide a thermal baseline.
- Understand the use of Waterproofing, insulation then thermal mass in walls.
- We will cover the subject of thermal buffer zones, importance and performance.
- Also discussed is why tires are ideal construction materials to build these types of housing.

- 2) Glass: Learn how to cut tiles and glass bottles to create and install bottle bricks.

- 3) Aluminum Cans: learn how to use cans to create can walls and fill voids in tire walls.

3) The basics of wiring: Learn the fundamentals of electricity and how to do a range of basic wiring in a safe way including. 2 credits

Course Description: Students will learn how to work on electrical systems safely. They will learn what tasks a general contractor can do, what tasks need supervision from an electrician and what tasks should be done by a professional electrician. Students will learn how to read architecture plans and install or “pull wiring”. They will understand electrical codes in relation to domestic houses. Students will learn and understand the difference between direct and alternating current. Students will learn about solar installation and Power Organizing Modules.

Taught by an electrician and YEP staff.

- 1) Solar Electric Wiring Lab
- 2) Demonstrate how to use the basic tools of an electrician.
- 3) Learn the basic physics of electricity.
- 4) Demonstrate the ability to correctly lay out and pull wires to prepare for hook-up by following the architectural plans.
- 5) Learn when you need a journeyman electrician and why.
- 6) Learn how to install solar panels with a D.C network.
- 7) Learn how to install lights, switches and plugs.
- 8) Learn how to select energy efficient lighting and appliances

4) Plumbing/Reducing water needs. Learn the fundamentals of plumbing and how to do a range of basic plumbing safely with the intended goal of reducing water needs. 2 credits

Course Description: Students will learn how to install plumbing that address the different needs of the homeowner. Including water catchment, greywater, and blackwater. Students will learn the basic tools and techniques of plumbing and how to use them to conserve water.

Taught by Journeyman plumber and YEP staff

- a. Demonstrate how to use the basic tools of a plumber.
- b. Understand the physics of water and waste. Demonstrate the correct placement of a plumbing run.
- c. Know the difference between clean, brown, and black water. Understand all the diseases associated with each category and how we design systems to remove threats from each category. Demonstrate how to put in these three systems: fresh, brown, black.
- d. Learn how to put in a freshwater collection system.
- e. Demonstrate greywater cells that offer the right conditions for bio cell (plant growth.)
- f. Demonstrate Xeriscaping landscaping design and understand the components that go into it.

5) The basics of concrete and other finishes: Learn the fundamentals of concrete and how to do a range of concrete projects safely . 2 credits (It could be taught for sculpture credit)

Taught by YEP staff

Course Description: Students will learn how to work with concrete projects safely. They will learn what are the different applications of concrete. Students will understand the chemical reaction of concrete and the resulting strengths and durability that follows. All students will mix and apply some application of a cementitious product. Student will also learn about stucco and earthen plaster and other natural finishes



Youth Employment Program pouring a slab

- b. demonstrate a basic understanding of the chemistry of portland cement
- c. Understand the dangers that this process presents and demonstrate the ways we mitigate risk when handling portland, cement, lime or other additives or materials.
- d. Demonstrate 4 out of the following:
 - i. Build concrete forms.
 - ii. Demonstrate the ability to pour a slab.
 - iii. Demonstrate how to create earthen plaster.
 - iv. Demonstrate understanding and installation of Dryvit or similar top coat materials.
 - v. Effective tile work.
 - vi. Use masonry mix.
 - vii. Use of concrete as an art form.
 - viii. Use earthen plaster.
- e. Understanding of the products available and the different uses.
- f. Understand the threats to the durability of concrete in our location.



Reynolds, Micheal, *Gimme (sustainable) shelter: The earthships of Taos County* | Art Of Space

6) The basics of wood: Learn the fundamentals of wood framing and basic carpentry and learn how to use the tools safely. 2 credits

Taught by YEP staff

Course Description: Students will learn how to work with wood. After demonstrating the capacity to use the tools safely. They will be presented with a wide range of tasks. The students will then resolve the tasks with support from their peers and faculty.

- a. Demonstrate a basic understanding of wood framing.
- b. Ability to make cabinets and interior functional wood products.
- c. Understanding and demonstrating how to trim out a building.
- d. Learn about finishes.
- e. Demonstrate how to use the following tools safely:
- f. Understanding and demonstrating basic framing.
 - i. Effectively use a table saw.
 - ii. Effectively use a Compound Miter saw.
 - iii. Effectively use a planner.
 - iv. Effectively use a nail gun.

Earthship Building Basics

The following are earthship disadvantages.

- Earthship use a lot of concrete to build.
- The climate in southwest Montana is excellent for them but they must be south facing with full sun exposure.
- May be difficult to resell.
 - They are non-standard in the market.
- Hard to adhere to building codes and zoning laws.
 - Okay in Beaverhead County and approved in the City of Dillon with slight modification.
- It takes at least twice as long to build an Earthship versus a standard home. So they do have expensive labor costs.
 - Some of this time can be saved as we reduce labor however these are hand built houses. Up front costs are high but long term costs are very low.
- Hard to get financing.
 - 20 year loans have been secured.
- Conservation easement around concentrated buildings footprint.

The advantages to building Earthships are:

- Conserves resources both in the building process and to provide their inhabitants needs. Energy efficiency: the buildings utilize solar and/or geothermal heat, cooling and sometimes hot water, and provide rain and greywater harvesting.
- Self-sustainability: grow fruits and veggies inside, use and reuse water, and minimize impact on the environment. (These structures help provide some of the inhabitants' needs but are not capable of providing all needs.)
- Ease of construction: in principle, anyone can build an earthship. If you can pound dirt, you can do it! (high physical input required!)
- "Recycling": some of the materials used in an earthship come from used products that would otherwise fill up a landfill. (Reuse of tires, glass bottles (2000), and aluminum cans (10,000) used may be "free" ... they take time to collect.
- Natural light: these buildings can have it in abundance.
- Artistic design are hallmarks of the design's success.

Patterns of development will also be studied to reduce roads and fences and keep the characteristics of the rural landscape intact protecting native species and our agricultural community. The pattern of development will also open up recreation trails.

Partners needed to create program:

1. Community Investment: This is a landowner or philanthropist or a combination of individuals. The goal is to create a model of human development that keeps the integrity of the open landscape intact. 80 Acres will provide enough land for a quad-pod development or four houses.
2. Grants to fund much of the work/educational component.
3. Building materials would be through business loans.
4. Renew commitment with High Peaks Credit Union (loan).
5. First build for the Airbnb market to normalize experience and maximize revenue.
6. Second build for long term rentals to minimize inhabitants' feeling of risk.
7. Target agency and non profit employees whose work is in conservation. Difficult for them to enter the housing market. Agency housing.

8. Give employees meaning in life as well as work. Supports the relevance of government agencies supporting their employees as conservation leaders.