The BarnHouse

Optimized for Modern Day Vegetable Farming at Footprint Farm

Taylor Hutchison and Jake Mendel own and operate Footprint Farm in Starksboro, VT. Starting their own farm in 2013, they now produce pretty much everything except storage potatoes and storage squash with 66 different kinds of vegetables grown in both fields and high-tunnels.

The new barn features everything needed for their diversified vegetable farm. In fact, it's so efficient they live on the 2nd floor!

Overview

The barn-house is 36'x48' and has two stories of 1,728 square feet. Two-thirds of the first floor is dedicated for washing and packing, the other third includes space for an egg washing station, cooler, employee break area, restroom, and a shop. The second floor is finished living space.

Special considerations that went into the design process included the main crops that will be washed, and what aspects of that process have been uncomfortable or inefficient in the past. For them, the focus on greens washing was the main priority.

About the Project

Overview: New, slab-on-grade construction 36'x48 (1,782 sq. ft.), Two story. Mixed use of wash/pack, storage, egg cleaning, cooler, break area, workshop and residential space

Cost: Approx. $300,000 ($87 per sq. ft.)

About Footprint Farm

- Location: Starksboro, VT
- Acreage: 2.5 (1.5 in production, 1 acre in cover crop)
- Crops: Greens, tomatoes, root crops and more with 66 different types of vegetables grown
- USDA Sales bracket: $100,000-249,999
- Markets: CSA, farmers markets, restaurant/wholesale accounts
- Crew: 4 (May-October), 2 (November - April)
- Wash/Pack Operations: Triple bay greens washing with a converted washing machine salad spinner, Barrel/ drum washer, bunch washing on spray table, 1 CoolBot walk-in cooler

Building materials were carefully considered to be durable, washable, and water resistant. In the wash area, they chose to go with corrugated metal roofing for the interior walls to meet these requirements.

Produce safety was in mind during the design process of this space. Some of the key elements include:

- Highly durable for long lasting function
- A bright and clean space that's pleasant for humans and not for pests
- Separation of clean and dirty bins
- Covered bin storage area
- Egg cleaning area separated from produce, including it's own entrance to the building separate from vegetables.

The wash area is large, and open (20x48') which makes it flexible for a variety of tasks. The farm triple washes greens using Rubbermaid bulk tanks, orange "fish baskets" and a modified washing machine spinner.

- Easily cleanable floor (concrete) and walls (metal)
- Proper drainage to control water
- Bright lighting (easy to see dirt and grime)
- Wash water is sourced from a drilled well

Reflecting on the new space, Taylor notes, "It's so fast now, there is not even an opportunity for things to get damaged or dirty." Going from the field, to the barn, washed, packed, and stored in a cooler quickly and methodically reduces risk of contamination.

The walk in cooler (10'x14') is powered by a window AC unit and a CoolBot. It has a floor drain for easy clean out. Plywood painted walls, and wire racking to hold Buckhorn bins packed for deliveries.

Many design features were implemented to make this a very practical space. Examples include the use of 4' wide people doors for easy maneuverability and an overhead door where the product comes in. A trench drain was installed in the washing space to carry the wash water out into a dedicated leach field constructed with perforated pipe that ends in a gravel area.

Labor savings both in time and money has seen has been seen as a result of this new build. Having a place for everything makes it easy to find. Putting things on wheels provides for adaptability. Having enough space to work and move makes it easy to get the vegetables washed and to market as quickly and easily as possible.

A typical cleaning procedure for the harvest containers, tools, and equipment consist of a daily rinse off of dirt and debris and scrubbing with soap and water as needed. For example, a deeper clean is typically needed after harvesting squash or other vegetables that can leave a sticky sap. Everything gets a scrub down with soap and water monthly if not needed prior.

The Why

"We wanted to do year-round production with-out a winterized building," Taylor explains thinking back about their previous setup. "But, it was too painful on our hands to be able to wash greens through the winter." They also had problems getting rid of the wash water with nowhere for it to drain. The continued growth of the farm pointed toward having employees in the winter and they couldn't put others through the pain of cold wet hands. At the time of planning, they also were commuting to the farm and wanted to build a house on location. They decided it made more much more sense to build one combined building rather than two separate ones. This simplified both planning and construction and reduced worrying about how to winterize both a barn for work and a house for living.

Another great benefit that's arisen from the BarnHouse build is that the profitability is greatly increased due to product quality improvements. "Our cull rates have plummeted since we got this building and our quality has increased immensely this year." This increase in quality has made it possible for them to sell everything they harvest, reducing both food waste and time into production!

Cost

The total cost to build the BarnHouse was about $300,000. The contractors they worked with said that a project like this fully hired out would have cost close to half a million dollars.

<u>Tactics to keep costs down</u>

- Self-designed the building
- Helped out with the construction
- Milled the lumber on-site

An outside wash space used for cleaning root crops or harvest containers on nice days. Plastic coated wire shelves sit on saw horses for versatile set-ups.

Regrets

This project was well thought out and the benefits far outweigh the regrets. A few things that didn't go as planned was the floor didn't get pitched perfectly to the drain, so water doesn't flow as well as it should. Taylor wishes there was a person-door in addition to the garage door on the side where the product comes in, but the rest of the crew agrees one is not needed. They had to change the way they pull up from the field to their unloading space due to the location of the septic, which changes the flow of operation which is less than ideal. Other than thinking about septic placement a little further ahead of time, regrets so far are minimal items like light switch placement and a few small things like that.

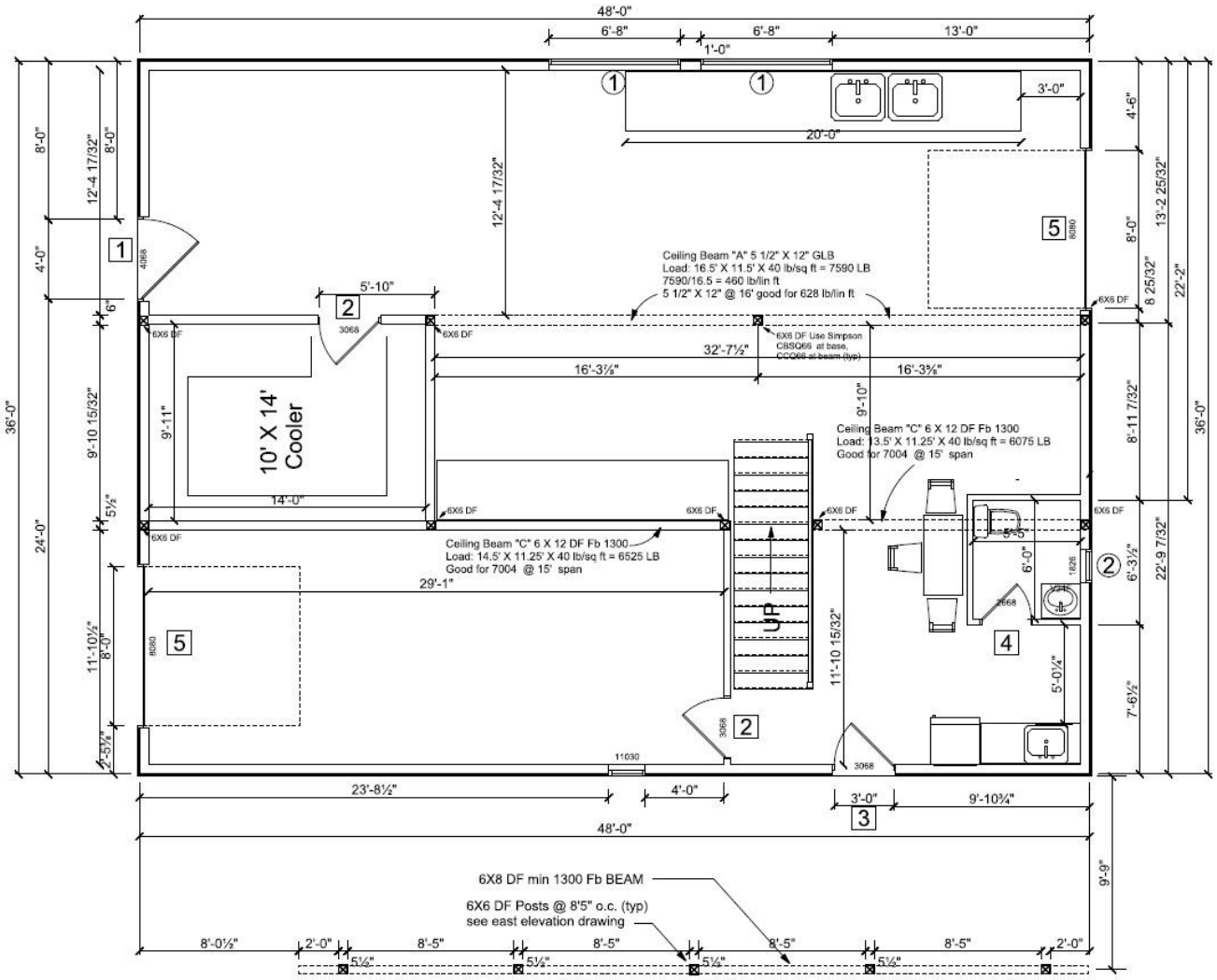
"Whoa, so much money we are going to save!"

Key Influencers and Partners

USDA REAP Program - This Rural Energy for America Program is a grant that paid a portion of the solar panels installed by SunCommon which cover all of their electrical cost for the entire year! Learn more about their decision to go solar in this video. https://vimeo.com/270172054

CoolBot (Store It Cold) was helpful figuring out the temperature differences causing humidity and condensation.

Consultation from other farming peers was helpful including Danielle from Root 5 Farm in Fairlee, VT for their building design with covered outdoor space or Christa from Jericho Settlers Farm for guidance influencing natural light to make it an enjoyable space. Ben Hartman, farmer of Clay Bottom Farm and author of The Lean Farm helped nail down the flow of production.



The floor plan for the first floor of the Barn includes space for washing and packing, a cooler, bathroom, break area, egg washing, and a work shop.

Everyone on the farm loves that everything is on wheels. These wire racks are easy to move around and are used for all kinds of tasks from landing vegetables from the field, holding packed produce to bring into the cooler, or stacking wash totes to dry.

University of Vermont Extension Ag Engineering helped with guidance on wall finishes surfaces and VVBGA CAPS helped with examples of how to make things comfortable and safe.

Taylor and Jake are both thrilled to have built this building. It has improved their daily lives so well that it's an enjoyable place to live and work. Though it was a costly project it's quickly paying for it's self by increasing quality, widening margins and providing more goods to go to market. By having a clean, bright, and comfortable place to work they are able to retain their employees for the following season. By utilizing solar energy, reducing food waste, and growing organic vegetables this improvement is enabling a sustainable farm to be a sustainable business.

Go to the UVM Extension Agricultural Engineering YouTube Channel to watch the full interview with Taylor or to see their wash-pack space in action!

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Favorite Things

"Natural light through large windows and everything painted white with tall ceilings make it a bright and cheery place to work."

Other Favorite Elements of this build:

- Heated Space via an electric heat pump
- 100% of electrical needs covered by green energy (Solar)
- Bright Cleanable Walls - Metal Roofing - go.uvm.edu/smoothnclean - about $1.00 per square foot.
- Trench Drains
- Everything on wheels
- Covered outdoor space

Favorite thing: "Building a shed roof on one side to create covered space outside the building has been wonderful." It's used to store equipment, like lawn mowers, hand tools and is even a great place to hang a hammock or park a bike.

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An online version of this publication is available at go.uvm.edu/footprint

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