

**2017 ACORN Conference & Trade Show  
Best Western Glengarry - Truro, NS**

**Workshop Title:** Root Cellar Design and Development - Part 2

**Speaker:** Zach Loeks

**Executive Summary:**

This session is the second part of Zach's presentation on root cellar design, development, and construction. He continues with a description of different types of cellars for different uses.

**Detailed Notes:**

**Meat Cellars:**

Generally, these are kept a bit warmer than a veggie cold room.

Basement walkout designs are common in houses, barns, and other outbuildings.

- These provide great access and good potential for integration with other farm activity centres.
- Watch for water issues, especially during the winter and winter thaw periods. Observe how snow drifts and water flows when designing the entry area.
- Ensure that there is adequate drainage near the door and under any walkways near the door. A shed roof over the door to keep sun and roof runoff away from the door is a good idea.

**Zach's Root Cellar:**

Zach spent much of the workshop describing the root cellar he constructed on his farm. It is built into a hill on the property, near his barn and vegetable cleaning area. The in-hill design has many advantages:

- Being buried in a ridge ensures a constant temperature around 9°C without any supplemental cooling.
- It is very well insulated by the soil surrounding it and above it, with significant insulation provided near the doors and front areas that have more contact with outside air.
- Passive venting to the roof as described in Part I of the presentation is integrated into the root cellar.

Referring to a picture of a traditional, in-hill Acadian root cellar he visited in Southwest Nova Scotia he made the following observations:

- Often a retention wall is needed on the front part of the hillside into which the cellar is dug. This can be of stone, cement, or another durable material.

- The rule of thumb is that one foot of soil gives you one inch of insulation. It is the top/roof and front that needs insulation. The deeper one goes into a hill, the better. Zach's cellar is covered by thirteen feet of soil.
- Air intake and exhaust on the roof of the Acadian cellar provides a natural flow of air. The intake is near the floor and the outflow is near the ceiling.

After considering many different construction options, Zach decided to use concrete to build his cellar. He was able to find concrete bridge arches at a local concrete yard that had been ordered but never picked by the contractor. He was thus able to get some expensive prefabricated material for a very reasonable cost. He recommends checking out concrete manufacturers near anyone thinking of building a large root cellar.

Using the prefab arches meant that the construction of the walls and roof was a one-day job using a crane for placement of the arches. The arches were placed on an engineered slab foundation. A drainage ditch was constructed around the periphery of the foundation. Drainage is very important. The drain is a French style buried drain, incorporating crushed gravel and perforated drainage pipe. The middle of the floor is bare ground (filter strip) filled with crushed gravel for drainage and cooling. The front wall is insulated, as well as the area under the front of the slab that is exposed to the cold and heat. When excavating, Zach reminded participants to make the area big enough to accommodate drains and room to work on exterior walls.

When designing the cellar, Zach recommended paying close attention to workflow considerations in the layout. Deciding which cultivars will be placed where in the structure and the order of their use throughout the season should be considered early on. Zach's cellar incorporates an open concept design making for a multifunctional space.

Siting and other considerations:

- It is important to consider the cellar's relationship with other functions of the farm. In Zach's case, the cellar is located near a barn in which vegetable cleaning and preparation are handled. It is a short distance between these two structures ensuring smooth workflow.
- Pile stones and boulders removed from the hill for future use. Rocks used for a retaining wall were placed in a dry pile.
- Don't disturb the soil under the structure. The cellar is buried so deep into the side of the hill that this is unnecessary.
- A slight slope towards the front door was integrated into the design. This ensures passive drainage away from the structure.
- A waterproof membrane was placed on top of the structure to safeguard the roof and prevent leakage into the cellar. The soil on the top of the roof was seeded early on to stabilize the soil on the top
- A pony wall on the front of the building was constructed to keep soil built up right to the very edge of the cellar.

### Cooling:

The Ottawa Valley where Zach's farm is located has very cold winters. Zach described an "Aha" moment when he realized he could use this to his advantage when designing a system to cool his cellar. Using Rubbermaid vegetable handling containers, during the months of January and February Zach makes hundreds of large "ice cubes". These are easy to move and cost next to nothing. They are placed at the back of his cellar creating a very efficient ice house. As they melt throughout the year, the water drains out through the middle drainage area in the cellar. The meltwater also keeps the cellar moist. When initially placed in the cellar, the ice ensures a temperature very near zero. As the ice mass melts, the temperature does rise somewhat but a steady temperature is maintained throughout the year. The ice will last until October, providing excellent cooling during the hot summer months.

Zach's cellar is thirty feet long and twenty feet wide. It houses four separate storage areas.