



NIFTI Fact Sheet: Considerations for High Tunnel Design and Construction

Compiled from 2017 NIFTI Listerv Contributions

High tunnels are valuable assets for any farm and are well worth investing in and farmers tend to want more high tunnels, so design for the future, making sure there is room for multiple structures. General wisdom about size of the high tunnel is to purchase a length as large as can be afforded. For example, 98 feet long and 30 feet wide. Among surveyed farmers, there is a preference for gothic style which offers better snow shedding than other designs.

In planning a high tunnel, think about shared use among incubator farmers, crop/variety selection, fair use of space, crop rotations and soil health. Other considerations will include whether you want year-round access, how the high tunnel will be heated, and whether you will need to remove snow.

Regardless of size and other considerations, it is recommended that you buy a high quality plastic to avoid frequent replacement. Other design considerations include:



Gothic-style high tunnel. Published with permission from The East Multnomah Soil & Water Conservation District, Portland, OR



Greenhouse drainage pit.. Published with permission from East Multnomah Soil & Water Conservation District, OR

Water shedding—High tunnel surfaces shed significant amounts of rain, and that flow needs to be managed. In areas of low draining soils (like clay) strongly consider putting in French drains and possibly even gutters for directing water to storage tanks. If grading the site, consider raising the finished floor elevation of the greenhouse a foot or so above lowest grade within 5'-10' of the house to help manage rainwater.

Tunnel irrigation—To get the most productive soils, know and test the water source. If using city/treated water to irrigate in tunnels there can be salt and mineral build up in the soil. To prevent this, use mobile tunnels or plan to remove plastic from one tunnel each year to let the rain water wash the soil.

Tunnel sides and walls—Roll down or roll up? Some think that roll down sides are superior to roll up sides, especially in warmer or windier climates. For those who prefer roll up sides consider getting mechanized rollups if possible, especially when the tunnel is long so smaller farmers can easily roll up and down solo if needed.

(cont'd) Other musts: 6 millimeter poly (or heavier) and channel lock with wiggle wire to hold the plastic and shade cloth without tearing. For end wall materials, many recommend polycarbonate, if financially feasible.

Footings—Depending on soils and appetite for working with a jackhammer, the high tunnel anchoring ground tubes may be set in concrete or hammered down into the earth. For concrete footings, it is recommended to use 80 lbs of concrete for each footing, and for hammering ground tubes in with a jackhammer, there may need to be special fittings made for the jackhammer and ground tubes that allow the jackhammers to be used without bits.

Siting hydrants—To ensure installation of frost free hydrants, locate them inside the high tunnel and put in an in-ground shutoff valve.

Tractor access—Consider building openings for tractors to get in and out of the high tunnel for winter storage. Site the openings on the opposite end from vent fans.

Temperature control—Controlling temperature, especially hot temperatures, can be tricky in high tunnels. Ridge vents, shade cloth, and 5 foot sidewall minimums can help shed heat and create better ventilation. If passively heating in the winter, consider building high tunnel walls with spacers as well as placing rigid foam underground along the sides and under paths, etc. Some farmers monitor temperatures in the houses with remote/smartphone technology, which may save some money if temperatures rise above or below a temperate range.



Using an electric jackhammer to sink ground tubes. Published with permission from: George Washington Carver Agricultural Initiative, Culpeper, VA

Resources

Shawn Jadrnicek has some excellent, innovative heating and siting techniques for high tunnels. See: [The Bio-Integrated Farm: A Revolutionary Permaculture-Based System Using Greenhouses, Ponds, Compost Piles, Aquaponics, Chickens, and More](#) by Shawn and Stephanie Jadrnicek

Learn about **Steve Moore's** workshops on high tunnel design and construction. Steve farms and works at the Agroecology and Environmental Science Department Elon University and is Director of the Peace Corps Prep Program. See the links below for more information on Steve, who is also known as the Ghandi of greenhouses: [Greenhouse Design 101](#), and [Greenhouse Design 102](#).

For knowledge in design and construction, contact **Ed Person, Ledgewood Greenhouses**, Ledgewood Farm, Rt. 171, Moultonboro, N.H. 03254. Phone: (603) 476-8829. E-mail: ed@ledgewoodfarm.com

Some use high tunnel design based off of Johnny's. See **Johnny Selected Seed** designs [here](#). And **Tunnel Vision Hoops** out of Cleveland can be found [here](#).