High Tunnel System

***Conservation Practice** - Implementation Requirements* **NH-325**

Producer:		**Planner:**	
Address:		**County:**	
Farm Name:		**Date:**	

Definition: A high tunnel is a gothic-style, polyethylene covered structure at least 6 feet in height, which modifies the climate to create more favorable growing conditions for vegetable and other specialty crops grown in the natural soil.

Practice Purpose:

☐ Improve crop productivity and health ☐ Extend the growing season from _____ to _____

Background: High tunnels provide a stable microclimate that can extend the growing season, help control certain pests and diseases, and generally improve crop yields and quality. Irrigation is required and must be managed to reduce nutrient leaching and crop water stress. Tillage and traffic must be controlled to prevent soil compaction and the loss of organic matter.

Practice Location Map:

See Conservation Plan Map for location, layout, and additional supporting practices for water control.

Product Selection:

Choose models based on the selection criteria listed on the following page. These criteria must be met in full. A check must be placed in every checkbox. A high tunnel is a versatile structure that can be modified in different ways and often there is no standard "kit".

IMPORTANT: Producers are responsible for ensuring that the model ordered includes all required components specific to NH. Vendor claims that models are "NRCS approved" must be verified against the selection criteria on the following page. Minimum criteria/specifications vary from state to state.

Selection Criteria:

- ☐ Frame is gothic style (peaked versus round)
- ☐ Tunnel width does not exceed 30 ft
- ☐ Frame is covered with at least 6-mil, 4-year UV resistant polyethylene film (the tunnel must be covered prior to certification and payment)
- ☐ Bows and ground posts are at least:
  (i) 1.90" round 14-gauge galvanized steel or stronger for tunnels ≥ 26 ft. wide
  (ii) 1.66" round 14-gauge galvanized steel or stronger for tunnels < 26 ft. wide
  (iii) 2.00" square 16-gauge galvanized for all tunnel widths
  (iv) 1.625" x 2.750" oval 16-gauge for all tunnel widths
- ☐ Bows are spaced 4 ft. apart. Bows may be spaced 6 ft. apart only for tunnels constructed with galvanized steel bows and ground posts that are at least:
  (i) 2.375" round 14-gauge or (ii) 2.0" x 3.56" oval 16-gauge
- ☐ Number of purlins (including ridge):
  5 for tunnels ≥ 26 ft. wide, 3 for tunnels < 26 ft. wide, 1 for tunnels ≤14 ft. wide.
- ☐ Trusses with braces/cross-ties every other bow for tunnels ≥ 26 ft. wide
- ☐ Wind bracing between last and next to last bow on each end, or as recommended by manufacturer.
- ☐ Roll-up or drop-down sides are installed on both sides and rope (or equivalent material) is attached from hip-board to baseboard to protect sides from billowing
- ☐ End walls are framed with wood lumber or metal and covered with UV resistant polyethylene film (at least 6-mil, 4-year), polycarbonate, or plywood
- ☐ At least one end wall contains a door for access
- ☐ Bows/posts shall consist of no more than 5 individual segments, including ground posts. Typically, this includes 2 ground posts, 2 half bows, and a bow connector.
  (Splices/sleeves may be used to join posts/bows and are not considered segments.)
- ☐ All bows and ground posts must through bolted (bolt and nut) at the connection point. It is not acceptable to connect bows and ground posts using self-tapping sheet metal screws. (Self-tapping screws may be used in other areas of the tunnel)
- ☐ All components, including bows, plastic, and end walls, are of new material. Re-used kits are not allowed for program payment.

Selection Considerations:

- For tunnels ≥ 26 ft. wide, consider using trusses with braces/cross-ties on every bow.
- Add more purlins and/or wind bracing kits in windier areas.

Construction Specifications:

- Prior to construction, consider collecting a soil sample to assess the risk of soil contamination at the site. This is strongly advised in urban and sub-urban locations or where soils were brought onsite.
- Prepare site according to manufacturer's instructions. Sites should be level (<5% grade), well-drained, and clear of large stones and other debris. Consider using a site level/transit.
- Consider elevating the soil 2-3 inches (to make a pad) to improve drainage
- Avoid shade from other structures by locating the tunnel a minimum of 12 feet away from other tunnels (on any side) or structures on the north side. The distance from the tunnel to a shading structure on the south, east, or west side should generally be twice the height of the shading structure (*e.g*. locate the tunnel approximately 40 ft. away from a 20 ft. high barn on the south side).
- Avoid plywood on southern sides of the tunnel. Paint white to increase light reflectance.
- The long axis of the tunnel can be oriented East-West if late and early season production is the primary goal. If improving plant quality during the main season is the goal, consider a North-South orientation. Also consider orienting the long axis of the tunnel perpendicular to the direction of the prevailing winds to increase ventilation through the sidewalls.
- **Assemble high tunnel structure according to manufacturer's instructions.** Do not pound ground posts directly with a sledge hammer. Use a large bolt or other material to protect the post from damage.
- Evaluate the size of the equipment to be used in the tunnel when constructing the endwalls and the height of the sidewall as it relates to the height of the target crops
- Consider a minimum 6 ft. x 6 ft. opening on each endwall for increased ventilation and access (e.g. 2-36 inch wide doors on each end or larger roll-up, sliding, or hinged doors).
- Seed down the disturbed area with around the exterior of the tunnel with perennial sod. Use straw or hay mulch to stabilize the soil and improve seed germination. (CPS 342 and 484)

Operation and Maintenance:

- Follow manufacturer's instructions for operation and maintenance of the high tunnel structure.
- Do not use the high tunnel for product or machinery storage. Livestock, such as chickens and sheep, should be excluded from the high tunnel and the structure cannot be used as livestock housing.
- Periodically inspect structure and cover for damage. **Reinstall or repair plastic promptly**. Most vendors sell repair tape specifically for patching rips and holes. Tape plastic patch to the existing plastic on **both** the interior and exterior of the tunnel.
- Completely close up high tunnel during high wind events.
- Inspect runoff control measures after every significant rainfall event. Repair promptly.
- **Remove snow on and around the structure**.
- Regularly take soil tests to adjust nutrients based on crop need. If compost is added to the soil as a conditioner, be sure the soil test includes a test for salts, which can accumulate in high tunnel soils.
- Practice Irrigation Water Management (449) to ensure adequate crop water without causing nutrient leaching. Consider using soil moisture sensors to time irrigation events more precisely.
- Utilize the roll-up sides in conjunction with large endwall doors to provide ventilation and ensure temperatures do not exceed tolerable levels. Fans can be added at the owner's expense.

Certification:

Planned Dimensions

Length: _____ ft. Width: _____ ft. Area: _____ sq. ft.

Model: _____ Manufacturer: _____

Applied Dimensions

☐ Same as above ☐ See below

Length: _____ ft. Width: _____ ft. Area: _____ sq. ft.

Model: _____ Manufacturer: _____

Include pictures of the completed structure.

Additional Comments:

_____

Plans Meet NRCS Standards and Specs.

Designer Signature:

_____

Date_____

Participant Agrees to the outlined plan:

Participant Signature:

_____

Date_____

Certification Statement: I certify that implementation of this conservation practice is complete, meets criteria for the stated purpose(s), and meets the NRCS conservation practice standard and specifications.

◯ Yes ◯ No

Planner Signature:

_____

Date_____