United States Department of Agriculture

ALASKA

High Tunnel System – Metal Frame

Conservation Practice Implementation Requirements

Definition

A High Tunnel is an enclosed polyethylene, polycarbonate, plastic, or fabric covered structure. High tunnels depend on the plastic covering to modify internal climate to the advantage of the plants growing inside the tunnel.

Purpose

Improve plant health and vigor.

Where used

This practice applies to land capable of producing crops. This practice applies where sun or wind intensity may damage crops, or where an extension of the growing season is needed due to climatic conditions.

The practice does not apply to crops not grown in the natural soil profile (i.e. tables/benches, portable pots, hydroponically, etc.).

Prohibited Uses

- Storage of equipment, furniture or materials at any time of the year (other than small hand tools and irrigation supplies commonly used in high tunnels).
- Livestock housing at any time (except for NRCS-approved activities, such as occasional gleaning by chickens).
- No more than forty percent (40%) of the square footage of the high tunnel may be used for non-crop growing space (paths, washing and crop prep area, storage of irrigation supplies, pumps, heaters, etc.).
- USDA NRCS policy specifically prohibits the production of cannabis and other Federally-prohibited substances in high tunnels or on any part of farms associated with USDA programs.

Supporting Practices

High tunnels are normally established concurrently with other practices as part of a resource management system for a conservation management unit. (Check all that apply)

□ Irrigation System, Micro-irrigation
□ Integrated Pest Management
□ Irrigation Water Management
□ Conservation Crop Rotation
□ Nutrient Management
□ Cover Crop
□ Critical Area Planting
□ Roof Runoff Structure
□ Underground Outlet
□ Mulching
□ Other _____
□ Other _____

Consider managing the high tunnel system to maintain or improve soil health by following a soil management system that creates a favorable habitat for soil microbes:

- Minimize soil disturbance: physical, chemical or biological.
- Use plant diversity in rotation to increase micro-flora and fauna diversity below ground.
- Maintain a living root growing year-round as much as possible.
- Keep the soil covered with residue and growing plants year round.

Planned Growing Season Dates: _____

Procedure and timing to add/replace shade cloth _____
(if applicable)

HIGH TUNNEL CONSTRUCTION

1) Contact your local NRCS Field Office before you begin construction.
2) Contact Alaska DigLine 1-800-478-3121, for location of underground utilities. Provide local NRCS with written confirmation on form AK-ENG-005.
3) Prepare site according to manufacturer's instructions, ensuring the slope requirements are met for the chosen high tunnel kit (not exceeding 5%, or manufacturer's instructions, whichever is less).
4) Lay out building location according to site plan. (Deviation from the NRCS plan or manufacturer's design/instructions could result in a contract violation and forfeiture of financial assistance.)
5) Install high tunnel structure according to manufacturer's instructions and NRCS specifications.
6) Install supporting practices as required, according to the construction plans provided, and the approved NRCS Conservation Plan.

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PARTICIPANT _____ **FIELD** _____ **TRACT** _____

PLANNER _____ **OFFICE** _____ **DATE** _____

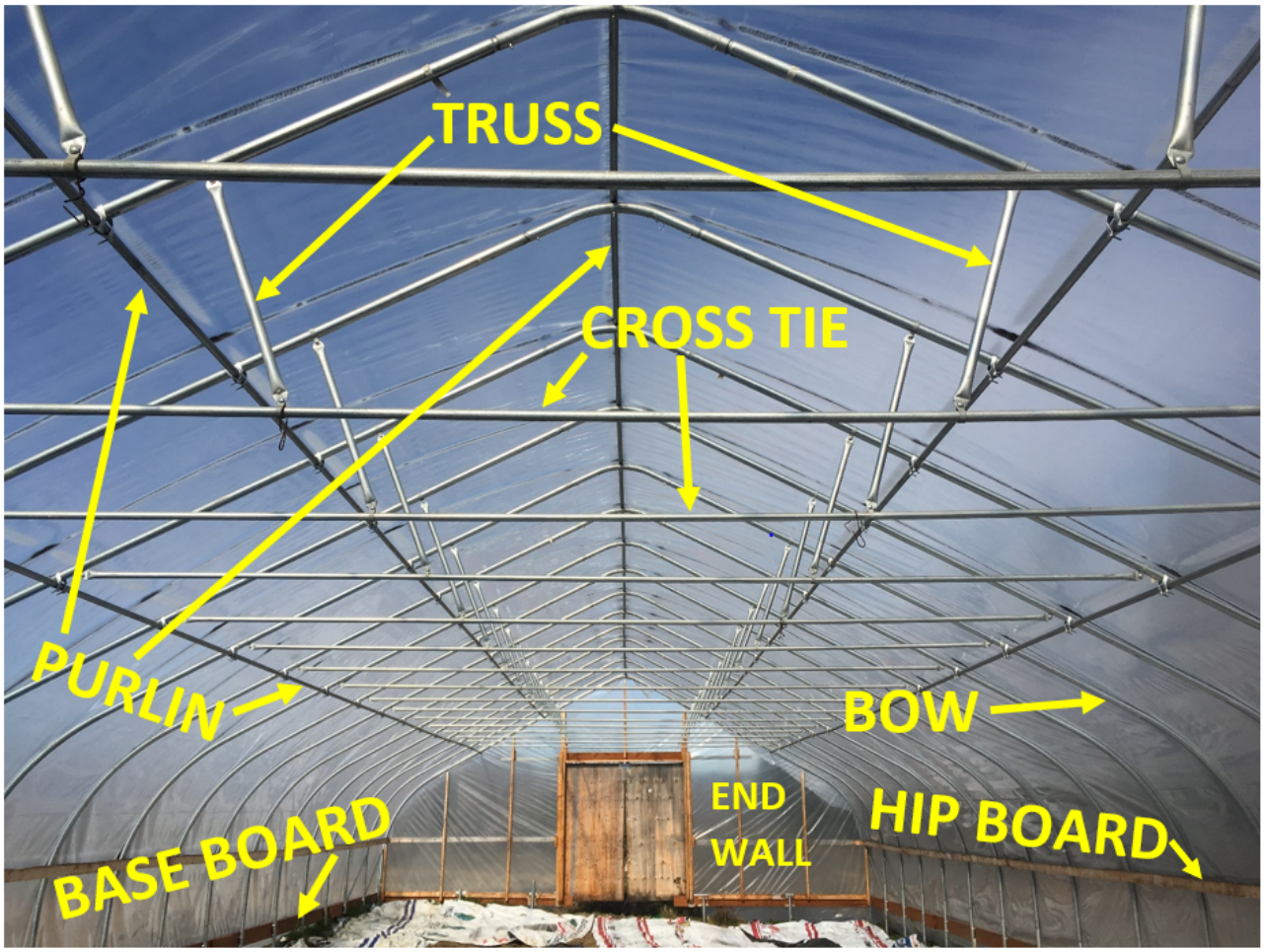
Planned High Tunnel: Width _____ft. X Length _____ft. = Area_____ft.^{2}

Specifications

The chosen manufactured high tunnel kit must meet the construction specifications criteria listed under *Specifications for Metal-Framed Structures* below. Some high tunnel kits may need additional components in order to meet the specifications. Deviations from the design must be authorized in writing by the manufacturer, or contract payments may not be authorized by NRCS.

NOTE: Vendors' claims of meeting NRCS specifications must be verified by the participant. NRCS does not endorse any product, company or brand. High tunnels that do not meet Alaska NRCS' High Tunnel Specifications are not eligible for Alaska NRCS program payments regardless of vendors' claims.

Anatomy of a High Tunnel



Specifications for Metal-Framed Structures

- Minimum height is 6 feet
- Maximum width is 35 feet
- Maximum total length is 96 feet. (A 96 foot long high tunnel can be covered by one 100 foot roll of plastic.)
- Bows and ground posts are at least:
  - 1.66" **round** 14 gauge galvanized steel or stronger for structures ≤ 26 feet wide
  - 1.90" **round** 14 gauge galvanized steel or stronger for structures > 26 feet wide
  - 2.00" **square** 16 gauge galvanized steel for all high tunnel widths
  - 1.625" x 2.750" **oval** 16 gauge for all tunnel widths
- Bows are spaced 4 feet apart. Bows may be spaced up to 6 feet apart for tunnels constructed with galvanized steel bows and ground posts that are at least:
  - 2.37" **round** 14 gauge or;
  - 2.0" x 3.56" **oval** 16 gauge or;
  - Welded-truss, reinforced-lattice arches with a certified snow load rating that exceeds 55 lbs./ft^2.
- 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 that are used to join posts/bows are not considered segments.)
- All segments of the bow must be secured at the connection point by screws, clamps, or through-bolts as per manufacturer's design.
- Purlins:
  - ridgepole purlin is <u>always</u> required
  - minimum 17 gauge galvanized steel for all purlins
- Frame is covered with at least 6-mil, UV-resistant, polyethylene film, or polycarbonate. (Practice life span is 5 years, so participant should budget for replacement plastic if the plastic life span is less than 5 years.)
- Roll-up sides are not required. For designs with roll-up sides, efforts should be made to protect sides from billowing.
- End walls are framed with wood or metal and covered with at least 6-mil, UV-resistant, polyethylene film, polycarbonate, or wood.
- Baseboards are required, and are installed per manufacturer's instructions.
- The structure is anchored to the ground according to manufacturer's design.
- At least one end wall contains a door for access. (A door of 6' x 6' or larger is recommended. End wall vents are also strongly recommended.)

State of Alaska Water Rights

Irrigation is an integral part of a high tunnel system. State of Alaska Water Rights may be needed by individuals who are irrigating crops in Alaska. Currently, State of Alaska rules indicate a property needs water rights if more than 5,000 gallons of water from a single source are used in a single day, OR if more than 500 gallons per day from a single source are used ten or more days in a calendar year.

Participant must provide NRCS with confirmation from the State of Alaska Department of Natural Resources that water rights are either secured, or are not required. Application for water rights can be obtained from the AK DNR online, or by visiting their offices in Anchorage, Fairbanks or Juneau: 907-269-8400 or http://dnr.alaska.gov/mlw/water/wrfact.cfm.

Compliance with the National Environmental Policy Act (NEPA)

If, during construction, pre-historic or historic artifacts are unearthed, construction shall be stopped, and the local NRCS office contacted.

A cultural resource discovery could be prehistoric or historic. Examples include:

- an accumulation of shells, burned rocks, or other food-related materials;
- bones, or small pieces of bone;
- an area of charcoal, or very dark stained soil with artifacts;
- stone tools or waste flakes (i.e., an arrowhead, or stone chips);
- clusters of tin cans or bottles, logging or agricultural equipment that appears to be older than 50 years of age;
- foundations, walls, wells or structure that appear to be older than 50 years of age.

Additional Notes and Specifications: (Including any required site preparations and supporting practices)

High Tunnel System – Operation and Maintenance Plan

- The participant is solely responsible for repair or replacement of a high tunnel damaged by ice, snow, wind, fire, flood, animals, or other causes. Because of the potential for snow, ice and wind damage, the participant is strongly advised to remove/roll-up the high tunnel cover at the end of the growing season.
- Follow manufacturer's instructions for operation and maintenance of the high tunnel structure.
- Close high tunnel completely during high wind events. Secure the sides to prevent billowing.
- Inspect structure, cover, ground anchors, and surrounding area for damage periodically and after weather events. Repair and/or replace damaged components promptly. In the absence of manufacturer's instructions, small injuries to plastic may be repaired with a suitably strong tape.
- Inspect runoff control measures frequently. Repair promptly.
- Maintain adequate ventilation at all times to prevent excessive heating or cooling, excessive humidity or excessive drying of crops and soil.
- Installation and removal of cover materials shall be consistent with manufacturer's instructions, the intended purpose, and site conditions. Plan for proper disposal of the cover at the end of its useful life.
- Fabrics may be used to control weeds and protect the soil, but not as a barrier underneath the soil in raised beds. Crop roots must access the natural soil profile.
- Operation of equipment near and on the site shall not compromise the intended purpose of the high tunnel structure or its cover.
- **Winter:**
  - Remove plastic for winter OR be diligent to remove snow/ice on and around the structure during and after storms, or as needed. Ensure that snow sheds off roof and does not pile up against sides. NRCS strongly recommends removal of the plastic at the end of the growing season.
  - Note: If structure is in danger of collapse from wind, snow, or ice, cutting the plastic (from outside the structure) may save the framework.
  - Close sides and ends before storm events.
  - Close side curtains prior to seasonal freezing to prevent them from freezing open.
- **Crops and Soil:**
  - Monitor and operate the high tunnel ventilation to manage temperature and moisture according to the tolerances of crops grown. Excess heat can reduce pollination and fruit set and may even kill the crop. Excess humidity can promote disease.
  - The soils under anchored high tunnels may require periodic "flushing" to remove salt build-up. This is accomplished by removing the cover outside the growing season to allow natural precipitation to infiltrate, or by artificially flooding the ground under cover.
- **Other O & M Requirements:**

PRODUCER/PARTICIPANT CERTIFICATION:

The participant and manufacturer take full responsibility for structural damage caused by failure to plan for environmental conditions, including wildlife.

Check Each Box

☐ I understand that I am required to supply local NRCS with the manufacturer's design and installation instructions for the specific model and size I intend to install. The chosen high tunnel kit must meet each of the elements listed in Specifications for Metal-Framed Structures above.

☐ I understand that the high tunnel kit I choose must meet the listed NRCS specifications, regardless of vendor claims, and that some high tunnel kits may need additional elements in order to meet NRCS specifications.

☐ I understand that I must install the structure according to manufacturer design in order to receive program payments related to this High Tunnel System practice.

☐ I understand that I am responsible for ensuring that the chosen model is ordered with all required components, as listed in this document. This may require me to order extra components, which will increase the cost.

☐ I understand I am responsible to repair or replace all materials of the high tunnel for five (5) years at my own expense if any damage is sustained by ice/snow loads, wind, flood, fire, animals, or other causes. I understand that plastic life expectancy varies and new plastic may be required. I may choose to obtain an insurance rider to cover structural failure.

☐ I certify that I understand these statements, and that I am aware of my obligation to meet the requirements of this document if I choose to sign a contract with NRCS for a program payment for a High Tunnel System. Furthermore, I understand that if I purchase and erect a structure that does not meet the specifications, I will forfeit funding and may be responsible for payment of liquidated damages associated with the planning and design associated with the contract.

☐ I understand that the structure must be fully installed, including end walls, functioning doors and plastic covering, regardless of the time of year, in order for the practice to be certified and eligible for reimbursement under the USDA program rules.

☐ I have received a copy of the implementation requirements and understand the contents.

_____ _____

Signature of Participant **Date**

Print Name: _____

NRCS PLANNER CERTIFICATION

This practice is designed and planned according to NRCS AK Standards and Specifications.

_____ _____

Signature of NRCS Planner or TSP **Date**

_____ _____

Signature of NRCS Representative with Job Approval **Date**

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