

High Tunnel System

Conservation Practice Job Sheet

Natural Resources Conservation Service

325 OR-JS
October 2015

Client Name: _____



Photo Source: www.hightunnels.org

Definition:

An enclosed polyethylene, polycarbonate, plastic, or fabric covered structure that is used to cover and protect crops from sun, wind, excessive rainfall, or cold, to extend the growing season in an environmentally safe manner.

Purpose:

- Improve plant vigor

Where the Practice Applies:

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.).

Plan supportive conservation practices to address all environmental concerns associated with the installation and use of the high tunnel systems such as erosion, irrigation, and runoff.

Crops must be grown in the natural soil profile. Raised beds may be installed to improve soil condition, fertility, and access. Raised beds are a maximum of 12 inches in depth.

The practice does not include greenhouses or low tunnel systems.

The practice cannot be used to provide shelter or housing for any livestock, or to store supplies or equipment.

Locate structures to avoid buried public utilities.

Locate the structure near a viable water source for irrigation.

The high tunnel structure must be planned, designed, and constructed from a manufactured kit in accordance with manufacturers' recommendations. The high tunnel frame must be constructed of metal, wood, or durable plastic; and be at least 6 feet in height at the peak of the structure. If required for enclosure, end wall covering may be greenhouse-grade plastic, polycarbonate, wood, or other. Use structures with the entry/exit point sized to facilitate movement of equipment and supplies needed for the production of planned crops.

Select the high tunnel covering material of a significant thickness to withstand the temperature change for the period required and shall have a 4-year-minimum lifespan. For polyethylene covers, use a minimum 6-mil greenhouse grade, UV-resistant material.

For organic producers, it will be the responsibility of the producer to make sure that all permissible activities, design, material used, and material specifications are consistent with the USDA Agricultural Marketing Service National Organic Program, National Standards on Organic Agricultural Production and Handling.

Construct high tunnel structures on level grade or the naturally occurring slope if the slope does not exceed five percent.

Where snow loads may damage the structure, the tunnel cover shall be removed or rolled up at the end of the growing season unless the structure is designed by the manufacturer to withstand expected snow loads.

Where wind loads may damage the structure, select the tunnel cover and structure designed by the manufacturer to withstand expected wind loads or manage the tunnel system in a manner that limits wind damage.

Where the intensity or duration of sunlight can shorten the growing season, the appropriate thickness of shade cloth may be used in place of, or in addition to impervious plastic covers. When shade cloth is used alone, end walls are not required.

High tunnels shed a large amount of water and can create drainage and ponding issues where none previously existed. Direct runoff away from the high tunnel structure to avoid ponding. Provide a detention basin, storage reservoir, or stable outlet when runoff from tunnel covers

empties onto the ground surface with potential to cause erosion.

Outside the high tunnel structure, vegetate all exposed surfaces disturbed during construction in accordance with CPS Code 342, Critical Area Planting. If climatic conditions preclude the use of seed or sod, use CPS Code 484, Mulching.

Significant modifications to the high tunnel structure design must be verified and approved by the manufacturer prior to construction to ensure that any warranties remain in effect.

Specifications

Prepare plans and specifications in accordance with the criteria of this standard.

As a minimum, the plans and specifications include the following:

- Identify purpose.
- Document the planned growing season.
- Layout and location of the high tunnel.
- Site preparations and the required supporting practices for erosion control, runoff, and vegetative cover according to the requirements of the corresponding conservation practice standard.
- The planned width and length of the seasonal high tunnel. Statement that the seasonal high tunnel will be built per the manufacturer's directions.
- Procedure and timing to remove or roll up the high tunnel cover prior to inclement weather conditions.
- Procedure and timing to add or replace shade cloth for protection from the sun for the high tunnel cover.

Operation and Maintenance

Managing a tunnel requires intensive and vigilant attention by the producer.

Prepare an operation and maintenance (O&M) plan and review with the landowner and/or operator responsible for the practice. Provide specific instruction for proper operation and maintenance of each component of this practice and detail the level of repairs needed to maintain the effectiveness and useful life of the practice.

Periodically inspect the high tunnel and repair, reinstall, or replace, as needed to accomplish the intended purpose.

Manage the structure in a manner that limits wind and/or snow damage. Close sides and ends before storm events. In areas that receive snow and ice, the structure should be closed prior to winter weather.

Remove snow and ice from the structure cover and sides promptly to prevent structure failure.

When the structure is at serious risk of collapse due to weather conditions, consider slashing the plastic cover to relieve pressure and save the framework.

Perform soil tests regularly to monitor nutrients and to monitor salt build-up. The soils under the immobile high tunnels may require periodic "flushing" to remove salt build-up. This is accomplished by removing the cover for a season to allow natural precipitation to infiltrate, or by artificially flooding the ground under cover.

If needed, seed all disturbed earth surfaces outside of the high tunnel and maintain the vegetation throughout the structure's life.

Removal of cover materials shall be consistent with the intended purpose and site conditions.

Plan for proper disposal of the cover at the end of its useful life.

Operation of equipment near and on the site shall not compromise the intended purpose of the high tunnel structure or its cover.

Client / Business Name:			
Planning Assistance by:		Date	

Site Specific Resource Attributes Prior to High Tunnel				Critical Season (Month Range)			
Soil	Slope %	Slope Length (ft)	T	Snowfall	Wind	Rainfall	Annual Precipitation Inches

Client Objectives			
Practice Purpose	Improve Plant Quality		

High Tunnel Manufacturer					Installation Date		
Length in Feet		Width in Feet		Center Height in Feet		Square Feet	Orientation
Site preparation and re-vegetation of disturbed areas:							
Run-off Control Requirements:							

Soil Quality, Production and Erosion assessments	Before Installation			After Installation		
	Crop	Planting Dates	Biomass Yield DM lbs/acre	Crop	Planting Dates	Biomass Yield DM lbs/acre
Crop Rotation						
Average Annual Rotation Soil Quality	STIR	SCI		STIR	SCI	
Average Annual Rotation Erosion tons/acre	Sheet/Rill	Wind		Sheet/Rill	Wind	

Planned Pest Management: Attach IPM plan with 595 Job Sheet	
Planned Nutrient Management: Attach 590 Job Sheet specification	

Supporting Conservation Practices, Installation Dates and Resource Concerns Addressed

Conservation Practice	Date	Resource Concerns Addressed

Additional Specifications
<ul style="list-style-type: none"> • Attach Conservation Plan Map: Identify Planned/Installed High Tunnel site(s). • Include any associated conservation practices planned for area(s) around the site(s). • Also include nearby sensitive resource areas and buffers • In climate conditions where damage to the structure may result (wind and snow), the tunnel cover shall be removed at the end of the growing season and prior to inclement weather conditions. • Frigid temperatures can make the polyethylene covering very fragile and prone to shattering. Polyethylene life depends on the quality of installation, operation and weather factors. Several ways to help increase the lifespan of the polyethylene covering are: <ul style="list-style-type: none"> • place the rafters close enough to minimize flapping in the wind • cross brace the structure to prevent vibration in the wind • sand the rafters smooth prior to installing polyethylene • wrap rafters with plastic or Styrofoam • install the polyethylene cover on a warm day to get plastic tight on cold days • keep farm implements and people off the polyethylene • make sure the structure is well anchored • Contact your specific manufacturer for additional suggestions. <div style="border: 1px dashed black; padding: 10px; margin-top: 10px;"> <p>EQIP regulations require that the system be functional for a minimum of four years. Therefore, selection of the high tunnel system kit should be made carefully to insure it will remain functional throughout the contract period.</p> </div>

Operation and Maintenance

Inspection, Repair and Cover Removal Dates; Crop Management Records and Conservation Practice Maintenance

- Maintenance and repair of the system is the sole responsibility of the contract holder.
- If damage occurs, contract holders should be prepared to bear the costs of making repairs or replacing the polyethylene cover during the contract period. EQIP does not provide additional payments for repair of structures.
- Operation of equipment near and on the site shall not compromise the intended purpose of the structure.
- Covered area shall be periodically inspected and shall be reinstalled or repaired as needed to maintain the useful life of the practice (4 years).
- Removal of cover materials shall be consistent with the intended purpose and site conditions.
- Maintain proper drainage around and away from the high tunnel structure.
- If plastic cover is removed for winter storage, place the material where it will not be handled, moved, or disturbed when cold.
- Many systems are movable and can be rotated to different locations depending on the anchoring system used. Please note that while the system can be moved, sometimes moving the structure can negate the manufacturer's warranty. Make sure to check with your manufacturer or supplier if you plan to rotate your high tunnel to a different location.

DESIGN APPROVAL:

Practice Code No.	PRACTICE	LEAD DISCIPLINE	CONTROLLING FACTOR	UNITS	JOB CLASS				
					I	II	III	IV	V
325	High Tunnel System	BCSD-Agron	Area	Sq Ft	<1000	1000-2000	>2000	All	All

This practice is classified as Job Class: _____

Design Approved By: /s/ _____ Date: _____

Job Title: _____

CLIENTS ACKNOWLEDGEMENT STATEMENT:

The Client acknowledges that:

- a. They have received a copy of the specification and understand the contents and requirements.
- b. They will operate and maintain this conservation practice in accordance with the site specific Job Sheet specifications.
- c. They will make no changes to the planned design and installation without prior notification and approval.
- d. They will assume responsibility for notifying all Utilities affected by the installation, operation and maintenance of this conservation practice.
- e. The information on Page 2 of the job sheet needs to be provided to NRCS by the client.

Accepted By: /s/ _____

PRODUCER SELF- CERTIFICATION:

I certify that this high tunnel has been installed according to all manufacturer’s recommendations.

Name Date

___ Client has provided a copy of the warranty to NRCS if available (attach)

CERTIFICATION:

I have completed a review of the information provided by the client and certify this practice has been applied.

Certification By: /s/ _____ Date: _____

Job Title: _____

- Map showing practice location and any sensitive areas
- Installation self certification
- High Tunnel Kit Manufacturer (attach warranty if available)
- 6 foot minimum center height
- 6 ml greenhouse grade UV resistant polyethylene cover
- Runoff directed away from the structure to avoid ponding
- All disturbed areas vegetated
- Review Operation and Maintenance requirements with producer

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication program information (Braille, large print, audiotape, etc.) should contact the USDA Office of Communications (202) 720-2791.
 To file a complaint of discrimination write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.