Texas A&M AgriLife Extension

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Costs to Build A Metal-Hoop High Tunnel

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High tunnels are structures that protect fruit, vegetables, and cut flowers from inclement weather and extreme temperatures. They are a low-cost approach to extend the growing season. Also called hoop houses, Quonset-style houses, and unheated greenhouses, high tunnels have become widely used in the United States (Fig. 1).

Other types of season-extending technology include row covers and low tunnels. This publication addresses the costs of building a high tunnel with metal hoops. High tunnels can also be built with PVC pipe. Sources of information on both types of technology are listed at the end of the publication.

Growers may build high tunnels from scratch, assemble a kit, or hire a company to build them. Most growers bend their own pipes or build high tunnels from kits (Fig. 2).

All types of high tunnels offer several advantages and disadvantages.

Advantages

- Extended spring and fall growing seasons
- Wind and rain protection
- Potential for reduced disease problems on certain crops
- Potential for higher market value of crops
- Potential for higher quality of harvested crops

Disadvantages

- Initial capital expense
- Disposal of polyethylene covering
- Additional time and effort to monitor the increased temperature inside the tunnel
- Potential increased pest problems
- Potential tunnel collapse from snow loads or high winds

Before building a high tunnel, factor in several site and engineering issues. These issues may include sunlight and wind exposure, access to water, and topography. Sunlight and wind direction may influence the orientation of your high tunnel.

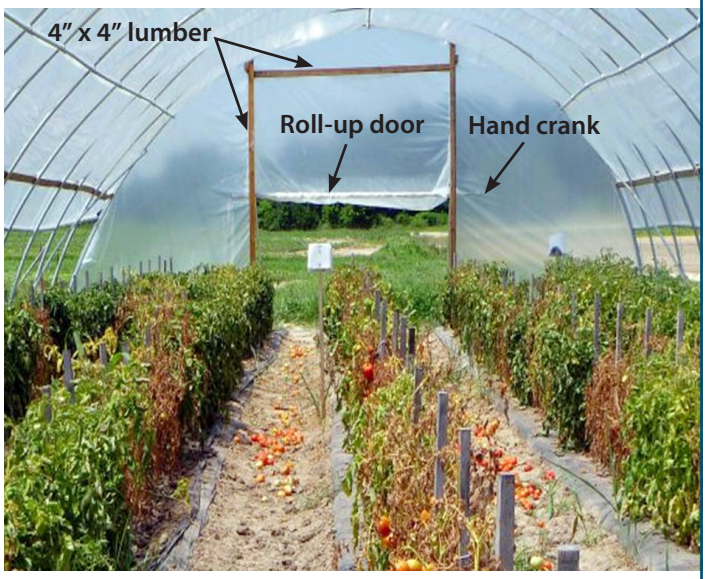

Figure 1. A high tunnel with early-season tomatoes (photo taken toward the end of the season)

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The overall dimensions and climatic requirements (such as snow loads) of the high tunnel will determine the bow/hoop spacing and bow thickness. For example: In areas with strong winds, such as the Texas Panhandle, bows are set 3 feet apart with concrete support on the end bows. In East Texas, bows are placed 5 to 6 feet apart with no cement support.

Pipe benders range in price from $150 to $750, depending on their features and size. High tunnel kits cost $2.25 to $5.00 per square foot, depending on the tunnel dimensions, features (such as roll-up sides and doors), bow steel thickness, and type of plastic film. Many suppliers offer high tunnel materials and kits.

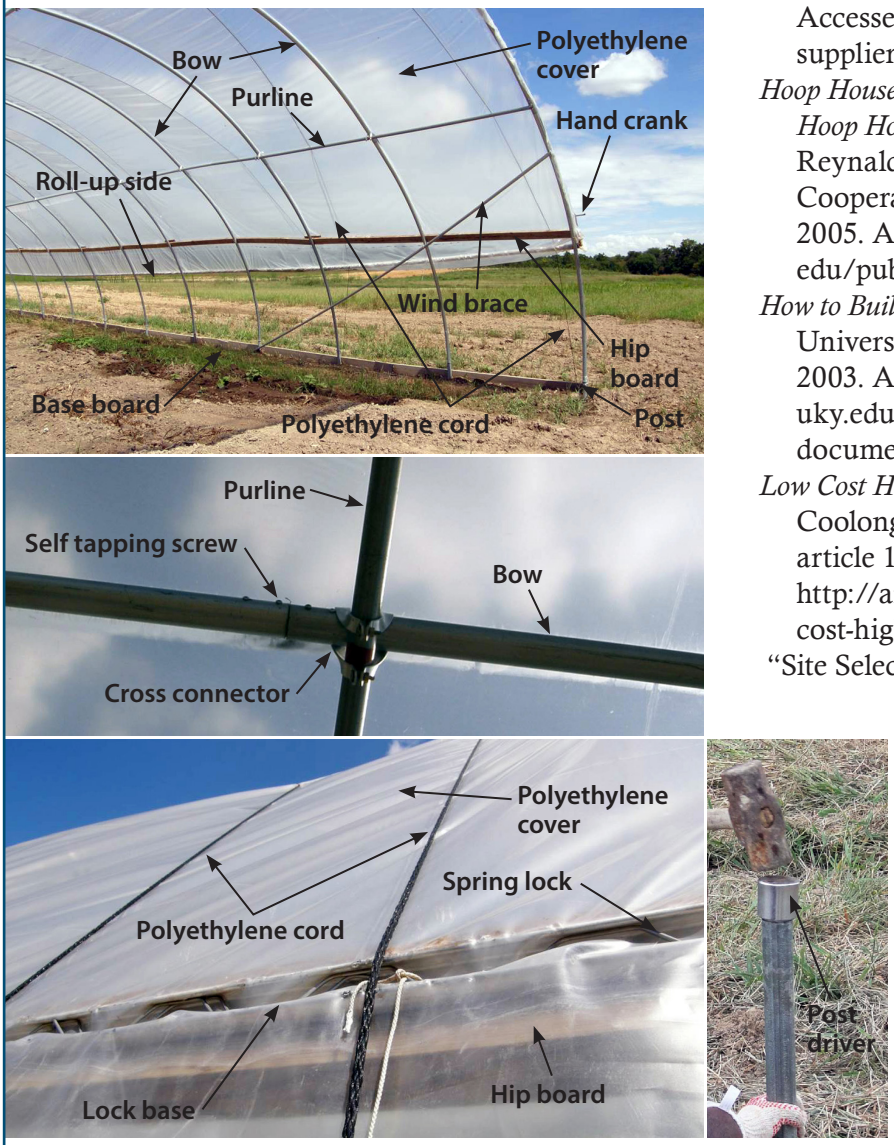

Figure 2. Components of a high tunnel

Tables 1 and 2 list the material and labor costs for building high tunnels of varying dimensions using metal hoops.

For more information

High Tunnel or Greenhouse? By Mengmeng Gu. 2009. Mississippi State University Extension. Information Sheet 1674. Accessed July 26, 2018: https://extension.msstate.edu/sites/default/files/publications/information-sheets/is1674.pdf

High Tunnel Production Manual. By William Lamont Jr. Penn State Extension. 2003. Accessed July 26, 2018: https://extension.psu.edu/high-tunnel-manual

High Tunnels Supplier Directory. Hightunnels.org. Accessed July 26, 2018: http://hightunnels.org/supplier-directory/

Hoop House Construction for New Mexico: 12-ft × 40-ft Hoop House. By Del Jimenez, Ron Walser, and Reynaldo Torres. New Mexico State University Cooperative Extension Service. Circular 606. 2005. Accessed July 26, 2018: http://aces.nmsu.edu/pubs/_circulars/CR606/

How to Build a High Tunnel. By Amanda Ferguson. University of Kentucky Extension Service. 2003. Accessed July 26, 2018: http://www.uky.edu/hort/sites/www.uky.edu.hort/files/documents/hightunnel.pdf

Low Cost High Tunnel Construction. By Tim Coolong. University of Kentucky. eXtension article 18356. 2012. Accessed July 26, 2018: http://articles.extension.org/pages/18356/low-cost-high-tunnel-construction

"Site Selection." *Minnesota High Tunnel Production Manual for Commercial Growers.* By Terrance T. Nennich and Suzanne Wold-Burkness. University of Minnesota Extension Service. 2012. Accessed July 26, 2018: https://conservancy.umn.edu/handle/11299/197952

Siting High Tunnels. By Kristin Pool and Alex Stone, Oregon State University. Hightunnels.org. 2014. Accessed July 26, 2018: http://hightunnels.org/siting-high-tunnels/

Table 1. Material and labor to build a 30- by 96-foot high tunnel using chain-link tubing with 17 bows

Item	Unit price ($)	Quantity	Subtotal ($)	Notes	Labor (hr)
Post/anchor legs					
1⅞ in. × 3 ft 18-gauge tubing	5.25	34	178.50	2 per bow for 17 bows	
Carriage bolts	0.15	34	5.10	2 per bow for 17 bows	
Nuts	0.10	34	3.40	2 per bow for 17 bows	
Post driver 1.9 in. pipe	13.95	1	13.95	—	
Ratchet tie-down	13.98	10	139.80	To anchor the tunnel structure and prevent wind damage	2.5
Bows					
1⅝ in. × 11 ft 18-gauge tubing	12.5	68	850.00	6 ft apart, 4 pieces per bow	
1⅜ in. × 21 ft 18-gauge tubing	17	2	34.00	Bend and cut into to 8-in. pieces to insert between 2 adjacent bow sections; need 4 tek screws per piece; 51 pieces, or 3 per bow	
Tek screws	0.05	204	10.20	—	6.0
Purlin					
1⅜ in. × 21 ft 18-gauge tubing	17.00	15	255.00	3 purlines, 5 pieces per purline	
Tek screws	0.05	24	1.20	2 per connection	
Cross connectors for 1.66 in. × 1.315 in. pipe	2.17	51	110.67	3 per bow	6.0
Cover					
8 ft aluminum wire lock base	5.54	34	188.36	12 per side × 2 sides + 5 per end × 2 ends = 34	
4 ft wire spring lock	1.23	68	83.64	To cover all lock base	
48 ft × 150 ft poly 6 mil Tufflite IV	452.75	1	452.75	—	
Tek screws	0.05	170	8.50	5 per base to put it on wood	
2 × 4 × 12 treated lumber	6.97	19	132.43	16 (= 96 ft/12 ft × 2) pieces for 2 sides, 3 (= 2 ft × 7 × 2/12 ft) pieces for 2 ft connecting pieces	
Wood screws (64 needed)	5.07	1	5.07	8 per connection	
Pipe strap for 1⅝ in. tubing	0.46	34	15.64	Connect wood with bows	
Polyester cord ⅛ in. × 1000 ft	26.47	1	26.47	45 ft × 17 to prevent poly cover from flapping and reduce wear	9.5
Roll-up sides					
2 × 6 × 12 treated lumber for baseboards	10.97	19	208.43	16 (= 96 ft/12 ft × 2) pieces for 2 sides, 3 (= 2 ft × 7 × 2/12 ft) pieces for 2 ft connecting pieces	
Wood screws (64 needed)	5.07	1	5.07	8 per connection	
Pipe strap for 1⅝ in. tubing	0.46	34	15.64	To connect wood with bows	
1⅜ in. × 21 ft 18 gauge tubing	17	10	170.00	5 per side; 2 sides	
Tek screws	0.05	16	0.80	To connect tubing	
Hand crank assembly, 12 in.	31.95	2	63.90	—	
Curtain 6 ft × 96 ft with sealed seam	450	1	450.00	200 ft long	4.0

continued on next page

Table 1 continued

Item	Unit price ($)	Quantity	Subtotal ($)	Notes	Labor (hr)
Miscellaneous					
WD 40	3.44	1	3.44	For easy installation of bows in posts	
String	5.00	1	5.00	For post line-up	
Flags	5.00	1	5.00	To mark post locations	
Spray paint	5.00	1	5.00	Marking	
Drill bits of various sizes	20.00	1	20.00	These will wear out.	
Tunnel subtotal			**$3,466.96**		**28.0**
Wind braces					
1⅜ in. × 21 ft 18-gauge tubing	17.00	4	68.00	1 per corner	
Tek screws	0.05	16	0.80	4 Tek screws per brace	1.5
Doors					
Poly	0.00		0.00	Use the extra pieces from the top cover.	
4 × 4 × 16 #2 treated lumber	21.97	4	87.88	To build the end frames	
4 × 4 × 12 #2 treated lumber	17.97	2	35.94	To build the end frames	
1⅜ in. × 21 ft 18-gauge tubing	17.00	2	34.00	For roll-up door	
Hand crank assembly, 12 in.	31.95	2	63.90	—	4.5
Subtotal for wind braces and doors			**290.52**		**6.0**
Total			**3,757.48**		**33.5**
Pipe bender					
M2030 bender (includes shipping)	750.00	1	750.00	—	

Note: Chain-link tubing of smaller diameter (for example, 1⅜ in. instead of 1⅝ in.) could be used when building 20-foot-wide (or less) high tunnels. There could be many variations of the materials listed in the table to meet different needs and situations.

Table 2. Estimated material and labor costs to construct a 30-foot-wide high tunnel of different lengths

	Length of high tunnel				
	36 ft	54 ft	72 ft	96 ft	120 ft
Expense	**Cost ($)**				
Tunnel	1,300.00	1,950.00	2,600.00	3,467.00	4,334.00
Doors, wind braces	291.00	291.00	291.00	291.00	291.00
Subtotal	**1,591.00**	**2,241.00**	**2,891.00**	**3,758.00**	**4,625.00**
$/sq ft	**1.47**	**1.38**	**1.34**	**1.30**	**1.28**
	Labor (hr)				
Tunnel	19.00	21.50	24.50	28.00	31.50
Doors, wind braces	5.50	5.50	5.50	5.50	5.50
Subtotal	**24.50**	**27.00**	**30.00**	**33.50**	**37.00**

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