

BUILDING AN EIGHT FOOT TALL FREE-STANDING NESTING TOWER for CHIMNEY SWIFTS (*Chaetura pelagica*)

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Second Edition

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The first edition of our book “Chimney Swift Towers: New Habitat for America’s Mysterious Birds: A Construction Guide” was published in 2005 by the Texas A & M University Press. The proven designs detailed in that book have been used by conservationists all across North America to build and provide hundreds of new nesting and roosting sites for Chimney Swifts. The featured design is the 12’ wooden tower, and it remains a great tower. When possible, it should probably still be the choice at a location where only one tower will be constructed since it is more likely to attract a roost as well as a nesting pair. However, we now have built enough 8’ nesting towers to be able to share another new and proven design. We briefly discussed 8’ towers in the book but provided minimal information at that time since the design was still in the testing stage.

During testing we discovered that simply making the tower shorter had some problems - primarily over-heating. What we developed is a tower that is shorter in height, but larger in diameter with a ventilated air space between the rigid insulation and outer siding.

Another modification is a foundation that is wider but not as deep. The wider foundation does a better job of keeping grass (which can be a conduit for ants to colonize the nesting chamber) away from the bottom and legs of the tower. The extra width is also helpful on property where prescribed burns are part of habitat management. The shape has also been modified from a square to an octagon, which uses less concrete and is more aesthetic in appearance, at least to us. -- not necessarily to the Chimney Swifts.

Hardie siding is now our product of choice for siding the towers. It is a bit more difficult to work with than wood (special blades and drill bits are required). But it is completely smooth (eliminating the need for a predator guard), holds the paint much better than wood, and is fireproof. Smooth Hardie soffit panels are readily available in 2’ x 8’ x 1/4” sheets. The faces of the towers are the size of the panels: 2’ x 8’, so some drilling, but no cutting is required. The material is available in several textures, but we highly recommend the “smooth” version. It is also available with pre-drilled vents, but these are not appropriate for this project. Use the “smooth / no vent” product.

We have now constructed dozens of this 8’ design - only a few have not yet attracted swifts – so we feel it is time to make these new plans available. The design is easier to build, safer with less high ladder time, and less expensive. We wish to thank our conservation colleague Walter Stewart for his invaluable assistance in editing these instructions while constructing several towers on his own of this design.

We have been experimenting with Chimney Swift tower designs for more than 30 years as of this printing. We have built more than 200 towers and tried nearly every material available to find the best products to make the towers successful. Readers who may use these plans as only a guide and decide to make modifications should take care not to use different materials than those recommended – especially the 5/8” T1-11 used for the Nesting Chamber. This is the most critical part of the project since it is the material where the Chimney Swifts will cling and construct their nest. It is also important that the T1-11 siding covers the entire interior from the top to the bottom of the tower on all four walls. Upsizing the tower will not be a problem as long as the materials and construction techniques remain the same, providing of course that the enlarged tower is structurally stable.

This tower can be built using some basic tools including the following:

tape measure, hammer, carpenter’s square, framing level, circular saw (with an all-purpose wood cutting blade and an abrasive metal cutting blade), wire-cutters / pliers, power screwdriver / drill, saber saw, razor knife, 3’ pipe or bar clamps, wheelbarrow and hoe for mixing concrete, and garden tools for preparing the site. However, a table saw is pretty much essential to make all of the cross cuts and rips accurately.

Master List of Materials

2 sheets of 4' x 8' x 5/8" Textured One Eleven (T1-11) siding with grooves 4" on center

Note: If 4" on center is not available in your area, you can use 8" on center and use a router to rout extra grooves between the existing grooves.

4 sheets of 2' x 8' x 1/4" Hardie soffit – smooth with no vent

2 sheets of 4' x 8' x 3/4" foil-sided rigid foam insulation board

4 pieces of 1 1/2" x 1 1/2" x 1/8" angle steel measuring 5' long

8 pieces of 1" x 4" x 8' pressure-treated lumber (Wide Outside Corners)

4 pieces of 1" x 4" x 10' pressure-treated lumber (inside and outside corners and cleats)

1 piece of 2" x 4" x 8' pressure-treated lumber (Inside Horizontal Cleats)

1/2 sheet (4' x 4') of 3/4" pressure-treated plywood cut to:

Top: 1 @ 24" x 24"

Sun Collar: 2 @ 7 7/8" x 7" / 2 @ 7 7/8" x 13"

Bottom: 19 3/4" x 19 3/4"

Temporary Hardie support cleats: 4 @ 3" x 17"

2 pieces of 2" x 6" x 10' #2 yellow pine (concrete foundation form)

1 piece of 2" x 6" x 8' #2 yellow pine (concrete foundation form)

4 pieces of 2" x 4" x 8' #2 yellow pine (temporary brace bars and stakes)

4 pieces of 2" x 2" x 10' metal corner trim (we like a product called 2" x 2" hemmed corner available from some roofing supply companies like Montopolis Supply in Austin, TX)

8 @ 4" x 16" louvered aluminum soffit vents with built-in insect screening

24 @ #12 x 3/4" Teks self-drilling metal screws metal to metal and nut driver to fit. (*The use for this here is actually metal to wood, but these screws work great for this project.*)

Or 24 #12 x 3/4" pan head sheet metal screws to attach the legs to the Bottom Tower Section if you do not want to use self-drilling screws. See "**Preparation of the Bottom Tower Section**".

1 lb. of 1 1/4" Grip Rite #8 screw size with #2 Phillips head, coarse thread, sharp point exterior screws (Home Depot)

1 lb. of 1 5/8" Grip Rite #8 screw size with #2 Phillips head coarse thread, sharp point exterior screws (Home Depot)

40 @ 3" deck screws

100 @ #6 x 1/2" pan head sheet metal screws for attaching the metal trim and vents

**Master List of Materials
(continued)**

½ pound of 1½” sheetrock nails for assembling the Narrow Outside Corners and the Wide Outside Corners

4 @ 1” stainless steel fender washers with ¼” center hole for securing the bottom to the tower

Masonry bits: 3/16” and 3/8”

1 roll of exterior duct tape

72 feet of 3/8” rebar (8 @ 48” / 16 @ 24” / 8 @ 12”) and a package of 100 Rebar Tie Wire
(or bailing wire)

15 @ 80-pound bags of ready-mix concrete (approximately 13 will be needed; the amount specified here includes a few extra just in case)

1 can of spray primer (enamel)

1 can of spray paint (enamel)

2 quarts of exterior latex enamel paint (light color to minimize overheating)

1 paint brush (2” to 3”) for touch up

1 paint roller and extension pole

1 paint roller pan

1 tube of paintable exterior caulk

Wooden shims like those used for setting doors (See Amazon or Home Depot)

1 container of Tanglefoot (insect barrier) / 1 small putty knife



We have been fortunate to work with a conservationist on his Spicewood Ranch in Central Texas since 2000. His habitat restoration and wildlife conservation efforts have included enlisting our help to build many Chimney Swift Towers. It was on this property that we perfected the design of this 8' tower, and by 2020 we had installed 13 of this design on his property alone – all of which have been occupied and most of them every year. Over this time, we have developed a construction protocol that serves us well.

We pre-construct all of the components off-site in our workshop. This takes the two of us 30+ hours working together. Once all of the components are fabricated, we can construct the tower on-site in two half days: four hours to set the forms and tower base and pour the foundation. Once the concrete is dry (24 to 48 hours), we can return and within four more hours have the entire tower constructed, painted, and ready for occupancy. We have also learned that by doing the pre-construction of three or more towers at one time, the off-site time per tower is reduced considerably. But here we will describe the construction of a single 8' Chimney Swift Tower.

List of Components to be Prepared Off-site

- | | |
|--|--|
| Steel tower legs: 4 | Temporary Hardie support cleats: 4 |
| Nesting Chamber: 2 sections | Foundation form and stakes |
| Top with Sun Collar | Tower bottom |
| Inside Horizontal Cleats: 4 top / 4 bottom | Narrow Outside Corners: 4 |
| Outside Horizontal Bottom Cleats: 4 | Wide Outside Corners: 4 |
| Outside Vertical Cleats: 8 | Insulation panels: precut for on-site work |
| Hardie siding panels: 4 | |

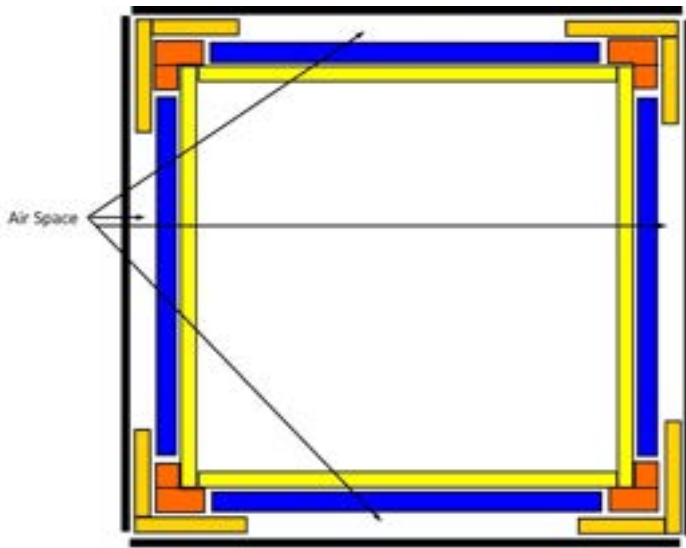


General Description of How the Tower is Constructed

The Nesting Chamber consists of two boxes of T1-11 measuring 21" x 21" x 48" (outside dimensions) with the grooves facing inside and running horizontally. When stacked together they form a column ~8' tall. The top and bottom of the column have 1 1/2" x 1 1/2" cleats on the inside that help give the Nesting Chamber strength and provide a place to attach the top (with an opening and Sun Collar) and the bottom with a grid of drain and ventilation holes drilled.

The Nesting Chamber is supported above the ground by four steel legs which are embedded in a concrete foundation.

The two sections of the Nesting Chamber are held together by the Narrow Outside Corners. These corners and the Outside Vertical Cleats provide a space that is filled with the insulation panels with the foil side facing out – away from the Nesting Chamber.



8 Foot tall Tower Cross-section

- 5/8" T1-11 siding: 19 1/2" and 21"
- 3/4" x 2 1/16" Narrow Outside Corners
- 3/4" x 3 1/2" Wide Outside Corners
- 3/4" rigid foil-faced foam insulation
- 1/4" smooth Hardie soffit

The bottom two feet of the wooden tower are treated somewhat differently from the top six feet. The outside corners of the bottom two feet of the tower are covered by the metal legs. Perpendicular to the metal legs and notched out to run over them, flush to the bottom, are the Outside Horizontal Bottom Cleats. Parallel to the metal legs and touching them and resting against the Outside Horizontal Bottom Cleats are eight Outside Vertical Cleats, that run two feet from the bottom. The upper six feet of the wooden tower are covered by the Narrow Outside Corners, and over them and the Outside Vertical Cleats are the Wide Outside Corners running the full length of the tower.

The Wide Outside Corners fit over the Narrow Outside Corners and the Outside Vertical Cleats and hold the insulation panels in place. The Bottom Outside Cleats are installed between the Wide Outside Corners. They and the Wide Outside Corner create a ventilated air space between the insulation panels and the Hardie siding.

The Hardie siding (with vent holes drilled near the top and bottom) is installed over the Wide Outside Corners, and two coats of paint are applied.

Metal trim is installed over all four corners and the top edges of the tower, and soffit vents are installed over the vent holes that have been drilled in the Hardie siding.

Steel Tower Legs

The first thing to do once all materials are assembled is to prime and paint the four five-foot steel tower legs. This requires two coats of spray enamel primer and two coats of final color spray enamel. Drying time is required between coats during which other components can be fabricated.

Foundation Form, Rebar and Stakes

Materials: 2 pieces of 2" x 6" x 10' #2 yellow pine
1 piece of 2" x 6" x 8' #2 yellow pine
1 piece of 2" x 4" x 8' #2 yellow pine
3/8" rebar (8 @ 48" / 16 @ 24" / 8 @ 12") and Tie Wire
3" deck screws

This process yields an octagonal box with four shorter sides and four longer sides. The tower will be oriented square to the longer sides (See Figures 10 and 11 on page 18).

STEP ONE: Cut each of the two 10' boards into two pieces measuring 54" and 51".

STEP TWO: Cut the 8' board into four pieces measuring 19" and cut a 45-degree angle on both ends of each piece.

STEP THREE: Using the 3" deck screws, construct a box frame from the lumber measuring 54" x 54".

STEP FOUR: With the box frame lying flat, measure diagonally in both directions and adjust the box so that the measurements are the same. This will ensure that the box is square.

STEP FIVE: Place the 19" pieces inside the 54" box in the corners to form an octagon and secure with 3" deck screws.

STEP SIX: Rip the 2" x 4" x 8' in half lengthwise and cut seven 16" wooden stakes.

STEP SEVEN: Cut the rebar to the specified lengths using either a metal cutting abrasive blade on a circular saw or a hack saw. Some building supply companies will cut it to length for a fee.



The Interior Tower Sections (Nesting Chamber)

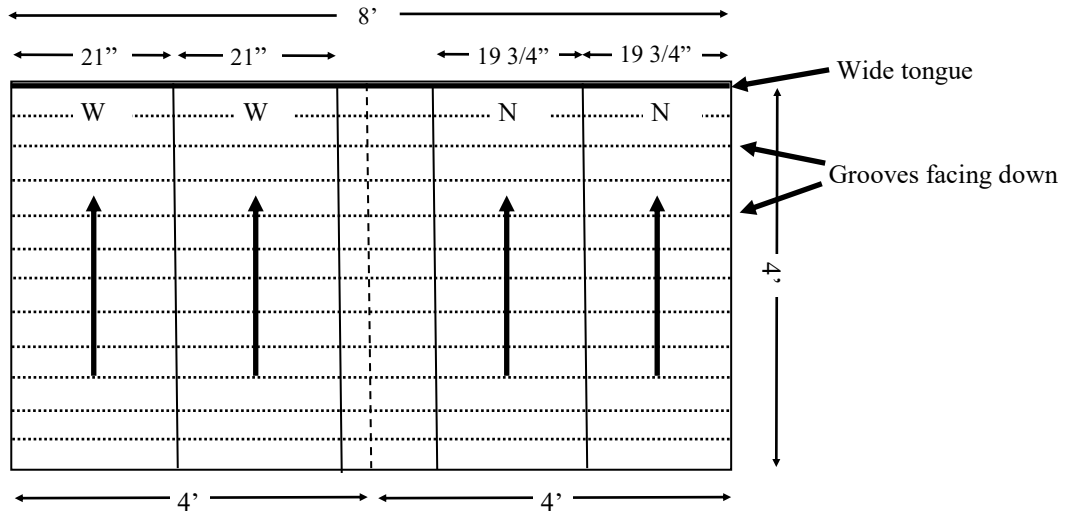


Figure 1 - T1-11 layout

Materials: 2 sheets of 4' x 8' x 5/8" T1-11 siding
 1 lb. of 1 5/8" #8 screw size with #2 Phillips head coarse thread, sharp point exterior screws
 1 @ 2" x 4" x 8' #2 pressure-treated yellow pine

Note: The long edges of T1-11 are designed to overlap when installed as siding. Therefore, they are different. The smooth side of the plywood has a wider tongue on one 8' edge and the grooved side has a narrower tongue. The dimensions of these tongues may vary depending on the manufacturer or batch. The wider tongue will measure from 5/8" to 3/4", and the narrower tongue will measure 3/8" to 9/16".

STEP ONE: To facilitate construction and to avoid confusion, the sheets should be marked for future reference. Lay the siding flat with the grooves facing down and horizontally with the 5/8" to 3/4" tongue on both sheets pointing the same direction (See Figure 1).

Place a temporary mark every 24" along the 8' length of the back of each sheet. Using a lumber crayon or other bold marking device, draw an arrow between each of the initial marks that point to the edge with the 5/8" to 3/4" tongue (See Figure 1). The arrows point to the "up" direction in the final assembly.

STEP TWO: Using a straight edge and a pencil or a chalk line, make a line on the side that is up on both sheets where each groove is located. This is important because screws used for later construction must not protrude into the grooves – which will be on the inside of the Nesting Chamber.

STEP THREE: Using a circular saw crosscut each sheet into two 4' x 4' sections.

STEP FOUR : For best results, use a table saw for these next two steps and place the "factory edge" next to the saw fence. Crosscut two of the 48" x 48" sections into four strips measuring 21". (see Figure 1). Mark all four strips with a "W" for "wide".

Note: Make certain all cuts are perpendicular to the grooves.

STEP FIVE: Crosscut the two remaining 48" x 48" sections into four strips measuring 19 3/4". Mark all of these 19 3/4" strips with an "N" for "narrow". *Again: Make certain all cuts are perpendicular to the grooves.*

STEP SIX: Using the 1 5/8" exterior screws, assemble 2 boxes measuring 48" x 21" x 21" on the outside (see Figure 2) . Screws should be placed approximately every 8" BETWEEN the grooves. Each box should be assembled with the grooves facing INWARD and the arrows all pointing in the same direction. Use 2 "W" and 2 "N" strips for each box.

*CAUTION: Be certain that no screws protrude into the interior of the boxes. For the safety of the swifts, it is critical **NOT** to put screws into the grooves either in this step or any of the following steps.*

Note: If assembled properly, the two tower sections will stack and interlock to form a structure measuring 21" x 21" x ~ 8' tall. The next two steps are important so that the sections fit together properly.

STEP SEVEN: Choose one section to be the bottom and stand it on the ground with the arrows pointing down: this is upside down from the way it will be installed. The top end of this section will be the very bottom of the tower. Trim the 3/8" to 9/16" wide thin edges off of the end that is facing up with a circular saw so that the walls on the end of the section are flat and measure 5/8" thick. Invert the section and stand it on the freshly-trimmed end with the arrows pointing up.

STEP EIGHT: Stand the other section (the section that will be the top) on the ground with the arrows pointing up. The top of this section will be the very top of the tower. Trim the 5/8" to 3/4" wide thin edges off of the end that is facing up with a circular saw so that the walls on the end of the section are flat and measure 5/8" thick.

STEP NINE: Test fit the Nesting Chamber sections by stacking the top section on the bottom section with all arrows facing up. If properly constructed, the two sections should interlock. It may be necessary to tap the sides of the tower at the joint to seat the top section properly. Once tested, separate the two sections.

STEP TEN: Rip the treated 2" x 4" x 8' into two 1 1/2" x 1 1/2" strips. There will be some waste, which can be discarded.

STEP ELEVEN: Fashion and install the Inside Horizontal Cleats by cutting four pieces 19 3/4" and four pieces 16 5/8". Using the 1 5/8" screws, install these pieces as cleats on the inside and even with the trimmed end of the tower sections at the very bottom and the very top of the tower. Drive the screws through the outer walls of the tower sections into the cleats.

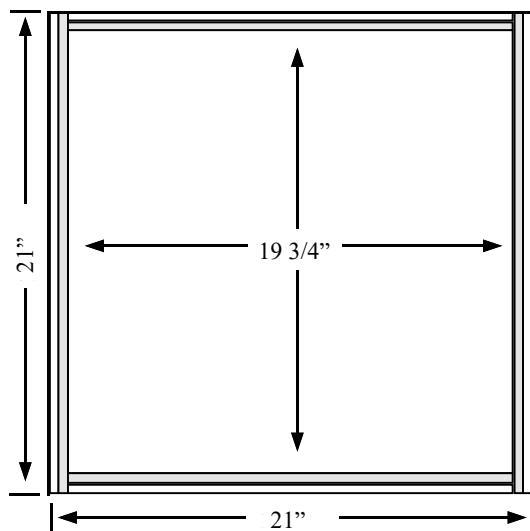


Figure 2 - Nesting Chamber cross section

The Tower Bottom

Materials: 3/4" pressure-treated, exterior plywood measuring 19 3/4" x 19 3/4"

STEP ONE: Drill a grid of 3/8" holes, 1 1/2" apart, in the 3/4" plywood for drainage, ventilation and snake exclusion (see Figure 3).

STEP TWO: Drill four 3/16" holes centered on each side and 3/4" from the edges

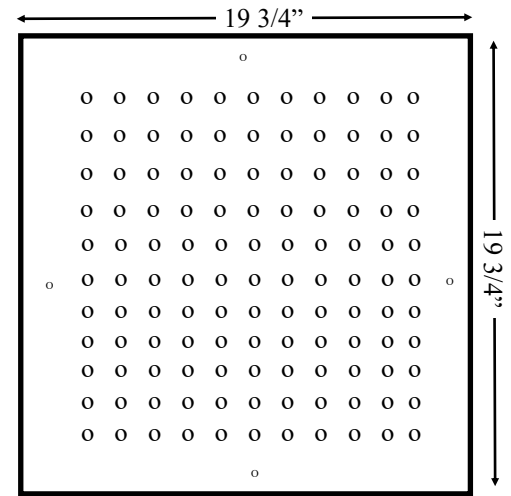


Figure 3 - Tower Bottom

Top and Sun Collar

Materials: 1/2 sheet (4' x 4') 3/4" pressure-treated plywood cut to:
 Top: 1 @ 24" x 24"
 Sun Collar: 2 @ 7 7/8" x 7" / 2 @ 7 7/8" x 13"
 1 5/8" exterior screws
 1 tube paintable exterior caulk

STEP ONE: Using a saber saw, cut a rectangular hole in the top as shown in Figure 4.

Note: The opening is off-center for a reason. It will be situated closer to the northern edge of the top of the tower to minimize the amount of direct sunlight that can penetrate into the Nesting Chamber.

STEP TWO: Build the Sun Collar using the four smaller pieces of treated plywood and 1 5/8" screws. It is a good idea to pre-drill the screw holes to prevent the plywood from splitting out. The finished piece should be 7 7/8" tall by 13" x 8 1/2".

STEP THREE: Center the Sun Collar over the hole in the tower top and mark around the outside of the collar with a pencil. Remove the collar and drill four 3/16" holes in the space between the hole in the top and the pencil line.

STEP FOUR: Attach the Sun Collar to the top with four 1 5/8" screws (see Figure 4a)

Note: The edges of the Sun Collar and the hole should be sanded to remove any rough edges that might injure the birds when they enter the tower. Rounding over the edges with a router is a nice touch.

STEP FIVE: Caulk the joint between the Sun Collar and the top and any cracks and screw holes. Once the caulk is cured (read the label on the caulk to determine the curing time before it can be painted), apply two coats of exterior latex paint to the top side of the top as well as inside and outside of the Sun Collar.

Note: We are testing the roof sealant compound Black Jack 5530-1-20 Elasto-Kool 1000 Siliconized Elastomeric Coating on the top and Sun Collar.

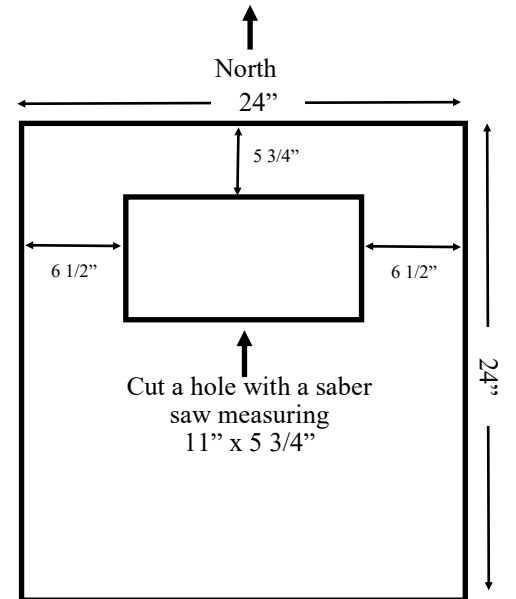


Figure 4: Tower Top Detail



Figure 4a - Tower Top with Sun Collar

Narrow Outside Corners, Outside Vertical Cleats and Outside Horizontal Bottom Cleats and Bottom Vents

Materials: 4 pieces of 1" x 4" x 10' pressure-treated pine
1 ½" sheetrock nails

Narrow Outside Corners

STEP ONE: Cut the four pieces of 1" x 4" x 10' lumber to 70 5/8". Save the four short pieces that are off-fall - each is about four feet long. They will be used in the next several steps. Rip each of the four 70 5/8" pieces to 2 1/16" strips. This will leave four strips of off-fall measuring ~ 1 1/2" which will be used in the next step.

STEP TWO: Using the 1 ½" sheetrock nails, assemble four corners measuring 2 1/8" x 2 1/16" x 70 5/8". These are the Narrow Outside Corners.

Outside Vertical Cleats (these will be used in preparation of the bottom section of the Nesting Chamber)

STEP ONE: Rip the four short pieces of treated 1" x 4" (saved from above) into eight 1 ½" pieces. Discard the waste.

STEP TWO: Cut four of the 1 ½" pieces into eight pieces measuring 22 ½". Discard the waste. These are the Outside Vertical Cleats.

Outside Horizontal Bottom Cleats

(these will be used in preparation of the bottom section of the Nesting Chamber)

STEP ONE: Cut two of the short pieces into four pieces measuring 21 ¼". These will be the Outside Horizontal Bottom Cleats. Discard the waste.

STEP TWO: Cut a rabbet or notch in the ends of the Outside Horizontal Bottom Cleats measuring 1 5/8" x 1/8". The notches will allow the cleat to sit flat on the tower and overlap the steel legs (see Figure 5).

STEP THREE: Cut the remaining two short pieces into four pieces measuring 16 7/8". Discard the waste. These will be used with the Wide Outside Corners.



Figure 5 - bottom cleat showing notch

Wide Outside Corners

Materials : 8 pieces of 1" x 4" x 8' pressure-treated pine
1 1/2" Sheetrock nails

STEP ONE: Cut all eight boards to 95 1/4". Discard the waste.

STEP TWO: Rip four boards to 2 3/4". The narrow off-fall from these cuts will not be needed for this project.

STEP THREE: Using the sheetrock nails, build four Wide Outside Corners measuring 3 1/2" x 3 1/2" x 95 1/4"

Insulation Panels

Materials: 2 sheets of 4' x 8' x 3/4" foil-covered rigid foam insulation board

Note: This insulation can be easily cut to size with a sharp razor knife.

STEP ONE: Lay one sheet flat with the foil side facing up. Starting on the left end place a mark every 18 1/8" on both edges along the 8' lengths.

STEP TWO: Place a mark 15" from the right end of the sheet on both edges. Draw cut lines to connect all of the marks.

STEP THREE: Score the cut lines with a razor knife, snap, and cut through the backing.
This will yield four pieces measuring 18 1/8" x 48" and one piece 15" x 48". The 15" piece will be used in the next step to make two pieces that will go between the Outside Vertical Cleats.

STEP FOUR: Cut the 15" x 48" piece into two pieces measuring 15" x 22 1/2". Discard the waste.

STEP FIVE: Lay the second sheet flat with the foil side up. Mark and cut two more pieces measuring 18 1/8" x 48" and one more measuring 15" x 48".

Note: There will be a sizeable piece of the second sheet left over.

STEP SIX: Repeat "STEP FOUR"

Hardie Siding Panels

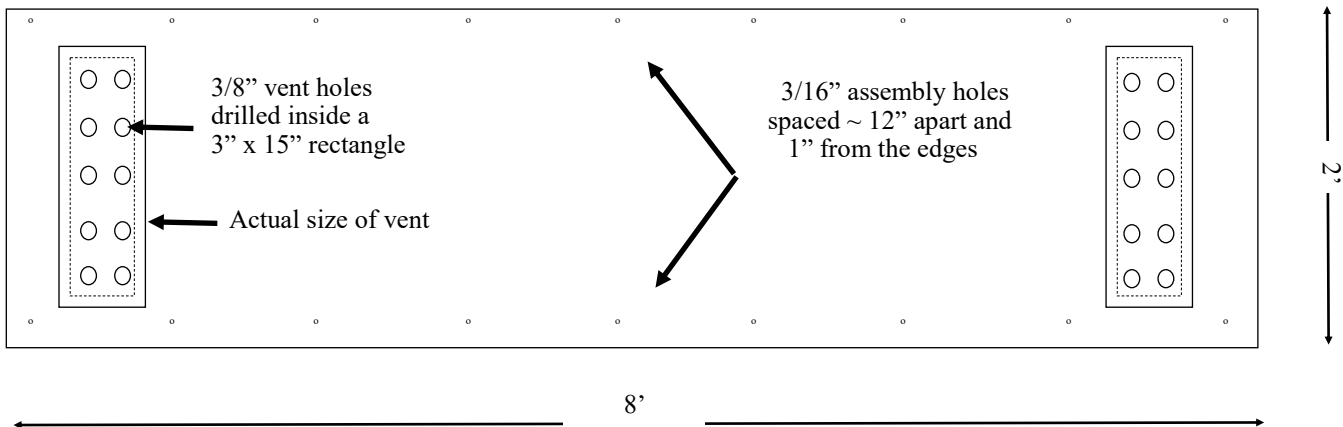


Figure 7 - drilling layout for Hardie siding panels

Materials: 4 sheets of 2' x 8' x 1/4" Hardie soffit – smooth with no vent

Note: Although Hardie siding is extremely durable once in place, it is very fragile and can easily break if not handled properly. Never pick a horizontal sheet up by the middle or suspend between sawhorses. Rather tilt it up on edge and lift from the middle and perpendicular to the ground. Hardie also requires carbide bits (masonry) to drill the necessary holes. It is best to drill it while it is lying flat on a worktable with waste wood placed under the panels where the holes are drilled.

STEP ONE: Carefully stack all four sheets on a worktable and align all edges.

STEP TWO: Place one of the soffit vents centered and with the top of the soffit 5" from one end of the Hardie panel, and trace around it leaving a rectangle. Draw a rectangle inside the original tracing measuring 1/2" less on each side (3" x 15"). Repeat on the other end of the soffit.

STEP THREE: Using a 3/8" masonry bit, drill a series of vent holes inside the 3" x 15" box through all four sheets as shown in Figure 7. The spacing is not critical because the holes will be covered by the 4" x 16" aluminum vents.

STEP FOUR: Using a 3/16" masonry bit, drill the assembly holes through all four sheets ~ 12" apart and 1" from the edges.

STEP FIVE: Cut four temporary Hardie support cleats from scrap 3/4" plywood. These do not need to be exact but should measure approximately 3" x 17".

Preparation of the Bottom Tower Section

Materials: 4 primed and painted 5' steel tower legs
Pre-constructed bottom section of the Nesting Chamber
24 #12 x 3/4" Teks (brand) self-drilling metal screws
8 pre-cut Outside Vertical Cleats
4 pre-cut Outside Horizontal Bottom Cleats
1 1/4" exterior screws
The pre-cut / pre-drilled tower bottom
4 @ 1 5/8" exterior screws
4 @ 1" stainless steel fender washers (not shown in photo)

STEP ONE: Stand the bottom tower section with the arrows pointing downward (this will be upside down from the final assembly), and install the tower bottom with the 1 5/8" exterior screws and fender washers (not shown in photo). See Figure 8.

STEP TWO: Lay the bottom tower section on its side and place marks 24" from the bottom on all corners.

STEP THREE: Place one of the steel legs on a corner lined up on the 24" mark. This will leave 36" of leg protruding beyond the bottom of the tower section.

STEP FOUR: While holding the leg in place snugly against the tower corner, use a power drill with a nut-driver to drill and screw the leg to the tower base with the self-drilling screws. The screw will drill its own hole through the steel leg and into the tower. Three in each side of each leg is sufficient.

*Note: Do **not** overtighten or run at high speed. Stop the drill as soon as the leg is snug to the tower. Take care to put the screws **between** the lines drawn on the tower so as not to place a screw in one of the grooves on the inside of the tower. It is easiest to install the screws only in the side of the tower facing up with the tower section on the ground rather than on a worktable or sawhorses. This way, the necessary force can be used to drive the screws into place.*

STEP FIVE: Once two legs are installed, roll the tower 90 degrees onto another side, install the third leg and put three screws in the other leg.

STEP SIX: Repeat STEP FIVE, and repeat again until all four legs are installed and there are three screws in each side of each leg.

Note: After trying several methods of attaching the legs to the tower base, we prefer the method described in steps ONE through SIX. It is faster, easier and eliminates the additional step of pre-drilling the legs. However, an alternate method of attaching the legs is to mark on the legs where the screws are to be placed and pre-drill the legs with a 3/16" bit and use #12 x 3/4" pan head sheet metal screws to attach the legs to the tower base.



Figure 8 - installing Tower Bottom

STEP SEVEN: With the bottom tower section still on its side, place one Outside Horizontal Bottom Cleat in place even with the bottom of the Nesting Chamber with the notches overlapping the steel legs and pre-drill three holes with a 7/64" drill bit.

*Note: **The size of the pilot hole is critical.** The pilot hole will prevent the screw from splitting the cleats. If the hole is any larger, the screw will not pull the cleat up tight to the tower. So little of a 1 1/4" screw actually grabs the T1-11, if it does not also thread tightly into the cleat, it will often strip out and not pull the cleat up tight. The same is true of the pre-drilled holes in the Narrow Outside Corners.*

STEP EIGHT: Attach the Outside Horizontal Bottom Cleat using three @ 1 1/4" exterior screws – do not overtighten.

STEP NINE: Place two of the Outside Vertical Cleats on the tower base right next to the steel legs and butted up against the Outside Horizontal Bottom Cleat. Pre-drill three holes with the same 7/64" bit – **between** the lines that indicate the grooves on the inside.

IMPORTANT: use only the 1 1/4" screws for installing the cleats

STEP TEN: Attach the Outside Vertical Cleats using three @ 1 1/4" exterior screws in each cleat – do not overtighten (see Figure 9).

STEP ELEVEN: Repeat STEP SEVEN thru STEP TEN for all sides of the tower base.



Figure 9 - Outside Vertical Cleat installed next to the Steel Leg and Outside Horizontal Cleat showing notches that will fit over the Steel Legs

This completes all of the off-site construction.



On-site Construction

Day One on Site

Checklist

Tower and Foundation Parts

15 @ 80-pound bags of concrete (this includes a few extra just in case)
Bottom tower section with the bottom attached
Form
Rebar: pre-cut as indicated
7 stakes
3 @ 2" x 4" x 8' braces
3" deck screws

Tools

Compass for orienting the tower
Excavation tools: sharpshooter / flat shovel / regular shovel / garden hoe / pick / rock bar
Sledgehammer
Regular hammer
Tape measure
4' Level
Cordless drill / bits / 3" screws / extra battery
Concrete tools: hoe, shovel, trowel, edging tool, poker (an old hoe handle, broom stick, etc.)
Razor knife for opening concrete bags
Mortar hoe for mixing
Poker (like a broom stick or something similar) for settling concrete into the edges and corners
Scree board for leveling the top of the wet concrete
Trowel / and concrete edging tool
Sponge for clean up
Hose / nozzle / 5 gallon water jugs in case the hose will not reach the construction site
Wheelbarrow for hand mixing or cement mixer
Tools for rebar: twisters / pliers / hack saw (in case the rebar needs to be trimmed)



Setting the Tower Base and Pouring the Foundation

Location: A Chimney Swift Tower should be placed in a clearing with no trees or over-hanging branches closer than 20'. If placed near an existing structure, it should be at least 10' away. This placement is to prevent potential predators (cats, raccoons, squirrels, etc.) from being able to jump to the top of the tower and gain access to the Nesting Chamber. If multiple towers are installed, they should be placed at least 12' apart. Only one pair will nest in a tower. This spacing will prevent any territorial disputes among pairs.

Some shade on the south and west is desirable, but due to the design of the tower with insulation and air space, the shade is not essential.

Note: In cold climates where frost heave may be an issue, check local building codes to see if the foundation needs to be set deeper and / or thicker.

Materials: Pre-constructed foundation form (box frame)
3 pieces of 2" x 4" x 8' #2 yellow pine
3/8" rebar (8 @ 48" / 16 @ 24" / 8 @ 12") and rebar ties or bailing wire
3" deck screws
7 of the 16" stakes prepared in a previous section
18 @ 80-pound bags of ready-mix concrete (this includes extra just in case)
3" deck screws

STEP ONE: Place the box frame on the tower site oriented in the desired position. Mark the area and remove the form box. Excavate a flat-bottomed square hole that is approximately 72" square and 2" to 3" deep.

STEP TWO: Place the form box in the excavated area. Secure in a square and level position with four of the wooden stakes and 3" deck screws.

STEP THREE: Back-fill the form around the outside edges and tamp into place. Level the soil inside the form so that it is even with the bottom of the form.

STEP FOUR: Stand the bottom tower section in the center of the foundation box frame. Align the sides of the tower parallel to the four long edges of the octagon. Secure the bottom section in a perfectly vertical position using a framing level, three 2" x 4" x 8' brace boards, 16" stakes and 3" deck screws.

STEP FIVE: Install a two-layer grid of 3/8" rebar. Drive the 12" pieces of rebar into the ground on each corner. Place the 12" rebar pins so that the 4' pieces of rebar run inside the tower legs. Use tie-wire to attach a two-level grid of 3/8" rebar horizontally inside the form box approximately 2" and 4" above the ground (see Figures 10 and 11).

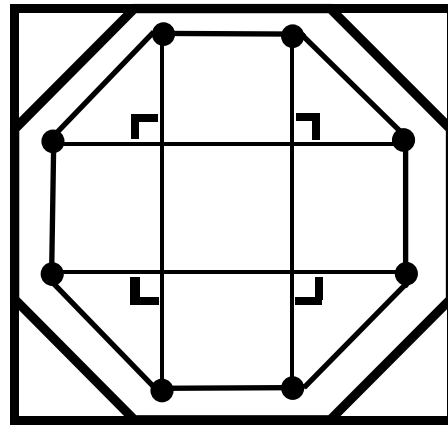
Note: Make certain none of the rebar or pins protrude above the top of the form boards. They should be at least 1/2" below the surface of the final pour.

STEP SIX: Thoroughly dampen the soil inside the form box and fill the box frame to the top with properly mixed concrete-gravel mix (follow the instructions on the bags). Agitate the edges and corners with the poker to make sure the concrete fills the form completely.

STEP SEVEN: Re-check the bottom tower section with a level to make sure it is still plumb, and carefully adjust if necessary. Once the concrete begins to set (approximately one hour after finishing the concrete pour), a concrete edging tool can be used to dress the edge of the foundation. Allow the foundation to dry for at least 24 hours before removing the forms – 48 hours is preferable.



Figure 10 - foundation form, tower legs and rebar ready for concrete



L Tower leg Form board
 — Rebar ● Rebar pin

Figure 11 - foundation form, tower legs and rebar ready for concrete (not to scale)



Placing the Form Box



Placing the bottom Nesting Chamber section



Checking for level and rebar pin height



Pouring the concrete



Spreading and tamping the concrete



Leveling the top of the foundation

Day Two on Site

Checklist

Tower Parts

Top Nesting Chamber section
Tower Top with Sun Collar
Insulation panels: 10 total, 6 that are 18 1/8" wide and 48" long, and 4 that are 15" wide and 22 1/2" long
Narrow Outside Corners: 4
Wide Outside Corners: 4
16 7/8" Outside Horizontal Bottom Cleats: 4
8 metal vents that were purchased
Hardie panels: 4 @ 2' x 8'
Outside metal corner trim: 4 @ 2" x 2" x 10'
Temporary cleats for holding Hardi panels: 4 that are 3" x 17"

Tools

2 ladders: 12' extension ladder and six-foot step ladder
Cordless drill, 7/64" drill bits (2 in case one breaks) and drivers for all screws: #2 Philips, T-20 and T-25 star drive
2 @ 36" pipe or bar clamps
Hammer
Razor knife
Framing square
Pencils
Tape measure
Tins snips
Pick
Shovel
Hoe
Sledgehammer

Supplies

Screws: 1 1/4", 1 5/8", 1/2" pan headed (as specified in the Master Material List)
Wooden shims or wedges (See Amazon or Home Depot)
1 roll of exterior duct tape
Paint, can opener, stir stick
Touch up spray paint for legs
Roller, cover, pan, extension pole, paint brush
Plastic bag, water, drop cloth, trash bucket or bag for clean up
Tanglefoot insect barrier and a small putty knife for application
Ground cloth or painter's tarp

Assembly of the Nesting Chamber

STEP ONE: Remove the brace boards and stakes that were supporting the bottom section of the Nesting Chamber.

STEP TWO: This step is best accomplished with a helper or two. Lean the extension ladder securely against the bottom section on one side of the Nesting Chamber so that it does not extend above the top edge. Lean the step ladder (still folded) against the opposite side of the bottom section of the Nesting Chamber. With a helper waiting on the step ladder, place the top section of the Nesting Chamber on the extension ladder and, pushing from below, slide the top section of the Nesting Chamber up the ladder until it rests horizontally on top of the bottom section of the Nesting Chamber. With the helper, carefully stand the top section of the Nesting Chamber upright with the cleated end up and maneuver it into place so that it interlocks with the bottom section (see Figure 12). It may be necessary to tap the joint with a hammer to help it seat properly



Figure 12 - installing the top section of the Nesting Chamber

STEP THREE: Place each of the four Narrow Outside Corners on the tower corners resting on the Outside Vertical Cleats, and mark where the internal grooves are on the Nesting Chamber. Remove and pre-drill 7/64" holes between where the grooves are located – approximately 8" apart. Start a 1 1/4" screw in each of the holes. ***Do NOT use the 1 5/8" screws because they will protrude into the inside of the Nesting Chamber and cause a hazard for the birds.***

STEP FOUR: Use the pipe clamps to draw the Narrow Outside Corners up tight to the tower. Install the four Narrow Outside Corners by driving the screws home - do not overtighten. (see Figure 13).



Figure 13 - installing the Narrow Outside Corners

Installation of the Insulation Panels

Note: Install all insulation panels with the foil side facing out.

STEP ONE: Install the four smaller 15" wide insulation panels between the Outside Vertical Cleats on the bottom section of the tower using duct tape to cover all vertical edges between the insulation and the cleats. Trimming a bit with a razor knife may be necessary on some or all of the panels. Use a framing square as a guide for straight edges.

STEP TWO: Install four of the larger 18 1/8" wide insulation panels between the Narrow Outside Corners and resting on the top edge of the smaller insulation panels using duct tape to cover all vertical edges between the insulation panels and the Narrow Outside Corners.

STEP THREE: Measure the distance from the very top of the tower to the top of the installed insulation panels. Cut the remaining two large 18 1/8" insulation panels into four panels the measured length (there will be some waste) and install using duct tape to cover all vertical edges between the insulation panels and the Narrow Outside Corners.

STEP FOUR: Cover the horizontal seams between the insulation panels and the top and bottom edges with duct tape. Wrapping the horizontal duct tape around the corners of the tower will ensure that the insulation panels remain secured (see Figure 14).

Installation of the Wide Outside Corners and Creation of the Air Space And Installation of the Top with Sun Collar

STEP ONE: Install the Wide Outside Corners with 1 5/8" screws even with the bottom of the tower and overlapping the Narrow Outside Corners and the Outside Vertical Cleats and edges of the insulation panels.

Start by placing two screws approximately in the middle between the top and bottom of the tower on each corner – one on each side of each corner. Use pipe clamps to draw the corners up tight to the tower before driving the screws home. Do not overtighten.



Figure 14 - installing the Insulation Panels



Figure 15 - installing the Wide Outside Corners

Make certain the screws are going into the Narrow Outside Corners in the top 6' of the tower or the Outside Vertical Cleats in the lower 2'. Measure carefully, as the lines for these screws are different. Go all the way around the tower until there are eight screws installed.

Start additional screws approximately 24" apart, but do not drive them up tight just yet. On one side, measure the width of the outside of the Wide Outside Corners where the original tight screws are located. Move up the one side measuring where the screws are and drive the screws home in such a way that the width of the outside of the corners is the same. Use a pipe clamp to draw the corners in, as necessary. Then repeat, moving down the side of the tower checking the measurements and driving the screws home (see Figure 15).

Note: The Wide Outside Corners may extend slightly above the top of the Nesting Chamber. Do not be tempted to trim them off. They need to be the full 95 1/4" with the 3/4" thick top to accommodate the 96" tall Hardie panels.

STEP TWO: Install the 16 7/8" Outside Horizontal Bottom Cleats between the Outside Wide Corners and even with the bottom edge of the bottom of the tower (see Figure 16). Use two 1 5/8" screws in each cleat.



Figure 16 - installing the 16 7/8" Outside Horizontal Bottom Cleats

STEP THREE: Center the top and Sun Collar on top of the tower with the Sun Collar on the north side of the tower. Attach to the inside cleats on the top section with four 1 5/8" screws.

Note: The sides may vary slightly in width from one another, but each side should measure the same width from top to bottom to within 1/8". This is important because if each side of the tower is not very close to a straight line, the metal corner trim will buckle when installed.

Removal of the Form Box

STEP ONE: Remove the screws in the stakes holding the form in place and then remove the stakes.

STEP TWO: Remove the screws holding the form box together and carefully remove all of the form boards taking care not to damage the edges and corners of the foundation.

STEP THREE: Use a shovel and hoe to fill in and level the ground around the foundation.

Installation of the Outer Hardie Sheathing

STEP ONE: Install the four temporary cleats on the bottom edges of the tower with 1 5/8" screws (two in each) so that the cleats protrude an inch or so out from the bottom vents. These will create temporary shelves on which the Hardie panels will sit during installation (see Figure 17).

STEP TWO: Carefully lift a Hardie panel into place (following the protocol previously described) so that it sits on the temporary cleat and is centered on the side of the tower. Each panel may be slightly narrower than the side of the tower, but the corners will be covered later with metal trim. Attach the panel with 1 5/8" screws in the pre-drilled holes. Do not overtighten or the Hardie panel may crack, or the screw may pull through the Hardie panel.

Repeat STEP TWO for all four sides of the tower (see Figure 18).

STEP THREE: Remove the temporary cleats from the bottom of the tower.

STEP FOUR: Spread a ground cloth or painter's tarp over the foundation and around the legs of the tower. Using a paint roller and extension, paint all four sides of the tower.

STEP FIVE: Once the first coat of paint is dry, apply a second coat and remove the ground cloth / painter's tarp.



Figure 17 - installing Hardie support shelves



Figure 18 - installing Hardie panels

Installation of the Final Corner Trim and Upper Vents

Note: To make best use of the 10' metal corners, do not cut the vertical pieces to 8'. Follow these instructions carefully:

STEP ONE: While the second coat is drying, cut 25" off of each piece of the 10' metal corner trim.

STEP TWO: Pre-drill the remaining 95" long pieces of metal trim every 24" with a 7/64" bit.

STEP THREE: Install the metal corner trim on each corner with 5/8" sheet metal screws, **with the bottom of the metal trim even with the bottom of the tower.** They will fall short of the top of the tower, but the top trim will cover the gap.

STEP FOUR: Install the 25" pieces on the outside top edges of the tower over the vertical metal corners – some trimming will probably be required. Pre-drill and attach with 1/2" sheet metal screws.

STEP FIVE: Center the soffit vents over the vent holes in the top side of the Hardie, mark and pre-drill the holes with a 7/64" bit and attach with 1/2" metal screws (see Figure 19). Repeat for the bottom vents.



Figure 19 - installing Soffit Vents

Predator-proofing the Tower

If any material was used for the exterior sheathing other than smooth Hardie soffit, a metal predator guard will need to be installed around the top 24" of the tower. Otherwise, predators may climb the tower and gain access to the birds inside.

Finally, a narrow band of Tanglefoot insect pest barrier will need to be applied around the legs of the tower just below the bottom of the Nesting Chamber. This will prevent ants from being able to enter the Nesting Chamber. The Tanglefoot will need to be replaced each year just before the birds return in migration (see Figure 20).

Tower Maintenance

The tower and swifts should be left alone during the nesting season: no maintenance needed.

Prior to the swifts' return in the spring, the bottom of the tower should be removed, any detritus cleaned out, and the vent holes cleaned. The old nest may be removed at this time, but it is not essential to do so. Once the tower bottom is replaced, the old and dried out Tanglefoot pest barrier should be scraped off and replaced with a thin coat of fresh Tanglefoot.



Figure 20 - installing Tanglefoot insect barrier

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Mated pair of Chimney Swifts over Travis Audubon's Chaetura Canyon Sanctuary

For more information on Chimney Swift conservation, please visit:

www.ChimneySwifts.org

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