

**649 - Structure for Wildlife Implementation Requirements**

**Client:** \_\_\_\_\_ **Planned Date:** \_\_\_\_\_  
**Location:** \_\_\_\_\_ **County:** \_\_\_\_\_ **Contract No. :** \_\_\_\_\_  
**Tract/Field or Site ID:** \_\_\_\_\_

**Practice Purpose:** To provide structures, in proper amounts, locations and seasons to enhance or sustain non-domesticated wildlife, or to modify existing structures that pose a hazard to wildlife.

**I. Goals and Objectives**

Client's Goals and Objectives:

This practice provides structure(s) to:

- provide needed habitat for a targeted species, group or guild *and/or*
- modify existing structures that pose a hazard to wildlife.

Description of the Need for the Structure(s):

*The biological and physical need is based on a habitat evaluation or assessment. Structural habitat components (i.e. nest boxes, rock piles, perches etc.) are only planned where vegetation management fails to meet the short-term needs of the wildlife under consideration, and where the habitat evaluation has identified the need for them.*

- Evaluation/Assessment Used: \_\_\_\_\_ Score: (before) \_\_\_\_\_ (after) \_\_\_\_\_

II. Planned Structures for Wildlife	Extent	Implementation Date or Timeframe

Specifications: The attached design(s) provide the requirements for construction and installation.

Location: The exact location of each structure is identified on the conservation plan map.

Additional Guidance or Requirements:

**III. Operation & Maintenance (O&M) Plan**

Operation and maintenance activities shall be carried out to ensure that this practice functions as intended throughout its expected lifespan of 5 years.

The attached design guide(s) provide the operation and maintenance requirements specific to the planned structures. Provided below are general requirements that are applicable to all structures:

- Periodically (at least annually) check the structures to ensure they are functioning as intended.
- Conduct activities when it will have the least amount of disturbance to wildlife.
- Implement adaptive management by relocating, modifying or repairing structures as needed.
- Remove structures if they may be potentially detrimental to targeted or non-targeted wildlife.



Contract Item Number(s): \_\_\_\_\_ Total Number of Ramps to be Installed: \_\_\_\_\_

**Material Criteria**

Escape ramps shall be constructed of graspable<sup>11</sup>, long-lasting materials, such as: expanded metal, roughened fiberglass, sand-embedded composite, roughened concrete, or rock-and-mortar.

<sup>11</sup> Graspable for small wildlife (i.e. bats, songbirds) so they can easily climb the ramp. Avoid smooth ramp surfaces or footholds that are more than 0.75 inch apart.

**Design Criteria**

- Ramps must be designed so that wildlife swimming the tank edge (in either direction) will make contact with a ramp. A multi-directional ramp is required.
- The design must prevent wildlife from missing the ramp (by swimming underneath or around it).
- Ramps must have a 45 degree slope or less ( $\leq 45^\circ$ ).
- The ramp must extend from the tank rim to the tank bottom (allowing escape at any water level).
- Allow the ramp to be securely attached to the tank.

Ramps constructed of expanded metal are an effective and practical approach to meet this criteria. Provided below is construction guidance for these ramps. However, alternative or fabricated ramps may be used if they meet the criteria provided above.

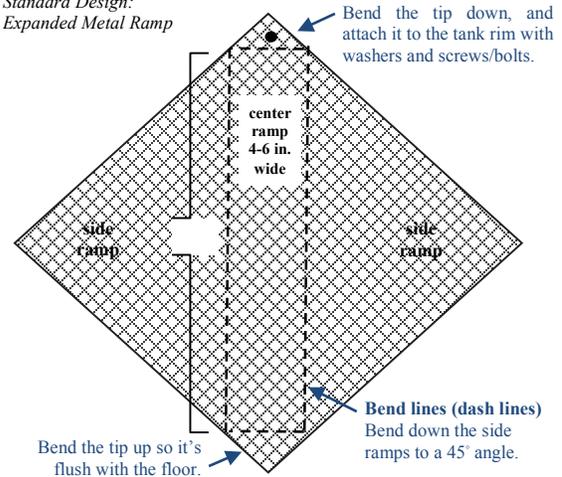
**Ramp Size and Quantity Criteria**

There must be at least one ramp for every 30 linear feet of tank edge (recommended at every 15 feet).

Tank #: \_\_\_\_\_  
 Tank Edge (ft.): \_\_\_\_\_ Depth (in.): \_\_\_\_\_  
(diameter x 3.14) or (L x W)  
 Min. Ramp Size (in.): \_\_\_\_\_ (rim to floor at a 45° slope)  
 Installed every 30 ft. = \_\_\_\_\_ ramps (*minimum*)  
 Installed every 15 ft. = \_\_\_\_\_ ramps (*recommended*)

Standard Design:

Expanded Metal Ramp



**Suggested Technique to Make Escape Ramps**

**MATERIALS**

1. 10-14 gauge expanded metal with 1/2 to 3/4 inch openings  
*(Recommend is 13 gauge, flattened with 1/2" openings)*
2. Rust-Proof Paint (non-toxic)
3. Washers & self-tapping metal screws (for installation)

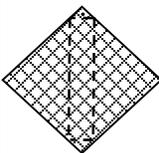
**TOOLS**

- Heavy mallet or light sledgehammer,
- If metal is not pre-cut, grinder and suitable cutting tool,
- Tape Measure, (2) 2x6 Boards, Clamps, Sawhorse, and
- Safety Equipment.

**CONSTRUCTION**

Step 1. If metal is not pre-cut, cut the metal to the design dimensions and grind the sharp edges.

Step 2. Bend the side ramps to 45 degrees. Use two 2x6 clamped boards (as shown here) to make bends easier. Use a hammer or mallet to finalize the bends.



Step 3. To reduce deterioration of the material, coat the ramp with rust-proof, non-toxic paint.

**Installation**

The ramp must be securely attached to the tank, making contact with the tank sides (from the top to the bottom).

**Operation and Maintenance (O&M)**

- Maintain the tanks full of water. If this is not an option, then take the "full or dry" approach; avoid half-full troughs that are attractive traps for wildlife.
- Periodically (at least annually) check the ramps to ensure they are functioning as intended by:
  - clearing any debris from the ramp (such as leaves, twigs and algae), and
  - ensuring the ramps are securely attached and flush along the sides of the tank (no gaps).
- Repair or replace any damaged ramps.
- Contact NRCS if there is evidence of wildlife mortality or injury.

**References**

USDA, Natural Resources Conservation Service. 2015. [Wildlife Escape Ramps for Watering Facilities & Open Storage Tanks](#). Biology Technical Note, No. 43. Colorado.

Contract Item Number(s): \_\_\_\_\_ Total Length of Fence to be Marked (ft.): \_\_\_\_\_

**Marker Material Criteria**

- Markers must not add significant weight or wind resistance to fences, or have the potential to cause wear to the wire.
- Not be harmful to livestock or wildlife.
- Must be durable enough to last for five years.
- Must provide contrast with the surrounding landscape.

Site Specific Contrast Needs:

- Use reflective material: white/silver.
- Use white/dark alternating markers.

Markers constructed of white vinyl undersill are an effective and practical approach to meet this criteria. Provided below is construction guidance for these markers. However, alternative or fabricated markers may be used if they meet the criteria provided above.

**Suggested Technique to Make Vinyl Fence Markers**

**MATERIALS**

1. Vinyl "undersill" Trim, White.  
*Trim is manufactured for house siding and sold at most home improvement stores (12 ft. section yields 48 markers).*
2. Reflective or Dark Tape (if needed). All-weather foil.

**TOOLS**

- Miter Saw & Fine-Toothed Blade and/or Tin Snips,
- Tape Measure,
- Scissors (if using reflective tape), and
- Safety Equipment

**CONSTRUCTION**

Step 1. If using reflective tape, apply the tape to the uncut sections of undersill; to the flat side. Or, if using a wider tape (2-3" wide) apply it so that it wraps over the top and down the flat side.

Step 2. Cut the undersill into 3-inch sections or to a length that will fit in-between the barbs on the wire (older fences may have less space between barbs).

If using a miter saw, use a fine-toothed blade (200 teeth) or a vinyl siding blade to reduce splintering. Multiple sections of undersill can be stacked and cut at once (see image).

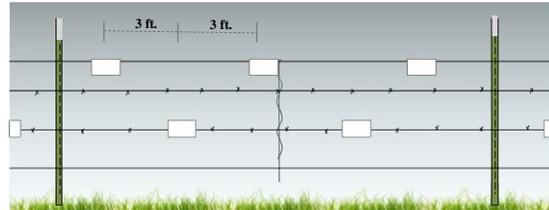


Caution: Follow manufacturer's guidelines for safety when operating power equipment

**Marker Placement Criteria**

- Markers will be placed approx. 6 feet apart on the top and on the third wire; in an alternating pattern, **or**
- Markers will be placed approximately 3 feet apart on the top wire.

Example: On a 20' post spacing there may be 3 markers on the top wire and 2 markers on the 3rd wire down.



**Fences to be Marked**

Fence lines planned to be marked are identified on the conservation plan map or as specified below:



Approximate Number of Markers Needed:

Fence length (ft) \_\_\_\_\_ ÷ 3 = \_\_\_\_\_ markers

**Installation**

Markers quickly snap into place on the wire. Placement generally takes 1-2 hrs. per mile.



Note: If installing markers on a smooth wire, use an exterior grade glue to keep them in place. Else they may slide along the wire which can make them ineffective.

When using reflective markers, ensure that the reflective side alternates so that both sides of the fence have reflective marking.

**Operation and Maintenance (O&M)**

- Periodically (at least annually) check the fences and replace any damaged or missing markers.
- Contact NRCS if there is evidence of wildlife collisions or entanglement.

**References**

USDA, Natural Resources Conservation Service. 2015. [Fence Visual Markers to Reduce Wildlife Collisions or Entanglement](#). Range Technical Note, No. 39. Colorado.

**Material Criteria**

Wooden nest blocks shall be constructed from preservative-free lumber.

*Do not use pressure treated wood or wood containing chemical, pesticide, fungicide or biocide. Cedar or Redwood is recommend.*

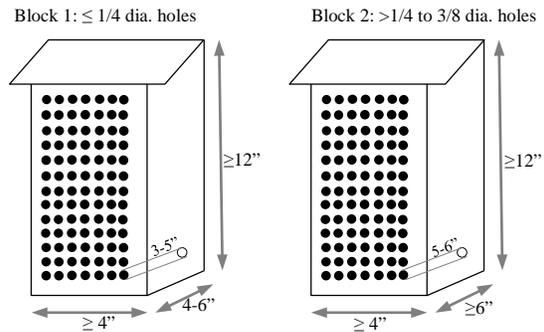
**Design Criteria**

Nest blocks must have a variety of tunnel hole sizes and depths. This is necessary to attract a variety of native bees that are active throughout the year. It is recommended to have one hole size per nesting box, therefore:

- There shall be at least two (2) nest boxes per site.
  1. One block will have a series of holes  $\leq 1/4$  inch in diameter and 3 to 5 inches deep (less than 3 inch deep is acceptable, it's just less desirable).
  2. The other will have a series of holes  $> 1/4$  to  $3/8$  inch in diameter and 5 to 6 inches deep.

In addition,

- Nest blocks will be at least 12 inches long.
- Tunnels must only be open on one end.
- Tunnels must be spaced at least  $3/4$  inch from each other (measuring from the center of each hole) and no closer than  $3/4$  inch from the block's edges.
- Tunnels must not have a rough interior.
- The nest box must have an overhanging roof to provide additional shelter to the tunnel entrances.



**Location**

Colonization by native bees is most successful when blocks are attached to a large visible landmark (such as a building), rather than hanging from fence posts or trees.

**Installation**

- Nesting blocks must be securely attached so that they do not move or shake in the wind.
- Install the blocks at least few feet above ground level ( $> 3$  ft.) to avoid rain splash and vegetation growth.
- No not install where the tunnel entrances will receive direct sunlight during the hottest parts of the day. But do try to place them so direct morning sunlight will reach the tunnel entrances (generally east/south east).

**Operation and Maintenance (O&M)**

One of two approaches for nest block sanitation must be used to minimize or avoid parasites or diseases:

- Use Tunnel Liners.** Line the holes with tight-fitting removable paper "straws". Commercial products are available or they can be made from rolling parchment, newspaper or wax paper. See figure 2 for examples.
  - Use a pencil or dowel to help roll the liners.
  - The outer tip may be painted black to help attract bees.

In late autumn, *gently* remove the liners; they should still have bees in them. Store the liners in a well ventilated container placed in an unheated building (i.e. garage or barn). Then, disinfect the blocks by submerging them in a weak bleach solution (1:2 ratio) for 5 minutes.

In early spring, re-install the blocks and line the holes with new, unused liners. The old liners (with bees still in them) should be placed alongside the blocks in a protected area (such as under the block's overhanging roof); to allow bees to naturally emerge.



Fig. 1

- Replace Nest Boxes Every 2 Years.** In order to replace a nesting block (for any reason) it must be phased-out of nesting production. This allows any occupying bees a chance to naturally emerge, while preventing any new nesting. *(cont. on next page)*

**Suggested Technique to Make Wooden Nest Blocks**

**MATERIALS**

1. 4x4" and/or 4x6" preservative free lumber
2. 1x4 and/or 1x6" preservative free lumber
3. wood screws

**TOOLS**

- Drill with sharp drill bits  
*Sharp drill bits help to ensure the tunnel holes are smooth.*
- Saw
- Tape measure, Safety Equipment, etc.

**CONSTRUCTION**

Step 1. Cut the lumber to the desired nest block size.

Step 2. Drill the holes that will become the nesting tunnels; using the size and spacing criteria provided above. Drill perpendicular to the wood's grain for smoother holes.

- Attach a backboard if you drill through the block, because bees will not use tunnels that are open on each end.
- Small bits may not be able to achieve the desired 3 in. depth; just drill as deep as possible.

Step 3. Cut and attach the overhanging roof. It should overhang the block's tunnel entrances by at least by 1 inch.

Step 4 (Optional). The block's exterior can be darkened by lightly charring the surface with a propane torch (Fig. 3). It may also be painted, just avoid paint or stain with harsh fumes.

**CONTINUATION**

**Replace Nest Boxes Every 2 Years (cont.)**

Place the nesting block inside a dark (light eliminating) container which has a single 3/8 inch exit hole at the bottom. Then hang this container near the replacement (new, unused) nesting block.

*As bees emerge from the old nesting block, they will be attracted to the light of the exit hole and should start using the new nesting block.*

To ensure all bees have had time to emerge, leave the old nesting block and its container in-place for a full year.

Afterwards, the old nesting block may be re-used if the holes are re-drilled (to loosen any debris) and then disinfected by submerging it in a weak bleach solution (1:2 ratio) for 5 minutes.

**Additional Guidance**

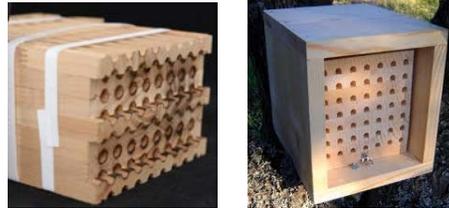
Fig 2. - Examples of tunnel liners



Fig 3. - Occupied Tunnels



Fig 4. - Examples of Other Designs that Meet Criteria



**References**

Mader, E. et al. 2009. [Tunnel Nests for Native Bees, Nest Construction and Management](#). 6 pp. Portland: The Xerces Society for Invertebrate Conservation. Available at: <http://www.xerces.org/>.