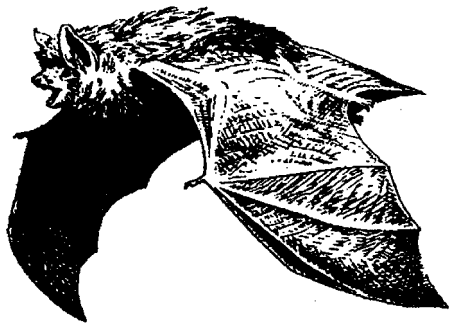
PENNSYLVANIA GAME COMMISSION

2001 Elmerton Avenue, Harrisburg, PA 17110-9797

Bureau of Wildlife Management



Wildlife Diversity Section

Bat Condo Directions

By

Cal Butchkoski
and
Jerry Hassinger

May 15, 1997
(rev. 08/98)

PA GAME COMMISSION BAT CONDO

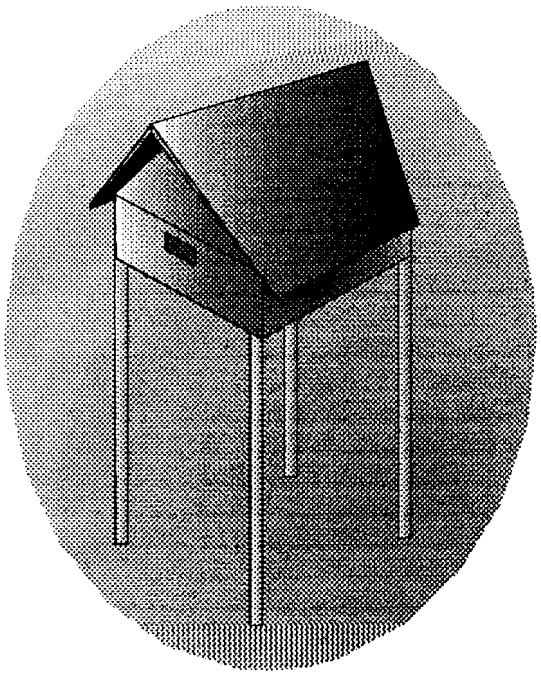
INTRODUCTION

The Bat Condo is a large bat house designed for use by little brown bat maternity colonies. Potentially, this roost could house more than 6,000 mother bats and their young. The condo, measuring 8' x 8' (wide) x 8 1/2' (bottom to peak), is elevated with the bottom at least 8' above the ground.

A prototype of the Bat Condo has been constructed at Canoe Creek State Park, Blair County, Pennsylvania. It is used by bats from spring through early autumn. The purpose of this prototype is to serve as an "insurance policy" in the event a nearby (within 500 meters) maternity site, an old church housing over 10,000 bats, is destroyed.

The Wildlife Diversity section of the Pennsylvania Game Commission is pursuing a course of community bat management. The problem is that when bats are excluded from someone's house, they are forced to seek refuge elsewhere. We'd prefer this refuge to be the Bat Condo rather than another house.

The dual purposes of community bat management are (1) to save bats in numbers sufficient to suppress local insect pest populations, and (2) to reduce nuisance problems associated with the eviction or exclusion of maternity colonies of bats from houses.



PA GAME COMMISSION

Bureau of Wildlife Management
Wildlife Diversity Section

Bat Condo Directions

(Directions are to be used with numbered sketches)

SKETCH #

PAGE 1A&1B: This design provides for 3/4" roosting crevices created using 1/4" plywood. Yellow pine plywood (AC or BC) is recommended. Avoid using luan plywood, it does not hold up well.

All lumber dimensions are finished lumber sizes. For example, a 2"x6"x8' actually measures 1 1/2"x 5 1/2" x 8'.

ALL INTERIOR SURFACES MUST BE ROUGHENED. This is probably the most labor intensive part of the project. It is usually easier to roughen plywood sheets before cutting using a board with many multipurpose screws screwed through, using the sharp protruding points to roughen the wood. It looks like a very nasty paddle.

An interior flyway is incorporated to provide exercise space for young bats. Extended roof overhangs are designed to provide overhead protection from predators while exiting. The black roof aids in solar warming during cool spring days. The fly-in entrance provides a land free entrance as well as ventilation for lower portion of roost. Rough exterior walls allow for easy landing to access entrance crevices. A closed bottom (with doors) minimizes cold spring breezes from robbing heat from the roost, and discourages vandalism.

The roost should be:
*Erected with bottom at least 8 feet off the ground.
*Placed in open area receiving at least 10 hours of direct sun.
*Placed within 1/4 mile of water (stream, lake, etc.)
*Located within 10-30 yards of cover (forest or treeline) for protection after exiting. Bats are vulnerable to predation when exiting roost.
*Located in good foraging habitat containing forests, clearings, and wetlands with abundant insect activity.

The roost should <u>not</u> be:
*Erected in shaded location.
*Located near burn barrels where smoke will disturb bats.
*Erected where roost is prone to vandalism.
*Erected within 30 yards of busy highways. Bats swarm the roosts during the dawn return and are vulnerable to automobile traffic.
*Placed in brightly lighted areas.
*Erected on exposed hilltops or other windswept areas.

PAGE 2: A site layout should plan for one of the sides to be oriented to the southeast. An aspect of 130 to 140 degrees is preferred. At these aspects, the spring time sun is high enough to really start warming the roost. Foundations should be good and solid, especially if the roost is located in a wet area that may flood.

PAGE 3A,B&C: When framing the lower section of the bat roost, one of the SIDE VIEW details (page 3B) should be oriented to the southeast. These two views will have a flat roof plane. Optional homemade hangers for 6"x6" sills can be made with 5"x 3/8" mild steel angle. Pay attention to their different orientation in the side & end view on page 3C.

PA GAME COMMISSION BAT CONDO DIRECTIONS

SKETCH #

PAGE 4A&B: Before erecting siding, the interior side must be roughened. If not using the rough exterior T-111 siding, the exterior must also be roughened. Cut fly-in entrances on two end sheets and crevice entrances on side sheets. The corner joints can be caulked with brown latex caulk or trim boards can be installed. The top dimensions on page 4B refer to bat crevice lengths. These 1/2" wide slits are basically cut to avoid interior 2x4 framing.

PAGE 5: After the 5 roof trusses are assembled, they should be roughened for bat roosting. A 3/4" hole should also be drilled in the peak. This hole will be useful to attach a sling and pulley to use with a longer rope in lifting roost baffles into place.

PAGE 6: If you're not into carpentry, these roof extensions will be a "real joy" to make. Two matching pairs are needed. Pay close attention to the compound angles on front (long) 2x4 and the central (peak) 2x4s.

PAGE 7A&B: Start by placing the roof trusses into the spaces between short 2x4s made as part of lower framing (page 3A top view and 3B side view). Once two are in place, make them plum and nail scrap lumber or 2x4s between them to hold them in place. Of course they should also be nailed to the lower framing. Once all trusses are in place, install roof extensions one section at a time, attach to each other and the end roof trusses. Its best to use 3" wood or deck screws for attachment. It is also helpful to have four C-Clamps to hold them in place. Install the 2"x6"x 8' fascia planks to the ends of the roof trusses. Use 3" wood screws for this installation (predrill if necessary).

PAGE 8A,B&C: Nail plywood sheeting to roof using 3 sheets per side, staggering the seams. Apply felt paper and drip edging around edges and then shingle the roof. If installing experimental parasite traps (page 8C), install them before applying felt paper. Scaffolding and roof jacks are necessary items for this roof work. Rent them if necessary.

Attach T-111 siding to peak ends. A 4" trim board is needed to trim the gap between the lower and upper (peak) siding on ends. The top edge of this board should be caulked with brown latex caulking.

Install 1/2" plywood soffit on the underside of roof overhangs on sides. Roughen the interior surface first. Be sure to leave a 1/2" to 3/4" space between the soffit and the fascia plank for a bat exit. **This crevice has been found to be a preferred exit route.**

Inspect inside of upper half of the roost for any cracks or gaps. Caulk any gaps found. The upper half (peak) of the roost must be airtight to hold heat during cool spring days.

PAGE 9: Attach 2x4s around inside edges of roost bottom. Recess them 1/2" up so that 1/2" plywood doors close flush with the bottom. Install four doors with hinges. Hasps with locks may be necessary depending on location. Use 2x4s as base for screwing doors shut with two or three 1 1/4" deck screws per side. This is a convenient way of securing the doors since they will only be opened once or twice a year.

PA GAME COMMISSION BAT CONDO DIRECTIONS

SKETCH #

PAGE 10: The roost baffle bundles are made to fit between the roof trusses and framing. The triangular shaped baffles are for the upper sections, and the rectangular pieces are for the lower roost areas. Eight bundles go above and eight go below. Nineteen to twenty-two 1/4" plywood baffles per bundle are needed. Spacer length variability will decide on the number of baffles per bundle. Also, end bundles will be thinner than middle bundles due to different dimensions between roof trusses. Measurements should be taken between trusses before bundles are assembled since slight variations may occur. Notice the two-inch notch cut out of four of the lower roost bundles to accommodate the four corner posts.

3/4" Dia. Schedule 40 PVC pipe is used as the spacers in the bundles. The pieces of pipe are cut to 3/4" lengths to create 3/4" roosting crevices between the plywood. These are used with four 3/8" threaded rods per bundle. It takes a lot of the little pieces of pipe and is best to precut during a cold winter day using a band saw.

The 3/8" threaded rod should be cut 1/4" shorter than the dimension between the roof trusses the bundle is to fit between. This is especially sensitive for the upper roost baffles and less so for the lower.

All apartment bundles do not have to be put in at once. You may only want to put half in and wait to do more the next year.

PAGE11A&B: If Optional parasite traps have been installed on roof, screen inside access to traps using 1/4 inch hardware cloth to restrict bat access to the trap.

Apply two foot wide fiberglass window screening to inside of roof peak. Use a staple gun with many 3/8" staples to make it secure. Screening should extend one foot on either side of roof peak.

Insert the baffles in side walls. Baffles in side walls can be made of many extra pieces of plywood with several horizontal cracks in each baffle. This provides many options for bat travel after entering through side entrance crevices. Do not run these baffles against the top 2x4, leave at least a 1/2 inch gap.

Inspect and roughen all interior walls, posts, framing etc.

With the help of several people, use sling, pulley and rope, lift upper roost apartment bundles into place, pushing pointed side into roof overhang. Use premeasured 2x4 to secure bundle by screwing the 2x4 ends to the roof trusses. If bottom of a roost bundle is not flat and wobbles, wedge scrap 2x4s and shims between sides of roost bundle and trusses. Secure with deck screws.

Install PEAK BAFFLE SPACERS (page 11B) for baffles that extend to roof peak. Insert premeasured peak roost panels and secure with screws at bottom.

Install four 2"x 6"x 8' planks on ends to support lower roost bundles.

With assistance, lift lower roost apartment bundles into place.

Insert two 1"x 8"x 8' roughened and/or screened boards for bat landing plates, against lower roost baffles. Secure these boards to end walls of structure.

Close the bottom doors, stain the exterior a dark brown color and you're finished.
Nothing to it !!!

BAT CONDO MATERIAL LIST (3 pages)

ITEM	NUMBER	UNIT COST	TOTAL COST
FOOTERS			
1/2" Rebar (#4)	160 FT		
1" Stand-off Column Bases (Simpson CBS66)*	4		
Class "A" Concrete (Cubic Yard)	1.3		
LOWER FRAMING			
6"x6"x12' #2 Yellow Pine, P.T. Posts	4		
6"x6"x8' #2 Yellow Pine, P.T. POSTS (sills)	4		
4"x6"x8' #2 Yellow Pine, P.T. POST (spanner)	1		
6"x6" Concealed Flange Face Mount Hangers (Simpson HUC66)*	8		
4"x6" Face Mount Hangers (Simpson U46)*	2		
2" x 4" x 8' Lumber	21		
5/8"x 6 1/2" Grade 5 Bolts,Nuts & Washers	8		
10d Common Coated Sinker Nails	5 LB		
Optional Hangers (see page 3C of Sketches)			
3/8"x5"x5" mild steel angle, 5"Long	*8*		
3/8"x5"x 5" mild steel angle, 3 1/2"Long	*2*		
3/8"x3" lag bolts	*48*		
SIDING			
T-111 Siding, 4'x8' sheets	6		
1 5/8" Galvanized Deck Screws	5 LB		
ROOF TRUSSES			
2"x6"x8' Lumber	20		
6"x 6" Nailplates	60		
Truss Nails	5 LB		

BAT CONDO MATERIAL LIST (3 pages)

ITEM	NUMBER	UNIT COST	TOTAL COST
ROOF EXTENSION			
2" x 4" x 8' Lumber	7		
2" x 4" x 10' Lumber	4		
3" Galvanized Deck Screws	3 LB		
ROOFING & TRIM			
2" x 6" x 8' Lumber (fascia for truss edges)	2		
1/2"x 4' x 8' Exterior Plywood for roof sheeting, soffit & doors	9		
30 lb Felt Paper (roof underlayment)	1 Roll		
Brown Drip Edging, 10 ft. long	6		
Black Fiberglass Shingles	2 Squares		
7/8" Roofing Nails	8 LB		
5" Strap Hinges	8		
4d, 1 1/2" Coated Ring Drywall Nails (Sheeting)	5 LB		
1"x4"x10' End Trim Board	2		
BROWN STAIN	3 Gallon		
Brown Latex Caulk	5 Tubes		
Roofing Cement (for Optional Parasite Traps)	2 Tubes		
Snap-off Blade Roofing Knife	2		

BAT CONDO MATERIAL LIST (3 pages)

ITEM	NUMBER	UNIT COST	TOTAL COST
ROOST BAFFLES			
3/8" Threaded Steel Rod	130 FT		
3/8" Nuts with Washers	130		
3/4" Dia. Sch.40 PVC Pipe			
cut in 3/4" lengths as baffle spacers	120 FT		
1/4" x 4' x 8' Plywood (Yellow pine, AC or BC)			
total # may vary somewhat	86		
1" x 8" x 8' Board (interior landing plate)	2		
2" x 6" x 8' Lumber (lower baffle supports)	4		
2" x 4" x 8' Lumber (upper baffle supports)	2		
2' Wide Fiberglass Window Screening			
attached with staple gun & 3/8"staples	30 FT		
1" X 3/4" X 2' wooden baffle spacer strips (walls)	48		
1 1/4" Multipurpose (Drywall) Screws	3 LB		
2"x4"x8' (to cut 16 Peak Baffle Spacers out of)			
See Sketches Page 11B	1		
Bundle of Wood Shims	1		
*Simpson Strong-Tie Company Inc.			
1-800/999-5099			

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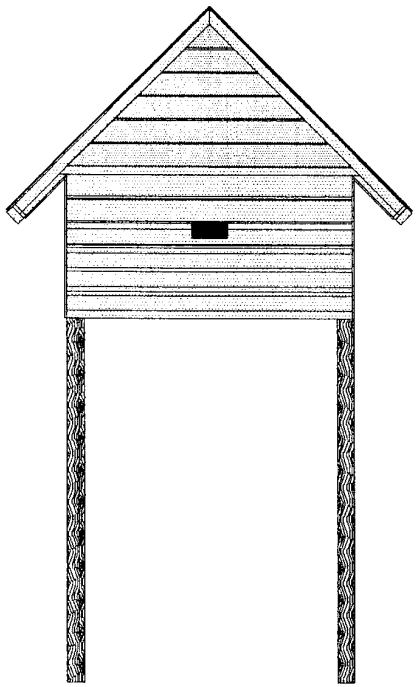
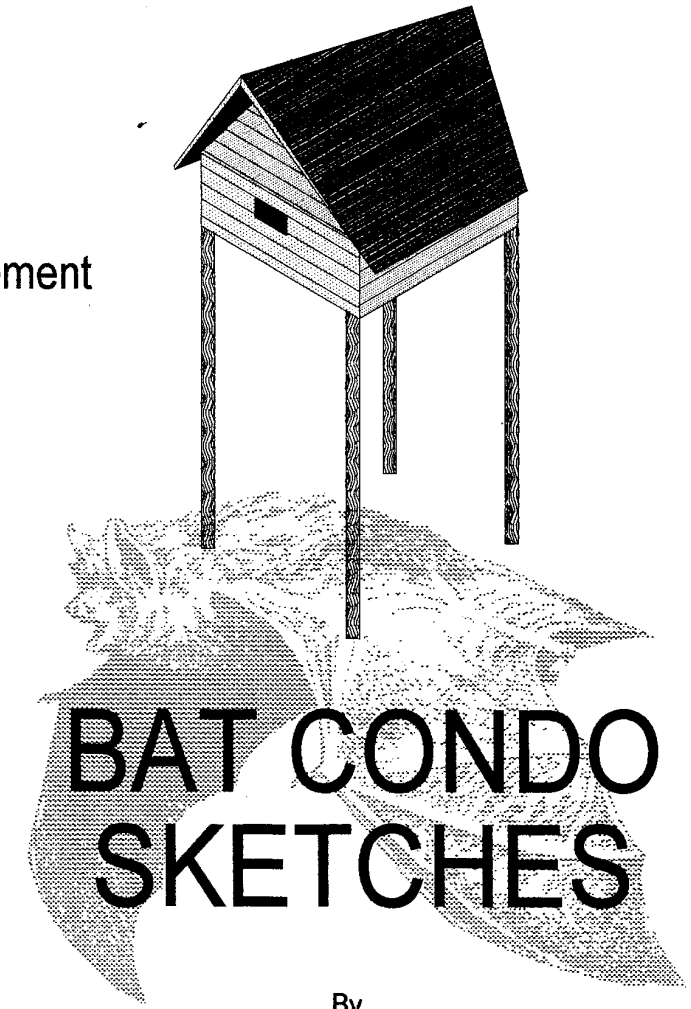
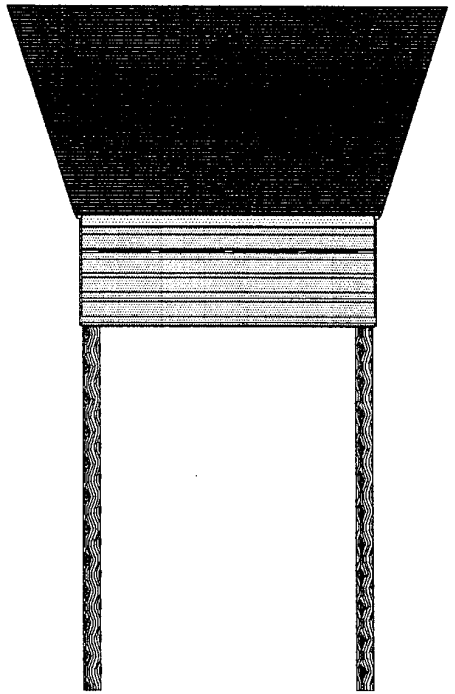




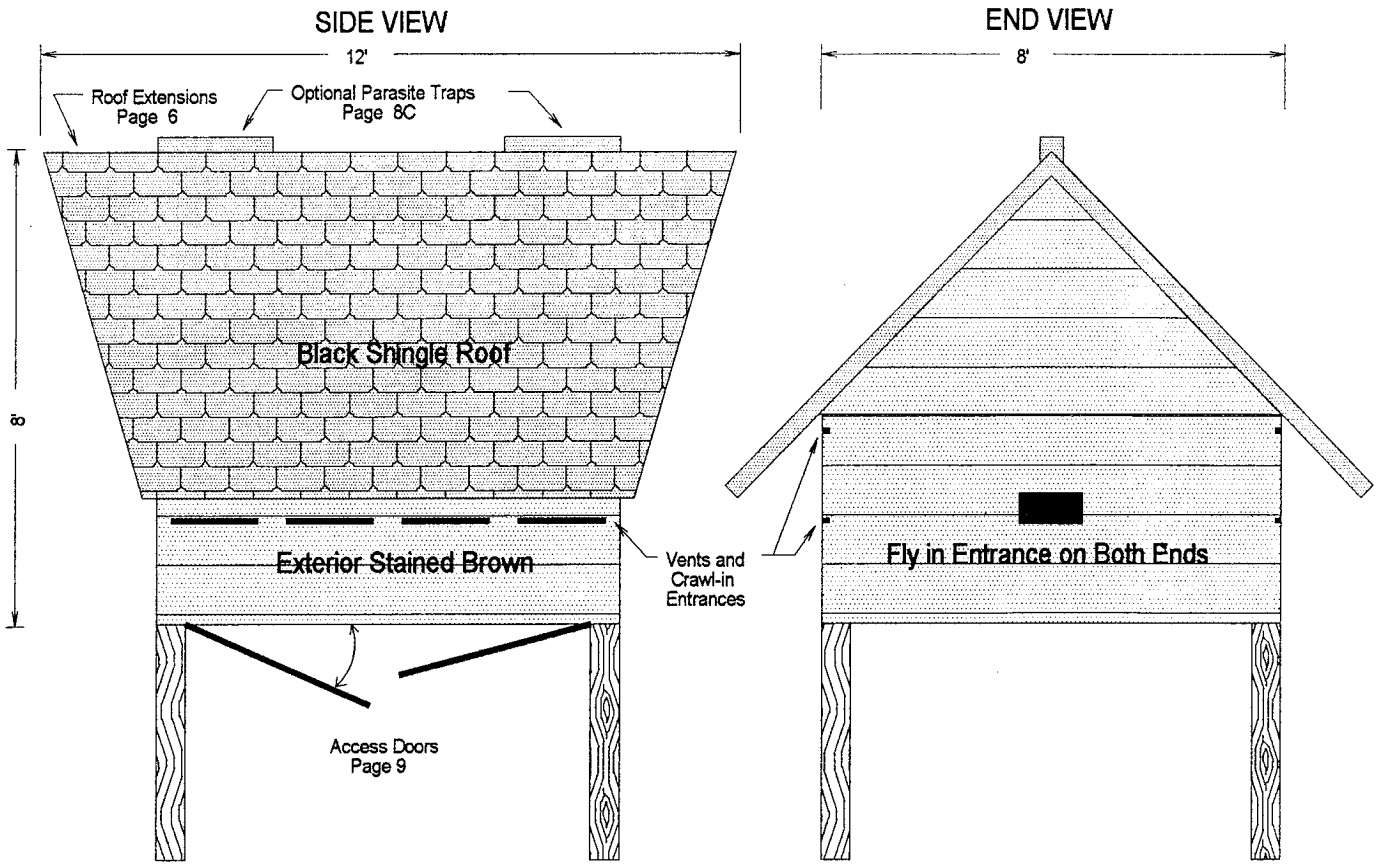


BAT CONDO SKETCHES

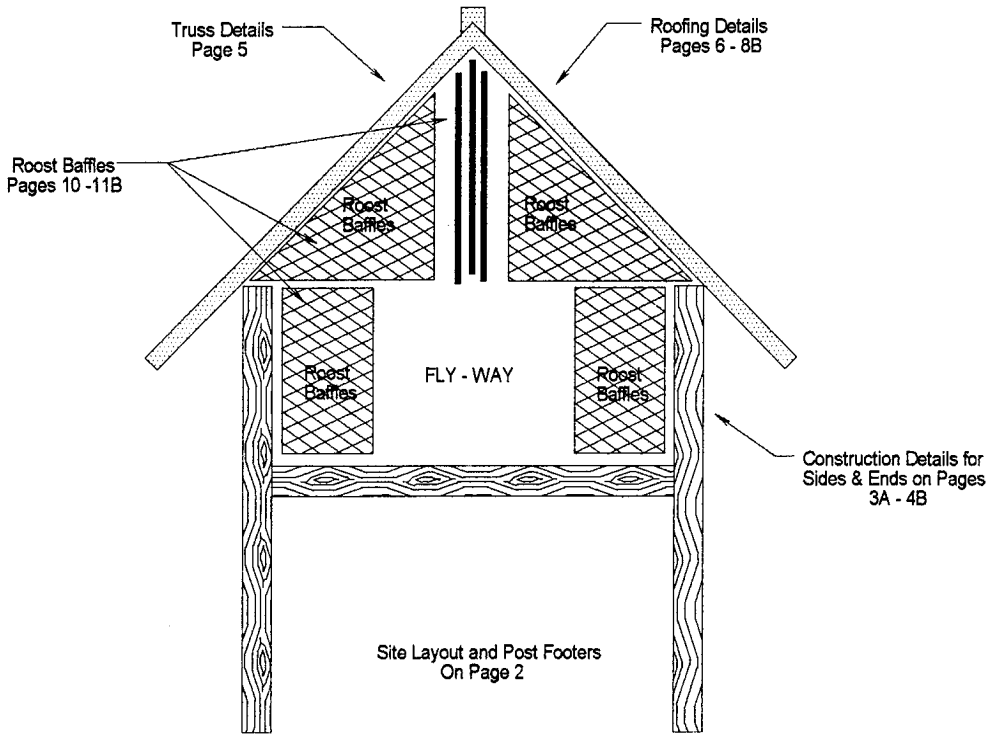
By
Cal Butchkoski
and
Jerry Hassinger

May 15, 1997
(rev. 08/98)

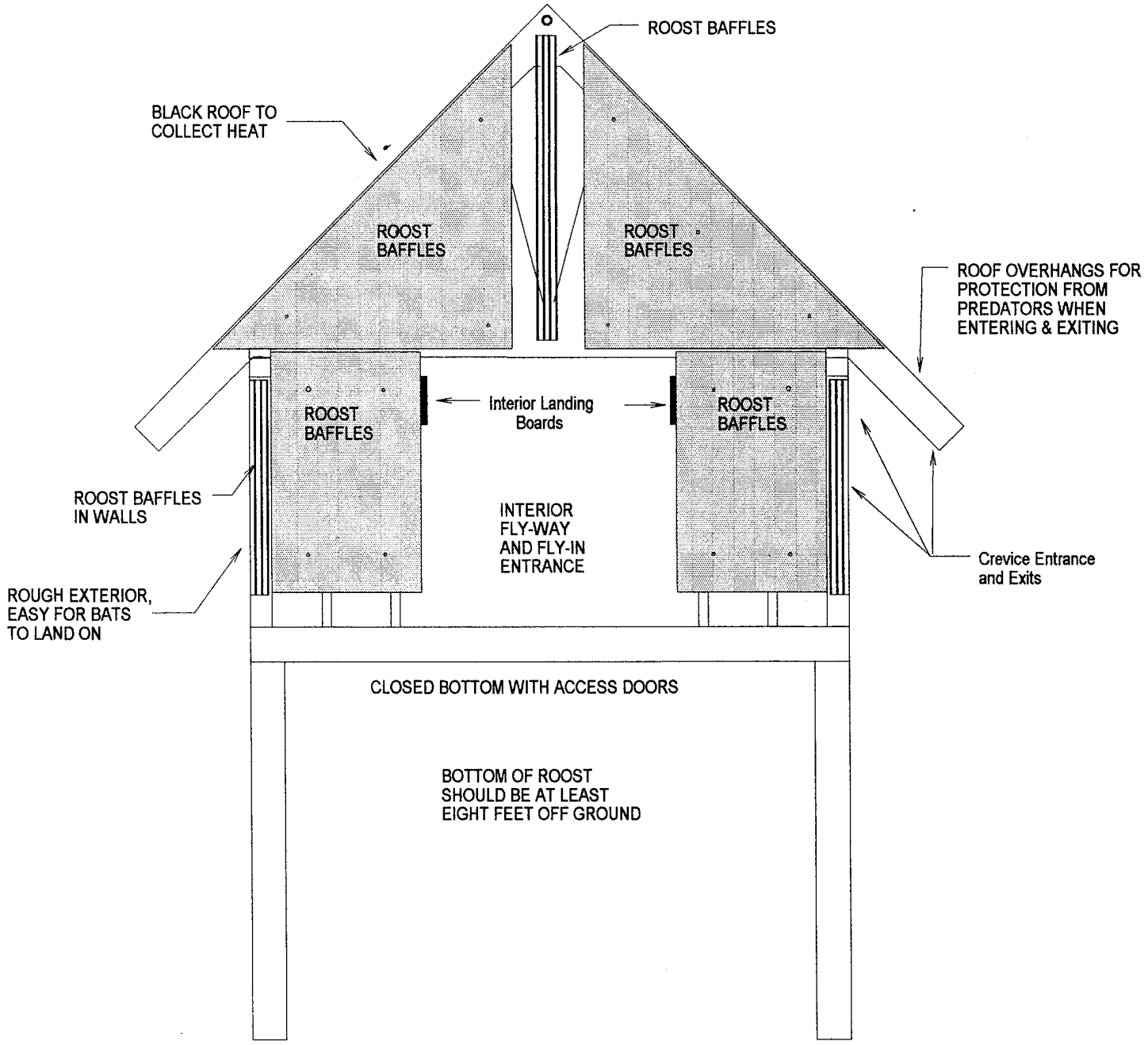
PA GAME COMMISSION BAT CONDO
BASIC DESIGN



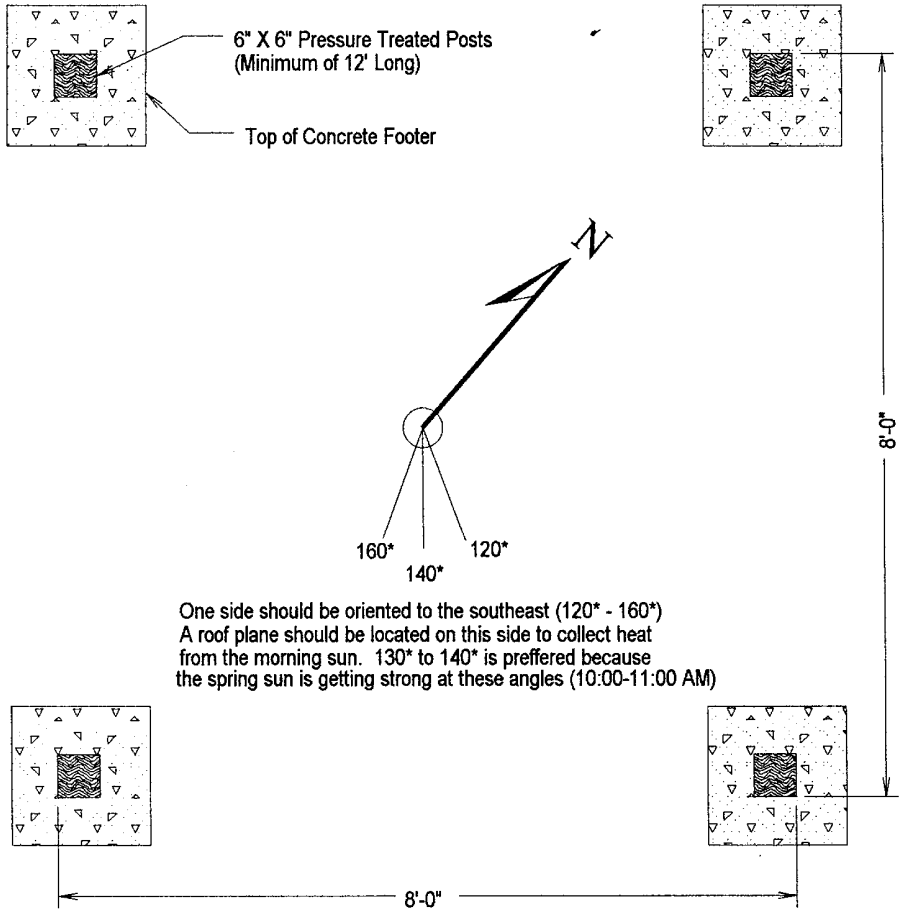
END VIEW
(Cutaway)



BAT CONDO HIGHLIGHTS
(Cutaway view of END)

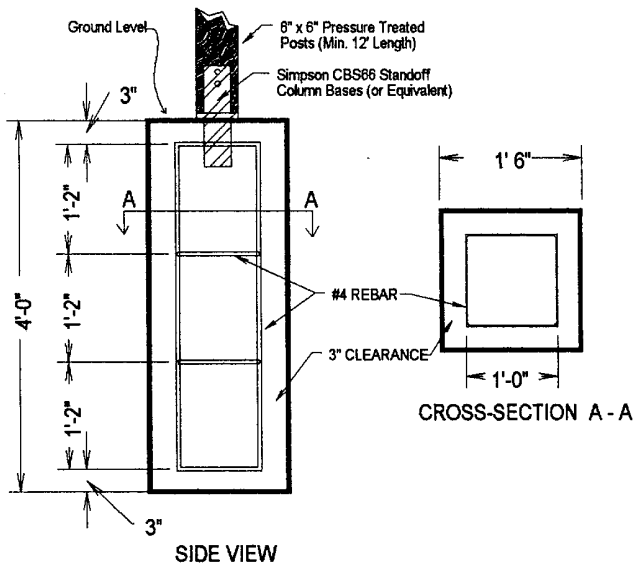


TOP VIEW OF POST AND FOOTER LAYOUT



One side should be oriented to the southeast (120* - 160*)
A roof plane should be located on this side to collect heat
from the morning sun. 130* to 140* is preffered because
the spring sun is getting strong at these angles (10:00-11:00 AM)

POST FOOTERS (4) AND STEEL REINFORCING DETAILS

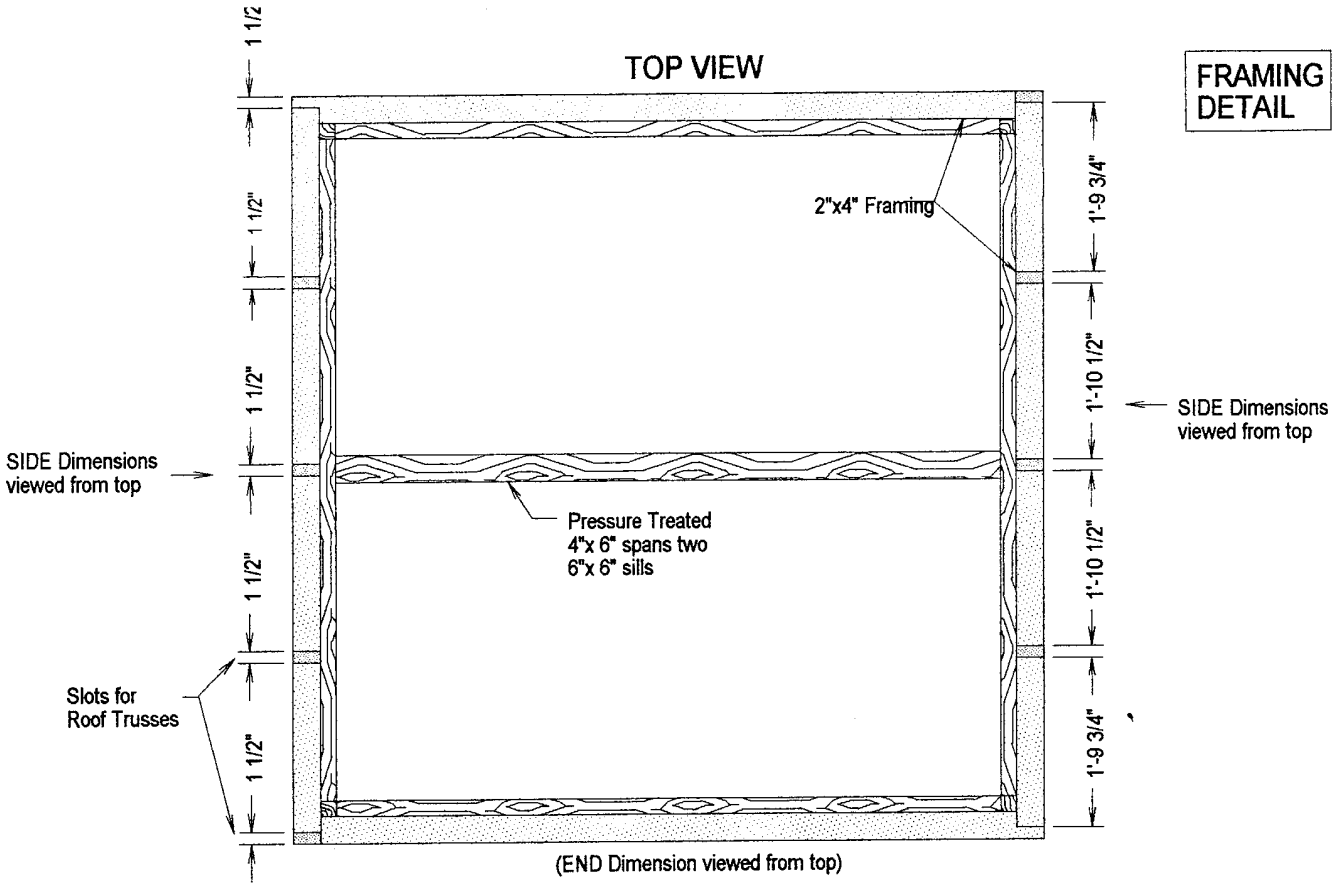


MATERIALS LIST

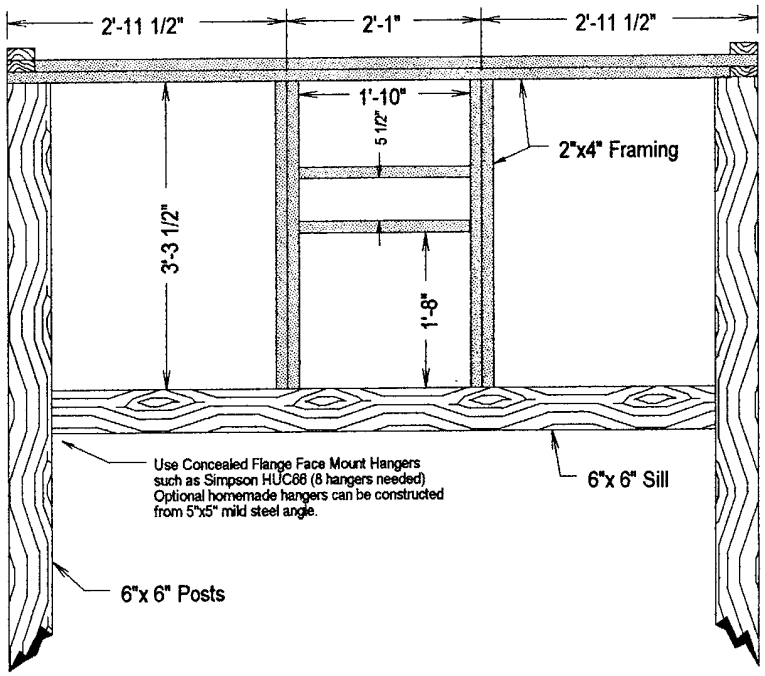
(4)---Simpson CBS66 Standoff Column Bases (1" Standoff)
(16)--1/2" Rebar - 42" long
(16)--1/2" Rebar - 48" long
(1.3)----Cubic Yards Class A Concrete
(8)----5/8" ϕGrade 5 Bolts, 6 1/2" long

FRAMING DETAIL

TOP VIEW



(END Dimension viewed from top)

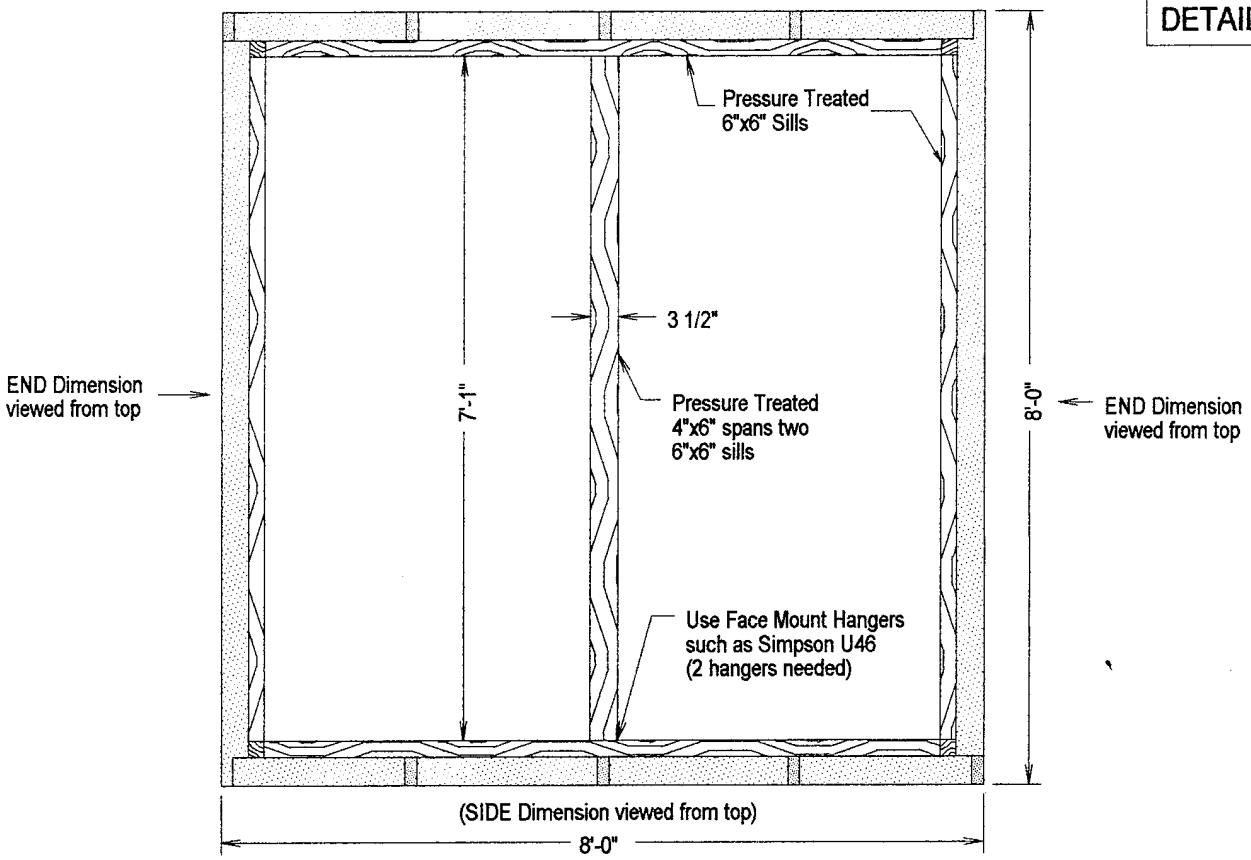


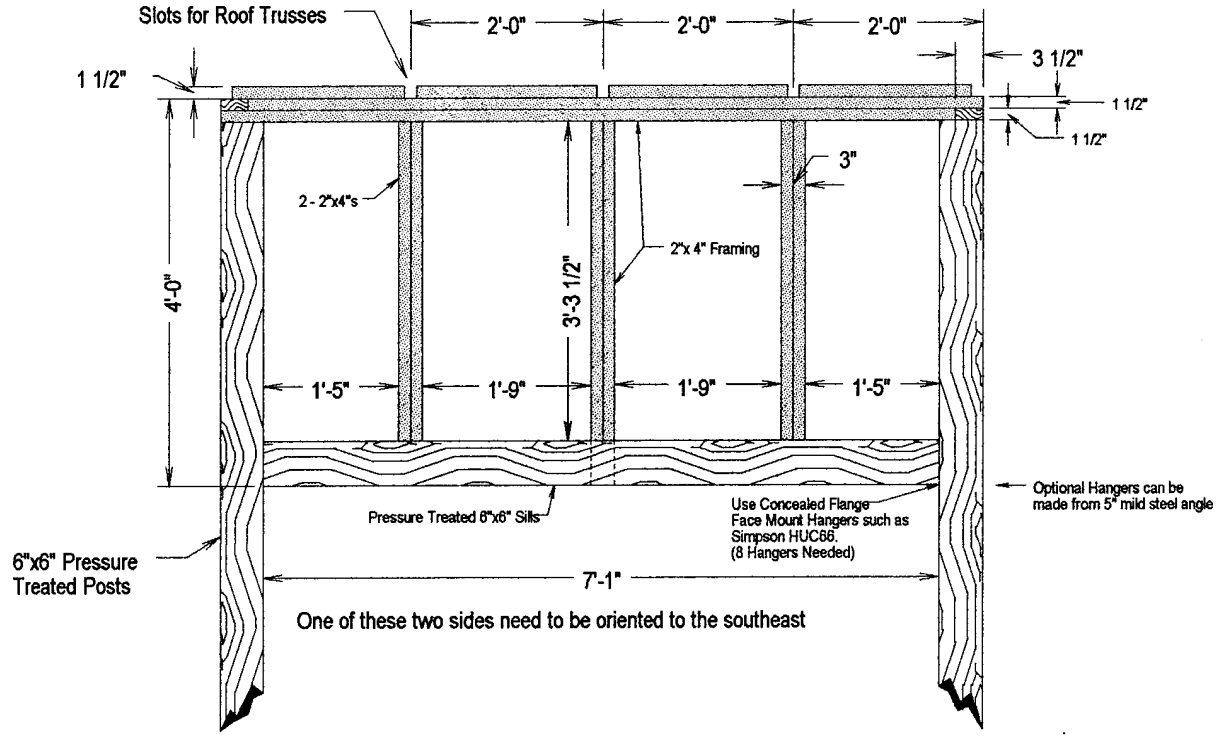
END VIEW

(Sides with Bat Fly-in Entrances)

FRAMING DETAIL

TOP VIEW

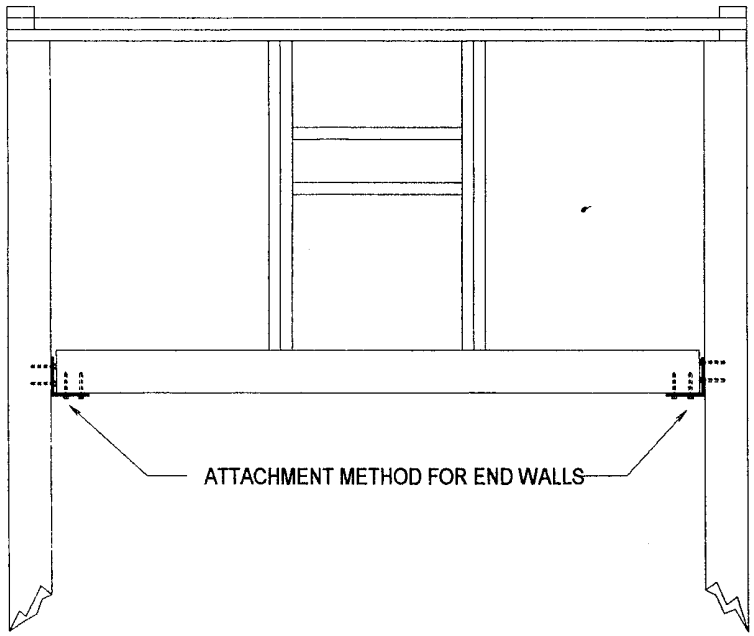


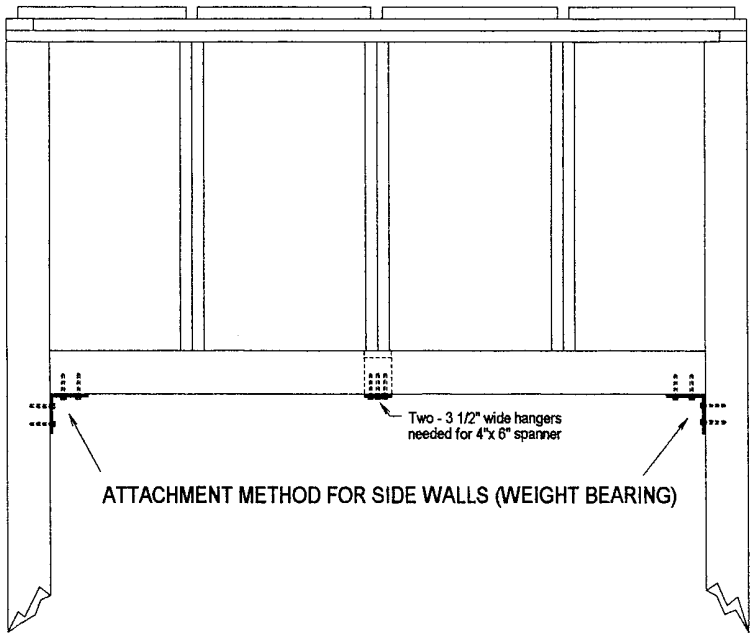


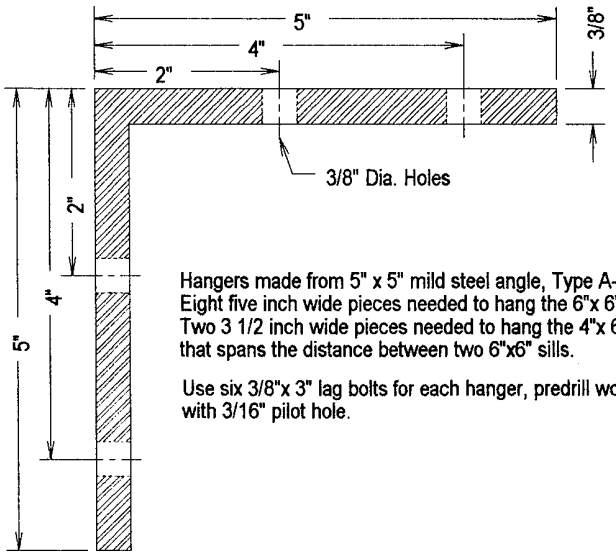
SIDE VIEW

(Weight Bearing Wall)

OPTIONAL HOMEMADE HANGER DETAILS



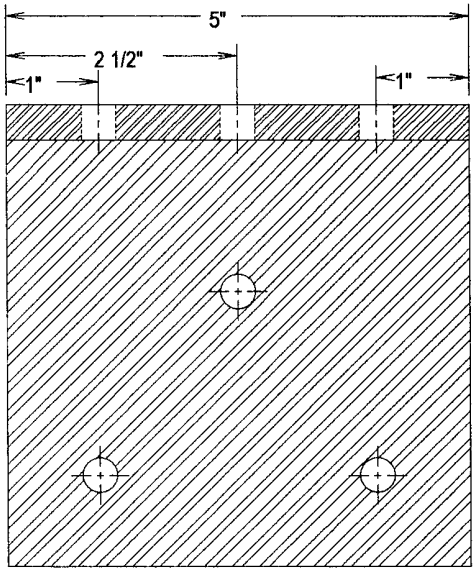




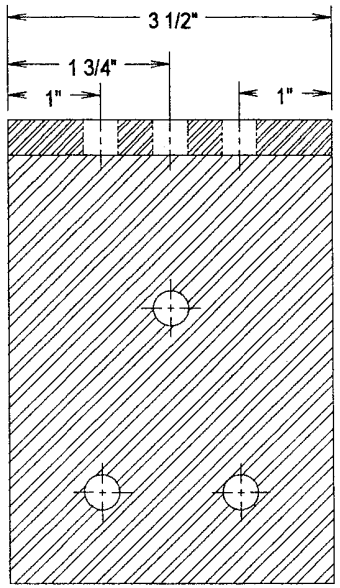
Hangers made from 5" x 5" mild steel angle, Type A-36.
Eight five inch wide pieces needed to hang the 6"x 6" sills.
Two 3 1/2 inch wide pieces needed to hang the 4"x 6"
that spans the distance between two 6"x6" sills.

Use six 3/8"x 3" lag bolts for each hanger, predrill wood
with 3/16" pilot hole.

SIDE VIEW (Both Sizes)
of HOMEMADE HANGER



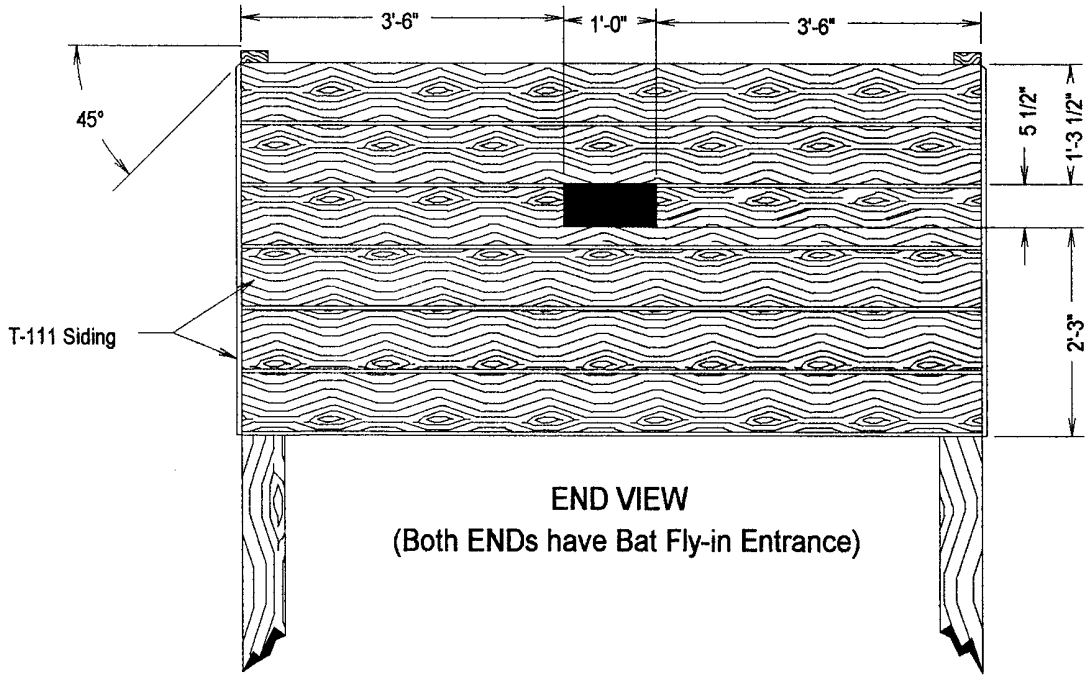
FRONT VIEW (5" Wide Pieces, 8 Needed)



FRONT VIEW (3 1/2" Wide Pieces, 2 Needed)

SIDING DETAIL - END VIEW

IMPORTANT !!!
INTERIOR SIDE OF ALL SIDING MUST BE ROUGHENED
IF EXTERIOR OF SIDING IS NOT ROUGH, THEN IT TOO MUST BE ROUGHENED SO BATS CAN LAND EASILY.

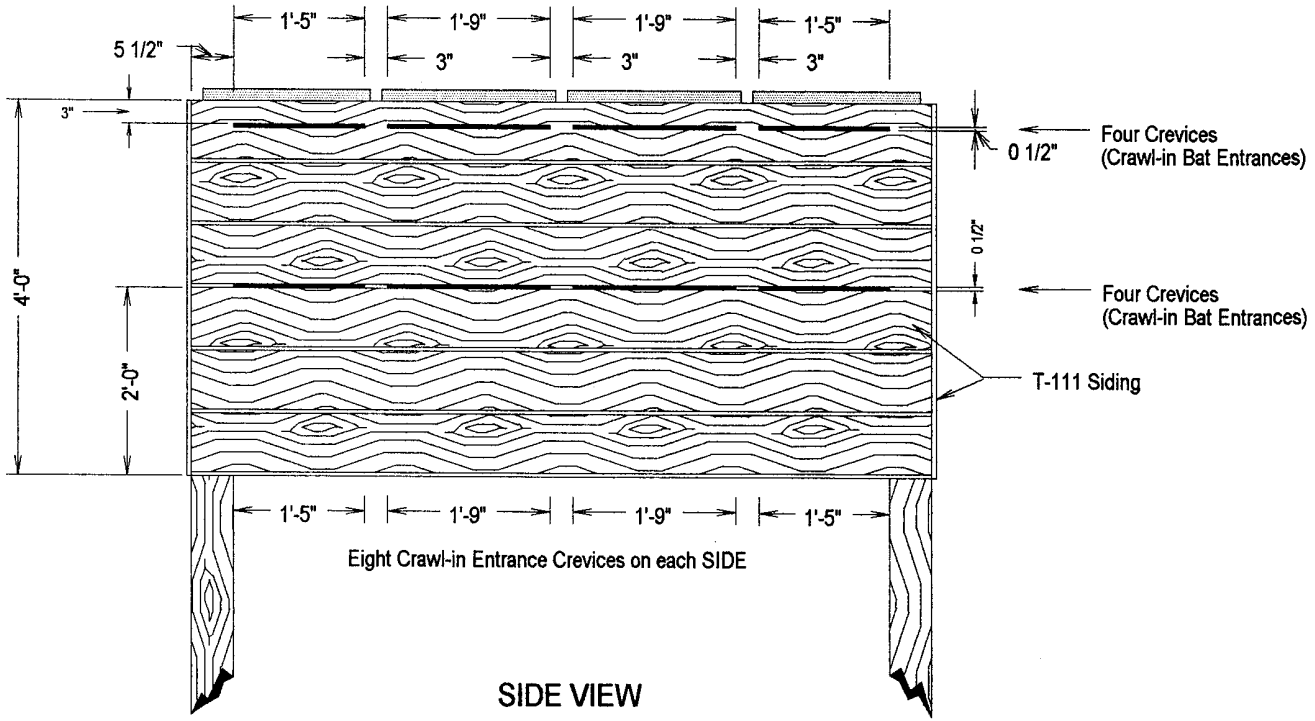


END VIEW
(Both ENDs have Bat Fly-in Entrance)

SIDE VIEW - SIDING DETAIL

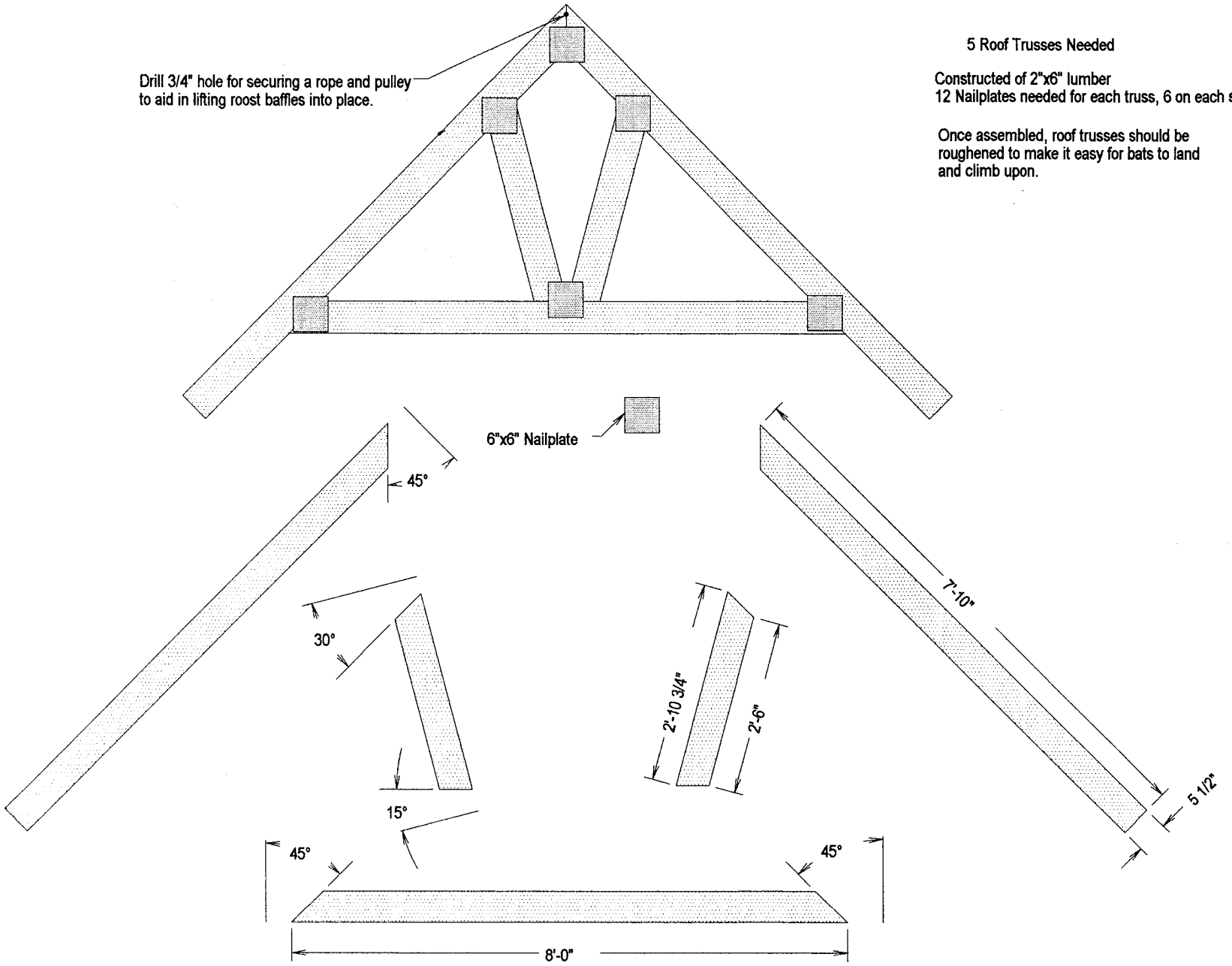
IMPORTANT !!!

INTERIOR SIDES OF ALL SIDING MUST BE ROUGHENED
IF EXTERIOR OF SIDING IS NOT ROUGH, THEN IT TOO MUST
BE ROUGHENED SO BATS CAN LAND EASILY.



SIDE VIEW
(Weight Bearing Wall)

ROOF TRUSS DETAIL



5 Roof Trusses Needed

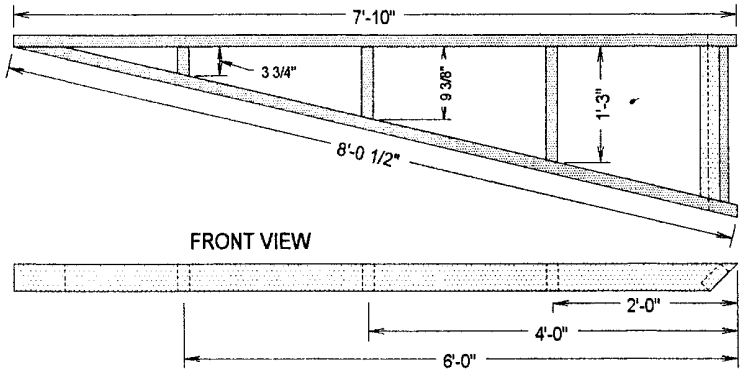
Constructed of 2"x6" lumber
12 Nailplates needed for each truss, 6 on each side.

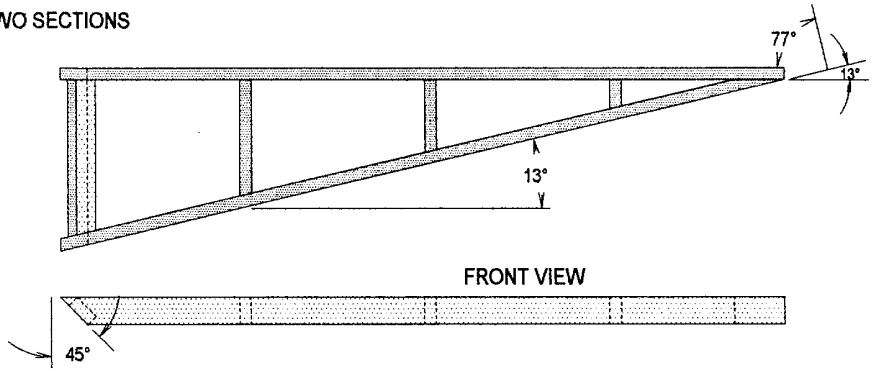
Once assembled, roof trusses should be roughened to make it easy for bats to land and climb upon.

ROOF EXTENSION FRAMING DETAIL

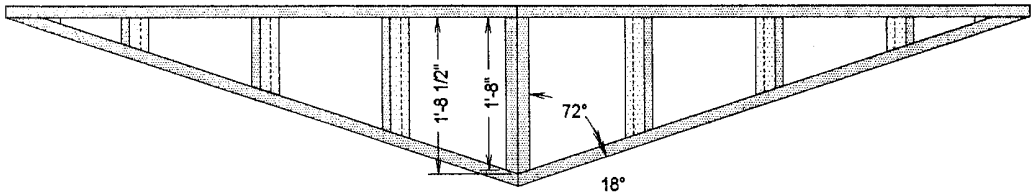
(2" x 4" LUMBER)

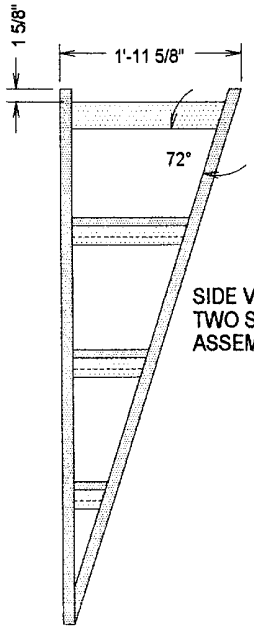
TOP VIEW OF TWO SECTIONS



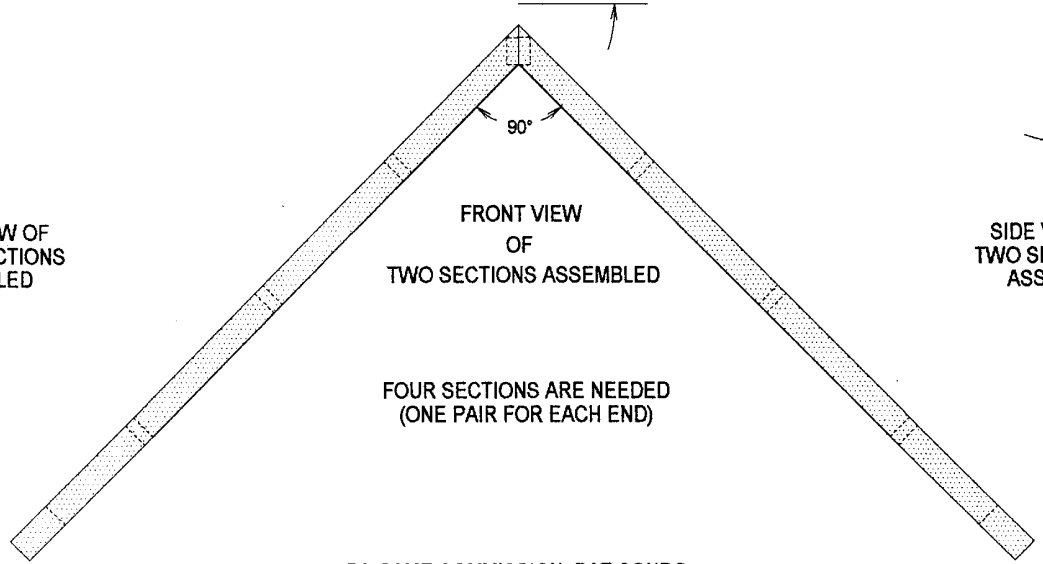


TOP VIEW OF TWO SECTIONS ASSEMBLED (see page 1A for side view of completed roof extension)



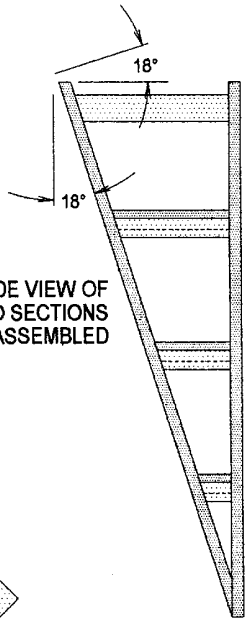


SIDE VIEW OF
TWO SECTIONS
ASSEMBLED



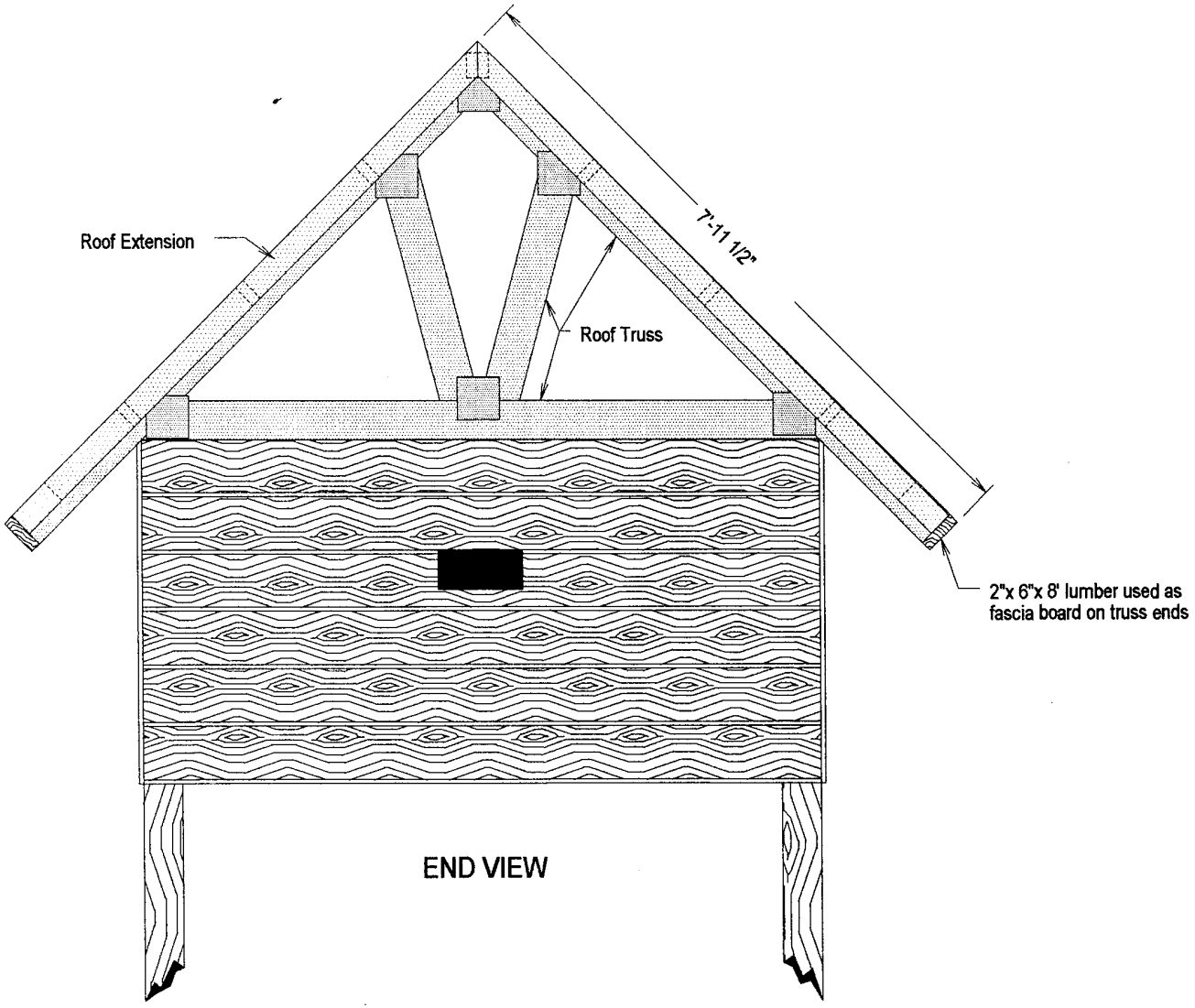
FRONT VIEW
OF
TWO SECTIONS ASSEMBLED

FOUR SECTIONS ARE NEEDED
(ONE PAIR FOR EACH END)



SIDE VIEW OF
TWO SECTIONS
ASSEMBLED

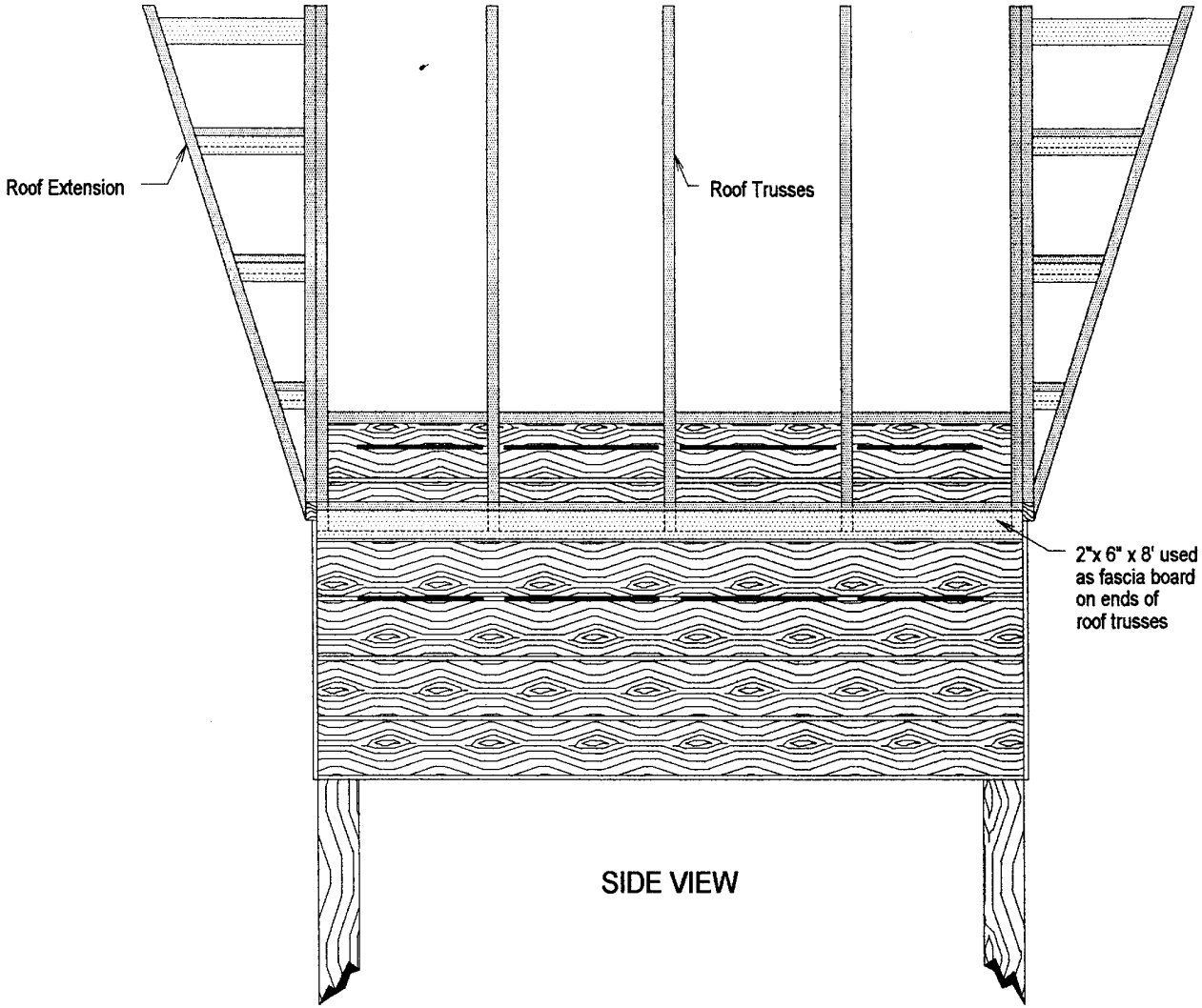
ROOF FRAMING DETAIL



END VIEW

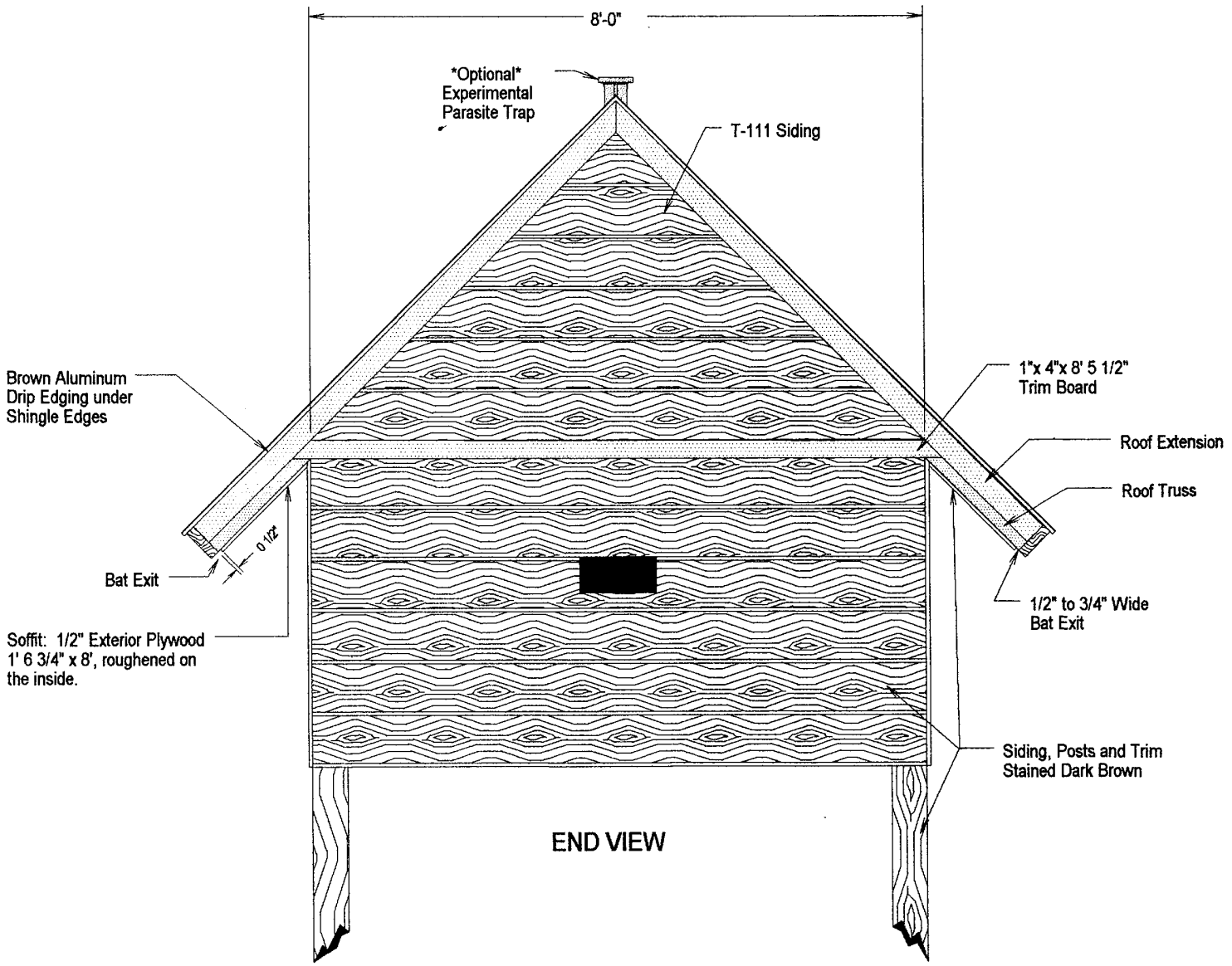
ROOF FRAMING DETAIL

USE 2"X 4"s OR SCRAP LUMBER TO TEMPORARILY NAIL ROOF TRUSSES TOGETHER



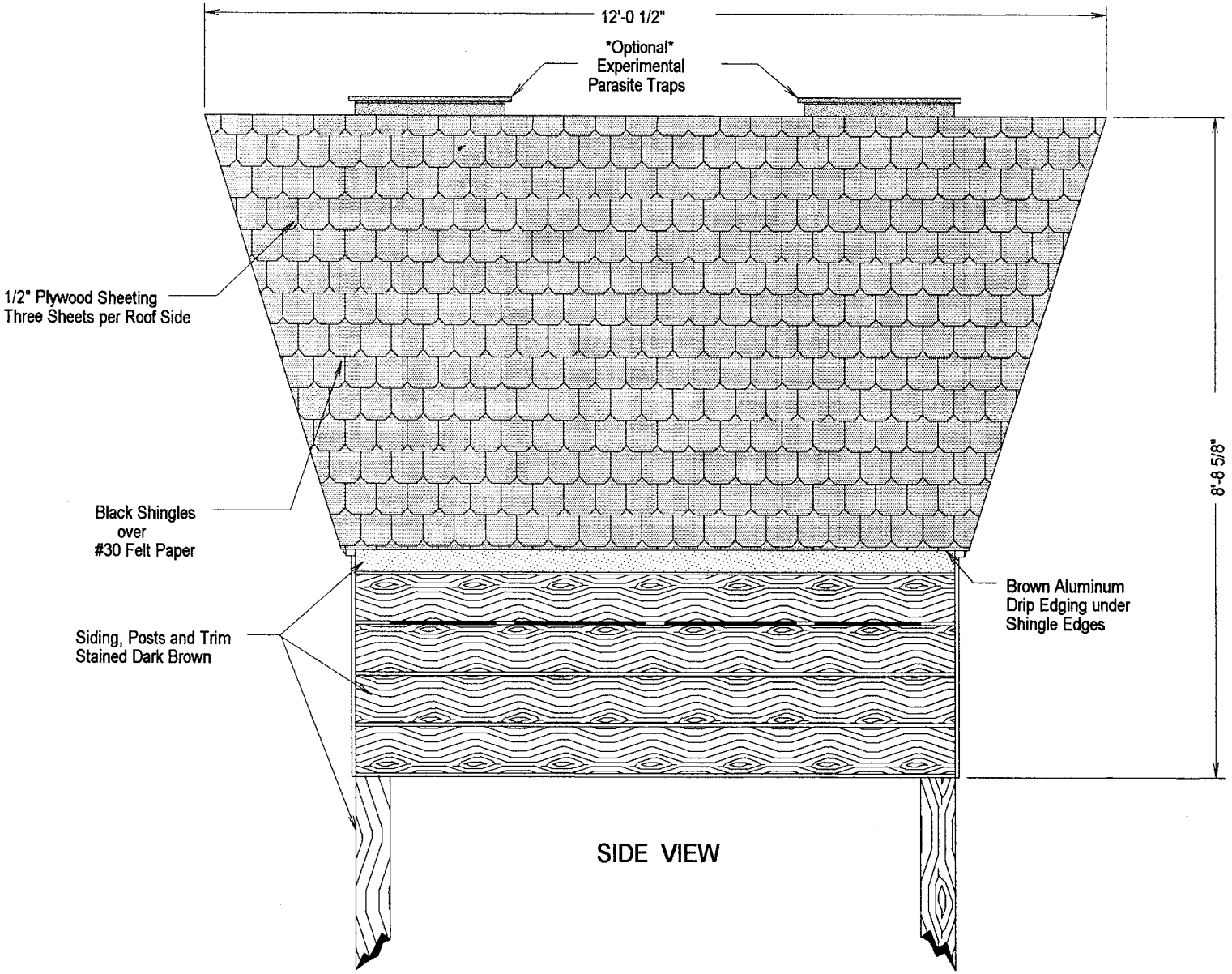
SIDE VIEW

ROOFING DETAIL



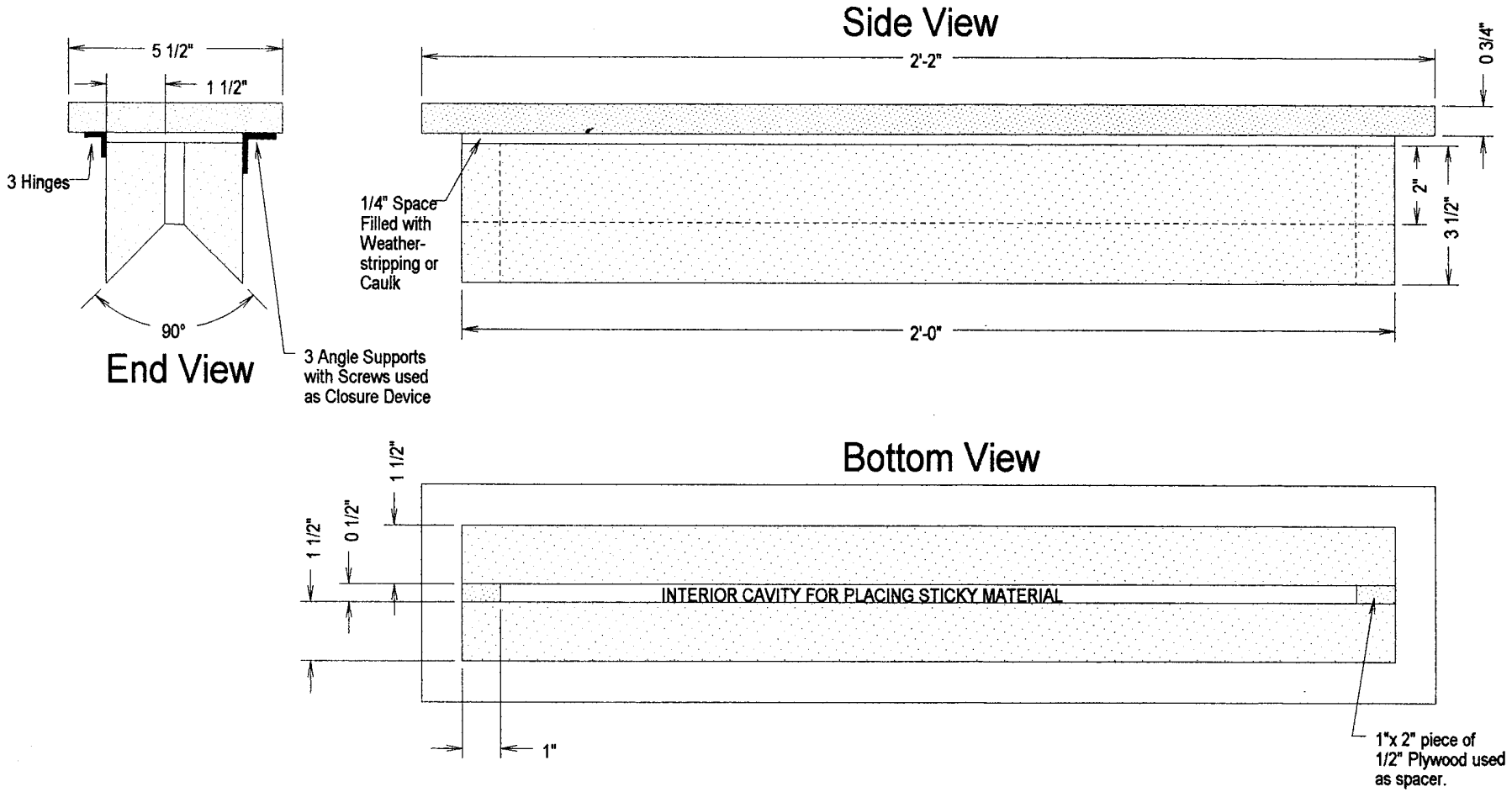
END VIEW

ROOFING DETAIL



SIDE VIEW

EXPERIMENTAL PARASITE TRAP (Optional)

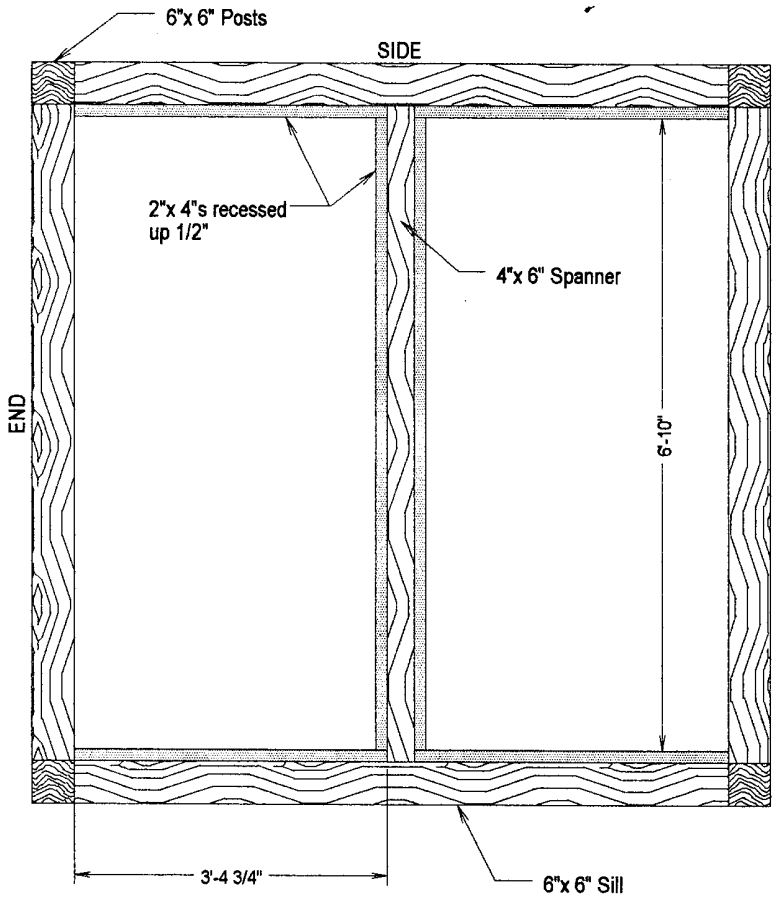


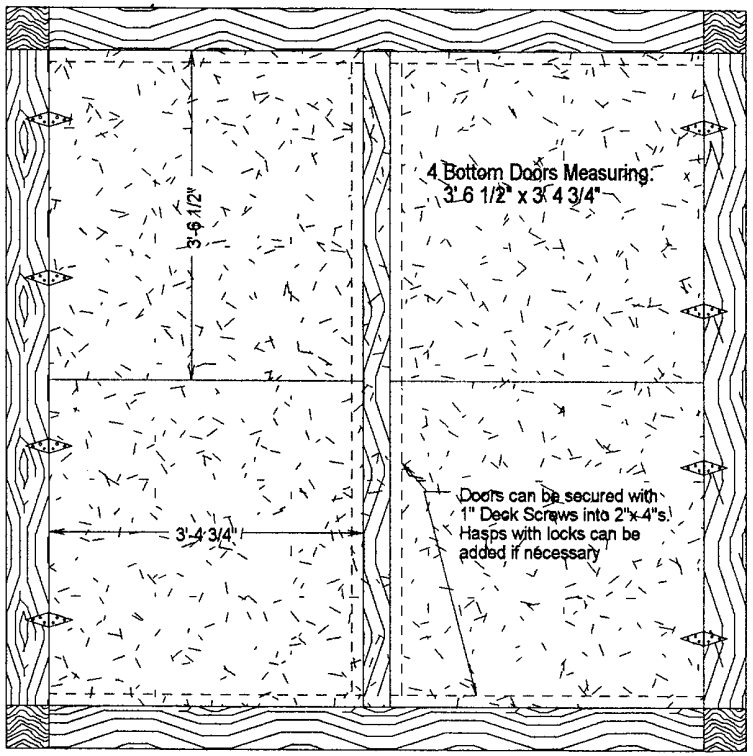
The Parasite Trap is basically an airtight box attached to the peak of the roof. There is a 1/2" wide opening that accesses the interior of the Bat Roost.

1/4" Hardware Cloth must be placed between the parasite trap and the bat roost to prevent bats from getting into the sticky material used in the parasite trap.

The Parasite Traps should be placed on each end of the roost, before the shingles are applied. All cracks must be sealed with roofing cement.
The traps should be stained black and rolled roofing applied to the top. Access for inspection and application of sticky material is through the hinged roof of the trap.
At the time these plans were drawn up, it is not known if this technique works or is necessary. Plans are to use material such as flypaper in this device.

DOOR DETAIL
(Viewed From Underside)



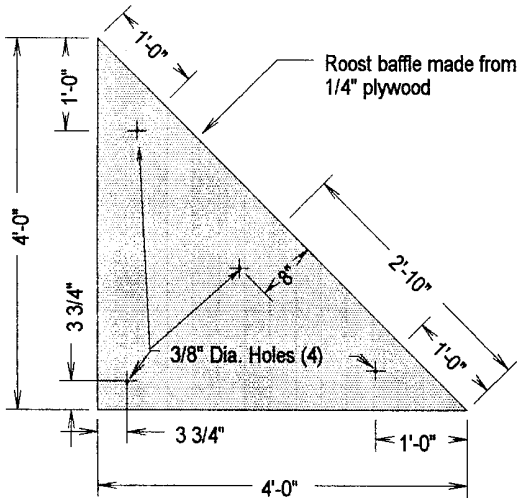


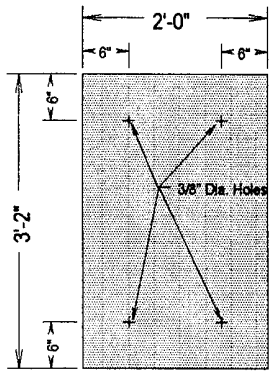
ROOST BAFFLE DETAIL

UPPER ROOST BAFFLES

All baffles MUST be roughened or scored for bat roosting

LOWER ROOST BAFFLES

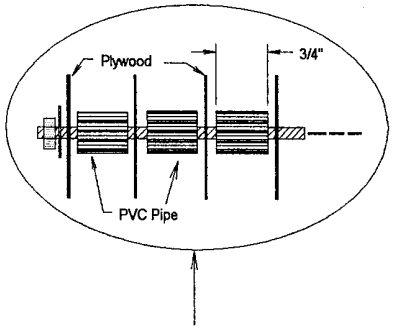




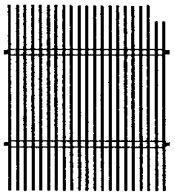
Roost Baffles made from 1/4" plywood

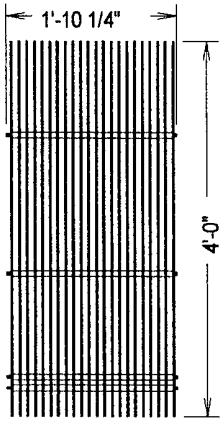
2" notch cut out of 4 narrow lower bundles to fit around post

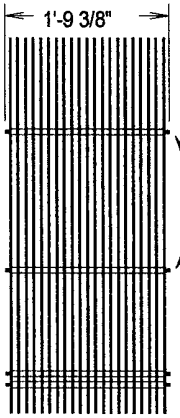
Roost Baffles bundled together with 3/8" threaded rod and 3/4" long pieces of Schedule 40 3/4" PVC pipe to form roost apartments.



Top View of narrow bundle

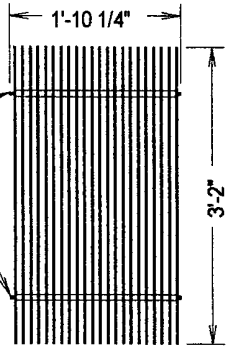


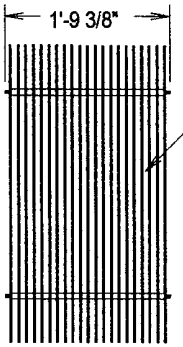




3/8" Threaded Rod with nuts and 1" washers on each end.

Plywood separated with 3/4" long pieces of schedule 40, 3/4" PVC pipe.



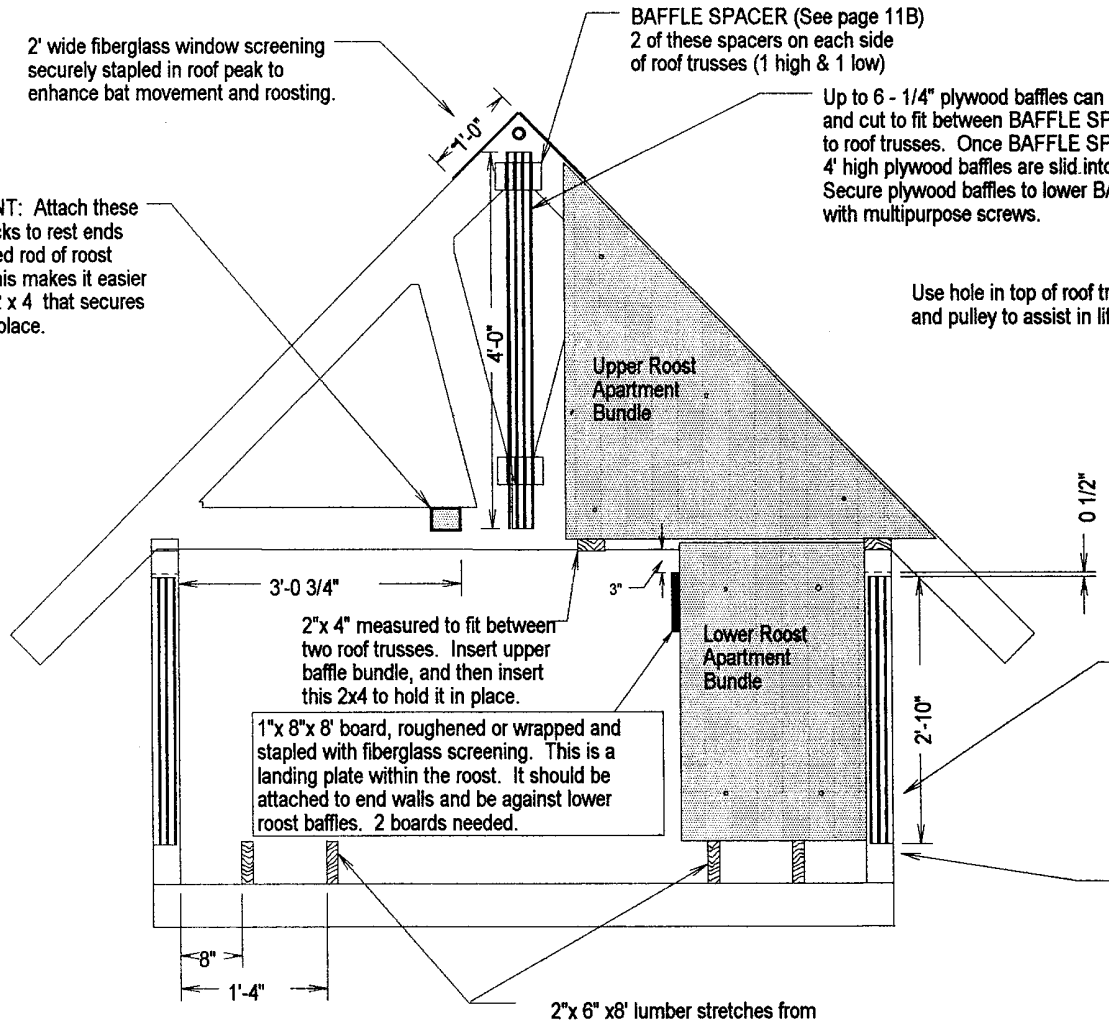


3/4" wide roosting crevices

End View of Upper Roost Apartments made to fit between the roof trusses. Measurements and number of baffles needed may vary somewhat. Eight apartments needed of two different sizes. One size fits the middle areas, and the narrower fits the end sections.

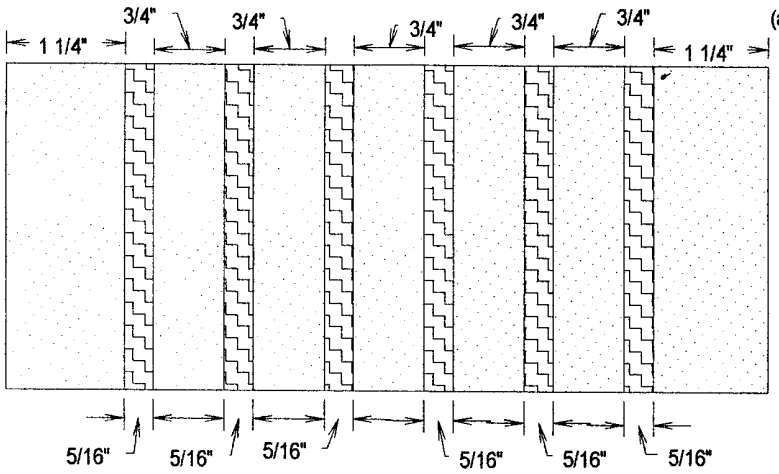
END VIEW of lower roost apartments. Eight bundles needed of two different sizes. The four wider apartments fit in the middle sections of the condo. The narrower bundles fit on ends.

ROOST BAFFLE INSERTION DETAILS

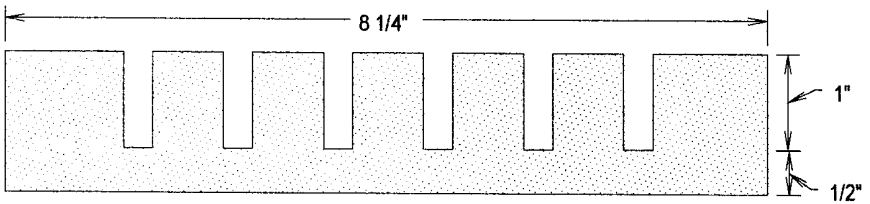


PEAK BAFFLE DETAIL

PEAK BAFFLE SPACER (Front View)

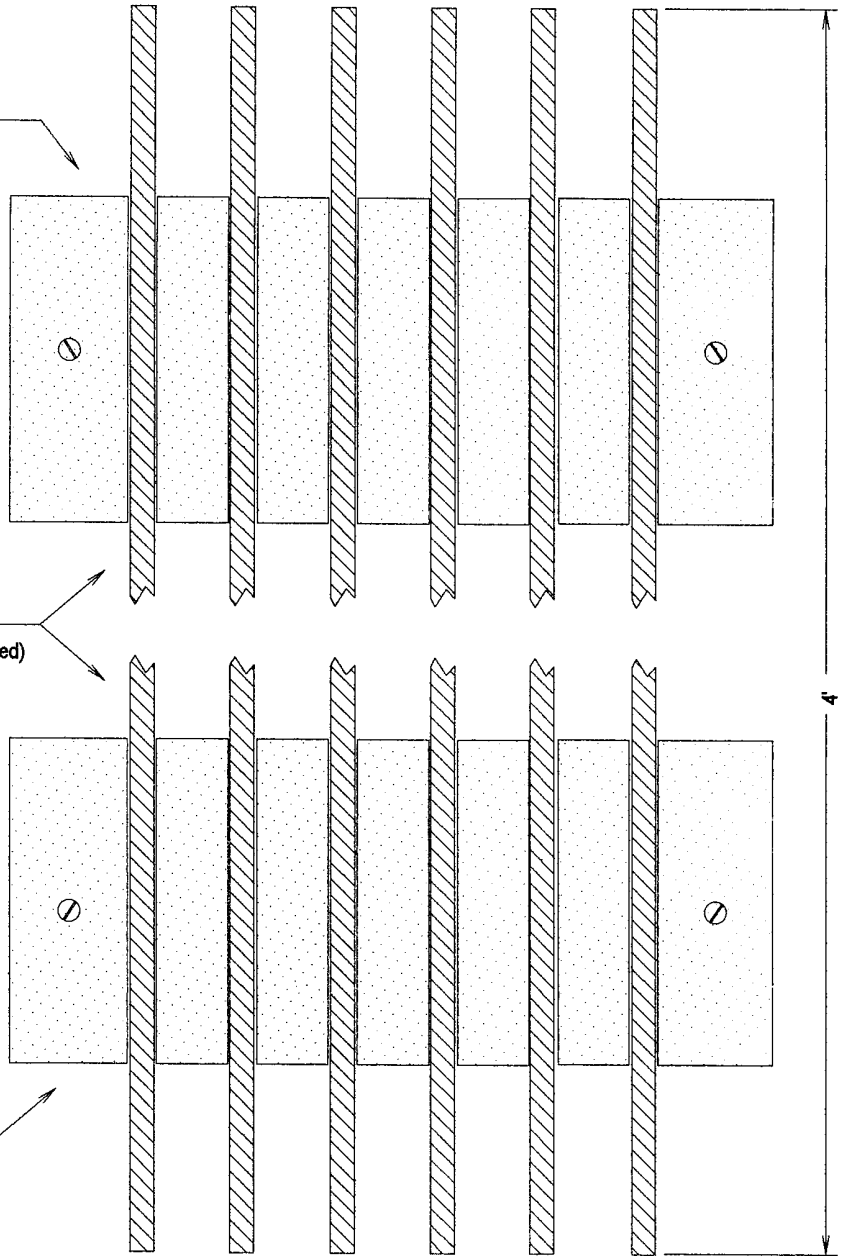


PEAK BAFFLE SPACER (Bottom View)



BAFFLE SPACERS are cut from 8 1/4" length of 2"x4"

Cutaway view of one end of Peak Baffles



Sixteen BAFFLE SPACERS are needed. Four for each of the four peak sections. Two SPACERS are attached to roof trusses near the roof peak, and two near the bottom of trusses for each section. After the spacers are in place, six - 4' high plywood baffles are slid in from the bottom. They are then secured at the bottom with 1 1/4" multipurpose screws. The width of the plywood baffles should be measured and cut to fit between the two pair of BAFFLE SPACERS.