

AITC Book Barn - 5 foot

Building the AITC Book Barn can be a fun project. It will take time for the job in order to get the finished project that you will be proud to present to the school of your choice.

The plans and pictures provided we hope will assist you in this building project. You may find it necessary to make changes that may work better for you. If you find better methods to build the book barn the people with AITC would like to hear from you so they may improve the process.

The materials used to build the book barn are below. It will be best for you to visit your local building supplies for availability and prices.

- .Number 2 grade shelving board 1 x 12-x length needed. The actual dimension is $\frac{3}{4}$ x 11 $\frac{1}{4}$ inches
 - Approximately 55 lunar feet is needed, this may vary based you how you chose cut your materials
- Four pieces of metal shelf brackets for the adjustable shelves cut to 33 inches long
 - There will be two adjustable shelves and you will need four shelf support tabs for each shelf
- Wood screws, nails and wood glue
 - To install the shelves in the silo there are four 1 $\frac{5}{8}$ wood screws per shelf or a total of 16 screws
 - To mount the silo to the book barn we used 9 1 $\frac{1}{4}$ inch wood screws
- Gluing clamps are very helpful in building this project
- Paint
 - Barn Red – exterior of barn
 - High gloss black – roof and silo
 - High gloss natural finish for the interior and shelves
- For the best results, if available, a pneumatic nailer is best for this type job.
 - A brad gun offer nail lengths from $\frac{3}{4}$ inch to 2 inches.
 - In this project we used
 - 1 inch brads to install the back to the bookcase
 - 1 $\frac{1}{4}$ inch brads to install the roof top
 - 2 inch brads to nail the end pieces to the fixed shelves and the nail the silo together.

First, build the bookcase or the lower half of the book barn.

Note: It will save a great deal of time if you sand each piece before it is assembled. You will still do some light sanding at the end. Helpful tools - router, biscuit cutter, skill saw, table saw, drill, sander and a tape measure.

Step-one – Cut and rabbet two end pieces for the bookcase (see plans and photos).

- Two end pieces of the bookcase - $\frac{3}{4}$ x 11 $\frac{1}{4}$ x 38 $\frac{1}{4}$ inches (right and left sides)
- There are six cuts to each end piece (mark the end pieces, one right and one left).
 - Cut for the back panel
 - Cut for the shelf support brackets
 - Cut for the top and bottom fixed shelves
 - Cut out to create legs
- Rabbet cut out for the back panel – $\frac{1}{4}$ x $\frac{3}{8}$ x 38 $\frac{1}{4}$ inches
- Rabbet cut out for the two shelf brackets – $\frac{1}{8}$ deep x $\frac{5}{8}$ wide x 38 $\frac{1}{4}$ inches long
 - Measure from the front edge of the board:
 - 2 $\frac{1}{4}$ inches
 - $\frac{5}{8}$ inch for first rabbet for metal shelf bracket*
 - 5 $\frac{1}{2}$ inch
 - $\frac{5}{8}$ inch for second rabbet for metal shelf bracket*
 - 2 inches and
 - $\frac{1}{4}$ cut out for the back panel.
 - Total measurement 11 $\frac{1}{4}$
- *Note - the two metal shelf brackets for each side are cut to 33 inches long but not installed until finish is applied.
- Rabbet cut out for the top and bottom fixed shelves – $\frac{3}{8}$ deep x $\frac{3}{4}$ wide x 11 $\frac{1}{4}$ inch long
 - Measure from the top edge of end pieces
 - First cut - top fixed shelf - rabbet cut $\frac{3}{8}$ deep x $\frac{3}{4}$ wide x 11 $\frac{1}{4}$ inches long.
 - Second cut – bottom fixed shelf - from the top edge 33 $\frac{3}{4}$ to top edge of the next rabbet cut - $\frac{3}{4}$ inch rabbet
- Cut out to create the legs - 6 $\frac{3}{4}$ wide x 2 $\frac{3}{4}$ deep

Step-two – Cut the top and bottom fixed shelves (two pieces).

- The two fixed shelves measure $\frac{3}{4}$ inch x 11 inches x 47 $\frac{1}{2}$ inches.

Step-three – Assemble the end pieces to the two fixed shelves.

- You will use wood glue and four gluing clamps.
 - Place a small amount of wood glue in the rabbet cut at the bottom of the two end pieces ($\frac{3}{8}$ x $\frac{3}{4}$ inch), insert the bottom shelf into the rabbet joint of both end pieces, and install the gluing clamp (do not tighten completely).
 - Place a small amount of wood glue in the rabbet cut at the top end of the two end pieces ($\frac{3}{8}$ x $\frac{3}{4}$), insert the top shelf into the rabbet joint of both end pieces, and install the gluing clamp (do not tighten completely).
 - Tighten the gluing clamp lightly, check the box (both sides) to ensure that the corners are square, and check the alignment of the shelves to the front edge of the two end pieces. If everything looks good, tighten the clamps.
 - Once the glue has set up, add a few nails to each joint.

Step-four – Build the face frame for the box (see plans for details).

- Cut two pieces $\frac{3}{4}$ x 2 x 38 $\frac{1}{4}$ inches - these two pieces will be the sides.
- Cut two pieces $\frac{3}{4}$ x 2 x 44 inches – these two pieces will be the top and bottom.
- Use a biscuit cutter, # 10 biscuits, and wood glue to make these joints.
- Assemble the face frame on a flat surface - use a small amount of wood glue and gluing clamps.
 - Apply a small amount of glue to the side pieces, insert the biscuits, and then add the top and bottom pieces.
 - Tighten the gluing clamp lightly and check the box (both sides) to ensure that the corners are square. If everything looks good, tighten the clamps.
 - Once the glue has set up, sand the back of the frame lightly to ensure a good fit to the face of the bookcase.

Step-five - Assemble the face frame to the bookcase.

- Lay the box on a flat surface with the front up. Check the box to ensure that it is square.
- Lay the face frame on the face of the bookcase and check to see if you have a good fit.
 - The top of the face frame should align with the top of the top fixed shelf of the bookcase.
 - The bottom cross member of the face frame should align with the top edge of the bottom fixed shelf.
 - If the alignment looks good, then you are ready to mount the face frame to the bookcase.
 - Do this using a small amount of wood glue; then, nail the face frame to the front edge of the bookcase.
 - Start by nailing one side after proper alignment, check for square, then nail the other side, then the top and bottom.
- Once the glue sets up, lightly sand the top of the box to prepare for mounting the roof structure.

Step-six – Base trim (see plan and photo).

- Cut base trim using $\frac{3}{4}$ x 4 $\frac{1}{4}$ x 64 inches.
- Use a $\frac{1}{2}$ cove bit to cut the top edge of the board. The front base trim is 49 $\frac{1}{2}$ inches with 45 degree angle cuts on both ends.
 - On the left end (silo end), the base trim should be cut with a return end.
- The right end base trim is 12 $\frac{3}{4}$ inches with a 45 degree angle to match the front base trim.

Second, build the roof assembly to be added to the bookcase.

Step-one - The front and back roof-frame-structure

- Cut two pieces $\frac{3}{4}$ x 1 5/8 x 70 inches long.
 - One for front roof frame structure
 - One for back roof frame structure
 - The back piece will have an additional cut. This cut will be $\frac{1}{4}$ inch deep and 1 3/8 inches from the bottom edge to allow the backboard to be mounted (see plans for detailed drawing).
- Using the $\frac{3}{4}$ x 1 5/8 x 70 inch long pieces, cut the individual pieces to build the roof frame structure (see plans and photos).
 - Front
 - Two pieces cut 17 1/8 inches with angles of 18 degrees on one end and 20 degrees on the other end.
 - Two pieces 14 3/8 inches with angles of 18 degrees on one end and 34 degrees on the other end.
 - Back – remember, the back piece has the additional cut for the backboard.
 - Two pieces cut 17 1/8 inches with angles of 18 degrees on one end and 20 degrees on the other end.
 - Two pieces 14 3/8 inches with angles of 18 degrees on one end and 34 degrees on the other end.
 - *At this stage, it would be helpful to build a gig to help assemble the roof structure.*
 - Use a piece of $\frac{3}{4}$ x 24 x 48 inch plywood.
 - *At the bottom edge of the plywood, add a $\frac{3}{4}$ x 3 x 48 inch piece, square this piece to the plywood, and mount using wood glue and clamps. The outside edge of the gig will be the same width as the outside edge of the bookcase (48 inches wide).*
 - *Mark the plywood at 24 inches (center). Using a square, draw a line to the top of the plywood. This is for reference only.*
 - *It would be helpful to have a band clamp to clamp the roof frame together.*
- With the roof frame pieces cut to measurement, assemble the roof frame using the gig that you built.
 - Front roof frame
 - Place the two pieces (14 3/8 inches with 34 degrees) on the board mounted to the plywood gig.
 - Place the two pieces (17 1/8 inches), matching the proper angles.
 - Check your fit at each angle joint (see the plans).
 - At the center of the gig (24 inches), the peak of the roof should measure 17 $\frac{3}{4}$ inches.
 - At the 18-degree joint, the height should measure 12 inches.
 - Assemble the back roof frame following the same steps (remember the additional cut on the back).
 - If all your measurements check out, then you are ready to assemble the front and back roof frames.
 - Place the roof frame pieces on the gig.
 - Use the band clamp to do a dry run before adding the wood glue to secure the joints.
 - If all joints look good, you are now ready to add the wood glue and tighten the band clamp.

- Cross members will be used to bridge the front and back roof frames together.
 - All cross supports are cut the length of $\frac{3}{4}$ x 1 x 10 1/2 inches.
 - Two cross supports will have two 18-degree angles cut on top.
 - Two cross supports will have one 34-degree angle on top.
 - One cross support will have two 20-degree angles cut on top.
- Install the front roof frame - set this frame on the top edge of the face frame of the bookcase.
 - Check the fit (foot of the roof frame should set on top of the face frame).
 - If the fit looks good, use a small amount of wood glue to set the roof frame in place. Use the pneumatic brad gun to secure the roof frame to the bookcase.
 - Use a level or a straight edge to check that the front roof frame is straight with the face frame of the bookcase. If necessary, use a temporary brace to hold it in place.
 - Mount the back roof frame in the same manner as the front roof frame. Check with your level as you did on the front.
 - Now add the cross supports that bridge the front and back roof frame together.
 - Check the length of the cross member.
 - Measure from the face frame across to the back roof frame for a total measurement of 12 inches.
 - To install the cross supports, use a small amount of wood glue and nail them in place. The angle on the cross supports should match the angle in the roof frame.
- For the final step before adding the rooftop, sand the face frame and the roof frame to get a smooth surface. The final sanding will be done after the bookcase is complete.

Step-two – Build the rooftop to the roof frame structure (see plans).

- The rooftop is 12 inches wide, so this requires that you glue two pieces together to get the 12 inch width.
 - Cut the first piece $\frac{3}{4}$ x 11 $\frac{1}{4}$ x 70 inches. Cut the second piece $\frac{3}{4}$ x 2 x 70 inches.
 - Once the two pieces are cut, use the biscuit cutter and cut three or four # 10 slots for the biscuits in each piece. (Biscuits help with the alignment of the two pieces and add strength to the joint.)
 - Using a small amount of wood glue on one side of the joint to be glued, add the biscuits, fit together, and use gluing clamps to complete the gluing of the two pieces.
- Now take the glued piece and trim it down to get the 12-inch wide piece for the rooftop. (Cut the excess off of the larger piece so as not to cut into the biscuit joint).
- In the gluing process, the pieces that you have glued together may not be smooth, so if you have a thickness planer, plane both sides to get a finished surface. The finished thickness should be 5/8 inch.

- The rooftop is now ready to cut to dimensions. Before you make your cut, check the measurement of the roof frame structure.
 - Two pieces 5/8 x 12 x 17 ½ inches, one end cut at 20 degrees and the other at 18 degrees.
 - Two pieces 5/8 x 12 x 15 1/2 inches, one end cut at a 18 degree angle
 - Cut the right side at 34 degrees.
 - The left side (silo side) requires some special attention. Cut the lower section on the left side roof panel as follows: the top side of the board measures from the 18-degree end 13 ¼ inches to the cut edge at the bottom. On the underside of the roof panel, measure from the 18-degree angle 14 ¼ inches to the bottom end cut. This will give the correct angle to allow the silo to fit properly.
- With the rooftop cut to size, install to the roof frame structure.
 - Check for fit. If the fit is good, prepare to install the rooftop.
 - The rooftop is installed with a small amount of wood glue. Nail in place using a brad gun with 1 ¼ brads to secure the top.
 - If necessary, use a belt sander to smooth out the edge where the silo will attach.
- Now install the rooftop front trim edge. This trim will give a finished look to the front edge of the bookcase.
 - Cut two pieces ¼ x ¾ x 17 ½ - 20 degree angle on one end and an 18 degree angle on the other to match the roof.
 - Cut two pieces ¼ x ¾ x 15 - 18 degree angle on one end and a 34 degree angle on the other to match the roof.
 - Note: the left side will overlap the silo frame.

Step-three – Cut the backboard to fit the bookcase.

- The back panel is a 3/16 inch long panel - comes in a 4 ft. x 8 ft. sheet.
- Cut the panel 48 inches wide x 52 inches long.
- Now cut the width of the backboard 47 ¼ inches. This should fit in the cut for the back of the bookcase. Check your cut to ensure fit.
- Place the panel (good side in) on the back of the bookcase, aligning the bottom edge of the panel with the bottom edge of the bottom fixed shelf. Use two small nails to hold it in place.
- Use a pencil to mark the top end of the panel by following the shape of the roof line.
- Remove the two nails. Flip the panel over to reveal your roof marks.
- To get the finished measurement to fit the roof frame, reduce the mark of the roofline by 1 inch. This can be done by measuring 1 inch below the roofline mark using a straight edge. Draw the new line and cut with a skill cut.
- Cut and fit the back panel but do not install at this time. To save time, paint the back inside first before you install it (see painting instructions at the end).

Third, build the silo to mount to the bookcase. The silo looks like a pencil (the back panel) with the side panel used to support the four shelves and mount to the bookcase.

Step-one - Cut material to the proper dimensions.

- The back panel – ¾ x 11 ¼ x 60 inches long
 - To create the pencil point part of the silo:
 - At the top end of the back panel, get the center point of the width (5 5/8 inches).
 - Measure down from the top 3 inches and use square to draw line.
 - Measure down from the top 10 inches and use square to draw line.
 - This 7 inch space will create the natural part of the pencil tip.
 - Using a straight edge, draw a line from the center mark at the top down to the outer edge of the 10-inch mark.
 - Using a skill saw, cut the excess material to create the pencil point.
 - Use a sander to clean up the edges.
- The right side panel – ¾ x 11 ¼ x 50 inches long
 - Measure up the right side of this board to 39 ½ inches.
 - On left side at the top (50 inch mark) of the back, use a straight edge to draw a line across the board down to the 39 ½ inch mark.
 - Using a skill saw, cut the excess material off of the side panel.
- Join the two pieces together (see plans).
 - The side panel will sit on top of the back panel creating a 90-degree angle.
 - The outside measurement across the back will be 11 ¼ inches.
 - The outside measurement across the right side will be 12 inches.
 - Use a small amount of wood glue on the edge of the side panel along the 50 inch measurement.
 - Take the back panel and place it on the edge of the 50-inch length side. Align the bottom edges and nail in place using a brad gun with two-inch brads.

Step-two - Cut the four shelves for the silo.

- With your silo sides built, now its time to cut and fit the four shelves.
 - Use a ¾ x 11 ¼ x 45 inch board to cut the four shelves.
 - Cut each piece to 11 inches long, for four 11 ¼ x 11 inch pieces.
 - You will now cut the semi-circle shelf to fit the silo frame you just built.
 - Note the inside side measurement of the silo is 10 ½ x 11 ¼ inches.
 - To get the proper curve to the shelf, on the 11 ¼ inch side, mark the shelf to 10 ½ inches and place the mark as close to the edge as possible. (Look at each shelf and align the wood grain so that they are all alike.)
 - Drill a 1/8 inch hole in a paint stir stick about ½ inch from the end of the stick. Measure from the first hole up 10 ½ inches and drill the second 1/8 inch hole.

- Use a small nail in the first hole drilled and nail in lightly at the 10 ½-inch mark on the shelf. In the other hole of the stick, place a pencil, which should be at the end of the 11 ¼-inch length. Now mark the shape of the shelf with the pencil
- The shelf should be marked to show the outline of a 10 ½ x 11 ¼-inch shelf.
- Use a band saw to cut the shelf to size. After you cut the first shelf, use the cut shelf to mark the remaining shelves to be cut.
- Once all shelves are cut to size, clamp the four shelves together and sand/cut edges as needed.

Step-three – Fit the four shelves into the silo frame.

- On the back panel of the silo (pencil piece), start at the bottom of the board and:
 - measure up 4 ½ inches. Using a square, mark a line for the top of the first shelf (first shelf should align with bottom fitted shelf of the bookcase).
 - measure up 15 ¾ inches. Using a square, mark a line for the top of the second shelf.
 - measure up 27 inches. Using a square, mark a line for the top of the third shelf.
 - measure up 38 ¼ inches. Using a square, mark a line for the top of the fourth shelf (fourth shelf should align with top fitted shelf of the bookcase).
- To install the shelves, place each shelf into the silo frame and align the shelf with the marks you have drawn. Use a square to align the shelf to both sides of the silo. Square the shelf and mark a line on the bottom side of the shelf on the silo back and side panels.
- The shelves will be mounted to the silo using 1 5/8 inch wood screws.
- Between the lines you marked for each shelf, drill two holes in each panel to mount the shelves. From the inside of the silo, measure out 2 ½ inches for first hole and 6 ½ inches for the second hole. Drill size should be 3/16. You will drill 16 holes to mount the shelves.
- Mount the shelves temporarily to ensure proper fit.
- With the shelves in place, add the bottom brace as shown in the plans. This brace should measure 14 inches long with 45-degree angles on each end.
- The bottom brace should be installed under the bottom shelf using a small amount of wood glue. Nail it in place using a brad gun with 1¼ brads.
- Once the glue for the brace has set, remove the screws that hold the shelves in place and mark each shelf on the spine of the shelf for the position it fits (example bottom shelf).

Step-four – Fit the silo to the bookcase.

- The silo is secured to the bookcase using 1 ¼ inch screws.
 - On the left end of the bookcase, drill 9 holes for the wood screws that will be used to secure the silo to the bookcase.
 - Measure from the inside of the left end of the bookcase as follows:
 - From the top, measure down 1 ½ inches inside
 - From the top, measure down 16 ½ inches inside
 - From the top, measure down 31 ½ inches inside
 - Across the end panel, measure from the back to the front to create three hole spacings.
 - From the back panel, measure to the front 1 ½ inches for first hole.
 - From the back panel, measure to the front 5 ¼ inches for second hole.
 - From the back panel, measure to the front 9 inches for third hole.
- With all the holes drilled, fit the silo to the left end of the bookcase.
- Check to determine that the silo fits well and is properly aligned.
- Use clamps to hold the silo in place.
- Install 1 ¼ inch screws to secure the silo.
- Remove all screws for painting.
- The silo and bookcase will travel as separate units and mount together once the Book Barn has reached its final destination.

Painting the book barn

Step-one - Prepare the surfaces for painting.

- Sand the book barn as needed to prepare for painting.
- Use a tack cloth to remove any dust before painting.

Step-two - Start with the interior of the bookcase and the natural portion of the silo.

- Mask off the face frame on the front of the bookcase (both the roof frame and the lower half). This will allow you to apply the natural finish to the interior of the bookcase and roof interior.
- Mask off the top of the silo at the 3 inch mark to the 10 inch mark (this crates the natural part of the pencil point).
- Use a high gloss polyurethane finish.
- Use a 200 grid sandpaper or steel wool to buff between coats.
- For a long-lasting finish, use three coats.

Step-three - Paint the silo less the shelves and the roof of the bookcase with black paint.

- You do not need to prime the wood before applying the finished paint.
- Mask off the natural part of the silo.
- Mask off the around the roofline before applying the black to the roof.
- Start painting the rest of the silo inside and out with the high gloss black.
- Paint the roof with the same black paint.
- Two coats are recommended for best results.

Step-four - Paint the exterior and back of the bookcase using the barn red paint.

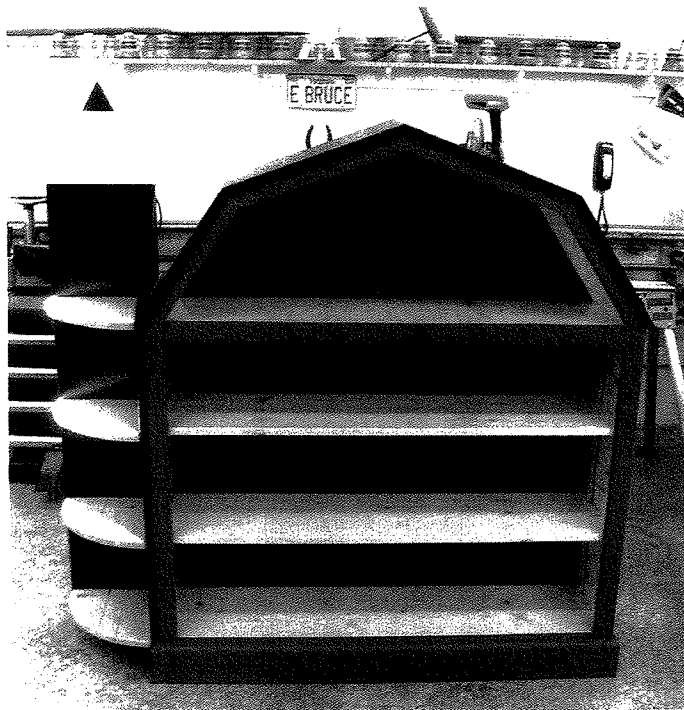
- You do not need to prime the wood before applying the finished paint .
- Mask off the natural portion of the interior of the bookcase and roof area.
- Mask off the roof area that has been painted black.
- Apply the barn red to all surfaces of the bookcase.
- Two coats are recommended for best results.

Congratulations! You have now built the AITC Book Barn.

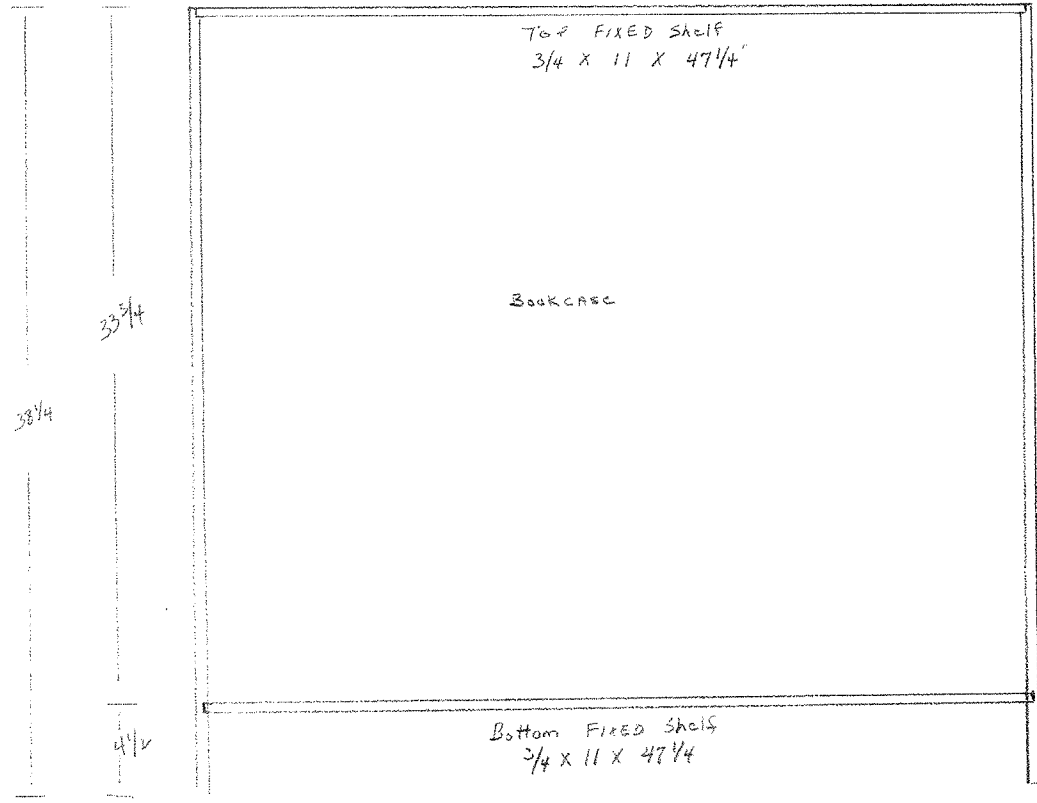
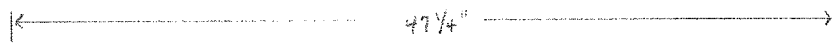
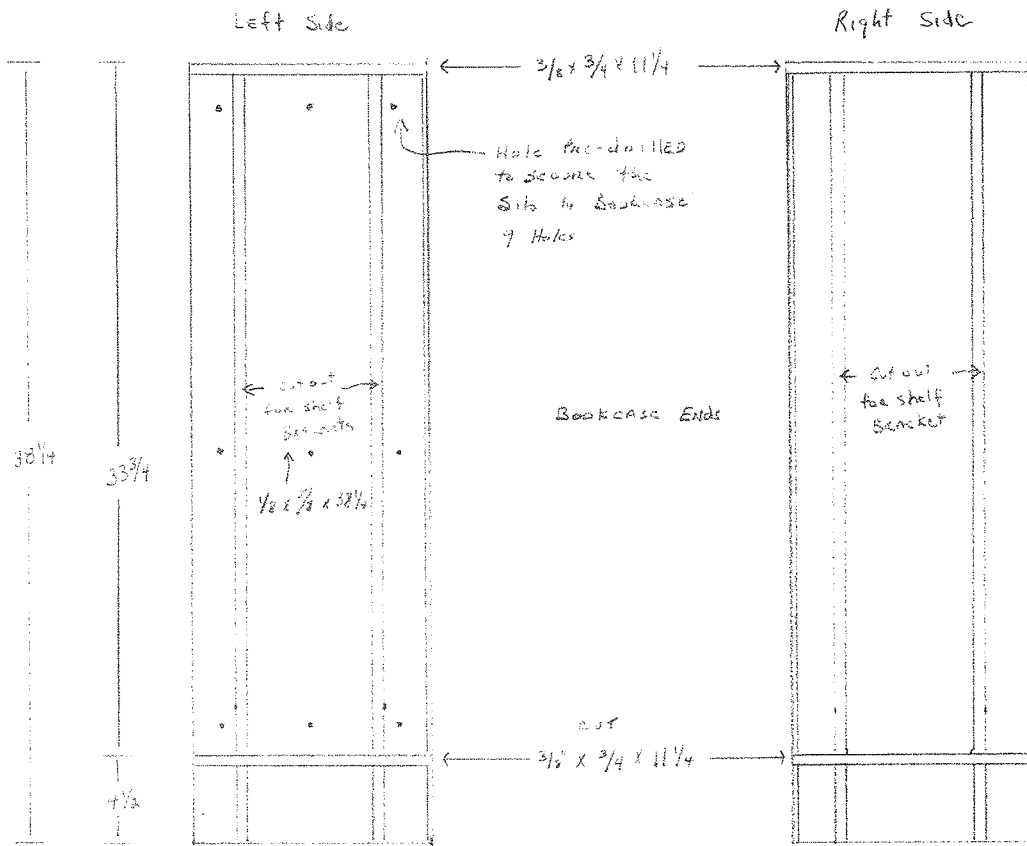
We hope that you have enjoyed building this project. I am sure you found ways to improve the process for future versions. If you wish to share your improvements, let AITC know and your ideas may be added to the plans.

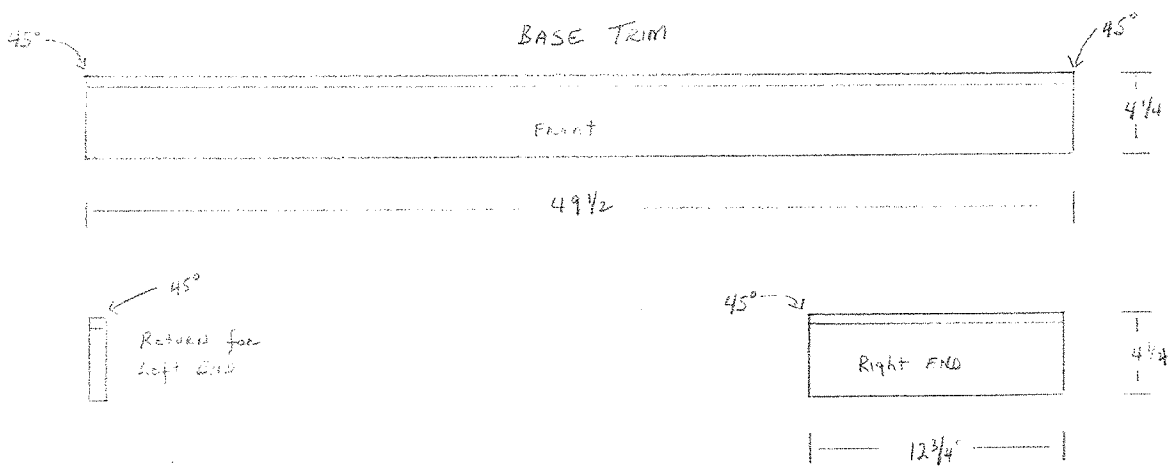
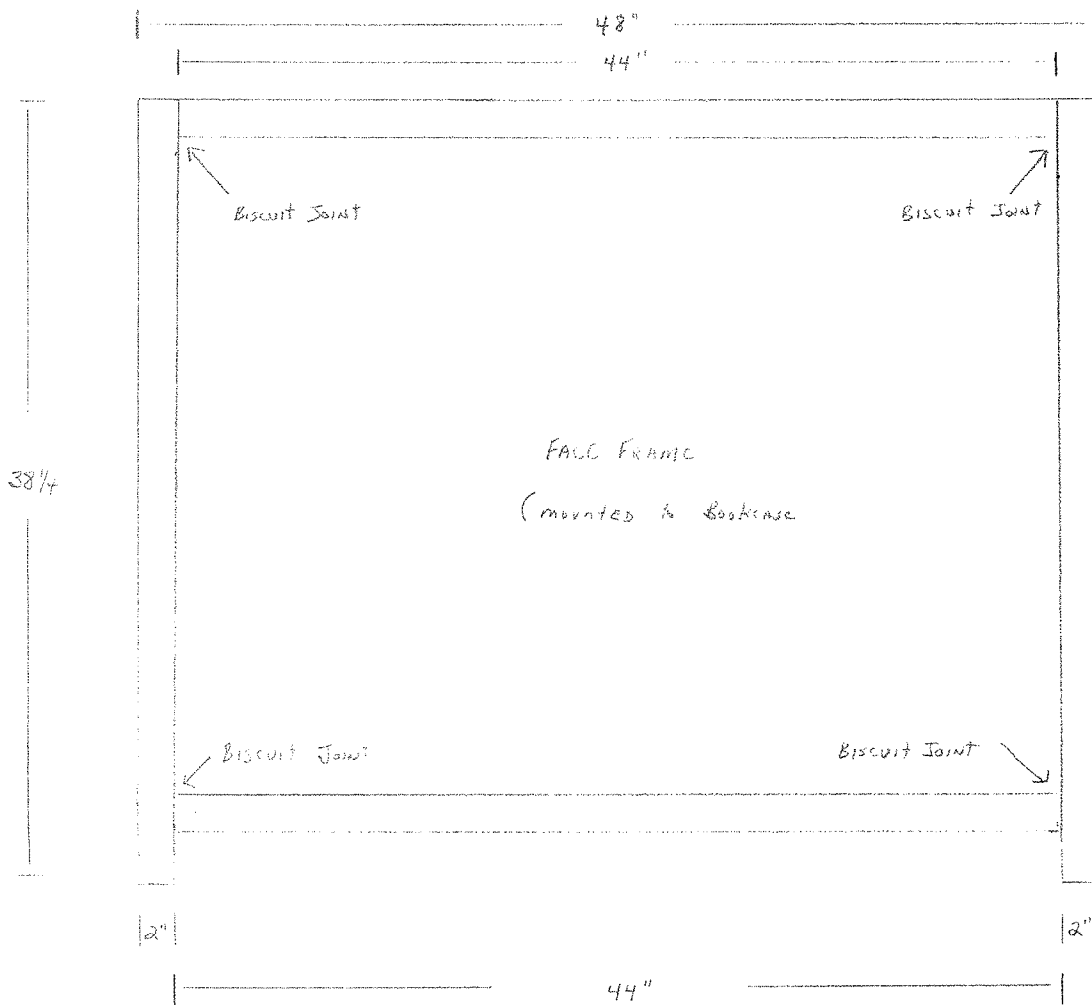
These plans were designed for the AITC Book Barn Project - Date: January 2008

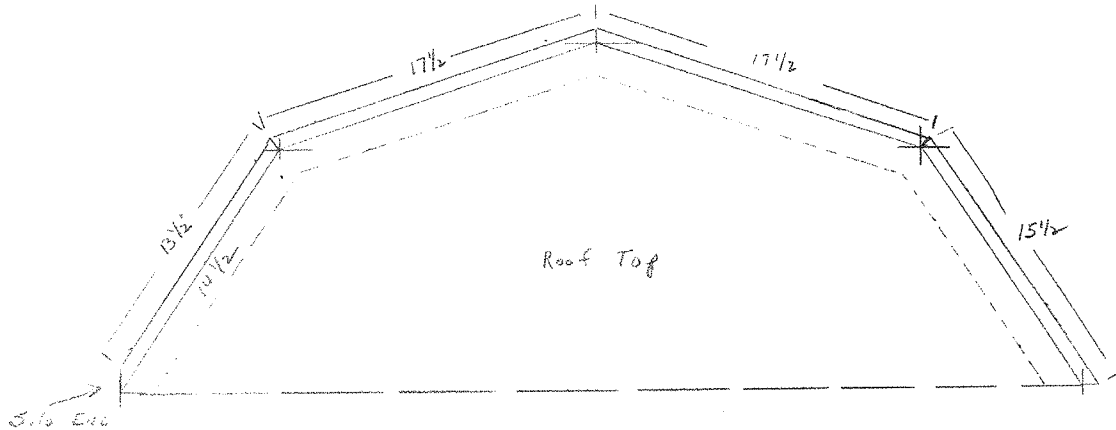
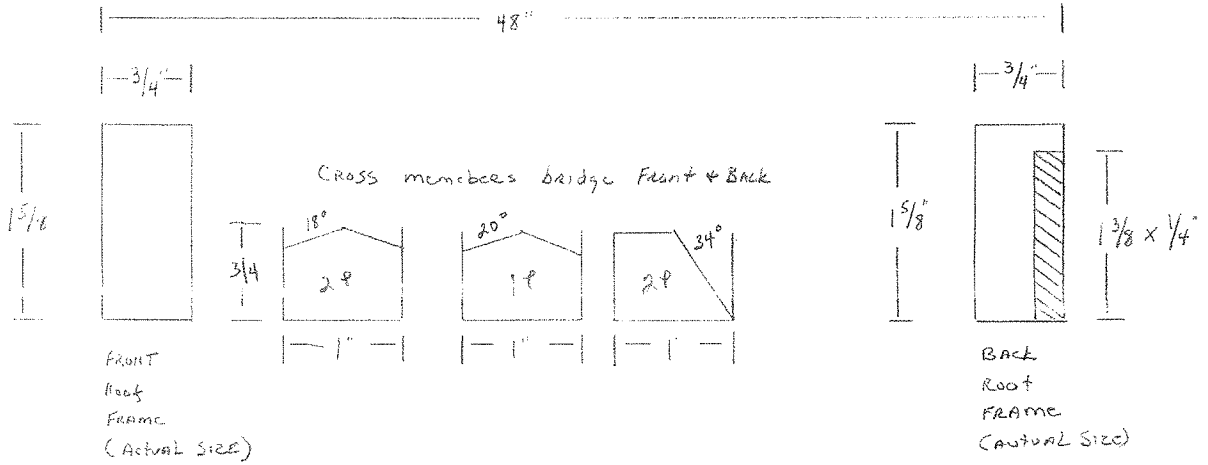
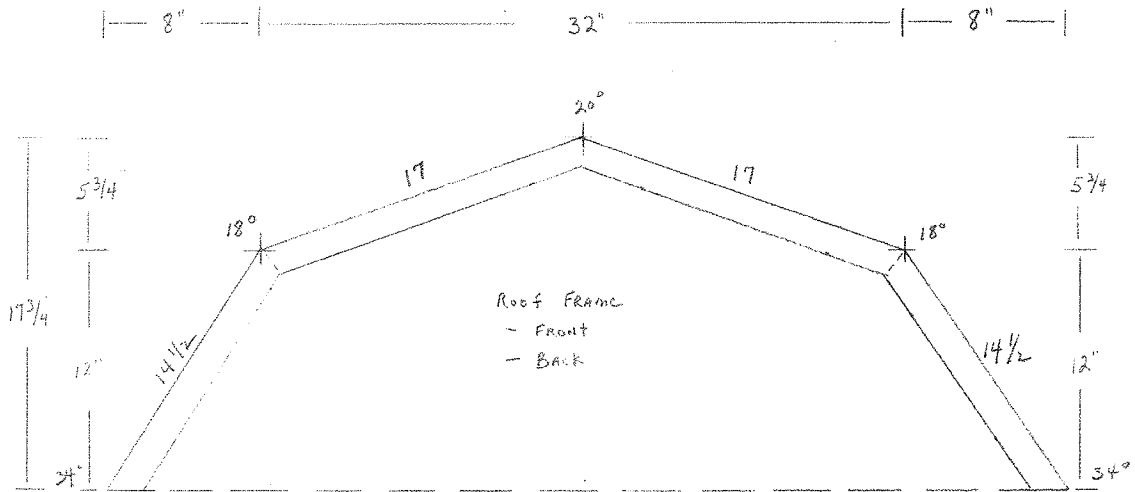
Paint Scheme for Book Barn



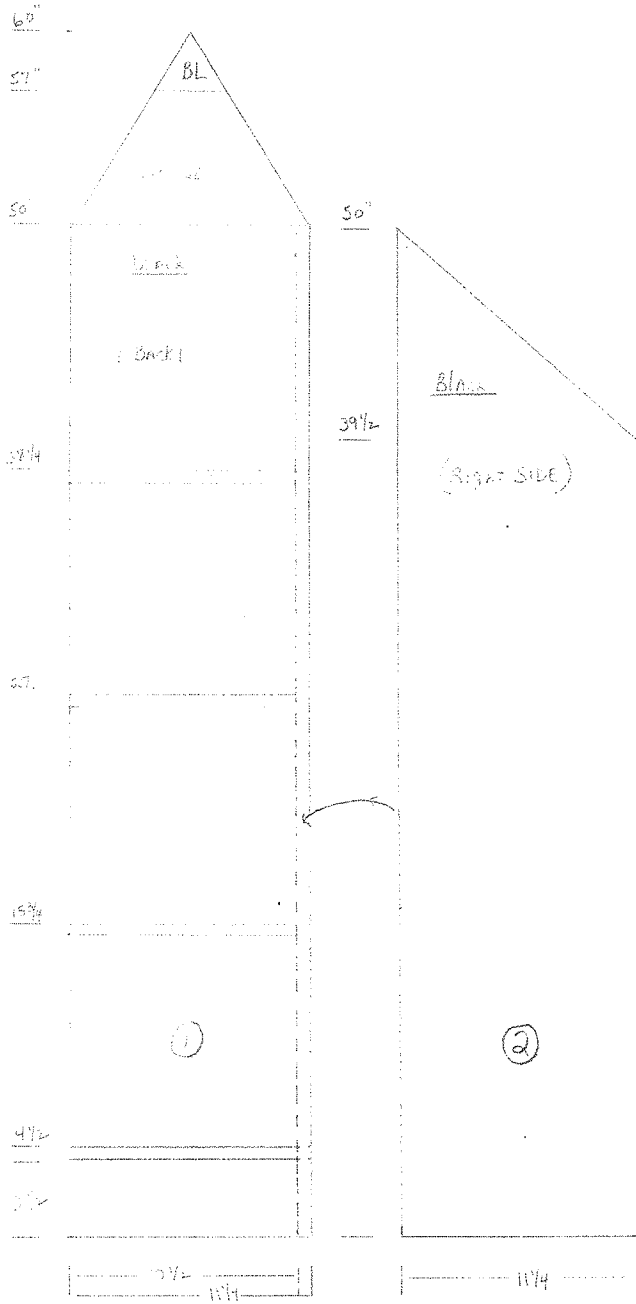
- Interior of book barn is painted natural using high gloss finish.
- The two adjustable shelves in the barn, the four fixed shelves and the pencil top of silo are also natural using high gloss finish.
- The outer shell of book barn and the back is painted with barn red latex paint
- The roof top and silo walls are painted a high gloss black latex



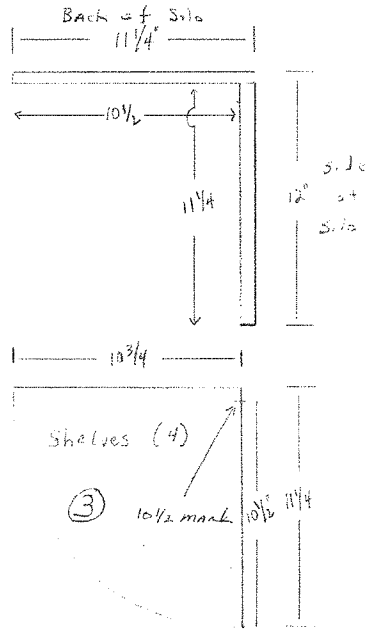




Silo



TOP VIEW OF Silo



Bottom View with BRACE 3/4 x 3 1/2 x 14"

