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# BUILD YOUR OWN DOG SLED

**Note: I have lost track of Charlie Yeager. His old email address is yeagerc@server.greatlakes.k12.mi.us, but it no longer functions.**

**National Mine School, Ishpeming, Michigan, U.S.A.**

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## INTRODUCTION

As part of the technology education program, an eighth grade middle school technology education class was given the task of designing and manufacturing a dog sled. Students investigated different types of dog sled designs. The original design of the dog sled parts was done with conventional drafting techniques. Students used a Mac Classic computer and MacDraw II to do the computer drawings. To incorporate writing across the curriculum, students kept journals noting their progress and wrote the directions that are found below. To incorporate reading across the curriculum, students read **WOODSONG** by Gary Paulsen.

The students' teacher, Charlie Yeager, previously taught math and science at the high school. Due to budget cuts he was reassigned to National Mine Middle School. Yeager is a musher and dog handler for Mark and Jill Churchill of Gwinn, Michigan. Yeager wanted to do an interesting project with his students yet still utilize the principles of technology. Students began with an idea and ended up with a finished product.

The dog sled is a basket sled and could be used for sprint races, short distance races or recreational mushing. It would make an excellent first sled for the beginning musher.

## DOG SLED PARTS LIST

### Wooden Parts

- Back Brace - 1
- Brake Board - 1
- Brush Bow - 1
- Cross Pieces - 3
- Driving Handle - 1
- False Runner - 2
- Foot Pads - 2
- Front Slat Cross Pieces - 2

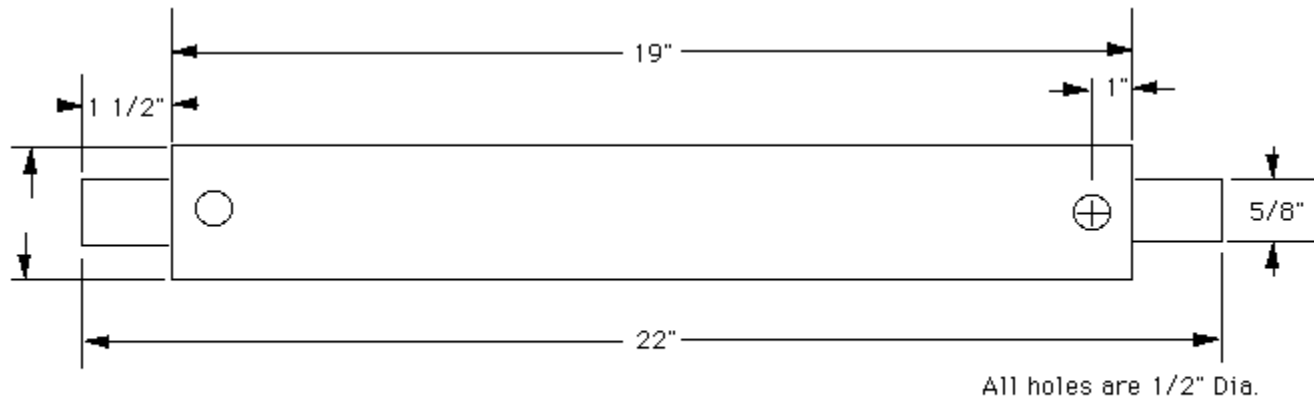
- Front Stanchion - 2
- Inside Slats - 5
- Rear Stanchion - 2
- Runners - 2
- Side Rails - 2
- Side Slats - 2
- Slat Braces - 4
- Wedge - 1

## Hardware

- 10 - Runner Bolts Flat Head 1/4 in. Diameter, 2 in. Long and Lock Nuts
- 12 - Eyebolts 1/4 in. Diameter, 2 in. of Thread and Lock Nuts
- 1 - Hinge and 1/4 in. Diameter Bolts With Lock Nuts
- 1 - Brake Claw With 1/4 in. Diameter Bolts and Lock Nuts
- 2 - Brush Bow Slotted Head 1/4 in. Diameter Bolts and Lock Nuts
- 14 - Bed Slotted Head 1/8 in. diameter Bolts and Nuts
- 2 - Front Cross Slat Slotted Head 1/8 in Diameter Bolts 1 1/2" Long Nuts and Washers
- 2 - Runner/Wedge Slotted Head 1/4 in. Diameter Bolts 2 1/2 in. Long
- 4 - Foot Pad Wood Screws 1 in. Long
- 1 pair - QCR Rails, Runners and Mounting Hardware
- 450 Feet - Nylon Cord
- Wood GLue
- Finishing Oil
- Varnish
- Wood Putty
- 1 - Bungee Cord 3 to 4 Feet Long

## INDIVIDUAL DOG SLED PARTS

### BACK BRACE

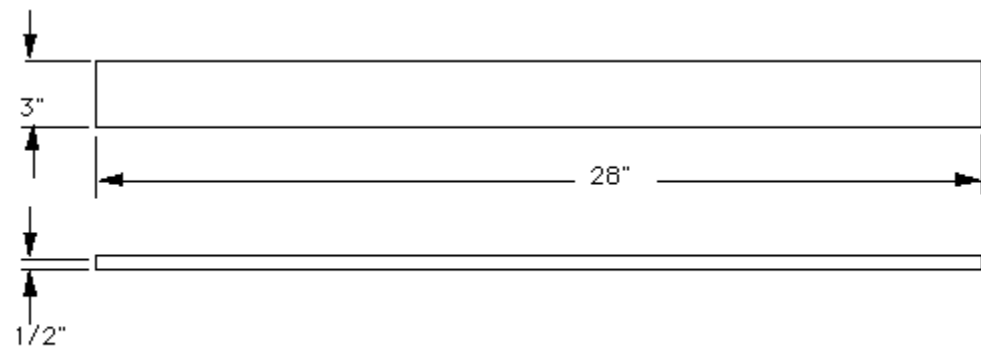


Justin Saari

National Mine School  
Ishpeming, MIDogsled - Back Brace  
Fall/Winter 1995

1. Select a piece of knot free wood and cut it to measure 22 in. x 1 1/2 in. x 1 1/2 in.
2. Cut tenons that measure 1 1/2 in. long and 5/8 in. x 5/8 in. on each end of the crosspiece.
3. Drill a 1/2 in. hole on each end of the back brace, centered, as shown in the drawing.
4. Using a rasp, round the edges of the back brace as shown in the drawing.

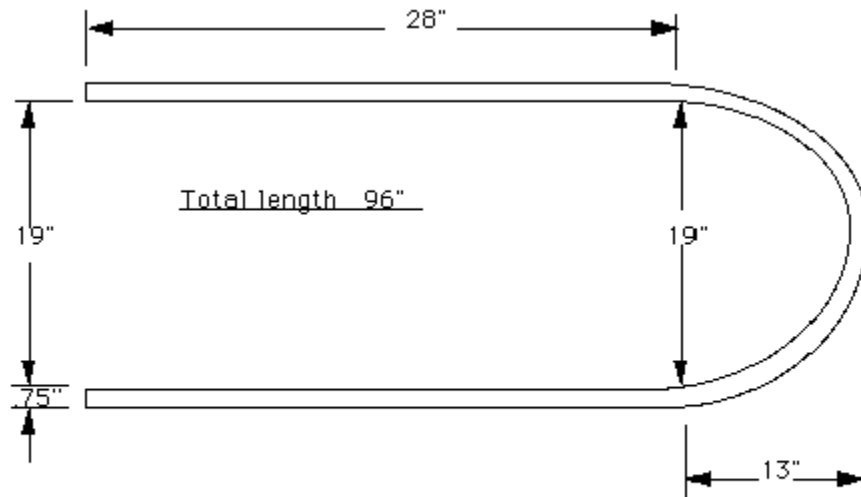
## BRAKE BOARD

National Mine School  
Ishpeming, MIDogsled - Brake Board  
Fall/Winter 1995

1. Select a piece of knot free wood and cut it to measure 28 in. x 3 in. x 1/2 in.
2. Sand the brake board until it is smooth.

- The brake board will be mounted with a hinge to the front main cross piece.

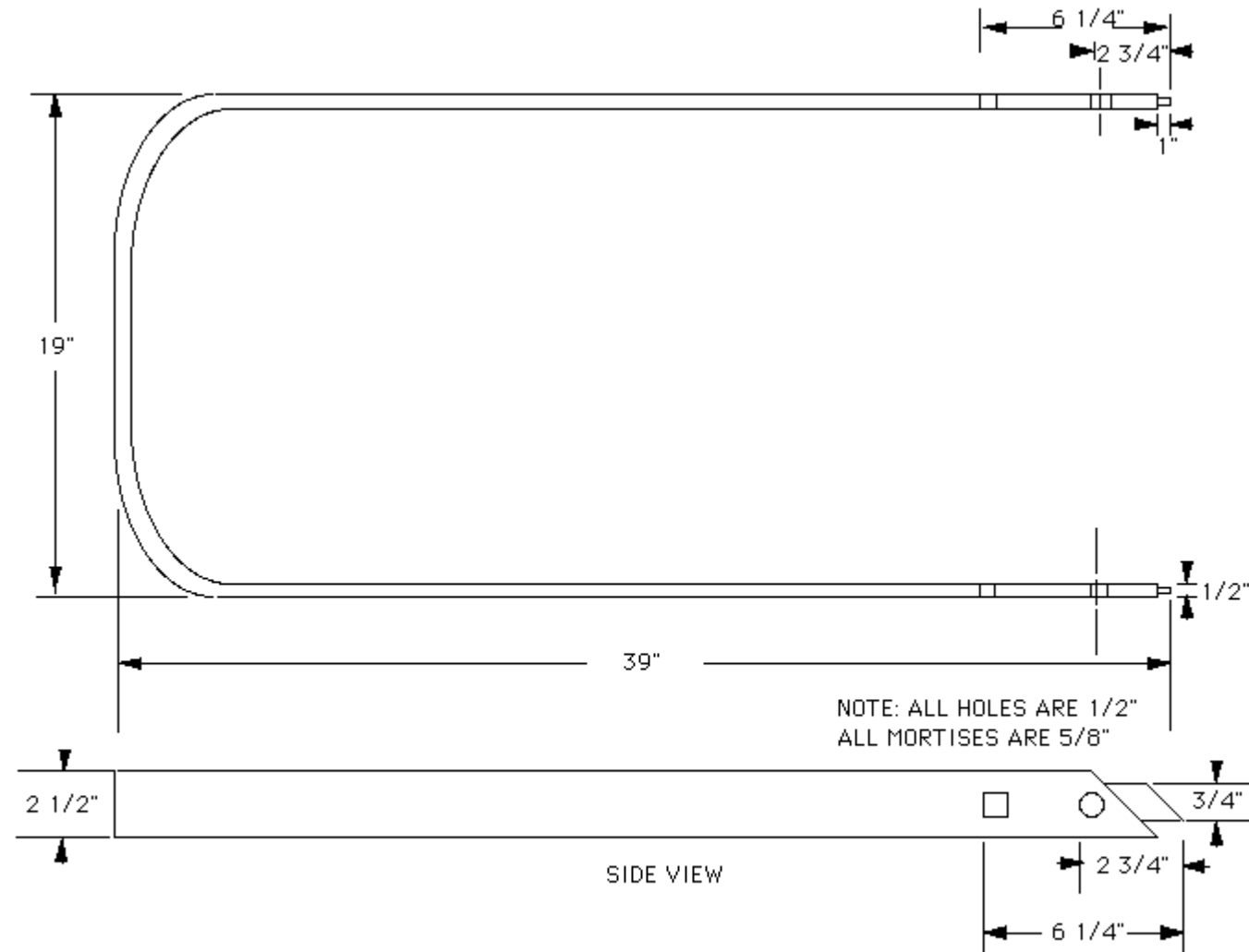
## BRUSH BOW



Mike Skogman    National Mine School    Dogsled - Brush Bow  
 Heather Henson    Ishpeming, MI    Fall/Winter 1995

- Cut four or five strips of wood 1 1/2 in. x 1/8 in. x at least 96 in.
- Steam them to soften them or bend them green on a form that is curved in front and 21 inches wide with a slight taper at the ends to a width of 19 inches.
- Clamp the strips to the form and let dry for a few days to a few weeks if the wood has been steamed or for a few weeks if the wood was bent green.
- Remove the wood from the form and laminate the strips together using either wood glue or contact cement. If you use wood glue, re-clamp the strips to the form after the wood glue has been applied. Wipe off all excess glue. Let the glue dry for 24 hours.
- Remove the brush bow from the form.
- Sand until smooth.
- Cut the ends to the proper length so that the brush bow can be bolted to the front stanchions. Drill a 5/32 in. hole, centered, 3/4 in. from each end.

## DRIVING HANDLE



Brett Rintamaki  
Willy Tippett

National Mine School  
Ishpeming, MI

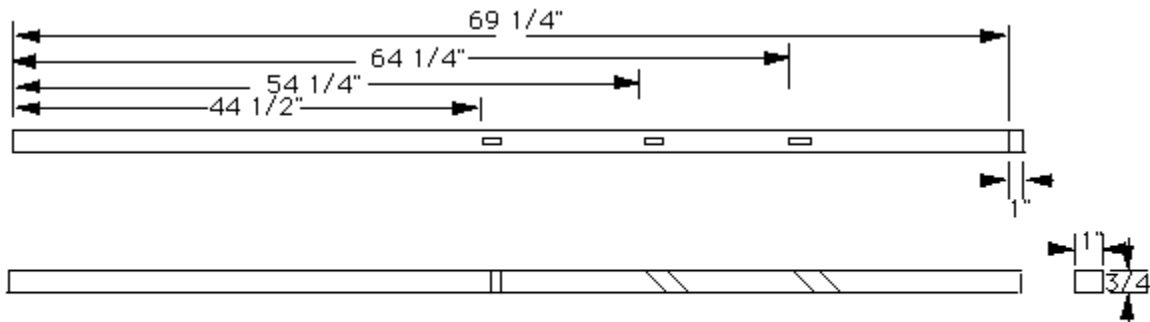
Dogsled - Driving Handle  
Fall/Winter 1995

1. Cut three or four strips of wood 1 1/2 in. x 1/8 in. x at least 96 in.
2. Steam them to soften them or bend them green on a form that measures 19 in. x 39 in. with rounded edges at the top of the handle.
3. Clamp the strips to the form and let dry for a few days to a few weeks if the wood has been steamed or for a few weeks if the wood was bent green.
4. Remove the wood from the form and laminate the strips together using either wood glue or contact cement. If you use wood glue, re-clamp the strips to the form after the wood glue

has been applied. Wipe off all excess glue. Let the glue dry for 24 hours.

5. Remove the driving handle from the form.
6. Sand until smooth.
7. Cut a 1 in. x 3/4 in. x 3/8 in. tenon on the bottom as shown in the drawing. This tenon should match the middle mortise hole in the false runner.
8. Cut a mortise hole 5/8 in. x 5/8 in. as shown in the drawing. Make sure that the mortise hole is centered. The mortise hole should match the tenon of the middle main cross piece.
9. Drill a 1/2 in. hole, centered, as shown in the drawing. This hole will be used to tie the sled together. This hole will allow you to tie the false runner to the driving handle.

## FALSE RUNNERS



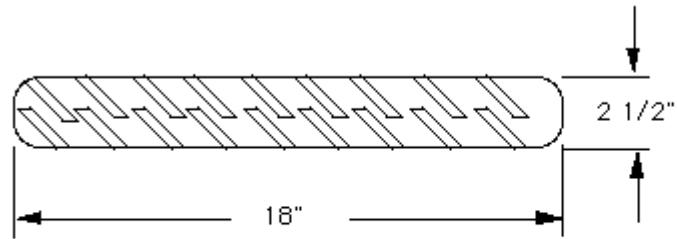
JEFF JACOBSON  
LOUIE VERVILLE

NATIONAL MINE SCHOOL  
ISHPEMING, MI

DOGSLED FALSE RUNNER  
FALL/WINTER 1996

1. Select wood for the false runners which is free from knots.
2. Measure and mark the wood at 70 1/4 in. long by 1 1/2 in. wide and 3/4 in. thick. Cut the wood to the measurements listed.
3. Cut the front of the false runners on a 45 degree angle as shown on the drawing.
4. Measure and mark mortise holes 3/4 in. x 1 in. x 3/8 in. The mortise holes are placed at 44 1/2 in., 54 1/4 in., and 64 1/4 in. from the rear of the false runners.
5. Cut the mortise holes out. The dimensions of the mortise holes should be 3/4" x 1" x 3/8". File them to fit the tenons.
6. Attach the false runners to the runners. Drill 1/4" holes for the bolts and eye bolts. Counter sink the holes in the runners. The Eye Bolts should be installed about two inches on each side of the stanchions and driving handle.

## FOOT PADS

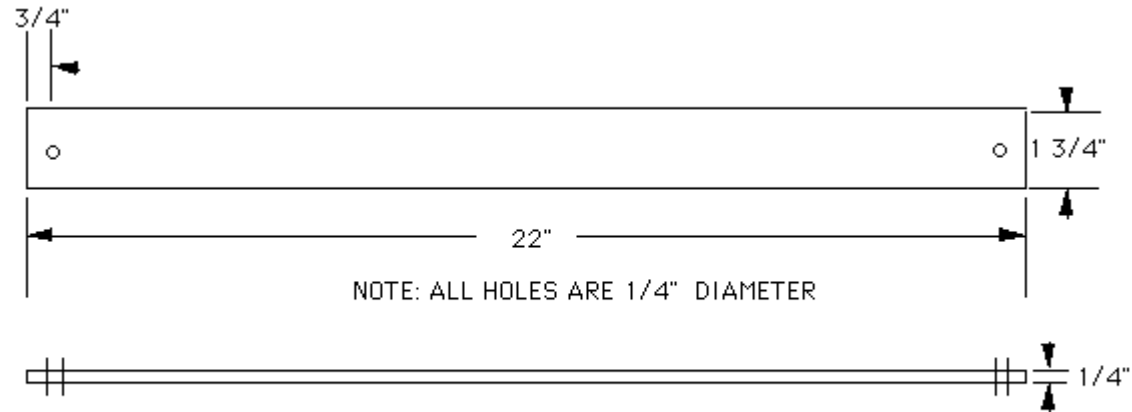


National Mine School  
Ishpeming, MI

Dogsled - Foot Pads  
Fall/Winter 1995

1. Select two pieces of knot free wood measuring 18 in. x 2 1/2 in. x 1/2 in. Round the corners.
2. Using a router, cut 1/4 in. grooves into the food pad as shown in the drawing.
3. Sand until smooth.
4. When the varnish is still wet, apply a dusting of sand for traction or glue or screw a rubber mat to the foot platform.

## FRONT CROSS SLAT PIECES



Dan Perry

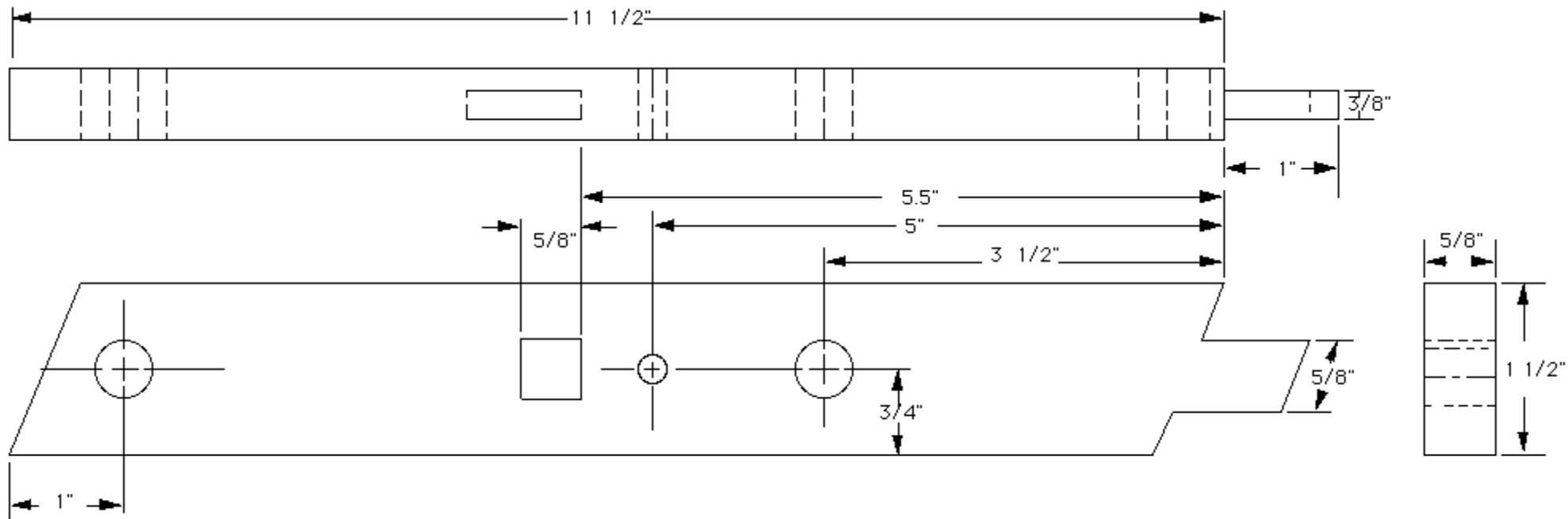
National Mine School  
Ishpeming, MI USA

Dogsled - Front Slat Cross Pieces  
Fall/Winter 1995

1. Select a piece of wood without any knots or other imperfections.
2. Cut it to 1 3/4 in. x 5/8 in. x 21 in.
3. Sand with coarse sandpaper, medium sandpaper, and then fine sandpaper until smooth.

4. Drill 1/4 in. diameter holes as shown in the drawing, centered and 3/4 in. from each end.
5. Using 1/4 in. bolts, bolt the front cross slat pieces to the side slats, the wedge and the runners.

## FRONT STANCHIONS



Brenda Benti  
Marc Hillman

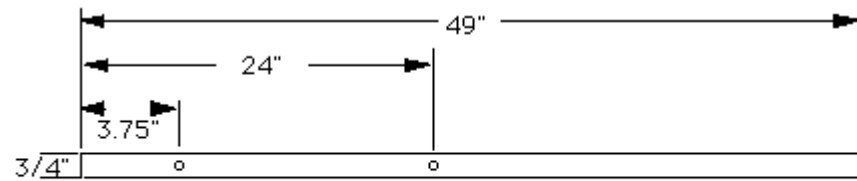
National Mine School  
Ishpeming, MI

Dogsled - Front Stanchion  
Fall/Winter 1995

1. Select a board that is knot free, about 15 inches long.
2. Cut it at about a 67 degree angle (see drawing) so it is 11 1/2 in. long, 5/8 in. thick and 1 1/2 in. wide.
3. Cut a 1 in. x 3/4 in. x 3/8 in. tenon on the bottom as shown in the drawing. This tenon should match the front mortise hole in the false runner.
4. Cut a mortise hole 5/8 in. x 5/8 in. Make sure that the mortise hole is centered. This mortise hole should match the tenon of the front main cross piece.
5. Drill two 1/2 in. holes, centered, as shown in the drawing. These holes will be used to tie the sled together. The top hole will allow you to tie the side rail to the front stanchion The bottom hole will allow you to tie the false runner to the front stanchion.
6. Drill a 5/32 in. hole 1 1/2 in. from the hole on the tenon side as shown in the drawing. This hole will be used to attach the brush bow.

## INSIDE SLATS

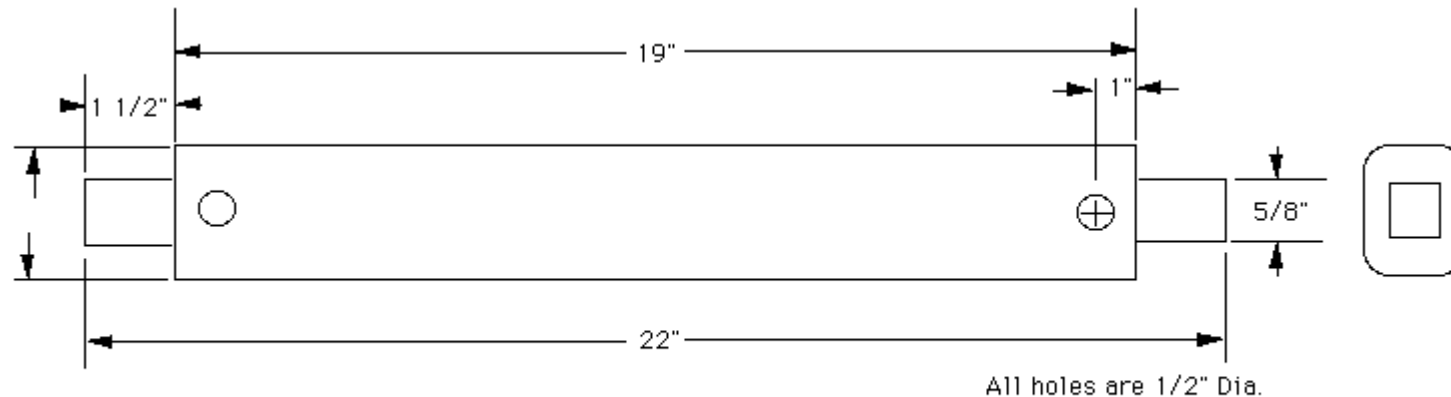




Adam Pascoe    National Mine School    Dogsled - Inside Slats  
Ishpeming, MI    Fall/Winter 1995

1. Select a piece of wood without any knots or other imperfections.
2. Cut it down to 3/4 in. x 1/4 in. x 49 in.
3. Sand with coarse sandpaper, medium sandpaper, and then fine sandpaper.
4. Drill holes in the center (3/8 in.) with a 3/16 in. drill bit at 3 3/4 in. and 24 in. (from the same end)
5. Bolt the inside slats to the other pieces of the bed.

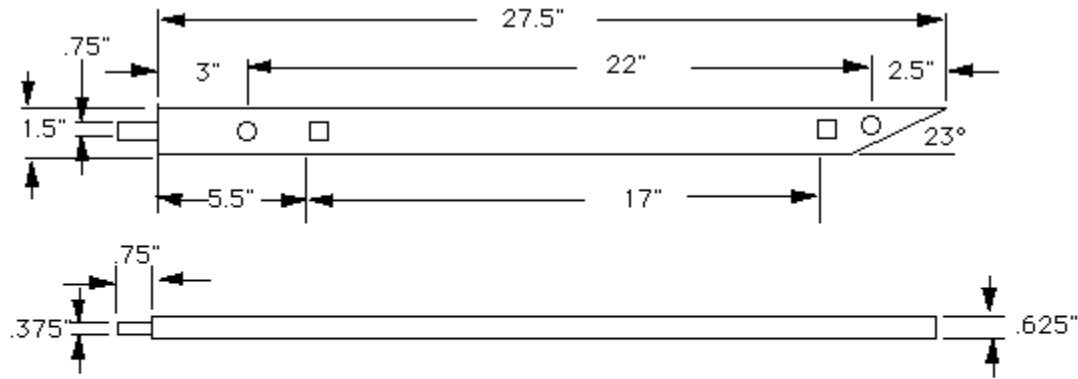
## MAIN CROSS PIECES



Jake London    National Mine School    Dogsled - Cross Pieces  
Ishpeming, MI    Fall/Winter 1995

1. Select a piece of knot free wood and cut it to measure 22 in. x 1 1/2 in. x 1 1/2 in.
2. Cut tenons that measure 1 1/2 in. long and 5/8 in. x 5/8 in. on each end of the cross piece.
3. Using a rasp, round the edges of the cross pieces as shown in the drawing.

## REAR STANCHIONS

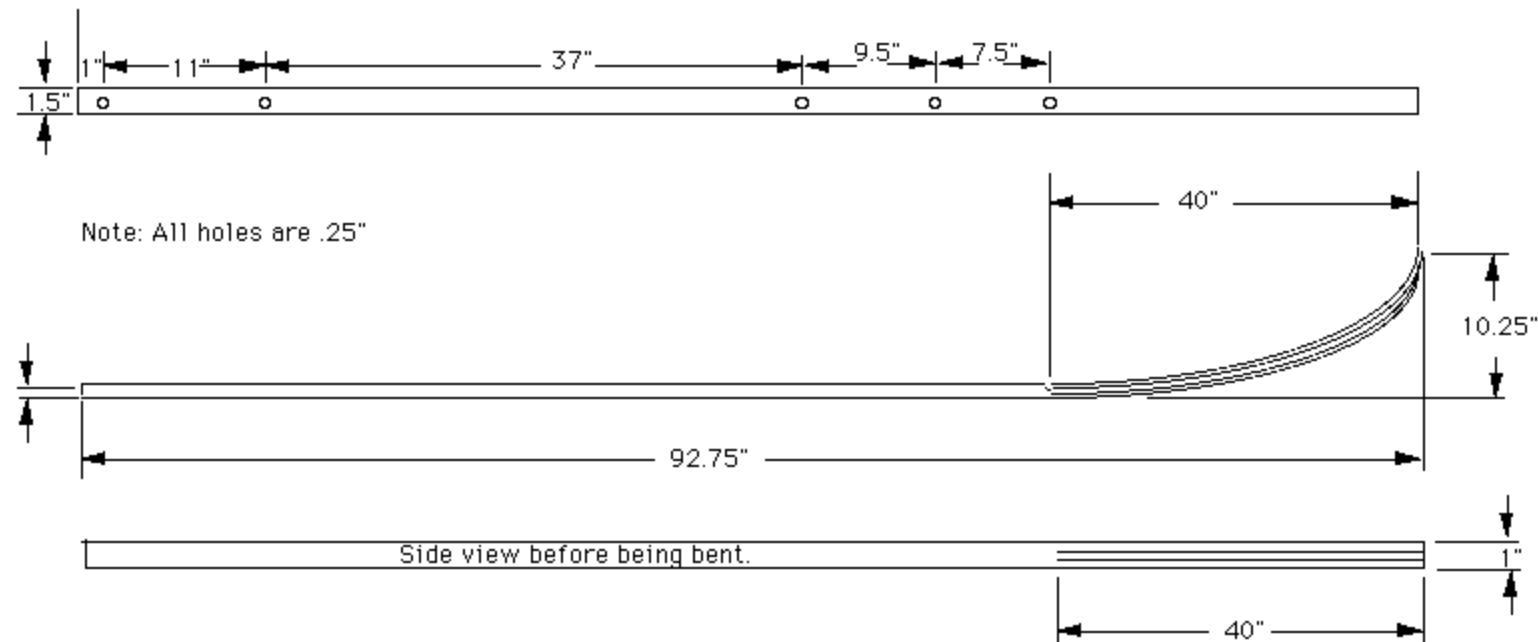


Note: Mortise holes are 5/8" x 5/8".  
Round holes are 1/2" diameter.

Mike Nardi      National Mine School      Dogsled - Rear Stanchion  
Suzanne Douglas      Ishpeming, MI      Fall/Winter 1995

1. Select a board that is knot free, about 30 inches long.
2. Measure, mark and cut it (see drawing) so it is 28 1/4 in. long, 5/8 in. thick and 1 1/2 in. wide.
3. Cut a 1 in. x 3/4 in. x 3/8 in. tenon on the bottom as shown in the drawing. This tenon should match the rear mortise hole in the false runner.
4. Cut two mortise holes 5/8 in. x 5/8 in. as shown in the drawing. Make sure that the mortise holes are centered. The bottom mortise hole should match the tenon of the rear main cross piece. The top mortise hole should match the tenon of the back brace.
5. Drill two 1/2 in. holes, centered, as shown in the drawing. These holes will be used to tie the sled together. The top hole will allow you to tie the driving handle to the rear stanchion. The bottom hole will allow you to tie the false runner to the rear stanchion.

## RUNNERS



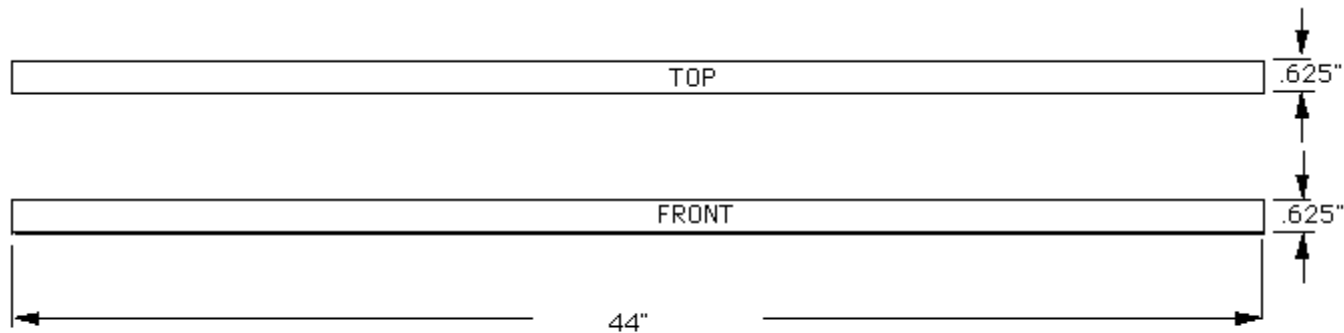
Tony Michalski  
Sean Palomaki

National Mine School  
Ishpeming, MI

Dogsled - Runner  
Fall/Winter 1995

1. Select a piece of wood that is about 100 in. long and knot free.
2. Cut two pieces that measure 98 in. x 1 1/2 in. x 1 in.
3. In the two pieces that are 98 in. long, make two cuts 40 in. long so that the wood will bend as shown in the drawing.
4. Cut four boards that measure 40 in. x 1 1/2 in. x 1/8 in. These boards will be placed into the spaces cut in the 98 in. pieces.
5. To laminate the curved portion of the runners, spread wood glue on both sides of each of the 40 in. long pieces of wood and on the insides of the 98 in. long piece.
6. Fit the 40 in. pieces inside the slits that were cut into the 98 in. long pieces of wood. While the glue is still wet, clamp them to a form that has been pre-cut to the bend of the runners. Begin clamping at the straight end and work toward the curved end. Wipe off all excess glue. Let the glue dry for 24 hours.
7. Remove clamps and sand off any excess glue that may have dried on the runners.
8. Clamp the runners to the false runners to drill 1/4 in. holes for bolts and eye bolts. Countersink the holes as needed.

## SIDE RAILS

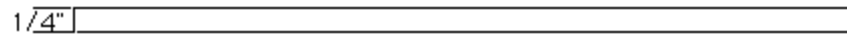
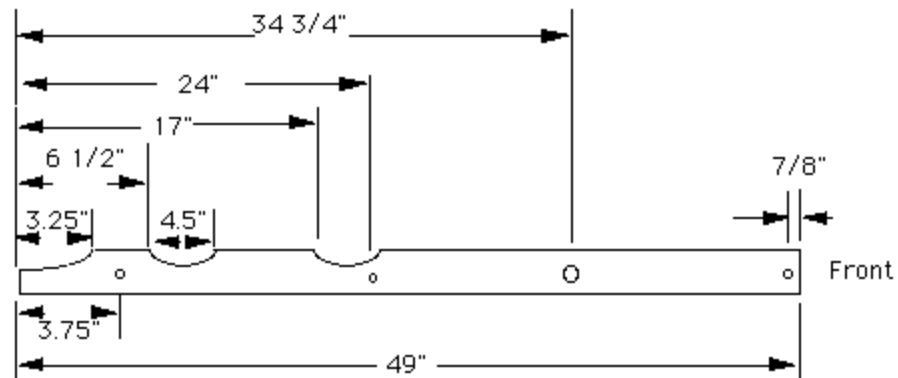


Jessica Benti

National Mine School  
Ishpeming, MIDogsled - Side Rail  
Fall/Winter 1995

1. Select a piece of wood without any knots or other imperfections.
2. Cut it to 44 in. x 5/8 in. x 5/8 in.
3. Sand with coarse sandpaper, medium sandpaper, and then fine sandpaper until smooth.
4. Steam until wood is flexible or bend when wood is green.
5. The false runners must be attached to the runners; the stanchions driving handle, main cross pieces, back brace and bed must be tied in place. After this is done, take the wood out of the steamer and bend into place. Clamp the side rails to the driving handle, the front stanchion and the side slats.
6. Let dry for a few days.
7. Remove the clamps and tie the side rails to the driving handle, the front stanchion and the side slats.

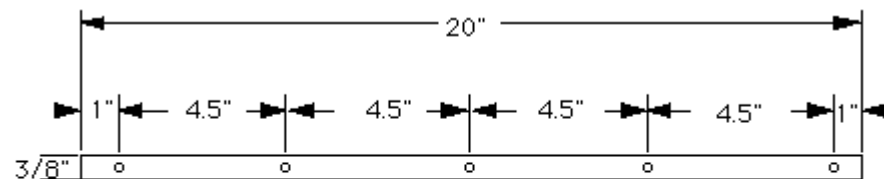
## SIDE SLATS



Kim Nuorala National Mine School Dogsled - Side Slat  
 Kristy Quayle Ishpeming, MI Fall/Winter 1995

1. Cut a piece of wood that measures 49 in. x 2 in. x 1/4 in.
2. Mark the curves (as shown in the drawing) on the wood and cut them out with a band saw, jig saw, scroll saw or coping saw.
3. Measure and mark locations for the holes on the piece of wood then drill the holes.
  1. Two 3/16 in. diameter holes should be centered and marked 3 3/4 in. and 24 in. from the rear end of the side slat. These will be used to bolt the bed together.
  2. A 1/2 in. diameter hole should be centered and marked 34 3/4 in from the rear end of the side slat. This hole will be used to tie the side rail to the side slat.
  3. A 1/4 in. diameter hole should be centered and marked 7/8 in. from the front end of the side slat. This hole will be used to bolt the front cross pieces, the wedge, the side slats and the runners together.

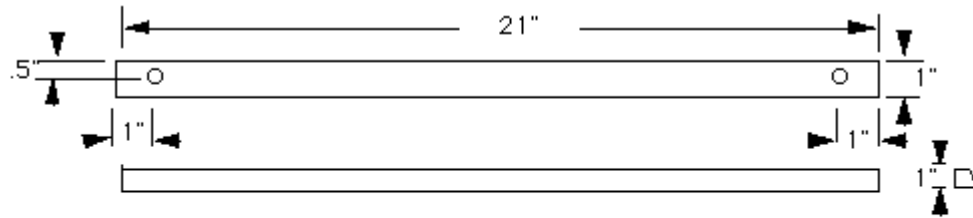
## SLAT BRACES



Jessica Benti National Mine School Dogsled - Slat Braces  
 Ishpeming, MI Fall/Winter 1995

1. Select a piece of wood without any knots or other imperfections.
2. Cut it to 20 in. x 3/8 in. x 1/4 in.
3. Sand with coarse sandpaper, medium sandpaper, and then fine sandpaper until smooth.
4. Drill 3/16 in. diameter holes as shown in the drawing.
5. Bolt the slat braces to the other pieces of the bed.

## WEDGE



NOTE: ALL HOLES ARE .25 INCHES.

Adrian Trudell

National Mine School  
Ishpeming, MI

Dogsled - Wedge  
Fall/Winter 1995

1. Cut a piece of wood so it measures 21 in. x 1 in. x 1 in.
2. Cut or rasp so that the wood resembles a wedge and it will fit in between the slats and the runners near the front of the sled (see drawing of wedge).
3. Drill 3/4 in. holes, centered, 1 in. from the each end of the wedge as shown in the drawing of the wedge. These holes will be used to bolt the wedge to the runners. The side slats will be tied to the wedge.

## DOG SLED ASSEMBLY DIRECTIONS

1. Attach the false runners with 1/4 in. flat head bolts. Also install the eyebolts to the runners and false runners. The eyebolts are used for tying down the stanchions and driving handles.
2. Bolt the wedge to the front of the runners.
3. Tie the front stanchions, back stanchions and driving handle to the eyebolts on the false runners and runners.
4. Tie the main cross pieces to the driving handle, front stanchions, and rear stanchions.
5. Tie the back brace to the rear stanchions.
6. Assemble the bed by bolting the side slats, inside slats and slat crosspieces together.
7. Tie the bed in place by tying it to the wedge, the front stanchions and rear stanchions, the driving handle and the rear main cross piece.
8. Steam the side rails. Bend and clamp them to the driving handle, stanchions and side slats.
9. Tie the side rails to the driving handle and rear stanchions, the front stanchions and to the side slats.

10. Attach the brush bow to the front stanchions with two slotted head 1/4 in. diameter bolts and lock nuts. Tie the front of the brush bow to the side slats and to the wedge.
11. Attach the foot pads to the back of the false runners with wood screws.
12. Attach the brake board to the front main cross piece with 1/4 in. diameter bolts and a hinge. Wrap the bungee cord around the brake board and attach it to the back brace.
13. Attach the metal claw brake to the brake board using 1/4 in. diameter bolts.
14. Attach the QCR rails to the bottom of the wooden runners. Slide on the plastic runners and bolt them in place.



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