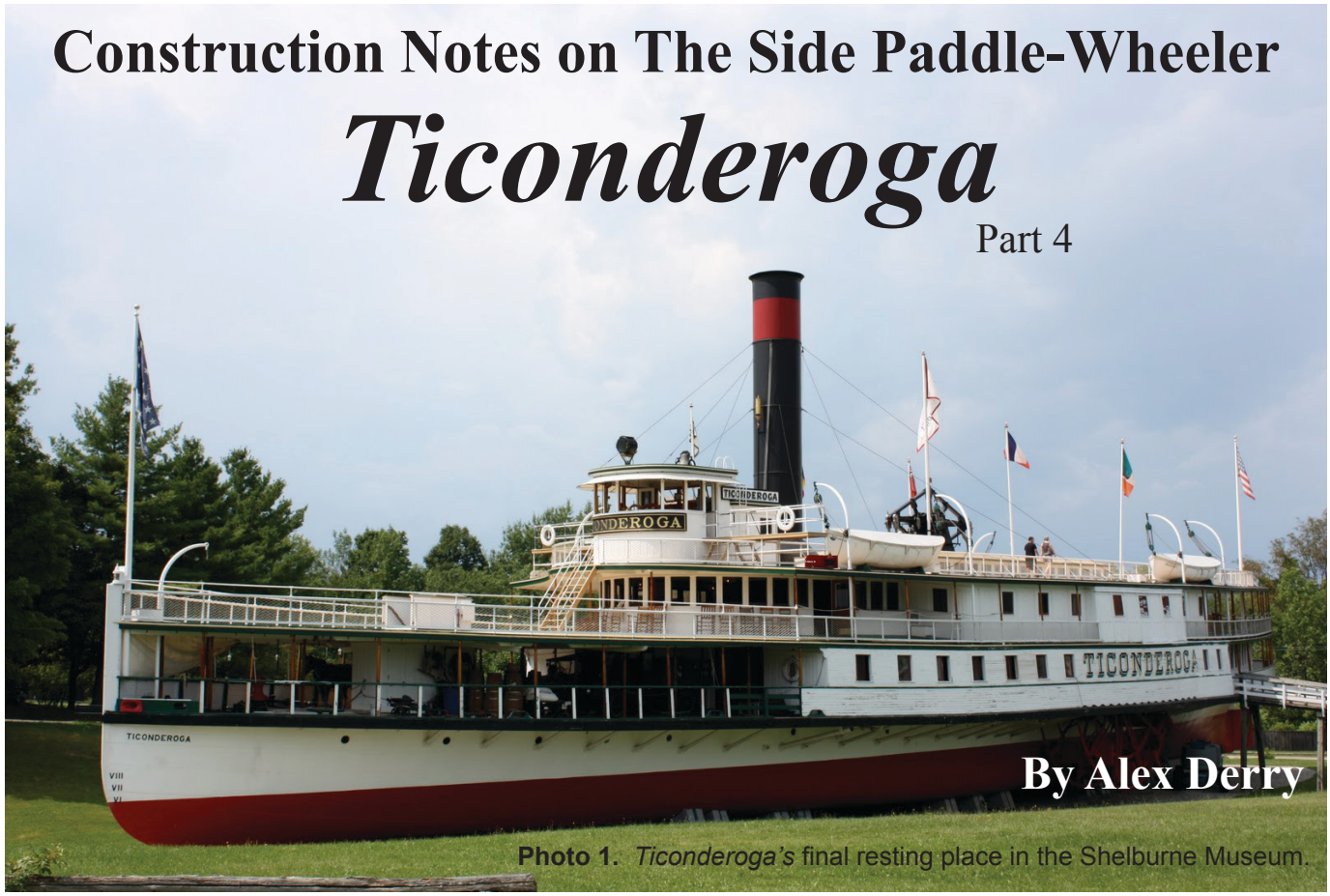
Construction Notes on The Side Paddle-Wheeler

Ticonderoga

Part 4



By Alex Derry

Photo 1. *Ticonderoga's* final resting place in the Shelburne Museum.

Welcome back, in "Part 3" I discussed the process of building the Walking Beam steam engine which was put aside to await the preparation of the interior of the first deck. The drawings that I obtained from Chip Stulen curator of the Shelburne Museum, were very complete however the interior details of all of the decks were not included since they were not intended to meet the needs of a modeler wishing to include those details. To remedy this shortcoming, I began to measure and record all these details. This essentially involved a twenty-five foot tape measure which included metric units, a pad of paper and pencil and, a lot of patience. Along with these measurements I took hundreds of digital images to provide a visual context for each measurement. **Photo 64** shows a scaling device that I used when taking these images. The black and white rod is evenly divided into 10 cm sections of alternating colours. Sorry about the 10 cm thing but I am a Canadian. I did all of these measurements in metric units since they are easier to use. By knowing the length of each colour on the rod, the size of the ship's helm could be estimated with reasonable accuracy. Care must be taken to take the photo as "face on" as possible to avoid parallax distortion. All of these measurements needed to be scaled

Photo 64. The black and white scaling tool allows the estimation of the size of objects seen in the image.

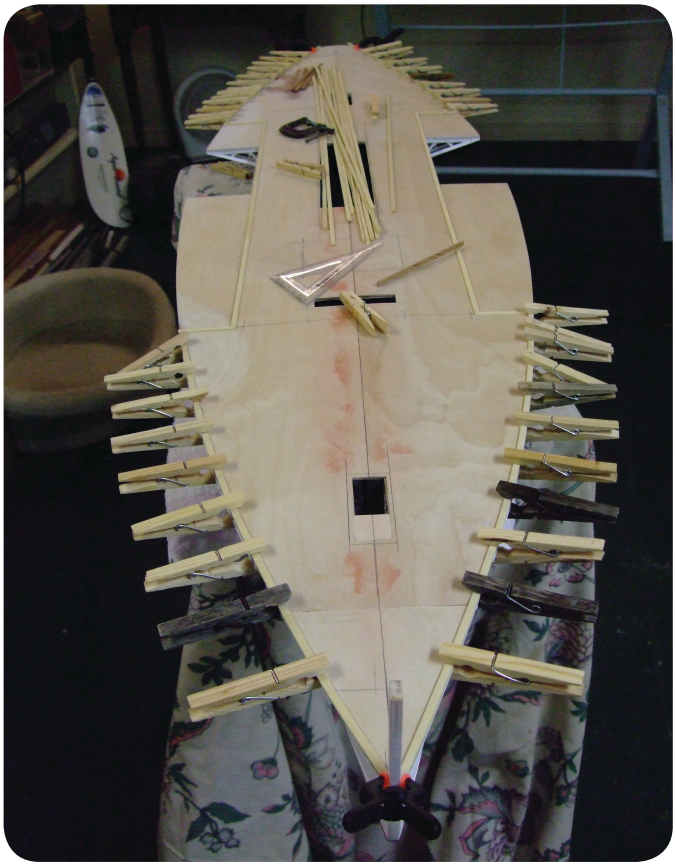


Photo 65. The framing based on the measurements transposed onto the deck is being added.

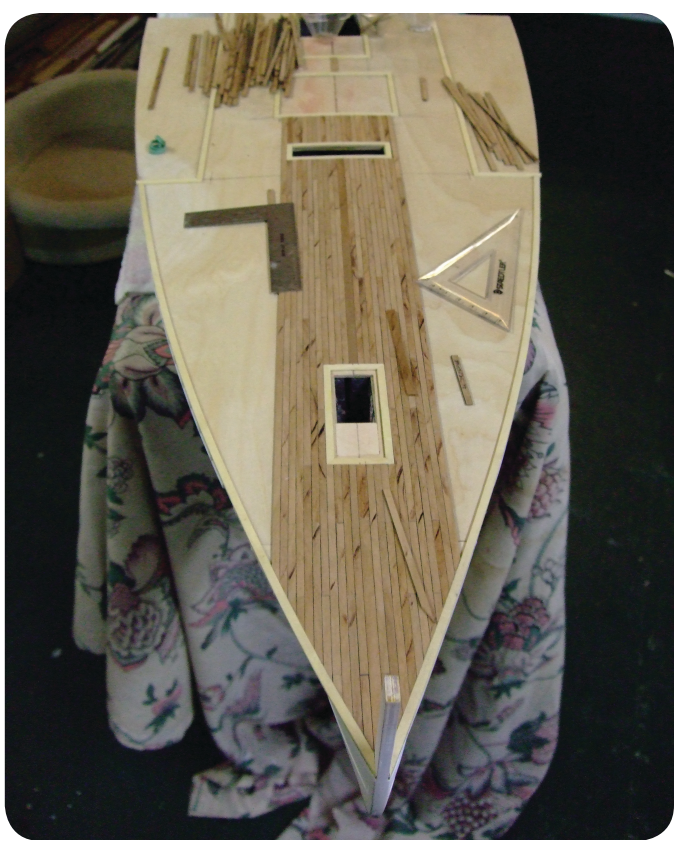


Photo 66. The "three-butt" planking has begun. Note that nibbling is not required for the planking at the water board near the bow.

down to 1/48th and then drawn onto the plans. I first drew on the plans a centre line fore and abaft from stem to stern. I then used anchor points from which to start measurements. An example would be, the centre of the abaft side of a forward outer wall shown on the drawing. I could then work my way inward. In this way I could transpose my scaled measurements onto the plan. The interior walls for the engine enclosure paired with the location for the grand staircase plus the location of the dividing walls for the dining area, were some of the details required to model the interior. Once the drawings were completed and verified with the images available, I began to transpose them onto the surface of the first deck. In "Part 2" you will recall that cut outs were made in this deck to allow for the placement of descending staircases and the base of the engine below this deck. The combination of the cutouts and the transposed drawings provided the detail required for me to define the deck areas that were planked. **Photo 65** shows the beginnings of the framing for the boarders of the planking. The framing of the edges of this deck provided the traditional water boards. I used milled clear pine for the framing that was later coloured with an application of polyurethane that had been stained to match the black cherry planking.

Photo 66 shows the start of the placement of the deck planking. I used black cherry wood for the planks as its grain is tight and the colour is consistent. In the photo one sees some darker spots on the planks caused by the milling of the wood. These were sanded away during the finishing process. Each plank was scaled to a twelve foot length and to a five inch width and then all edges were darkened with a drawing pencil to simulate the sealant placed there during their installation. I used Thirty Minute Epoxy for the adhesive since it permits the movement of the planks before setting and once set it is easily sanded and leaves no visible traces on the finished product. Care must be taken to ensure that the adhesive isn't allowed to set while leaving excess, as this would interfere with the positioning of the next set of planks. One can see in **Photo 66** a central plank which is wider called the "king plank" onto which the placement of all the remaining planks follow in matching sequence on each side. It is wise to apply the planks equally on each side to avoid any possibility of warping. I used a "three-butt" system for the installation. This means that each sequential line of planks starts one-third the length of a plank behind the previous line. This ensures that the butt locations are always a third of their length away from those

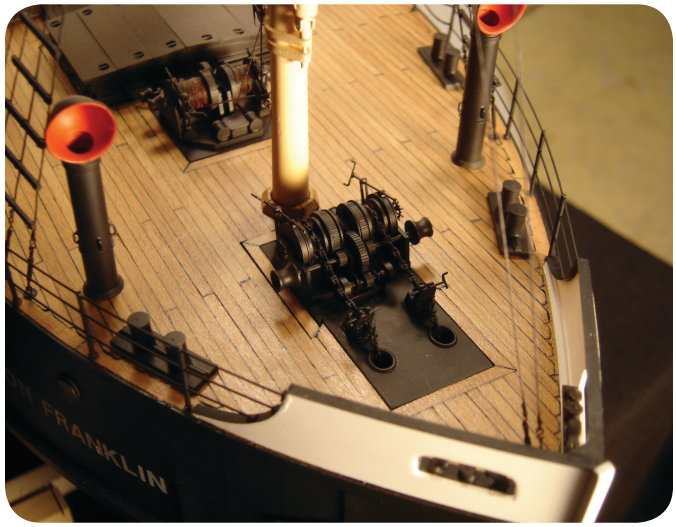


Photo 67. This image shows the "three-butt" planking and nibbling at the bows.

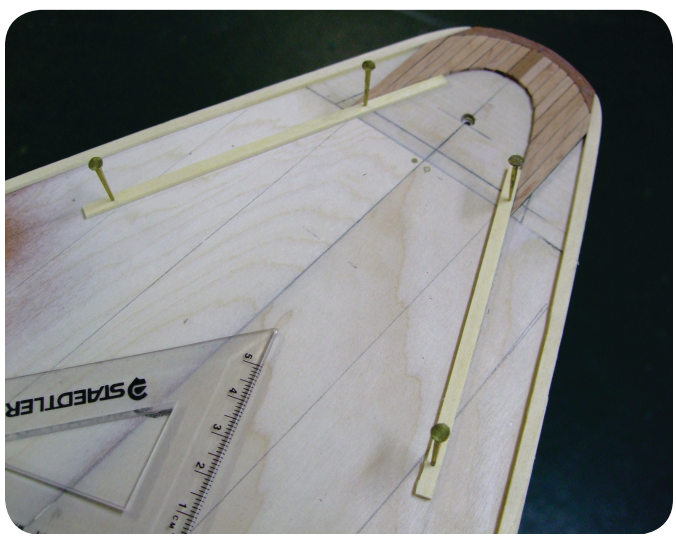


Photo 68. The application of the planking at the stern follows the pine boarders in a fore and abaft pattern.

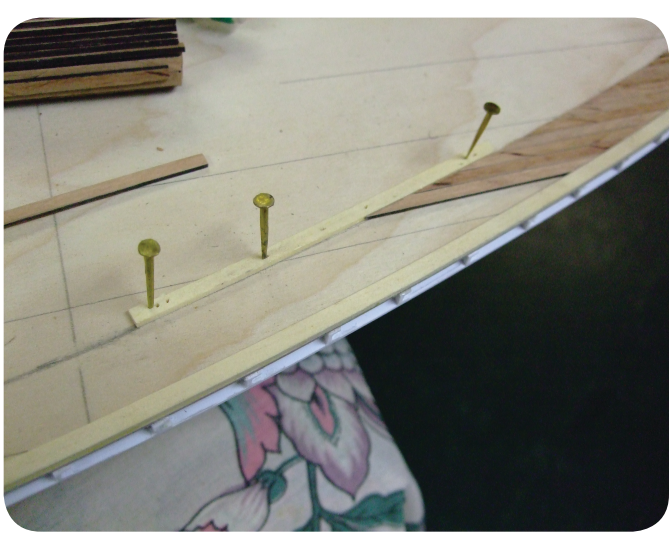


Photo 69. The planking for the walkway outside the dining salon needed to be fared into the pine boarders.

Photo 70. The planking is complete for the area where the engine will be mounted. Next, the finishing will be done.

Photo 71. The forward cargo deck is ready for sanding and polyurethane application.

found on either side. Also in **Photo 66** one can see at the bows that the planks are cut obliquely to fare into the water board. This would not usually be permitted as nibbling would be required to ensure that the width of the plank would be wide enough to provide the strength to secure it at its narrowest point. **Photo 67** shows the "three-butt" planking and an example of nibbling. In the case of *Ticonderoga*, her hull was steel and along the interior edge of the hull the steel extended to create a support below for the plank end and so the plank attachment strength was assured and as a result, nibbling was not required.

Photo 68 shows the stern planking that was found on the walkway surrounding the dining salon. The pine boarders were set out to provide a guideline

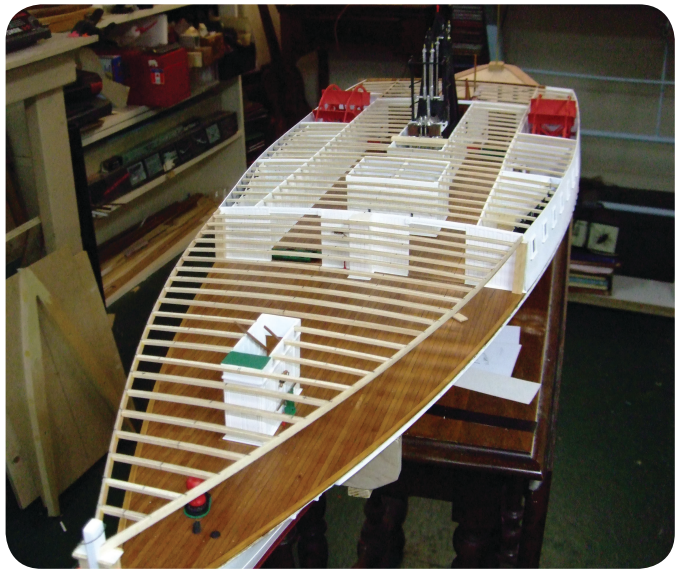


Photo 72. The finished planking and pine boarders.

Photo 73. The less complex raised paneling of the inner walls of the portion of the deck dedicated to the paddlewheels and engine.

Photo 74. The more complex raised paneling for the majority of the walls.

for the planks which were laid in the 'fore and abaft' manner as in all other areas on this deck. The shape of the stern is unusual for a ship of this size. The inside pine boarder for the very end where the curvature is tight, needed to be cut and shaped from a sheet of clear pine. This took patience since the piece required a consistent width matching the other boarders. The walls for the salon were to be located on the inside pine boarders. The planking for the walkway further forward around the outside of the Dining Salon, is shown in **Photo 69**. Each piece needed to be fared into the pine boarders in order to maintain the " fore and abaft" pattern. **Photo 70** shows the planking located where the steam engine enclosure was placed. Again, sanding and finishing is yet to be done. There is some observable evidence of the "three-butt" system here. Finally, **Photo 71** shows the forward deck planking finished and ready for sanding and application of polyurethane. The coloured polyurethane for the pine boarders was applied after the planked area was complete. Coloured polyurethane is a product that is tinted to provide a wood like colour. Minwax and Varathane are examples of companies that make these products. **Photo 72** shows the finished deck surface.

Photo 72 also serves to show the structures that will be needed to complete this deck. There are numerous enclosures to build, partition walls to raise and the ceiling beams to mount. With all this to do I will begin with some general comments on walls and partitions.

All of the walls that make up the compartments and partitioning are built as raised paneling. **Photo 73** is an example of the paneling of the walls that were used to partition the paddlewheels from the inner space of the engine deck. This was a less elaborate design than that seen in **Photo 74** as this was an area of less formality.

All of the raised paneling seen on this model is hand laid. I used Evergreen styrene products and various milled wood to build up the patterns that you will see. This process required careful planning as the correct widths and depths of the pieces were needed to build the scaled down patterns found on the full sized ship. The drawings on the plans were very helpful since the paneling detail were present and could be easily referenced (see **Photo 75**). As for the interior walls, I had to rely on my photos and measurements. Each wall built by me needed to be measured to scale. Cut to the correct size and shape and then the widths of the styrene strips selected so that the patterns of panels would fit onto the wall. Once the plan had been made then the

assembly could begin. **Photo 73** is a good example to consider. The first things I built were the vertical and horizontal pieces as seen here. I found that I had to decide which plane would be one continuous piece for example, the horizontal plane, and then build in the vertical plane. This took a lot of time, patience and spatial judgment. Look carefully and you will see evidence of the choices I made here. Once the pieces were set in place I filled any seams with a talc and acrylic paint putty and then gently sanded them when dry. This process needed to be repeated to meet my expectations. In the case of **Photo 74**, I needed to add the panels that would fill the spaces between the vertical and horizontal frames. In this case I chose the appropriate width and height to fit within the space while leaving a narrow gap on all sides. These gaps created the contrast needed for the eye to see the panel as separate and yet integrated with the framing.

I need to mention a few things here about the glue choices. I used thin CA (cyanoacrylate) for the applications shown in **Photo 73** since it would easily flow under the styrene strips once they were placed co**rrectly.** For the panels filling the spaces shown in **Photo 74**, there needed to be time to shift each piece after its application to ensure it was perfectly centered. I used Five Minute Epoxy for this purpose. All styrene used here was washed carefully to remove any releasing agent before being applied. This insured that the bonding agent could do a good job.

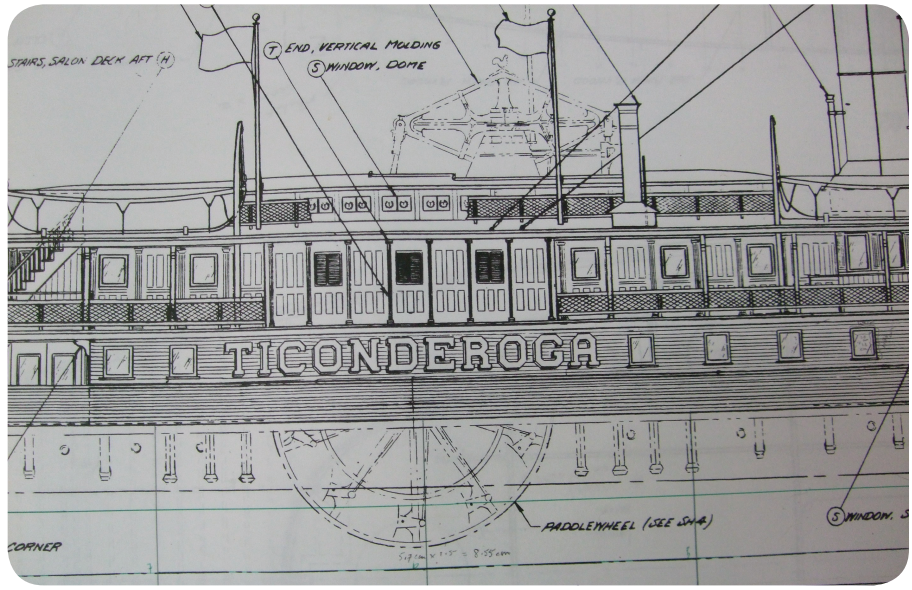


Photo 75. The plans provided references for the paneling of the exterior walls.

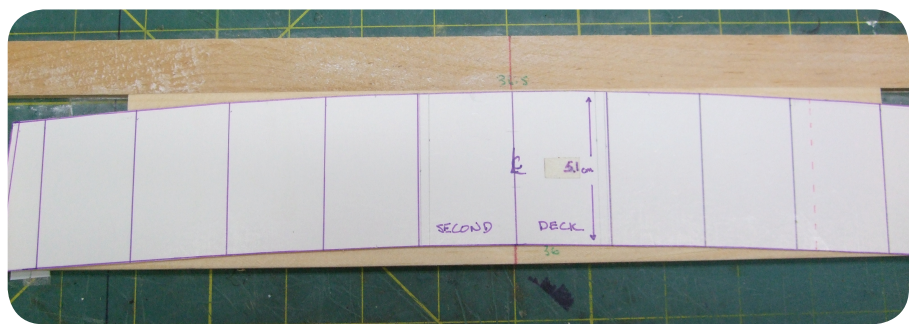


Photo 76. The pattern of the deck and ceiling camber and the enclosed height was made from Bristol-board.

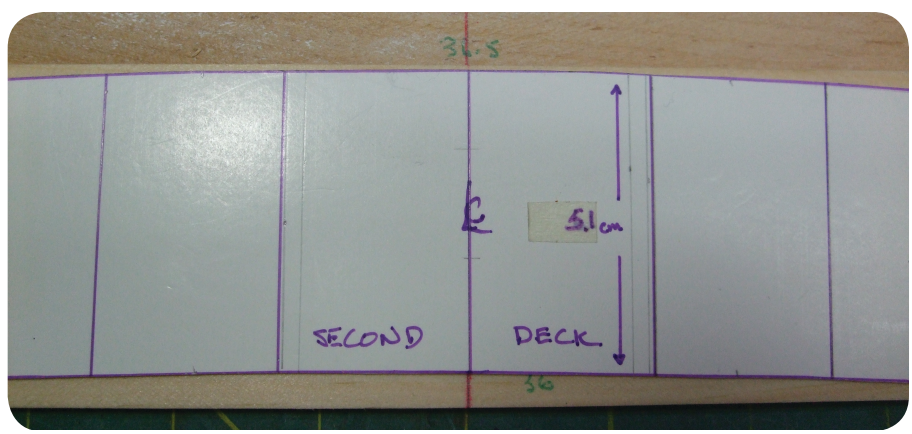


Photo 77. The centre line of the pattern was drawn first then the vertical lines were added at equal distances from it.

The three decks on *Ticonderoga* have a camber that is illustrated in the plans. The camber needed to be taken into account when cutting out wall and partition shapes which rest on the camber shape. Both the top and bottom of these structures must incorporate this camber so I decided to make a pattern that would allow me to repeatedly trace the appropriate shapes. **Photo 76** shows the pattern minus its very edges. The lines drawn on the pattern are vertical to the horizontal. I drew these lines on the stock material using the rectangular shape to establish these vertical lines. The camber was then drawn over these lines while ensuring that its outside lower corners were equidistant from the bottom of the rectangular stock material.

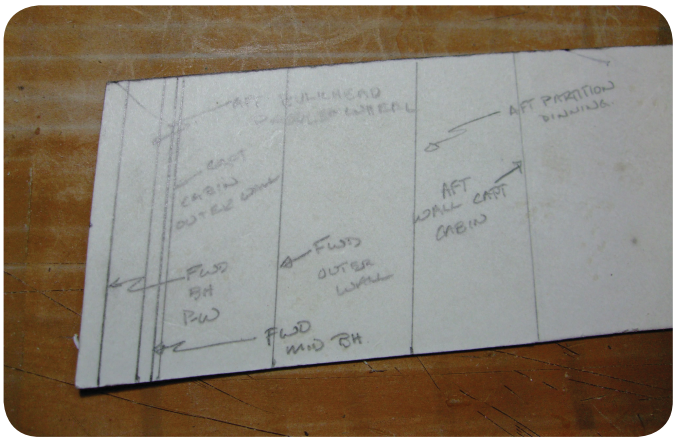


Photo 78. The outer most ends of the pattern could the be used to establish the angle of the outer ends of the partition.

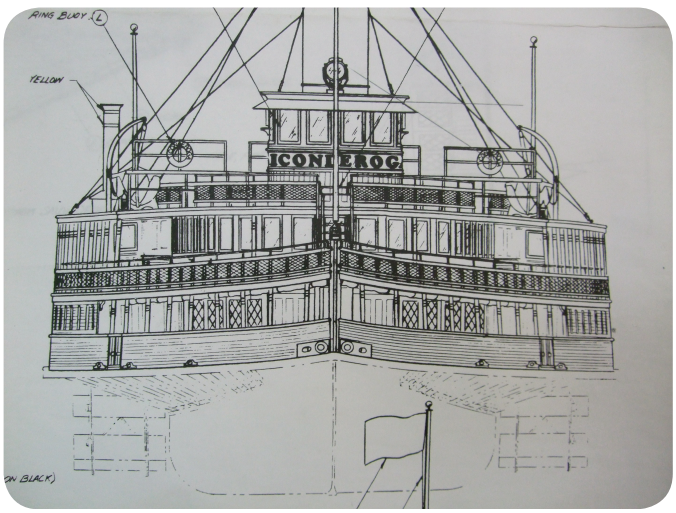


Photo 79. The plan drawings show that the outer walls are slanted inward from the vertical plane which resulted in a reduction in the size of each consecutive deck.

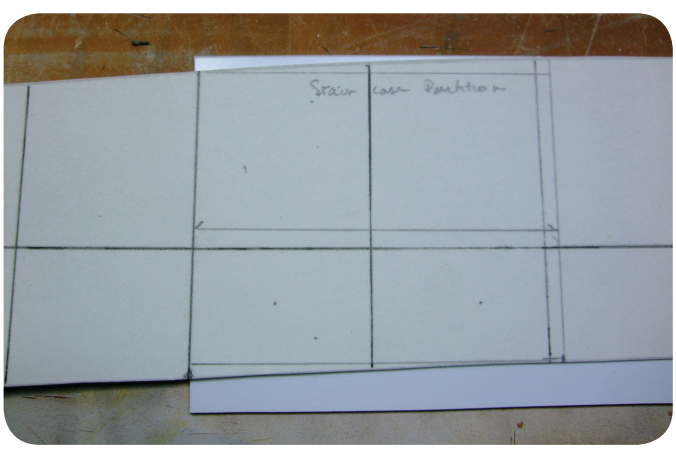


Photo 80. The pattern was used to draw the shape of the cambers.

Once this was done it was cut out. The material that I used was Bristol-board which is thick enough that it can guide a pencil nib and thin enough to be easily cut to shape. **Photo 77** shows the centre vertical line which was established first and then equal spaced reference lines were added out from the centre. The height of the deck space was established from the plans as 5.1 cm.

Further to this, the pattern could be used to determine the angle of outside ends of the partition which would be supporting the outer most walls of the ship as is shown in **Photo 78**. These lines were drawn following the diagrams in the plans. *Ticonderoga* was not a straight-sided vessel. **Photo 79** shows that the outer most walls are angled inward from the vertical resulting in a consecutive reduction of the size of the decks. By placing the centre line of the pattern onto the centre line on the plan I could set the size of the wall and the angle required on its outer sides. Any walls that did not span the full width of the ship were given sides that followed the vertical lines as is shown in **Photo 80**.

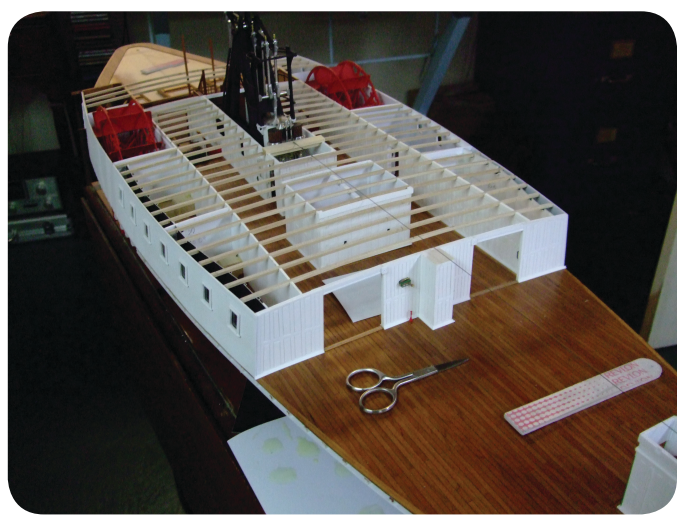


Photo 81. The middle third of this deck had four enclosures, the grand staircase, two partition walls and The ceiling beams.

I started first with the build of the middle third of this deck. **Photo 81** shows the arrangement of the various structures. The engine and paddle-wheels had to be installed during this process since they would be enclosed here. There were six structures to be built. Two long narrow ones that housed the paddlewheels and work related spaces were my first priority so I focused on the long walls. I will discuss the building of the paddle-wheels at another time as they were an intense challenge worthy of a separate part in the series. **Photo 82** shows the full wall finished and its mold. I had some aging RTV Micro Mark molding supplies that needed to be used, so I decided to mold a copy rather than endure the tedium of building it up the second wall. The Micro Mark product works very well

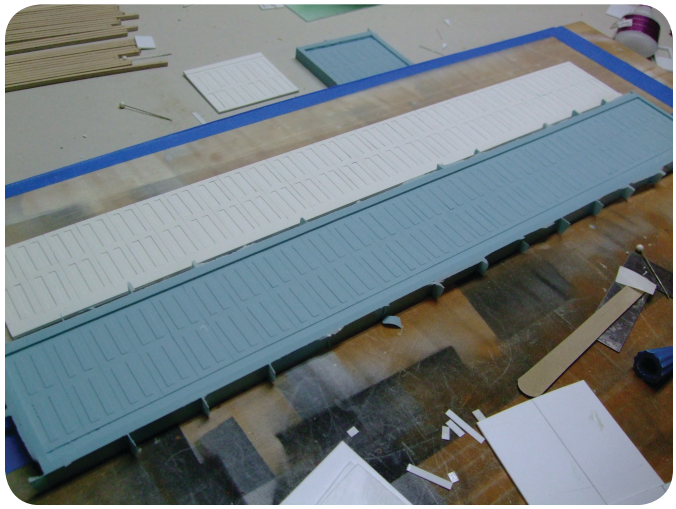


Photo 82. The long paneled wall for the paddle-wheel enclosure was built and then used to cast a second.

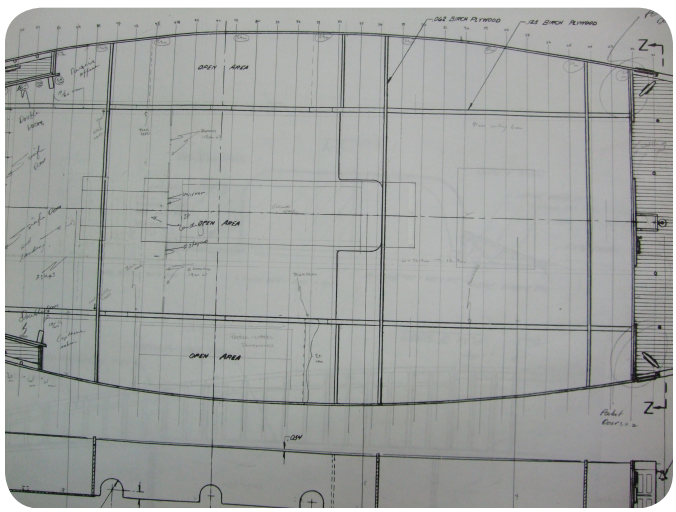


Photo 83. The beam locations as drawn on the plans in the middle third.

Photo 84. Slots were filed into the wall to provide room for the ceiling beam to pass through.

and resulted in an excellent duplicate. As is seen in **Photo 81** and **84**, there are slots required to be added to the top of all fore and abaft oriented walls to accommodate the ceiling beams. The location of these slots was a task requiring organization since all of the walls that shared the job of holding any one beam needed to match in their location. To coordinate these locations, I drew the ceiling beam locations onto the plans as is seen in **Photo 83**. I could then correctly mark their locations. **Photo 84** shows a portion of this wall after the slots had been made. This process may seem excessively complicated but since I wanted to apply more real world construction methods into my models, this was a necessary step.

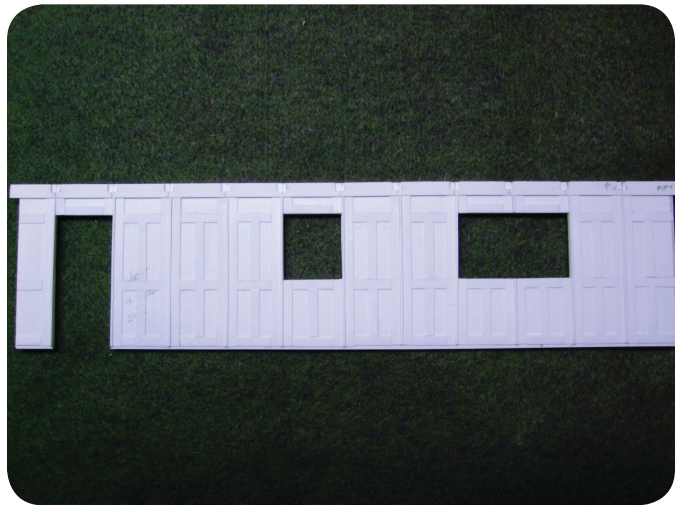


Photo 85. The walls for the engine enclosure have been paneled. Doors and half doors are yet to be added. The slots for the beams are not yet filed.

Photo 85 shows the wall that would run fore and abaft for the steam engine enclosure . The openings have been cut and the raised paneling done however the slots are yet to be cut. The end paneling was yet to be built.

Photo 86 shows another enclosure located just forward of the engine compartment. One can see that the height of the wall follows the curvature of the deck and the slots are ready to accommodate the ceiling beams. This cabinet housed the exhaust stack and provided a passage for the various communication and steering gear. **Photo 87** shows this cabinet and the engine room. The doors and closing panels for the engine compartment have been added. Also doorknobs have been installed onto the stack enclosure cabinet. One of the ceiling beams has been set into the slots to access the accuracy of the slot locations since the beam must run parallel to the closest side of the cabinet. The result was satisfactory thanks to the effort expended on the planning for their location.

This accuracy extended into the remaining beams. Yahoo! The beams were built from quality 3 mm sheet plywood. Each beam was first rough cut on the band saw along the line generated by the pattern

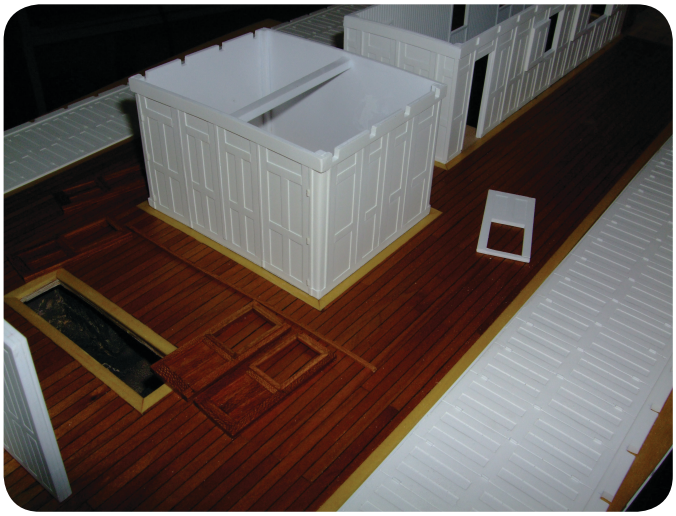


Photo 86. This enclosure is found forward of the engine room. The exhaust stack plus communication and steering gear were enclosed here.

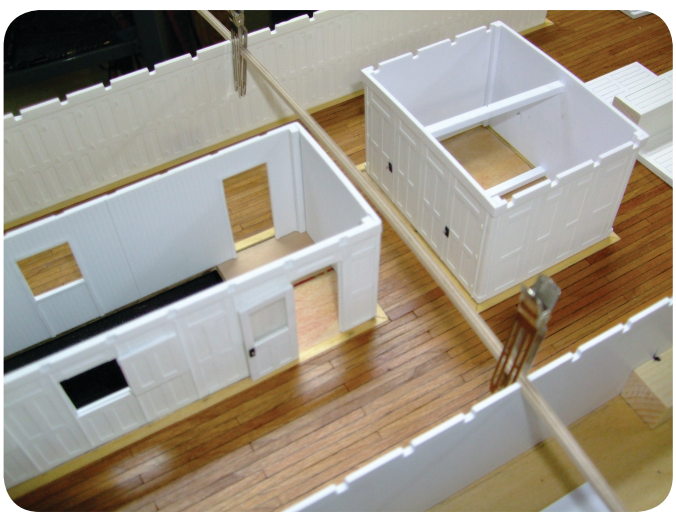


Photo 87. A ceiling beam has been temporarily installed to test for accuracy. The beam must run parallel to the adjacent wall for it to be correct and it does.

Photo 88. The fence of the band saw allowed the cut of the beam to be of a consistent depth.

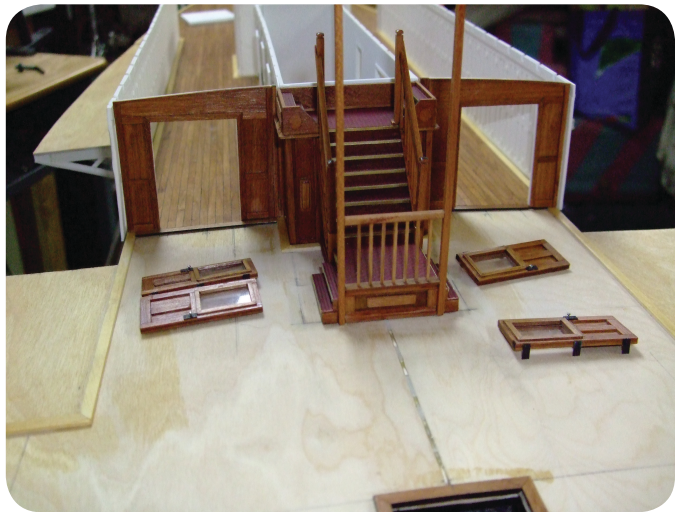


Photo 89. This is the abaft partition made of black cherry wood.

for the camber of the deck. This was then sanded down to the mark on my disk sander and then the centre point was marked for reference later. Then the inside of the camber was cut on the band saw using the fence to generate a constant thickness as is shown in **Photo 88**. It was necessary to hand sand the bottom side to finish their preparation for painting. This needed to be repeated way too many times for my liking to meet the demand. All told there were 69 beams built. The centre mark on the beams allowed me to align each beam down the centre of the model. In **Photo 81** one can see a black line that ran from the centre of a beam that rested on the two walls of the enclosure for the steam engine to the stem at the bow providing a guideline for the placement of the ceiling beam centres. As the beams were installed some trimming was needed especially in the forward part of the build where the hull narrows to the bow and stern. The adjustments were done on both ends of the beam so that the centre remained aligned. In this way the curvature of the beams remained consistent.

The next stage of the build required that the forward and abaft partitions be built. In **Photo 81** one can see the forward partition that reached right across the ship's beam. The two large openings in the wall could be closed since there were pocket doors stowed within the walls. I chose this configuration so that the viewer could see into this part of the deck. The bottom rail on which the doors ran, are visible in the photo. Raised paneling was applied to both sides of this partition. The abaft partition was not as wide since the paddle-wheel compartments were located here. **Photo 89** shows this partition wall looking forward. In this area all

Photo 90. A closer look at the cherry wood side of this partition.

Photo 92. The cherry wood side of the double doors.

Photo 91. The paneled and painted side of the partition.

of the walls on the abaft side were made of black cherry wood with some butternut wood highlights. The grand staircase was located here. It backed into the abaft wall of the engine compartment. **Photo 90** shows the cherry side of the partition and **91** the paneled and painted side. Double doors filled the openings. **Photo 92** shows the cherry side while **Photo 93** the paneled and painted side of these doors. Doorknobs have yet to be place on each side of each door. The doors were mounted in the open position. **Photo 94** shows the finished abaft partition. Next time I will continue the build of this deck starting with the assembly of the grand staircase. Until then enjoy your modeling projects.

Photo 93. The paneled and painted side of the double doors.

Photo 94. The finished partition.