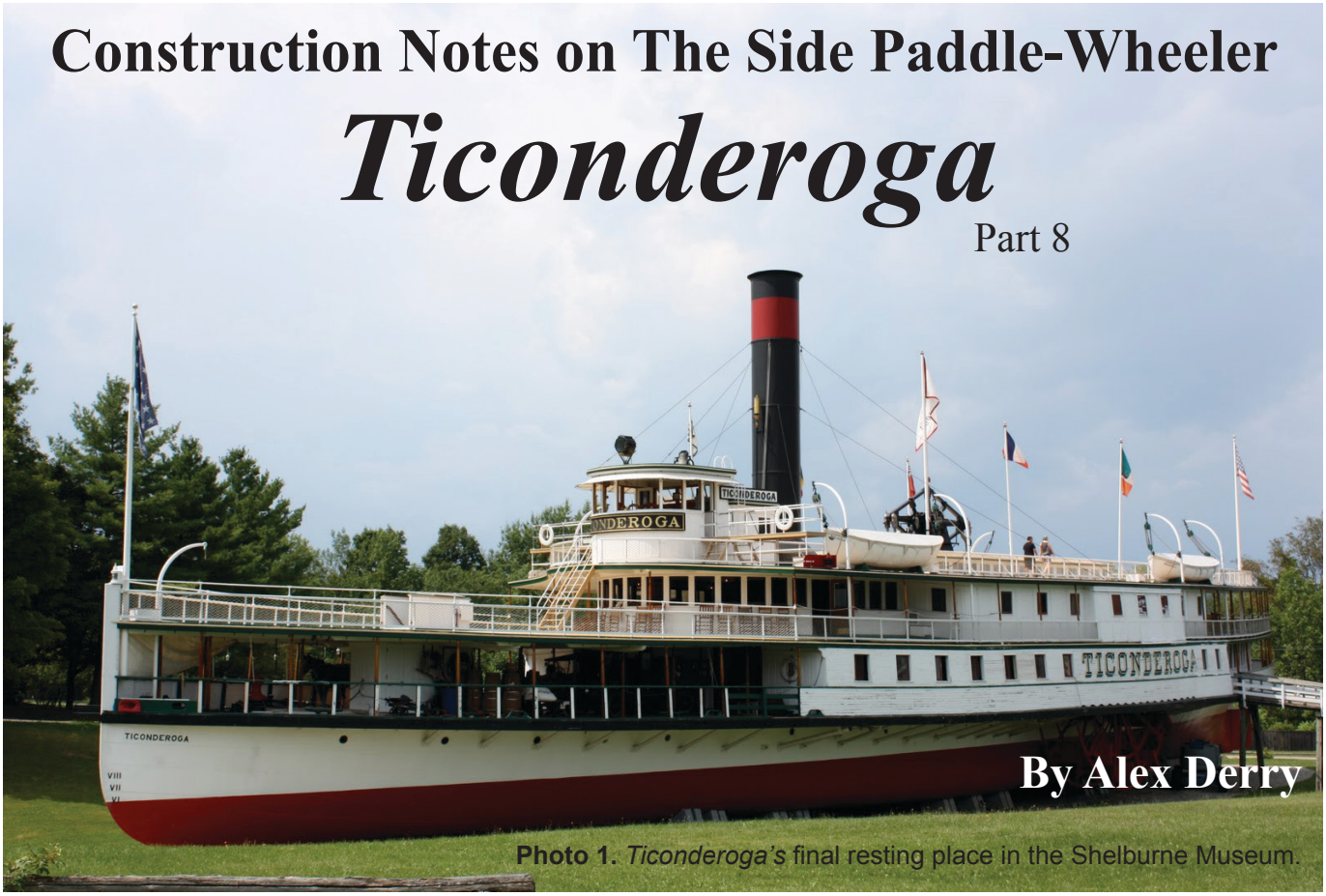
Construction Notes on The Side Paddle-Wheeler

Ticonderoga

Part 8



By Alex Derry

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

Welcome back! Up to this point, all of the major components of the build have been completed for the first deck including the paddle-wheels and the walking beam steam engine. The next project was to build and mount the next deck. The superstructure which would support this deck has been put in place (**Photo 245**). What needed to be built was the deck itself. This had to be carefully planned since the circuitry for the LED lighting system needed to be embedded into this next structure. I decided that I would use Evergreen Scale Model styrene products. Two factors determined my choice of styrene sheets. One, the presence of the circuitry required a two-layered deck. And two, I wanted to keep the number of seams to a minimum as these can be problematic over time. Careful reinforced gluing usually ensures that the seam remains stable however I always choose to reduce any risk factors in my work.
I ordered part number # 19040 from Evergreen Scale Models Inc. that gave me 30 x 60 cm sheets of plain textured sheets and # 14080 of simulated tongue in groove. **Photo 245** shows the first step in designing the LED layout. For those of you who have followed my work on *Segwun* and *Trillium* some of what I am going to discuss will be a bit repetitive however worth a brief description for

Photo 245. The first step in the process required for the installation of LEDs. The yellow jell allows the siting of the LED to be free of support structures.

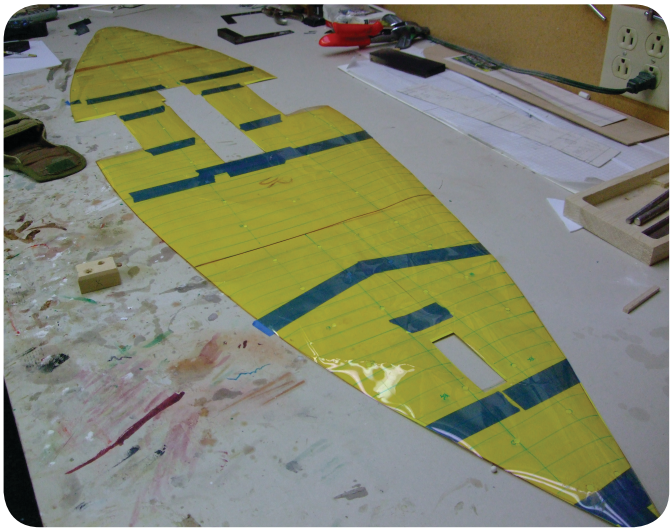
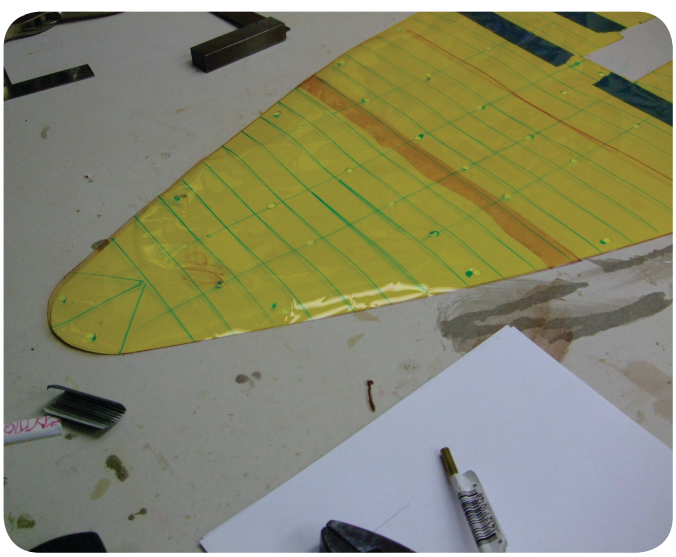


Photo 246 and **247**. The locations have been punched out, and the jell has been labeled "Up" to ensure that there will be no confusion during the transfer of information.



the benefit of others. In this image, you will see the support structure holding up a transparent sheet of lighting jell. This material is well suited for this task as it is thick enough to offer a semi-ridged texture while being transparent. Once fitted onto the model I could locate the LEDs on the jell. It is important to label the jell with "UP" so that interpretation of these locations aren't confused by an inadvertent reversal during the transfer onto the styrene layers of the deck. In **Photos 246** and **247** this signage is visible. The locations of the LEDs have been punched out using a hot brass tube which allows for a tracing to be made onto the deck materials. This layer is the lower portion and has on its bottom side simulated tongue in groove (Evergreen part # 14080). It also is 30 x 60 cm in size. These locations were then cut out using a brad drill bit. These types of bits possess cutting edges at the outer circumference that ensures a clean cut. The design of the circuit needs careful consideration as the LEDs are best arranged in a parallel pattern.

The parallel circuit provides two advantages. The first is that if any one LED ceases to function, there will be no impact on the remaining LEDs. Secondly, I was planning to include 120 LEDs in the circuit which will if done in parallel, ensure a much lower resistance value and identical voltage value at each LED. For those of you who want to see how these values can be calculated Google "Kirkovoff's Laws of Circuits." **Photo 248** shows the lower forward section ready to accept the LEDs once they are in place on the bottom side of the upper portion of the deck. Note that the simulated tongue and groove can be seen in the bottom portion of this section. To ensure that the LEDs are located precisely, the lower portion of the deck was laid down onto the upper deck portion. The

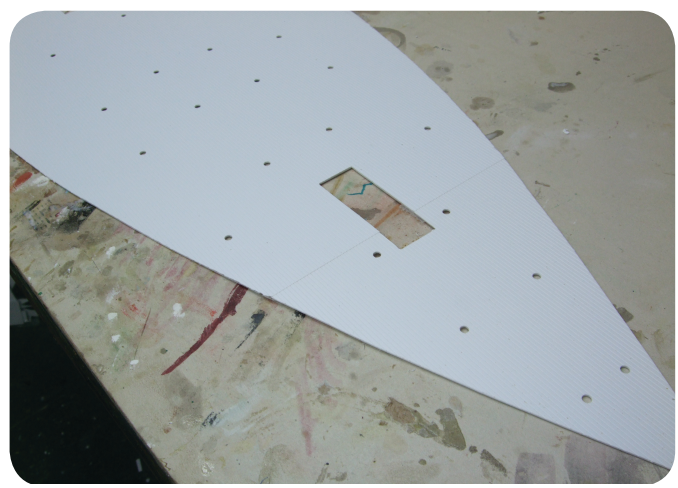
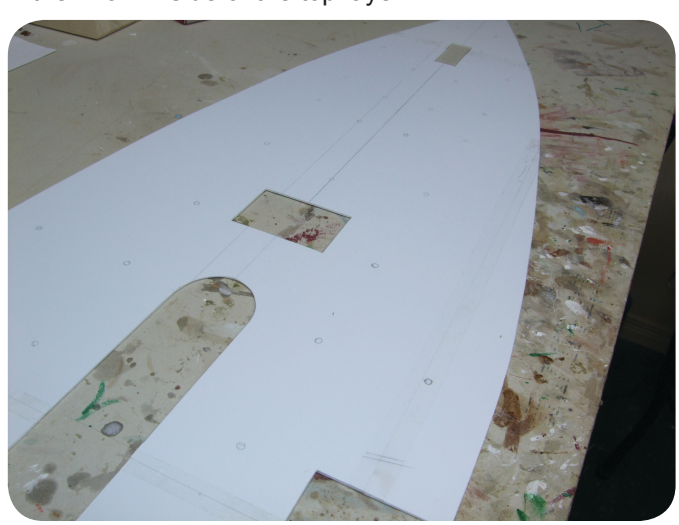


Photo 248. The LED locations have been cut into the lower portion of the two-layer deck. Note that the simulated tongue in groove on the "Down" side of the third layer is visible.

Photo 249. The locations have been traced onto the "Down" side of the top layer.



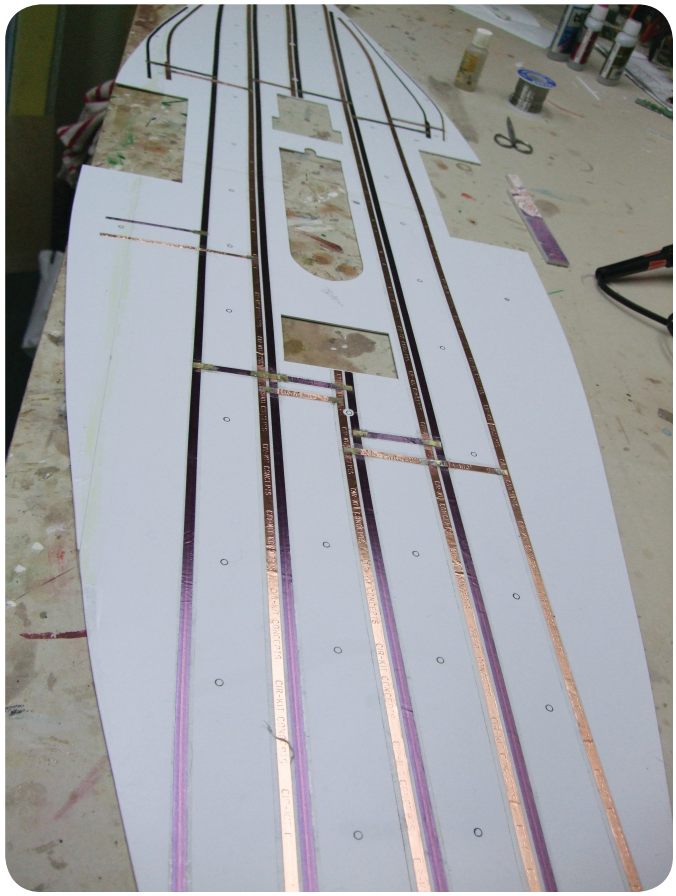


Photo 250. The parallel circuit has been added to the "Down" side of the top layer of the deck.

"Up" side of the lower portion must be fitted to the "Down" side of the upper portion of the deck. Then the LED locations were traced onto the "Down" side of the upper portion of the deck as is shown in **Photo 249**. **Photo 250** shows the layout of the circuit on the "Down" side of the upper portion of the deck. LEDs are pole sensitive. The positive side of LED must be connected to the positive side of the circuit. The material used to deliver power to the LEDs is a sticky one side copper strip. Dollhouse shops will have this material. It comes with the two colors so that one can designate polarity consistently. The LED is then soldered as is shown in **Photo 251**. **Photo 252** shows the endpoint that I chose for the hook up to the power source. In this model, I chose to have a direct connection to the circuit to reduce the problems that occur with faulty connectors. You will note in **Photo 250** there are two endpoints in the circuit one of these will provide a site for connectors that will feed up to the next deck above. When setting up the parallel circuit, you will find that you will be required to run circuit lines over others. **Photo 253** shows the need for the copper-colored line to travel over the purple line. At these points, I used non-conducting tape to insulate the site. I used this technique

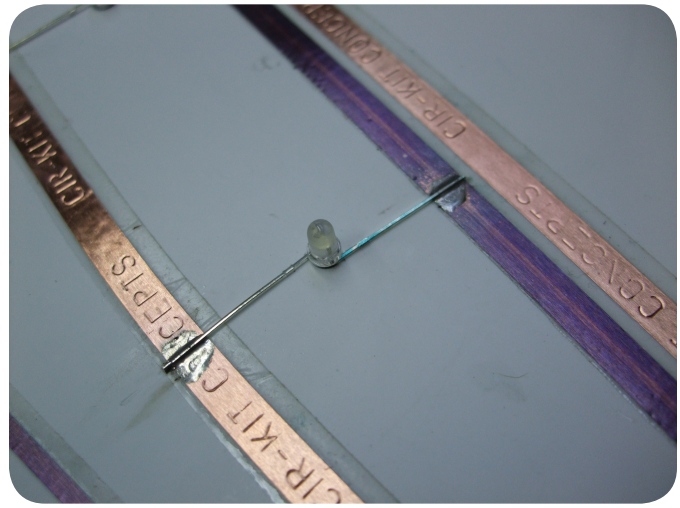


Photo 251. The LED is then soldered onto the circuit tape.

Photo 252. This is the endpoint chosen to accept the hook up of the power source into the circuit.

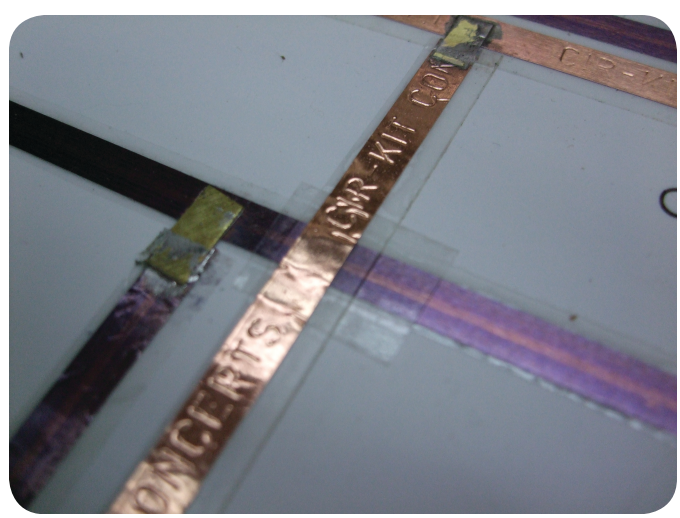


Photo 253. When necessary to cross over existing lines I used insulating tape.

for all crossovers regardless of the types of line combinations to avoid any issues with conductivity. **Photo 254** shows the LEDs protruding through

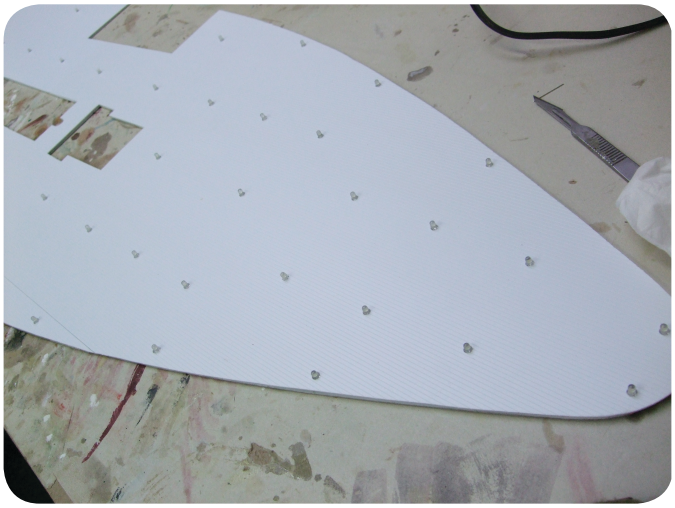


Photo 254. The LEDs are protruding through the lower layer of the deck.

Photo 255. The LEDs are illuminated in this section of the deck.

Photo 256. The building board jig was created to ensure that camber would be consistent over the entire first deck surface.

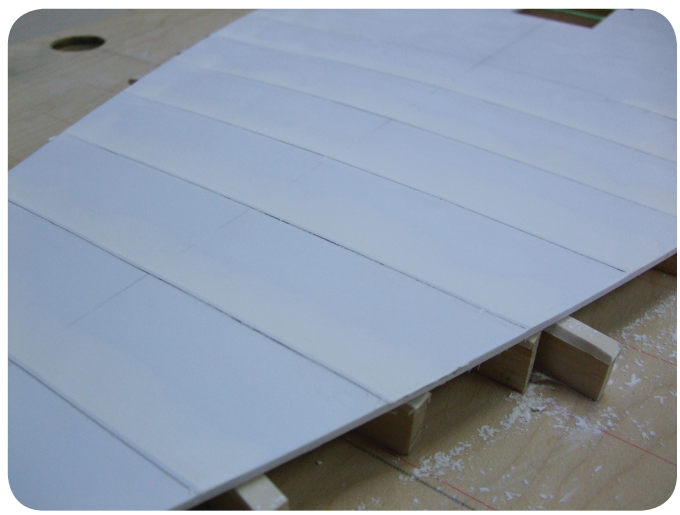


Photo 257. The beginning stages of simulating the stretched canvas upper side of this deck.

the bottom layer of the deck. If you look closely, you will note that the LED lenses look grayish. Before I solder them in, I turn them in my lathe and scuff them up using fine wet-dry sandpaper. The LED is held in an Exacto Blade handle which is then loaded into the head stalk to be sanded. This procedure ensures that the light is diffused rather than focused giving a realistic tone. **Photo 255** shows a section of this deck's LEDs illuminated.

The next step needed to be taken is the gluing of the two layers of the deck together. All of the horizontal surfaces on Ticonderoga posses camber. The camber needed to be present during the gluing to ensure a consistent shape. **Photo 256** shows the building board that I made for this purpose. The location of the forms needed to follow that of the support beams for this deck to avoid interfering with the LEDs that are projecting below the second layers. This step provided one critical question; what type of glue would best suit this task? I ruled out epoxy since its grip while good, wasn't up to the task. Cyanoacrylate also was unsuitable as it has too fast a setting time and lacks a suitable viscosity. The two layers of the deck did not seat perfectly together as the LED connectors have 0.5 mm of height. As a result, the glue needed to be able to adhere without the two surfaces contacting completely and needed to hold the layer in the camber shape. Using untested glues is not a good strategy so I set out to find glue that would meet my requirements. My choice landed on a "construction adhesive" that would not burn through foam. Lepage's PL 300 adhesive had the correct viscosity and ensured me that it would not distort styrene. I made several test runs to satisfy me that it would do the job. The only drawbacks were its 24 hour set time and the awkward application process. I didn't want overflow or inadequate amounts of the adhesive; so, careful application was made

Photo 258, **259** and **260**. A map using the images from the plans was built to allow the dimensions to be transferred onto the upper layer of this deck.

Photo 261. The jig plug for the aft rounded building and the partially finished structure.

Photo 262. One of the doors being fitted into its frame. To determine the frame's its proper dimensions.

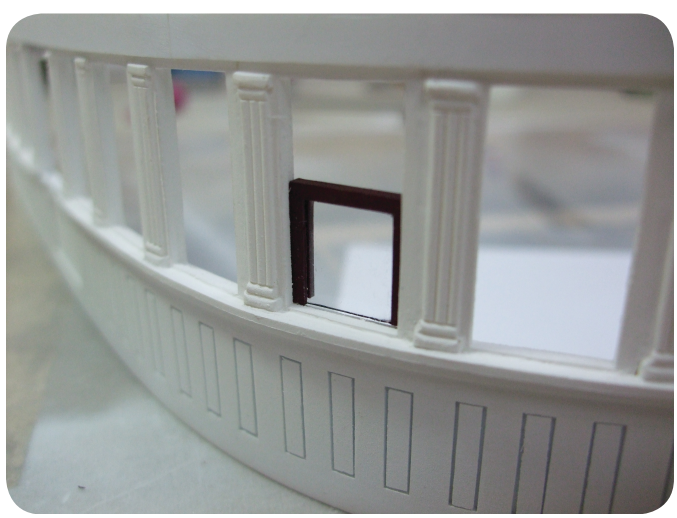


Photo 263. Pocket windows were used in these buildings. I chose to show them at varying heights to allow a better view of the interior.

around the LED openings and at the edges. During this process, a lot of bad language issued out my workshop. However, the end product turned out to be acceptable. Once this was done and cured, I began to prepare the top layer's "Up" side to simulate canvas sheets that were used to waterproof the deck's surface. **Photo 257** shows the early stages of the addition of styrene strips (Evergreen part # 121 0.5 x 0.75 mm or 0.020 x 0.030 inches) and then backfilling with a talc paint putty. The putty was added on the forward edge as this would help to decrease the risk of leakage due to driving rains. Acrylic paint mixed with talc makes an excellent filler that is quick to dry and easily sanded. On the real ship, these layers were tacked down in place after the canvas was soaked in paint. A messy job which required skill to get the stretch

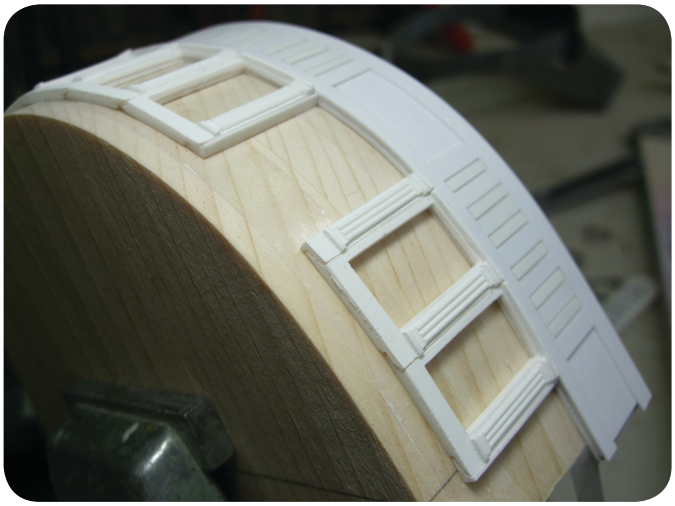


Photo 264. The forward building partially finished.

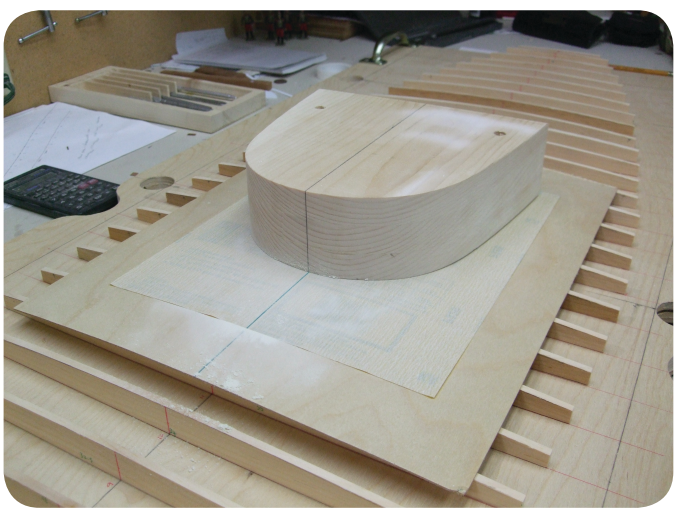


Photo 265. The sanding arrangement for the camber of the deck.

Photo 266. A typical laminated wall located outboard side of this deck, fore, and aft of the paddle-wheels.

right without wrinkles or distortion.

Before the build of the simulated canvas started on the deck surface, a map of the buildings that would follow was drawn on its surface. **Photos 258**, **259** and **260** shows the complexity of these dimensions. The canvas simulation was built up to the edge of these dimensions.

I approached the building of these structures much as I did in the descriptions discussed in the preceding parts of this series. All of these structures included interior black cherry paneling. **Photo 261** shows the building jig for the aft rounded building. The layers to establish the permanent curvature of the walls were added first. After that, the addition of raised paneling and the window frames were completed. **Photo 262** shows one of the doors being fitted into the wall. In all of the rounded buildings, these doors were mounted in an open and secured position. I imagine during the hot days of summer all windows and doors would be opened to encourage the movement of the air. The motion of a vessel necessitated that any open door is fasted open. The window frames were cast as before but, these were pocket frames that slid down into the wall. **Photo 263** shows the first frame being glued in place. I chose to represent these frames partially open as they allow unimpeded views of the interior. **Photo 264** shows the rounded forward building approaching a finished state. The deck having a camber required that the building also be sanded to this shape (**Photo 265)**. To get this jig to its proper shape, a plywood sheet was temporarily attached to the deck camber jig. Sandpaper was then attached in the same manner to the top of its surface. I then drew center lines on the plywood and on the jig plug. The center lines needed to align during sanding to ensure that the camber shape sanded into the jig plug would align with the deck. It took a while, but finally, it was ready to guide the sanding of both round buildings.

Looking back at **Photo 258** one can see on each outboard side of this deck, three-walled structures. **Photo 266** shows the typical wall found forward and aft of the paddle-wheels' external wall. The curved corner and the consideration for the camber made this build a challenge. To solve the problem of the curvature I built it up as a lamination using a jig plug, layers of styrene and cyanoacrylate glue (**Photo 267)**. Once the lamination was stabilized, parallel lines to follow the camber were drawn onto the wall and then trimmed top and bottom. **Photo 268** shows the wall in an early stage of construction. Once trimmed each wall was fitted onto the model and adjusted. The windows

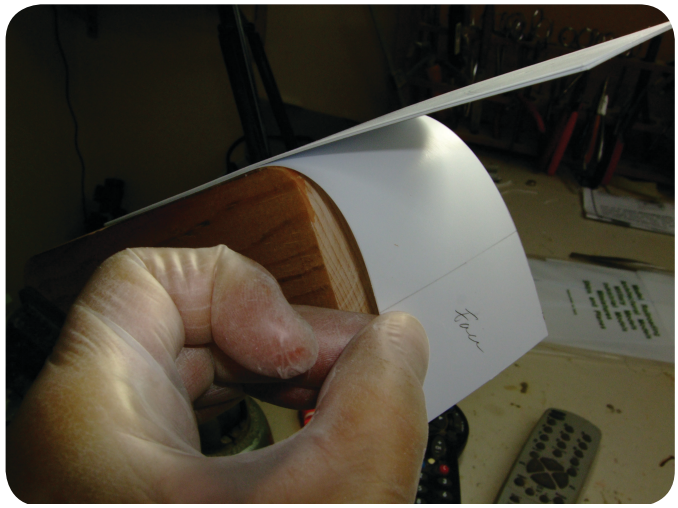


Photo 267. The jig and laminations used to build up the rounded corner for theses walls.

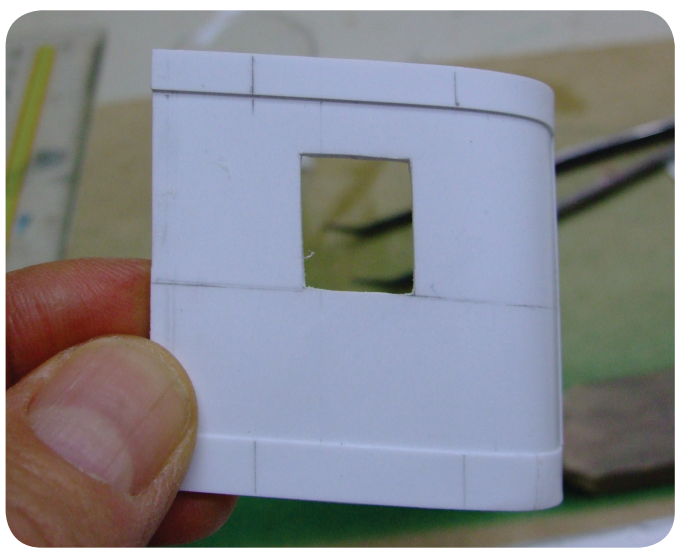


Photo 268. The secured lamination was trimmed to match the camber of the deck. Note that the window opening is a parallelogram.

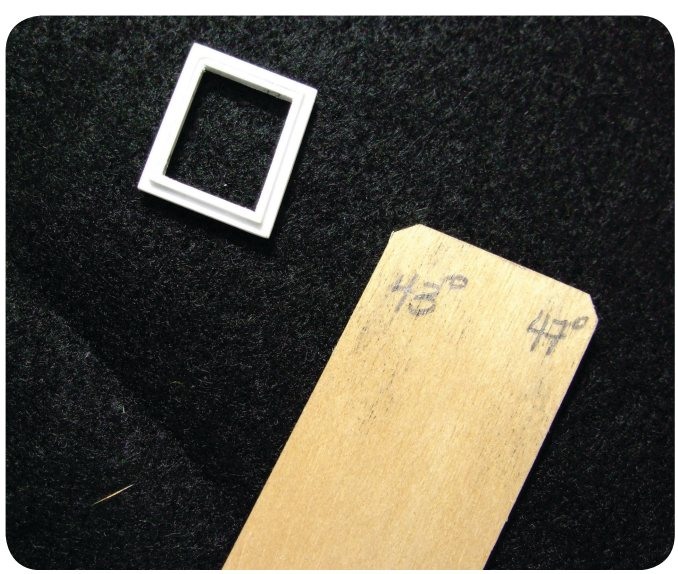


Photo 269. Each of the four window frames needed to be built up using the jig shown.

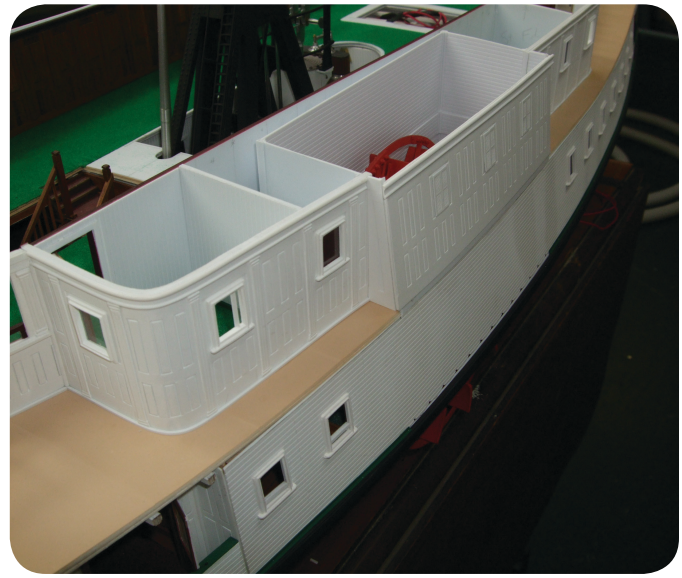


Photo 270. The outboard sections of this deck have been added. The laminated wall sections needed to be carefully blended into the center wall.

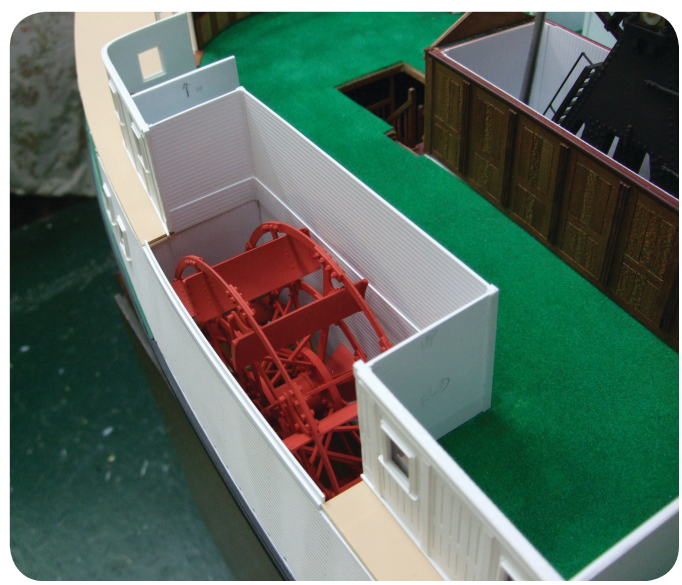


Photo 271. The two laminated walls have been linked to the interior walls of the paddle-wheel enclosure. The out sidewall needs to be joined at both ends with short sections of paneled walls.

shown in this photo came from two places. The outboard side frames came from the mold that I used previously. The frame is shown on the side that followed the camber needed to be constructed separately as they are parallelograms. **Photo 269** shows the jig used to assemble these frames. The windows in this region of the ship were pocket designed which slid sideways when opened. **Photo 270** shows an example of how I chose to arrange these window frames, not all were open. The center piece of this side of the hull enclosed the upper portion of the paddle-wheels. The raised paneling and the louvered openings were fashioned

after the drawings on the plans. These walls had more lean than the forward or aft laminated walls to allow the next deck to fit properly. As a result, the interface between this wall and the two walls of the forward and aft cambered wall sections needed care to blend them together.

As is shown in **Photos 270** and **271**, the interface between the laminated walls and the covering wall for the paddle-wheels required two short sections of walls to link them together. These short sections needed to be paneled and built to conform to the camber of the deck. I also felt it necessary to use simulated tongue in groove styrene for the enclosure of the paddle-wheels as is shown in **Photo 272**. Looking back at **Photo 270** and **Photo 273**, one can see that partitions for all of the various rooms on this deck that were built up follow the camber of the deck both at the top and bottom. **Photo 273** shows how these rooms were later enclosed by two long black cherry paneled walls.

A few words here about the painting of the deck would be important since a few hard lessons were learned (**Photo 274**). As I have mentioned earlier in this series, the paint that I chose to use for this model was Polyscale an acrylic paint, primarily used by model railroad enthusiasts. The problem was that there wasn't a color close enough to the actual deck's color. Not thinking that the Polyscale paint may go out of production, I decided to mix paints to obtain the color I needed. I carefully developed a formula of volumes and colors that could be easily be repeated for consistent results. This choice was made knowing that there was an element of risk. However, I had no idea though, that my paint source would dry up! Another complication arose during the painting of the last two surfaces which increased the volume of paint required as failed attempts at perfection meant that repeated applications were necessary. This was caused by my inability to reproduce the texture of the paint. I discovered that the cause was my worn airbrush so after replacing it, I could once again obtain acceptable results. My paint supplies were depleted due to the airbrushing issue, so I had to search for hobby stores that happened to have inventory left over. Luckily I found what I needed, however, a lot of driving was required to go and get them. To summarize, don't mix paint to obtain a perfect shade, especially for a large project. Long-term projects such as this one necessarily exposes the builder to supply problems as the market place evolves. One way to hedge your bet is to use paints that are standard colors. Railroad paints are

Photo 272. Simulated tongue in groove panels were used for the interior of the paddle-wheel enclosure.

Photo 273. The partitions for the rooms on this deck have been added, later they would be enclosed by long sections of black cherry wood paneled walls.

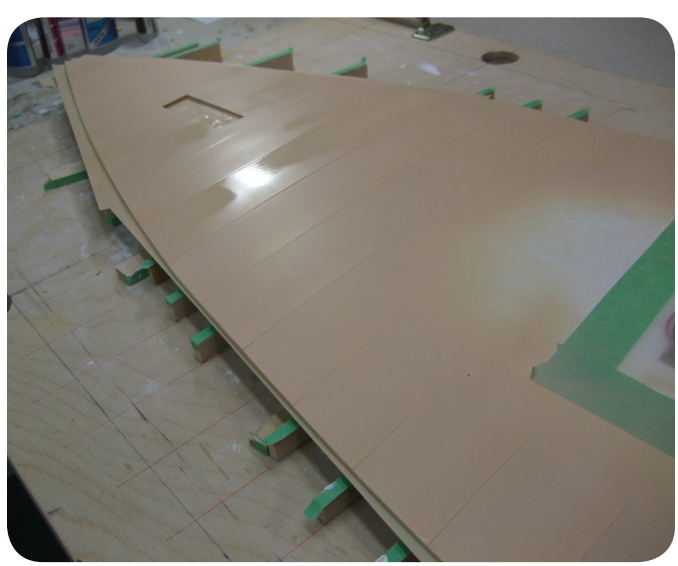


Photo 274. The painted surface of this deck drying.

Photo 275. The finished forward companionway is surrounded by a protective layer of felt.

associated with specific railroad companies. The standard paint colors are those of these companies, for instance, Rock Island Maroon or Conrail Blue and standard colors are made by more than one company.

So back to where I was, once the exterior deck had been painted, my attention went to the task of simulating the interior carpeted area. This was accomplished by using a flocking system as described earlier in this series. Application of the paint adhesion layer, required extreme care since it needed to follow the edges of the painted deck surface. You will have glimpsed the result in several of the photos presented.

Photo 275 shows the finished companionway for the forward stairway. You will have noticed that the painted deck is covered by a felt cloth. This was an attempt to protect the paint from contact with any object that might make marks. Any hard object like even the small tools that might be left on the deck can create crazes which convert the matt texture to one of shininess. I was not keen to return to airbrushing these marks out. The felt was later replaced by high-quality paper as it was more available, didn't leave fiber traces and was up to the job of protecting the deck. Companionway structures are designed to be able to slide and swing closed to keep out the heavy weather. The

Photo 276, **277** and **278**. These are the components of the companionway with exception of the doors.

components of the companionway consist of a three-sided structure on which slides the curved "roof" and on which are hung the doors. **Photos 276**, **277** and **278** show these components minus the doors. The exterior walls needed to be paneled and the interior needed a simulated tongue in groove. Also a skirt of tongue in groove needed to be added to create a cover for the pass-through of the deck. The sliding "roof" has been added along with the rails on which it slides as can be seen in **Photo 279**. Also, you will notice that doors have been included.

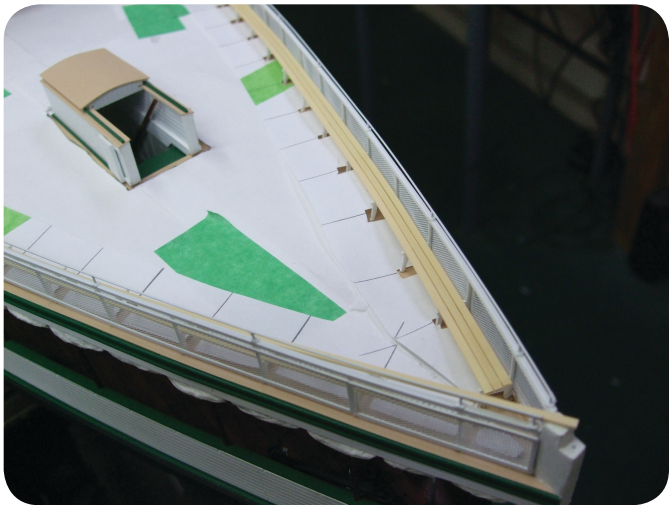


Photo 279. The “roof”, as well as the rails on which it slides plus the doors, have been added.

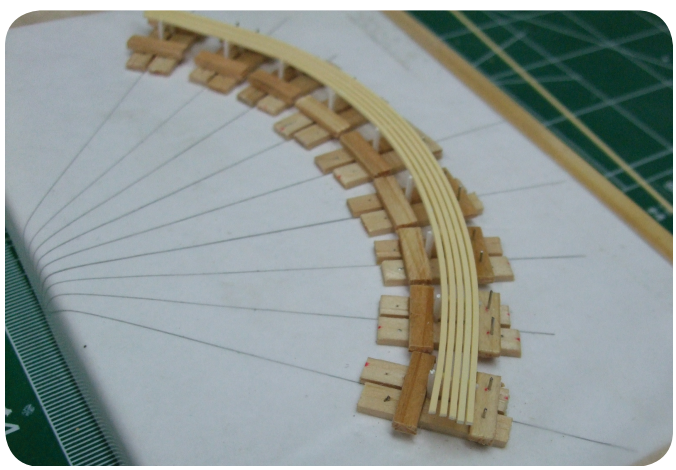


Photo 280. The bench is nearing completion while being held in the jig.

Ship models are a series of smaller models which are the delight and bane to all of us who build them. Look back at **Photo 259**, and you will notice a bench that runs along the curved wall of this building. This bench was built in a jig shown in **Photo 280**. The frame on which the “boards” are mounted were molded from a master and trapped in position by the jig. Strip styrene was added carefully to exhibit symmetry. Once it is trimmed, it will be ready to be added to the model. Another detail worthy of discussion is the finishing of the deck sides. **Photos 281** and **282** show start and finished stages. The simulated tongue in groove was carefully marked where butt joints would occur before the finishing green composite was added. The last detail for this edition of the series is seen in **Photo 283**. This is one of two lockers in which were kept some of the life vests. A wooden core served as the mounting surfaces for the styrene. The actual locker’s sides were made of tongue in groove

Photo 281 and **282**. The covering for the deck edge consisted of tongue in groove treated with butt ends and then a composite applied over it.

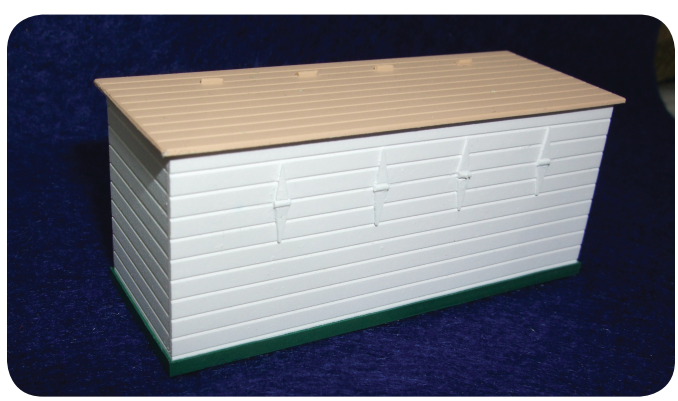


Photo 283. One of two lockers that were used to store some of the life vests kept on this deck.

while the top was canvased and painted for water proofing. Hinge and baseboard details were added using styrene pieces. It seems endless the demands of this project, but we have been making progress towards the finish. Next time I will discuss building up the interior of this deck that will include some discoveries I made that worked well to maximize the detail found there. From there, I will move the discussion to the next deck. In the mean time, enjoy your projects.