



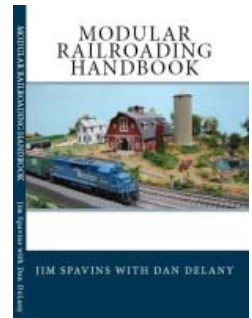
Lift Bridge Module



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By Stu Dom

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Many times when one is developing a layout plan for a modular layout it becomes necessary to create a way to get into or out of the closed space within the layout. Most modular railroad layouts are operated from the inside of a closed track plan, for which access cannot be obtained without the use of a duck-under, removable track section or a movable section such as a lift bridge. This article lays out the details of planning and design of a modular lift bridge. While the details of this process are keyed to the use of this lift bridge by the modular railroad club, the *Mohegan Pequot Model Railroad Club*, located in southeastern Connecticut, the application of this lift bridge design could easily be adapted to other modular or permanent layout needs.

As I indicated before, the lift bridge requirements for this lift bridge are established by the needs of the members of our modular railroad club. When I joined the club in 1985, the club had a lift bridge that was built by one of the members, and is still in use today. At that time the members of the club were younger and the trend was to have modules that were usually 8 feet in length, although the club specifications allowed the use of 4 foot modules. Thus, the lift bridge was 8 feet in length, had an opening width of nearly 3 feet, and was deep enough to handle the 2 track mainline track arrangement that was adopted by the club since its inception. Due to its relatively narrow depth (front-to-rear), the bridge has been extremely difficult to align with the adjoining modules. Also, it is heavy and extremely awkward to transport.

About 15 years ago, another lift bridge was built that was only 4 feet in length, in an effort to resolve the physical difficulties of handling the 8 foot lift bridge. While the handling of the bridge was very much improved, the design has continue to be flawed by stability issues when inserted into the layout. The primary difficulties have been manifested by the sensitivity of bridge operation to connection of adjoining modules, which cause the bridge alignment to change during operation during a show, leading to train derailments.



What have we learned from this experience? First, shorter bridges are not necessarily better, if they aren't designed properly. Our experience clearly favors the first bridge (8 feet long) that has been a superior design. Secondly, the height and length of the bridge are not nearly as important as providing good stability of the bridge under operation that will provide more controlled alignment of the bridge and fewer train derailments. The design clearly needs to be deeper (front-to-rear) than the previous designs to provide better stability, and the alignment of the movable part of the bridge, needs to be more positive.

My design for our clubs new lift bridge continues to support the trend to lighter modules, but limiting the design to 4 feet in length. The height of bridge as measured from the top of the track rail to the floor meets the club standards of 40 inches, and allows adjustment for variations in levelness of the floor of plus and minus 1-1/2 inches. The bridge now

supports a 2 track mainline, plus a local track, that the club has recently adopted to allow for more flexible operation. Thus, stability is increased because the depth of the bridge has increased significantly.

Further improvements include use of robust alignment pins for the lift bridge to reduce the risk of derailments, improved access to the adjustment feet to improve leveling, permanent inclusion of plastic sheet material (Lexan) to prevent derailed trains from hitting the floor and unsupervised hands from reaching the trains, ability to have the bridge stay open without supporting hands when setting up, and all wiring located within the bridge frame to avoid inadvertently breaking wires during handling.



Let's talk a look at each of these features.

Stability

Stability of the module is optimized when the feet are placed at the extreme limits of the module. Further improvements are achieved when the footprint of the feet are as large as possible relative to the height of the module. As noted above, the depth of the new lift bridge has been increased to 13 inches over the 6 inches for the old lift bridge designs to accommodate the addition of another track, and increase the depth-to-height ratio of the module which directly correlates to improved stability of the modules.

Bridge Alignment

Pins have been provided at the free end of the lift bridge to ensure absolute alignment of the bridge with the stationary abutments. To reduce wear with this alignment mechanism, 5/16" rods on the bridge are captured by corresponding sleeves on the bridge abutment.



Improved Leveling

Leveling of our current bridge modules is accomplished by adjusting carriage bolts on the bottom of the module by hand or with a wrench. This almost always requires a club member to lay on the floor and receive directions from another club member regarding the levelness of the module. With the average age of our club members approaching 65, it has become much more difficult to make this



adjustment, and nearly impossible to stand up afterward. The new lift bridge design incorporates an adjustment mechanism that allows height adjustment while standing or slightly bent over, and can be done without assistance. The design could be used as an adjustment mechanism for almost any module, as it can simply be added onto any leg design.

Train Protection

Most modular railroad clubs, including ours, use a transparent material such as plexiglass, acrylic sheet or Lexan to protect equipment from being damaged by falling off of the layout, and being grabbed from a errant spectator. In our club, plexiglass or acrylic sheet protectors are placed individually onto each module by inserting them into holders attached to the front of the modules. We have created special plexiglass transport carriers for the material to prevent damage during transport and storage. Since the lengths of the materials required for our lift bridges have abnormal sizes relative to the other modules, we have found on many occasions that we did not have the material with us for our shows. Murphy's Law clearly has been shown to be absolute, as we always seem to have trains hit the floor, on the rare occasions when we fail to install the material. In addition, the protection material for the lift bridge must be permanently attached, since the lift bridge changes orientation when being lifted. As a result of this, both of our previous lift bridge designs have wood protection permanently installed on the lift which doesn't allow for the audience to see the trains cross the bridge.

The solution for these problems is to have transparent material permanently attached to all parts of the bridge. My first attempt was to use acrylic sheet material to provide protection for both front and back of the module. However, within the first week of bridge completion we accidentally broke 3 pieces of this material while handling. I have subsequently purchased and installed Lexan for all sides, and do not expect to have the same problems. Lexan is about 3 times more expensive than acrylic sheet, is more subject to abrasion by rubbing on the surface, but should not break. For this application, where the club members need to handle the bridge frequently, strength is definitely the most important consideration.

Holding Open

Both of our previous lift bridge designs are able to be opened and will stay open if the bridge is folded back. However, this was more of an afterthought, and generally caused damage to the bridge when implemented. The new design incorporates this feature from the outset, and will not damage the bridge, which is truly a necessity when setting up the layout. Due to the weight of the bridge, one cannot rely completely on the stop mechanism of the hinges to provide this feature. Therefore, a positive stop has been provided to enable this feature.



Wiring Harnesses

All wiring for this bridge is routed internally through the structure. Both AC wiring and track power is routed in this manner. Standard AC receptacles are included on one end of the module and pigtail plug is supplied on the other end to feed power through the module. Track power is handled similarly. The free ends of the cable are supported by special clamps to keep the cables protected during transit and handling.

This concludes the discussion of planning and general design aspects of the Lift Bridge Project. I believe there is sufficient information in this article to allow many of you to move forward in designing and building your own lift bridge.