Modelling a Qld Rail Overbridge

ABOVE: "Kolan" passing under the overbridge on Lincoln Driver's HOn30 Wallaville layout, which was exhibited at the Wallaville School Centenary, November 2009. Carl Millington photographer.

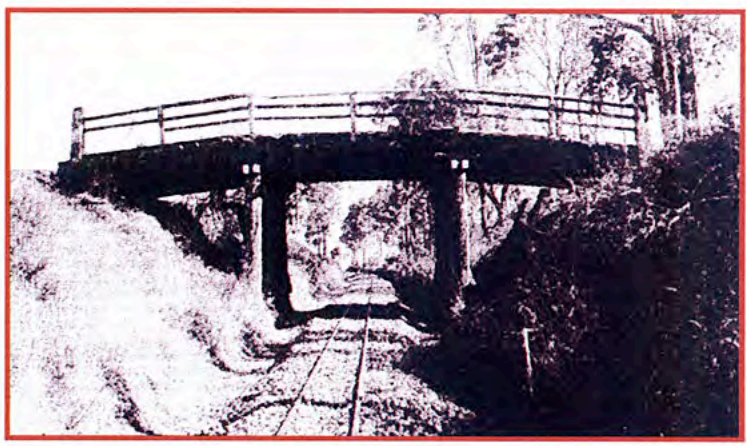
by Lynn Zelmer

Photos by the author except as noted.

Grade crossing safety has long been a problem for Queensland Rail and its predecessor, the Queensland Government Railways. One solution was a road overbridge to cross the railway as it passed through a cutting. This avoided a major grade change for either the railway or the road, minimised the length of the bridge required, and ensured the separation of road and rail. The bridge might be arched or straight, depending on the depth of the cutting, to allow enough clearance underneath to meet the requirements of the loading gauge in effect when the bridge was constructed.

This article provides some details of the two types plus an HO model of the Wallaville bridge. Modelling details are limited as both overbridges follow standard QR bridge practice and should only require conventional modelling materials and techniques.

The Wallaville bridge is one of very few arched overbridges left in Queensland. Arched overbridges may have been less common than straight span bridges, although changing loading gauge requirements may simply mean that older arched bridges on the main lines have long been replaced by alternative arrangements. It's interesting to note that most of the QR and PN traffic on Queensland's North Coast Line is containerised, but double decking of containers is not possible because of the limited clearances on many of the rail bridges and road overbridges between Brisbane and Cairns.



RIGHT, UPPER: The Wallaville overbridge, from the Kolan Recorder's 'Pioneers to Prosperity, Celebrating Gin Gin 130 Years', Sept 2009, p 12.

RIGHT, LOWER: Wallaville arched overbridge at the entrance to Bailey's farm. The QR branch where this bridge is situated was originally 3' 6" gauge, thus the loading gauge is wider than would be necessary for the current two foot gauge cane railway track. In 2010 the bridge had a two tonne load limit, reflecting its age and state of repair. Graham Hibberd photographer.

Wallaville Three Span Arched Overbridge

Originally an overpass road bridge into Wallaville, the arched structure allowed Queensland Rail's steam locomotives to pass underneath. The branch line was subsequently abandoned, the gauge narrowed for use by Bingera Mill's cane railway, and the bridge passed into the care of the local Council.

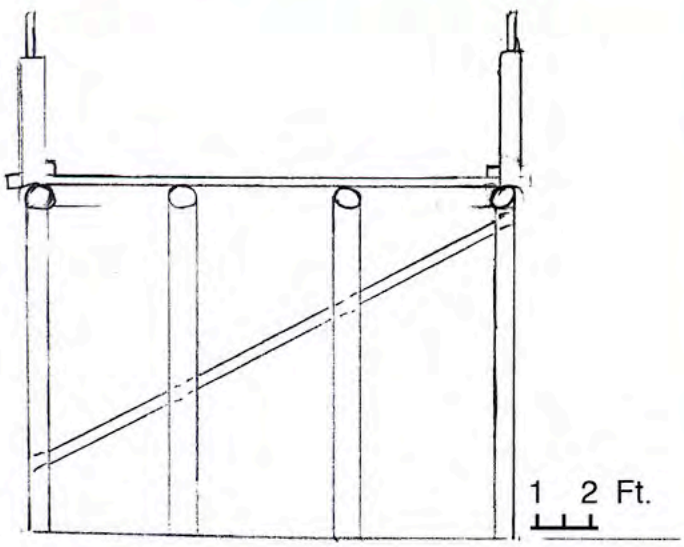
The bridge became an entrance bridge to Bailey's cane farm and served a number of other local residents as a shortcut into Wallaville. More recently the bridge has had a two tonne load limit imposed, severely restricting its use except perhaps as a footbridge. While the Gin Gin Historical Society has attempted to raise funds to save the now fairly unique bridge, costs of $50,000 to $150,000 have been too much for the local shire and its volunteers.

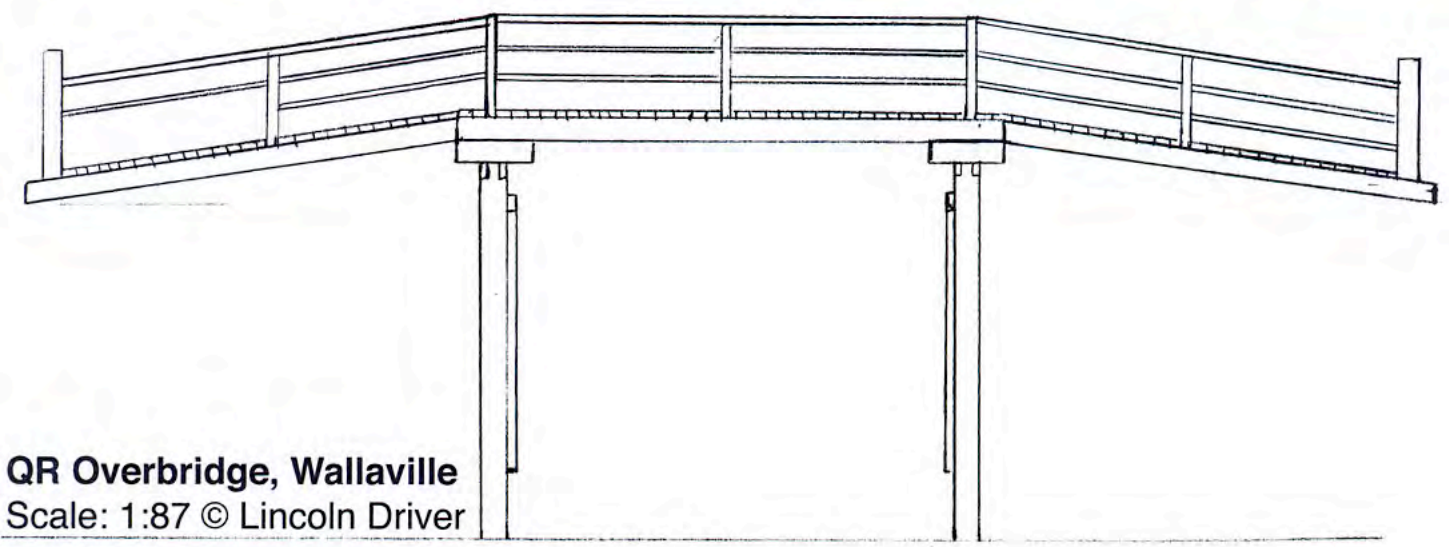
This bridge was modelled by Lincoln Driver as part of his HOn30 Wallaville layout that was exhibited in the Brisbane area several times and most recently at the 2009 Wallaville School Centenary. Lincoln's drawing is roughly to scale, so basic dimensions can be estimated, remembering to leave enough room underneath for your railway's loading gauge. It might be reasonable to shorten the bridge slightly for narrower gauge use as the bridge was originally built to cross the QR line (3' 6" gauge).

TOP: Underside of overbridge at Wallaville, 2009. Note different timber finishes, sizes and other details such as the odd lengths of the replacement deck timbers and the angles of the diagonal bracing on the inside and the outside of the timber piles. Graham Hibberd photographer.

MIDDLE: Looking back over Currajong Creek bridge towards Wallaville and the overbridge, 2009. Note the dog spikes down either side indicating where the rails were located when in QR service. Graham Hibberd photographer.

BOTTOM: Looking back from the modern Currajong Creek bridge towards Wallaville and 'Bailey's bridge', the old QR overbridge, 2009. Graham Hibberd photographer.





QR Overbridge, Wallaville
Scale: 1:87 © Lincoln Driver

The Caves Overbridge

The level deck of the overbridge near The Caves, Central Queensland, indicates that the cutting underneath was likely quite a bit deeper than that at Wallaville. Although the bridge simply connects a rural property with the Bruce Highway, it is in much better physical shape than the Wallaville bridge, presumably the result of QR being required to continue providing maintenance for a bridge crossing the main North Coast line.

Lincoln's drawing can be used for the basic dimensions for this bridge as well, with the photographs being used to identify the type of timber used (round, squared, square set on one corner for rain drainage, six-sided, etc.). The main line had been recently upgraded, and likely the formation lowered to provide additional clearance and a gentler grade, shortly before the photographs were taken, so the ballast looks neat and well formed. Unfortunately for QR the limited clearances on many of its bridges, not just timber structures such as this, mean that it would be very expensive to upgrade the line sufficiently to permit double-decked containers.

QR overbridge near The Caves, Central Queensland provides single lane access to a rural property from the Bruce Highway. The bridge deck and railings seem to be in good repair; note that the top railing (likely a 6 x 6) is square and angled with a corner upwards for weather protection, 2007.

Modelling Details

Lincoln's drawing shows the basic structure of the arched bridge. The level bridge structure is very similar, with the girder timbers running straight through rather than being in three sections. If I was modelling the arched bridge I'd likely construct the pile structures first, then cut the girders, etc, to fit, with the deck and railings constructed last. Note that the join between sections of the longitudinal girders must be directly over the supporting piles. Also note that The Caves bridge uses a three pile pier, rather than the four piles of the Wallaville bridge.

It is important to remember that these bridges were built when vehicular traffic was both smaller and lighter than modern vehicles. Lincoln's drawing shows the arched bridge as roughly eight feet wide (vehicle clearance) with what appears to be 9x5 or 9x6 inch timbers for the decking. The piles are roughly 12 to 16 inch diameter poles with the bark and sapwood removed, and the longitudinal timbers (girders) are roughly the same size. The twin headstocks appear to be roughly 9x6 inches, notched and bolted into either side of the piles. Normal QR bridge practice would seem to have had 9x5 inch braces, 12x12 inch headstocks, and 17 inch diameter girders, corbels and piles but a road overbridge might be built to lower standards.

Use the photographs for determining the placing of the bracing as the drawing is incomplete in this regard, being simply a modelling aid when both photographs and the prototype were close at hand for reference... and Lincoln likely built the overbridge to fit the location on his layout.

The level deck overbridge at The Caves is undoubtedly newer and is built with some milled timbers, rather than just debarked poles. Note in particular the somewhat larger QR standard six-sided girders, milled that way to more easily repel water and optimise load-bearing strength. Both bridges were built when the railway loading gauge was smaller. The formation under The Caves bridge was likely lowered during recent track upgrading to reduce the grade and permit higher loads to pass underneath. The combination concrete and timber base for the bridge supports illustrates good practice for light bridges and would add detail to any bridge model, although originally both overbridges likely had driven piles with a horizontal brace near ground level rather than a concrete base.

For HO scale and smaller it might be easiest to build the bridge railings, etc from scale styrene shapes (timber dimensions), especially if they are to be painted as if well maintained. Scale timber, stained or painted prior to assembly, would be more appropriate for a bridge less well maintained and for the supporting timber structure. I've found that 'Redheads' extra-long match sticks make a very reasonable timber 'pole' that would be quite appropriate for an HO bridge. The concrete foundations and abutments might be plaster or timber painted appropriately.

ABOVE: Side view of the QR overbridge near The Caves, Central Queensland, 2007. Note the fairly new appearing concrete footings; it is quite possible that bridge pilings would originally have been driven into the ground, rather than sitting on a pier.

BELOW: Three-quarter view of the QR overbridge near The Caves, Central Queensland, 2007. The steel railing in the foreground is meant to discourage anyone climbing down the cutting. The extra length horizontal brace and short diagonal brace are likely the result of a repair at some time, rather than design.

Larger scales require scale timber, stained or painted prior to assembly, and lots of nut and bolt detail for a good representation. Brisbane modeller Greg Stephenson once noted that he stained the timbers for a model bridge with actual creosote for authenticity, but the lingering smell dissuaded him from repeating the experiment.

The height of the supporting timbers, and the length of the centre span (distance between the supporting timber piles/headstocks), will depend upon your loading gauge. The loading gauge for my On30 railway, for example, is roughly 20% smaller than the NMRA's On30 gauge. This reflects the smaller size of sugar cane/shire rolling stock and locomotives compared to North American narrow gauge equipment. I may not be able to run most commercial On30 equipment through my stations or bridges, but such models are usually too long (more than 18-20 scale feet) to go around my curves in any event.

To each his or her own... and remember to measure the vertical height for the loading gauge from the top of the formation, not the roadbed base (don't ask!).

ABOVE: Timber pile, sill and concrete footing detail, QR overbridge near The Caves, Central Queensland, 2007. Note that the base timber (sill) is actually two timbers set on their side and bolted together. It's likely recent track upgrading lowered the formation to increase the vertical clearance.

Acknowledgments and References

Thanks to Graham Hibberd for providing historical information, photos and an update on the status of the Wallaville overbridge. Photos of The Caves overbridge by Lynn Zelmer.

Details of QR bridge building practice can be found in several of the *Modelling the Railways of Queensland Convention* clinic books: Peter Ford and Rod Taylor, *Modelling Timber Bridges*, 1996; Greg Stephenson, *Railway Bridges*, 2000; and Arthur Robinson, *Past and Present*, 2010. (QldRailHeritage.com/mrqc).

ABOVE: Trestle detail on QR overbridge near The Caves, Central Queensland, 2007. Yes, the girder and the headstock are six sided - a slight but definite hexagonal shape is milled.

BELOW: End railing and bridge number detail at The Caves.

BELOW: Railing detail, QR overbridge near The Caves, Central Queensland, 2007.