Ealing Road in perspective

In this third instalment examining the Missenden Modellers' Great Model Railway Challenge *entry* Ealing Road, **ANDREW HICKS** *explains how the forced perspective effect was achieved.*

Photography by the author or as credited

A view across the central part of the finished layout showing the rows of terraces gradually reducing in scale to give the effect of greater distance.

The really *Big Idea* behind *Ealing Road*; the thing that evokes the most commentary at shows, is its use of forced perspective. Perspective refers to the visual effect in which things appear to diminish in size as they get further away from the viewer, in which parallel lines appear to converge onto a point on the horizon. Forced perspective is a deliberate optical trick – more commonly known as an optical illusion – in which objects of diminishing size are arranged such as to create a perception of greater distance. by mimicking the effect of perspective. There is more to it than that, of course (which we will come to in a bit), but that is the basic idea.

Paul Bambrick is the undisputed master of forced perspective in the world of model railways (see RM May 2016 and April 2017). Paul has created some stunning backscenes in 3D that merge seamlessly into the scenery in front of them and regularly teaches his techniques of building 3D backscenes at Missenden Abbey.

It was there that Barry Cossins (captain of the Missenden Modellers team in season 1 of *The Great Model Railway Challenge*) got the inspiration that would lead to *Ealing Road*. Indeed many of the other techniques we used were also learnt at Missenden.

The original design for *Ealing Road*, once we had settled on our theme of London-East-End-Grimy-Docks, called for a road running behind the viaduct with terraced houses on either side. The visual effect we were after was a sea of chimneys flowing into the backscene. There was initially some debate among the team as to the sanity of building houses that would be mostly hidden from view, given the time constraints of the show to build the whole thing in 24 hours. That was nothing compared to the argument when Barry suggested we increase the number of terraces from two to five (see Fig 1). The point, Barry insisted, was visual impact not operational interest. We were building a landscape with a railway running through, not a railway with landscape around it. There is a difference. He was right.

We named the front road

'Ealing Road', after the studio whose films inspired most of the cameos on the layout, and the rear road 'Balcon Street' after Michael Balcon who headed Ealing Studios during its most prolific and successful period. 'Miramont Place' (the set of *Passport to Pimlico*) connects the two roads on the right.

From the outset we agreed on Scalescenes self-print kits as our preferred choice of building. Metcalfe buildings are good quality and usually much quicker to build, but we had already cast sanity out of the window: the advantage of the self-print card kits is that one can select any scale when printing them by using the percent printer setting, and thus ideal for perspective reduction.

A test build showed that they take about 10 hours per house and quick calculation led to the conclusion that to build them all (over 80 buildings) within the 24 hour time limit would require a team of 30+ people.

Fortunately, Barry assured us, the production company had already agreed to accept whole clusters of buildings as single prebuilt items: so no worries there then *[Ed. – the competition judges did, however, have a different view!]*. Nevertheless, after looking at the row of test-built houses in reducing scale, it was just so mesmerising, that we just had to press on and do it (see photo 1).

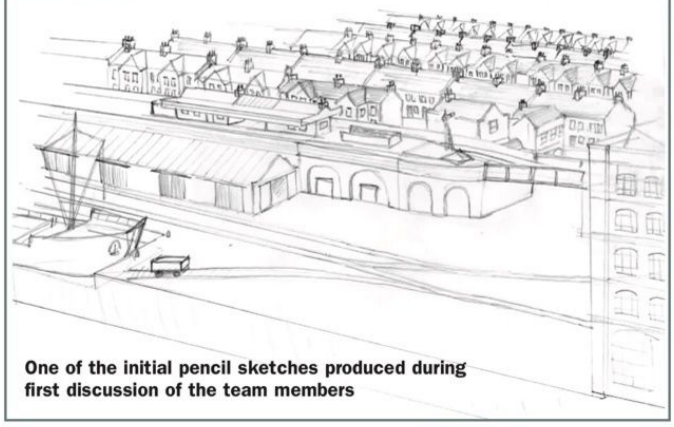
Reducing scale

Everything close to the track had of course to be at 4mm scale (100% on the printer). The reduction in scale started immediately behind that. We decided that the very back row should be 2mm scale so we could use Metcalfe N gauge low-relief terraced house backs, weathered by team member Kiwi, who made them blend in with the Scalescenes houses.

The intermediate rows were set to decrease in stages from 100% to 50%. Rather than scaling down in linear steps (100, 87.5, 75, 62.5, 50) we set our scaling as 100%, 90%, 80%, 70% and 50%. Forced perspective looks better if scale decreases in exponential steps rather than in identical fixed steps. This is because equal distances appear to get closer together as they approach the horizon; like a row of telegraph poles. Done properly the buildings should also have got flatter towards the back. This is known as 'foreshortening' – when an image in 2D gets compressed when viewed at an oblique angle.

Paul Bambrick does this sort of thing; but we had to operate within the limits of the competition. To keep things simple we progressed from the low relief 2mm terrace directly to the 3D laminated backscene as an acceptable compromise.

Fig 1



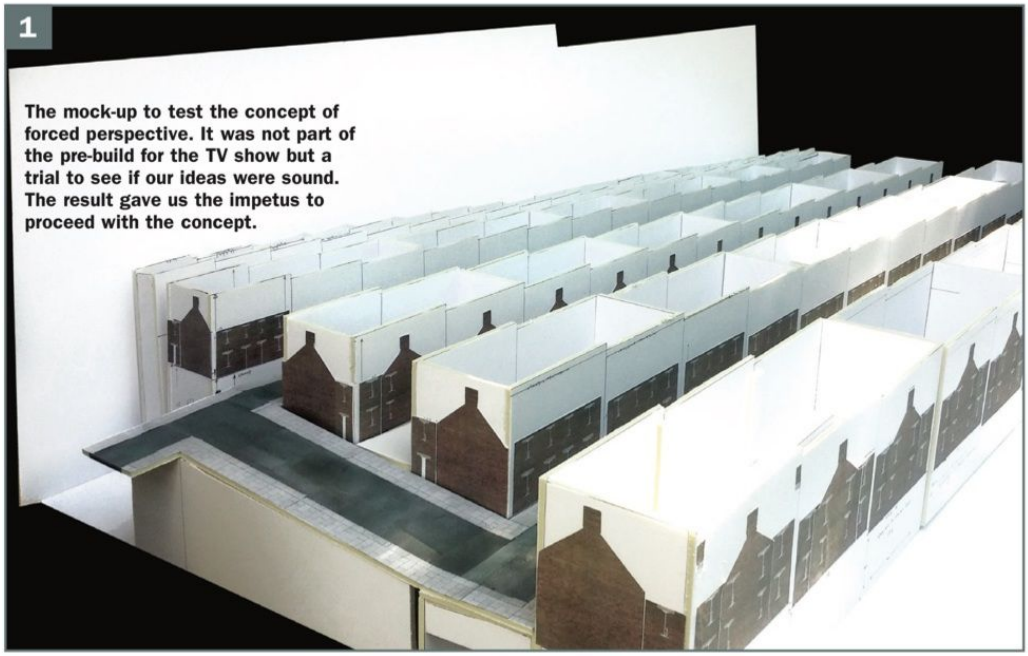
One of the initial pencil sketches produced during first discussion of the team members

View point

Another challenge to overcome with 3D forced perspective is to make sure the perspective lines all point in the right direction to the horizon. Houses of diminishing size on a flat baseboard will have forced perspective lines that point downwards – towards a horizon level with the board. This is fine if the model is to be viewed only at track level. If it is to be viewed from normal standing eye height then it should appear as if viewed from a tall building, helicopter or balloon – in which case the horizon will be higher (level with the viewer's eye – see photo 2) and the perspective lines should point upward towards a horizon point on the backscene.

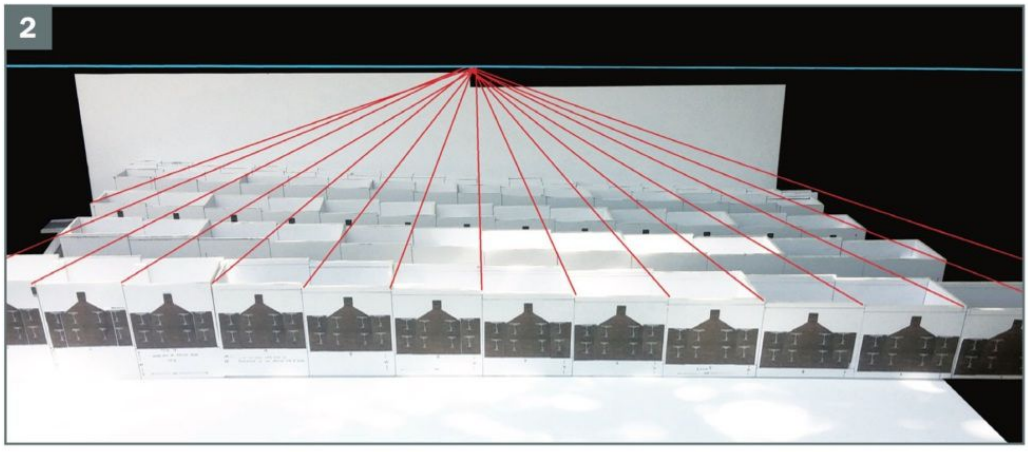
The solution is that the ground level of the model has to rise towards the back, so that the tops

1



The mock-up to test the concept of forced perspective. It was not part of the pre-build for the TV show but a trial to see if our ideas were sound. The result gave us the impetus to proceed with the concept.

2



Showing how the horizon line was raised in tandem with the viewing height – street level being lower than normal eye level.

of the buildings at the back appear very slightly higher than those at the front. It doesn't have to be much higher for this to work: because they are smaller they will also be closer together with more buildings on each terrace going back and so will naturally create converging lines of forced perspective just from looking at the chimneys.

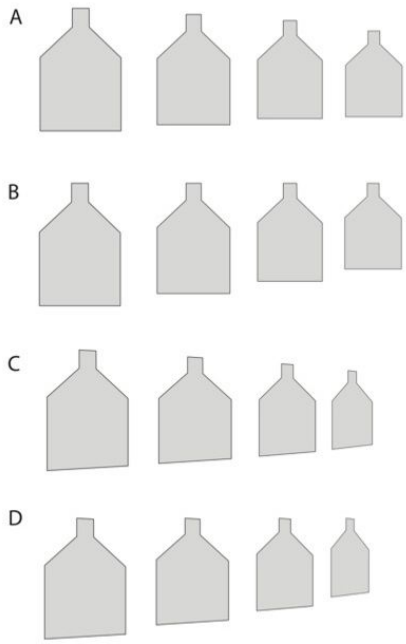
Discrete steps

So for *Ealing Road*, the houses in the front row were 12cm high while those at the back (50%, 2mm scale) were 6cm high. Therefore the ground had to rise 6cm between front and back. Because the perspective lines are based on the tops of the chimneys, and the chimneys in each scale get shorter, the roof ridges will rise slightly. That, combined with the converging chimneys, is enough to give the effect.

In proper forced perspective the ground should rise, not as a steady gradient, but in an elliptical curve into the backscene. This is, again, a property of the foreshortening phenomenon. As a rule of thumb, each halving of scale towards the backscene should occur in half the horizontal distance towards the backscene, in a continuous reduction of size.

What we built however was a form of forced perspective in which the scale changed in discrete steps. Each row of buildings were built to a single fixed scale, in regular cuboid size, rather than reducing in size towards the rear elevations that proper forced perspective with foreshortening would demand (see Fig 2). As a result, we faced the added problem that houses on one side of each road were at a different height to the other. We resolved this by building the roads at an angle – sloping them upwards towards the rear side – so as to meet the houses on each side. This effect can be seen in the bomb crater behind Miramont Place: even the water in the crater had to slope upwards to follow the gradient – making it flat simply looked wrong within the forced perspective surroundings (see photo 3).

Fig 2



Forced perspective methods. (A) Showing the reducing scale of the terraces in cross section, as they were subsequently built, effectively forced perspective in discrete steps.

(B) How the terraces were arranged with chimney tops aligned at the top.

(C) True forced perspective would have reducing sizes in all planes. Building models in this form is usually far more challenging than normal modelling.

(D) Aligning the chimney tops in true forced perspective would be appropriate when the viewpoint is raised.

Then we realised the added complication: Mrs Willoughby's lopsided house has to sit, at the end of the rear road, on the top of a hill above a tunnel overlooking the track. That meant Balcon Street and Ealing Road both had to climb gradients towards the left in order to reach the 20cm elevation at Mrs Willoughby's.

Because Balcon Street was close to the back it was already raised 6cm at its right-hand end, and Ealing Road could climb the same amount once it turned the corner at the left. Therefore each of the straight sections had to climb 14cm along their length with matching gradients so that the chimneys would always line up correctly front-to-back to give the right forced perspective effect.

Except: the number of houses on each road is not the same. Because the scale gets smaller there are progressively more houses on each row going back. It means that the step height between houses along each road had to be carefully calculated to make sure the overall gradient was correct. Smaller buildings means more buildings which means smaller steps between each building.

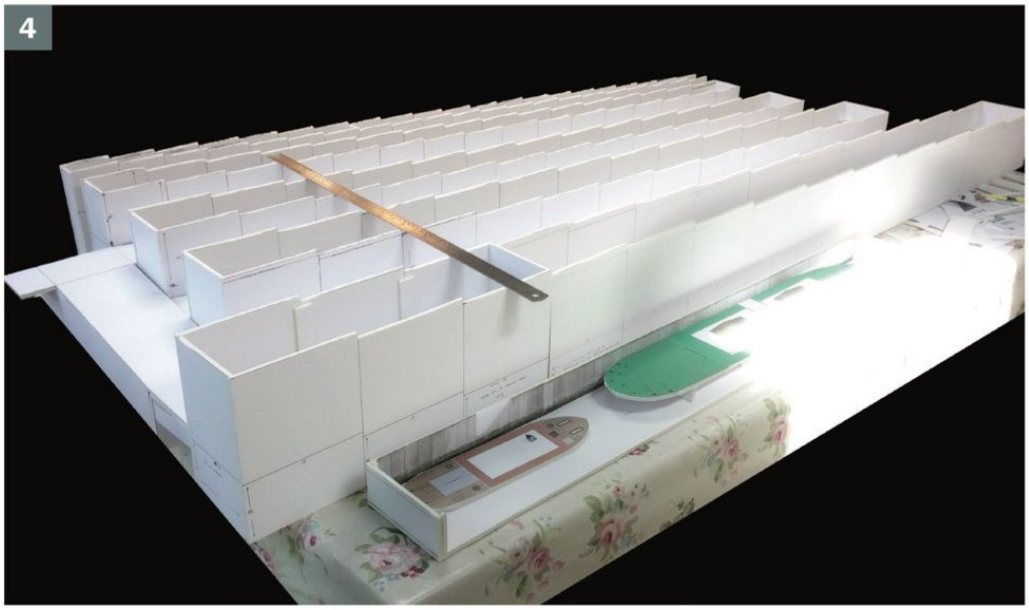
An easy rule-of-thumb is to divide the gradient into multi-house steps of 12mm. This can be divided evenly into smaller steps of 2, 3, 4 or 6mm, depending on the number of houses on each step. As long as the terraces don't get too far out of alignment; it doesn't have to be more exact than that.

Finding out, in front of cameras, that one has made a disastrous error in one's calculations is a situation generally to be avoided at all cost. It happened anyway (the best laid plans of mice and men…) but that's a different story.

To be certain the Big Idea would really work; there is only one fail-safe way and that is to build it. So that's why we made the aforementioned mock-ups of all the terraces, in full scale with all the steps as calculated, using foamboard purchased in large sheets from the local hobby store (see photo 4).

Although not so obvious in the photo, the water in the bomb crater is actually on a gradient.

The early stages of our trial set up constructed from foamboard.



We made these as simple cuboid blocks for each terrace, and faced with Scalescenes wall textures (as in photo 1 on the previous page), just so we could see what it would all look like 'in perspective'. This later also included the front profile of the viaduct and the simple shapes of the dock with the ships. This could then be placed on the baseboards, which had by then been delivered for prepping and track laying, so we could confirm everything would fit and would look OK.

Standing in front of a fully mocked-up *Ealing Road*, with the forced perspective effect so overwhelming, it quickly became apparent that it would be better than just OK. We knew then that we were onto something really good. It was a powerful moment for the whole team, topped only when we assembled the real thing for the first time on location at Fawley.

Then it had to be dismantled while we got on with the fateful prebuilds. Simon took the blocks away to start on the terraces while I took the harbour for the ships. In fact parts survived through to the final build as the frame for the dock scene and the roads. The ground structure on *Ealing Road* at either end is made from blocks of lightweight roofing insulation, carved to shape, but all the terraces are made from foamboard; much of it reused from the mock-ups to make the precisely stepped platforms for each house.

Of course we bit off more than we could chew, like several platefuls too much, but who wouldn't after having seen what might be? Even looking back with hindsight now I think none of us would have chosen differently. So we dug down and struggled on to build our allotted tasks so it could come together on camera at Fawley and inspire viewers as we were inspired.

So it was that I was left with only three days before filming for my other task: to come up with a 3D backscene to match the layout. That, too, is another story.

The proof of the whole idea was demonstrated in front of the cameras on the set of the TV production. The layout has since been finished and has appeared at several shows in the interim. *Photo: via Knickerbockerglory TV*