WARGAMES illustrated®

"How To..."

INTRODUCTION

This 'How To...' guide is a compilation of articles published over several years in Wargames Illustrated magazine. This first volume (like the following two, which will be published annually) is an eclectic mix of the best of the articles from our regular 'How To...' column. Although 'How To...' has featured several different contributors over the years, Paul Davies (author of *Battlefields in Miniature* by Pen and Sword) has been its main contributor. Consequently, we invited Paul to pen the words below by way of introduction.

My introduction to wargaming was in the early '60s, when the choice of combatants was the figures produced by Airfix; initially their British Infantry Combat Group and German infantry. I never really 'warmed' to their Guards Colour Party although I noticed that on eBay recently someone was offering an original set for £39.97 plus £2.97 postage!

The choice of buildings available was limited to OO/HO generic British buildings such as Airfix's 'Trackside' series of plastic kits, or pre-printed card kits by Superquick and Bilt-Eeezi. If you wanted something in a different scale or of a different subject, you had to scratchbuild, using whatever materials you could scrounge. I was regularly inspired by TV programmes like *Blue Peter*, and I remember building their interpretation of Thunderbirds' 'Tracy Island' for my son. Never have cardboard boxes, newspaper, kitchen foil, crisp tubes, straws, corrugated card and washing-up bottles been put to better use.

Nowadays the availability of figures and buildings has improved immensely. The recent introduction of laser-cut mdf kits has made it even easier to create your own collection of buildings in the most popular scales at a relatively competitive price. But if you want a lot of them the cost can quickly mount up, and if you need a particularly obscure building, or one with limited commercial potential, then 'doing it yourself' remains the only solution. I confess that I actually get as much satisfaction creating and using my own buildings on the 'battlefield' as I do from painting my armies and deploying them.

It was that thought which prompted me to start the *'How to…'* series of articles, and also, much later, to write my first book, *Battlefields in Miniature* to demonstrate that virtually anyone could make buildings if they wanted, so long as the construction principles were well-explained, and accompanied by photographs of the most important steps.

This compendium (the first in a series) includes just a few articles from the *'How to…'* archives, and it reminded me just how much time I have spent over the years, looking for materials to adapt for my building projects…; ventilation grids, bamboo roller blinds, beach mats, textured wallpaper, air-drying clay, wood veneer, crepe paper and fake fur to name just a few. And of course where would my buildings have been without those precisely engineered Lego® bricks to ensure accurate right angles.

It was interesting for me to read through these again, and I hope that anyone who has not seen these articles before, will find inspiration to 'have a go' themselves, and for any regular *Wargames Illustrated* readers, I hope that you will discover something you might have missed 'first time round', if only a reminder of a construction technique or material that you can apply to one of your own projects.

Paul Davies

'How To...' author and model maker.

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CONTENTS

IN ORDER TO AID WITH THE CONSTRUCTION OF SOME OF THE MODELS DESCRIBED IN THIS BOOK, WE HAVE PROVIDED 'PLANS', WHICH ARE AVAILABLE TO DOWNLOAD FROM THE WARGAMES ILLUSTRATED WEBSITE.

WWW.WARGAMESILLUSTRATED.NET

HOW TO... BUILD A NORTH AMERICAN MANSION

Words & Pictures by Paul Davies

We are off to the American Deep South to construct a small Southern style mansion. For aficionados of *Gone with the Wind,* it may not be "Tara", but in the immortal words of Rhett Butler, "Frankly, my dear, I don't give a damn." Seriously though, I didn't want the mansion to be too dominant on the average wargames table, but obviously you can extend, or scale up the front and rear walls to make a truly imposing residence.

Safety warning:

Sharp things cut. Hot things burn. Vapours and gases are harmful, so always work in a well ventilated area.

Outline of the series:

Each *How to…* feature will follow a similar format and include plenty of photographs to illustrate the various stages in construction.

When appropriate there will be some background/historical information, and of course a list of materials used with suggestions for suppliers if not obvious.

The topics covered will initially be those that interest me, or covering subjects about which readers have already requested "How to…" information.

However if any readers have particular terrain/building problems that they would like to see covered in the series, please feel free to contact the magazine, and we'll see what we can do. letters@wargamesillustrated.net

Materials Required for this project

Materials	Suggested Source
Foamboard* PVA glue Pins	Craft/Art shop
Balsa & strip wood Embossed plastic sheet	Model shop or mail order from: Squires Model & Craft Tools; Tel: 01243 842424
Lego® bricks	Perfect for creating right angle templates… and cheap too!

*Foam board: Never try to cut foamboard with a single cut. The blade will drag and damage the material. You can repair it with filler, but avoid the extra work by using a very sharp blade and a series of light cuts. The foam centre of foamboard can react with spray paint. If you intend to use spray paints you should protect any exposed edges of foam, either by sealing them with 'normal' paint or by gluing thin strips of paper over any exposed edges.

Pinning and gluing: Apply glue to both surfaces and press them firmly together using pieces of Lego® or a square to ensure a right angle. Push pins in at an angle, to hold the components together. When the glue has set, snip off the pinhead. Wearing safety goggles at this point is recommended because the pinheads will ricochet in every direction! Using the flat blade of a screwdriver gently push the end of the pin just below the surface. Fill any hole with smooth filler.

The models featured in these articles are designed and constructed as I'm working, and so improved methods of construction sometimes become obvious during the construction process. Always read through the instructions to ensure you understand how the construction and assembly works before starting to cut out anything.

SCALING THE PLANS

Enlarge the plans to make the door height so that one of your based figures could pass through it. Although the basic plans can be used as a guide for a model in any scale, the material thickness and dimensions in this article assume that you're building a model for 28mm scale.

ACW SOUTHERN MANSION ©2009 Paul Davies

Plans and instructions may be used for *personal use only* and not for commercial purposes

Front Upper Wall

Front Lower Wall

Upper Floor

Side Wall x2

First Floor with balcony

Ground Floor with Porch

Rear Wall

SCALING THE PLANS

And if you intend to create your own buildings then create a template similar to the one on the right. Remember, there's a lot of difference between the height of a doorframe of a single storey cottage and that of a more imposing building.

THE CONSTRUCTION

Decide whether or not you want to have access to the interior of the building. If so, the rear wall can be removable, but it will alter the construction sequence slightly. The overhanging roof will prevent the rear wall from falling outwards, and vertical supports on the two side walls will prevent it falling inwards.

From your scaled plans, mark out the various components onto 5mm foamboard, including the position of the door(s).

Decide on the number of windows. The top edge of each window aligns with the top of the doors, so you need to mark this line, and also the vertical centre point for the windows.

Ceiling/Roof —————
Door Top —————
Head Level —————

Ground Level —————
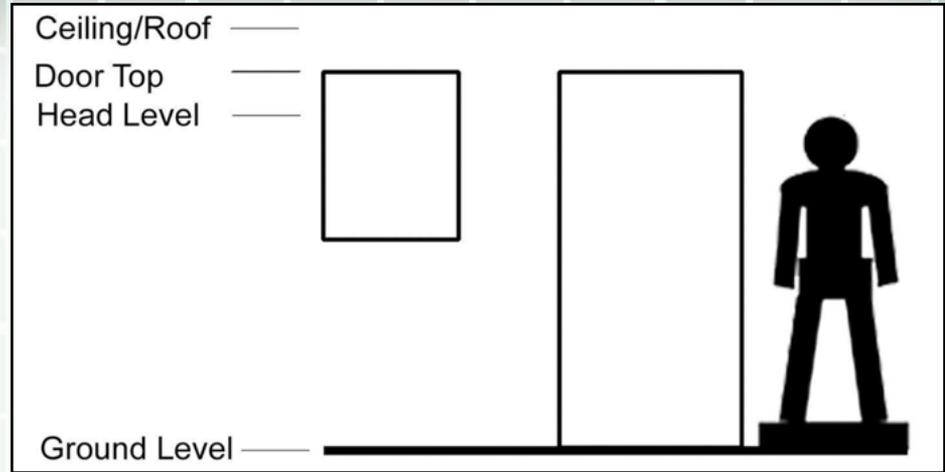
THE WINDOWS

It's easier to construct windows then cut apertures to match than cut the apertures and try to make windows to fit!

I'm always looking at different procedures or materials to use. Previously I've used brass mesh for window frames, but it IS expensive. For this model I've found a cheaper option…. Surface Mounting Interior Adjustable Ventilators with (most importantly) an integral fly screen that comprise two components; the outer piece with slots in, and the fly screen itself, which is basically a small rectangular white plastic mesh.


Score a line around each section of the grid leaving a narrow outer frame and cut out these frames either by repeated cuts with a craft knife, or a fine-toothed modellers saw. I used a miniature drill with a circular saw cutter. This latter tool can be an evil blighter if used carelessly. When mine slipped it sliced a gash in my finger that was, well… colourful and largely responsible for my almost missing the magazine's copy date, so be VERY careful when using one! And don't try to hold the grill in one hand and the mini circular saw in the other, use a vice or clamp to hold the plastic! Black & Decker make an excellent tabletop version of their "Workmate", the Workmate Workbox WM450 that is a toolbox with a vice assembly as the lid. I've seen various versions of this on e-bay. Mine I bought for £8.50 from a car boot sale, complete with tools!

Once you've roughly cut out the mesh sections trim them down to create your basic windows. For this building I went for three 'panes' wide by four deep.

To create the outer window frames, use 2mm square section balsa. You could use matchsticks, but they're tougher to cut and often aren't very straight. It's a good idea to paint a length of balsa in the window frame colour. I chose GW Kharloc Green, a fairly subdued green, but you could use a pale blue or grey, even white.

Turn the plastic mesh over so that the chamfered edge is face down. This means that if you're a bit 'flamboyant' with the glue, it will be on the rear surface of the windows, not the front! Cut two verticals and glue them to the plastic mesh, followed by the top and bottom pieces. If you want to create an integral windowsill the lower horizontal will have to be wider to overhang the front of the wall.

Once the assembly has dried, just touch up the unpainted end sections. Most of the windows for this model are configured as 3 horizontal x 4 vertical, but I also created 3 x 3 and 2 x 2 versions. And if you're feeling REALLY adventurous/confident you could butt two window sections together to create some much wider windows.
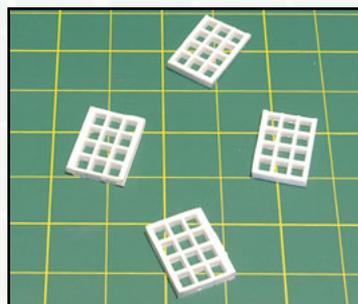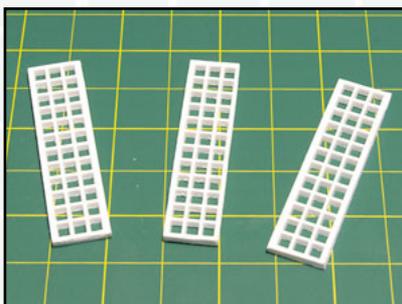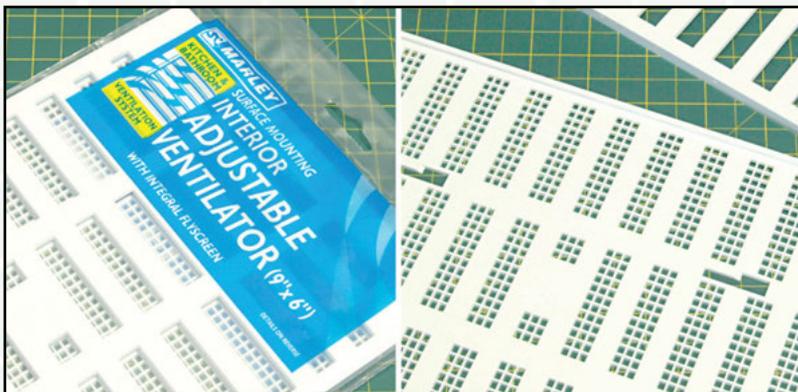
WHERE TO FIT THE WINDOWS?

Lay your completed windows on the walls, using the guidelines for positioning. Draw carefully around the frames and cut out the apertures. Use thin paper to line the inner edges of the apertures. Double-check the fit of the windows, and if necessary, lightly sand the edges. Unless you are VERY accurate, it is unlikely your windows will be exactly the same size, so it's important that you match windows to openings. The easiest method is to number the windows on your plan, and similarly mark the back of the windows.

PAINT THE INNER WALLS

Paint the inner walls and inside the window apertures. The colour you choose is up to you. Black, Grey, even white. Even if you intend to leave the inside walls of the building unpainted it is important to be aware that if you are going to be applying a lot of glue, or painting, to one side of the material, there is a chance that it might warp, so you should similarly coat the opposite side to prevent this happening.

CLAPBOARD

A common feature of this style of building was the overlapping horizontal outer panels, variously called clapboard, lapboard or weatherboard. To simulate this, we use overlapping strips of thin card starting at the bottom edge of the wall. Another possibility is to use textured card, available from some craft shops.

To help align these strips, rule a series of horizontal lines at 5mm intervals. The corners of the building will feature a folded strip of card to finish off the angles cleanly and cover any bare foam ends. At each end of the sidewalls rule a vertical line 5mm in from the edge.

## APPLYING THE HORIZONTAL CLAPBOARD - THE FRONT AND REAR WALLS

Taking the full width of your front wall as your guide cut a number of strips of thin card 10mm deep. Offer up the first strip aligning it with the vertical left edge of the wall and mark off the doorframe edge. Cut the strip and glue it into position with the bottom of the strip flush with the bottom of the wall.

Repeat this process on the opposite side of the door to the right hand vertical edge of the wall. Take another strip and overlap the first one by 5mm.

When you reach the lower edge of the windows you'll need to cut out a notch to fit around the window aperture.
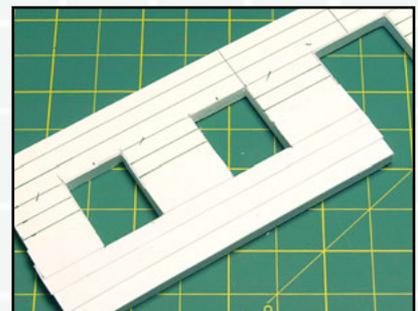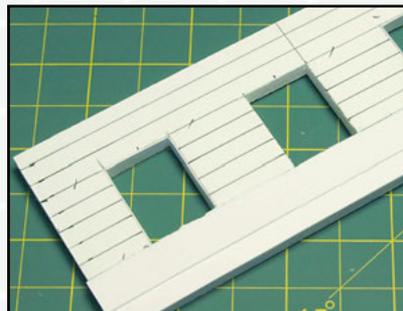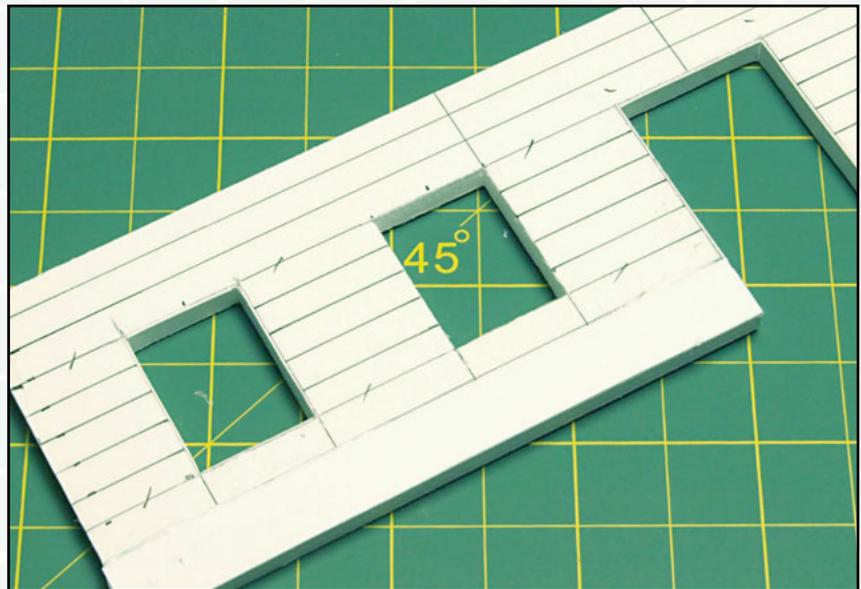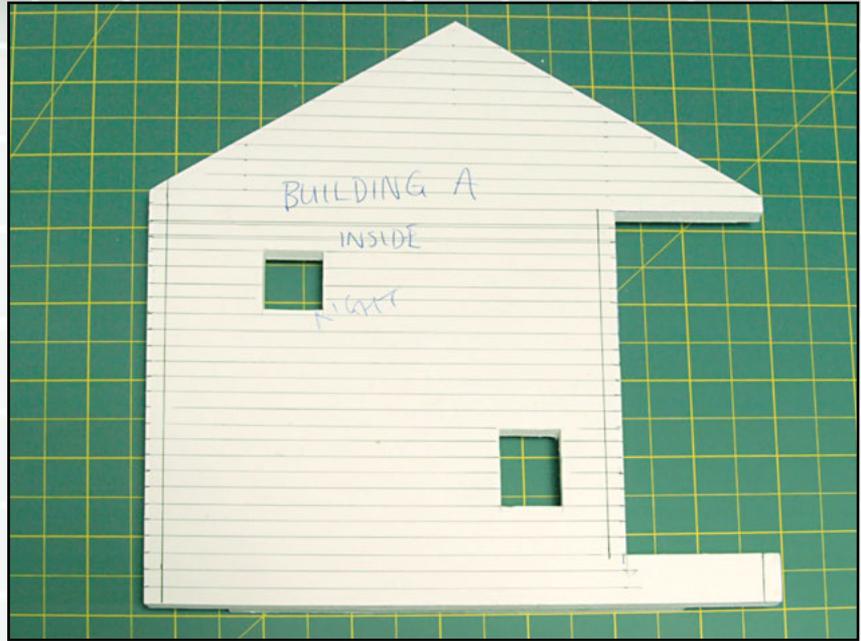
Using the lines you ruled as your guide, continue overlapping. The next few strips will be shorter and fit between the wall edges, each window and the doorframe.

Once past the upper window and door line the strips can run the full length. Repeat this basic process for the front and rear walls.

APPLYING THE HORIZONTAL CLAPBOARD TO THE SIDE WALLS

The process is basically the same as for the front and rear walls EXCEPT that the horizontal strips do not run the full width and stop at the vertical lines that you ruled 5mm in from the vertical edges of the walls.

PAINTING THE OUTER WALLS

Paint the outer walls now, or at least around the door and window apertures to avoid getting paint on the frames. I applied a base coat of pale grey, followed by a dry brush of white.

DOORWAYS AND DOORS

Make inner doorframes from strips of balsa to finish off the doorway. Start with the top horizontal, followed by the two verticals. Whatever the style of your doors the construction process is the same; a piece of balsa or card trimmed to fit the aperture with strips of thin card according to the style of door. Paint the door(s) to match the window frames.

THE INTERIOR FLOORS

If the interior is going to be an important part of your game play, other than simply being a means to 'prove' how many figures are positioned inside, then there's a number of options open to you:

- Paint the floor and rule floorboards onto it using a fine point. Staedtler produce a very good range of pigment liners, as do Pilot, the finest of which is 0.05.
- Glue a series of strips onto the foamboard to create floorboards.
- You can also obtain embossed thin plastic sheet in many different texture finishes. In the UK, check out the Squires catalogue, as they market sheets that are 300mm x 174mm. Ratio also market embossed plastic card, but it is thicker and smaller, about 90 x 75mm, whilst Wills' sheets are 130mm x 75mm. I always try to avoid any unnecessary joining, so it will come as no surprise that any uninterrupted flat areas of the models rarely if ever exceed 300 x 174mm.
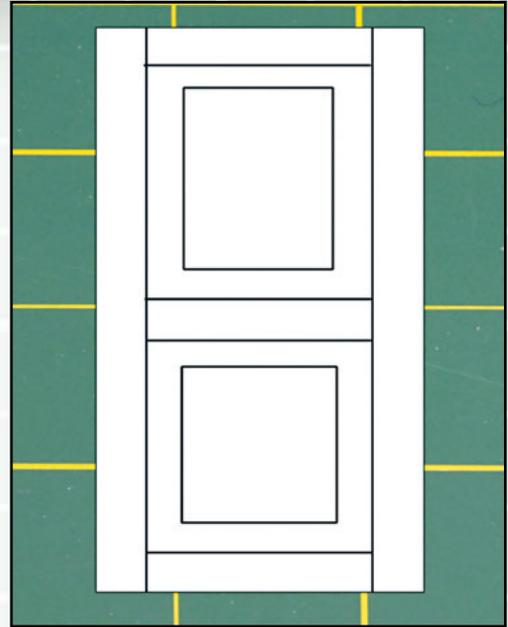
ASSEMBLING THE BUILDING

This building has a raised ground floor and porch, which needs to be supported by strips of scrap foamboard glued along the bottom of the sidewalls. Ensure that the supports are at least 5mm clear of the front and rear vertical edges of the sidewalls otherwise they will obstruct the front and rear walls.

Take the ground floor. Turn it upside down and glue into position the front porch front supports and the stair side supports.
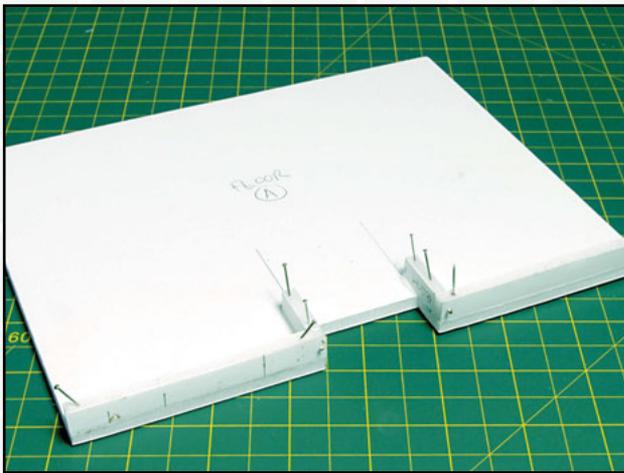

The steps leading up to the porch are made from two layers of foamboard.

Remembering that the front and back walls fit between the two end walls, pin and glue together one side and one end wall fixing them to the floor, and then pin and glue the other side wall to the floor and rear wall. Use Lego bricks or an engineers' square to ensure a right angle.

NB. *If you are intending to have a removable rear wall you need to pin and glue the two side walls to the floor, but do not pin and glue them to the rear wall, and ignore any subsequent instructions "to pin and glue anything to the rear wall". Until the front lower wall is glued into position the two side walls will be relatively fragile and will need to be supported to keep them vertical to the floor. One option is to lightly pin, **BUT DO NOT GLUE,** the rear wall into place.*

PLANKING THE PORCH AND BALCONY

Draw a line on the porch and balcony between the leading edges of the side walls. This will be the guideline for positioning the two front walls, and also the rearmost point for the planking, which is created from 5mm wide strips of thin card glued into position.
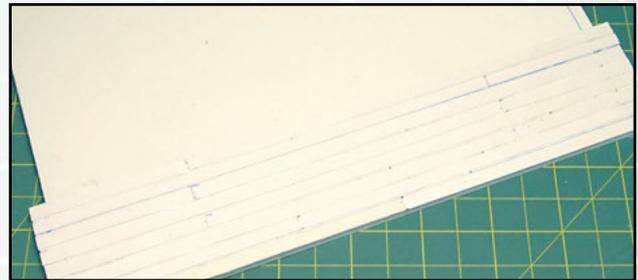
You will need to 'clapboard' the front face of the porch, in the same way as for the main walls. Paint the porch and balcony using the same paints as for the side walls.

THE LOWER FRONT WALL

Glue and pin the lower front wall into place between the two outer side walls. Glue the windows in place in the front, side and rear walls, followed by the front and rear door(s).
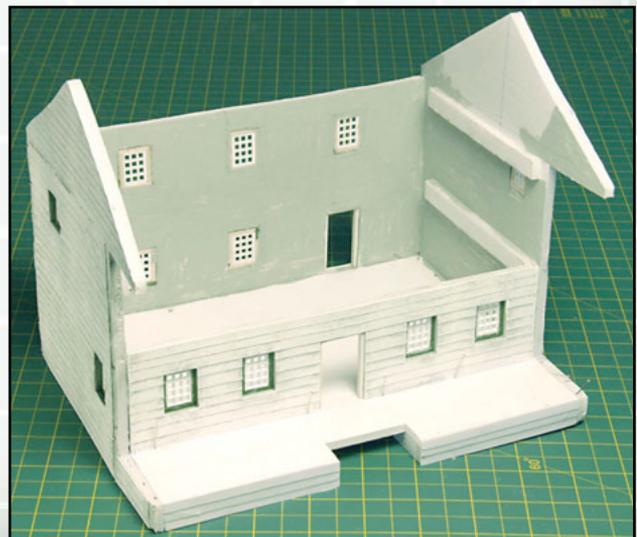
THE FIRST FLOOR

Pin and glue the first floor into position, followed by the upper front wall, and then fit the windows and door.
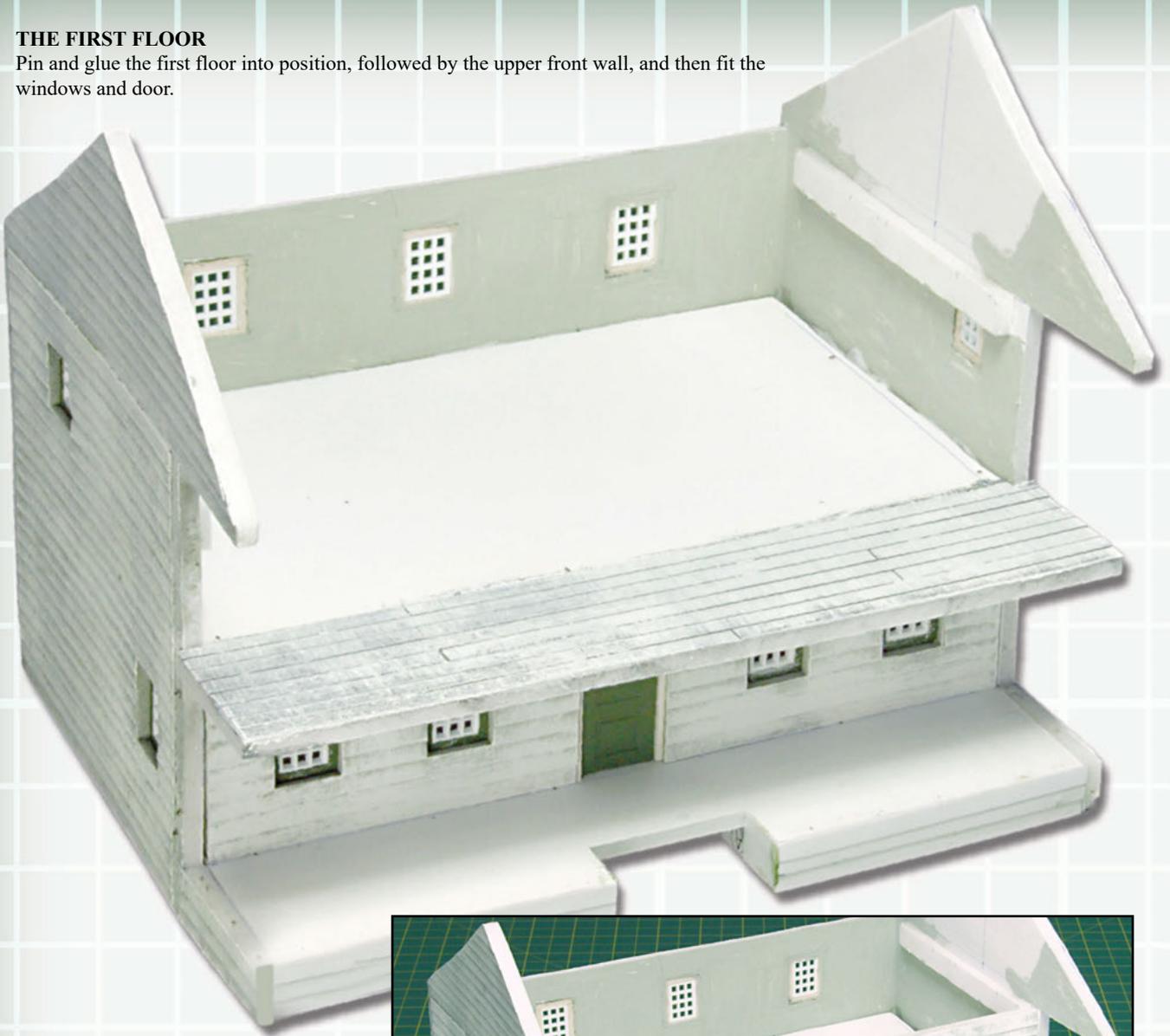
THE ROOF FLOOR

There's no access to this floor on the model so no need to plank it at all. Pin and glue it into position.

THE VERTICAL EDGING

Using strips of thin card, add the edging on the corners of the building.
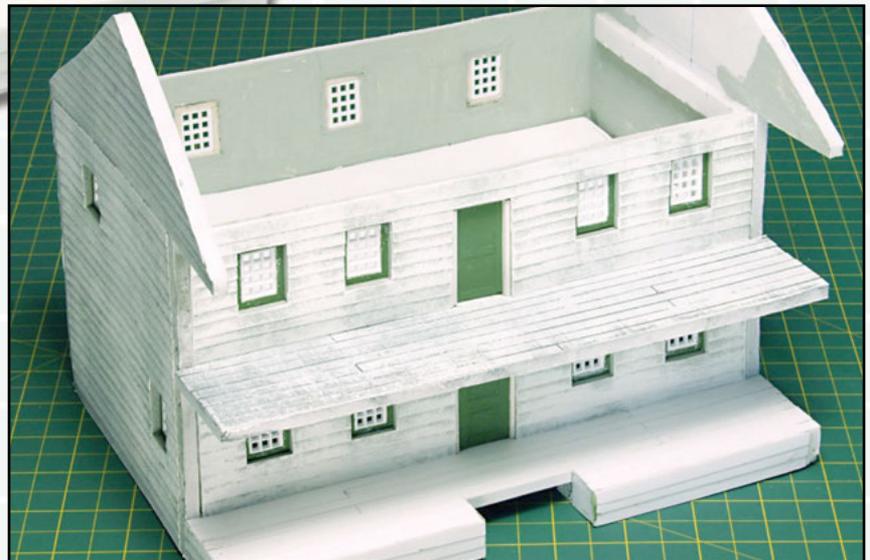
THE ROOF AND TILES

Using mounting card cut a single piece large enough to overhang the side walls, front and rear walls by about 5mm. Score a line for the ridge to aid folding. Draw lines where the side walls will be and drill along these two lines. Pin the mounting card in place pushing pins through the drilled holes to prevent the 'roof' sliding out of position. Once the glue has dried, clip off the heads of the pins and push them fully in so that they're flush with the card surface.

There are several ways to create the roof tile effect. You can use individual tiles made from thin card, (See *Wargames Illustrated* 253 – "How to make… Ruined WW2 Buildings"), or embossed plasticard, (See *Wargames Illustrated* 257 – "How to… Make A Tudor Manor House"). For this model I chose the latter option. Cut your sheet to size, glue it in place and use bulldog clips to prevent it moving while the glue dries. The join between the sheets is covered by small pieces of thin card to represent ridge tiles.
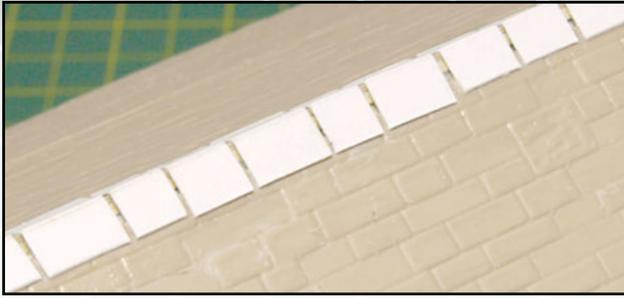
THE CHIMNEY

The chimney stack is made from a combination of foamboard, and card, with the bricks made from individual pieces of thin card. The chimney stacks are made from the barrels of old ballpoint pens. Prior to painting, the top of the chimney was given a brush over with PVA glue and sprinkled with fine sand.

PAINTING THE ROOF AND CHIMNEY

The roof and chimney were given a base coat of matt black, followed by a dry brush of GW Terracotta and finally a very light dry brush of GW Flame Orange. A few of the bricks on the chimney stack were picked out in grey, brown or red.
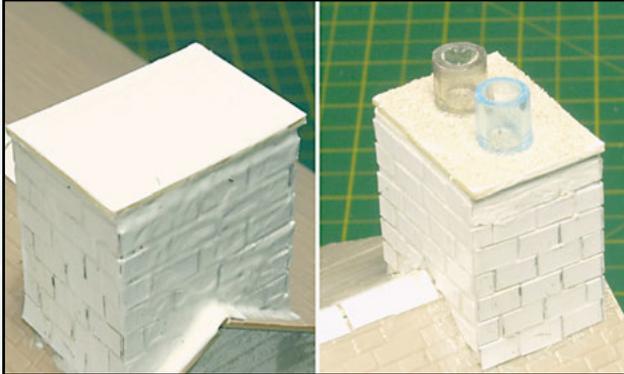
BALLUSTRADES

The balustrades were constructed from various sizes of balsa. First balsa strip 5mm x 1.5mm was used to create a 'base'. Then 4mm square section balsa was used for the uprights. To create a support for the handrails, short strips of balsa 15mm long x 4mm wide were glued to each upright where the handrails would fit.

Using 3mm x 1.5mm balsa strip cut lengths to fit between the uprights and glue them into position. Allow plenty of time for these handrails to dry.

The short supporting uprights are matchsticks cut to length and glued into position.

Finally the balustrades were painted with GW Fortress Grey, followed by a white dry brush.

And you should now have a representative Southern style mansion suitable for American Civil War, American War of Independence, War of 1812 and even Wild West games.
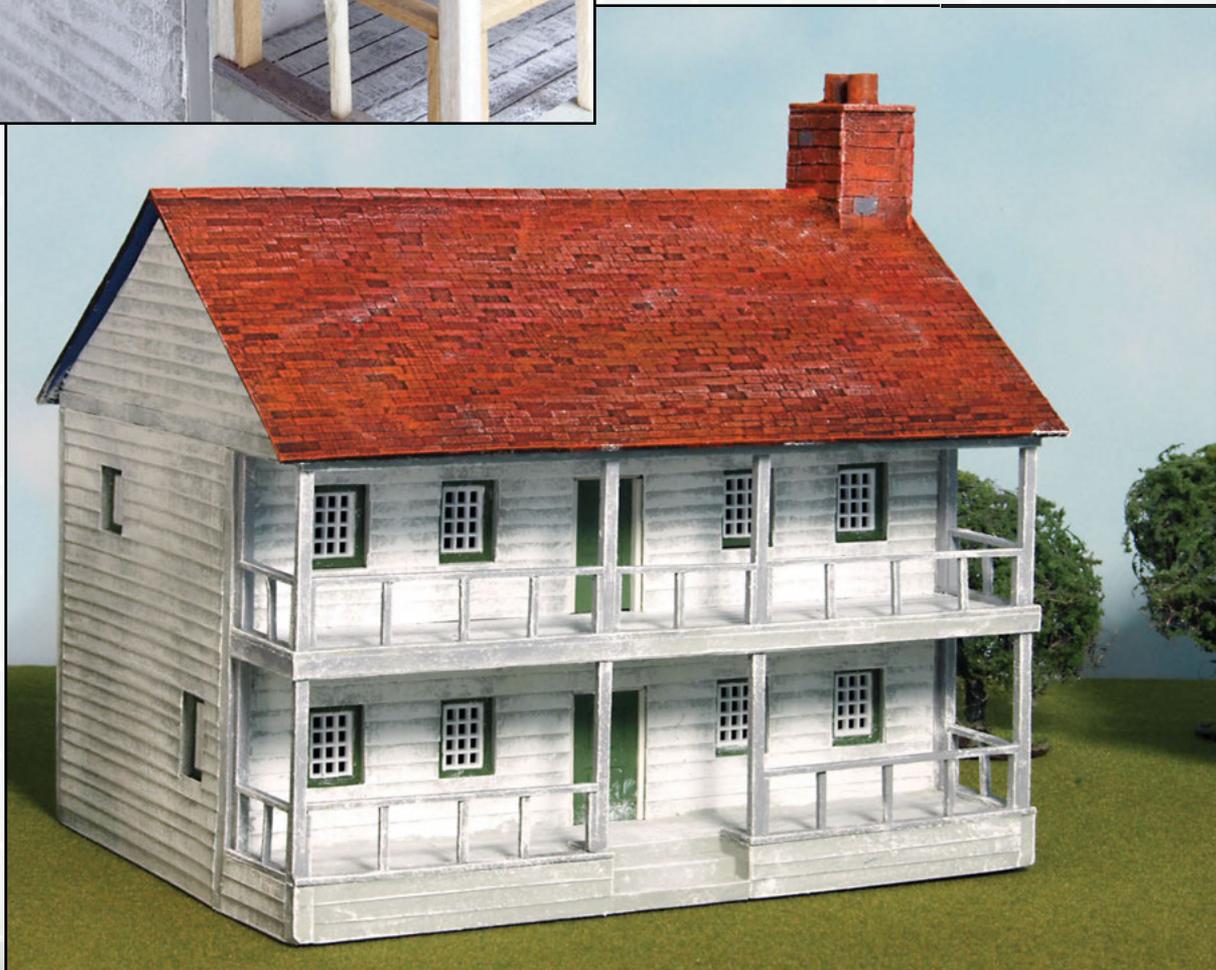
ROMAN FORTIFICATIONS

HOW TO BUILD THE ROMAN FORTIFICATIONS OF ALESIA

This project shows how to create Roman siege fortifications similar to those at the Siege of Alesia in 52 BC. These defences, comprised two concentric siege lines surrounding the city. The inner ring called a *contravallation*, protected the besiegers from counter-attack by the besieged, and the outer ring called a *circumvallation*, protected the besiegers from any attack by a relief force. As well as palisaded ramparts, the defenses included pits containing *cippi*, individual pits filled with *lilia* and *stimuli* AND ditches, some filled with water. The pits containing the *lilia*, were set out in a *quincunx* pattern.

No, I didn't know what it meant either. Doesn't it irritate you when people use technical terms assuming that you know what they mean? Anyway, to save you all time, *quincunx* means five units laid out in the pattern like the five-spot on dice.

I've included a glossary below to help you out with the other terms.

BASIC TOOLS & MATERIALS
- Sturdy hobby knife (box cutter)
- Needle-nose pliers
- Metal ruler
- Cocktail sticks (toothpicks)
- Bamboo placemats
(or Balsa wood)
- Bamboo roller blind
(or barbeque skewers)
- Polystyrene or Insulation Foam
- Super glue
- PVA glue (white glue)
- Brushes
- Texturing material
- Paints and Wood dye (stain)

ADVANCED TOOLS & MATERIALS
- Hot wire cutter
- Pyrography machine
(a description is given
to the right)

CONSTRUCTING THE TERRAIN

The first thing to do is to make sure that your plans are set for the miniatures you'll be using. Enlarge (or reduce) the plans to suit the height of your based figures. My model features a rampart 70mm above 'ground' level, with the palisade adding a further 40mm. The towers were 160mm high x 95mm wide x 80mm deep.

For this article I didn't build terrain boards to fit between the two ramparts as I already had some suitable. However the texturing and painting suggestions in the article can be used to create any further panels you might need.

The terrain is made from polystyrene. When I need precisely cut sizes, I buy direct from Total System Scenic (www.totalsystemscenic.com) who, as well as making 'finished' terrain panels themselves, are able to supply plain panels. There may be other services like this elsewhere in the world and a little internet searching should reveal them, and the chance to cut down on shipping.

ENVIRONMENTAL NOTE:

Polystyrene materials don't biodegrade easily, if at all. Most recycling sites keep such materials separate, so it might be worth paying your local centre a visit to check if they have any polystyrene waste you can have; they're usually only too keen to get rid of it. Its free AND you can play a small part in reducing waste. For this project, although I had to buy plain polystyrene for the square 'ground level terrain' I was able to use waste material for the ramparts. And if you ever need to build hills or cliffs, see what your local recycling site has lying around before spending money on new material!

GLOSSARY

cippi	gravestones - also used to describe tree trunks with sharpened branches thrown into defensive pits
contravallation	the inward facing line of a fortification
circumvallation	the outward facing line of a fortification
crenellations	a series of rectangular spaces through which defenders shoot with intervening higher sections to provide cover
embrasure	the opening in crenellations
lilia	"lilies" - also used to describe a single sharpened stakes used in defensive pits and ditches
merlon	the higher section between embrasures which provide protection for defenders
quincunx	five units laid out in the pattern like the five-spot on dice
stimuli	spurs - also used to describe barbed spikes used in defensive pits and ditches
titulus	an opening left in the ramparts

MAKING THE RAMPARTS

I built four rampart sections, which can be used to represent the inner and outer defences, or as a single long line of defences. It was essential that they'd all butt up to each other. To ensure this you'll need to make an end profile template; similar to the one to the right, which is intended for use with 25/28mm scale figures.

For the ramparts, use a thick piece of scrap polystyrene trimmed to size, or you could sandwich together several thin sheets. For added strength, and to stop the layers moving whilst drying, push barbeque skewers through all the layers.

Once the glue has thoroughly set, mark out the end profiles and rule lines between the ends for your cutting line. Its easier to shape the ramparts before gluing them to the 'ground level' panels.

I used a hot wire cutter to cut the rampart profile. Work in from each end, to ensure the end profiles match. Make sure you've got a spare set of batteries BEFORE you start work!

For cutting the ditches and pits I used an 'Artists Pyrography Machine' (pictured to the right and set for ditches). The advantage of which is that apart from it being mains operated with a variable heat control, cutting is done by a piece of wire which can be bent into different shapes. Bend the wire into a 'V-shape' for ditches, and a square shape to simplify cutting out the pits. If you plan to do a lot of work with polystyrene or similar materials I thoroughly recommend you treat yourself to one! I do know they can be found here: *www.peterchild.co.uk/pyroinfo/pylist.htm*

Once you've profiled the ramparts, glue them in position on your polystyrene tiles with PVA (white) glue, using skewers again to hold the components together.

TEMPLATE FOR RAMPART PROFILE
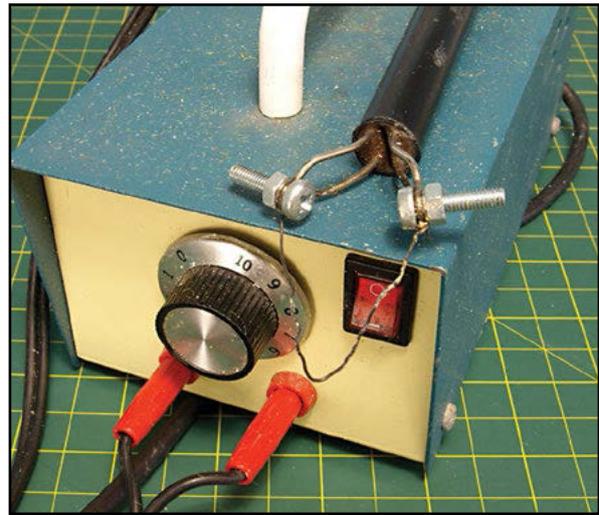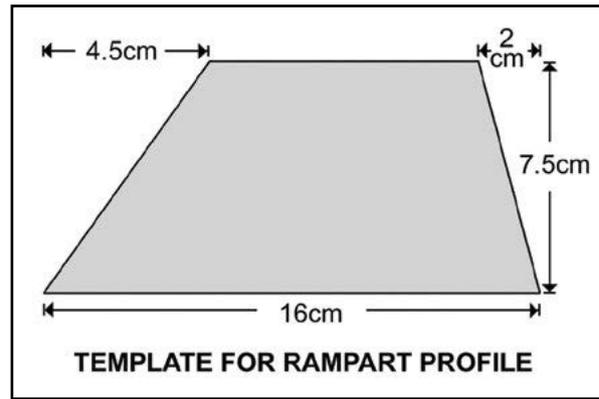
LAYOUT OF TERRAIN AND DEFENSES

Plans and instructions may be used for *personal use only* and not for commercial purposes

SIDE ELEVATION

Ramparts

PLAN VIEW

Ramparts

KEY

⊞	*cippi* - sharpened stakes in pits	▪	*stimuli* - barbed spikes buried at random
▭	Ditch	⨳	Outer steep face of rampart
⬚	*lilia* - individual stakes in pits in quincunx pattern	⊪	Inner rampart
☐	Watchtower	---	Palisade
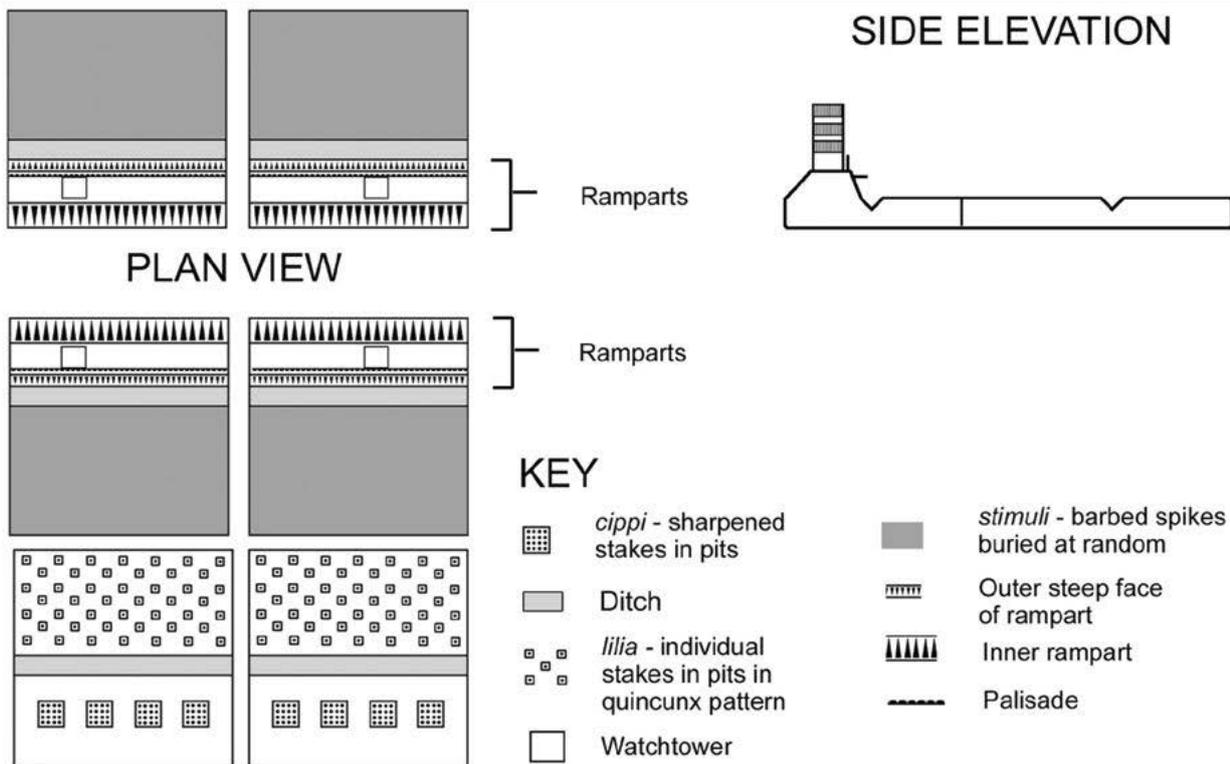
DITCHES, PITS, AND RAMPARTS

The next step is to mark out the ditches and cut them out, remembering to start from the ends working inwards, then mark out and cut out the pits. Both these operations are very simple if you have a pyrography tool, otherwise you'll have to use some form of sturdy knife or rasp. Be warned, this latter option is extremely messy and creates a lot of very intrusive and unpleasant dust. Wearing a safety mask is definitely recommended.

Coat the surfaces with PVA (white) glue, then sprinkle fine sand over the terrain. Leave it to dry.

You can use textured paint instead of the "PVA and sand technique" but I prefer the latter as it allows for much more variation in texture.

For painting I adopt the same procedure; a dark version of the final required colour and followed by a series of progressively lighter coats dry brushed on. For this model I started with Dulux 'Desert Island 3', followed by a drybrush of Dulux 'Desert Island 6', and a random, very light drybrush of white*.

Then brush on PVA (white) glue in irregular patches and sprinkle on static grass. If the colour of the static grass stands out too much from the terrain colour, you can always dry brush it lightly to blend it in with the terrain, but wait until you're certain the glue has thoroughly dried otherwise you'll drag off the 'grass'.

For those with ready access to it, I thoroughly recommend the Dulux range of Vinyl Matt paints. They have an excellent range of colours and a consistent colour mixing system. When you're aiming for some really subtle effects you can simply select your basic colour, in this case 'Desert Island', and there are usually six compatible variations from which to choose.

MAKING THE PALISADES
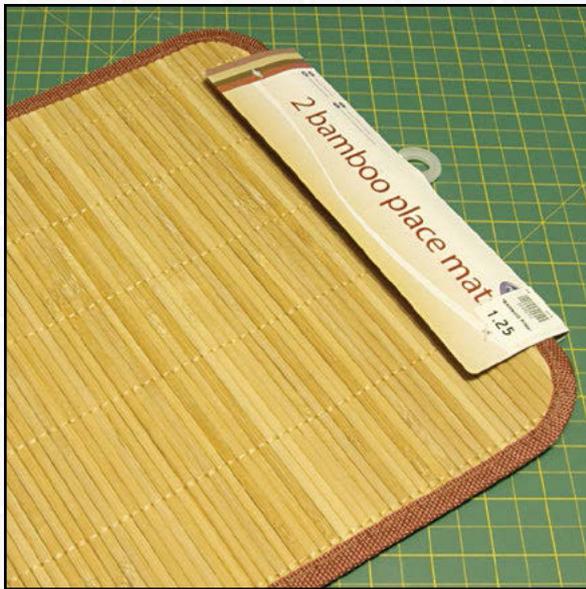
I had intended using strips of balsa for the palisade, but discovered some bamboo placemats in, of all places, a local hardware store. They were a real bargain at £1.25 for two! If you use mats like these you'll need to cut away the edging, but I recommend leaving the cotton mesh backing, as it holds together the bamboo strips. MUCH cheaper, easier and quicker than working with individual strips of balsa.

The palisade at Alesia followed a similar pattern to the crenellations seen on medieval castles; a series of rectangular spaces through which defenders shoot arrows with intervening higher sections to provide cover. The opening itself is called an embrasure or crenelle, and the higher section between is the merlon.

To determine the depth of the embrasure consider the height of your based figures. If they're holding *pila* for example, the cutout needs to be low enough so that it looks as if they could actually throw them. Once you've decided this distance rule a line on the bamboo. To cut out the embrasures, first score heavily along this line with a sturdy knife; grip each individual bamboo strip with a pair of long nosed pliers and bend it forward along the score line.

If your ramparts are longer than the width of the bamboo mat then you'll need to plan how each section butts up to the next one. Once you've decided upon the pattern for the crenellations and merlons, just stick to that pattern. If for example one palisade section ends with three full height strips, then, if you're working to a pattern of an eight strip width of crenellation followed by the same width of merlon, then you'll need to start the adjoining section with five full height strips... it's easy once you've got the idea, honest!

CRENELLATION TEMPLATE
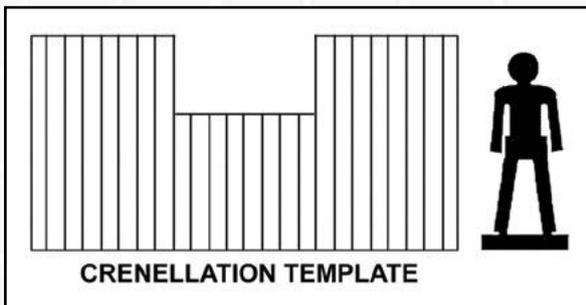
For the stakes in the various holes and pits, I used cocktail sticks (toothpicks) coloured with wood dye, and glued into place with PVA (white) glue.

Caesar stated that these pits and the surrounding ground were often covered with brushwood to conceal the holes. The easiest way to simulate this is to use lichen or other proprietary foliage.

Research also suggests that the ramparts at Alesia had sharpened branches installed at the top just below the palisade. I felt that these would be very fragile at this scale so used cocktail sticks for a similar effect.

The Gauls also constructed panels from wicker to breach the ditches and fill the pits. You can make these simply by using a "beach mat". To stop the mat separating into individual strips when you cut it into individual panels, give both sides of the mat a coating of PVA (white) glue.

For added support, once you've cut out your panels to size, glue a couple of strips of thin card or balsa to the underside of each mat.

I left them unpainted as I thought they looked fine left natural.

To finish off the palisade I added a single horizontal length of bamboo strip across the front for extra rigidity.

Instead of painting the palisade, I decided to try wood dye (or stain) as it enhances the wood texture more than paint. I used "Dulux Quick Drying Wood Dye – Teak". Be warned though, wood dye soaks into the wood, but doesn't cover up markings or guidelines you may have drawn on the surface of the wood, so you'll need to remove any such marks before applying the wood dye.

While the palisade is drying, cut a narrow groove in the top of the ramparts into which the palisade sections will fit. Again I used my hot wire cutter, which cuts through polystyrene like… well, like you know what.

To fix the palisade sections in place I used Elmer's PVA (white) glue, which comes in a dispenser with a handy nozzle. Squirt the glue into the groove and slide the palisades into position. Use a ruler to check that the height of each palisade is consistent along its entire length.
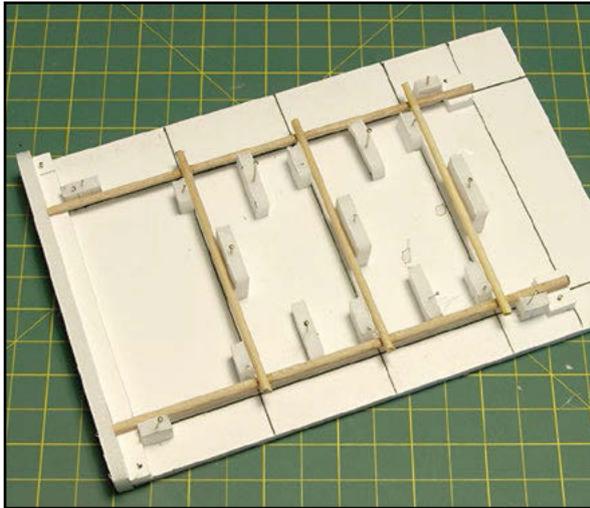
The towers have three floors with ladders connecting each one. Each tower is made by constructing a front and back section on a 'jig', and then joining the two sections together with crosspieces. I decided to use the bamboo rods from an old roller blind to form the four uprights and horizontal beams of the tower, but you could also use barbeque skewers, although these can be much harder to cut.

The first step is to create the 'jig'. Remember that the floors must be spaced far enough apart so that when you add the protective side panels, figures can fit through the gap between the top of the sidepieces and the floor above. To ensure consistent positioning of the uprights and cross pieces, I used a combination of scraps of foamboard and pins, as the picture to the left shows.

• Trim lengths of bamboo rods to the appropriate length. My verticals were 16cm long and the cross pieces were 9.5cm long.

• Position the two verticals and three cross pieces into the template. Drip super glue over the join, taking care that it doesn't run onto the positioning guides of the template.

• Once the assembly has dried thoroughly remove it from the tower template. Repeat the process according to the number of towers you're building, two frames per tower.

• The next step is to join the two frames together. To simplify this procedure, take a piece of scrap polystyrene and carefully mark the positions of the bottom of the tower uprights. Using a spare length of bamboo make four holes.

• Take two tower assemblies and carefully position them in the holes with the cross pieces facing inwards. Its important that the cross pieces of the two assemblies are level with each other. I used Lego bricks to aid this alignment.

• Next, cut lengths of bamboo to the depth of your tower and glue them into place. Mine were 8cm long. The central pair on each level set the width of the opening on each floor through which the ladder will pass. For added strength you can wrap thin wire around each 'joint'.

• The next stage is to add each floor, starting at each end and working towards the centre, again using the bamboo from the roller blind. Remember to cut shorter lengths to create the opening for the ladder!

Note: I used super glue for initial fixing because capillary action ensures that it runs between the surfaces, making a good joint, and it dries quickly. Once the joints have dried, go over them with PVA (white) glue for added strength and durability.
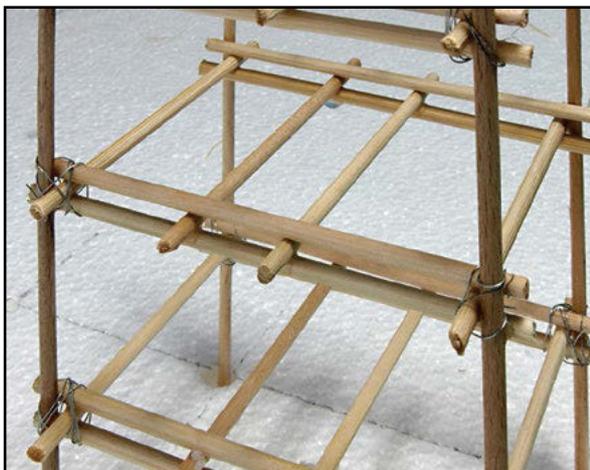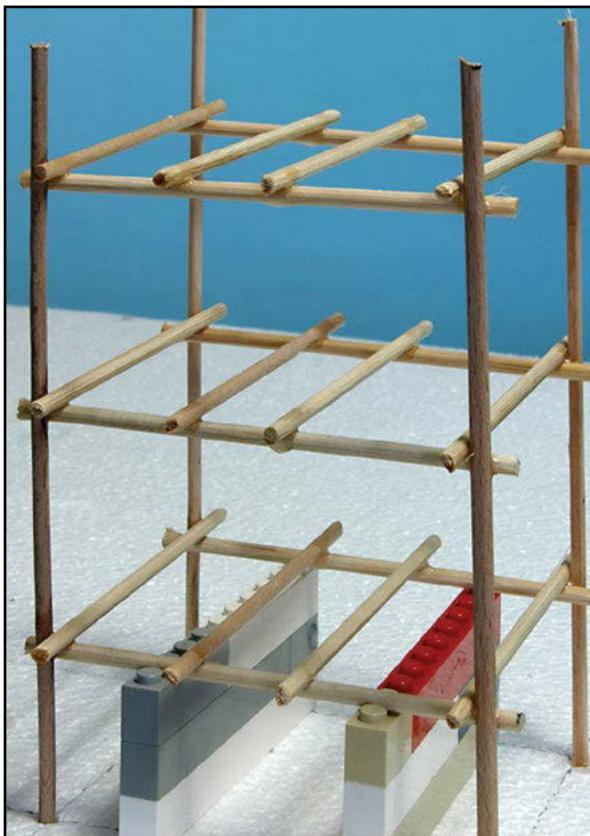
At this point I decided to 'paint' the tower to match the palisade as access is easier before the sides are added. The tower sides are made from the bamboo mat. Determine the correct height and length and cut strips accordingly. If you intend positioning figures on each floor make sure you don't make the sides to high, otherwise you won't be able to get the figures in!

To 'finish off' the side panels, you can add capping pieces made from bamboo.

Each tower needs ladders. The uprights are made from bamboo and the cross pieces from thinner cocktail sticks. Once again I used Lego bricks to assist alignment of the ladders.

Paint the ladders to match the tower and secure them in position using superglue. If, like me, you want to retain maximum flexibility you won't want to glue the towers into position, so the lower ladder will have to be rested in position instead.

You'll also need ladders to enable the defenders to gain access to the ramparts. Construction is exactly the same as for the tower ladders except that the ladders will be longer. I would suggest that you don't fix the ladders in place so that you can retain as much flexibility as possible.

While researching this article I couldn't find specific details for entrances and exits in the fortifications, although there's an aerial photograph in *Siege Warfare in the Roman World*, which shows a *titulus* on the north east corner of the fortifications. A *titulus* is an opening in the ramparts, with one or two ditches overlapping the gap, which were sometimes screened by wickerwork panels. Attackers either risked falling into the ditches or were 'filtered' around the sides of the ditches, revealing their flanks to the defenders. If you want to include this feature, then you'll need to create a rampart with a gap in it, which is easy enough by following the steps in this article.

You should now have enough information to build a good representation the siegeworks at Alesia or for other styles of fortification options.
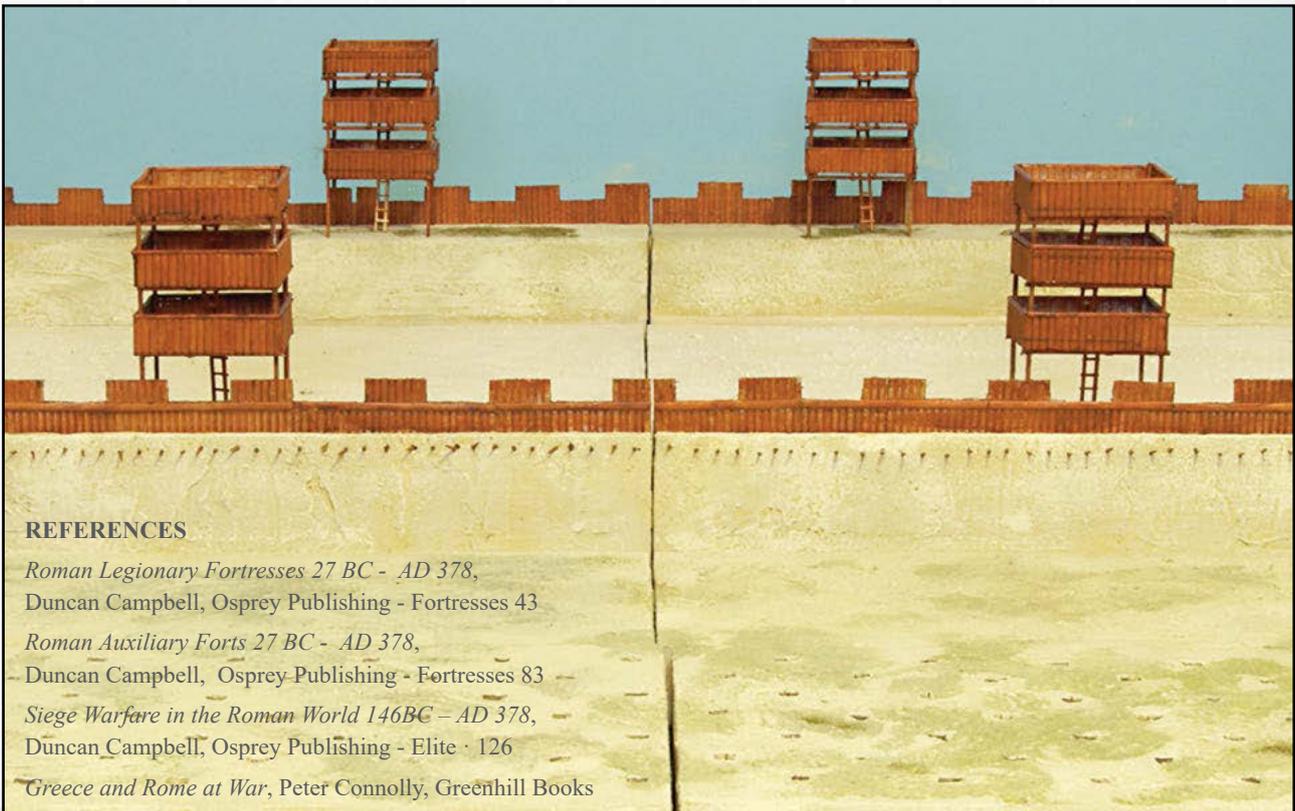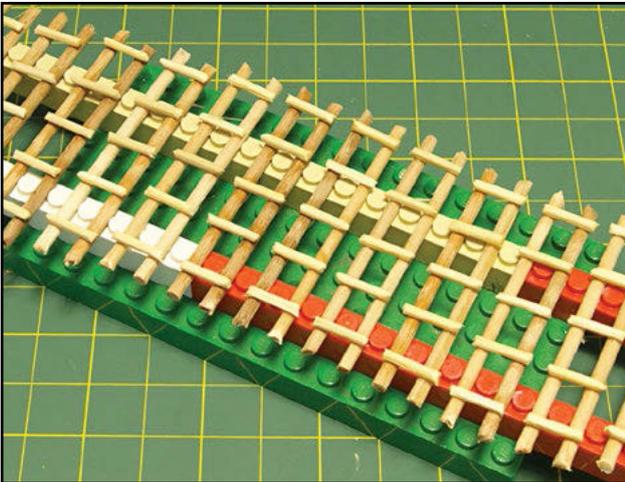
REFERENCES

Roman Legionary Fortresses 27 BC - AD 378, Duncan Campbell, Osprey Publishing - Fortresses 43

Roman Auxiliary Forts 27 BC - AD 378, Duncan Campbell, Osprey Publishing - Fortresses 83

Siege Warfare in the Roman World 146BC – AD 378, Duncan Campbell, Osprey Publishing - Elite · 126

Greece and Rome at War, Peter Connolly, Greenhill Books

BUILDING BRIDGES

TOOLS & MATERIALS

These should all be available from your local art and hobby stores, failing that they can typically be found through various online vendors

- Cutting mat and steel ruler
- Sharp hobby knife
- Balsa & Stripwood
- Barbeque skewers
- Cocktail sticks
- Matchsticks
- Foamboard
- Textured wallcovering

- PVA glue
- Sewing pins
- Paints and brushes

- Lego® bricks
  - Perfect for creating right angle templates… and cheap too!

Hopefully something for almost everyone in this article; bridges and lots of them… well, four anyway. Please note that to save space, instructions may refer back to techniques described for previous bridges in this article.

A BASIC WOODEN BRIDGE

For wooden bridges I use a combination of balsa, coffee stirrers, cocktail sticks, barbeque skewers or bamboo 'rod', depending on the scale. For example, barbeque skewers for 'logs' would be compatible with 25 or 28m figures, but over scale for 6mm. Generally I use PVA glue, but for 'fiddly' assemblies, (or if I'm in a rush), I use superglue.

Your bridge should be long enough to span your river (obviously), and wide enough for based figures or transport to cross. To these dimensions, allow for bridge supports and handrails. Figure height also dictates the height of the uprights, which rest on your 'river', and support the handrails. I use mostly TSS terrain panels. The distance from their river surface to the top of the bank is 10mm, which controls the height of supports, piers etc. and is an important consideration when designing bridges to suit your river sections.

THE SPANS

Cut two lengths of material to span the river. Use a jig to maintain the width between the pieces. Mark the positions of the uprights.

BASIC FOOTBRIDGE

Distance from surface of 'water' to top of bank

Width of widest base

1 Longitudinal pieces	4 Long widths
2 Short widths	5 Retaining strips
3 Uprights	6 Handrail
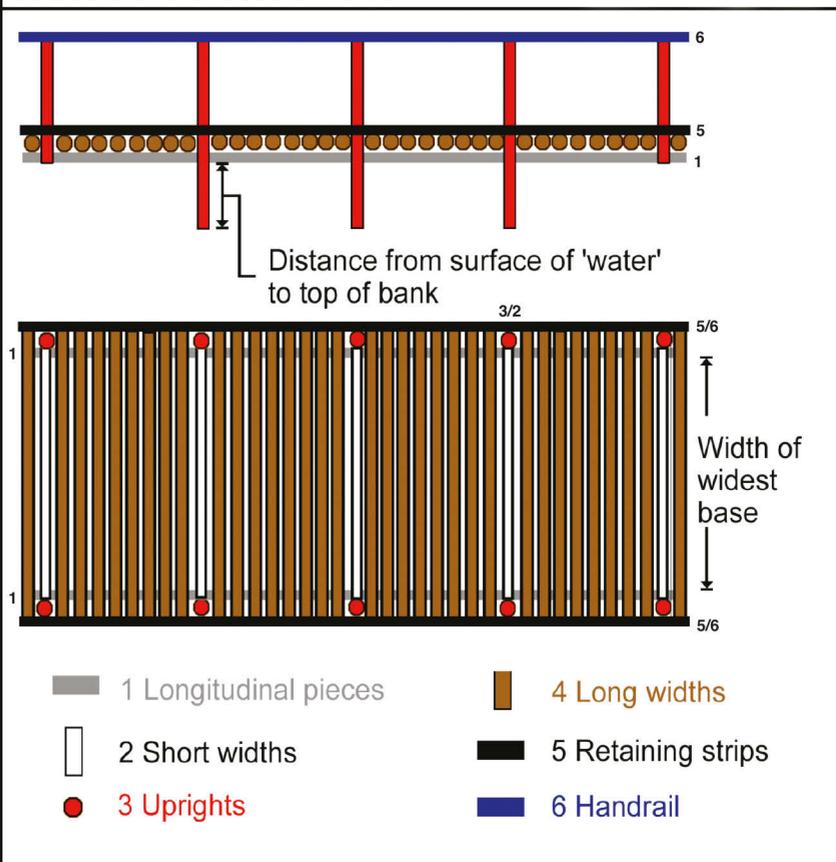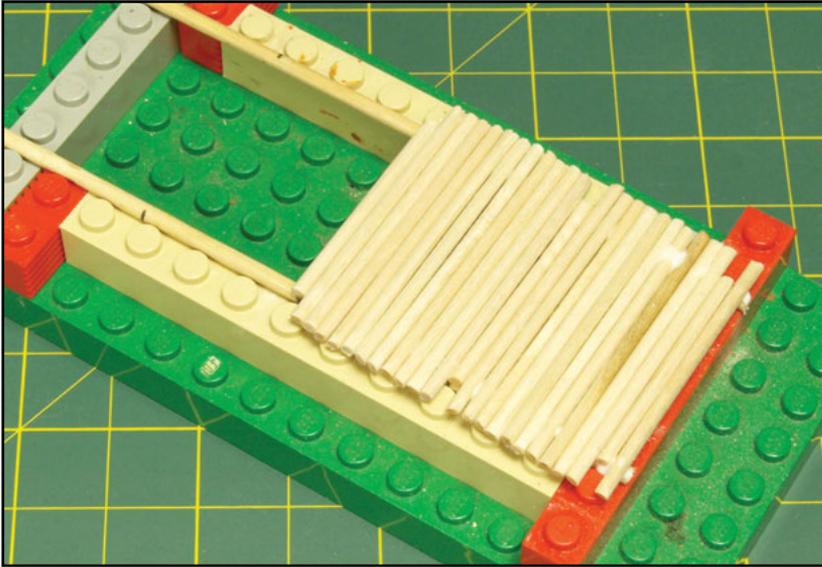
THE DECK

There are two 'log' sizes; short, where any uprights fit, and full width. Glue a short 'log' at the bridge's centre point. Don't glue any more 'logs' until the first centre 'log' is firmly fixed!!!

Work outwards with full width 'logs' until you reach the position for the next short 'log'. Glue in another short 'log', and continue with full width 'logs'. Repeat the process as necessary.

THE UPRIGHTS

Check the uprights are the correct height by positioning the bridge across your river. Glue the uprights in place, ensuring that you don't glue them to the river as well! I also added an outer base rail for extra strength.

HANDRAILS

Add the handrails, and then the shorter uprights at each end of the bridge.

PAINTING

Undercoat the bridge matt black, then dry-brush with successively lighter coats of grey. The regular reader will probably spot the 'snake rail' fencing in the background of this photo, which was the subject of the very first "How to…" way back in October 2008 in WI252!

Of course you don't have to use cocktail sticks for the basis of your bridge, coffee stirrers from your local coffee shop work well too, giving the effect of planks rather than logs, as the following photographs demonstrate.
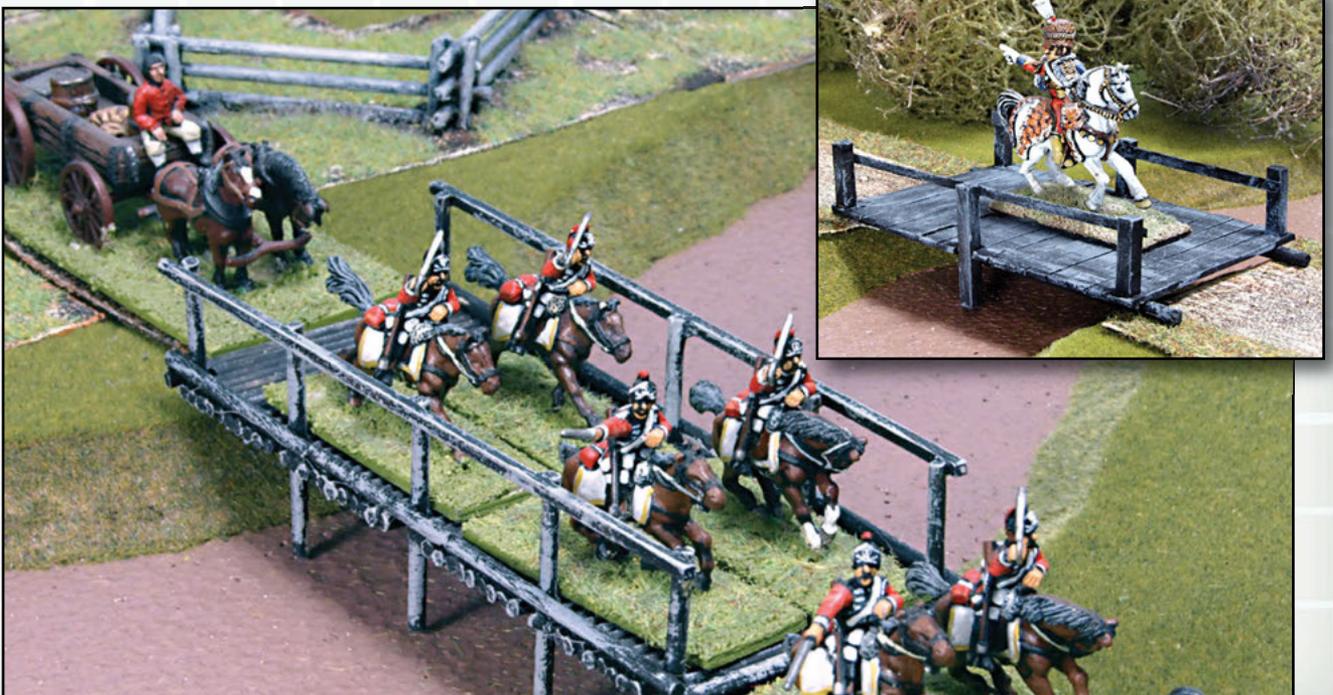
'ROMAN' STYLE WOODEN BRIDGE

1 The spans

2 The cross supports

3 The deck

4 The side framework

5 The uprights

6 The bracing beams
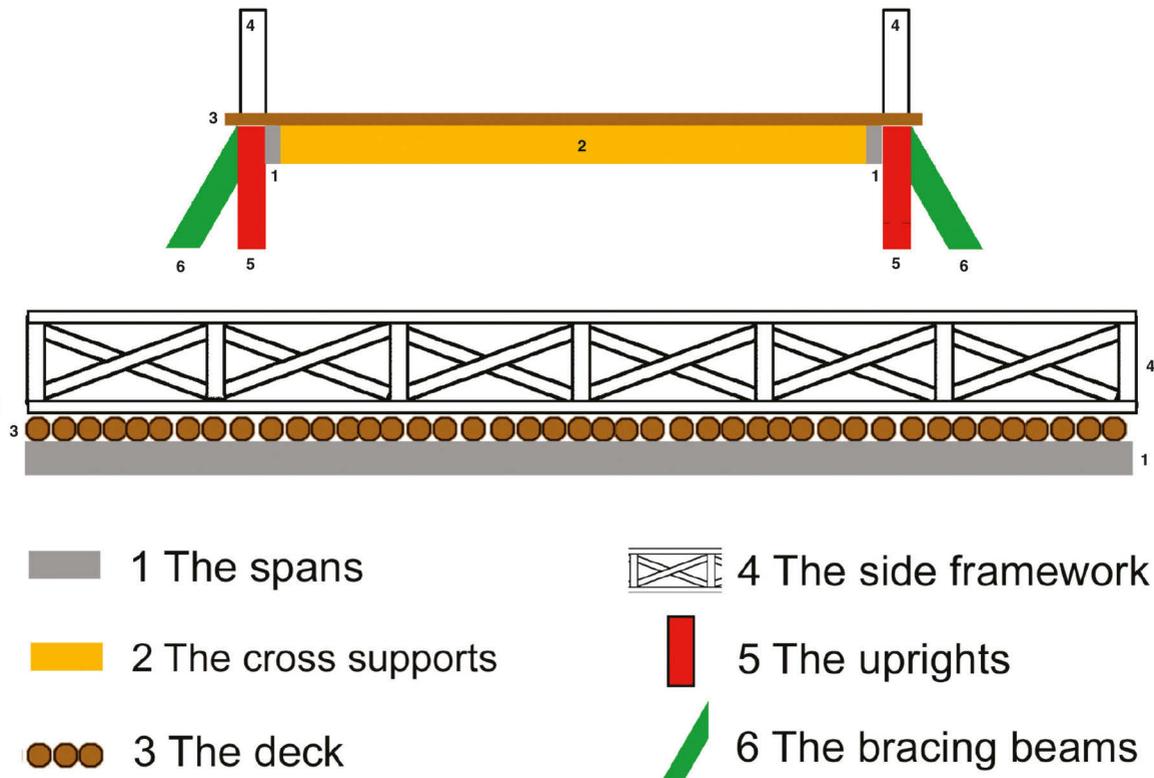
Construction follows a similar sequence to the basic footbridge, but is a more complicated because of the side framework.

THE SPANS

Cut the 'spans' from 6mm x 3mm balsa strip. I wanted an 80mm wide base of legionaries to be able to cross, so made the bridge 100mm wide to allow for the side frameworks. Position your two spanning pieces onto a Lego® jig. Pin and glue two or more cross supports, depending on your bridge's length.

THE DECK

For the deck, I used bamboo placemats. Ignore any cotton backing on the underside. It won't be seen. Trim the placemat to size, and glue to the spans. Leave overnight with a heavy weight on it... I used a box full of unpainted, mostly metal figures, and what true wargamer hasn't got more than a few of those?

MARKING OUT THE SIDES

| Thickness of upright | Centreline of upright | Position of upright |
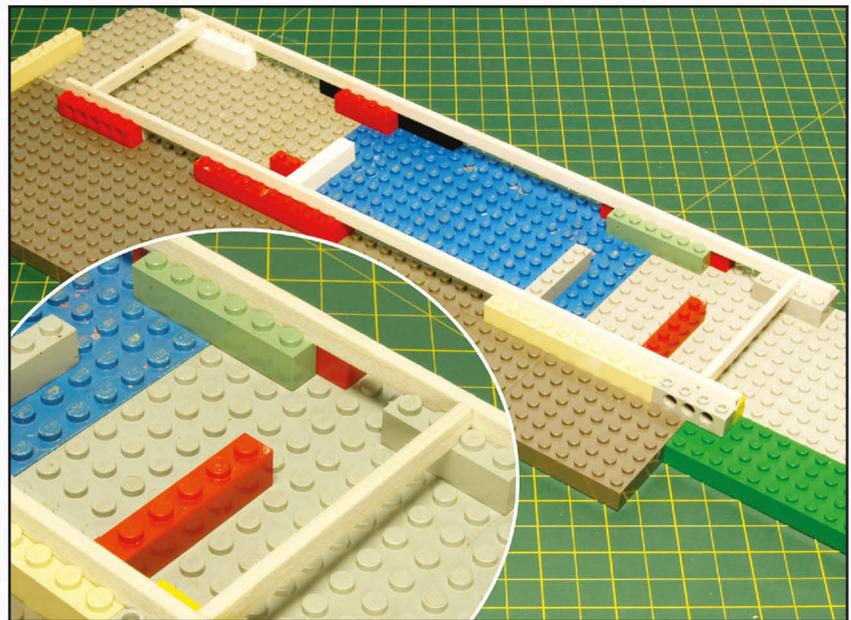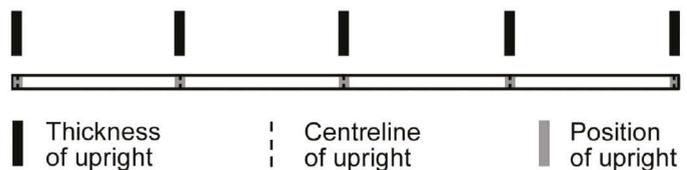
THE SIDE FRAMEWORKS

These are constructed using balsa strip. You can omit the diagonal pieces for a simpler construction. The plans are really the starting point. Once construction of the model is underway, refer to them, but take measurements from the model.

Mark the centre point of your spans. Then mark the thickness of the upright material either side of the centre point. Next mark the thickness of the uprights in from each end. Divide the distances between the inner edges of the end and centre uprights in half and mark another centre point. Repeat the process until you have a completely marked out strip.

Glue one set of uprights to the lower side framework strip. I use cheap superglue, (12 tubes for 99p!), as it soaks into the balsa and makes a solid joint… and it's quick! Once the glue has set, turn the assembly over and pin and glue the upper rail in place. The exposed pin ends will be clipped off once the complete assembly has dried.

Repeat the process with the opposite side framework.

Unless your workmanship is perfect, (and mine certainly isn't), the openings won't be identical, so you'll need to deal with each opening separately. Lay the assembly on its side. Place a piece of balsa strip over the gap and trim it to create angled ends and superglue them into place.

Repeat the process until you have fitted the diagonal pieces to every aperture.

Glue the frames onto the deck. Use small pegs to hold them in place.

THE UPRIGHTS

The number of balsa uprights depends upon your river's width.
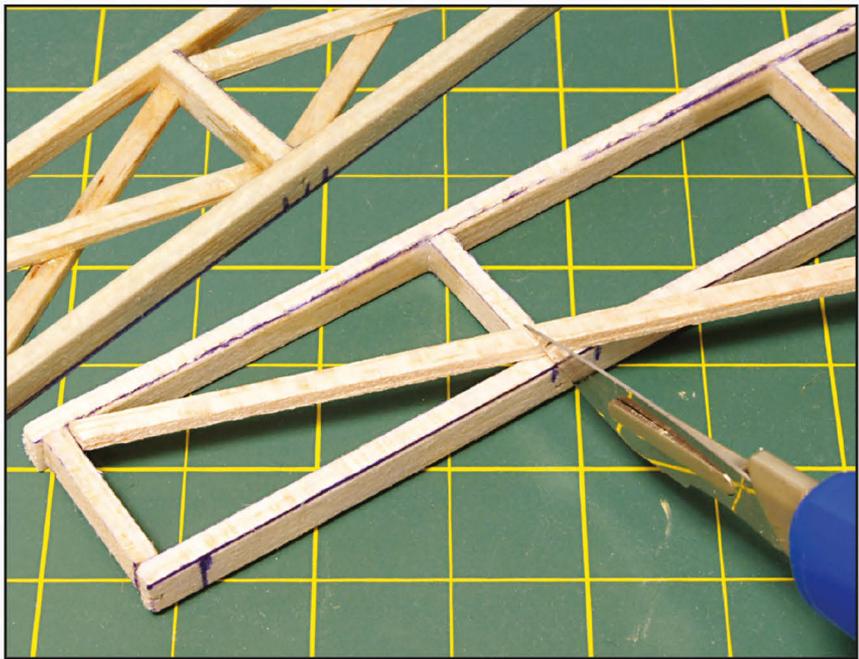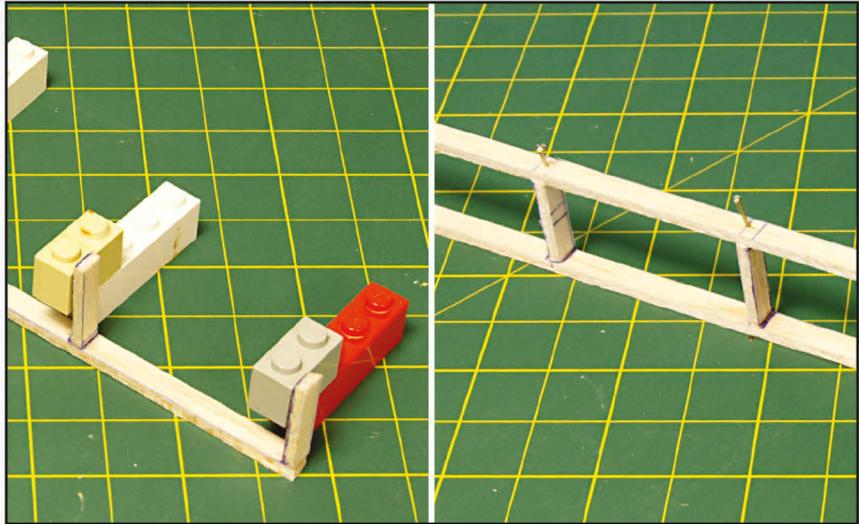
THE BRACING BEAMS

Frequently bridges had beams on the upstream side to brace them against the current. I made them from balsa strip, but decided to have them both sides because it looked better! The pictures above show how I put them all together.

BRIDGE DEFENCE

Defences were sometimes added on the upstream side to prevent floating 'objects', either deliberately or accidentally, smashing into the bridge supports. Mine were made from cocktail sticks to create a 'railing'.

PLAN FOR BRIDGE DEFENCE
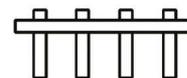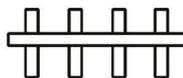
Note the horizontal rails are at different heights
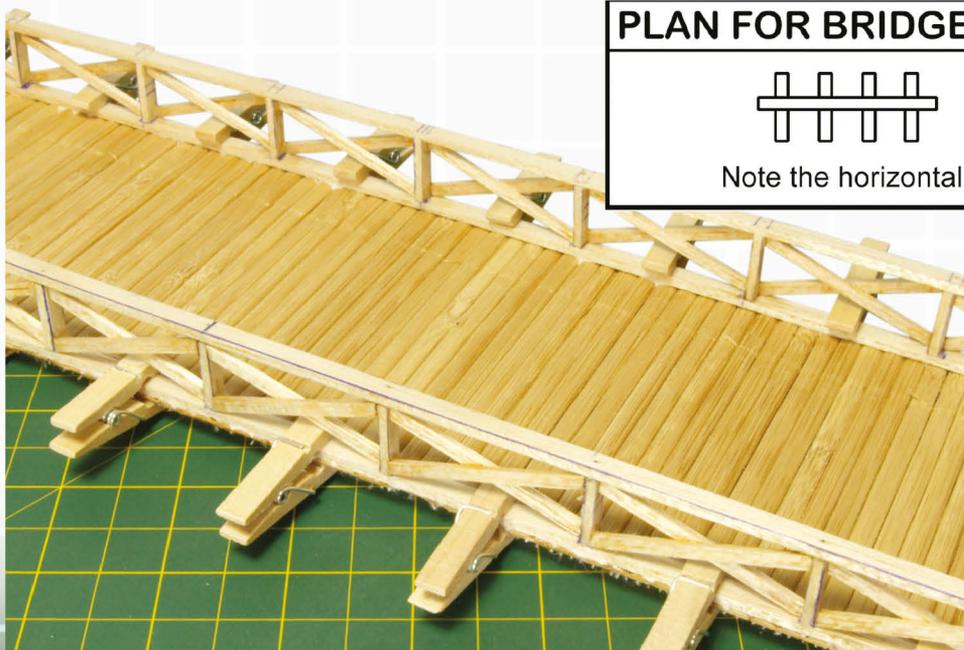
The horizontal 'bars' are at different levels so they'll slot over each other. Create a template. Print it out and work directly onto it.

Once you've made sufficient 'pairs', glue them together at right angles.

RAMPS

You may need to build ramps to ensure a smooth transition from road to bridge. Each one simply consists of two 'wedges' of balsa with a cross piece, to which is glued a piece of bamboo placemat.

PAINTING

I gave the bridge and defences an undercoat of Dulux Bramble Moor 3, which is a pale cream colour, followed by a drybrush of 50/50 Bramble Moor 3 and white.

Warlord Games Roman Legionaries march across the finished 'Roman style' bridge

A 'STONE & BRICK' BRIDGE

This single arched bridge should suit virtually any period. As usual, your bridge must be long enough to span the river and wide enough for troops or vehicles to cross. If you opt for a multi-arched bridge then to simplify construction, build the bridge with the lower edge of the arches at the same level as the bank, then construct 'piers' to stand on the surface of the 'water', and onto which the lower edges of the arches can rest. The plans make it clearer… hopefully!

STONE AND BRICK BRIDGE

Single arch bridge

Multi arch bridge
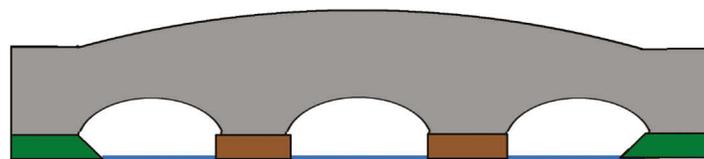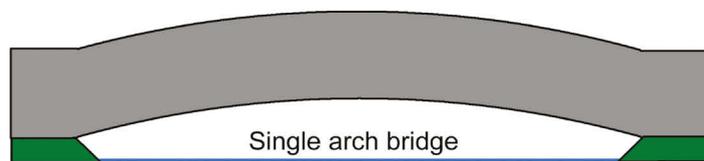
The supporting piers usually had rounded or pointed ends to offer less resistance to the flow of water.

THE BRIDGE SIDES

Draw the outline of the bridge side onto foamboard. Cut out the shape. Pin it to another piece of foamboard. Trace around it to create the opposite bridge side, and cut it out.

THE ARCH AND 'ROAD' SUPPORTS

Cut two pieces of mounting board to go at the 'flat' end of the bridge where it rests on the bank. (Shown blue on the following photograph). Drill a series of small 'pin-size' holes through the card corresponding to the centreline of the foam board sides. Pin and glue these into position. You'll also need supports between the sides to support the inner arch and the 'road'. Make these from strips of foamboard. Pin and glue them into position. Fit as many of these as possible to ensure the 'road' doesn't sag.

INNER ARCH

This piece follows the curve of the arch. Use the thickest card that will bend without 'cracking'. Cut it to the full width of the bridge. If necessary, drill a series of holes in it so you can then pin and glue it into position.

THE 'ROAD'

Cut a piece of card the full length of the bridge and wide enough to fit between the walls. PVA it into position.

While visiting my local D-I-Y store recently, I discovered a textured wallcovering under the Superfresco - Paintable brand name. One particularly caught my eye; "Bubble". To me, it looked just like 'cobbles'. I decided to use it for the 'road' on the bridge. Incidentally, I think that this material would be perfect for forming the basis of a cobbled courtyard…. !

Glue the wallcovering to the card. Leave to dry overnight.

Trim off any excess wallcovering. Don't even THINK of trying to trim off the excess paper until the glue has completely dried, otherwise it will rip and your wall will be ruined!

TEXTURING THE BRIDGE SIDES

Cut off any protruding pinheads then push the pins in fully. Cut out long bricks from thin card. Fold and glue them around the arch. Cut out smaller 'bricks' and pva glue them in random groups on the bridge sides. Remember to keep these bricks parallel with the surface of the 'water'.

To keep the size of the bricks uniform, I created a 'brick-sized' grid in Adobe Photoshop. Then simply printed the grid onto thin card and guillotined the card into strips from which I snipped off individual bricks as needed.

Cut 'slabs' from mounting board to fit along the top and ends of the bridge sides. Glue them into place.

PVA the walls. Sprinkle fine sand over them, and leave to dry. Don't worry if your 'bricklaying' doesn't go exactly

The bridge sides pinned togerther after being cut out

according to plan. A bit of strategically glued lichen or static grass will hide a multitude of sins… I use it all the time!

PAINTING THE BRIDGE

How you paint the bridge is up to you. I already have quite a few buildings in a 'sandstone' colour so I decided to paint the bridge to match them, using Dulux Malt as my base colour and then drybrushing several times with Malt mixed with increasing amounts of white.
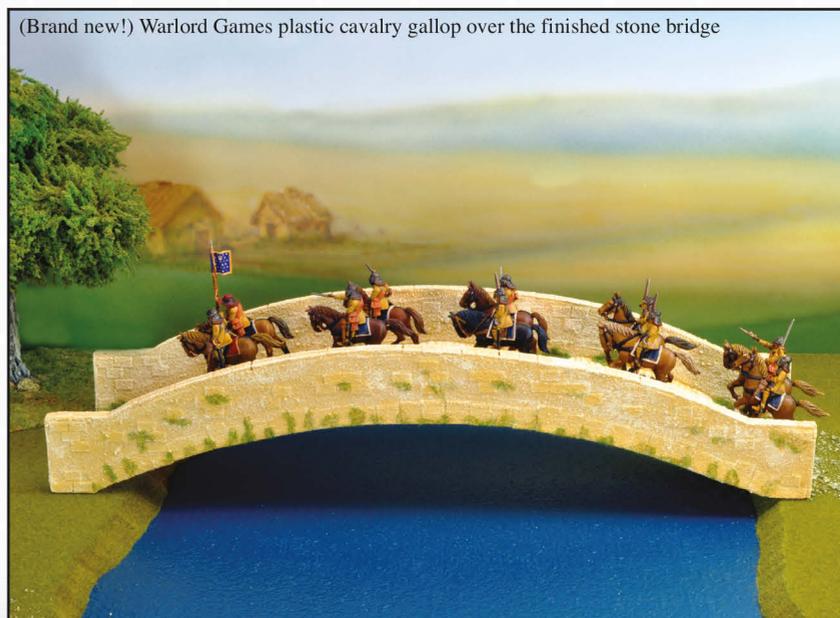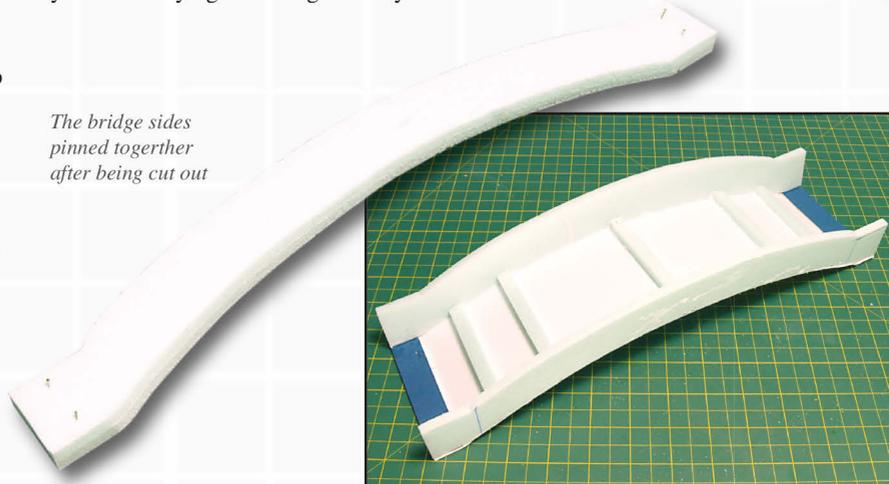
(Brand new!) Warlord Games plastic cavalry gallop over the finished stone bridge

The following plans will help you build a generic covered bridge. There were many variations in style, but fortunately many of the original bridges have been preserved or rebuilt. For inspiration, take a look at the following websites:

http://bridges-covered.com/index.htm
www.coveredbridgesite.com
www.dalejtravis.com/cblist/cblistus.htm

THE SPANS AND DECKING

Please refer to the spans and the deck in the building the Roman bridge section of this article. The only difference is that the decking is only 80mm wide as it doesn't need to cater for the massed ranks of a Roman legion marching over it!

THE ENDS

The ends enclose the side sections, so create them first. The ends are made from mounting card 'planked' with balsa strips, coffee stirrers, or bamboo placemat. Once the glue has dried, trim away the excess material.

THE SIDES

On many bridges, to allow light into the inside, the side panels only reached part way up. If you don't want the open sides, just adjust your construction accordingly. Construct the frames from balsa. Remember that the frames fit 'inside' the ends, so make sure you allow for the thickness of the end panels when determining the length of the side frames. I pinned each joint and then dribbled superglue over each one, finally clipping off the pinheads.

Next add the uprights, which will be exposed.

Cut a length of bamboo placemat to match the frame. Remember that the 'planks' will be vertical and also to leave a gap, unless you're modelling a bridge without open sides! Glue the bamboo onto the frame and leave to dry thoroughly. Its always a good idea to weight assemblies down whilst drying to prevent warping.

Clip off any remaining pin heads.

Next, cut thin strips of balsa, mine were 4mm wide and cut from 2mm thick sheet. Trim and glue them to the inside of the bridge sides to represent the internal bracing pieces. You don't have to include these pieces below the level of the

NORTH AMERICAN COVERED BRIDGE

Suggested midpoint to show appearance of bracing pieces

1 The spans
2 The cross supports
3 The deck
4 The sides and bracing
5 The end
6 The roof
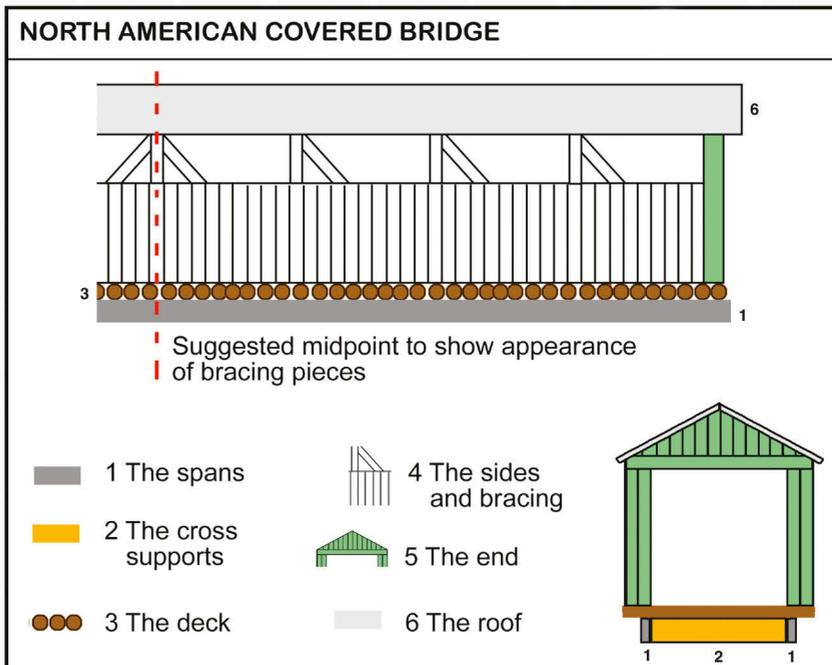
exterior planking, you could just fit the visible pieces and clad the inside of the panel with balsa sheet heavily ruled vertically to simulate planks and glue it in place. The choice, as they say, is yours.

ASSEMBLING THE SIDES & ENDS

Glue one end piece onto one side. Repeat with the other end and side.

Paint the inner surfaces of the bridge and the deck. I used Dulux Jamaica Ginger 1, which is similar to GW Scorched Brown.

ASSEMBLING SIDES TO DECK

Fitting the two assemblies is fiddly. Start by pinning and gluing one side and end assembly to the deck. When thoroughly dry, pin the remaining assembly to the deck and end piece. I added a strip of balsa along the lower edge of both sides to help secure the sides in place.

Paint the rest of the bridge. I used Dulux Jamaican Ginger 1 again, and drybrushed it with Dulux Clouded Slate 1 which is similar to GW Codex Grey.
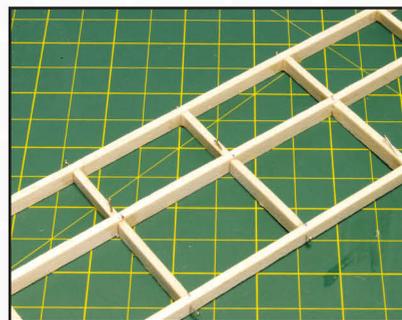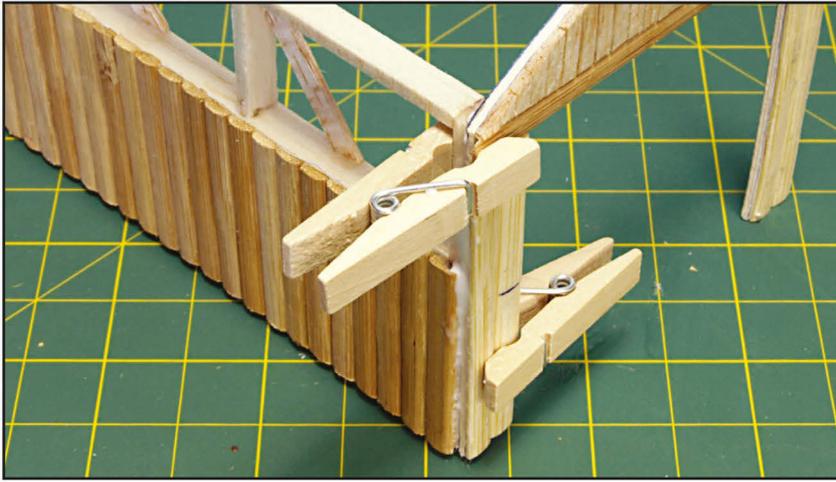
THE ROOF

Make a roof support from mounting board, scored at the ridge so it will fold cleanly. Allow a small overhang on all edges.

Paint the inner surface of the roof, either dark brown or black.

Drill a series of small holes corresponding to the end pieces of the bridge. Glue the roof into position and push pins through the holes to keep it in position while the glue dries. Once dry, snip off the pins flush with the surface of the card..

If you want a removable roof to your bridge, cut two triangles of foamboard to match the top of the end panels. Pin and glue them to the mounting board approximately 10-15mm in, so that they fit between the two ends and maintain the pitch of the roof.

Finish the roof by gluing on 'tiles' cut from thin card. Start from the lower edges of the roof. Finish the roof by positioning 'ridge' tiles made from scored and folded card. I undercoated the roof matt black, then drybrushed it with Dulux Clouded Slate 1, which is similar to GW Codex Grey. This procedure is covered in more detail in "How to… Make WW2 Ruined Buildings" in *Wargames Illustrated 253* - November 2008.

RAMPS

See the ramps section for a 'Roman' style bridge for how to make ramps.

And that's it! How to make, not one, but FOUR different bridges. Hopefully, there will have been at least one bridge of interest… I did think of including another one, but that really would have been, "a bridge too far"….

Sorry, just couldn't help myself!
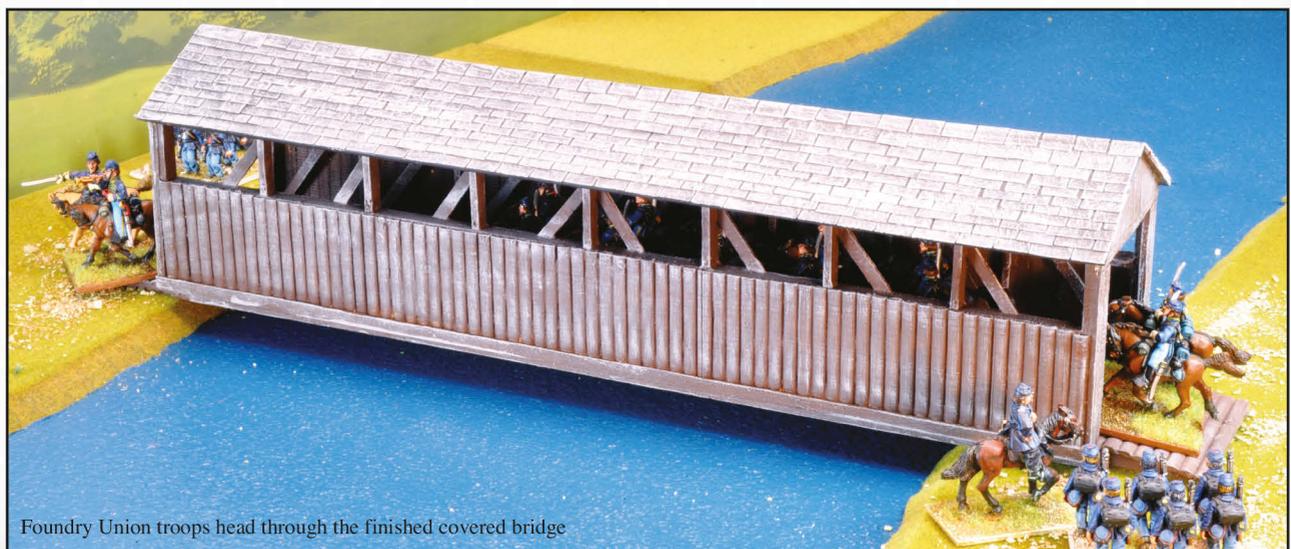
Foundry Union troops head through the finished covered bridge

HOW TO MAKE...
SOUTHEAST ASIAN BUILDINGS

INSPIRATION ... AND DIGGING DEEPER INTO THE HISTORY

This "How to…" has a Southeast Asia theme, and is inspired by the buildings at Son Tay prison in North Vietnam. They'd be equally suitable for WW2 in Southeast Asia and for 20th century Africa too.

By way of background, on the 21st November 1970, US Special Forces launched a mission to rescue prisoners held at Son Tay, 23 miles from Hanoi, the capital of North Vietnam. Unfortunately when they arrived, they discovered the prisoners had been moved to a different prison. As one of the Green Berets was quoted as saying, "Nothing could or would have stood in our way to successfully complete the mission except what we encountered… no prisoners at Son Tay!"

GENERAL NOTES

The material thicknesses quoted in this article relate to 1/100th scale (15mm) models. Window and door size and position are up to you. Scale the plans to match the size of a based figure. Allow for the material thickness when scaling the plans.

To avoid duplication, 'common' information; texturing, painting, doors and roofs is covered at the end of this section, so please read right through the instructions before starting your build.

You'll also notice that while there are quite a few different buildings in this article (as well as walls and watchtowers) there are only one set of plans shown. All of the plans can be found on the Wargames Illustrated website.

TOOLS & MATERIALS

These should all be available from your local art, hobby, and sewing stores, failing that they can typically be found through various online vendors.

• Cutting mat and steel ruler
• Sharp hobby knife
• 2.5mm thick Balsa wood
• 5mm thick Foamcard
• PVA glue and super glue
• Sewing pins
• Bamboo skewers, cocktail sticks, match sticks, and a couble of bamboo beachmats
• Polyfiller (AKA spackle)
• Paints and brushes

CAUTIONARY NOTES ON GLUE - *When gluing different materials together ALWAYS test it using scrap material, just in case. For example superglue 'eats' foam and so does Evo-stik. The best solution I've found when* *gluing together different materials, i.e. foamboard and embossed plastic sheet, is 'No More Nails' (or a cheaper alternative), which is a "super strength gap filling adhesive", which "does what it says on the box". Not all PVA glue* *sticks balsa; either use balsa cement or test your PVA glue first.*

Also, superglue gives off a nasty vapour. So either wear a mask when using it or work in a well-ventilated area.

SON TAY CELL PLANS

INNER WALL

END WALL

FRONT WALL

CELL ONE

END WALL

BACK WALL

INNER WALL

BACK WALL

CELL TWO

END WALL

END WALL

FRONT WALL
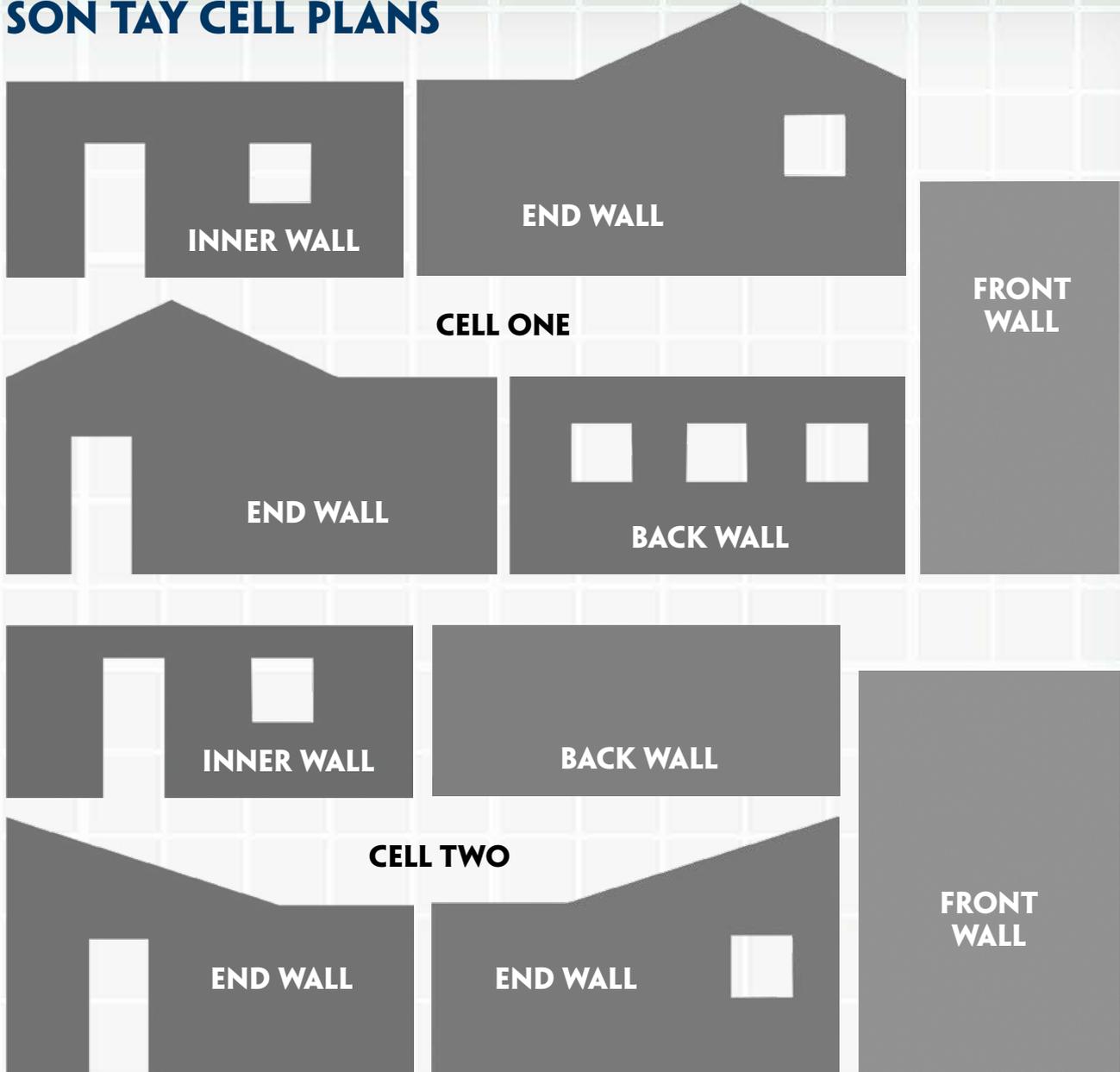
CONSTRUCTING THE CELLS
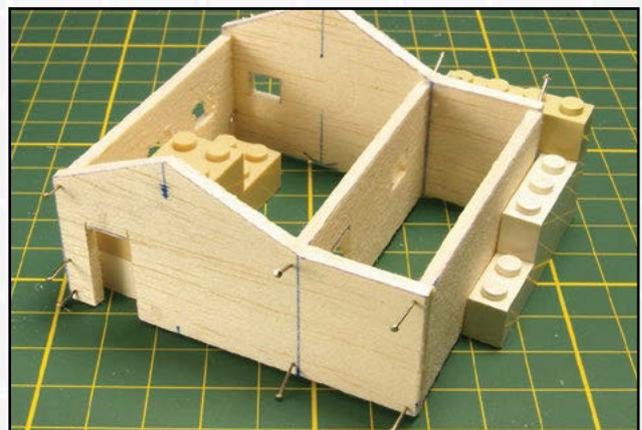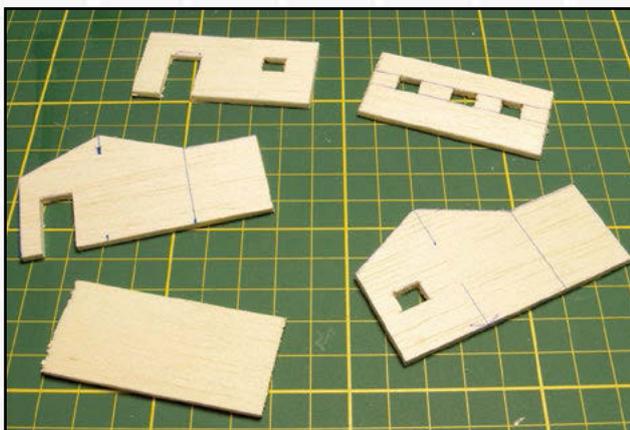
For the Cells I used 2.5mm thick balsa instead of my usual 5mm foamboard, I felt that the foamboard would look too thick for the visible outer walls. The construction procedure for the two cells is identical, so we'll just show the first.

• Transfer the dimensions to the balsa.

• Cut out the components.

• Glue together one end wall and the back wall, then the other end wall, front wall, and finally the inner wall.

• Lego blocks can help keep the corners square, and pins help keep the walls in

place, while the glue dries.

Note: Balsa can easily split, so when cutting, make 'cross the grain' cuts first, then cuts 'with the grain'. The 'cross grain' cuts tend to stop 'with the grain' cuts splitting beyond the marked area.

## CONSTRUCTING THE CAT HOUSE
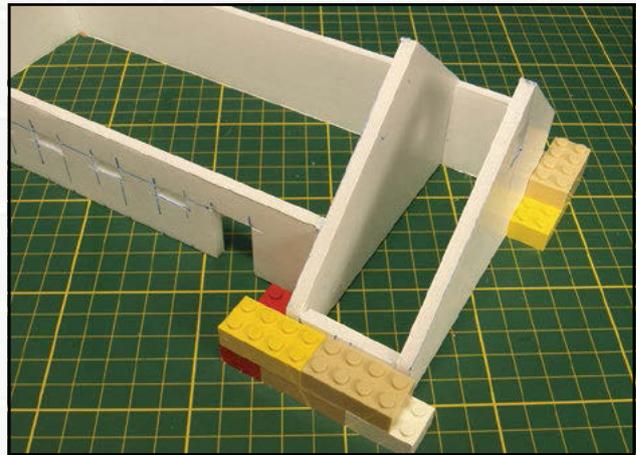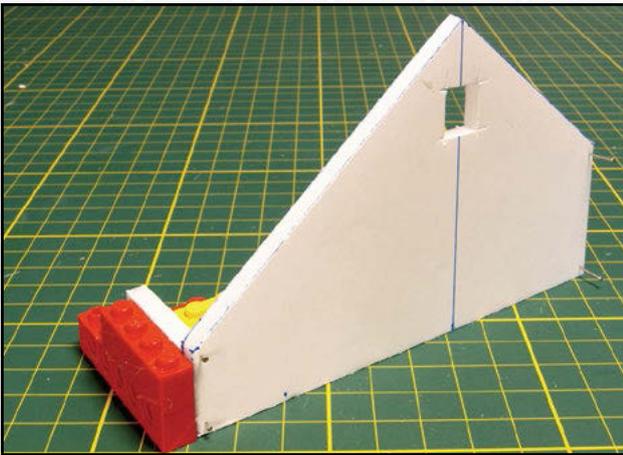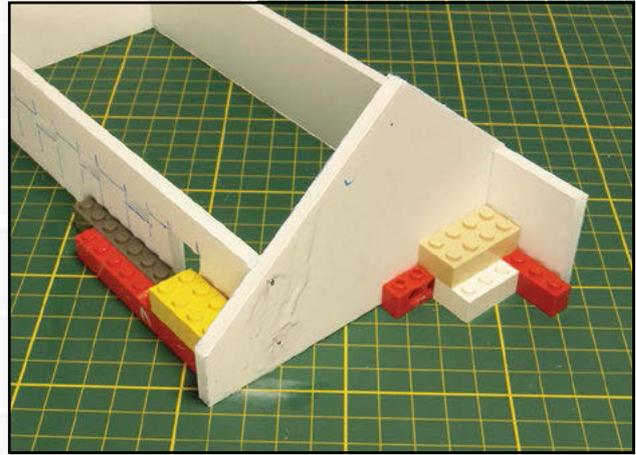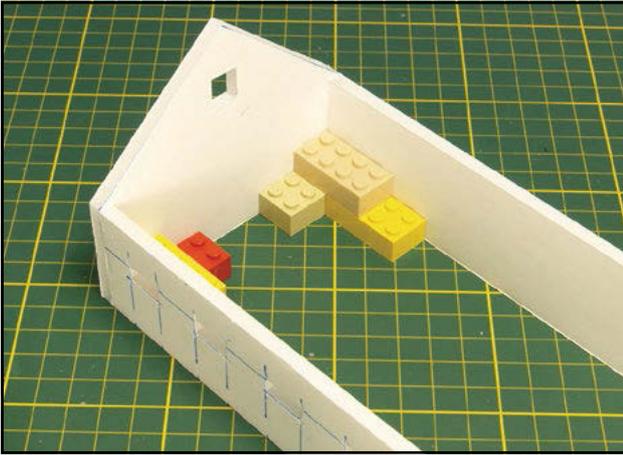
The 'Cat House' is apparently another name for a house of 'ill repute', but this building could have any use you choose.

For this building (and most of the others) I switched back to my preferred 5mm foamcard as I find it easier to work with and a bit more cost effective.

• Cut out the components.

• Pin and glue End wall to Back wall. Add the Front wall.

• Fix Inner wall into position ensuring the rear cutout fits over the Back wall.

• Glue together the End wall with overhang and the Low front wall.

• Fix the two assemblies together.

BUILDING THE PERIMETER WALLS AND GATES
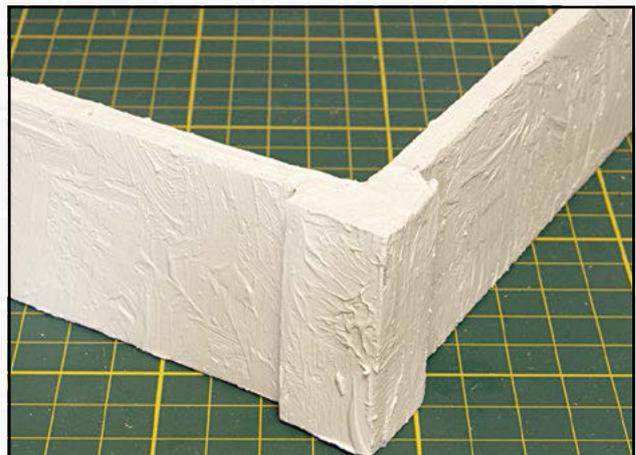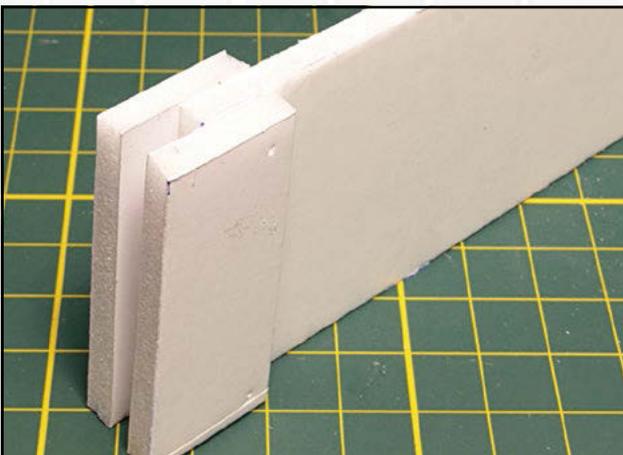
The first step to building the walls is t determine the length of your perimeter. Cut sufficient strips for the total perimeter and to the appropriate height. I built the walls in 15 cm (6") long modules.

For ease of assembly, I created a simple slotting buttress system, whereby the left end of each wall section would have two overhanging pieces of foamboard into which the right edge of the adjacent wall on the left would slot.

To create the buttresses, cut suitable strips of foamboard and glue them in place. My buttresses were 20mm wide with a 10mm overhang, as shown above left.

For each wall section, draw a vertical line 10mm in from each end. The left line
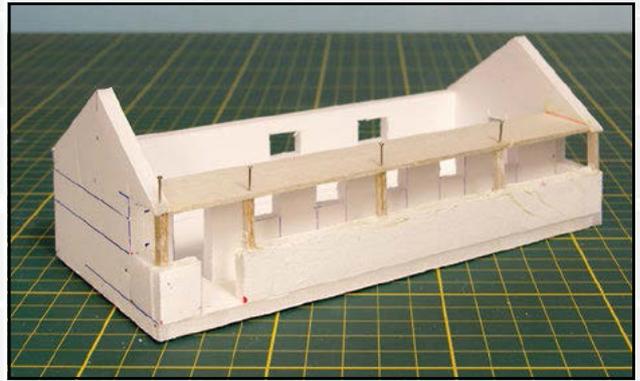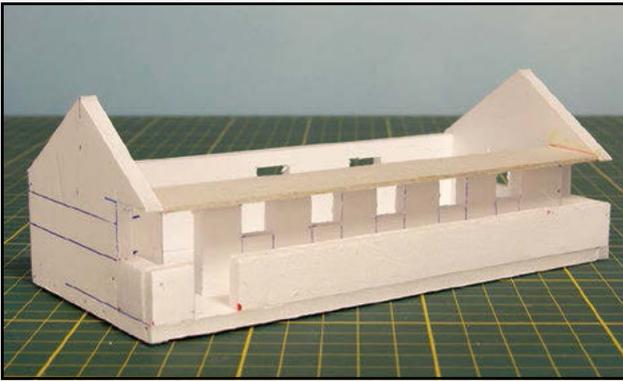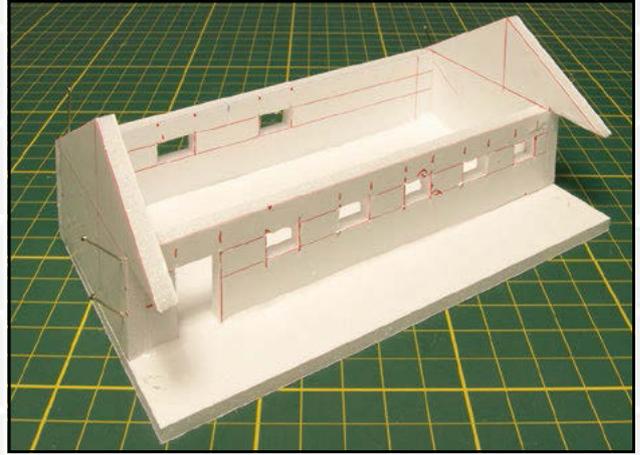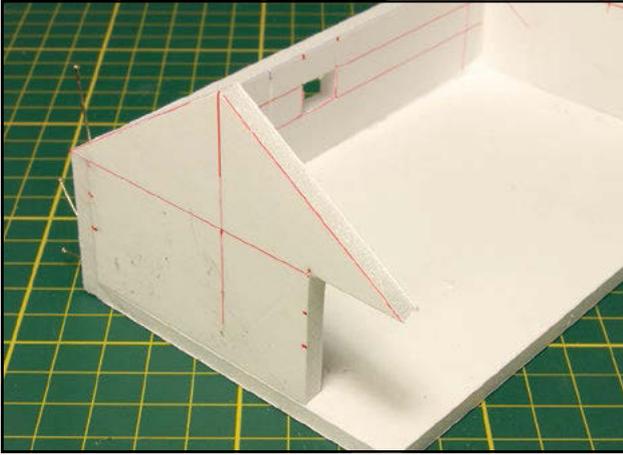
The 'Beer House' has a built-in floor to form the base of the porch. A side benefit is that it provides additional stability.

• Pin and glue the rear wall to the inner floor. The rear wall does not rest on top of the floor but sits behind it.

• Glue the side walls to the rear wall and inner floor (they sit on top of the floor).

• Glue the front wall in position.

• To make the ceiling of the porch, cut a piece of balsa or card to fit between the side walls and rest on the front wall. Glue it into place.

• Mark out the position of the side and front walls. Texture the patio as described later, avoiding the area where the patio walls will fit.

• Texture the inner surface of the walls then pin and glue into place.

• Add some roof supports from 3mm square balsa.
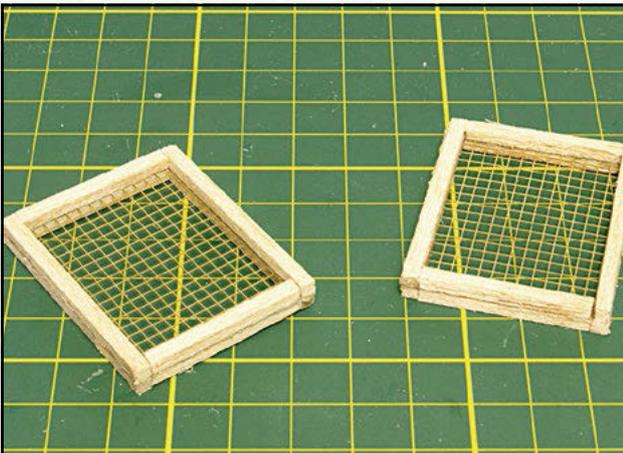
indicates where the buttress fits and the right, the area that should not be textured, otherwise it will be too thick to slot between the buttress of the next wall.

The walls incorporating the gates are not as long as the other walls to allow for the gates, which slot into place using the buttress system.

I decided to add square foamboard capping pieces on top of each buttress to give the walls a more "finished" look.

The gates are made using balsa wood strips and fine brass mesh (although flyscreen could work just as well). Cut the mesh to size and 'sandwich' it between a balsa frame.

I stained the balsa with a thinned-down wood stain and painted the mesh silver.

TEXTURING THE BUILDINGS, WALLS, AND DOORS

I decided to use to different approaches for texturing the walls of the buildings (glue and sand) and the perimeter walls (polyfiller).

For the buildings it was simply a matter of clipping off the pin heads and pushing the pins fully into the model. Then I brushed PVA glue over the walls and sprinkled fine sand over them.

You can, of course, texture the perimeter walls in the same way as the buildings but I decided to roughen them by applying polyfiller with a small spatula (although fingers can work too, if you don't mind getting messy). Take care to keep the buttress 'slots' free of filler otherwise the walls may not fit!

To paint both surfaces I started with a cream basecoat, followed by a white drybrush. I also added some static grass at the base of the wall.

MAKING THE DOORS

Score a sheet of balsa to represent planks. Either stain them or paint them dark brown or dark grey; drybrush light grey, and glue into position.

MAKING THE ROOFS

The roofs for the buildings all follow essentially the same principals, covered in more detail in 'How to… Build a Tudor Manor House', *Wargames Illustrated* ¬ 257 - March 2009.

Make a supporting 'under roof' from black mounting board (black saves you having to paint the undersurface).

Allowing for an overlap all round, cut out the roof shape and score it along the ridge. Then drill small holes through the mounting board. The location of these holes depends on whether the roof is to be fixed or removable.

• If fixed, the holes correspond with the end walls.

• If removable, make two triangles of foamboard to match the angle of the end walls. These will be positioned slightly in from the end walls, and the holes drilled to match the position of these triangular supports.

Fold the roof and either pin (through the small drilled hole) and glue it into position, or pin and glue the triangle supports into position.

What follows are a few suggestions of what to use to represent "common" Southeast Asian roofing materials.

**THATCH: from scratched polyfiller**

Coat the mounting board roof with smooth polyfiller. When it is almost set, scratch the surface repeatedly to create a thatch effect. You can use an old fork or banboo skewer to create this effect.

CORRUGATED IRON: from corrugated cardboard

My local artshop stocks 'ColourFlute' a ridged (or corrugated) card, available in a range of colours. For a small roof (like those on the watchtowers) you probably

won't need the supporting roof. Cut a piece of 'Flute' slightly oversize. Score along the ridge of the roof and glue it in place.

TILES: from textured plasticard

Numerous plasticard vendors sell textured sheets, available in several designs, which can be ideal for representing tiled roofs. When gluing the plasticard to the roof structure I typically use 'No More Nails' (a construction adhesive).
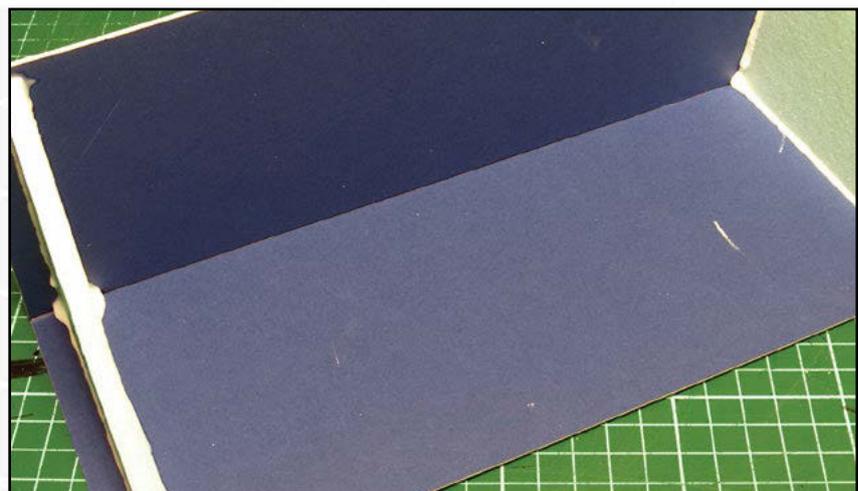
THATCH

CORRUGATED IRON

TILES

**WATCH
TOWER**

OPIUM DEN
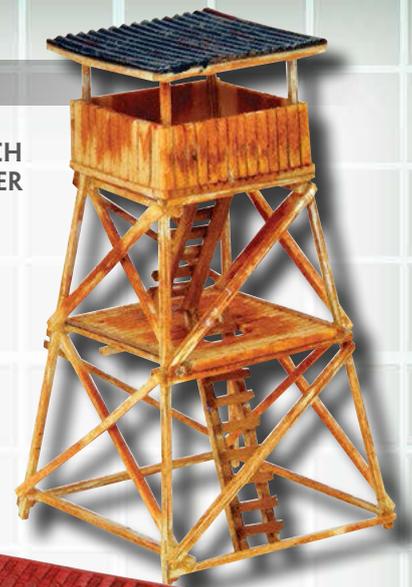
BEER HOUSE

CAT HOUSE

CELLS

VILLAGE HUTS

So, you should now have the start of a collection of buildings suitable for Vietnam, WW2 Far East, or for that matter the African continent too! The buildings are quite basic, and its easy to add more detail if you require, but the idea behind this article is to 'get you started'. There's no doubting the satisfaction of making something yourself, it really isn't difficult…and it's certainly cost effective!

HOW TO BUILD...
AN EARLY IRISH CHRISTIAN CHURCH

INTRODUCTION

This 'How to…' takes for its inspiration, the Viking raids in Ireland during the early 9th and 10th centuries. Although local Irish chieftains frequently fought each other they tended to respect religious sites, and many wealthy Irish stored their valuables in the monasteries. Of course the pagan Vikings had no scruples about attacking such sites, and once they realised that they represented a rich source of plunder, they were regularly raided. I decided, therefore, that a generic early Irish Christian church would be a useful building for anyone wargaming the period. Fortunately a typical church of the time; St. Kevin's church (also known as St. Kevin's kitchen?), at Glendalough, Co. Wicklow, has been partially preserved, and provided some useful ideas for the model.

The church originally comprised a single chamber, (the nave), but over the years a tower was added, as were a sacristy and chancel. Today the nave, tower and sacristy remain relatively intact. I decided to model the church with the nave and the tower as I felt that configuration would fit in best with the Viking raid games that I have planned.

CONSTRUCTION NOTES

The sequence of instructions might not at first glance seem logical, but I've created the sequence so that, whilst one assembly is drying, you can move on to a different assembly to avoid wasting time.

The church only had a ground floor, so unless you intend giving your model an integral base there is no need for access from above, and the instructions are written on that basis. If however you intend incorporating an integral base AND require access inside the building then you will need to cut an access hole in part 5, and obviously not glue the roof and tower assembly in place.

TOOLS & MATERIALS

These should all be available from your local art, hobby, and sewing stores, failing that they can typically be found through various online vendors.

- Cutting mat and steel ruler
- Sharp hobby knife
- Circle cutter or geometry compass
- Mini-drill (AKA Dremel tool)
- Needle files
- 5mm thick Foamcard
- Sewing pins
- Various thickness of card
- Cardboard tube
- Square Balsa wood beam
- PVA glue and super glue
- Fine sand
- Polyfiller (AKA spackle)
- Paints and brushes

Below: A local priest, along with a handful of his parishioners, stand fast against a plundering band of Viking raiders.

EARLY-IRISH CHRISTIAN CHURCH PLANS

The templates shown below are all to scale with each other, but I have not provided them at a particular size for interaction with your model soldiers. The starting point to determine the size of your church is to determine the distance between **A** and **B** (below). This should be the height of one of your rampaging Vikings. Feel free to scale them up or down on a photocopier to suit the scale of your Dark Age miniatures.
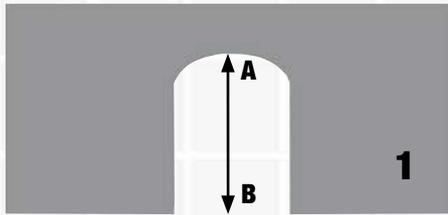

Above: St. Kevin's Church, Glendalough, Co. Wicklow. Image from Wikipaedia

A

B

1

4

2 & 3

7

6

5

Approximate tower location

Suggested area for cut-out if required

These roof pieces are approximate measurements only. Check carefully against your base model once you get to the roof assembly stage.

8

9
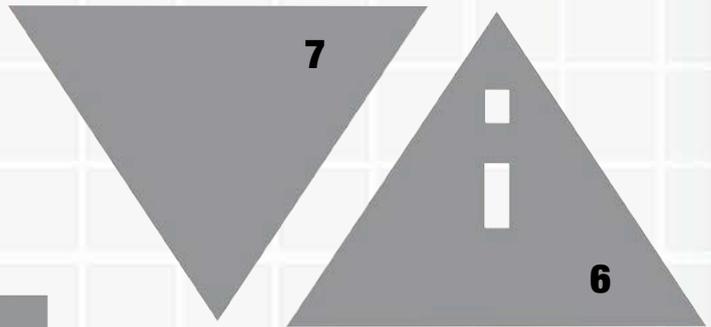
Below: To achieve the signature stone wall and roof texture of the early-Irish church, Paul has used a fairly surprising technique. You can read more about it over the page, but here's a picture of the mini-drill he used. Tools like this are available at many good hobby stores and online retailers and can range in price from £30 ($45) to over £100 ($150).

DON'T FORGET YOU CAN
DOWNLOAD ALL THE PLANS FROM
THE **WARGAMES illustrated** WEBSITE.
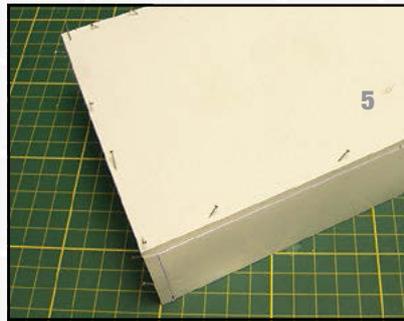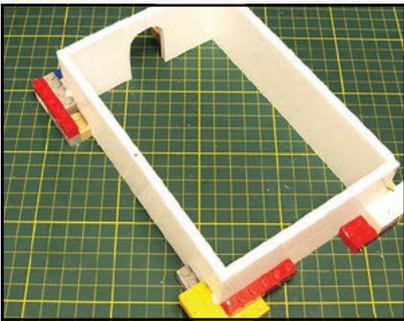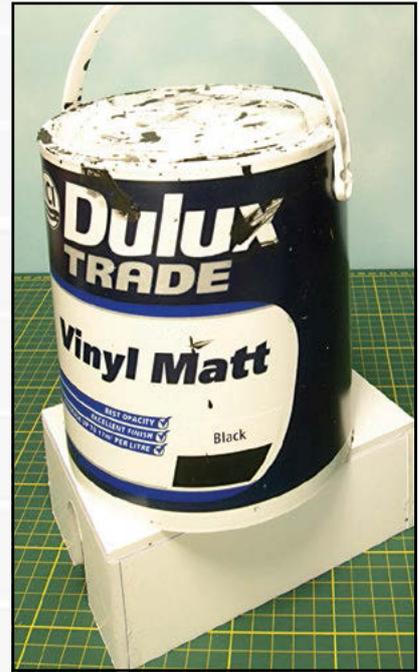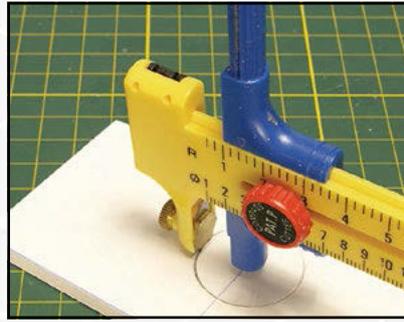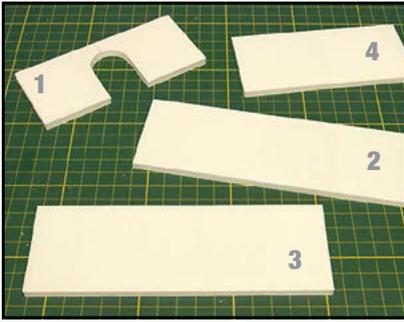
• Cut out parts 1, 2, 3, and 4 from 5mm foamboard.

• The door arch is created using a circle cutter. Cut out the circle first and THEN the two vertical door sides. It's much easier than trying to make the circle match pre-cut vertical lines.

• Adding one wall at a time, pin and glue

all four walls together, using Lego bricks at each corner to ensure a right angle.

• Taking your dimensions from the model; cut out the roof base; part 5.

If you are planning access from above then cut out a suitable aperture in part 5 now.

• Pin and glue part 5 in place.

• Cut off all the pinheads. Push the stubs of the pins completely below the surface of the foamboard. Put a weight on top of the assembly while the glue dries to ensure a really good join.

I'm not suggesting you use anything quite as heavy as the paint can I used, but if nothing else it proves that I build my models strong!
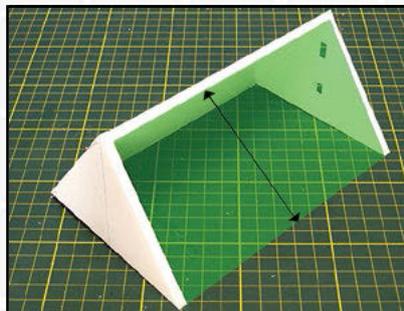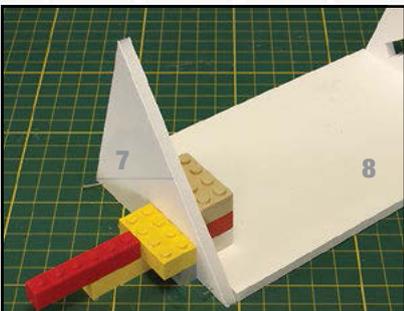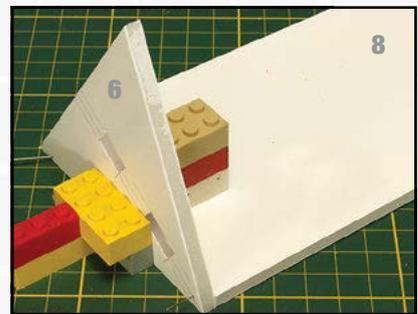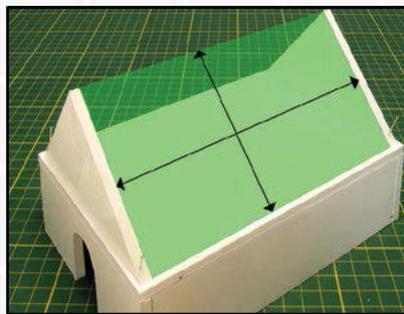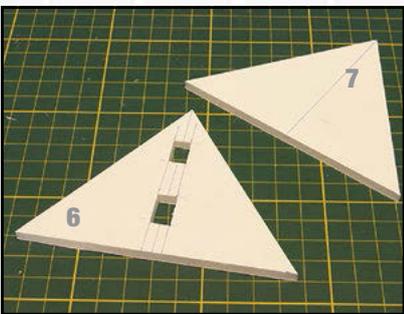
• The roof assembly is inset from the walls by approximately 2.5mm all round. Lightly pin the two roof end pieces into position allowing for this inset. Check the dimensions as shown in the picture.

• Cut a piece of foamboard to size; part 8. Unpin parts 6 and 7. Lay part 8 on a flat surface. Pin and glue parts 6 & 7 to

part 8. Use Lego blocks to keep the roof ends vertical.

• For the opposite roof you'll need another piece of foamboard; part 9, the same length as part 8 but not quite as deep. Determine the depth from the model, and cut the foamboard to size.

• Pin and glue part 9 into position.

• Any gap can be filled later. Clip off all the pinheads and push the pin stubs fully into the foamboard. Turn the roof assembly on its end, and weight it down as with the walls above.

ADDING THE STONEWORK TO THE WALLS
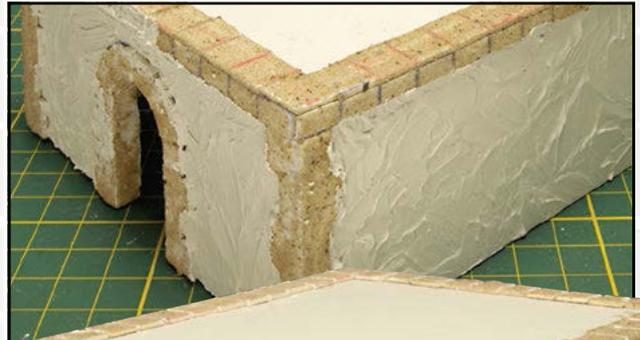
• The next stage is adding corner and edging stones around the door, corners and upper edges of the walls. These were cut from thick card and glued in place.

I was fairly 'generous' with the PVA glue because I wasn't worried about the wall being perfectly flat… and also because I'm a REALLY messy worker anyway!

• Coat all these card pieces with PVA (white) glue and sprinkle on fine sand to create a texture.

• Once the PVA/sand mix has dried, coat the rest of the walls with fine Polyfilla. Leave to dry, normally about an hour, and then give the walls another thin coat of filler, and leave it to dry thoroughly, preferably overnight.

• The random stone pattern is created by etching into the Polyfilla using a mini-drill with a suitable attachment. Remember, the stonework should be irregularly shaped, and don't etch completely through the Polyfilla and

foamboard! If you do, don't worry, just glue a piece of card behind the hole, fill it, and re-etch the stonework.

• Give the entire model a thin coat of PVA glue, to seal any areas where your etching may have penetrated into the foamboard itself. Set the wall assembly aside to dry.

The technique shown for creating random stonework using Polyfilla can be used for many other buildings from a simple tower to a complete medieval castle.

THE TOWER

This might seem odd, but you have to create the stonework on the tower before you can cut the correctly sized hole in the roof. I found that the inner card tube from a kitchen roll was just about the right size. Before trimming the tube to height, remember that it should rest upon part 5.

• Decide the size and position of the windows and cut them out. Don't make their shortest edge narrower than your smallest file otherwise it will make cleaning up the window edges after applying the filler, more difficult!

• Spread two coats of filler over the tube, allowing about an hour between applications. Always apply a series of thin layers rather than one thick one to avoid the fine filler cracking.

• Use a file to 'tidy up' the edges of the windows.

• Before starting to etch in the stonework, it can help to first draw in the stonework

using a felt pen. My method is to start by etching horizontal lines connecting the top and bottom of each window, which then provides a guide for extending the horizontal lines around the tower.

• With the windows 'connected' by stonework, use those lines as the guide for creating the remaining parallel horizontal etched lines.

• When you're satisfied with the horizontal lines, etch in the 'verticals' to complete the stonework.

THE TOP OF THE TOWER
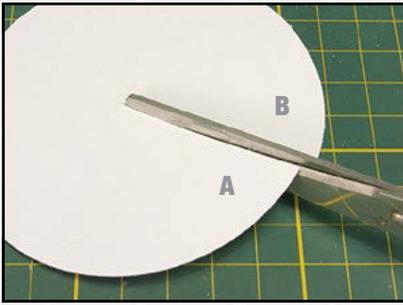
• Cut out a circle from thin card. I set my circle cutter so that its radius matched the diameter of my tower, about 45mm. Cut a single line from the circumference of the circle to the centre point.
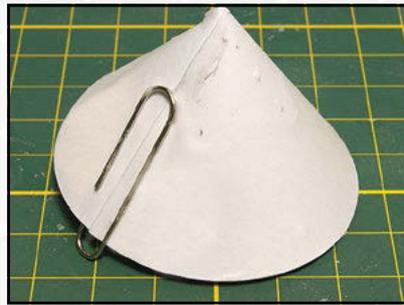
• Carefully bring A over B to create the cone. Adjust the size of the cone until it looks right when placed on the tower. Apply PVA glue and use a paperclip to hold it together while the glue dries.

• Coat the cone with Polyfilla, as you did for the tower. Etch in the 'tiles', starting with the horizontal lines. Then create the individual tiles by etching in the verticals.

THE ROOF - PART TWO

• Cut some small 'stone slabs' from thin card and glue them around the windows on part 6.

• Brush a thin coating of pva onto these 'stones' and sprinkle on fine sand, and then give the entire roof two coats of Polyfilla and set it aside to dry.

• With the tower positioned on top of the roof as a guide, cut out a hole slightly smaller than the tower's diameter.

• Next draw on the horizontal guidelines.

• And now, etch in the stonework itself. This is similar in style to that of the tower, namely a series of relatively uniform layers with stones staggered on top of each other. Start by etching in the horizontal lines, then connect them by etching the 'verticals'.

• Check the fit of the tower again, and file the hole in the roof as necessary so that the tower slides through it. Paint the inside of the roof, tower and the top of part 5 either black or very dark grey. Glue the roof to part 5 and weight it down whilst the glue dries.

• Apply glue to the base of the tower and push it firmly through the aperture.

• Fill any gaps between the tower and roof. When the filler has dried, etch in more stonework to blend in the filled area.
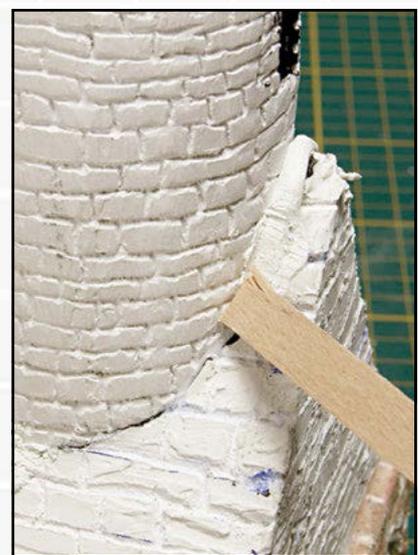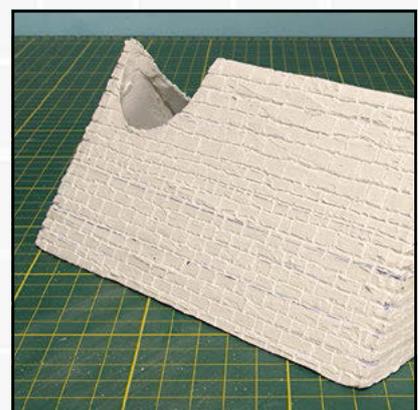
THE CROSS

• The cross was made from two pieces of square section balsa. Cut half way through the two pieces of balsa at the point where they cross over, then simply glue them together.

• To fix the cross, first file a short section of the roof ridge flat, and then VERY carefully drill a hole slightly smaller than the end section of the cross. Carefully glue the painted cross into place.
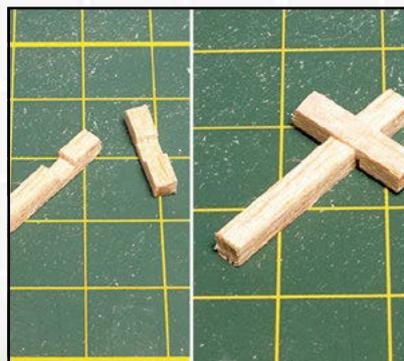
PAINTING

I recommend that you download, and study the image, that can be found at: http://upload.wikimedia.org/wikipedia/commons/6/6b/Glendalough_monastery.jpg

• Undercoat the roofs with a medium to dark grey.

• Undercoat the walls, and the tower with a medium grey.

• Dry brush the model with a 70:30 mix of your medium grey basecoat and white, then pick out individual stones in the walls and the roof and paint them with varying shades of grey.

Don't go over the top on this stage. The photograph, to which I refer, shows quite a few different coloured stones, albeit in very subdued colours. I included a few as the photo shows, but I suggest you ignore them and stick with contrasting shades of grey. My first efforts looked more like a 20th century patio than a 10th century stone church!

• Give the entire model a light drybrush with a 50:50 mix of your medium grey basecoat and white. This will do the job of tying all of your disperate shades of grey together nicely.
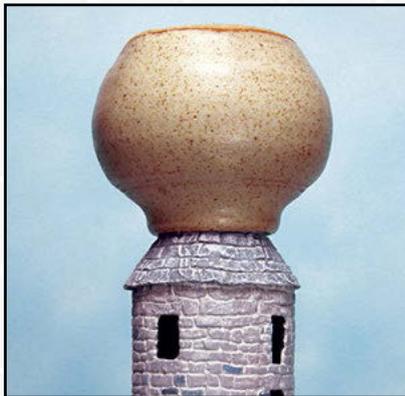
It's quite awkward to hold the conical top in place on the tower whilst the glue dries. My solution was to position the top and then put a weight on it. I used a small pot; removed the cork stopper, inverted the pot, and rested it on top of the cone. I know it looks ridiculous, but it worked!
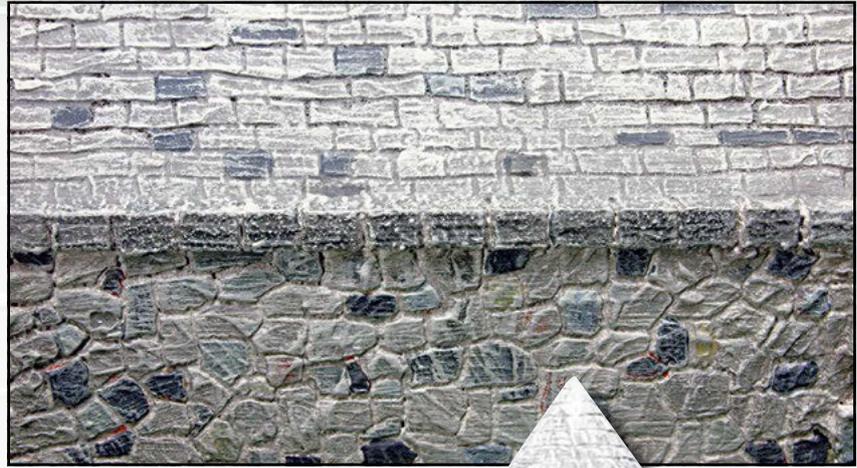
• Finally, glue small patches of modeling flock onto the model, to represent the growth of mosses and so on.
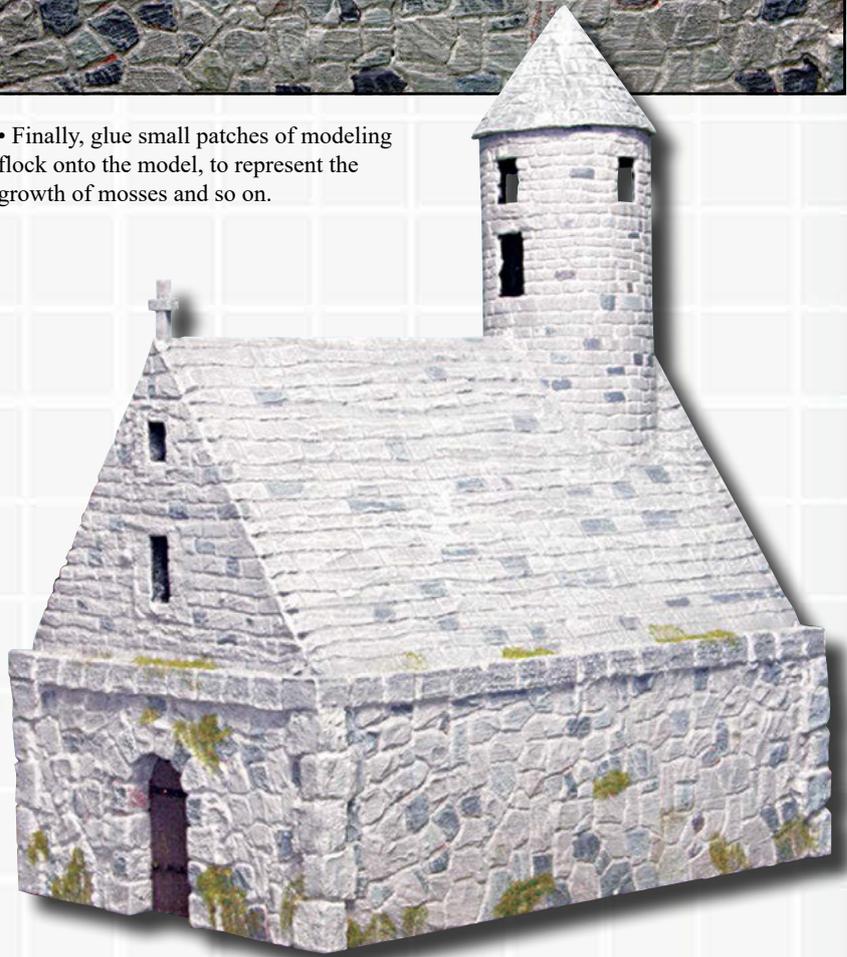
And there we have it, a simple, early-Irish, Christian church just ready and waiting to be pillaged by the next party of Vikings that happens to drop by.

Hopefully you'll be tempted to try some of the ideas in this article yourself. The stone etching technique can be used for many different types of building; using a long postal tube as your starting point you could easily make an Irish watchtower such as the one in the background of the photograph at the beginning of this article, and if you're feeling REALLY enthusiastic, you could even build your own castle!

REFERENCES, INSPIRATION AND THANKS

• John Haywood, *The Penguin Historical Atlas of the Vikings*, Penguin

• Ian Heath, *The Vikings*, Osprey

• Harry Harrison, *The Hammer and the Cross*, Tor Books

This one is an "alternate history" novel, but one which creates a truly excellent and gripping view of England in the 9th century, and which poses some intriguing 'what-ifs?'.

• Lloyd Laing, *The Archaeology of Late Celtic Britain and Ireland c. 400 – 1200 AD*, Cambridge University Press

Thanks to Mark Densham, a fellow wargamer and keen Dark Ages enthusiast for the loan of the last named publication as well as the benefit of his archaeological knowledge and enthusiasm for the period.

USEFUL WEBSITES:

en.wikipedia.org/wiki/Glendalough

www.rucsacs.com/samples/28.pdf

www.wesleyjohnston.com/users/ireland/past/pre_norman_history/vikings.html

HOW TO BUILD...
A SPANISH CONVENT

INTRODUCTION

This model was initially conceived to support the US-Mexican War themed article "Brilliant Events: The Battles for Mexico City, 1847" written by Neil Smith, and is loosely based on the convent at the battle of Churubusco, which goes way beyond what most of us think of as a convent, as can be seen from the contemporary painting by James Walker.

It quickly became obvious, however, that the basic style of the building had far wider applications both historically and geographically, such as Central and Southern America, Middle East, India and the North-West Frontier. And if you don't glue the various components together then the model can be even more multi-purpose.

GENERAL CONSTRUCTION AND MATERIAL NOTES

• The buildings are made from foamboard. Each one follows the same construction method; walls A and B 'enclose' walls C and D (see the diagram opposite page, below right).

Below: Paul's Spanish convent stands in for the Convent of Churubusco in last month's article on the U.S.-Mexican War.

• The number and position of doors and windows is up to the modeller.

• Arches are cut using a circle cutter. Cut the arch first, followed by the verticals.

• The pieces are assembled using pins and PVA glue. Once the glue has dried, clip off the pinheads and push the pins fully into the foamboard.

• The convent comprises four buildings, a plinth with an eight sided cupola topped by a dome, plus another smaller dome which fits on the roof of Building One.

THE PLANS.

Scale up the plans to match your figures. You can see that I've incorporated doors and archways etc., as part of the convent, but if you intend to use the buildings individually as well as together, then you might prefer to only have a basic doorway on each building. The choice as they say, is yours.

Above: The Convent of Churubusco by James Walker

BUILDING THREE

BUILDING ONE

B

C A D

A C

B D

B

C A D

BUILDING TWO

D

BUILDING FOUR

A C B

**How the walls fit together**

A

C D

B

The building plans above (and overleaf) can be photocopied and enlarged (or reduced) to suit the needs of your preferred gaming scale, be it 6mm or 54mm. As you can see from the photographs, the 28mm miniature Mexican defenders can line up the top of their shakos to the bottom of the arched windows on Building Four.

You will also notice we haven't provided templates for the convent roofs. This is because the thickness of the foambard you use may vary from ours, which would then impact the interior dimensions. Simply measure these dimensions once you have assembled each of the four buildings, cut out the roofs, and drop them in.

BUILDING ONE
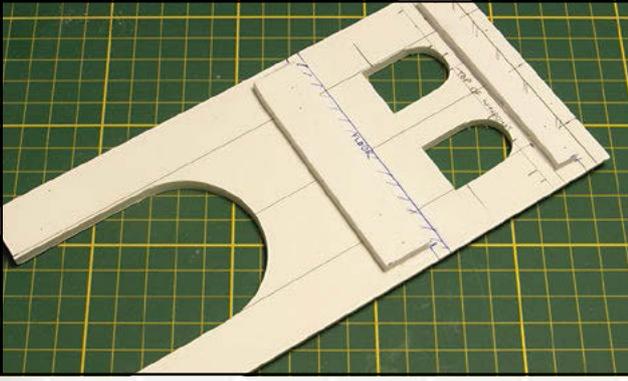
• Cut out pieces A, B, C and D together with windows and door aperture. Position strips of foamboard for floor/roof supports.

• The inner floor must be positioned so that it 'rests' on top of the wall of Building 2 as shown in the diagram below, otherwise you won't be able to slot Building One over Building Two!

• Glue the two sides C and D in place.

• Measuring from the model cut out two pieces of foamboard for the floor and roof. Glue the lower floor in place. The roof rests on the supports otherwise you won't be able to gain access to the floor beneath.

• Glue wall B in place.
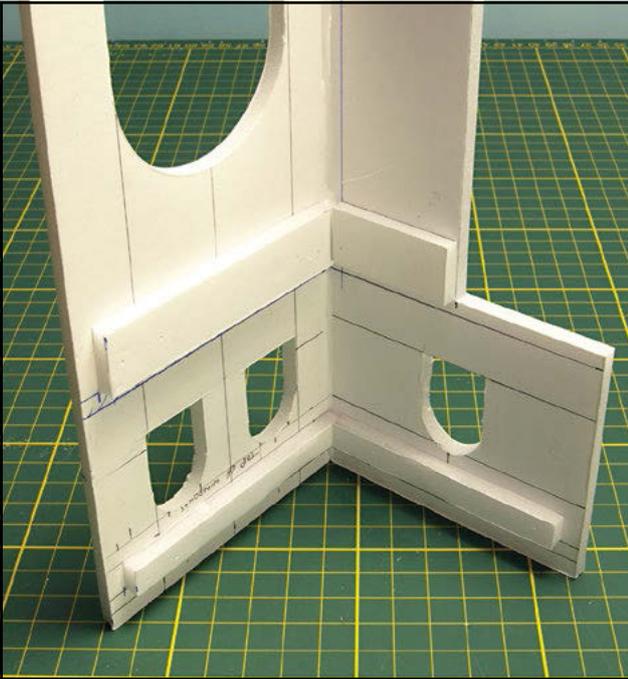
BUILDINGS TWO, THREE, AND FOUR

• Cut out the pieces for each building. Glue in place roof supports from strips of foamboard, assemble the building walls.

• Taking your measurements from the model, cut out roof pieces and either glue, or rest them in position.

Building Two

Building Three

Building Four

A & B (cut 2)

C & D (cut 2)

Diameter of your dome

cut 8
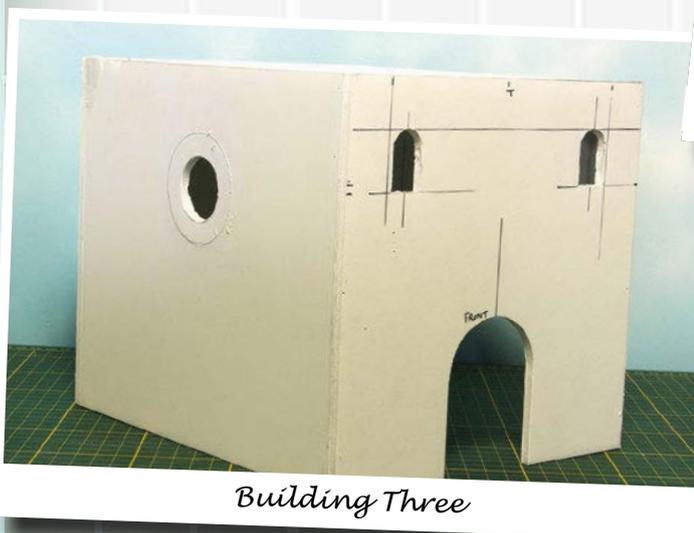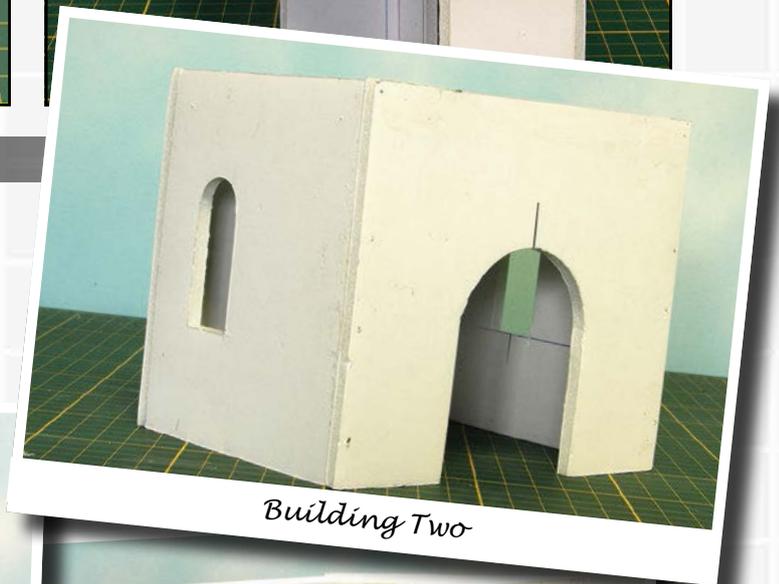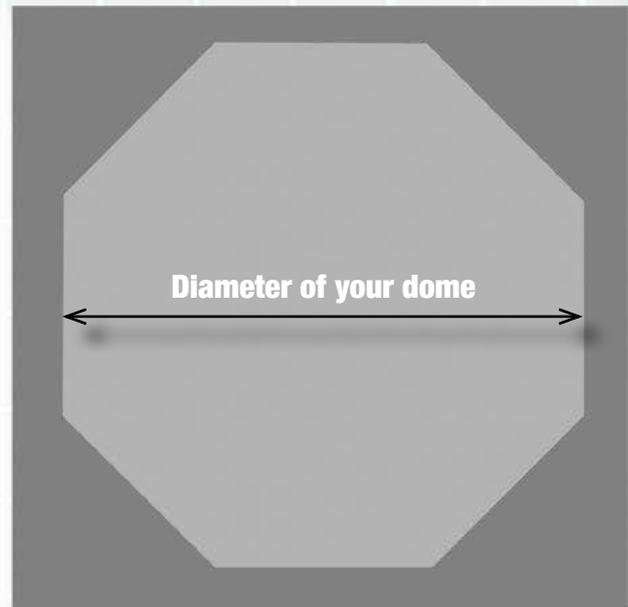
A plinth on which the cupola and dome will rest sits on the top of Building 3. It is made following the same principles as the buildings; two opposite sides enclosing the other two with a 'roof' added.

Domes are difficult to scratchbuild, so finding an alternative is always the way to go. I used an old globe, the diameter of which was about 140mm and which was, conveniently, in two halves.

• Scale the octagon on the plans, together with the cupola side, to fit comfortably within the 'roof' of the plinth and cut them out to create templates.

• Cut out eight side walls from a sheet of foamboard. Draw vertical centrelines on each piece. Using a circle cutter, cut out complete circles, and then the verticals.

• Position one sidepiece on top of the octagonal template. Cut the ends at an angle of approximately 22.5º. Don't worry if you don't get it exactly right, that's why filler was invented!

• Cut the remaining seven pieces in the same way. Turn the first side wall around. Pin and glue the adjacent side wall to it.

• Repeat the process until the octagon is complete.

• Cut a circle of foamboard slightly larger than the diameter of the 'dome' using the circle cutter. Glue the eight-sided assembly to the circular 'base'.
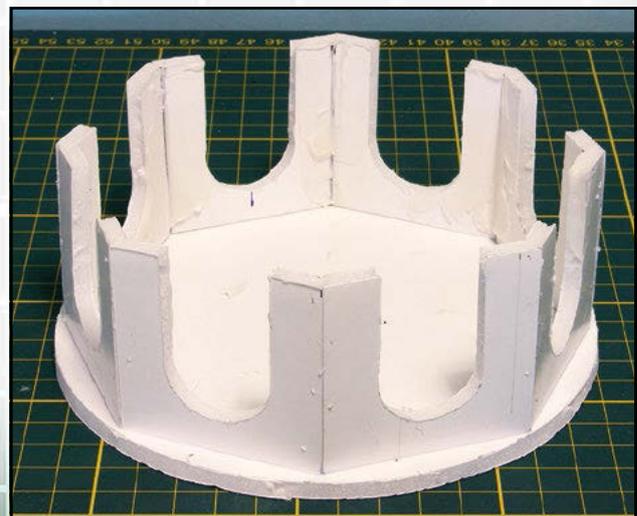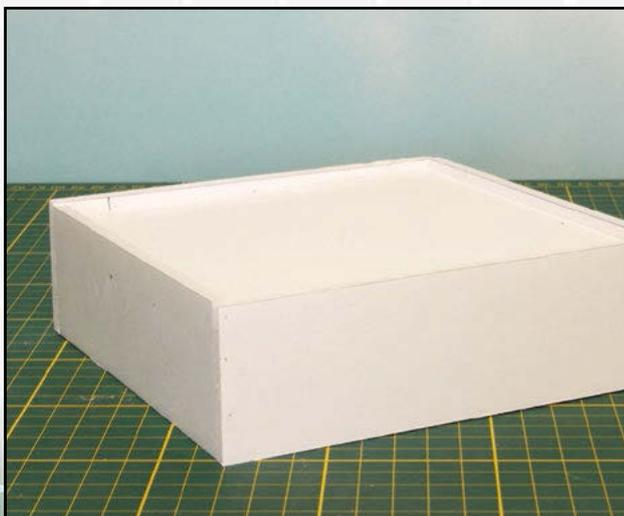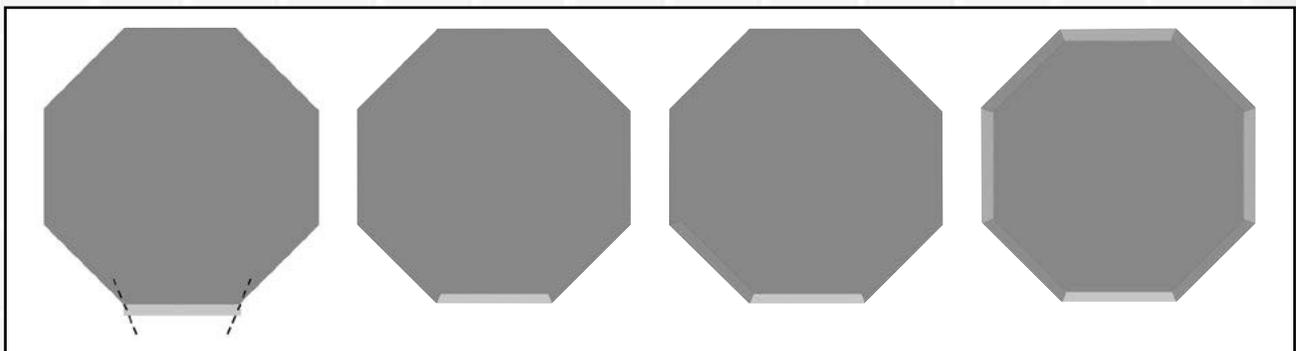
THE OUTER WALLS

• The walls are made from foamboard; either single or multiple thickness depending on the scale. The model for this article was 25/28mm scale, so three thicknesses were used; for 10 or 15mm scale a single thickness would be enough.

• 'Buttresses' are added to support the adjacent walls.

• Add a square capping piece.

• The wall sections interlock by sliding the walls together.
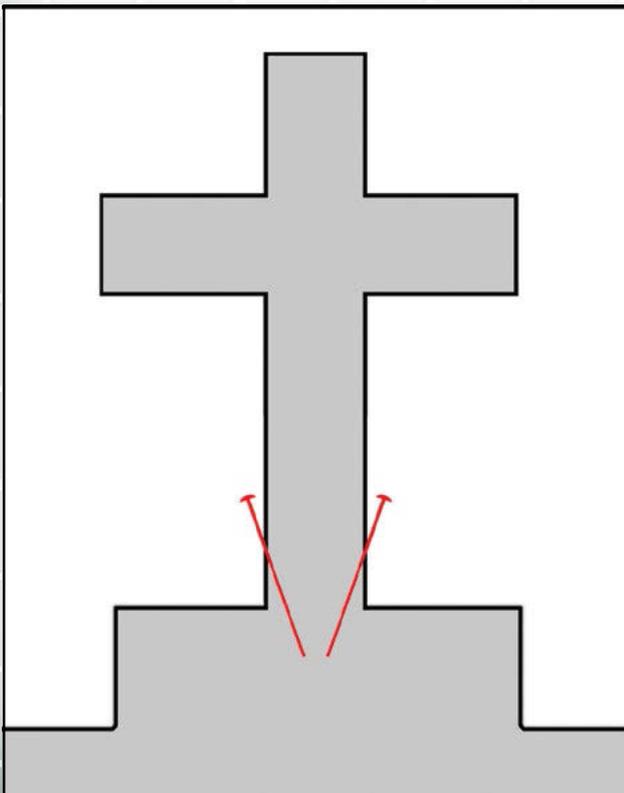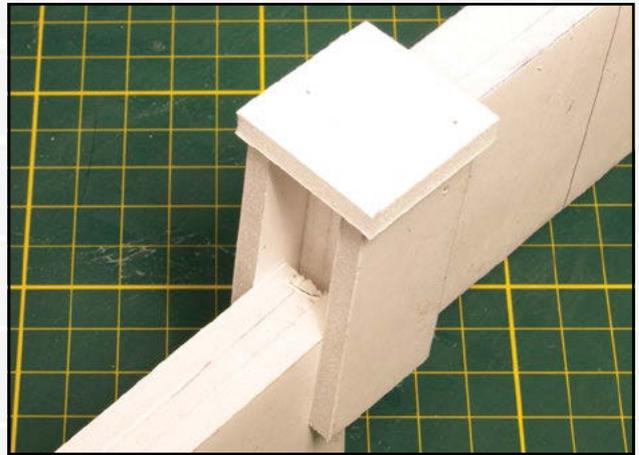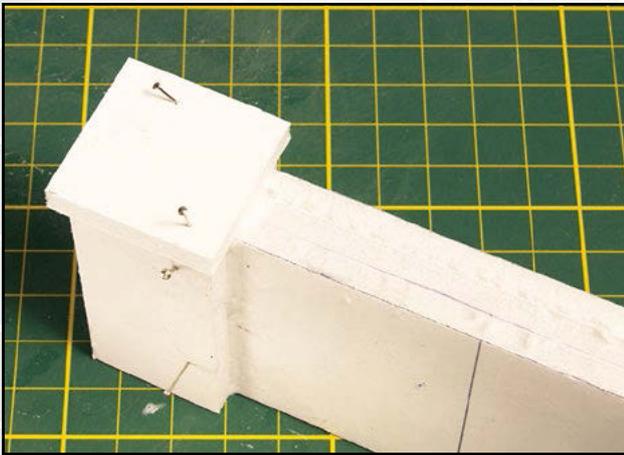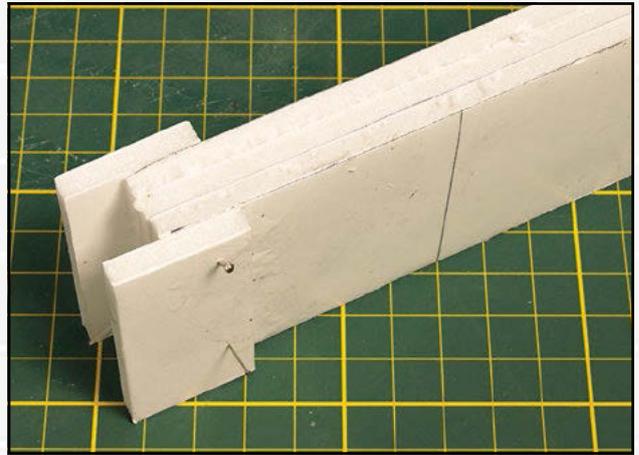
THE GATEWAY

This is slightly more complicated than the basic walls, because of the integral cross, which is part of the middle wall section only! Cut the arch in the gateway using a circle cutter. Keep the cut out piece, as it will form the basis of the gate. To strengthen the cross, push pins diagonally downwards into the wall.

Clip off the pinheads and push the pins fully into the foamboard.

THE CORNERS

Corners follow the same basic principles as the walls, except that the thicknesses of foamboard are interleaved for strength.
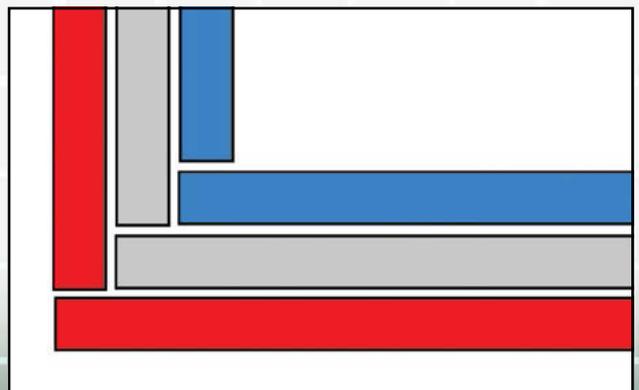
TEXTURING THE BUILDINGS AND OUTER WALLS

• Paint the walls and buildings with a matt white textured paint, which not only provides texture, but also strengthens the surface. It also helps 'even out' the exposed foamboard edges.

• The only exception to this were the domes, the larger because it had the continents of the World engraved on it, and the smaller to match it. I first gave a coat of smooth Polyfilla®, then followed up with the textured paint.

• The smaller dome was originally a plastic Christmas tree decoration, which I cut in half using the hot wire cutter and then glued to a circle of foamboard.

PAINTING THE BUILDINGS AND OUTER WALLS

With the buildings and walls already textured, I gave them a basecoat of an autumnal orange. This was followed up with a heavy drybrush of a 50/50 mix of the basecoat and the original textured paint. Once dry, the buildings and walls were then given a light drybrush of the textured paint. This drybrushing was applied with a sturdy 2" brush.
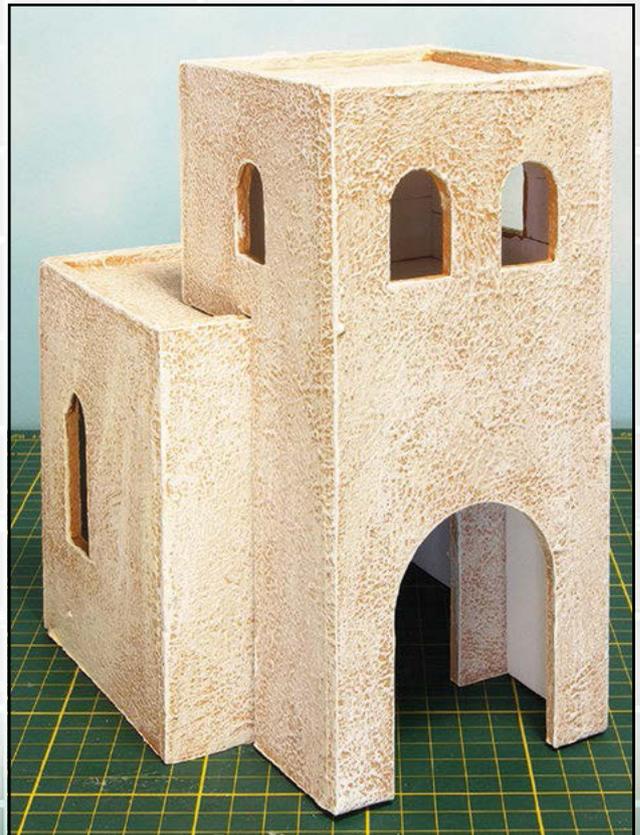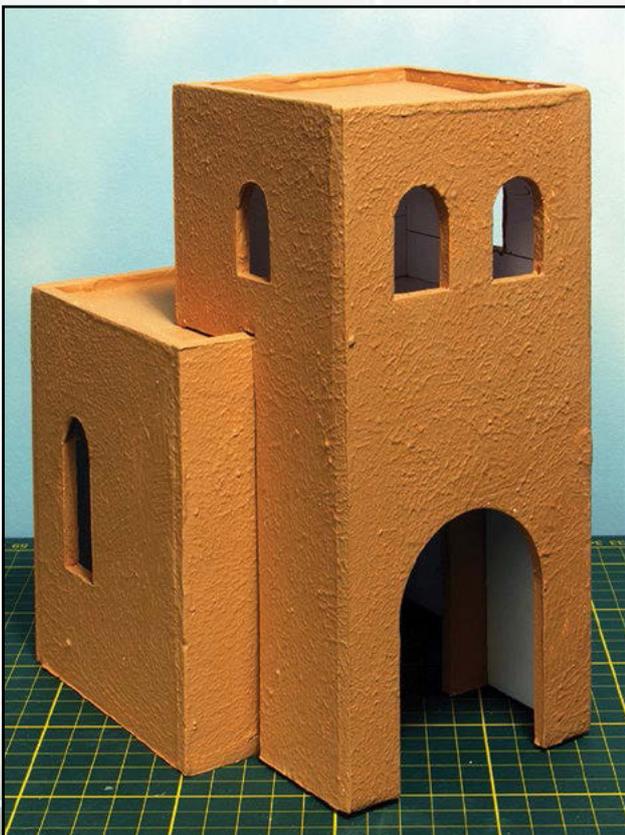
THE MAIN GATE AND THE DOORS

• Take the piece of foamboard from the gate opening and glue a piece of sheet balsa onto one side. Hold the assembly together using bulldog clips.

• Once dry, trim away the excess balsa, and glue another piece of balsa sheet on the other side. Trim off the excess balsa, and then score vertical lines in the balsa to represent planks.
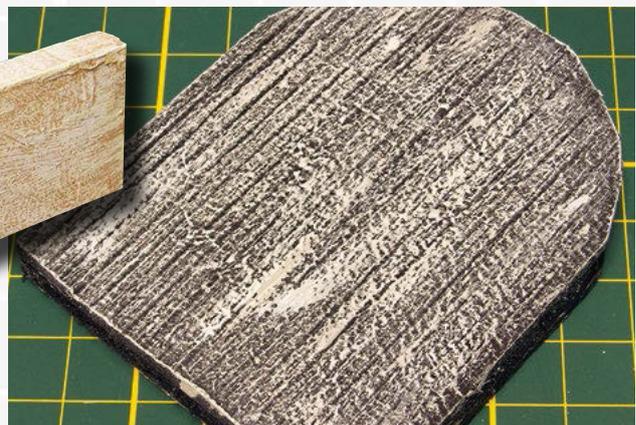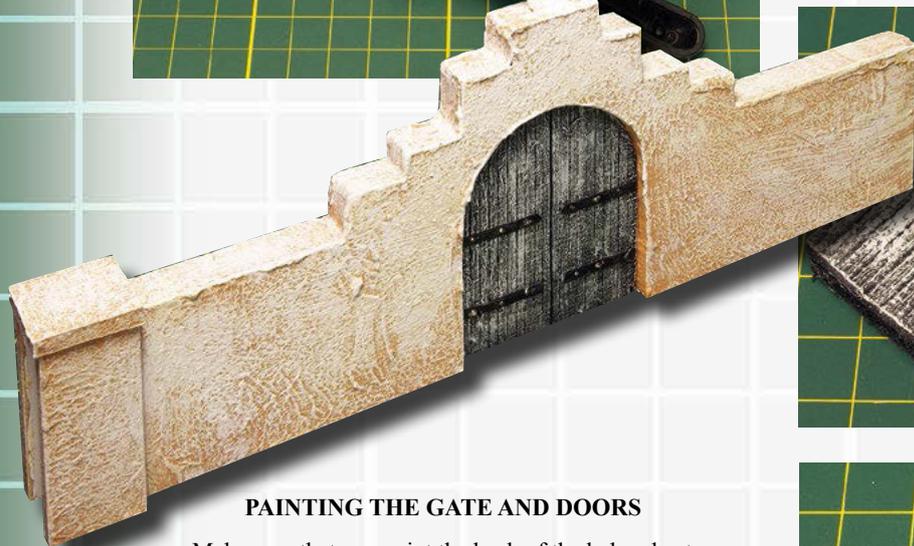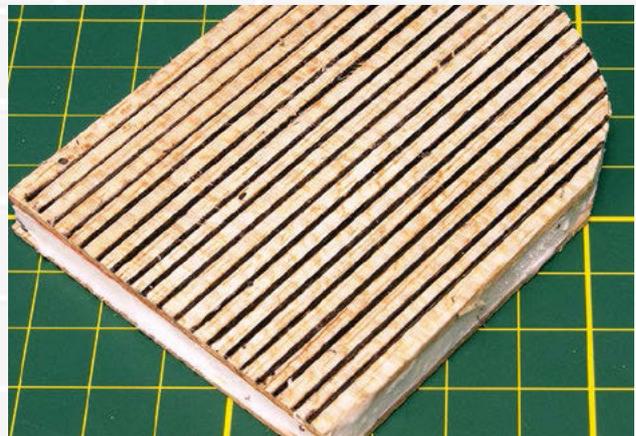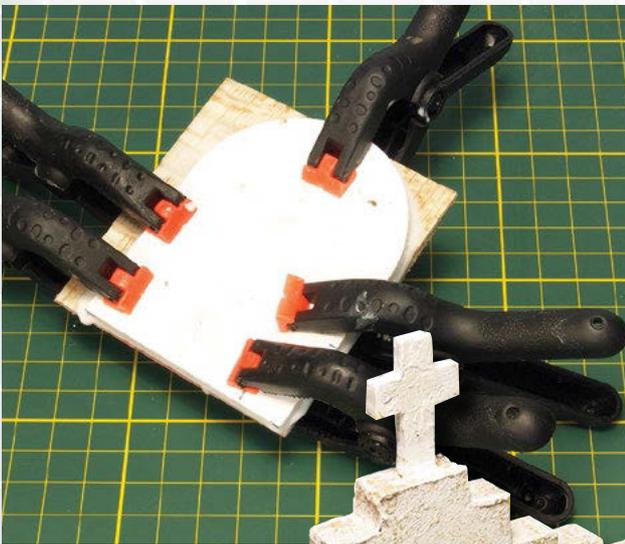
PAINTING THE GATE AND DOORS

• Make sure that you paint the back of the balsa sheet before scoring the front to reduce the risk of the sheet warping. Paint the gate and doors with a base coat of black followed by a drybrush of grey.

• Add some 'hinges' from thin aluminium sheet, drilled to take pinheads representing fixing bolts.

• The main gate fits inside the archway.

• To simplify construction, the doors of the building are made using a sheet of pre-scored balsa slightly larger than the opening, and will simply be glued to the inside of the walls once painted.
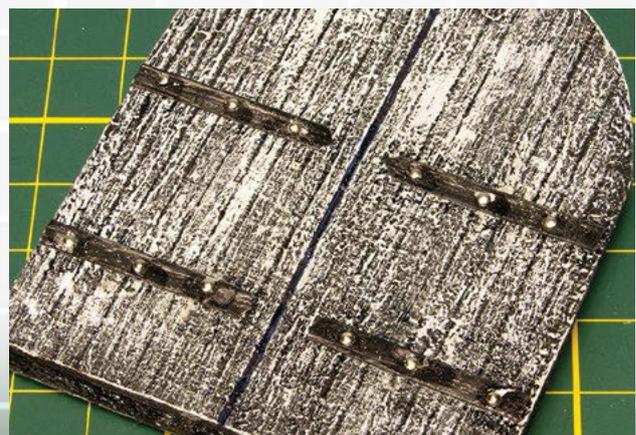
EARTHEN RAMPARTS WITHIN THE CONVENT

SAMPLE "END" TEMPLATE

To enable the defenders to fire over the walls a rampart was built against them. Given that there were defensive ditches dug near the convent, and very few trees nearby, I'm assuming that the ramparts themselves were built up using the soil from these defences.

• The ramparts were built in sections to simplify storage and transportation. It is important that each rampart section matches the adjacent one. To ensure this, create an "end" template from thick card such as the one shown above (sized appropriately).

• The ramparts were made from three layers of 10mm thick expanded polystyrene cut to fit inside the walls and with a sloping rear surface.

• The best tool for cutting foam is a Hot Wire Cutter. You should be able to find a reasonably priced one at your local hobby/ model train store.

• The rampart was painted with PVA glue and a mixture of fine and coarse sand was sprinkled on.

PAINTING THE EARTHEN RAMPARTS

• The rampart was given the same autumnal orange basecoat as the buildings and walls, followed by the same 50/50 drybrush. I stopped there as I didn't think the freshly dug desert earth would be as pale as the buildings. I've also not added static grass as the ramparts were newly constructed, and there probably hadn't been time for the grass to grow.

You could leave the ramparts at this point, but I felt that they would be improved by the addition of some 'decking' made from bamboo placemat.

• Cut the placemat into strips the width of the ramparts and glue into position.
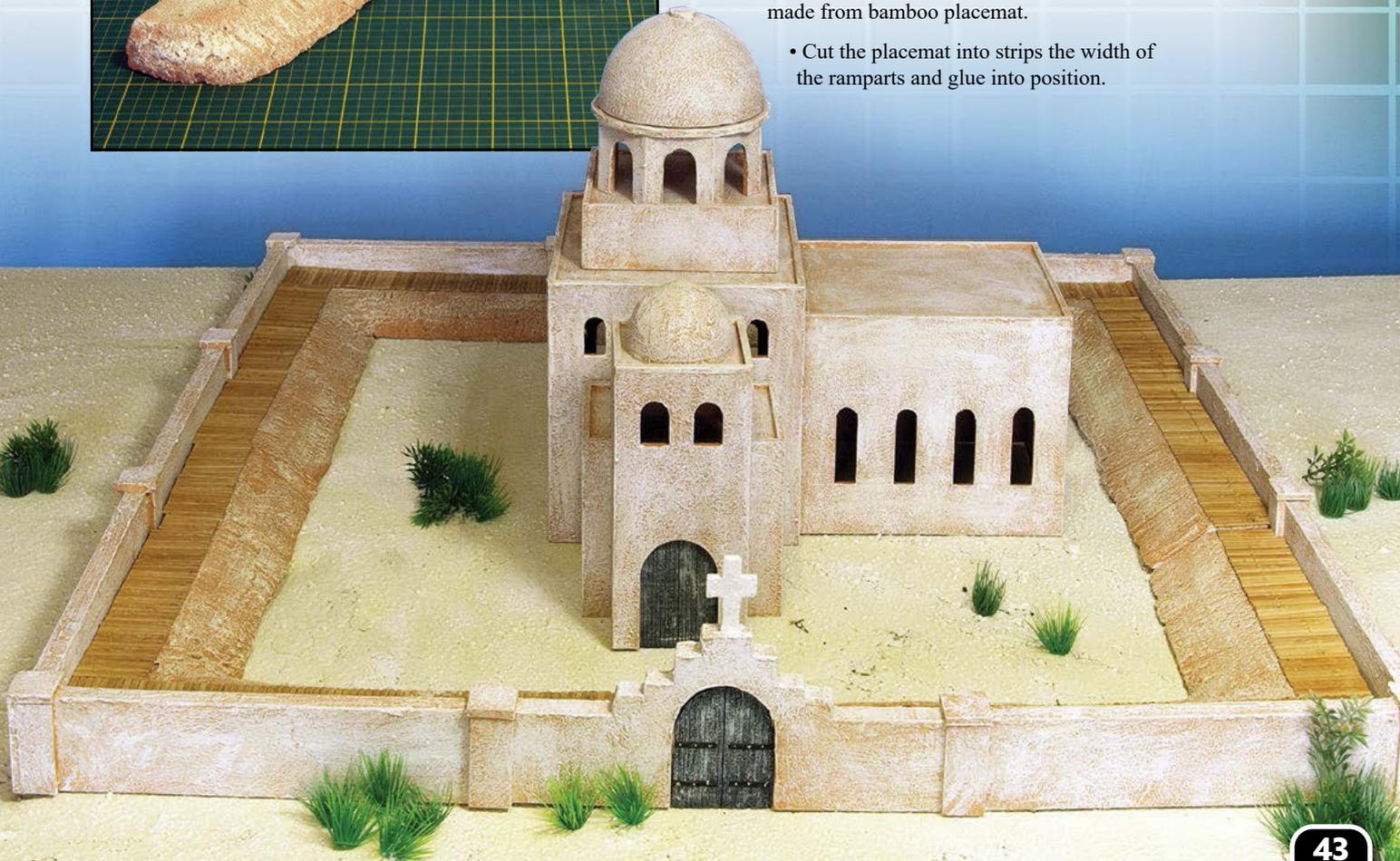
HOW TO BUILD...
WOODEN FENCES & DRY STONE WALLS

By Pat Smith

When making terrain, and specifically fencing and walls for your wargames table, a few factors you have to consider are: how much time and effort you want to put into the project, how much you want to spend on materials, and how realistic you want it to look. If you have a reasonably sized table, you are going to need a fair amount of the above to get the right look for the period we are about to cover in this article.

With fencing and walls, you have the choice of buying the terrain piece ready made and painted (from various terrain vendors) or you could also buy an unpainted, unassembled commercial product such as Redoubt's metal cast fencing, or Renedra's and Perry Miniatures' plastic picket, rail and five-bar American fencing. There are also quite a few other companies making commercial walling. Using these products helps you to speed things up, getting your terrain on the table once they have been painted and based to match your terrain boards (I tend to repaint and flock bases even on ready made/painted items). Finally, you have the choice to make the piece completely from scratch, depending on your interest and enthusiasm for this aspect of the hobby.

The advantage of making fencing and walls from scratch is the financial cost (particularly when building in volume) and the satisfaction of making something that looks good and fairly unique. Using natural materials such as wood and stone are more likely to make them look, well... like wooden fences and stone walls, rather than using commercial metal and plastic. The downside is that it takes a little longer to make, but I feel the end result is worth the effort. As well as the examples shown in these pictures, you can see more of my terrain by visiting: *www.wargamingwithsilverwhistle. blogspot.com*

In this article, I'll show you how to make snake/worm/zigzag fencing, cross rail fencing and dry stone walling. These last two items I discovered in the excellent *Touching History* books by the talented Paul Darnell. There are four books in the series on making terrain and models and I highly recommend you trying to get your hands on a copy or two. Unfortunately, these books are no longer in production, but I have still seen copies for sale at different trade stands when visiting wargaming shows.

A gaming table suitable for the American War of Independence is probably going to need a good amount of fencing and dry stone walling to give your table the right look for the period.

The landscape during the century between 1750 and 1850 would have been of agricultural villages and family farms, carved from what had previously been a forested wilderness. During the ploughing of a field, larger rocks would have been dragged up from the ground and then piled along the edge of the fields to mark their boundaries.

NATURAL RESOURCES

One of the most ample natural resources in America at the time was wood. Not surprisingly, early Westerners built many of their fences from this abundant resource, using them, sometimes combined with the dry stone walling, to corral livestock, mark their territory and to keep out deer.

The various styles of fencing made during this period were designed to be made as easily as possible and were constructed without nails, which were expensive and not easy to come by. One of the most popular styles of fencing was called 'cross rail', which was used widely throughout America. The fence would have been constructed by first placing large rocks along the boundary. Next, the two stakes would be hammered into the ground at an angle (forming an X) and,

once secure, lengths of wood could then be pushed through the lower part of the X and also rested along its top.

Another style in which no nails were used was called 'snake fencing' and this type of fence would have been used where the ground was too hard or rocky to hammer posts into it. The posts would have been placed down on top of each other in a zig-zag, or snaking, formation to create a barrier.

With both of these types of fencing, I have based them on various bases, which can be placed on the tabletop and then again removed to change the layout. This does not look as realistic as building the fencing into your terrain boards, but unless you have unlimited funds and lots of storage space then we

have to compromise to make the terrain as versatile as possible for other settings. This type of fencing would not look right in other periods on other continents.

The dry stone walling, however, is more or less timeless and suitable for almost any setting that you wish to game (apart from naval and air battles of course). For this reason, I have built much of my walling into terrain pieces such as hills, which look so much more realistic when you see the line of the wall following the contour of a hill. I have also lined some of my roads and fields with stonewalling and these, along with the hills, can be placed down or removed from the table for maximum versatility. Having said that, I have built some straight sections of walling on standard flat lengths for when the need arises.

SNAKE FENCNG

For the base, cut lengths of hardboard (or MDF) at your preferred size. Mine are at 280mm x 40mm.

For the actual fencing, use strips of balsa wood cut to lengths of 55mm. hack at these these along their lengths to give them a rough-hewn look.

Glue four pieces of the fencing at an angle, spaced out along the base and then let dry.
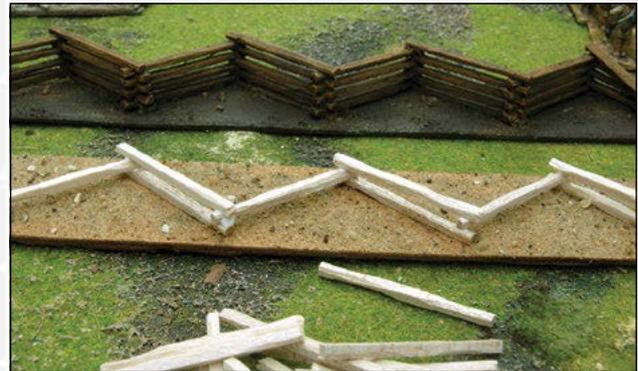
Brush watered down PVA (white glue) all over the base, apart from the pieces of fencing, and then cover in sand. Then add the next four pieces of fencing, linking up with the fence you glued earlier, adding a spot of glue where they touch.

Keep adding fence rails until you reach your required height, leaving glue to dry between each layer.

CROSS RAIL FENCING

You need to cut lengths of foam card for each base.

For the making of the fencing, use barbeque sticks (skewers). You need to trim these along their length to get rid of their neat roundness. Cut shorter lengths (around 30mm) for the Xs and some longer lengths (60mm) to join the X's together.

Put a dab of PVA glue on the end of two of the smaller lengths and push them into the foam card to create your X. Work your way along your base, leaving a gap of about 40mm between each one. You then need to put a dab of glue to join the two lengths that form the X.
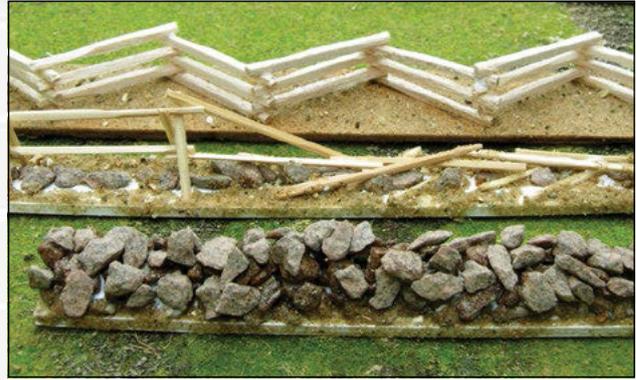
Run a line of glue along the centre of the base and then place some small stones in a line on top.

When dry, brush some watered-down PVA along the base around the stones and cover in sand or railway ballast.

Then glue the longer, joining lengths in place.

As you can see in the picture above left, this particular piece is going to have the fence fallen down and broken but the finished fencing in the background is what you will be aiming for when making yours.

DRY STONE WALLS

Cut your base to your required size, a variety of lengths is good, and get yourself a big bag of grit, ballast, or gravel with rocks of the appropriate size for your scale.

Put a thick wash of PVA glue on your base, then cover with your first layer of course grit, and whilst still wet, cover the edges in sand.

Let it dry overnight and then keep adding extra layers, letting it dry each time until you reach your required height.
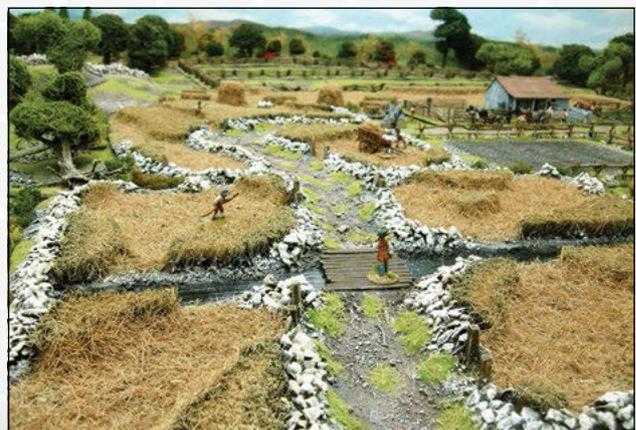
The process is the same if you are gluing the wall directly onto your terrain, as seen around these wheatfields above.

PAINTING

Whether you are painting walls or fencing, give it a base coat of watered-down dark brown (I used Sandtex Bitter Chocolate) masonry paint. Then, for the walling, a heavy dry brush of Sandtex Mid Stone, followed by a lighter dry brush of Ivory Stone.

For the wood fencing, use a medium dry brush with a lighter brown (Focus DIY Smooth Chocolate) over the dark brown and then a light brush with the Mid Stone masonry paint for a weathered look.

The bases were painted dark brown, followed by dry brushing Mid Stone, Straw and then finally a lighter, bone coloured paint. They were then flocked with static grass, which was then dry brushed with a yellow ochre.


SIGNPOSTS

While you already have the materials out for making your fencing, why not make a few sign posts at the same time? The signs seen here were made from balsa wood glued onto a coin or washer with the base covered in some filler and sand. Paint them the same way as your fencing. My signs are simply secured to the posts with a little Blue Tac, so I can change them around and have different names to fit the battle/place I'm representing.

COMMERCIALLY AVAILABLE OPTIONS

This farmstead is from Perry Miniatures, and showcases the three types of plastic fencing that they (and Renedra) sell, as mentioned earlier.
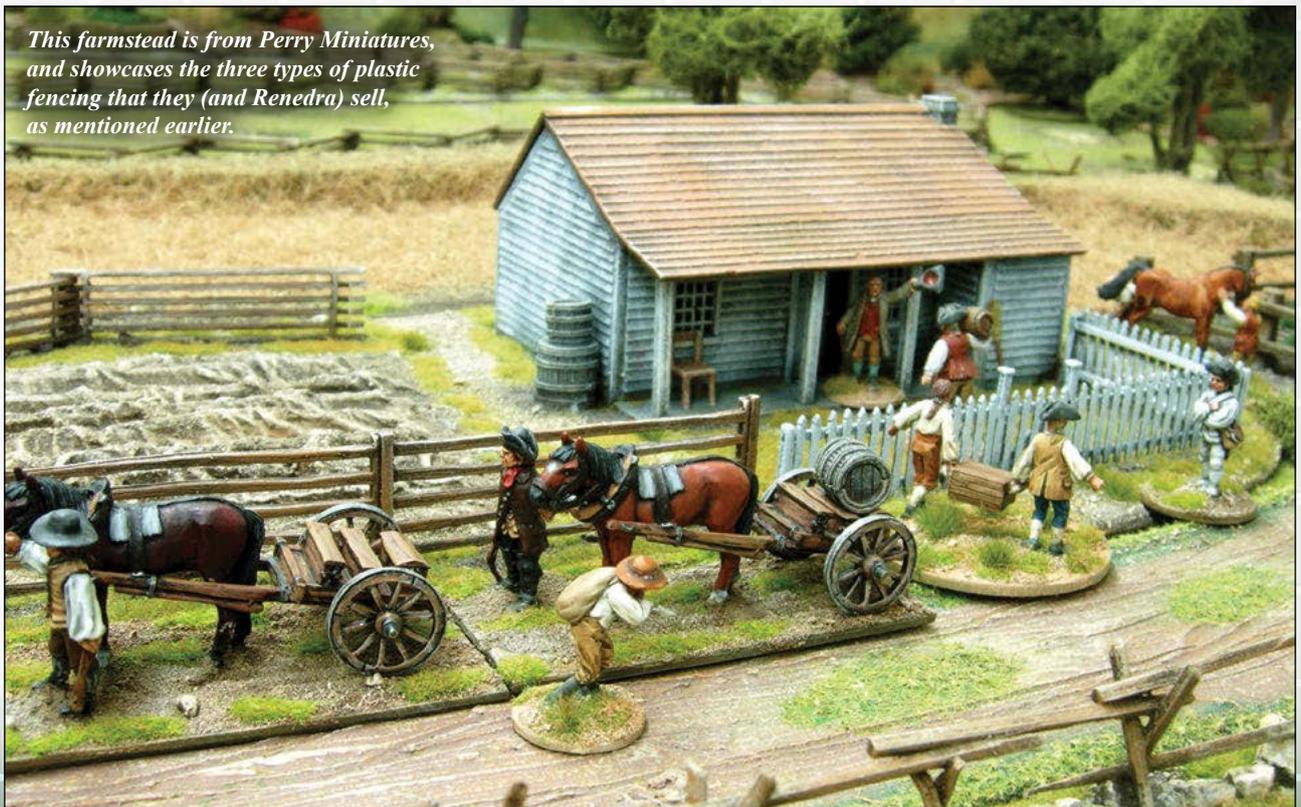
HOW TO BUILD...
# A DICE TOWER

BUILDING A DICE-ROLLING TOWER

Fed up with seeing your figures being bounced across the wargames table?

**Nauseated at the sight of your fine scale naval models being broad-sided by over enthusiastic dice rolling?**

Well, your worries are over thanks to this 'How to...' article which will show how to build a simple dice-rolling tower, complete with tray, for next to nothing. No longer will your models be subject to the whims of 'buckets of dice'.

Please note that this model has been designed to accommodate reasonably large dice, but if you use really large dice then you'll need to adjust the size of the ramps to ensure that the dice will drop through. I always advocate a test assembly prior to gluing, so I suggest that if you have any doubts, pin the dice rolling tower together first to check.

Step one is to head to *wargamesillustrated.net* to download the plans for the dice-rolling tower.

STEP ONE
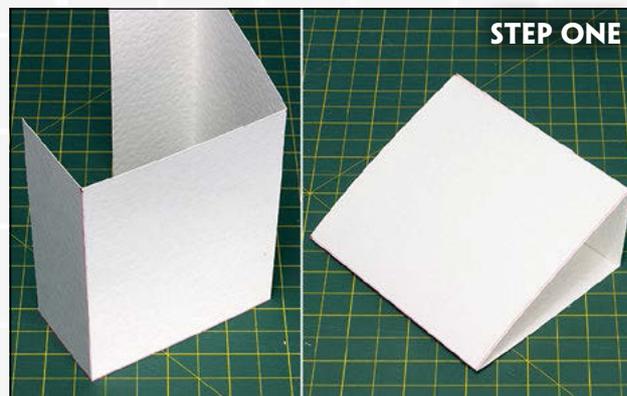
The 'ramps' in my tower use a slightly unusual method of construction which make it easy to assemble the tower without the need to align ramp supports on either side of the tower.

• Start by making one of the three small ramps from medium weight card. Lightly score along the fold lines. Fold and glue as shown to create the first of the three self-supporting ramps.


STEP TWO
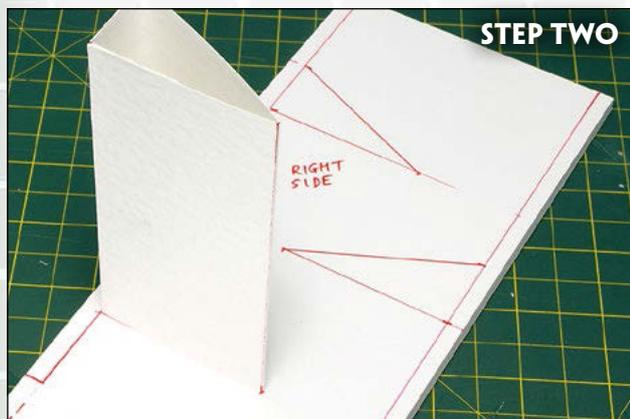
• Before making the other two small ramps, check that the ramp fits by positioning it on the guidelines drawn onto the right side panel. Make the other two small ramps in the same way. The bottom ramp, larger than the others, follows the same process.


STEP THREE
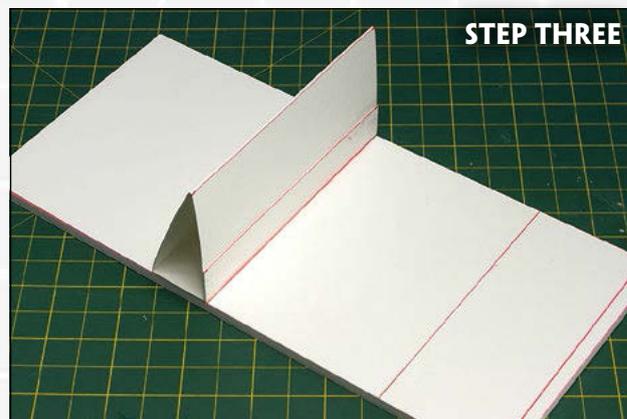
• Glue one small ramp into position on the back panel, cut from 5mm foamboard (foamcore) as shown.

STEP FOUR
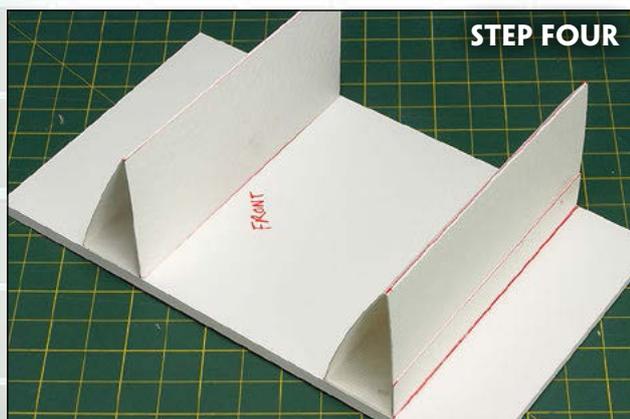
• Glue the other small ramps into position on the front panel.

STEP FIVE
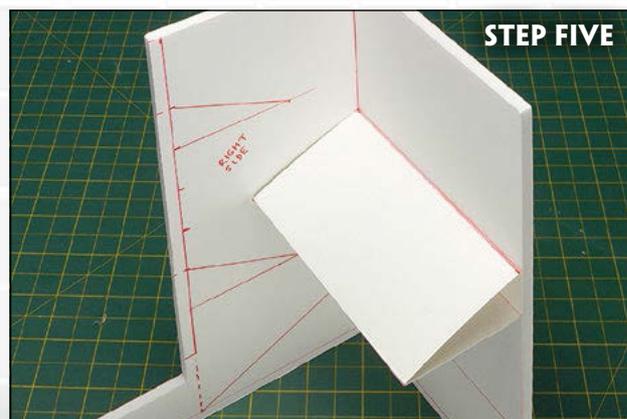
• Glue the right side panel to the back panel.
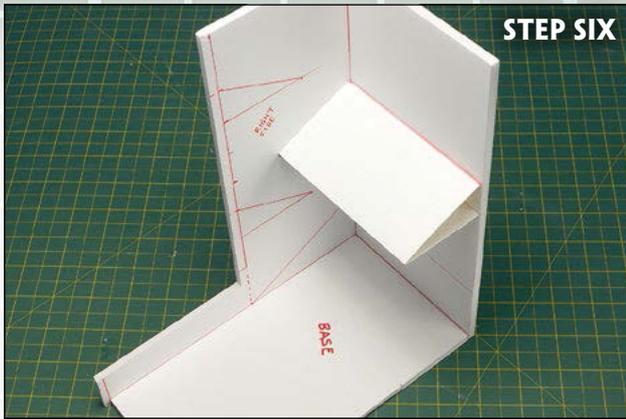
STEP SIX

• Next, glue the base into position so that it sits inside the rear and side panels.
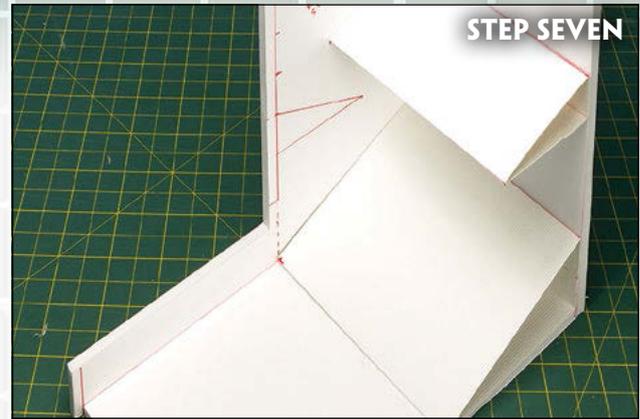
STEP SEVEN

• With the base glued in position, glue the lower ramp to the back panel and the base.
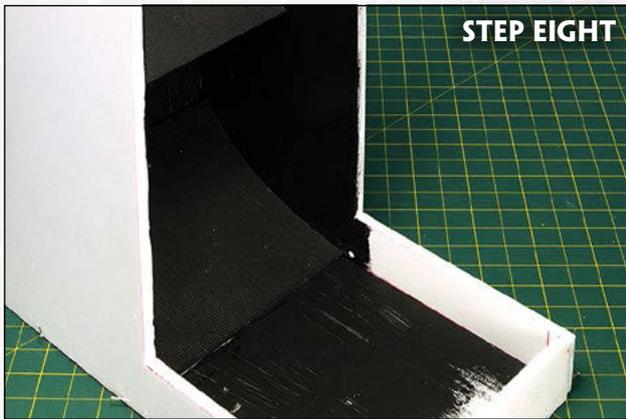
STEP EIGHT

• Glue the left panel into position, followed by the tray front. Paint the inside of the tower, as it will be impossible once you've added the tower front. I used matt black emulsion. Do not be tempted to spray the tower. In my experience the paint in spray cans reacts very aggressively with the foamcore!

STEP NINE

• Glue the tower front in place.

And that, basically, is it. A dice-rolling tower, complete with tray, that will protect your precious models!

DECORATING THE TOWER

There are several possibilities; you could simply paint the tower and tray matt black followed by a coat of matt or gloss varnish. But if you really want to create something that reflects your wargaming interests, why not decorate the exterior of the tower with images depicting the particular periods you game. You could print out images from the Internet, but to be perfectly honest I've no idea how long such inkjet printed images will last. You'd probably be wiser to cut out images from old magazines. Obviously I'm not suggesting cutting up your cherished collection of *Wargames Illustrated* back issues, but if you have other sources of suitable images, why throw the magazines away when you can at least make use of the images to create something unique to you!

Simply cut out the images of your choice and glue them to the tower, overlapping the edges. Once you're happy with the finished result, give the tower several coats of varnish and you've got a really useful dice rolling tower AND your precious models will be protected from volleys of indiscriminately thrown dice! If you're a modern or WWII gamer, you could even disguise your tower as a block of flats or office building and incorporate it into your terrain!

DICE ROLLING TOWER

Plans and instructions for personal use only, and not for commercial purpose   Davies

110mm	100mm	110mm
Tower rear	Tower side x2	Tower front
240mm	65mm / 50mm / 210mm / 50mm / 75mm	195mm
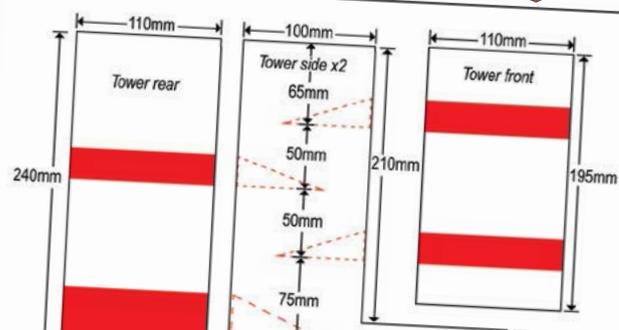
HOW TO BUILD...
A WATERMILL

This 'How to…' shows you how to construct a generic watermill. Whilst the construction of the basic building shell and the waterwheel are the same, by varying the treatment of the walls and the roof, your model could be easily built to represent a watermill in post-Medieval Europe or colonial North America. Whichever version you decide to build, we suggest that you read through all the instructions, before you start.

THE BASIC BUILDING AND MILL WHEEL

We'll start by constructing the basic building, the basic shape of which is common to both locations. Enlarge or reduce the plans (found online) so that a based figure could pass through the door. Remember the plans are only a guide because I don't know what thickness of material you'll be using to make your model. When creating your plans you need to allow for the thickness of the material being used. With this particular model this only becomes an issue with part F, which fits between parts E and D. If in doubt, ALWAYS do a dry run, pinning the parts together as necessary before gluing.

Cut out the wall sections, windows* and doors. Pin and glue them together in the following sequence: A to B, C to B, D between C and A, E to A, and finally F between E and D.

*If building the North American watermill, make the windows before cutting out the window apertures. It's far easier to make the windows and then cut the apertures, than cutting the apertures and then trying to make windows to fit!

WATERMILL
Plans and instructions for personal use only, and not for commercial purposes.

F   B

D

E

These plans are intended as a guide and make no allowances for the thickness of the material being used, which will affect the width of part F which fits between parts D and E.

See the text for the full assembly sequence.

A   C
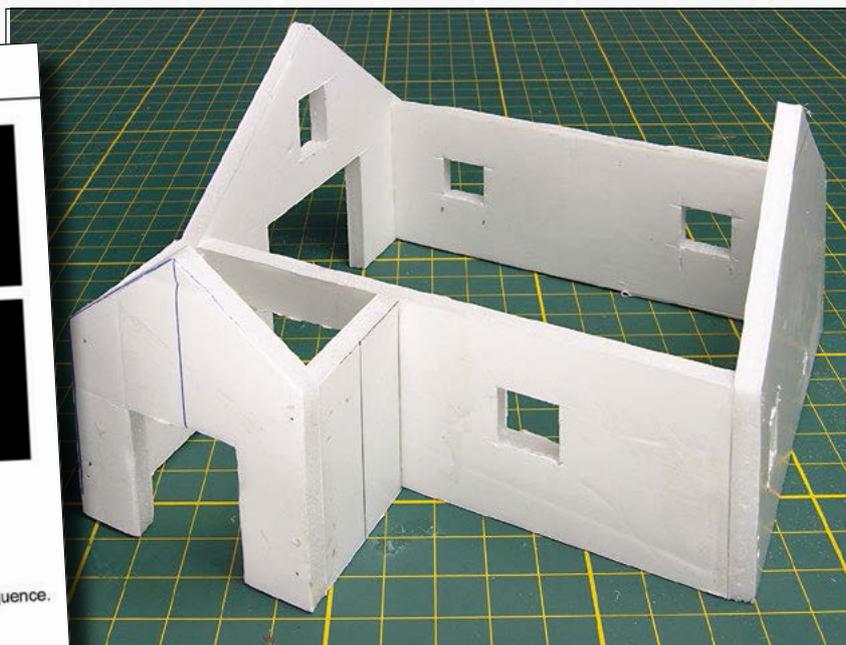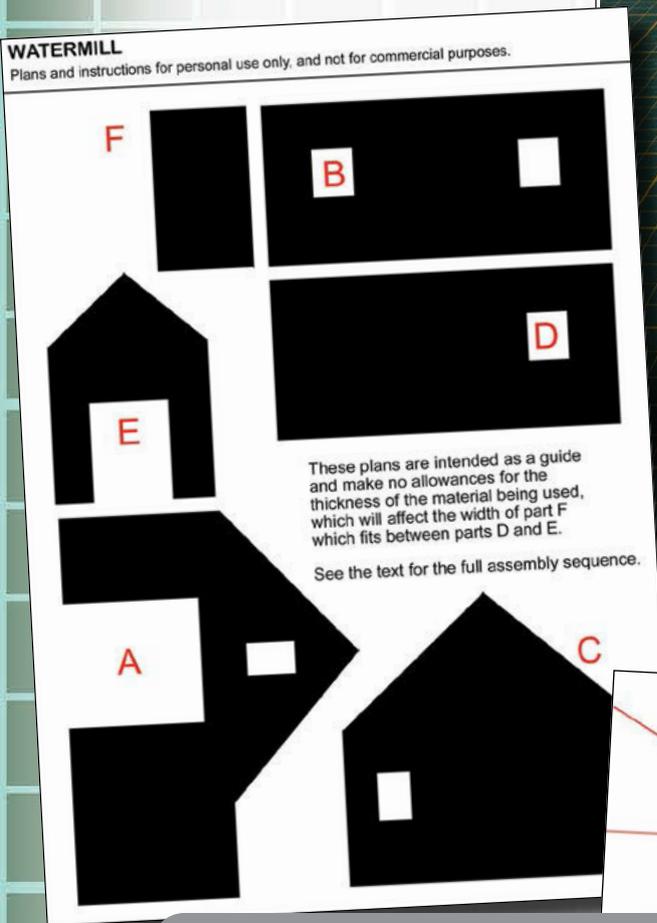
*Above: The 'basic building' structure assembled from foamboard.*
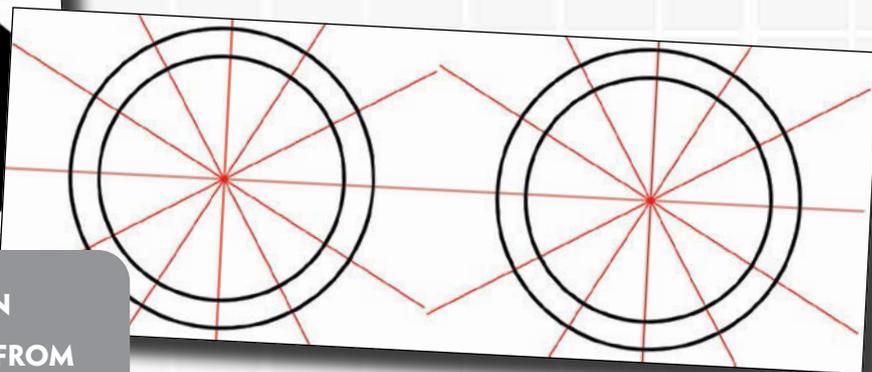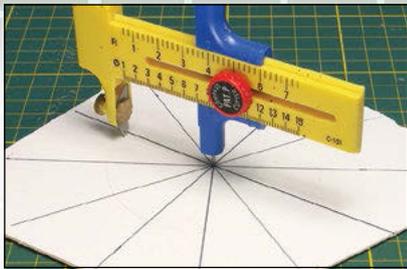
For the Mill Wheel, cut a piece of mounting board large enough for two wheels side by side. Draw a central horizontal line. Mark the two centre points. Using a protractor, divide each circle into 12 equal segments, each 30°. Then, using a circle cutter (shown above), cut out the two wheel rims.
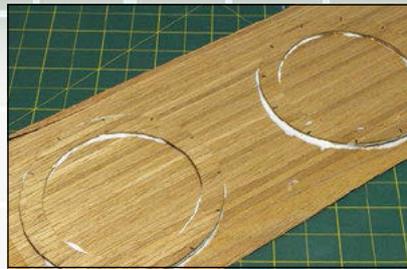
Glue the wheel rims to a piece of wood veneer. Trim off the veneer. Turn the wheel rims over. Transfer the segment dividing marks onto the veneer surface, (these will be your guide for fitting the 'blades' of the wheel), and glue the underside of the wheel rim to the veneer so that the wheel is 'veneered' on both sides. Trim off the excess veneer.
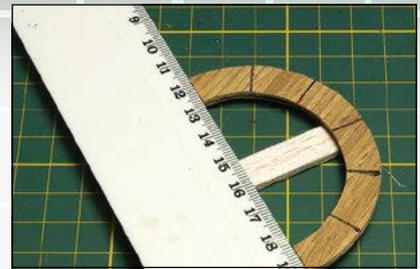
Put the wheel rims together and sand them to as accurate a match as possible. Next step is to create one of the two main spokes, which need to be wider than the diameter of the wheel axle - my axle was a 6mm diameter barbeque skewer, so I cut a strip of thin balsa 10mm wide. Using the marks as a guide, glue a length of balsa to the wheel.
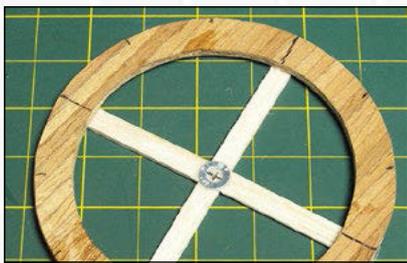
Trim off the excess balsa. Mark the centre point of the first main spoke. Next you add the second primary spoke, which is in two sections that butt up to the first spoke.

Note: I added a metal washer to reinforce the hole that will be drilled later to take the wheel axle.
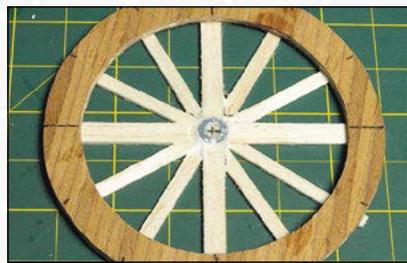
The remaining spokes are thinner than the main ones and are added one by one. Lay a strip of balsa beneath the wheel rim. Trim it to fit and glue in place.

Continue adding spokes until the wheel rim is completed. Trim off any excess balsa. Drill out the axle hole. Repeat the whole process to make the other wheel rim.
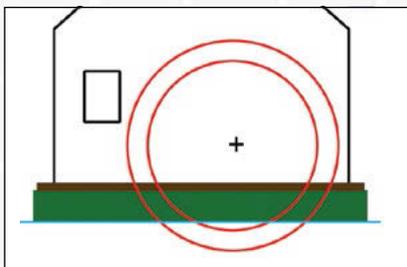
Next, you need to determine where the wheel must be cut off to allow it to 'sit' on your 'water'. The easiest way is to rest one wheel rim on the side of the mill building and, allowing for the thickness of any base upon which you might decide to mount the completed model AND the height of your terrain above the 'water' level, draw a horizontal line on one wheel rim. The drawing on the left, which has had the wheel spokes removed for simplification, will hopefully make the process clearer.

Carefully trim off the segment of the wheel rim that would be 'underwater'. Lay the trimmed rim over the other one taking care to align the spokes accurately and trim.

The next step is to glue the axle in position. It needs to extend into the building to help hold the wheel in place. My axle was about 50mm long and made from a barbeque skewer.
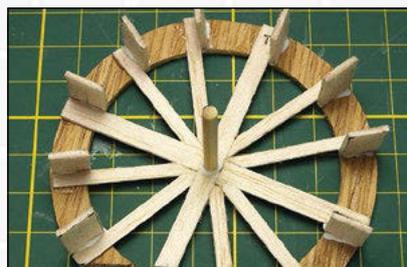
Cut out the 'blades' for the waterwheel from balsa sheet and glue them in place. Mine were about 18mm wide. Carefully slide the other wheel rim down the axle and glue it to the blades and the axle.

FRAMING

The framing consists of corner uprights, strips around the windows and various horizontal strips as suggested in the following photographs. For the framing on both models, I used a combination of balsa strips, and 5mm wide coffee stirrers, courtesy of a friendly waitress at my local coffee shop!

Note: Ignore the various lines on the foamboard. I hate to throw anything away and these models were made using scraps of foamboard that I had left over from other projects.
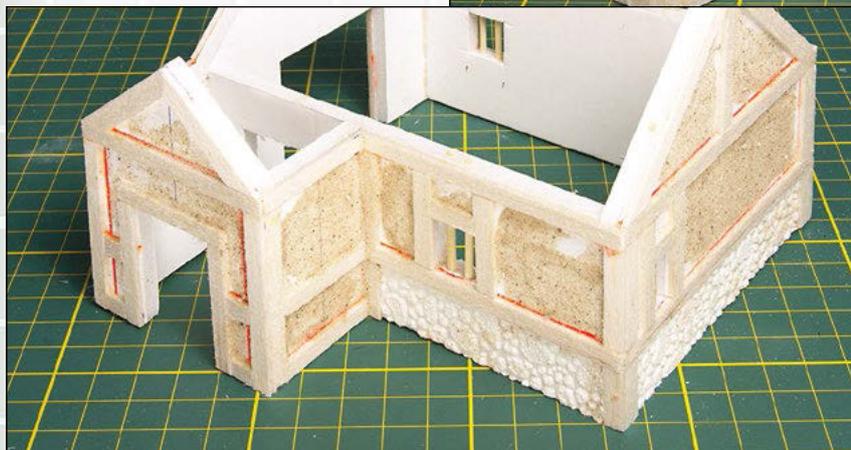
THE WINDOWS

For this period, you could justifiably leave the windows simply as basic apertures, but I decided to add bars to the windows by pushing cocktail sticks through the foamboard. Then just trim off the ends of the cocktail sticks.
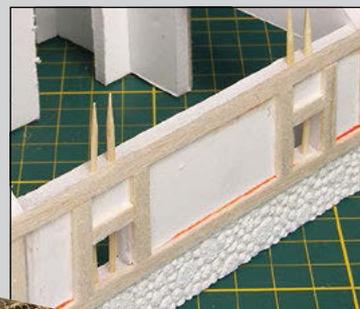
WALL TEXTURE

Stonework - I used suitably textured wallpaper to simulate stonework.

The rendering/stucco - to add texture, brush PVA (white glue) onto the walls, and then sprinkle on fine sand.

THE DOORS

The doors are made from sheet balsa, cut to size, lightly scored with a ballpoint pen to simulate planks, and with supporting balsa strips added as appropriate.

The doors should be painted in the same colours as the framing timbers, and then glued into position; open, closed or partially open, the choice is yours.
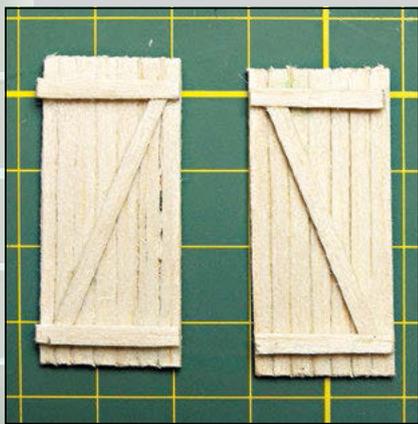
PAINTING THE STONEWORK, WALLS AND TIMBER

With the roof painted, you can move on to the walls and 'timber'. The 'stonework' was given a thin wash of Games Workshop (GW) *Graveyard Earth*; the walls were painted pale grey, and the timber GW *Scorched Brown*. The walls and timber were then given a light drybrush of white. I also added a bit of flock to make the stone section look a bit older and overgrown.

ROOF

This version of the watermill will have a thatched roof made from fake fur and so will need a supporting roof made from mounting board cut to size, pinned and glued into position. Take your measurements from the model itself. Construct the larger roof, and then add the smaller one.
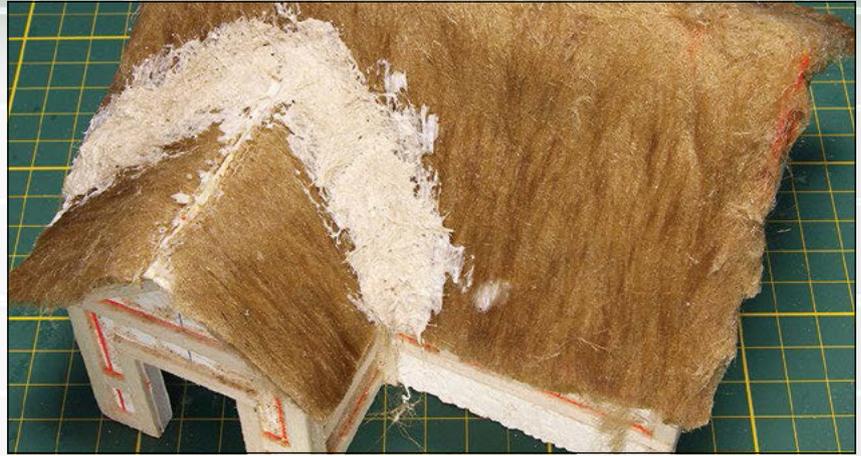
Trim a section of 'teddy bear fur' roughly to size allowing an overlap. Glue the fur in place using PVA glue. Once dry, paint the 'fur' with PVA glue, and then comb it to make it lie flat. Remember that fur has a 'grain' just like wood, so make sure that you cut the fur so that the grain runs from the apex of the roofs to the lower edges. You'll probably need to blend the two thatches together using scraps of fur heavily soaked in PVA glue.

When all the thatch is dry, trim the edges. I gave the thatch an undercoat of Dulux *Flame Frenzy 1* (similar to GW *Scorched Brown*), followed by a drybrush of Dulux *Jamaican Ginger 3* (similar to GW *Vermin Brown*), and finally a light drybrush of Dulux *Bramble Moor 3* (similar to GW *Bleached Bone*).

Over time you'll develop your own painting technique for painting thatch. Just be sure to keep a record so that the thatch on all your buildings will match!

THE NORTH AMERICAN WATERMILL

The construction sequence for this option is different to the Europoean watermill. Scale the plans to size and cut out the wall sections, but do not cut out the window apertures yet, as its much easier to cut the apertures to match the windows than the other way around!

WINDOWS
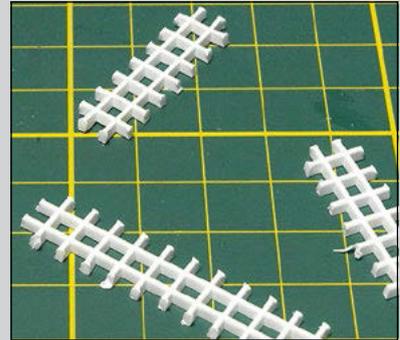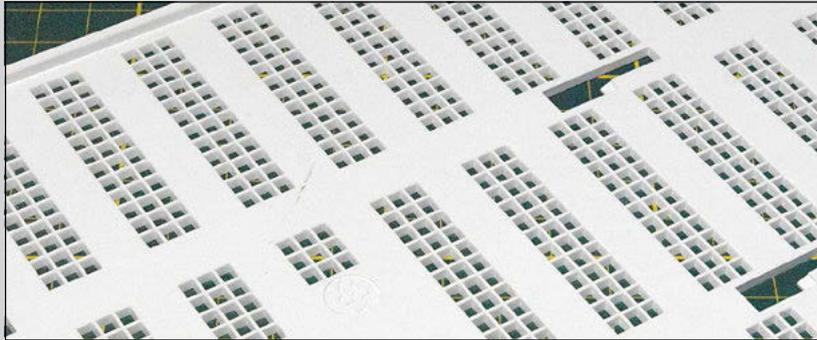
The simple option is to purchase suitable windows, ready made from a company such as Antenociti's Workshop (www.antenocitisworkshop.com). Being a glutton for punishment, I decided to make the windows from scratch. This procedure was covered in 'How to build... a North American mansion' in *Wargames Illustrated 261* (July 2009) but for anyone who hasn't read that article, I'll cover the procedure again.

Start by taking apart a plastic ventilation grill. Carefully cut out the mesh into several pieces.
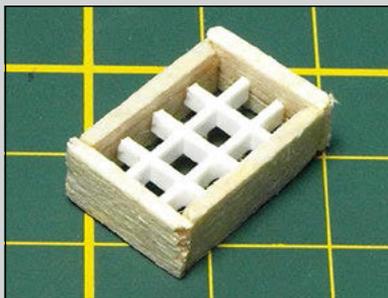

Trim the mesh as near as possible to your chosen window size. Fabricate a balsa window frame, and glue it around the mesh.
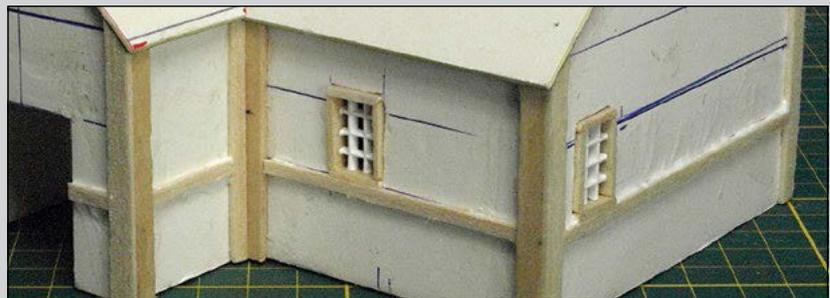
Make as many windows as required. Position each window on the relevant section of wall, trace around it, and cut out the hole and glue the window assemblies into position.

Assemble the building as described in the previous section, adding the card roof onto which tiles will be added. Note that as this building will be 'clad' with simulated timber cladding, the framing is simplified.
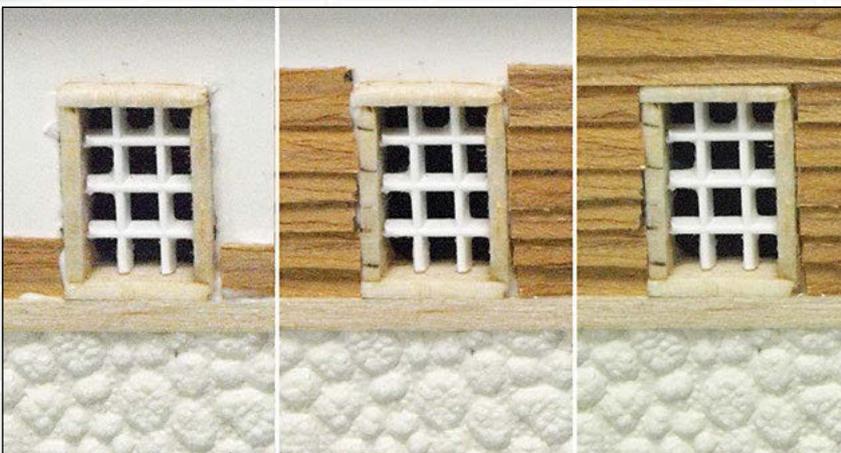
WALL TEXTURE

Wood cladding - Using strips of wood veneer, work your way up the wall adding successive overlapping strips of veneer.

Stonework - Textured wallpaper can be glued into position to simulate a stone texture as with the European watermill, but if you prefer, you can omit the 'stonework' and simply timber clad the entire building.

TILING THE ROOF

Edge the triangular roof ends with balsa strip, then glue the tiles - which were cut individually from thin card - onto the 'under roof'.

PAINTING THE BUILDING

Wood: Dulux *Dove* (a pale grey) followed by a drybrush of white.

Stonework: GW *Graveyard Earth*. The individual stones were picked out with GW *Desert Yellow* and finally drybrushed with GW *Bleached Bone*.

Roof: A basecoat of black followed by a drybrush of Dulux *Slate Grey* and finally a very light dry brush of Dulux *Dove* to highlight the edges of the tiles. The doors were then added and the waterwheel slid into position.

Obviously there are many variations possible once you've constructed the basic building; for example the European watermill, could easily be 'updated' by giving it a tiled roof instead of thatch, and you could add a hoist above the upper window, or for the North American mill, you could omit the stonework and start the cladding at ground level. It really is up to you.

The idea behind the '*How to…*' series of articles is to encourage you to 'have a go'. It is extremely enjoyable and satisfying to create buildings etc., from, in many cases, materials just lying around. And it's a lot cheaper too, particularly if you need more than a few buildings! So if you've not been tempted yet, then why not give it a try?

And if there is a subject that you'd like to see covered in a future '*How to…*' article, feel free to contact the magazine, and we'll see what we can do.
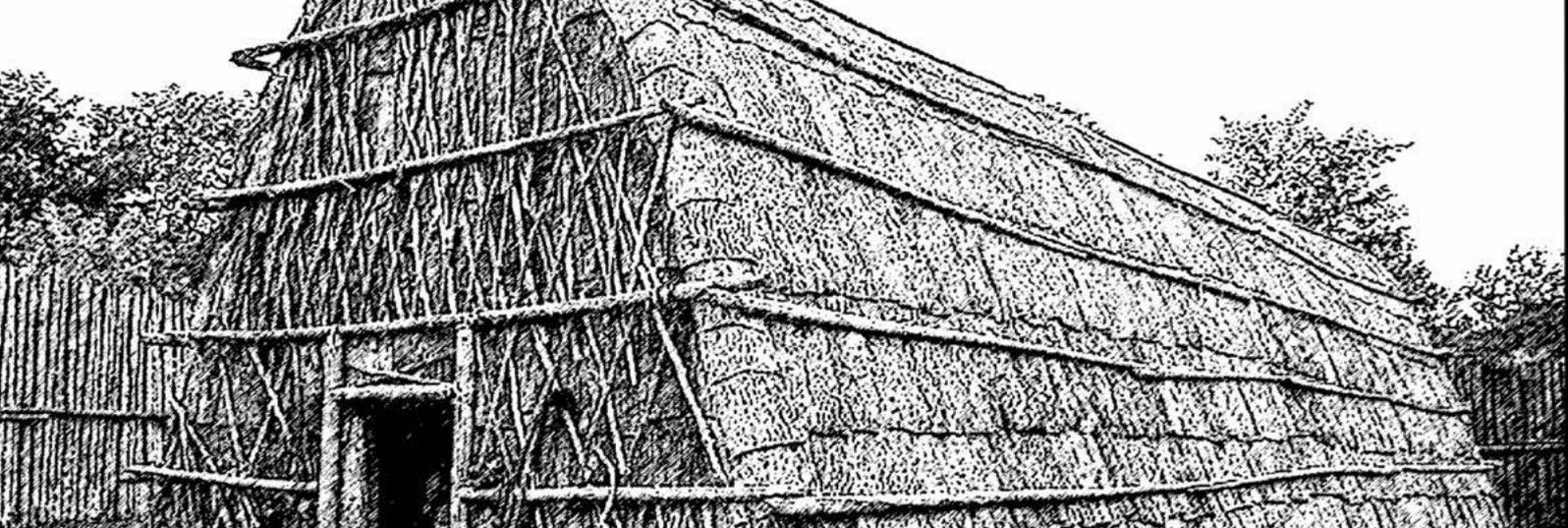
HOW TO BUILD...
A NATIVE AMERICAN LONGHOUSE

Most readers will be familiar with the teepees or wigwams associated with the Plains Indians of North America, but the native Americans of the East Coast of North America and Canada, known as the Iroquois Confederacy, or the Five Nations comprising the Cayuga, Mohawk, Oneida, Onondaga and Seneca, and from 1722, the Six Nations when the Tuscorora joined, lived in 'longhouses'.

A brief search through the internet will show that there were at least as many designs of longhouses as there were tribes in the 'Nations'. Some had vertical sides with an overhanging curved roof, others looked a little like a WW2 Nissen hut with an almost semi-circular cross section, whilst others had vertical sides a curved roof and curved ends too!

Given that the longhouses were built from natural wood and tree bark, which inevitably rotted away, the only references available from which to hypothesise about their appearance are post holes in the ground which suggest their floorplan, linked to contemporary reports and illustrations. For my interpretation I used the longhouse at *Sainte-Marie among the Hurons* as my starting point:

http://www.coolgool.nl/canada/images/ Day10/MarieHuronsLonghouse..JPG

As with any model, before you start building your longhouse, make sure that you have reference material close by.

THE PLANS

There was no set size for the longhouses. In fact they were designed to be easily extended as the family or clan expanded. Interestingly the 'groom', although he retained his own clan connection,

moved into his bride's family home, so I guess that meant he moved in with his 'In-laws'… hmmm?! Anyway, moving swiftly on.

Not so much a case of plans, really more an end profile.

Simply scale this end profile so that the opening will suit a based figure, as there's nothing looks more strange than a building with a door too small for a figure to pass through.
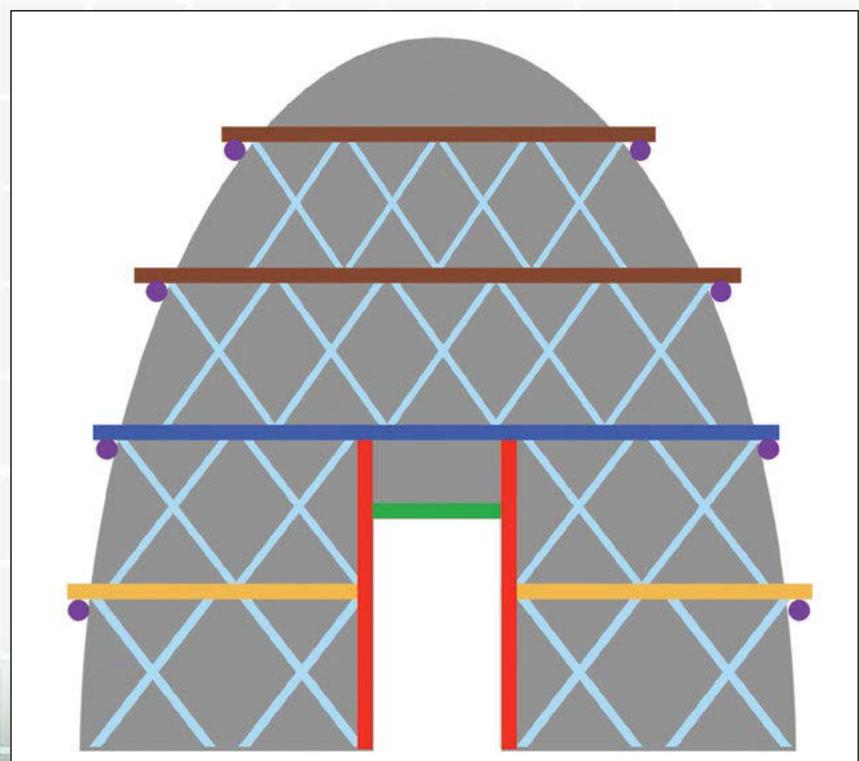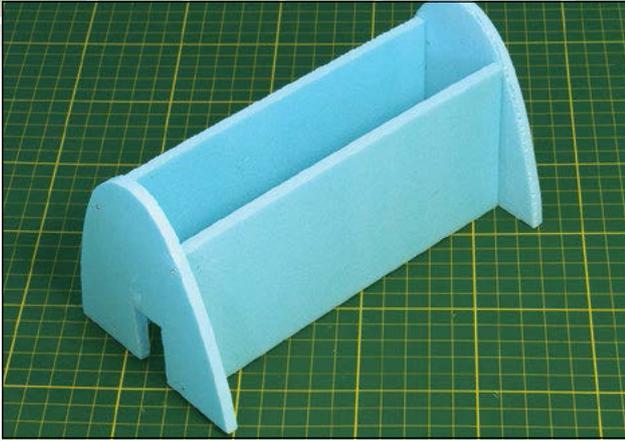
Start by creating a card template and trace this end profile onto Styrofoam or foamboard. I started off with a relatively short longhouse. Most sources agree that longhouses were approximately 20' wide and 20' high. As for their length, some experts suggest they could have been as long as 200'! But I suggest that you start off by building a short longhouse… if you see what I mean?, and then gradually build 'longer' longhouses.
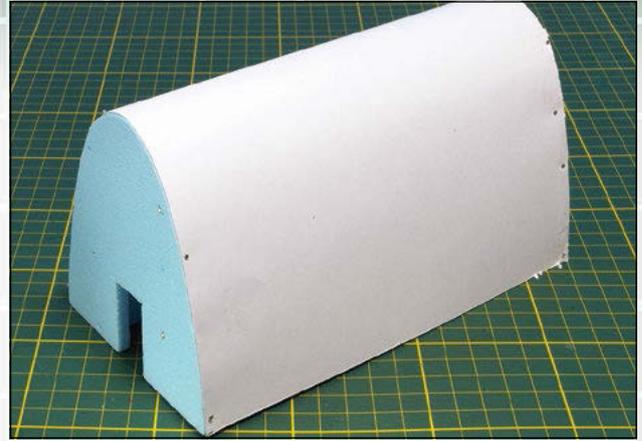
Cut two side panels to create a longhouse of the length you require. Glue the end panels and side panels together. I recommend that you use pins and glue to create a stronger construction.

Taking measurements from the model, cut a piece of thin card slightly oversize. Pin and glue it into position to create a supporting roof. Once the glue has dried carefully trim off any excess card.
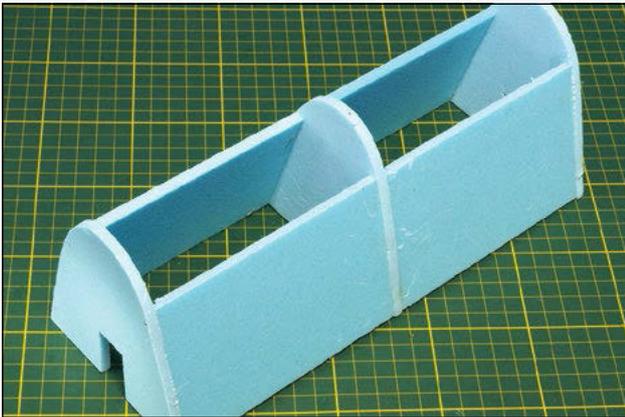

If you decide to build a longer longhouse I recommend that you start by creating a short one and then extend it so that the card 'roof' will be better supported and be less likely to distort. You'll notice that for a longer longhouse I have re-positioned the 'sidewalls' to give more support to the card roof.

To suggest the effect of the bark panels, I used crepe paper as it has an interesting texture. Another option would be to use some handmade paper as that often has a unique texture. My original plan, and that which is shown in the accompanying photographs, was to cut squares of crepe paper and carefully overlap them horizontally and vertically to create the required effect.

However, once the glue had dried, it was clear that whilst the horizontal layers retained their 'separation', the vertical separations completely disappeared, so I suggest that instead of cutting individual bark panels, just cut strips of crepe paper to the length of your longhouse and, starting at the bottom edge, glue the strips in place, overlapping each strip with the next.

Repeat the procedure for the other side. Glue a single long strip of crepe paper along the apex of the roof.

Similarly, glue crepe paper strips to each end panel.

Next give the longhouse a matt black undercoat, followed by a grey drybrush.
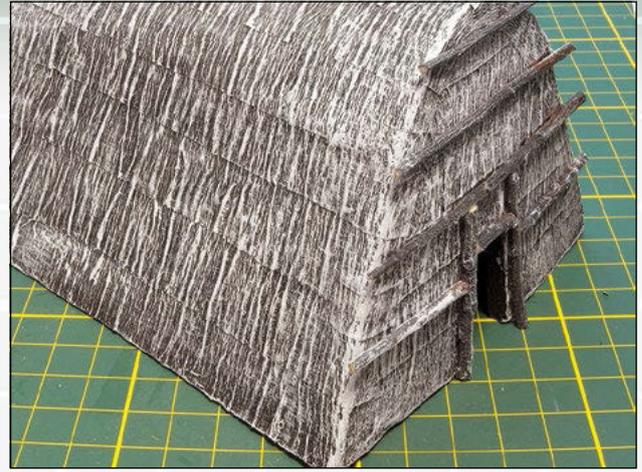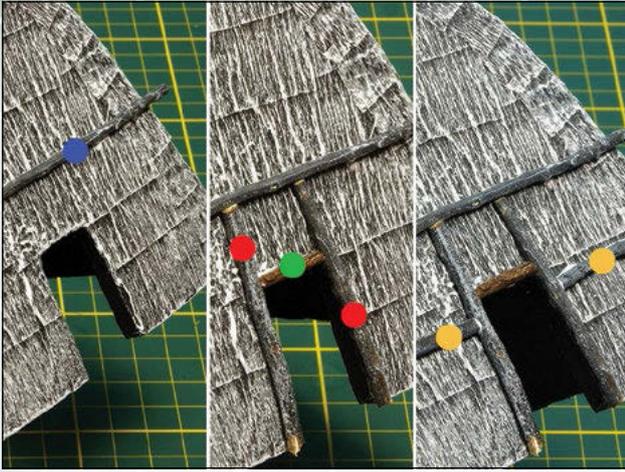
Although the bark panels were tied to inner frames, at the very least, by the upper edge, additional framing was added to hold the bark in place and prevent it flapping around in the breeze. For the model I used various thickness of twigs from plants in my garden. Unsurprisingly, you want twigs that are as straight as possible, so hunt around. Since the twigs may be slightly vulnerable, its best to paint the twigs following the same technique as for the longhouse, namely matt black followed by a grey drybrush.

If you study photographs of longhouse reconstructions you'll see that the end beams rested on top of the long side beams,

which suggests that the side beams were positioned first, but from a model making point of view, its easier to complete the end sections first.

Using your reference material and the end template as a guide, add the first horizontal beam, followed by the uprights either side of the doorway, and then the short horizontal lintel. Finally add the two horizontal beams either side of the doorway. The coloured dots (above left) refer back to the end profile plan.

Check your references then add the remaining horizontal beams on the end panel.
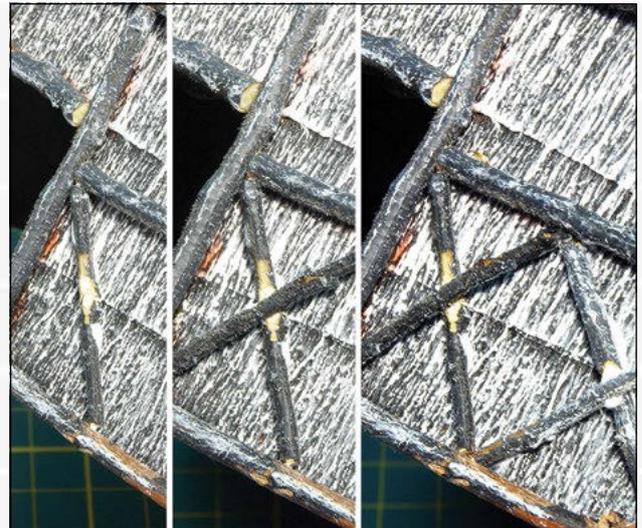
Repeat this procedure for the opposite end and then add the horizontal beams on both sides. You can either use a single beam or a series of overlapping shorter ones. Repeat for the other side. I also added horizontal beams at ground level.

In addition to the main poles, longhouses also had smaller, thinner poles that fitted between the main ones. As already mentioned there are many variations in the details of the construction of longhouses. I chose an option that featured

additional 'bracing' only on the end panels, but that's basically because I ran out of suitably dried twigs! You could continue the outer cross bracing on both sides between the horizontal beams.

Carefully trim thinner twigs to size and then position them so that they fit between the longitudinal beams. Cut or file a 'notch' in each twig at the point where the twigs cross over each other to make sure that these 'crosses' are not thicker than the horizontal beams.

REFERENCES

www.thecanadianencyclopedia.com/articles/longhouse

www.ontarioarchitecture.com/Firstnations.htm#Longhouse

http://www.coolgool.nl/canada/images/Day10/MarieHuronsLonghouse..JPG

These Woodland Indians are from North Star's Muskets & Tomahawks *range, painted by Paul Cubbin.*
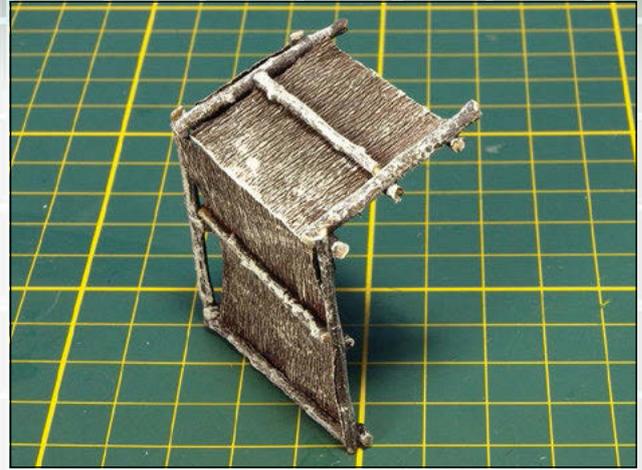
Some longhouses included a porch. I made mine using twigs to create a simple 'lean-to' framework…

…which I then covered with my crepe 'tree bark', and painted as for the longhouse.

I decided to make my porch free standing, but be warned, it is fragile, so it's probably better to base your longhouse and then glue the porch in place. Either make another porch for the other end or make a simple 'curtain' from crepe paper and glue it inside the door opening.

As already mentioned, there are many possible variations in profile, shape and length of longhouses, but this shape was one of the easiest to construct which I felt was an important consideration, particularly if you want to create a reasonable sized village.

Many villages were enclosed by a palisade, which sometimes incorporated a raised walkway. Palisades are easy, if a bit time-consuming to construct. For a guide to the basic techniques,

Wargames Illustrated 300 includes an article on constructing a North American palisaded fort which contains all you need to know, as well as suggestions for building a typical log cabin.

Even though you may not intend to build your Longhouse(s) yet, since its construction relies heavily on a good supply of twigs, its worthwhile collecting suitable material when you can, because you can bet your life that when you want some twigs you'll be unable to find any!

HOW TO BUILD...
A SIEGE TOWER

PLANNING OUT YOUR SIEGE TOWER

This time we're building a medieval style siege tower, which should be equally suitable for Ancient and Medieval wargaming as well as fantasy.

Siege towers (also known as *belfries*) were first used in the 9th century BC by the armies of the Neo-Assyrian empire, and were a major feature of sieges until the introduction of cannons, which could destroy the towers before they could get close to the city walls. This now also meant that defences didn't have to rely on high walls anymore.

Similar in basic design, namely a wooden tower on wheels, siege towers came in different shapes and sizes. Some had all four sides vertical and were completely enclosed, with floors and ladders to enable troops to reach the top; some were completely open at the back, whilst others had a sloping rear back with ladders so troops could clamber up the outside.

The size of your model will be determined by several considerations: its height will be based upon the height of the battlements over which the drawbridge will be lowered to disgorge the besieging troops; the distance between floors will be dependent upon the height of a based figure; the width and depth of the tower will be controlled by the number of figures you want to fit onto each floor.

Decide whether or not you want to place figures inside the tower, and also if you want the interior of the tower to be realistically modelled. If you decide that you don't want access to the inside of the tower, then you can build the tower sides out of thick card, or even mdf, and then simply clad the outer surface.

The following plans are for a typical siege tower. It can sometimes help to build a simple card model first; just the four sides taped together, so you can adjust the dimensions to meet your requirements before starting on the actual model as it's often easier to work with a simple 3D card mock up than it is to go straight into the final model.

To save space, only one side of the tower is shown, simply reverse the image to create the plan for the other side.

Crusaders use their Siege Tower to storm a Muslim-held city. Miniatures by Gripping Beast, painted by Artmaster Studios
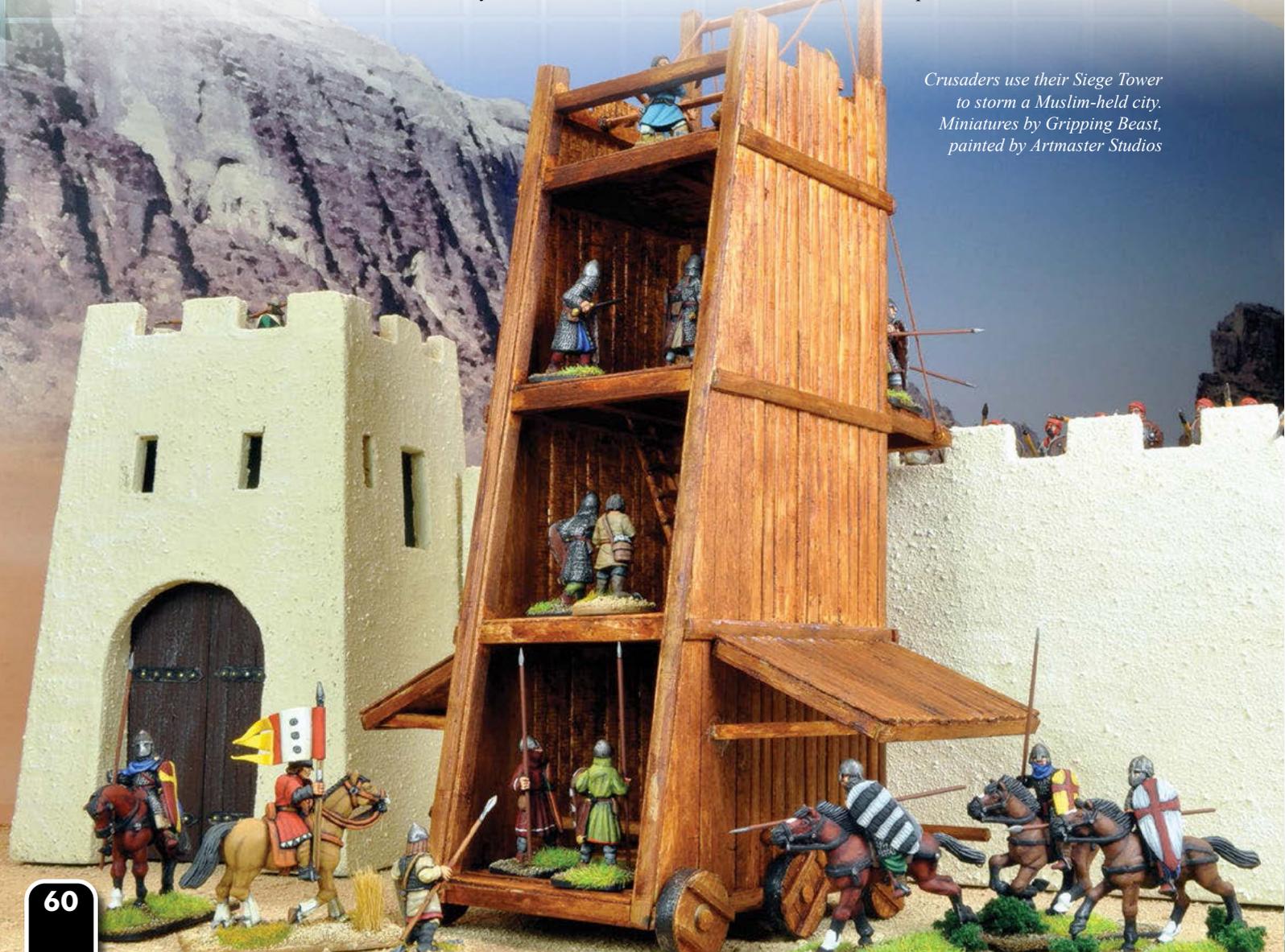
SIEGE TOWER

Plans and instructions for personal use only, and not for commercial purposes.

The cladding has been omitted to show the floors.

Wheels

Uprights

Floors

Frame for drawbridge

Upper crossbeam
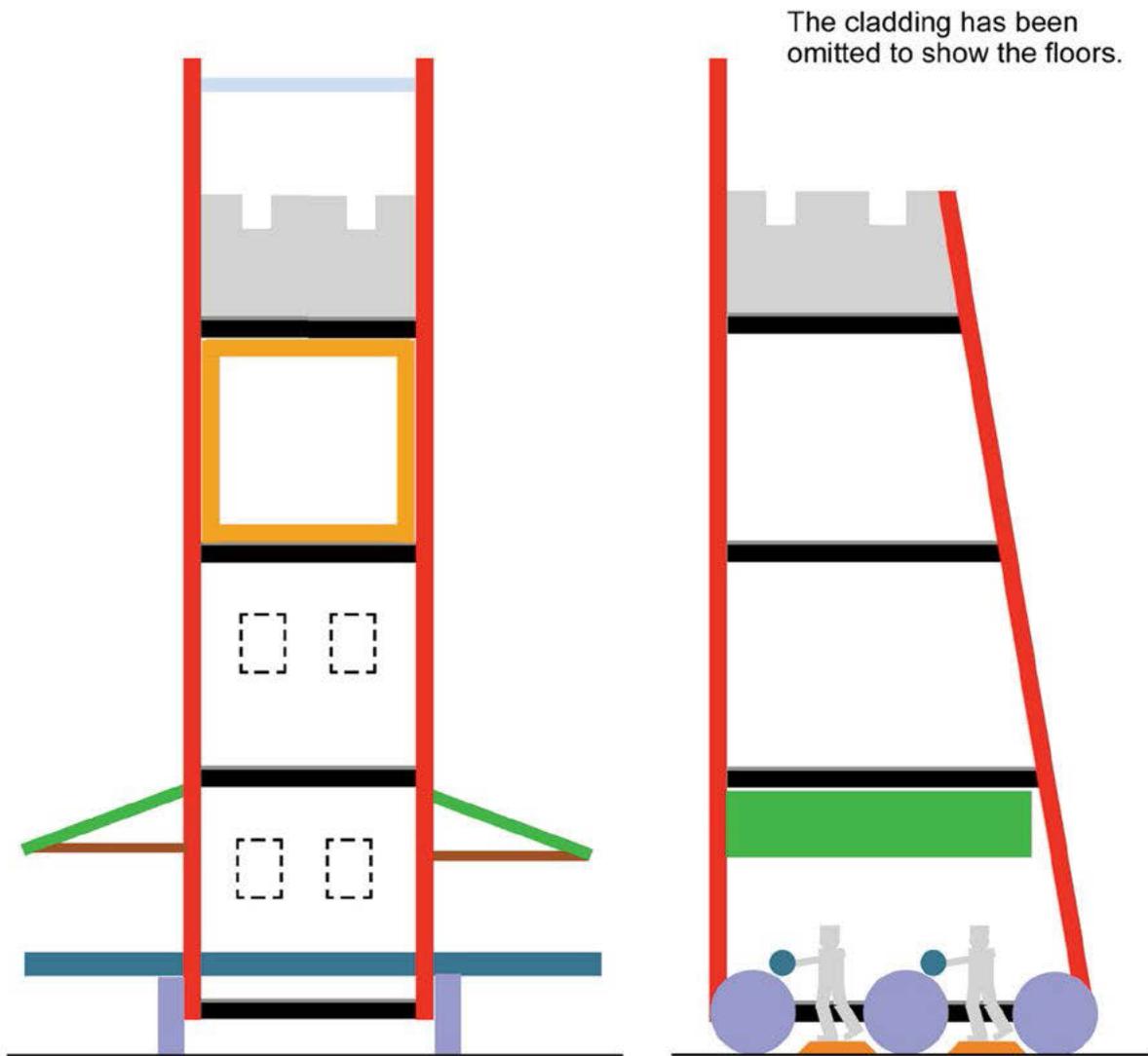
Suggested castellation

Approximate position for windows

Pushing poles

Protective roofs

Roof supports

TOOLS & MATERIALS

These should all be available from your local art, hobby, and sewing stores, failing that they can typically be found through various online vendors

- Cutting mat and steel ruler
- Sharp hobby knife
- Circle cutter
- Balsa wood (for beams)
- PVA glue and super glue
- Sewing pins
- Eyepins
- Bamboo skewers, cocktail sticks, match sticks, and stripwood (or a couple of bamboo placemats)
- Paints and brushes

THE WHEELS

It might seem strange to start with the wheels, but their size and positioning obviously affect the height of the tower and thus the position of the 'drawbridge' which, for this model was a critical consideration.

There are several options; the easiest is to buy them from Games Workshop! But if you prefer to make your own then the following steps will show you how.

• Cut out your circles from mounting board using a circle cutter.

• Cut some thin strips of balsa and, starting from the centre, glue them to the 'circle'.

• When the glue has thoroughly dried, turn the 'wheel' over and trim away the excess balsa. Push a pin through the hole in the centre made by the circle cutter to ensure that you can locate the wheel centre.

• Stick more strips in place, and again, once dry, trim off the excess.

• To make it look as if the wheel really has been assembled, add two cross pieces at right angles to the main planks and on one side of the wheel.

• Cut a strip of thin card the width of the wheel to create a 'rim'.

• Position the strip of thin card on a flat surface slightly overhanging the edge. Place a ruler across the card flush with the edge of the flat surface. Whilst maintaining pressure on the ruler, pull the thin card under the ruler and downwards. You'll finish up with a nicely curled strip of card that will wrap around the wheel, without springing back straight.

• Wrap the curled card strip around the wheel. Cut it so that the card doesn't overlap, and glue it.

THE INNER FRAMEWORK

Working from the plan, cut out the vertical front upright and the horizontal pieces from 5mm square section balsa. Pin and glue them together. I used superglue as it soaks into the balsa and makes a strong joint.

• Cut the sloping rear piece approximately to length. Rest it over the horizontals and mark where to cut.

• Trim the ends of the horizontals. Pin and glue the sloping rear piece into place.

• Trim off the pinheads. Push the pins flush with the surface of the balsa.

• Repeat the process to create the other side frame.
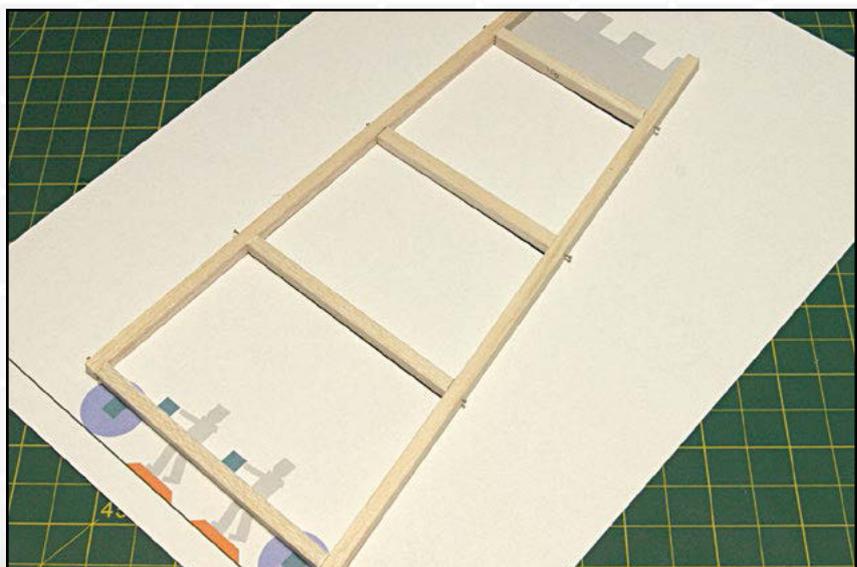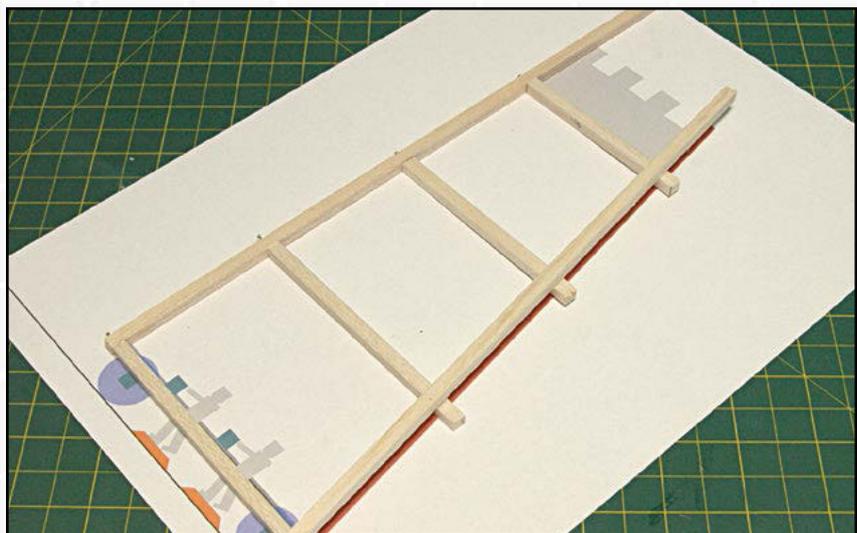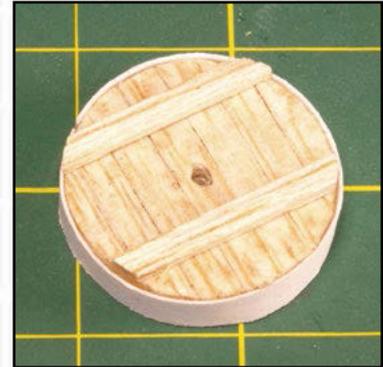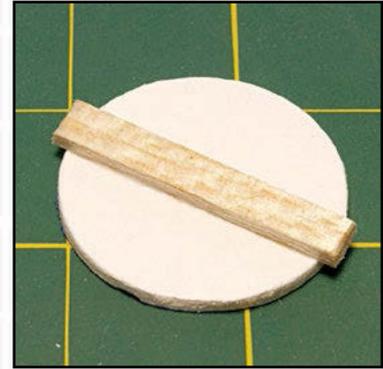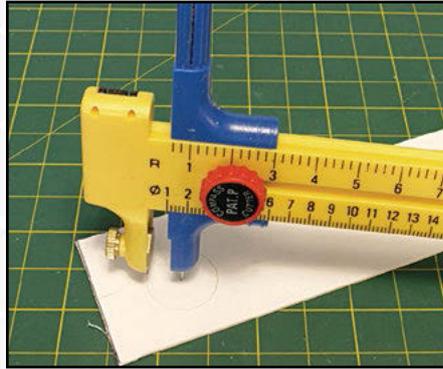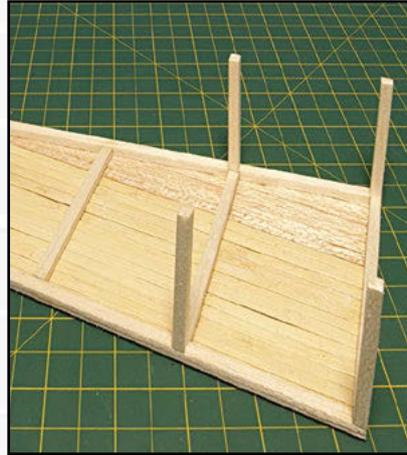
CLADDING

I used strips of wood from bamboo place mats, but you can use any strip wood, or if you prefer, simply cut a sheet of thin balsa to size and score lines onto it to represent the planks.

Starting with one side, cut the wood strips to length and glue them into place. As I've mentioned before, use the plans as your guide, but take your final measurements from the model itself. Then repeat the process on the other side.

Note: I started my cladding 'one thickness' in from the front edge, to accommodate my hinging mechanism for the drawbridge.

ASSEMBLING THE SIDES

The width of the siege tower is dependent on the basing and scale of your figures. My figures are on 20mm square bases and I wanted to get three figures side by side in the tower, so the length of my cross beams was 60mm. The cross beams themselves were made from 5mm square balsa strip which was pinned and glued in place on one side first. Once dry, pin and glue the other side to the cross beams.

THE FLOORS

Before fixing the floors in place, decide how realistic you want the interior of the siege tower to look. If you just want floors on which to position figures, fair enough, but I wanted ladders too, so I needed to allow for access holes in each floor, which meant adding a further beam to support each floor. I then "planked" the floors using strips of bamboo glued onto the side supports and cross beams.

THE BACK

If you decide to build a back, cut a piece of thin balsa or plywood that fits onto the rear edges of the side frames and then stick a cross piece of balsa near the top of the back panel on the inner side which will rest on the upper floor.

THE DRAWBRIDGE AND FRONT

The drawbridge is a balsawood frame, which fits inside the frames and support beams. Take your measurements from your model.

To create the hinging effect, I positioned the drawbridge frame, then pushed pins through from the outside of the frames… you can see now why I didn't clad the first 5mm or so of the uprights!

Next, "plank" the drawbridge, and clad the front of the tower at the top, creating a castellation similar to that on each side.
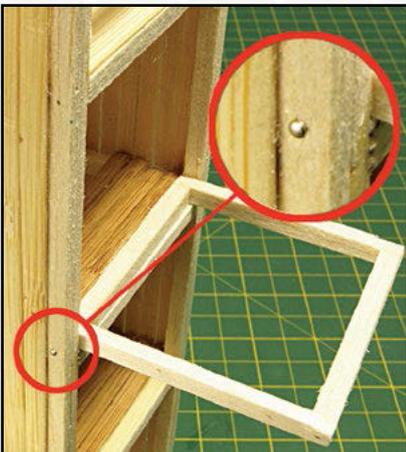
DRAWBRIDGE MECHANISM

The components for the operating mechanism are a pair of 'eyelets', a thick wooden barbeque skewer, and some thinner cocktail sticks.

First create the main shaft. Cut a length of barbeque skewer to fit between the two side supports of the tower. Next drill two holes at right angles to each other through this beam. Cut four short lengths of cocktail sticks as the handles. You must ensure that the handles are not too long otherwise they will catch on the floor! Depending on the thickness of your main shaft and the handles, you may need to file down the ends of the handles slightly.

Glue the handles into place. Once dry, slide the eyelets onto opposite ends of the main shaft, and position the shaft assembly in place. Apply superglue over the eyelets. Once the beam is firmly set, drill two holes through the main shaft for the 'rope' that will be used to raise and lower the drawbridge. If you prefer you could drill these two holes before assembling the winch, but I just found it easier to do so with the assembly in its final position. Cut a length of wooden rod and glue it between the siege tower uprights.

To complete the drawbridge assembly, you need a ring on either side of the drawbridge through which you'll thread the rope to lift it. I found some 'eyepins' in my local craft shop. Cut the pins down. Coat the ends with superglue and push them into the sides of the drawbridge.

ADDING THE WHEELS

Carefully drill through the centre of the wheel. Put each wheel in position in turn and drill through into the lower frame of the siege tower. Position the wheels so that the join in the card rim is at the bottom of the wheel. Push pins through the wheels and completely through the side frames and glue a small bead on the end. If you're very careful when gluing, the wheels should turn, but I NEVER bother with this for models intended for wargames use, and prefer to glue the wheels in place, the pins simply adding more support. When the glue has dried, snip off the pin ends. To make the wheels look more 'interesting' I added some 'hubs' from small circles of card made using a hole punch.

LADDERS

I've covered making ladders before (See *Wargames Illustrated* 258 – April 2009, "How to… Build a Desert Fort), but basically they're made from lengths of wooden rod for the sides with thinner pieces glued in place for the rungs.
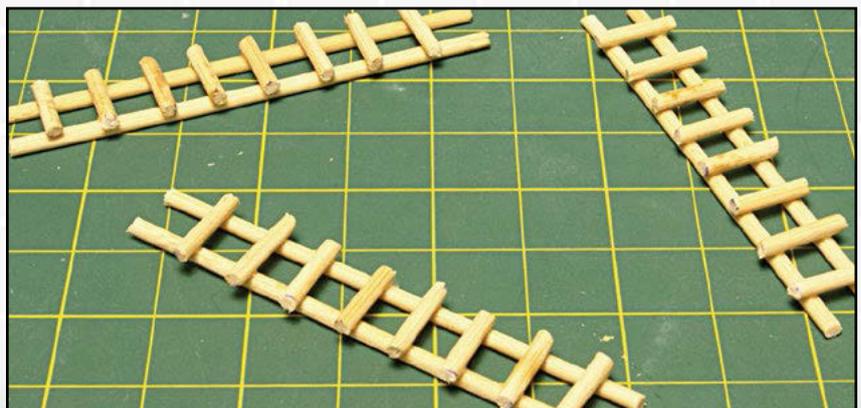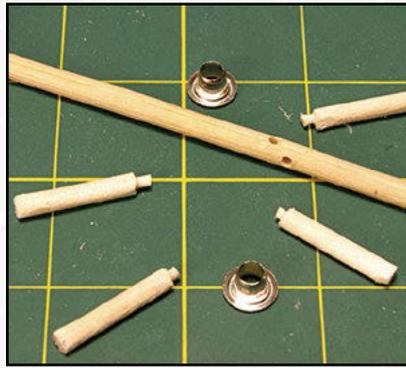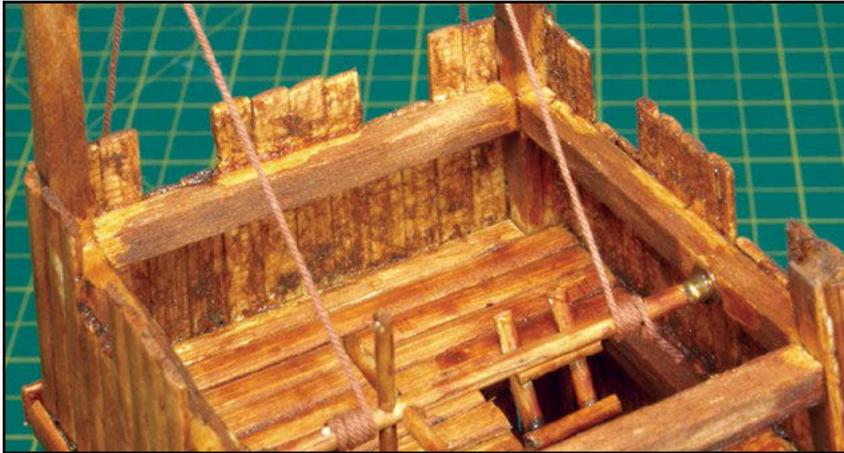
ADDING THE ROPE

I left adding the rope until the end because I didn't want to risk getting wood dye or glue on it. Pass a length of thread through the holes in the winch, over the beam and through the rings on the sides of the drawbridge. Then knot it and trim off any spare string. Repeat on the other side.

If you've followed the instructions (and been careful applying glue), the winch handles WILL work, but to be honest I'd suggest that you simply rotate the centre shaft itself which will put less strain on the handles.

PAINTING THE BEAST!

If I use real wood for a model, I prefer to use wood dye instead of paint. For this model I used Dulux Antique Walnut Quick Drying Interior Wood Dye. The actual colour of the wood would probably have varied. A short siege and the timber would have looked freshly cut, whereas for a long siege the wood would have weathered considerably. In the latter case I would go for a really dark colour and then drybrush it with grey paint. I painted the card rims of the wheels black and drybrushed them with GW's Boltgun Metal.

SO, HOW DID THEY PUSH SIEGE TOWERS?

Some references suggest that the attackers stood behind the tower and pushed; others that there was no lower floor and troops inside the tower pushed it along. Another option was that there were long poles that passed right through the tower and out the opposite side and troops pushed against them to propel the tower forward. I chose the latter option.

Mark out the position for the poles. Drill the holes and slide a thick length of wooden rod through. You just need to get the holes the right height so that it looks as if your figures could really be pushing against the pole.

If you choose the 'pole' option, there's the question of protecting the 'pushing' troops! One suggestion is that a 'roof' projected from the tower sides to offer at least some protection. I don't know how historically accurate the film *Kingdom of Heaven* was, but it did feature siege towers with these projecting roofs. So, without any unequivocal historical basis, I decided to build some roofs anyway. Simply create a frame from balsa, and clad it in the same way as the drawbridge.

Position the roof against the model and decide the angle that looks right. Cut two supporting beams from square section balsa for each roof. With the tower on its side, superglue the roof into position and then add the support beams.

You should have now completed a generic siege tower that will be as equally at home in historical games as fantasy!

Obviously there is more that you can add to your tower. Sometimes the front and sides of siege towers were covered with animal skins soaked in water to reduce the likelihood of the tower being set on fire. My tower, however, was to be used in the desert and the chances of there being 'spare' water seemed unlikely. There were cases of towers being covered by shields, so that's a possibility. But if you decide to go for the 'animal skins' option, then buy an inexpensive chamois leather, (the type used for washing cars). Cut it into small rectangular pieces and glue it to your tower!

# HOW TO MAKE...
A DUTCH WINDMILL

**BUILDING A WINDMILL FROM HOUSEHOLD SCRAPS By Dave Taylor**

I was asked by the WI team to build a windmill in the distinctive Dutch style, using materials that are quite easy to get hold of and that most wargamers might have lying around their homes. Research involved looking at quite a lot of Dutch windmills online and tinkering with various sizes and shapes. The final result here is an amalgam of a few designs that can be found across The Netherlands and would've been in use during Operation Market Garden.

Building one of these beasts can take a bit of time and building a few might take the better part of two weeks for a single hobbyist. Our recommendation is that, with the help of a dedicated group working in a production line-style, a handful of windmills can be cranked out in a weekend. Imagine how great these would look scattered across a number of gaming tables for a fantastic themed event or "Firestorm" campaign season!

TOOLS & MATERIALS

- Cardboard boxes (cereal, soft drink/ soda, etc.)
- Masking tape
- Super glue
- Pen (BIC pens work best, but any round pen with a long end cap will do)
- 3x3mm Bass (or Balsa) wood strips
- Paper clips, florist's wire or brass rod
- Matchsticks (or thin dowel)
- Hobby knife
- Cutting mat
- Clippers
- Razor saw
- Scissors
- Pin vise drill

- Steel ruler
- Pencil
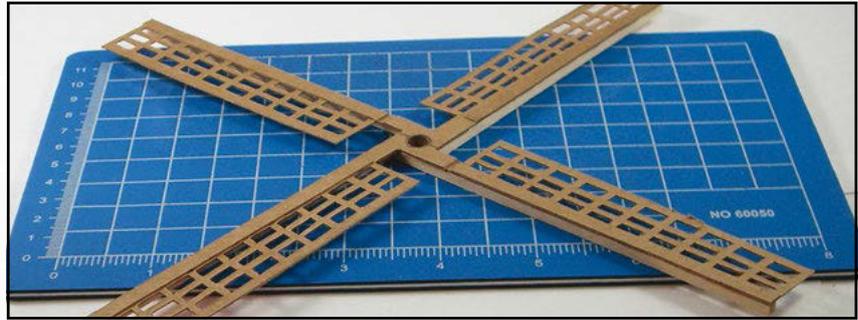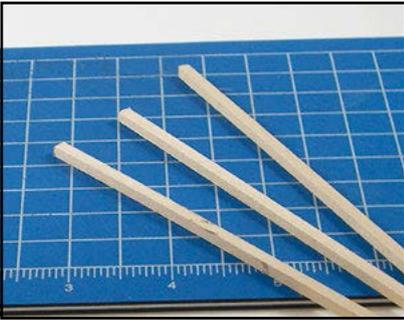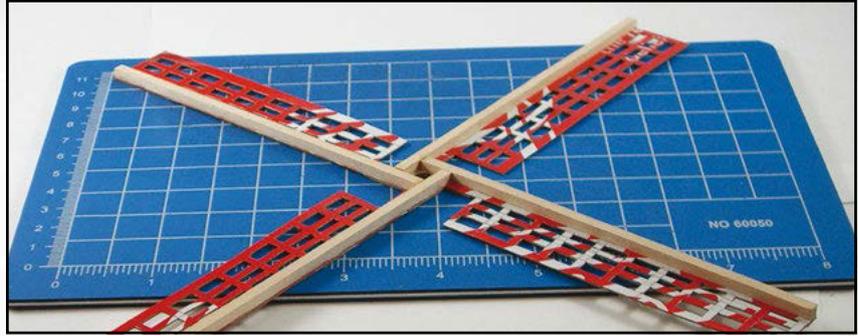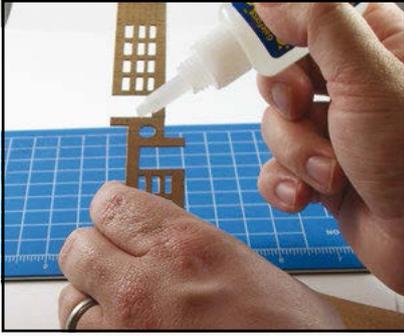
• Once you have cut out the two sail sections, glue them together at right angles. Make sure the hole is the same diameter as your pen's end cap.

• Cut four strips of bass wood to length.

• Glue the bass wood strips to the back of the sails.

• Glue the facing strips to the front of the sails. These strips will represent the folded sails.

The windmill was originally designed for 15mm scale games, and the templates here are shown at 50%. Photocopy them at 200% to produce templates at the correct size. The windmill can also be built in 25-28mm scale by photocopying the templates at 350%.

A full-size PDF of the 15mm templates will be available on the *Wargames Illustrated* web site.
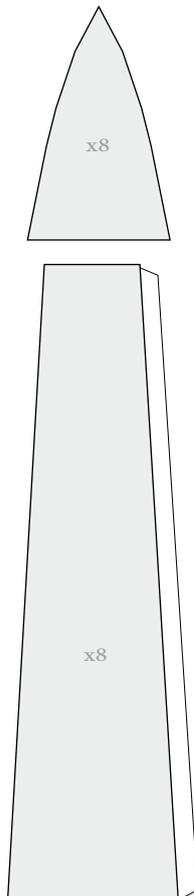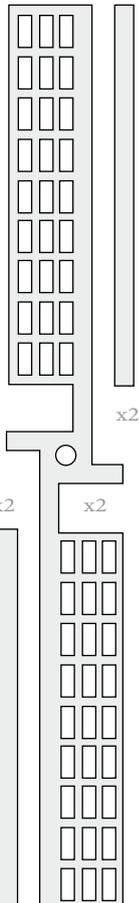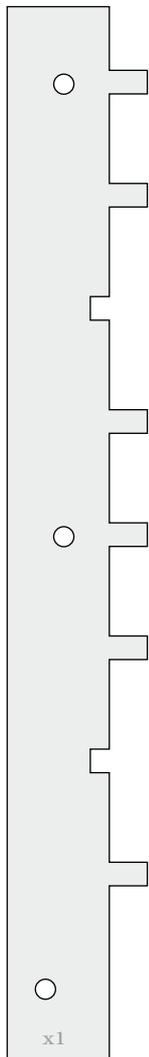
x4 — *Wooden sail spar*

x1 — *Roof cross-beam*
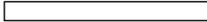
x1 — *Rear cross-beam*

x1 — *Rear vertical spar (centre)*

x2 — *Rear vertical spars (sides)*

x2 — *Long outer beams*

x2
x2
x8
x8
x2
x2
x1
x1
x2
x1
x1
x2
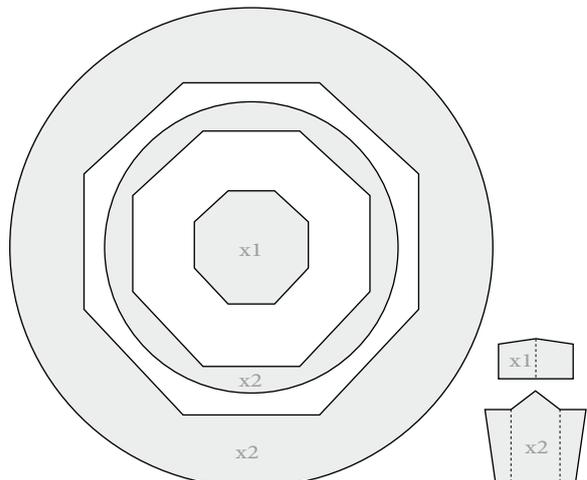
• Trace the tower sides onto your thin cardboard. Wherever possible you should draw the shapes touching each other. This will help with structural integrity later on.

• Carefully cut out the tower sides, eight in total. Where you were able to keep the sides connected, carefully score the line between the pieces.
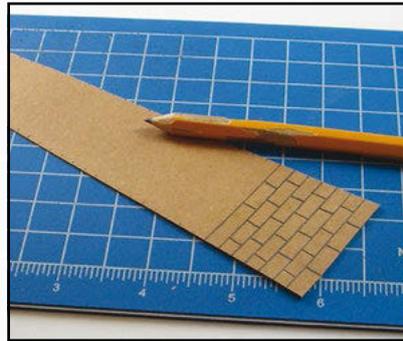
• We recommend that you stop at this point and add detail to the tower sides. By adding a stacked brick pattern you can paint your windmill up as either a brick structure or a structure covered in wooden shingles. This is achieved by drawing on the tower sides with your pencil. Be sure to press hard so that the design is obvious once the windmill has been primed.

• To attach the separate pieces of the tower sides together, use thin strips of masking tape. Use the masking tape for the final connection to create the "conical" tower shape.

• Trace out the circular pieces for the observation deck. To save materials I also cut the circular pieces for the cap from the center of the observation deck pieces.
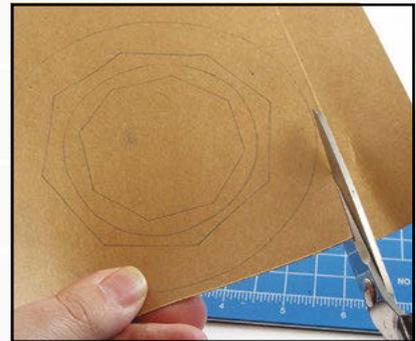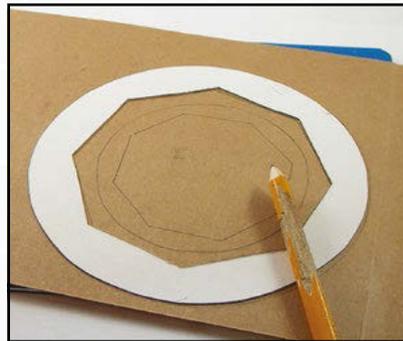
• Carefully cut the observation deck pieces from the cardboard. We recommend scissors for the circular cuts and a very sharp hobby knife for the straight cuts.

• Use super glue to join the two pieces of the observation deck together. Super glue will give you a more instant result than PVA glue as well as forming a stronger bond between the layers of colorful glossy coatings typically found on cereal and soft drink boxes.
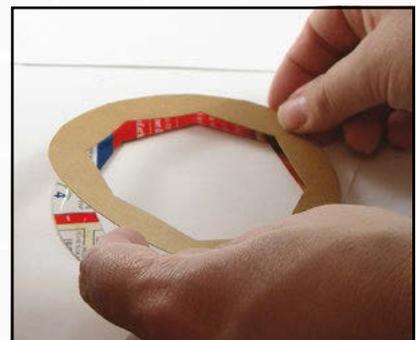
• Be very careful when lining up the two pieces of the observation deck. Two pieces are used to provide additional strength and integrity.

• Slide the observation deck down the tower until it is level on all sides (the pattern you've drawn on the tower will help with this). Once it is level you can glue it into place using super glue. Be very careful as you let this dry that you don't bump the deck. Once dry, this will really help with the structural integrity of the windmill.
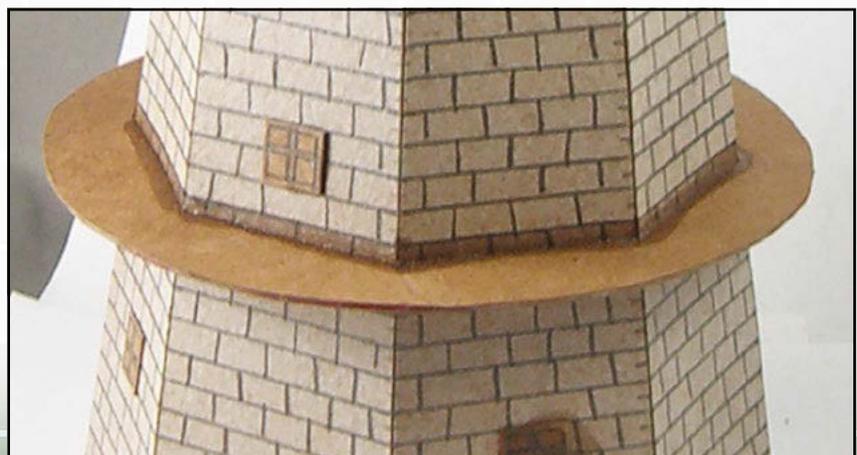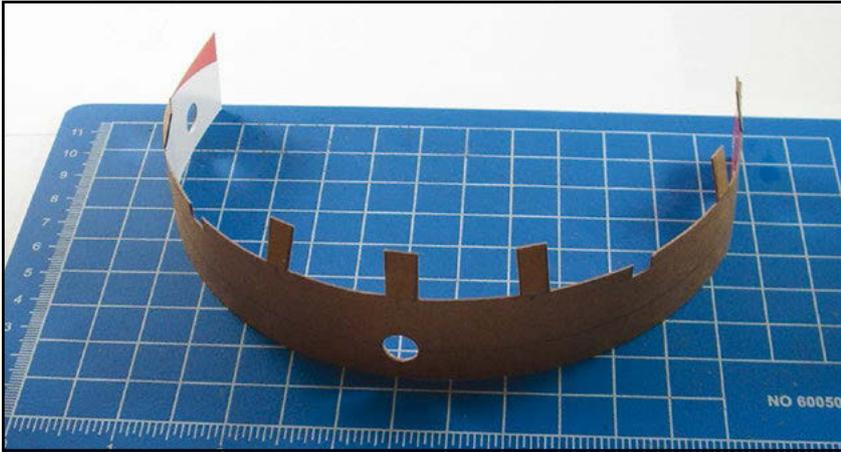
• Cut out the cap rim section carefully and cut holes in the indicated places. The holes should be the width of the pen used in the next stage, so check this if you are building the windmill in a different scale. Thread your pen casing through the holes in the cap rim to help you determine where to cut the pen. leave around 5mm at the rear of the cap and around 25mm at the front.

• Carefully cut the pen casing with your hobby saw. Make sure you keep the end cap as you will need this later!

• Cut out and glue together the two circular cap pieces in the same way as the observation deck. Once these are dry glue the cap rim in place around the edge. By threading the pen casing through you have something you can rest the circular pieces against while the glue is drying.

• Cut out the eight cap panels. Stop at this point to draw on the roof shingle pattern as you did with the tower sides.

• Connect the cap panels together with masking tape. As the sides of the panels are curved, you'll need to bend the panels before taping them.

• To strengthen the cap run super glue along the joints between the panels. Once the glue has dried, cut out small sections from two opposite panels to accomodate the pen and two 5x5mm holes for the wooden spars and then glue the cap to the tabs on the cap rim. Finish this section by attaching the octagonal roof top piece.
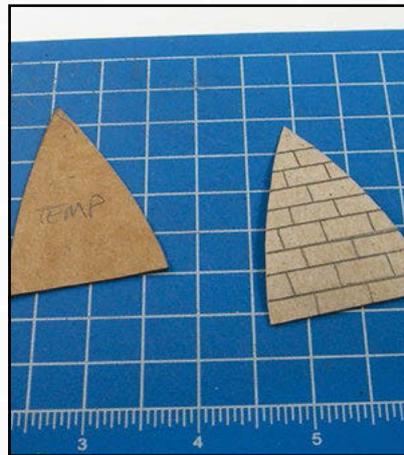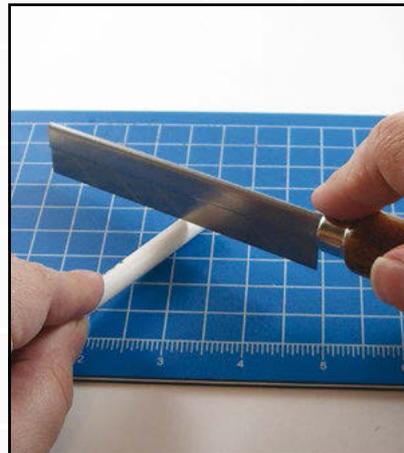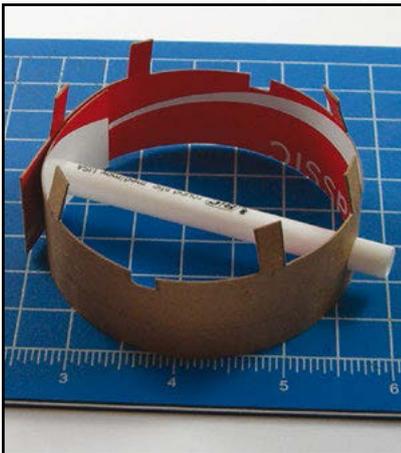
THE DETAILS

• Carefully cut the sections from the two observation deck railing pieces.

• Glue the strips together with an overlap.

• Glue the other end of the observation deck railing together. As the size of your deck may vary slightly, size the railing carefully by wrapping it around the windmill to determine the right place for the final position. Once you have it in the right spot and the glue has dried, glue the railing to the observation deck.

• Cut out the door and small roof section to make the main entrance, and cut a second door piece – using only the centre section – to make the upper level door. Cut out some small squares to add windows.
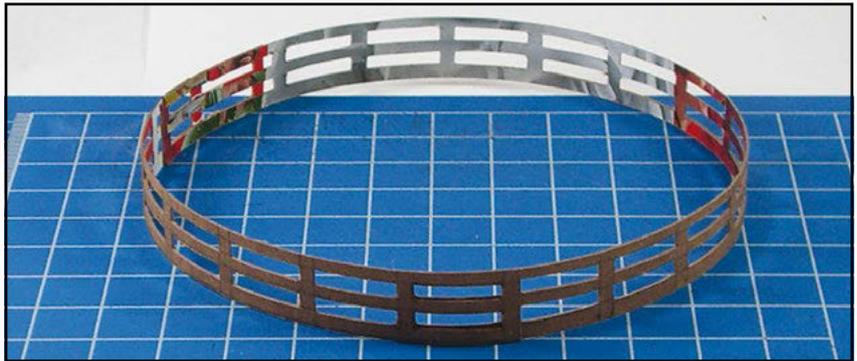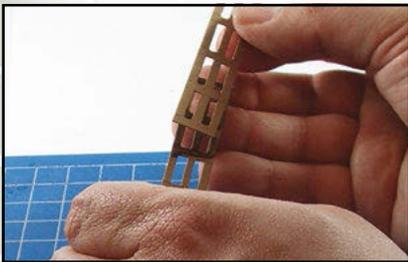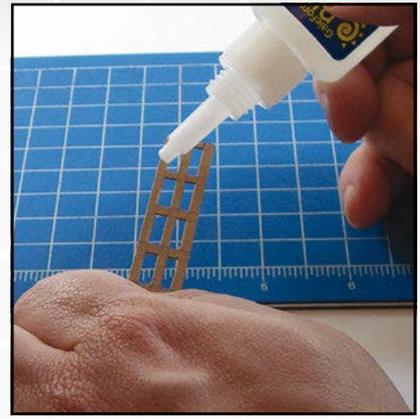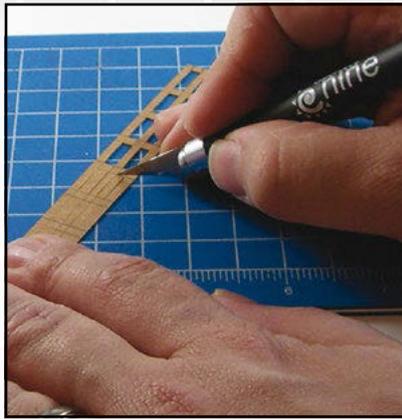

THE SPARS

The wooden spars really are the stand-out feature of Dutch windmills. While they can be a bit fiddly to get right, the final result will be more than worth it.

• Cut a 140mm piece of bass/balsa wood and shave down each end. Drill a hole through each of the thin sections. Thread this through the roof section with the cut sections facing the rear and glue in place. Cut another small piece and glue it into the pen at the rear of the windmill, leaving about 10mm sticking out.

• Cut a 55mm length of wood and shape the ends in the same way as the previous step. Cut out a section in the middle as well, and drill all of these.

• Cut the following lengths of balsa: one 85mm, two 95mm and two 135mm. Trim down one end of each and drill both ends.

• Using lengths of wire, pin all the pieces together. Start by attaching the smaller shaped crosspiece to the section glued into the pen, and hang the shorter sections off this. Hang the longer pieces off the ends of the long crosspiece, then wire all of these together at the base. Glue all the hanging pieces and the small crosspiece together, but do not glue anything onto the rear of the windmill or the large crosspiece until they are all painted.

PAINTING THE WINDMILL

Using a black spray primer, undercoat the windmill in sections. Keep the main building, the sail assembly and the spars assembly separate until they are painted.

All colors listed are Vallejo paints.

• Drybrush the black sections with Black Grey then pick out the edges of the shingles with Cold Grey.

• Basecoat the brown sections with German Camouflage Medium Brown, then wash with Brown Shade. Lightly drybrush the shingles with German Camouflage Medium Brown and highlight with German Camouflage Pale Brown.

• Basecoat the white sections with Stone Grey and then paint with White. Paint in the lines of the shingle pattern with Stone Grey. Use the same colours for the window, door frames and railings.

• Basecoat the green doors with Russian Green and highlight with a mix of Russian Green and Khaki.

• Paint the window panes Black and then paint over with Gloss Varnish.

• Basecoat the wooden sail spars with Buff and highlight with a mix of Buff and White.

• Use German Camouflage Black Brown to paint the sail frame and drybrush with German Camouflage Pale Brown.

• Basecoat the folded sails with Buff and highlight with a mix of Buff and White. Add slashes of German Camouflage Black Brown highlighted with German Camouflage Pale Brown to show the ties.

• Paint the wooden spars assembly using the same colours as the folded sails.

• Once the main building is painted add thin supports beneath the observation deck. Cut a number of thin pieces of dowel or matchstick 20mm in length and angled at each end (If you are copying this one exactly you will need 32 supports!). Painted these black, and glue into place under the deck.

• Finally, assemble all the painted sections. Pin and glue the wooden spars to the main body of the windmill, and paint over the wires. Push the end cap of the pen through the sail assembly, and into the pen; this should fit snugly, but still allow the sails to turn.

CONCLUSION

So there you have it, a Dutch windmill built from materials most wargamers should have around the house (either in their hobby room or the pantry). A great addition to any Operation: Market Garden battlefield.

HOW TO BUILD...
BATTLEFIELD DEFENCES

INTRODUCTION

This *'How to…'* dives into the world of battlefield defences. From the early days of mimicking natural terrain features (stakes dug into the ground) through to using wicker tubes filled with earth (gabions, used to form great earthworks). Man has always sought to use the materials and knowledge available to weaken his enemies and boost his own strengths.

Through careful (or sometimes hasty) application, the defences described in this article stood the test of time and many could still be found on the battlefields of the late 20th Century.

CONSTRUCTION NOTES:

• Although the Stakes appear first in the article, you could actually save them until last and use the offcuts from the Gabion and Chevaux-de-frise projects.

• I have painted the wood using dark and light greys to simulate weathered wood, and based the models to match my table.
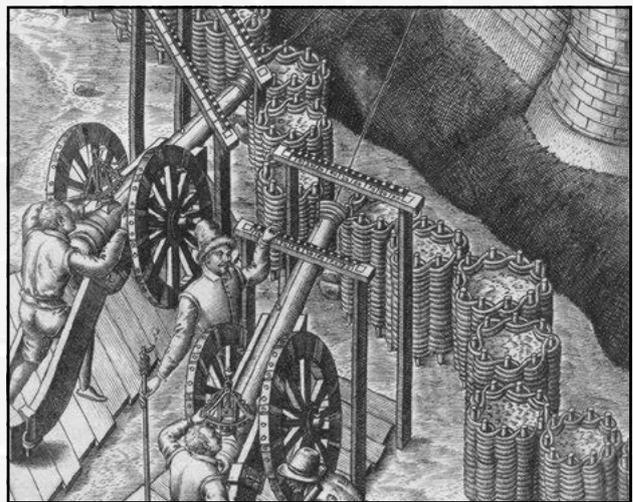

*Above: Gabions with cannons from an illustration circa 1588.*

STAKES
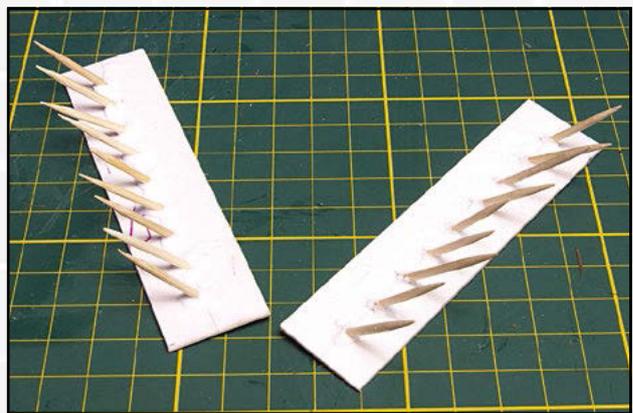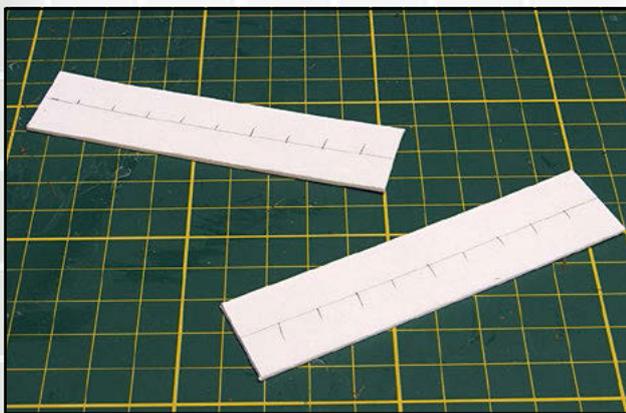
• Make a suitable sized base from mounting board. Draw a centreline and mark on it the position of the stakes.

• Drill the holes at approximately 45º. With the holes drilled, use cocktail sticks that have been cut in half and give the blunt end of the cocktail sticks a good coating of PVA glue (white glue) and push them into the holes.

• Once thoroughly dry, place the base onto a sheet of sandpaper, and carefully sand away the ends of the cocktail sticks that protrude through the base. Glue sand on the bases then paint the bases and 'wood' spikes. Finally add clumps of static grass or flock to match your tabletop.

Chevaux-de-frise (singular: cheval-de-frise), were originally devised as cavalry obstacles in the Middle Ages, but were also used as movable roadblocks and comprised a thick horizontal 'beam' through which were inserted, at right angles, thinner pointed spikes. The name means 'Frisian horse' and derives from the fact that the Frisians had no cavalry of their own with which to tackle that of their enemies, and so they created their own defence against them; the chevaux-de-frise.
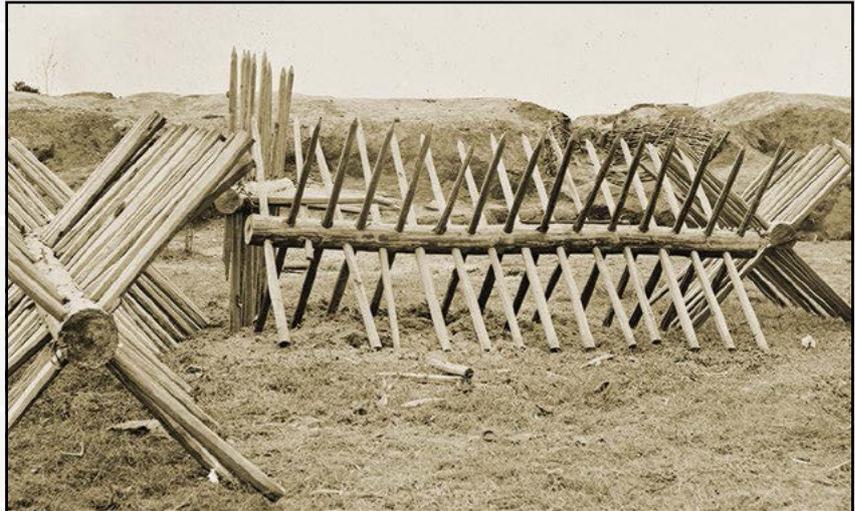
*Right: Chevaux-de-frise.
American Civil War - Petersburg.*

I used an 85mm length of 5mm square section balsa for the beam. The 'spikes' are cocktail sticks.

• Drill a series of holes through the beam to match the diameter of the cocktail sticks. Each hole should be at right angles to the adjacent one.

• You can either leave the horizontal beam with a square cross section, or round off the edges slightly.
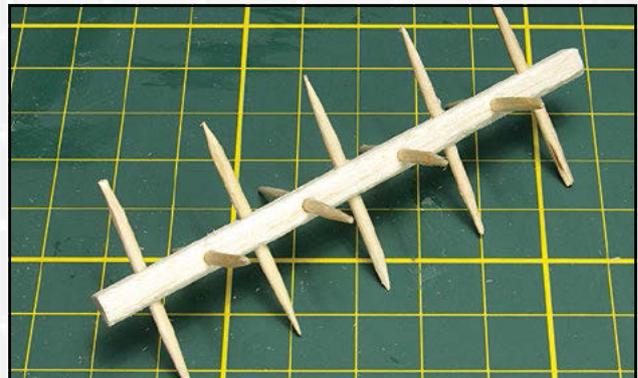
• Cut the cocktail sticks to length, mine were 35mm. Keep all the offcuts to use when building your rows of stakes (see opposite).

• Sharpen the trimmed end. Squirt PVA glue into each hole. Slide the cocktail sticks into place. Wipe away excess glue.

• Let the glue dry, then paint your chevaux-de-frise.
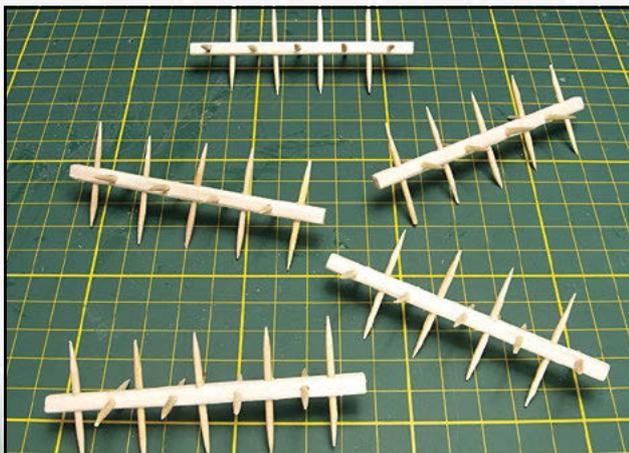
FASCINES

Fascines were used for strengthening defensive works, and filling in ditches so they could be crossed.

Right: Churchill AVRE (Armoured Vehicle Royal Engineers)

'Brushwood screening', from your local garden centre is ideal for representing 'fascines'. One pack should satisfy your wargames fascine and fencing needs for years!

• Decide on the length and 'thickness' of your fascine. Hammer two nails into a piece of scrap wood. The distance between them is the maximum width of your fascine. Using the intended length of your fascine as a guide, hammer in another pair of nails. The distance between the first and second pair of nails should be the length of your fascine less about 25mm.

• Cut two lengths of linen thread. The longer the thread, the easier it is to tie it up. Lay the threads onto the wooden template. Cut off some brushwood screening. Slide it between the nails.

• Pull the threads tight around the 'fascine'. Knot them and drop a blob of PVA on the knot. I decided to add a third thread in the centre of the fascine to make the 'bunching' a bit tighter.

• Once the glue has dried, trim off the excess thread.
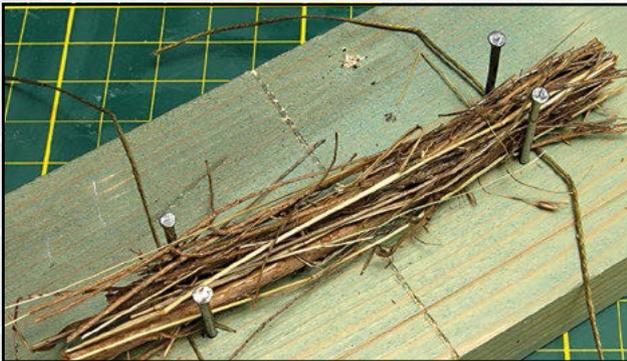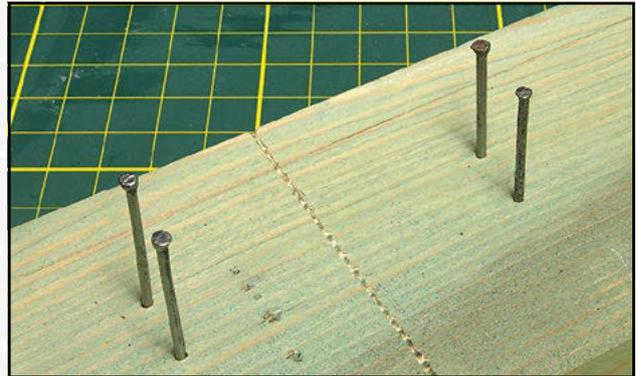
BRUSHWOOD FENCES

Not much of a defence, but useful for keeping the livestock.

• Make a base from mounting board. If you're intending to use the brushwood fence for an enclosure you'll need some corners. Either make each corner as a single component, or cut the end of some bases inwards from the outer edge at 45º, so you can combine two to make a corner.

• Use cocktail sticks for the vertical posts, trimmed to size. Once again, keep any offcuts!

• Drill pairs of holes into each base so that the uprights are a tight fit and glue them in place.

• To reduce the risk of the base curling, paint the underside of the card with PVA. When thoroughly dry, apply PVA glue to the upper surface of the base(s), and sprinkle on fine sand.

• Paint the bases followed by the 'wood' uprights.

• Cut lengths of brushwood and slide them between the uprights. Drip superglue on top of the brushwood and between the uprights. Trim off any excess brushwood.

• Finally paint the base with patches of PVA glue and sprinkle on your flock. Remember, if the fences are being used to enclose animals, there probably won't be much 'grass' on the inner edge of the bases (because the livestock will have eaten it!).
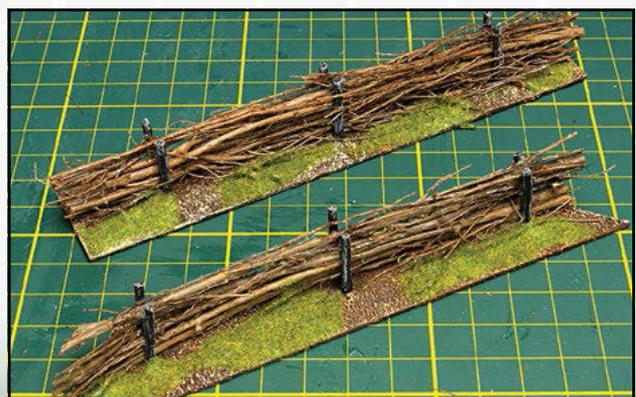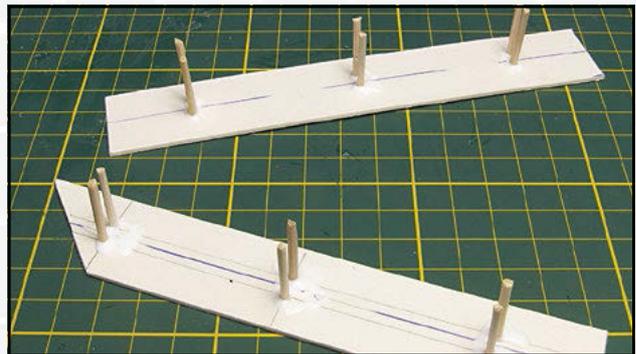
GABIONS

*Gabions were open-ended cylinders of basketwork, which, when filled with earth or sand, were musket and bullet proof.*

The gabions are made by weaving material around a series of cocktail stick uprights. Decide upon the diameter of your gabions. For 28mm figures mine were about 18mm. The height depends on their intended use. If figures are to fire over them, then the gabions will be lower than if they formed a defence behind which your troops will hide.

• Draw a circle to the diameter of your gabion onto a piece of mounting board. The number of uprights is really up to you. Just remember that there should be an odd number. I decided on 9, so the circumference of the circle had to be divided into nine 40º segments using a 360º protractor.

• Drill the holes for each upright. Push the cocktail sticks completely through the template,

• To create the 'basketwork' I used thick thread (linen thread). Before starting to 'weave' your gabion, position a narrow spacer of card to fit between some of the uprights to make it easier to separate the finished gabion from the template. Believe me there's nothing worse than diligently weaving your 'basket', coating it with PVA glue and then finding that its stuck to the template and is totally unusable. Don't bother to ask how I discovered THAT problem!

• Tie one end of the thread to one of the cocktail sticks and start interweaving, alternately passing the thread in front of, and then behind each adjacent stick.

• When you reach the starting point you'll see that the thread will be on the opposite side of the first stick to where you started. Continue weaving around the cocktail sticks until you reach the desired height.

• Paint over the gabion with PVA glue. Carefully slide out the spacer, and set the gabion aside to dry thoroughly.

• Using side cutters cut the lower ends of the cocktail sticks just above the template and trim the upper ends slightly above the top edge of the gabion. Paint the exposed ends of the cocktail sticks to match the approximate colour of the thread.

• Roll up some kitchen towel or tissue into a 'sausage' shape, and twist it up inside the gabion, until it protrudes slightly above the upper edge of the gabion to create a 'dome' of tissue. Give the tissue a thick coating of PVA glue and then sprinkle sand onto it. Leave to dry thoroughly

• Paint the 'earth' to match the colour of your terrain.

• You can either leave your gabions freestanding or you can make them part of an integral defensive position.

• Undeniably, the first time you try to make gabions they can be quite fiddly, but they get easier, and I think that the effort is worthwhile. They cost next to nothing to make. Each one is completely individual, and you have total control over their size and proportions so you can make them exactly how YOU want them!

Colour	Label	Colour	Label
Grey	Height of barrel	Green	Angled supports
Tan	Base beams	Blue	Pivot beam
Red	Uprights	Orange	Brackets

(Door omitted to show pivot bar)
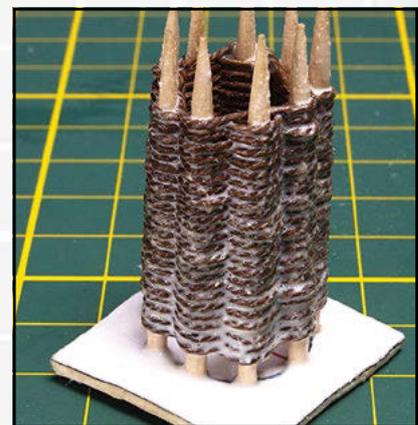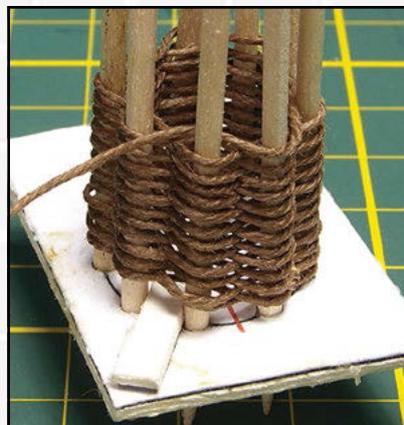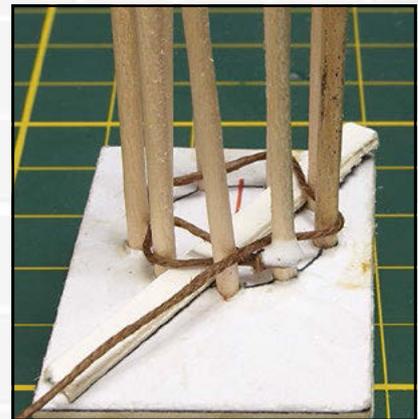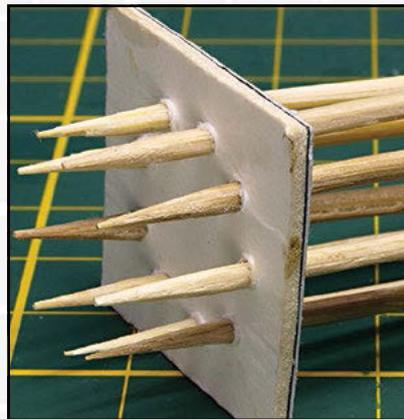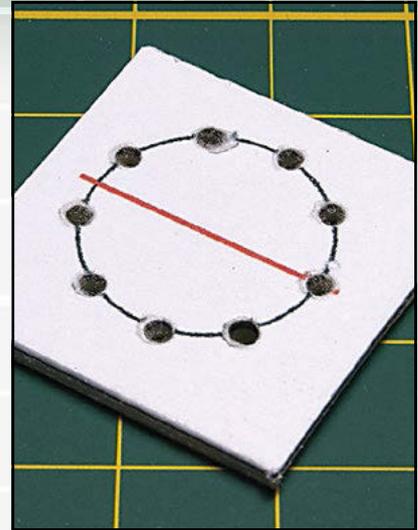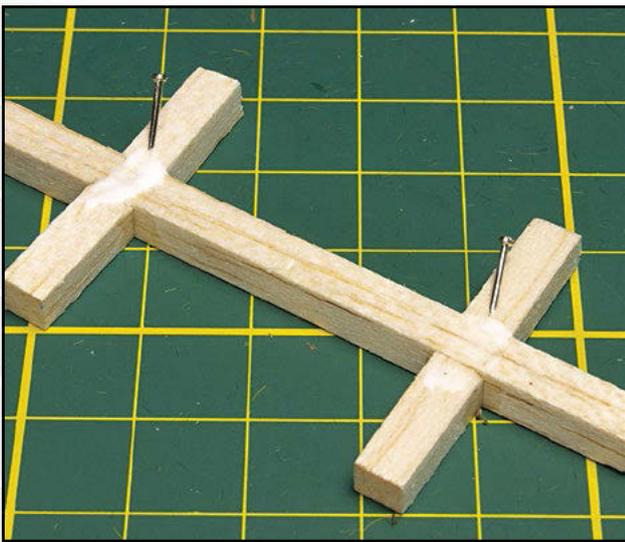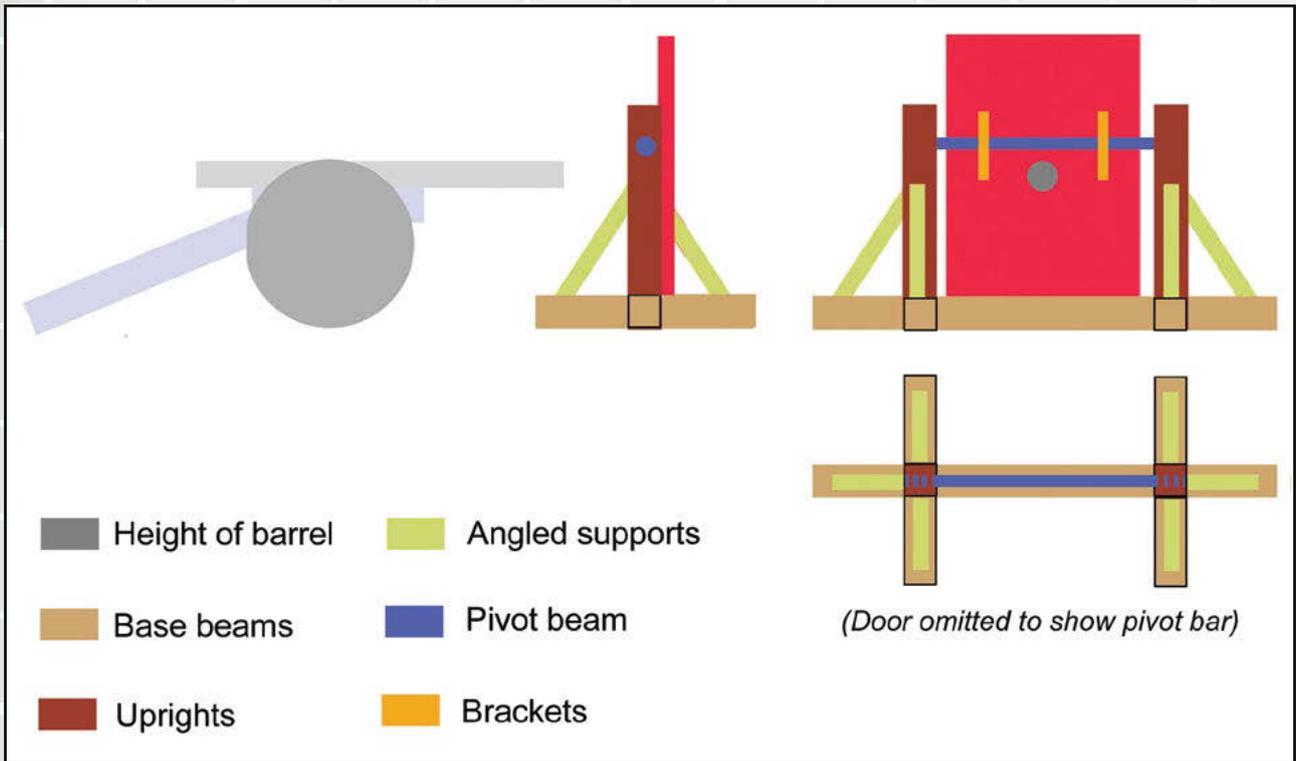
Mantlets varied from small wheeled versions to protect an individual, to larger static version with an opening door that protected gun crews whilst their artillery piece was reloaded. For this article I'm building one of the large versions.

The door width depends upon the size of the weapon shielded behind it. I made mine 30mm wide, and 45mm high. The pivot line for the door must be above the possible maximum elevation of your cannon. The door is fixed to a horizontal beam, supported by two stands. In my initial research it appeared that the two stands were separate, but I decided to have them joined together for several reasons; firstly it makes the model more stable, particularly if you are not going to fix it to an integral base, and secondly, without some form of beam at ground level, there would have been the likelihood of the door swinging back and hitting the cannon (or its crew!), which seemed illogical. If you want the stands to be separate then ignore the central area of the beam from the plans.
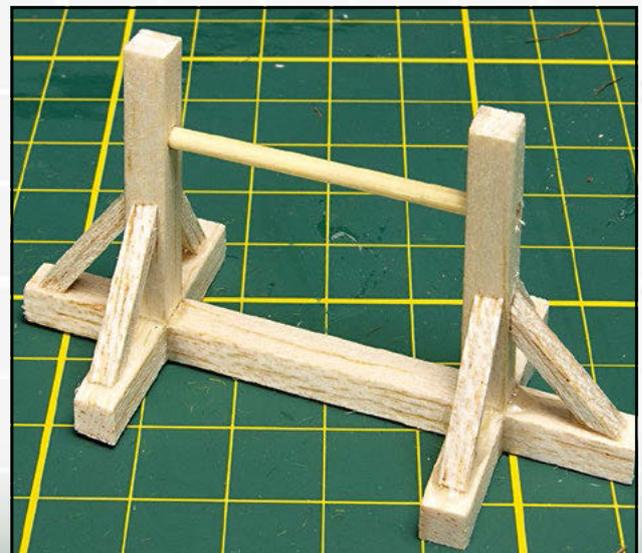
• To build the supporting framework, start by cutting the base beam and side supports from 5mm square section balsa, and glue them together, using pins if necessary whilst the glue is setting.

• Cut out the two uprights and drill through them for the pivot bar. Cut a cocktail stick to length and ensure that it rotates freely in the drilled holes. Cut out six angled supports from 3mm square section balsa.

• Glue the uprights in place with the pivot bar slid into position, followed by the angled supports.

• Make your door from 3mm thick balsa. Score the plank effect onto both sides of the 'door' using an old ballpoint pen, and add two horizontal supports.

• Glue the door to the pivot beam.

• To enhance the model, make a pair of support brackets. Cut a strip of thin aluminium sheet, lay it over a cocktail stick and press down on either side of the cocktail stick to create a 'bump'. Repeat the process, and then trim them to size.

• Glue the brackets in place and add two small hooks to which thread will be attached when painting has been completed.

• Paint the mantlet.

REFERENCES

Peter Harrington, *English Civil War Fortifications 1642-51*, Osprey Publishing, 2003

L. & F. Funcken, *Arms and Uniforms – "The Age of Chivalry" Parts 1 & 2*, Prentice Hall, 1983

HOW TO BUILD...

By Barry Hilton

THE REDOUBTS AT BORODINO

After Barry Hilton presented his *Republic To Empire* scenario for the battle surrounding the Fléches at Borodino, he shows us how he went about building the Russian earthworks for his massive "Battle of Borodino weekender".

Military redoubts are often misrepresented. This occurs mainly for want of clear descriptions in accounts and the preconceptions of readers regarding what a redoubt might look like. Fortresses on the battlefield towering above the mass of troops and acting like huge rocks around which a sea of men and horses sweep or crash upon is a popular vision. Often the truth is much less grand, yet even more dramatic for all that. The redoubts at Balaklava in 1854 have been portrayed as stout forts which their Turkish defenders did not fight too hard to keep. The reality was that these excellent soldiers fought like tigers to protect rather flimsy and hastily thrown up earth ramparts which were lower than waist height!

The best point to begin this article is to set expectation levels about what we are trying to recreate. The ferocity of the Russian performance at Borodino was in large part due to the positioning of field works around which coalesced

desperate resistance. There were several positions, some famous, others less so. Those which have passed into legend are the three 'flèches' (arrows) often called the Bagration flèches and the 'Great' redoubt. The former were roughly 'v' shaped earthworks erected by men of the 2nd Army of the West. Some sources say between 500 and 600 men each from the 26th & 27th Infantry, 2nd Grenadier and the 2nd Combined Grenadier Divisions were assigned to their construction. Work was finished on 25 August, 1812 about two weeks before the battle, suggesting the Russians had well laid plans to stop Napoleon near this spot. The latter seems to have been finished literally on the morning of the battle with a contemporary account citing 4.30am, 7 September as the time of completion.

One flèche is described as a *redan* and the other two as *lunettes*. The flèches were open to the rear and large enough to accommodate between five and 12 guns each with some infantry in support.

These infantry may have numbered less than 200 per flèche and possibly they stood to the rear and did not man the ramparts at all. Their dimensions can be seen in the diagrams. The so called Raevski (or Great) redoubt was a modest, low walled earthwork open at the back until its construction supervisor used the timber from the dismantled village of Semenovskoye to erect a double palisade across most of its rear. Evidence suggests that, in the case of the 'Great' redoubt, it was built by the Moscow Militia without any kind of tools, including shovels!

That so many thousands of men were killed or injured taking and repeatedly retaking these seemingly insignificant features is testimony to the desperation and ferocity of both armies at Borodino. Overall casualties at the flèches alone are estimated at 30,000!

In summary, we are building some low-grade, hastily-erected, earthen ramparts whose notoriety echoes down two centuries because of their pivotal role in the battle between two mighty empires. Nowhere else is the struggle between the Eagle and the Bear so vividly defined.

MATERIALS

I use bulk DIY materials to make terrain. To build these redoubts you will need:

• Polystyrene, balsa, or ply strips to make the ramparts.

• 3mm thick hardboard, plywood or MDF to make the base.

• Household filler mix and tile grout

• Builders sand. Sieve it into various grades which you should separate out and store.

• PVA or wood glue.

• Matchsticks & thin balsa strips 25–50mm broad and 2-3mm thick (1"-2" broad and ⅛"-¹⁄₁₆" thick).

• Wooden kebab or ice lolly sticks (for 'Great' redoubt palisade)

• Super glue

• Pot of water to help things along.

• Emulsion paint: Chocolate brown or similar, sand or yellow-brown, cream. Tester pots are good for the highlight colours.

• Static grass.

• Model paint: I used Vallejo's Japanese Uniform, Dark Flesh, Red Brown, and Black.
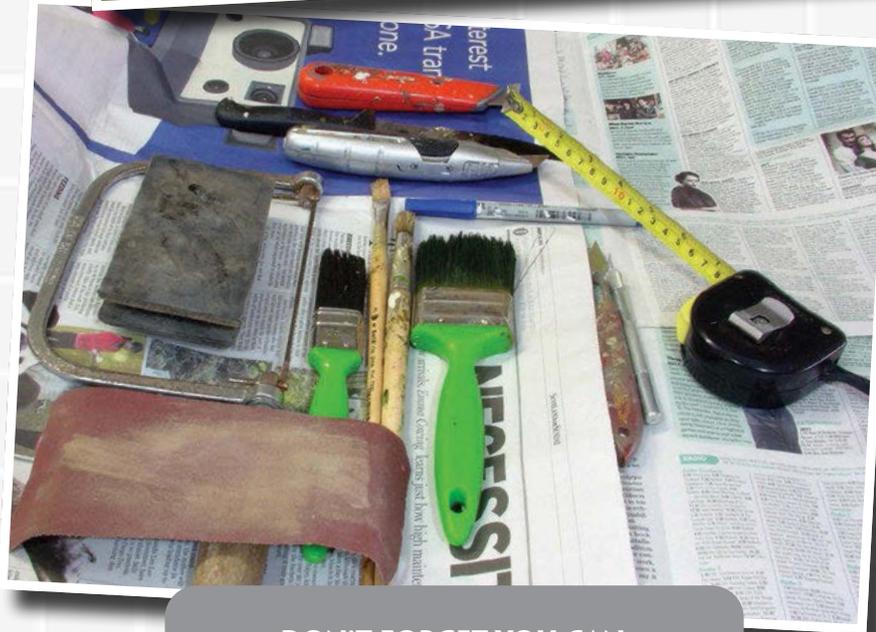
TOOLS

• Pen and paper.

• Steel rule.

• Hacksaw.

• Coarse and fine sandpaper and sanding block.

• Craft knife & scalpel.

• Old, but sharp, "kitchen" type knife.

• Small palette knives/trowels.

• Largish emulsion brush.

• Coarse modelling brushes.

DON'T FORGET YOU CAN DOWNLOAD ALL THE PLANS FROM THE WARGAMES *illustrated* WEBSITE.

STEP 1 - PLANNING

Use the measurements from the plans to sketch out the shape and size of each redoubt on pieces of paper or card. Be as accurate as possible. Cut these shapes out. Place them on your table and position some guns and figures around them to get a feel for how they'll look when completed. I built the redoubts in proportion to the ground scale used in *Republic to Empire* which is 2.25mm = 1 yard. Ground scale is important if these items are to assume proportional significance on your tabletop. Too big will ruin the game and too small will create problems accommodating the models. Adjust the sizes for smaller scale

models. Choose the ground scale that you wish to make the template sizes.

STEP 2 - BASEBOARD CUTTING

Using your saw cut four pieces for the base sections. Cut them in squares or oblongs depending on which field work you are making. Position your template on the base board material. Draw around it carefully, thus transferring the design permanently to the base board.

STEP 3 - BASEBOARD PREPARATION

Cut the based board in an imitation of the redoubt shape, meaning that the shape of the base is now a larger version of the

redoubt shape itself. This is a cosmetic touch, but it does accentuate the redoubt orientation and dimensions when placed on the table. Sand down the edges so that there is no 'lip' where the edge meets the table surface. This too is cosmetic but adds to the appearance of the finished article. Use a craft knife to score the base board in a cross-hatch fashion. Don't go too deep and do both upper and lower surfaces. Ensure some scores run from edge to edge. This creates a rough surface for subsequent plastering and gluing to key on to. It also provides a route for contraction stresses to run out of the base minimizing warping as wet products dry out.

Russian troops man the Bagration Flèches, awaiting the onslaught from the invading French.

STEP 4 - ROUGHING OUT THE REDOUBT WALLS

Compromise is inevitable because of the lack of compatibility between model scales and ground scale. The redoubt has to look right when figures are placed in and around it, yet the ground area required makes the walls incredibly thick relative to the ground scale. I made my walls from high density polystyrene. Balsa or plywood is equally good. Cut strips roughly 1,000mm by 20mm high and 20mm thick. I heated an old kitchen knife on the flame of a gas cooker for about 30-40 seconds and used it to slice through the polystyrene. Cut straight down lengthways into the top face of the one metre strip to about half the depth, then angle the blade at 45 degrees to complete the cut. This creates the redoubt wall profile shown in Diagram 1. It does not matter that these raw shapes are

rough. Slice the long strip into shorter sections. Glue these using PVA to the base board on top of the template lines you have already drawn. Don't worry about joins and small gaps. The butting of sections at angles can be achieved by further small cuts or sanding if using balsa or ply. You'll have time to slide the sections around to get the best fit and orientation as the glue takes time to dry. Once done, set aside overnight to cure.

STEP 5 - SECOND STAGE OF REDOUBT WALLS

Use filler to spread a layer over the wall sections. Don't spread too thickly or thinly. Drying cracks will appear in the heavier sections. You can kneed these together just before the plaster completely dries out or apply a little more plaster to cover if already dried out. Once finished, set aside overnight.

## STEP 6 - THIRD STAGE OF REDOUBT WALLS

Photographs of a post WW2 re-construction of the 'Great' Redoubt appear to have crenellations at which artillery pieces are positioned. I am not sure these are accurate but I suspect Russian military historians know much more about their heritage that I do, so, they're in! With polystyrene it is easy to cut these in the wall sections even when covered in a thin coat of plaster. I used a scalpel and measured them off on the 'Great' Redoubt from the centre angle out along both faces. You could cut them before plastering, but it does not make any real difference. I put them on the two larger flèches also.

STEP 7 - SECOND STAGE OF THE BASEBOARD

Apply a thin layer of tile grout or filler to the base board and blend it up to and over the base of the plaster covered walls. Use a pallet knife or small trowel for this. Try and avoid spreading it onto the chamfered base edge. Set aside to dry.

STEP 8 - WOODWORK (OPTIONAL)

This is conjectural aesthetics on my part. There is a strong argument to say that such refinement was not applied in the flèches (I have no evidence one way or the other) and that there was no time, materials and tools to do so in the 'Great' redoubt. I liked the look and so included it. I wanted the appearance of timber shoring on the inside edge of the walls. In addition I wanted rough bits of timber laid across the front floor area of the 'Great' redoubt in the appearance of a rudimentary gun platform.
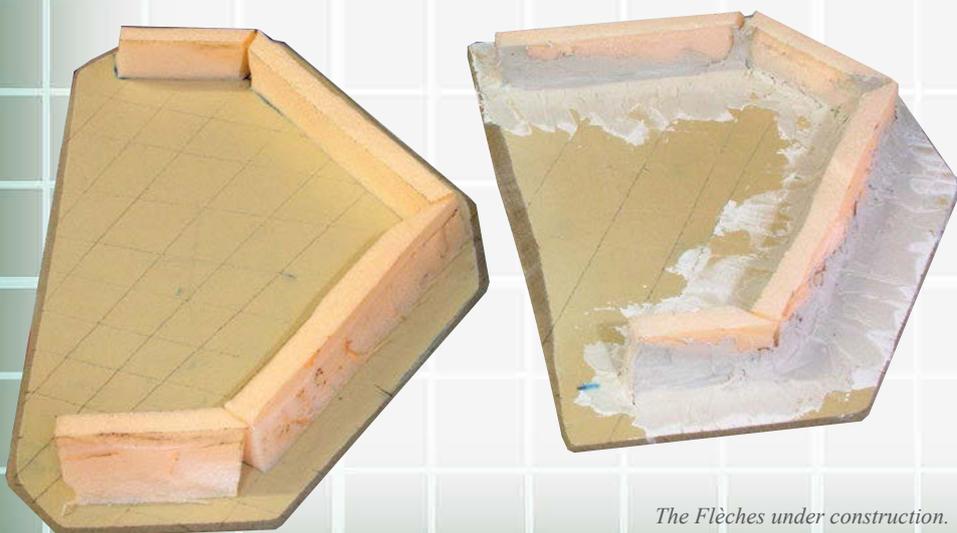
The Flèches under construction.

For the wall internals, use matchsticks cut down to a level where they are of equal height to the wall. Glue them upright on either side of the crenellations and at intervals on the long sections. I used super glue to hold them quickly in place. In the gaps between the matchsticks I used PVA to glue plank lengths cut roughly from balsa strips in the fashion of trench works. I used the same method with large chunks of balsa to make the floor area of the 'Great' redoubt. This is fiddly but much quicker than you might imagine. Have all your balsa bits pre cut before you start so it is a little like making a jigsaw. The results can be seen in the photos. Don't worry about gaps, these will be dealt with at the next step.

STEP 9 - WALLS AND GROUND WORK

Note: This is the final step before painting.

Coat the all parts of the walls and selected patches of the base board in a thick-ish mixture of PVA and water. Sprinkle thick quantities of the

finest graded builder's sand over these wet areas. Ensure bare areas of plaster are covered, including up to and around the gaps in the timberwork if used. This sand will give a great texture to the walls, ground and around the timber areas. Once dry use the same method to glue some courser sand in small patches on the outer edges and open ends of the walls. This looks like builder's rubble.

STEP 10 - UNDERCOATING

The basic construction is complete. Ensure the model is dry and then undercoat it in chocolate brown or similar emulsion paint.

EXTRA STEP - A PALISADE

As a last minute touch the Russians built a double thickness palisade across most of the open back area of the 'Great' redoubt. They left entry gaps on both ends between the palisade and the earth rampart. This was constructed out of wood taken from the dismantled village of Semnovskoye. A model double palisade would take up far too much space and make the redoubt too big on the table. I compromised with a single thickness palisade which probably still occupies too much ground area! I left its construction to the last minute (just like the Russians) so that all the fiddly work in the inside edge of the earthwork wall and firing platform could be done unimpeded. The palisade is made from lengths of kebab stick glued upright onto a frame of horizontal kebab sticks. It is secured at each end by balsa 'posts' set in milliput foundations. The 'kebab-works' are balanced and glued against a plinth of 3mm thick balsa laid as a raised area inside the rear part of the redoubt. Once this was set I used filler along the outside and inside edges to give it strength. The balsa plinth is also covered in plaster and shaped to look like a natural rise in the ground level. I

undercoated the previously completed front part of the redoubt before finishing this construction of the palisade for practical reasons of easy assembly.

STEP 11 - PAINTING

When the undercoat is dry use the coarse modelling brushes to dry brush the highlights onto the model. First use the yellow-brown then the cream. This is a very quick step. Any areas of woodwork should now be gone over again either in chocolate brown or a dark grey-black. Drybrush these up with a finer brush by mixing Flesh, Beige or similar and then White into that. This distinguishes the woodwork from the groundwork.

STEP 12 - TONES

I prefer to subdue drybrushing on large pieces of terrain. To do this I wash down in a thin mix of paint and water. I use a cup or can to mix a red-brown (such as Vallejo Cavalry Brown) with a little black and lots of water. Brush this liberally over the entire model. Thicken it a little on the piles of rubble. Set aside to dry. The whole model will now be less garish.

STEP 13 - VEGETATION

Coat selected areas in a thick-ish PVA and water mix. Liberally sprinkle on your static grass and tamp down with your hand. Shake off excess, gather in a newspaper. Do the whole thing in patches and don't over cook the grass! When the glue has dried paint the static grass areas in the chocolate brown emulsion. Let that dry. Lightly dry brush the grassed areas in Japanese Uniform. Spot glue a few Silfor tufts around the outer edges of the redoubts and you're done!
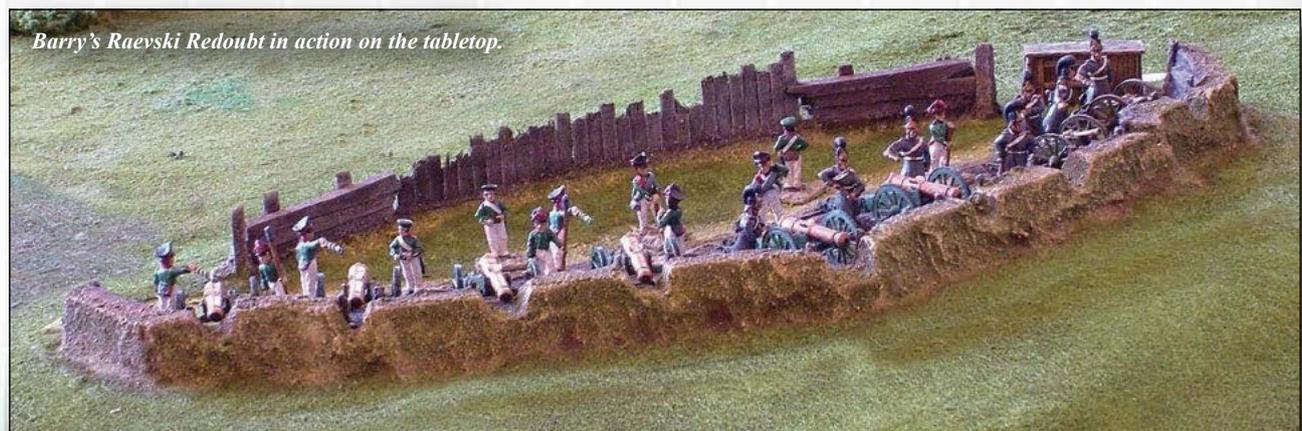
Barry's Raevski Redoubt in action on the tabletop.

WARGAMES illustrated®

Wargames Illustrated is the world's preier tabletop gaming magazine and throughout its thirty years of history the magazine has showcased some of the best model making talent in the wargames hobby.

Over recent years *Wargames Illustrated* has produced a series of modelling articles entitled "How To..." in which some of the best model makers currently working in the hobby have created easy to follow guides for their fellow wargamers, so they too can construct terrain, buildings and other eye-catching gaming pieces for the tabletop.

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"How To..."

A GUIDE TO MODELLING (2)