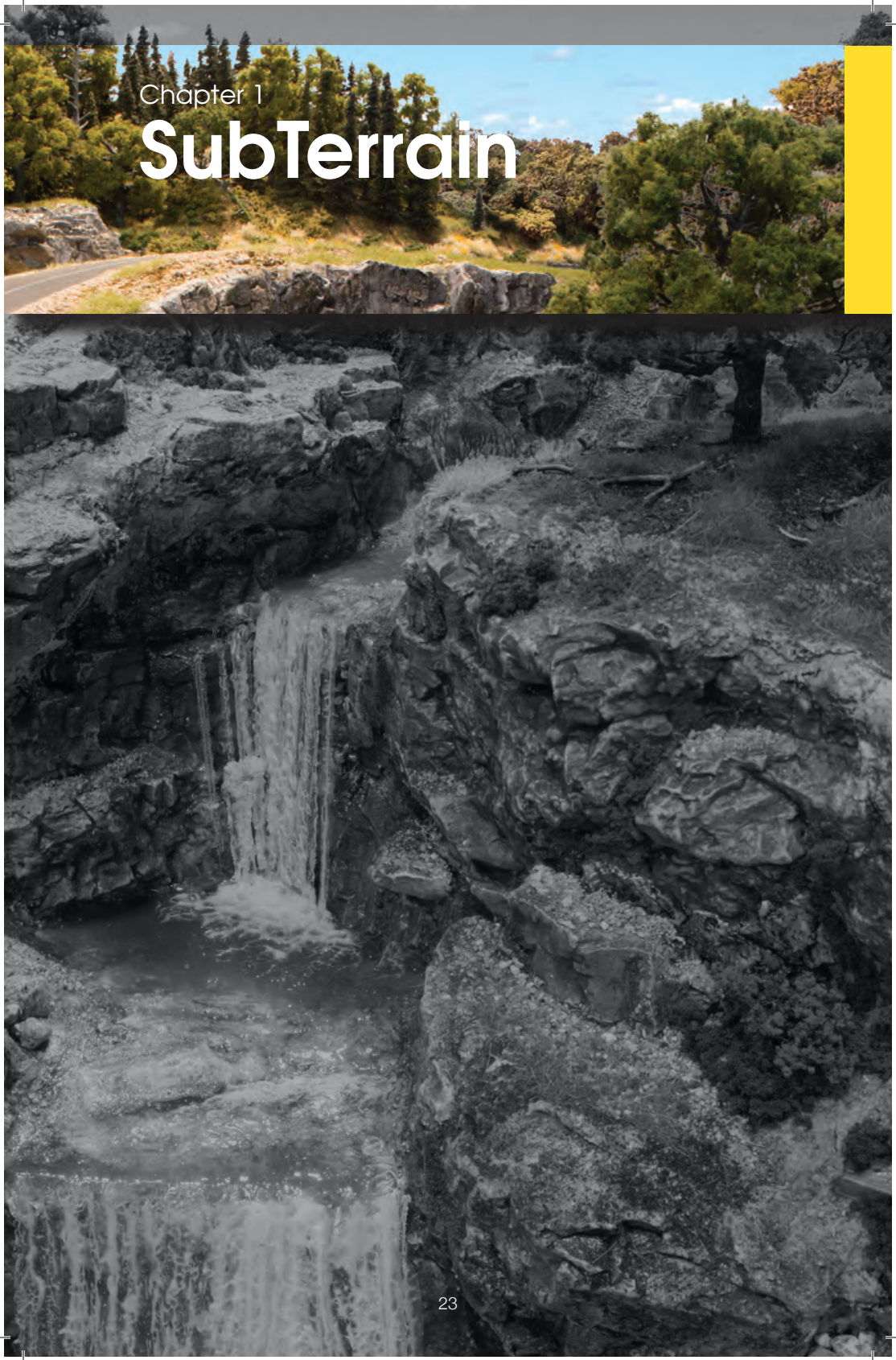
Chapter 1

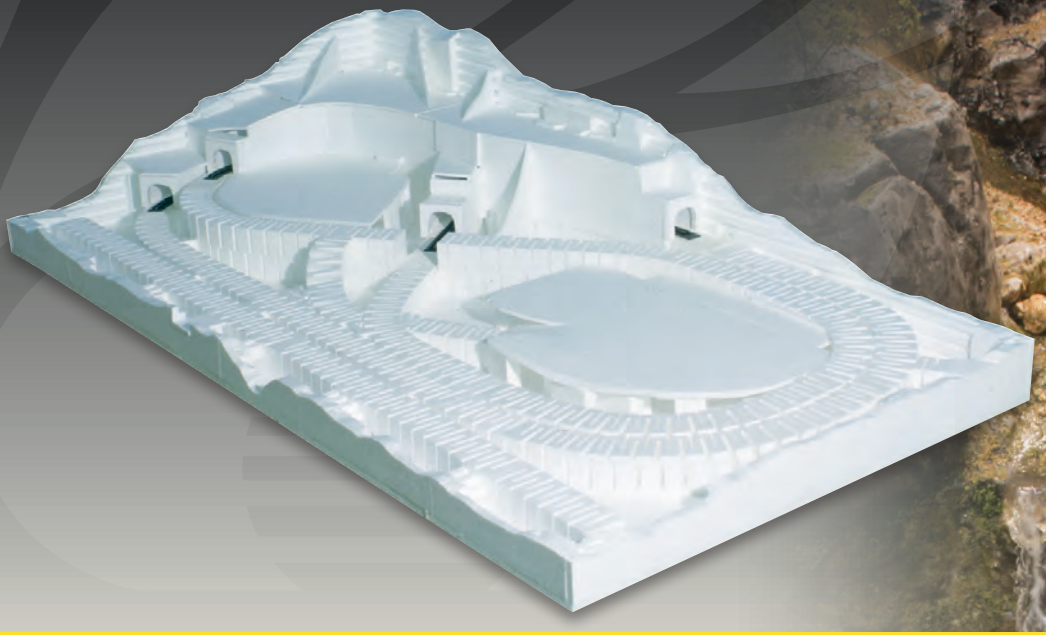
SubTerrain



The SubTerrain Lightweight Layout System® consists of durable, high-density and non-toxic foam components that take the guesswork out of designing and building a layout. This system is extremely adaptable and expandable to any layout plan and includes all necessary tools and accessories. Since this system is so lightweight, SubTerrain is ideal for situations where the layout will have to be moved, when space is limited or for modular layouts.

SubTerrain is different from older methods of building model railroad layouts, so we recommend familiarizing yourself with the entire process before using the SubTerrain System. We use model railroading as an example for using these products, but if you are not a model railroader, do not overlook these items. The SubTerrain products and techniques can be used for multiple scales and types of modeling.

All SubTerrain products are described at the beginning of this chapter. Then, you will learn how to use the products together. Read through this section focusing on the key descriptions of each component and take notes of how you could use them in your style of modeling. Notice the colors used to indicate each product. These colors will be used throughout this chapter to indicate which pieces of SubTerrain are being used.



SUBTERRAIN FOAM COMPONENTS

ONLINE VIDEO

The SubTerrain System's foam components are like puzzle pieces that are designed to work together to create any layout you can imagine. All foam components in the SubTerrain System are made of high-density, non-toxic foam. These products have limitless uses in all types of modeling. Read through this section focusing on the key descriptions of each component and take notes of how you could use them in your style of modeling.

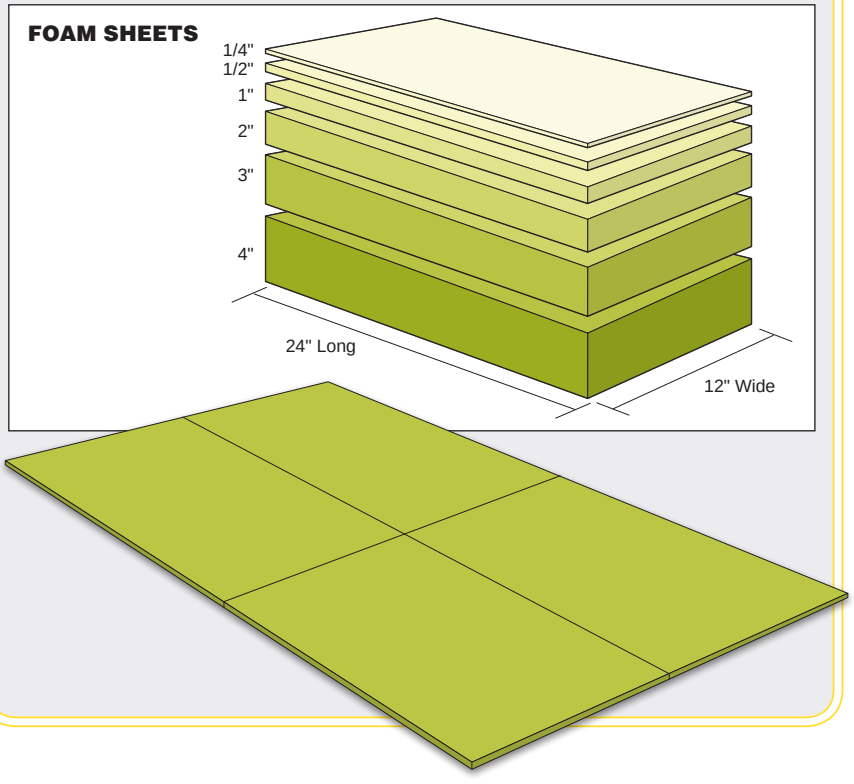
As you read this section, notice the colors used to indicate each product. These colors will be used throughout this chapter to indicate which pieces of SubTerrain are being used.

Product Overview

Foam Sheets

Use Foam Sheets as a lightweight layout base, to enclose tunnels, build bridges, create interior terrain profiles, form level areas for buildings and towns, or build structures. Thinner sheets are great for creating things like tunnel walls, and thicker sheets can be carved or used to support heavy terrain like water features.

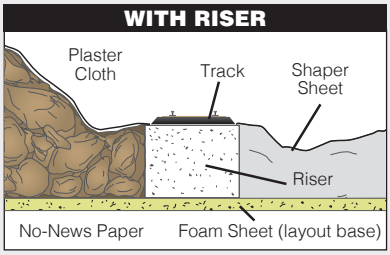
The number of Foam Sheets and Support Panels you may need is dependent upon the number and size of raised level surfaces you plan to have. Measure the spaces you need to fill and purchase the number of Foam Sheets you need accordingly. Foam Sheets can also be glued together at the ends to create larger sections if necessary. If the seam will be weight bearing, make sure it is supported underneath with benchwork or support foam.

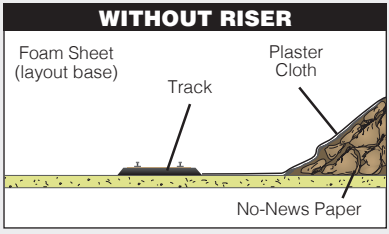


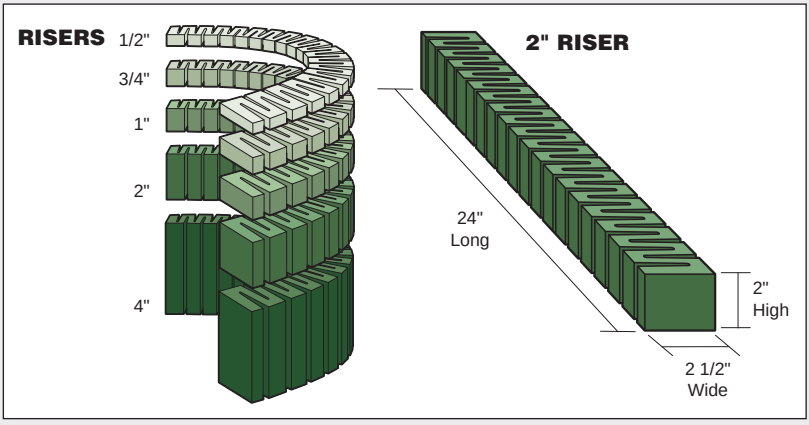
Risers

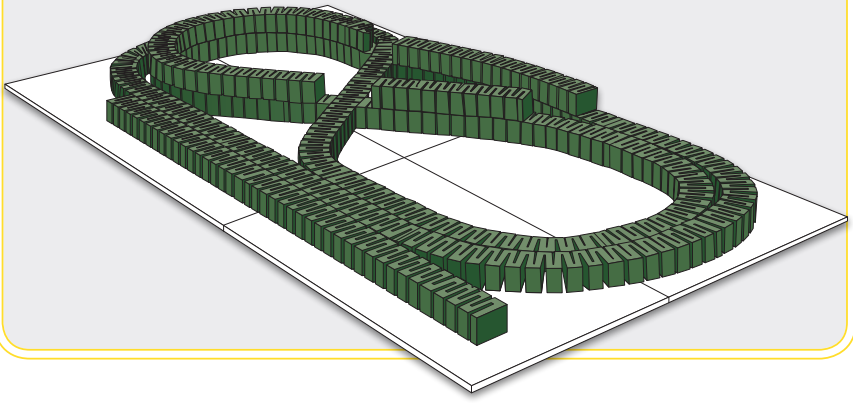
Risers allow modelers to quickly elevate roads and track to create dramatic terrain like ravines, creek beds and valleys without cutting into a layout's base. Risers are formed into a compact accordion shape with smooth, flat sides. This shape is flexible enough to easily form realistic curves and flat enough to support train tracks. Risers are 2 1/2" wide, 24" long and available in 1/2", 3/4", 1", 2" and 4" heights.

Risers will be placed under the entire track or road. To determine how many Risers you need, simply measure the total length of your track or road in feet. You will need the same number of feet in Risers. The higher you want to increase your elevation, the more Risers you will need.









INCLINES/DECLINES

Incline/Decline Sets and Starters are used to create a smooth transition from one elevation to another without complicated calculations, guesswork or wood construction. They will be needed anywhere that your track or road will climb over planned terrain features like mountains, tunnels and overpasses.

Sets are multiple pieces that are used together to create one incline or one decline, while Starters are one piece. Starters are designed to be stacked on top of Risers to create custom grades. Both products are available in 2%, 3% and 4% grades. Grade is the degree of elevation change over a specific distance. The larger the grade percentage, the steeper the slope.

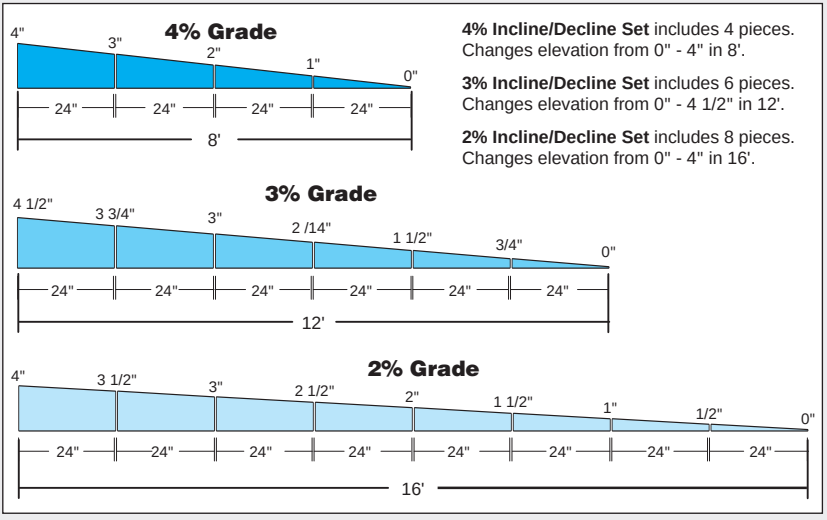
Product Overview

Incline/Decline Sets

Incline/Decline Sets are ideal for grades that grow gradually over a long distance, as often found on railroad lines. Sets are ideal for the beginning model railroader.

GRADE	RISE OVER 2'
2%	1/2"
3%	3/4"
4%	1"

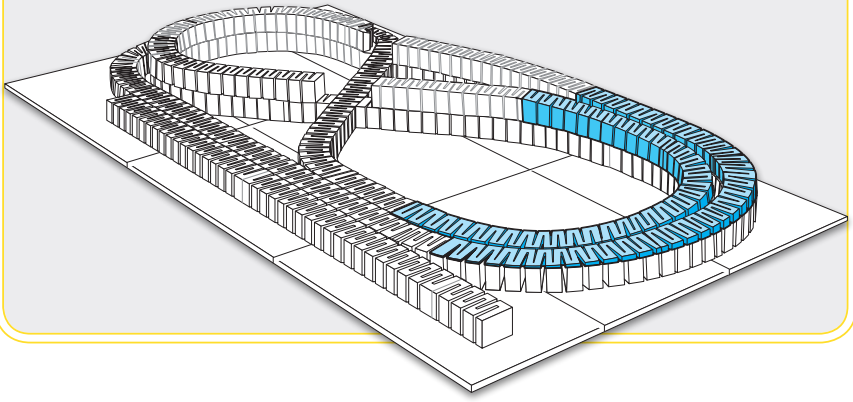
INCLINE / DECLINE SETS



4% Incline/Decline Set includes 4 pieces. Changes elevation from 0" - 4" in 8'.

3% Incline/Decline Set includes 6 pieces. Changes elevation from 0" - 4 1/2" in 12'.

2% Incline/Decline Set includes 8 pieces. Changes elevation from 0" - 4" in 16'.

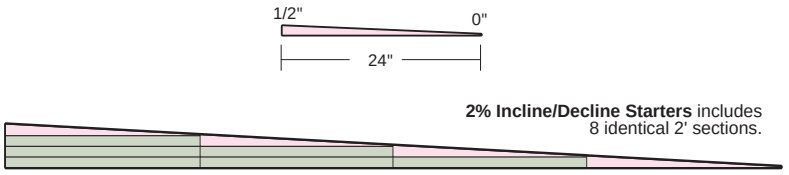


Incline/Decline Starters

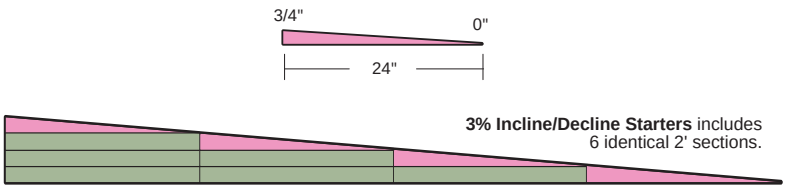
Starters make it easy to create terrain with gently rolling hills. Starters allow modelers to create grades over shorter distances. Starters are also used to create inclines for road crossings and ramps, since each Starter tapers to 0%.

INCLINE / DECLINE STARTERS

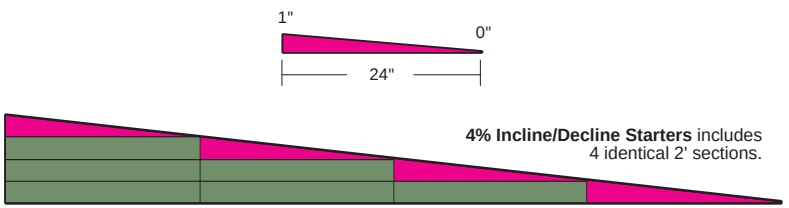
2% STARTER

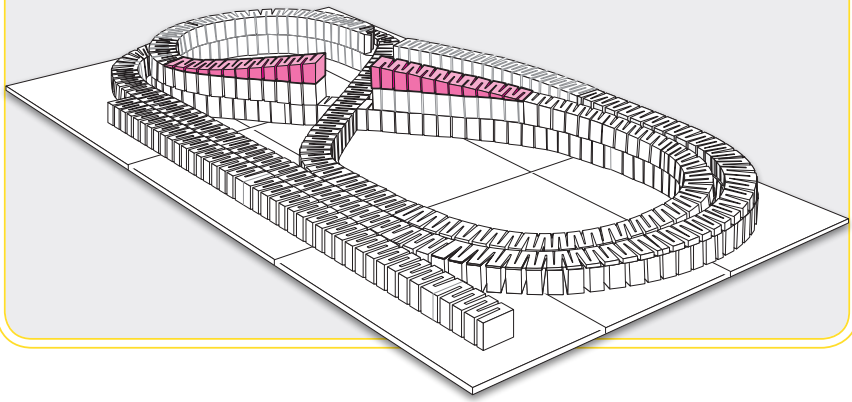


3% STARTER



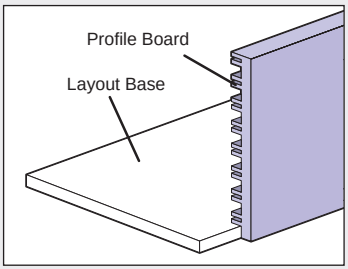
4% STARTER

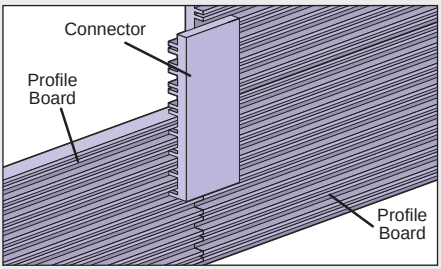


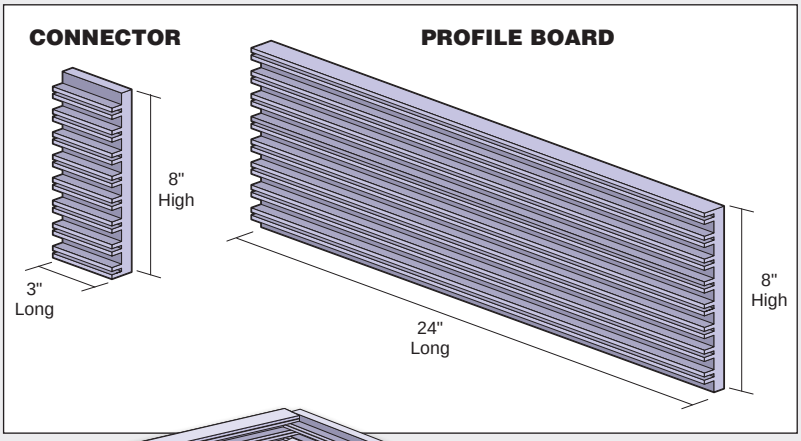


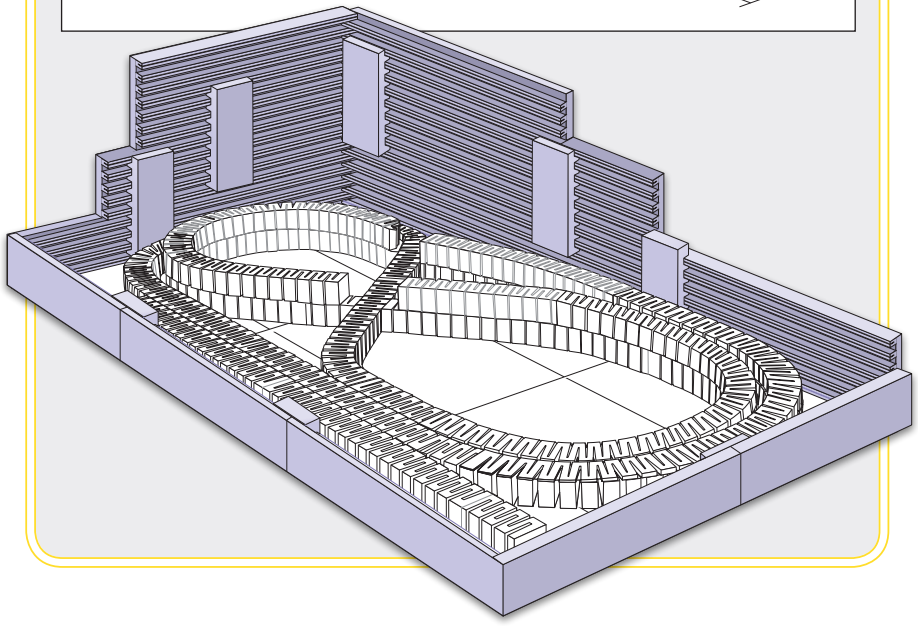
Profile Boards™

Use Profile Boards around the perimeter of the layout to support the terrain surface that you will create later. Profile Boards come with connectors that are used to lock the Profile Boards together for secure assembly. Boards are placed end-to-end or can be stacked to any height. They create a clean edge that can be covered or painted.



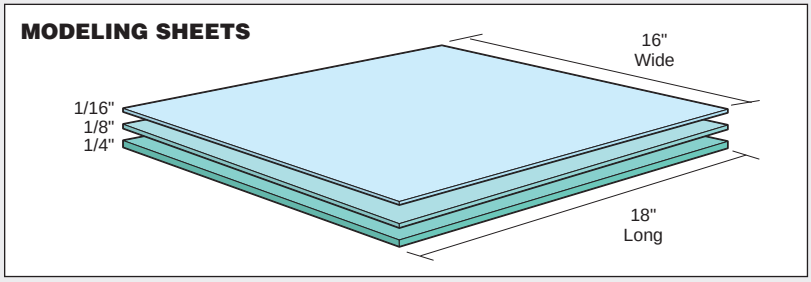


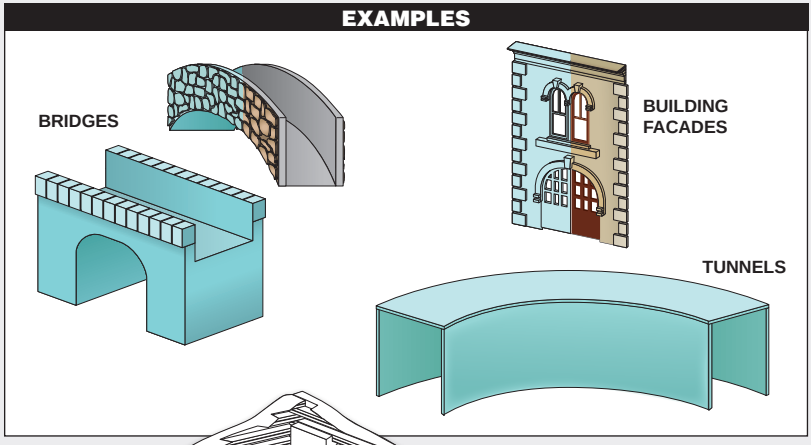


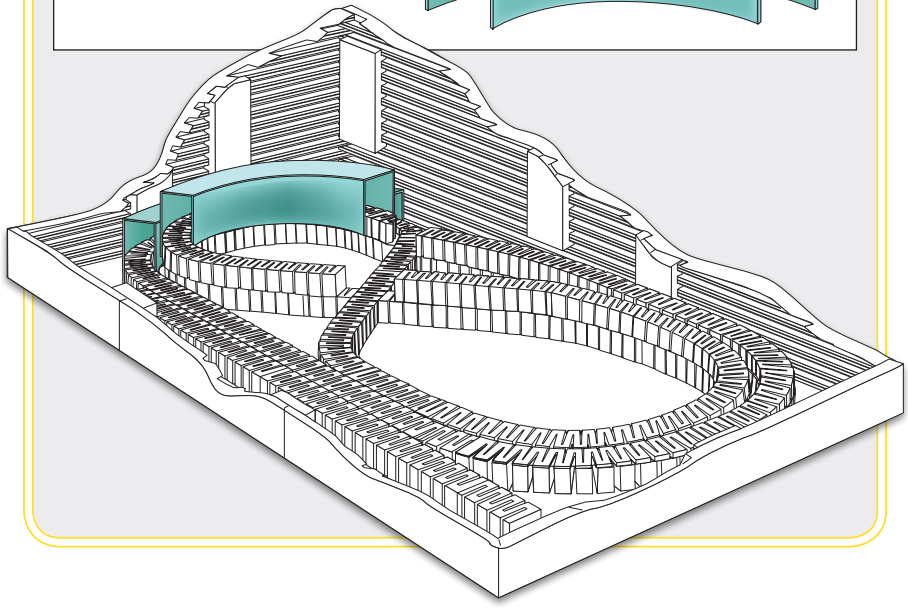


Modeling Sheets

Modeling Sheets are a multi-purpose building material that serve as a lightweight alternative to styrene and balsa wood. They are flexible, easy to cut and the smooth, paintable surface accepts a variety of paints. You can also use Modeling Sheets to add special features, tunnel walls, create flat surfaces for buildings and water areas, make building facades or use for arts and crafts.





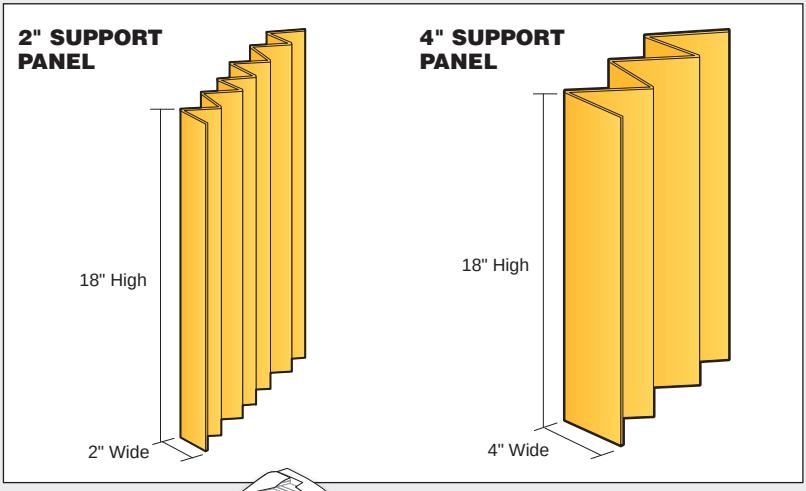


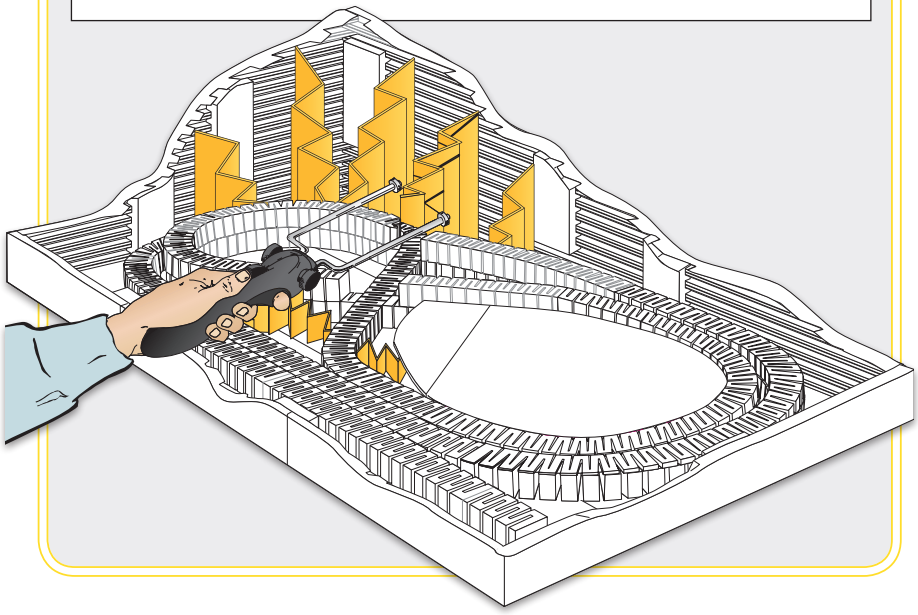
Support Panels

Designed as a strong but lightweight terrain understructure, Support Panels are quick and easy way to create height on a layout. The accordion shape allows them to stretch to cover a large distance quickly.

The 4" Support Panels have a 4" distance between accordion folds and are best for expansive areas where less support is needed. The 2" Support Panels have a shorter distance between folds, allowing for more substantial support. Both versions are 24" long when laid flat. They are ideal for supporting Road Risers when you need a flexible understructure to create elevated hairpin turns like you might find on a mountainous road.

See Chapter 2 for more in-depth information on methods to use Support Panels with the Terrain Shell.

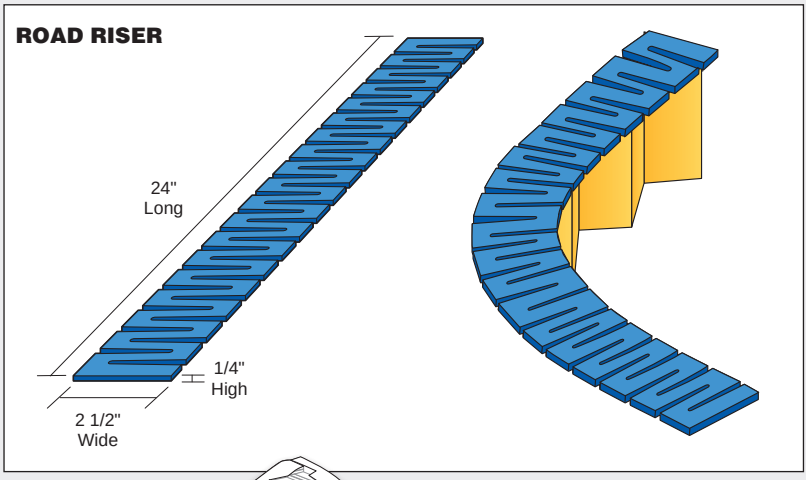


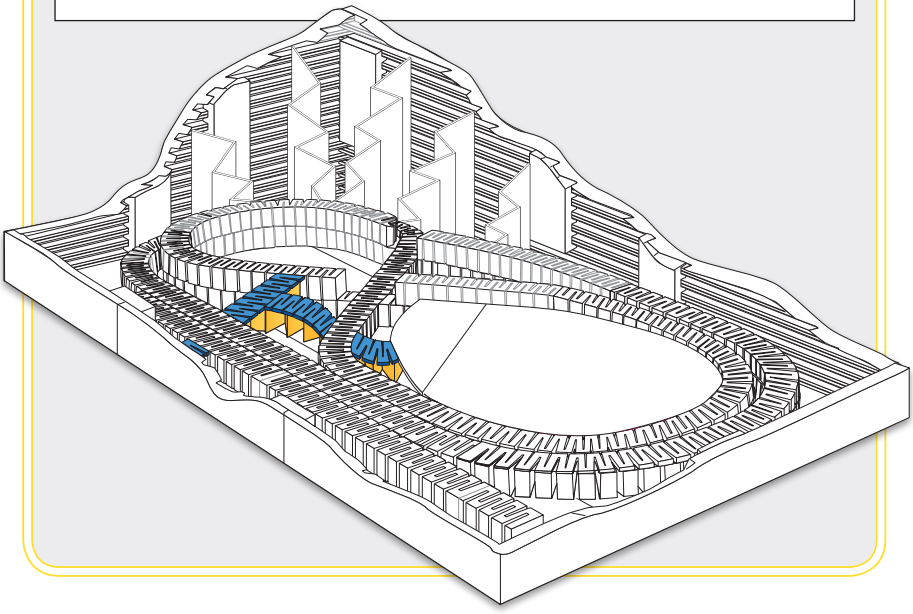


Road Risers™

Road Risers make it easy to add roads and highways to terrain layouts. They are 1/4" tall, 2 1/2" wide, and 24" long. Road Risers are specifically designed to provide an instant flat area for modeling roads. Road Risers flexibility follows the curvature of the terrain much more closely than a thicker Riser, allowing a modeler to create realistic winding and hilly roads. Use Road Risers with Support Panels to create custom grades for roads. To determine how many you will need, simply measure the length of your highways. You will need the same length in Road Risers.

NOTE: Do not use Road Risers in areas that will need to bear weight for a train.



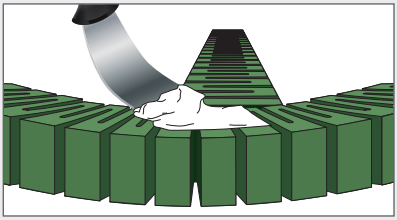


SUBTERRAIN TOOLS & ADHESIVES ONLINE VIDEO

Product Overview

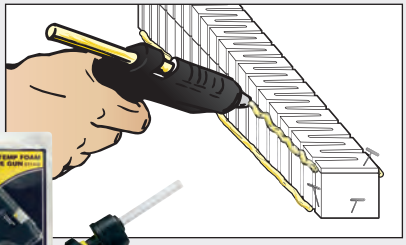
Foam Putty™

Foam Putty is ideal for filling gaps and cracks in foam. This non-shrinking, easily sanded and lightweight filling material has the same characteristics as foam.



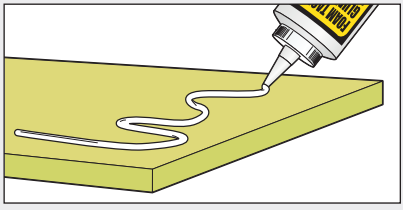
Low Temp Foam Glue

The Low Temp Foam Glue Gun uses Low Temp Foam Glue Sticks. This glue is specially designed to work with SubTerrain and other common modeling and handicraft materials like wood, foam and cork. As the name suggests, this glue gun operates at a lower temperature than ordinary glue guns so it will not melt the SubTerrain foam. The Low Temp Foam Glue will still be hot enough to burn your skin, so you should not spread the glue with your fingers.



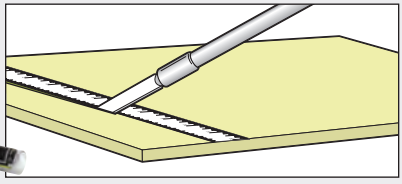
Foam Tack™ Glue

Foam Tack Glue is a high tack glue that is effective on SubTerrain and other common modeling materials like wood, cork and foam. This glue is water-soluble and dries clear. To ensure the glue dries between two pieces of foam, use Foam Tack Glue as a contact cement.



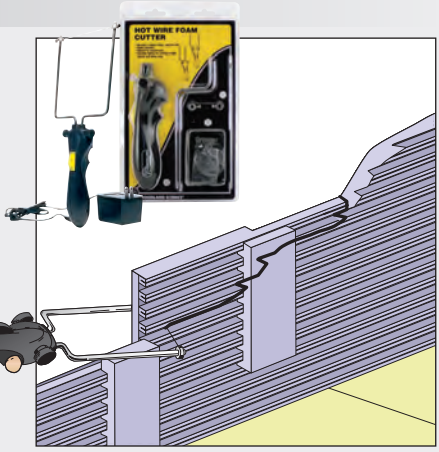
Foam Knife and Blades

The Blade on the Foam Knife is longer than a typical hobby knife. This makes the Foam Knife easier to use when building with SubTerrain foam components. The Foam Knife comes with a 2" replaceable Blade ideal for cutting thick pieces of foam.



Hot Wire Foam Cutter

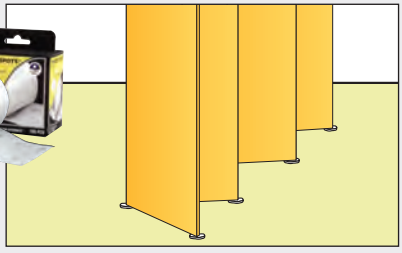
The Hot Wire Foam Cutter comes with a Nichrome wire that heats up and maintains an even temperature so it cuts through foam quickly. Adjustable collars allow for accurate cuts in different heights and angles. To create more versatile, precise and angled cuts, use the Foam Cutter Bow & Guide. This attachment to the Hot Wire Foam Cutter makes beveling and specialty cuts a breeze.



Note: To avoid the emission of toxic fumes, use the Hot Wire Foam Cutter only on Woodland Scenics foam products. Use in well ventilated area.

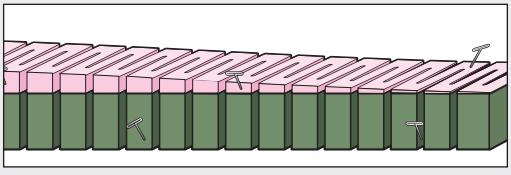
Sticky Spots™

Sticky Spots are a high-tack, round-shaped, multi-sided adhesive that yields instant placement on smooth and textured surfaces. They are repositionable and leave no residue. Sticky Spots are perfect for positioning Support Panels, Modeling Sheets and Road Risers before permanent installation. They can also be used to attach Shaper Sheet (page 61) to Profile Boards.



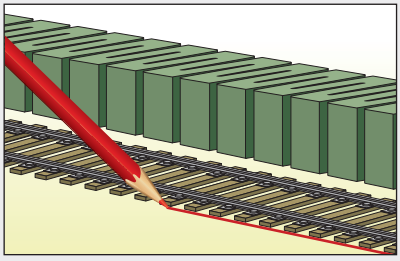
Foam Nails

Foam Nails are 2" long and are used to temporarily pin track, foam and other products to your layout.



Foam Pencils

Foam Pencils have special lead and are designed to draw on foam without causing damage. The colors will not bleed through paint or other coverings. Each package contains two red and two black pencils.



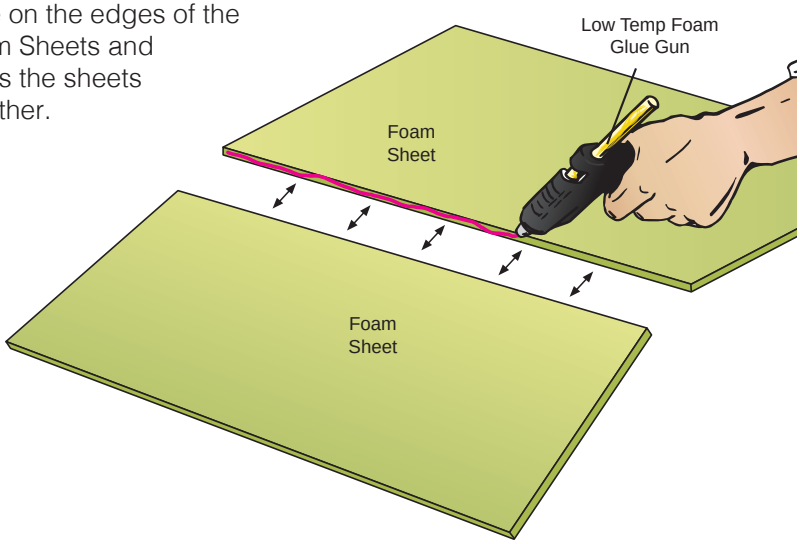
CREATE A LAYOUT BASE

The SubTerrain System is very versatile and can be constructed on almost any size or type of layout base. The layout base should be flat, cover the benchwork, and be firm enough to hold the weight of the model. Many models are built on layout bases made of either plywood or Foam Sheets. We recommend using Foam Sheets that are a minimum of 1/2" thick. For a plywood base, try a 5/8" thick, grade AC plywood. If the model will bear substantial weight, use thicker base materials or install additional support beams in the benchwork.

To get started, decide what size your layout will be and create the same size layout base by cutting plywood or assembling sections of Foam Sheets. When deciding the size of your layout, consider scale and the amount of workspace available to you.

If you are using plywood as your layout base, cut pieces of plywood to size and secure the plywood to the benchwork. If using Foam Sheets for your layout base, determine how many Foam Sheets are needed to create the size of layout you need. Measure the total length and width of the layout. Draw a diagram with the measurements and count how many Foam Sheets will be needed to fill the space. Then, lay the Foam Sheets out on your benchwork until the benchwork is covered. Once the sheets are glued together, the seams between the sheets will be very strong. However, the middle sections of the Foam Sheets are where additional support may be needed. Add support beams to the benchwork, or reorganize the Foam Sheets to optimize the benchwork support.

To make a modular layout with Foam Sheets, mark the foam where each module will begin and end. Once the Foam Sheets are arranged as desired, glue the ends of the Foam Sheets together. Spread Low Temp Foam Glue or Foam Tack Glue on the edges of the Foam Sheets and press the sheets together.



Secure the seam between Foam Sheets with Foam Nails while the glue is drying. When the sheets are pressed together, the glue may squeeze out of the seam and leave a ridge on the surface. Use a craft stick to smooth the excess glue. If you do not smooth the excess, the ridge will cause problems later when installing Risers and other SubTerrain components. See page 56 to use Foam Tack Glue as a contact cement for an instant bond. Allow the glue to dry thoroughly. After the glue has dried, cut any excess foam that overhangs the benchwork with the Hot Wire Foam Cutter or Foam Knife.

TIP! *Please note all other SubTerrain Foam components should be assembled, pinned in place and tested before they are glued together.* ***Model Railroaders—do not glue until you have tested your track!***

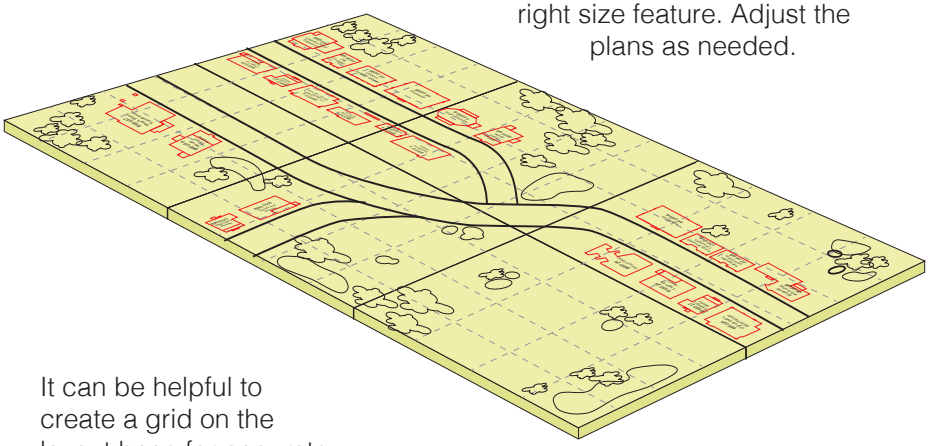
TRANSFER LAYOUT AND TRACK PLAN TO BASE

Once your layout base has been built, you are ready to transfer your layout and track plans onto the layout base.

Drawing the track and layout plans on the layout base will help you position the SubTerrain foam components. It is also an opportunity to check that your measurements are accurate, that the plan will work in the amount of space you have available, and to make adjustments as needed.

PLANS WITHOUT TRACK

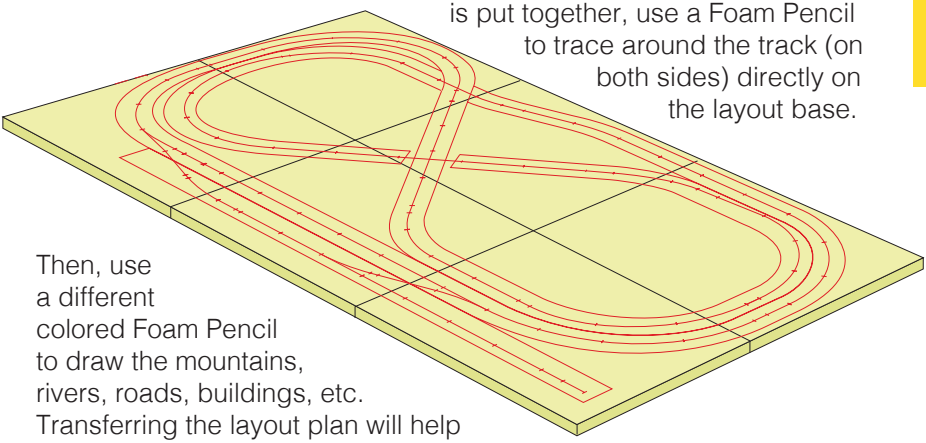
If your plans do not include railroad tracks, simply transfer the layout plan you have already sketched (page 17) directly onto your layout base. Use Foam Pencils to draw the plans onto the layout base. Use one color for structures/roads, and a different color for bodies of water, mountains or other features. Color coding the features will help you identify what should go where. Label the features as needed. You can temporarily place buildings and other features that will be installed directly on the layout base and trace around them. This way you ensure that you are planning for the right size feature. Adjust the plans as needed.



It can be helpful to create a grid on the layout base for accurate measurements and placement of features. To make a grid, use a measuring tape to make evenly spaced gridlines on one side of the layout base. Then, make evenly spaced marks on the opposite side and connect the lines. Repeat this on the other two ends of the layout and connect the lines. This will leave a perfectly spaced grid to help you measure the distance between features.

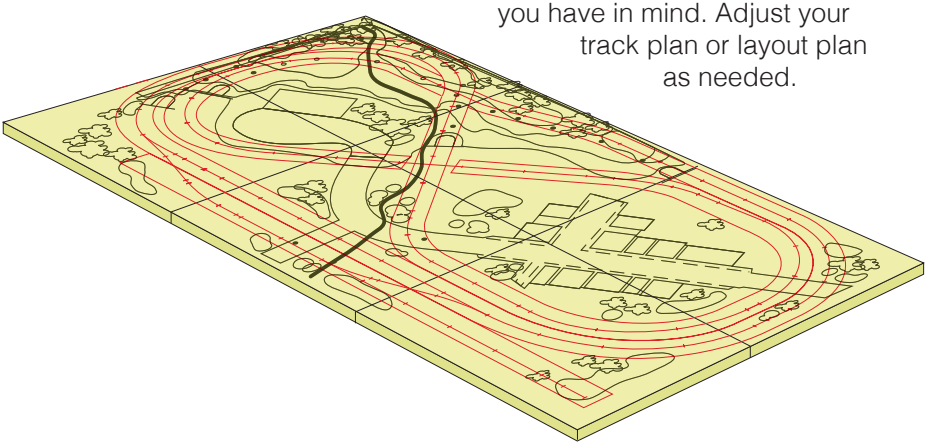
PLANS WITH TRACK

If you are a model railroader, it is time to put the track plan and layout plan together on the layout base. Transfer the track plan to the layout base first. Assemble your track and lay it on the layout base according to the track plan. Temporarily pin the track in place with Foam Nails. The track sections should be butted together tightly. Once the track is put together, use a Foam Pencil to trace around the track (on both sides) directly on the layout base.



Then, use a different colored Foam Pencil to draw the mountains, rivers, roads, buildings, etc. Transferring the layout plan will help clarify the track plan. Check for clearance issues where features meet the track plan and adjust any features that interfere. If needed, add tunnels or overpasses to the track plan. Consider how your train will go over hills. You will need to build up the height of the track gradually so it can go over the hill.

Grade is the degree of elevation change between two points over a specific distance. The percentage of grade affects whether or not your train can pull its weight up the hill or mountain that you are planning to build. Unlike automobiles, trains cannot gain elevation rapidly. Choose a grade for your track based on the amount of space that you have on your layout and whether your train can handle the grade. Check with the train manufacturer to ensure the train is compatible with the grade you have in mind. Adjust your track plan or layout plan as needed.



CHOOSING A GRADE

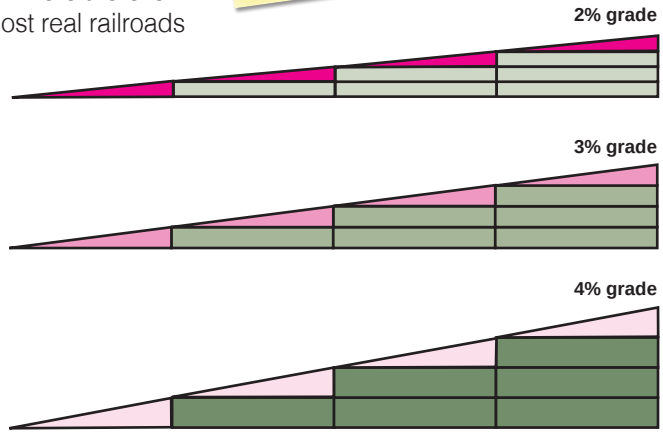
When choosing a grade, consider the length and space needed to create the desired effect. Determine how many feet it will take to reach the desired height and whether that height can be achieved on your layout. SubTerrain Incline/Decline Sets and Starters are designed to model specific grades without any complicated calculations. They make it easy to plan for a grade.

Reference the chart below to determine how many feet of track is needed to reach and descend from a specific elevation. The chart shows how many feet it takes to achieve a specific height using 2%, 3% and 4% Incline/Decline Sets and Starters. Once you know the height you want to achieve and the number of feet needed to achieve the height, double the measurements for the descent.

DESIRED ELEVATION		1"	2"	3"	4"	5"	6"
Length needed to reach elevation using:	2% Incline/Decline	4'	8'	12'	16'	20'	24'
	3% Incline/Decline	3'	6'	9'	12'	15'	18'
	4% Incline/Decline	2'	4'	6'	8'	10'	12'

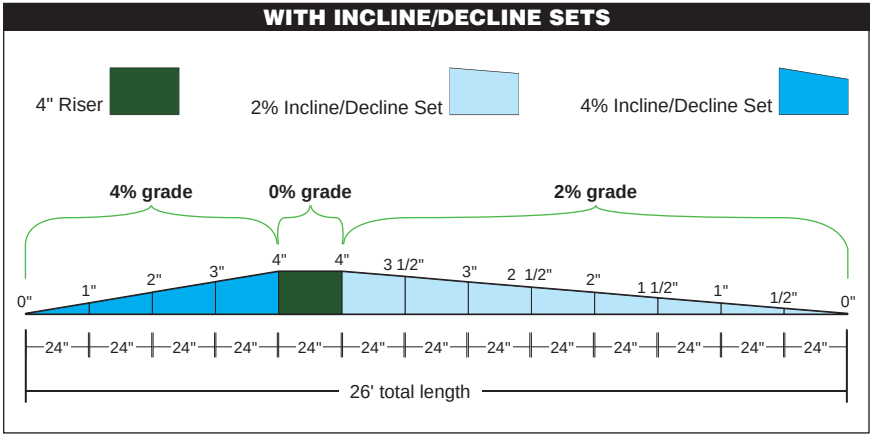
A 4% grade is ideal for many model railroads. Although this is steeper than most real railroads would use, it allows for interesting changes in elevation over a short distance and helps when selectively compressing large geological features onto your small layout. If you have a small space, but want the realism of a grade, use a 4% grade. Smaller grades like 2% or 3% are better for less dramatic terrain like prairies where there is moderate relief. Most real railroads have 2% or 3% grades, but they require more space on model railroad layouts. You can also create custom grades. Just ensure the custom grade is not too steep for your train.

TIP! Please note that if the track must level out for features like bridges and turnouts, this will add to the overall length of the incline or decline. Measure these on your layout base and include the number in the overall length.

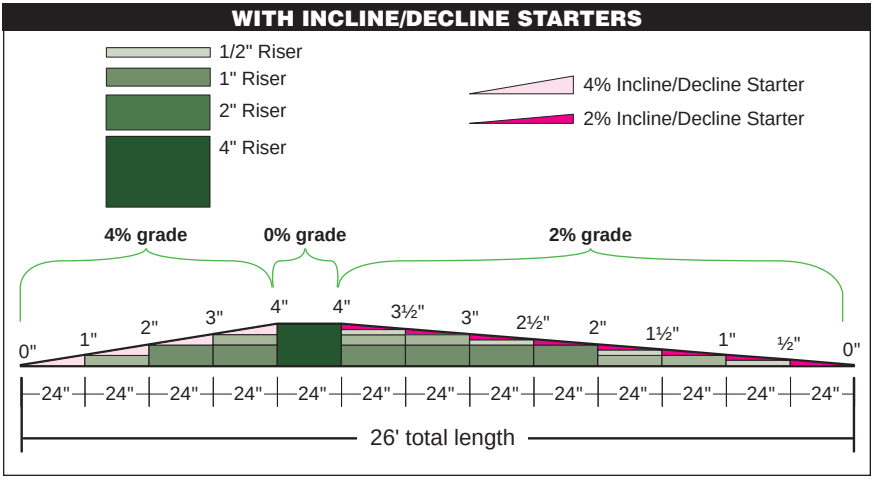


CREATING GRADES

Incline/Decline Sets make it easy to create grades. Just stack the sections of your Incline/Decline Set on top of Risers or your layout base. Many train tracks and roads climb and descend at two different grades due to naturally occurring terrain variations. For realism, make the model's decline grade different than its incline grade. You can also alternate grades with Starters, adjust the length of Sets, change grades mid-incline or combine Sets and Starters to get any elevation. Learn about these techniques on the next few pages. The illustration below shows how to use a 4% and 2% Incline/Decline Set to create a 4% grade and 2% grade over 26'.



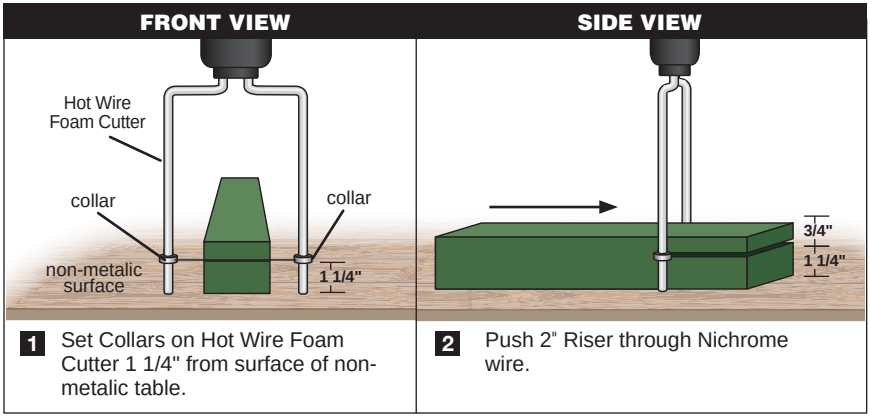
Incline/Decline Starters can create the same effect, but must be used in combination with Risers. The illustration below shows a 4% and 2% grade created with a combination of Risers and Incline/Decline Starters over 26'. However, Incline/Decline Starters are intended to be used to create custom grades as discussed on the following pages 42-44.



Alternate Grades with Starters

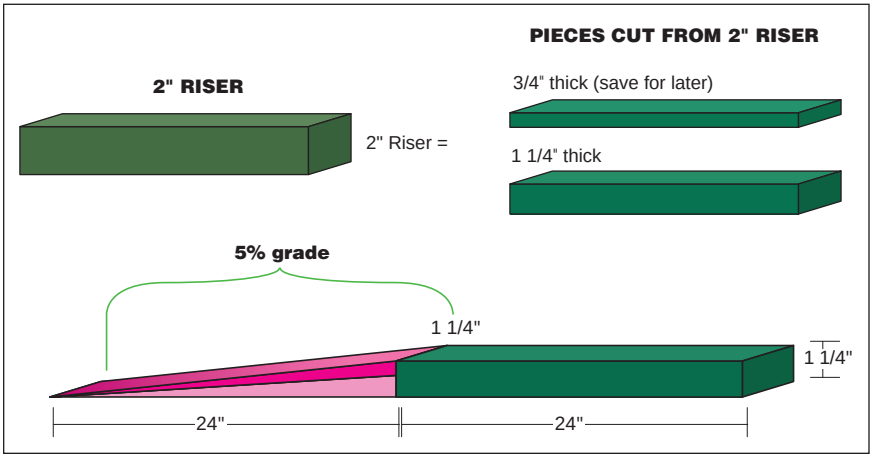
A benefit to using Incline/Decline Starters with Risers is that you can build grades other than 2%, 3% or 4%. The illustration below shows how you can stack Starters to create steeper grades. When you do this, you may end up with a height that does not match a specific Riser height. For example, if you want a 5% grade, stack a 2% and a 3% Starter to create a 5% grade. This makes the incline end at a total height of 1 1/4". No Riser is 1 1/4", but a 2" Riser can be cut to a 1 1/4" height. Use the Hot Wire Foam Cutter to cut the Riser, see illustration below.

NOTE: *No Riser is 1 1/4" high. To match this height, modify a Riser by cutting it lengthwise as shown below.*



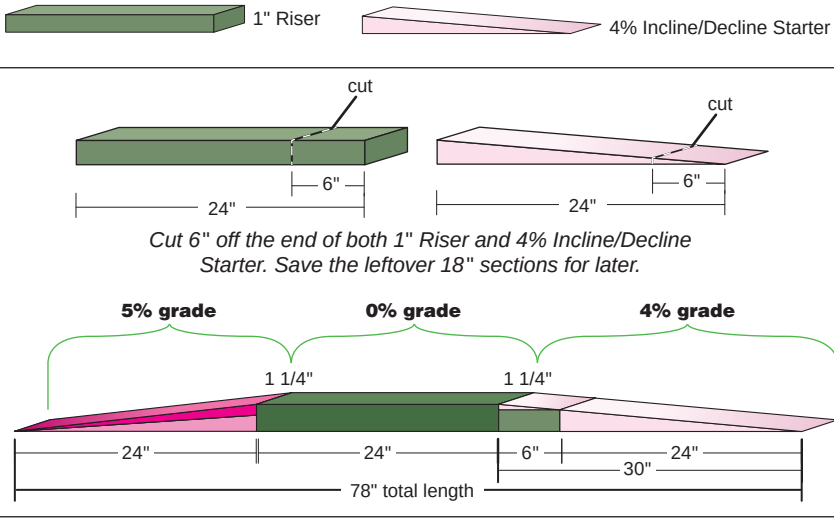
1 Set Collars on Hot Wire Foam Cutter 1 1/4" from surface of non-metalic table.

2 Push 2" Riser through Nichrome wire.



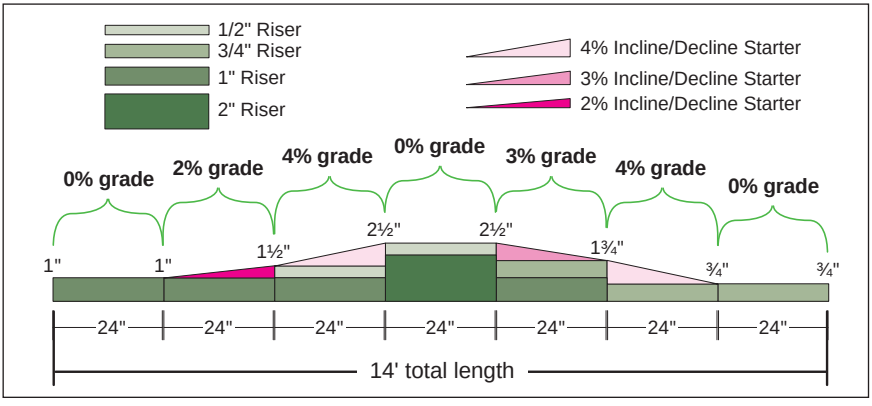
Adjusting Length

Sometimes the available space on a layout does not perfectly fit the length of an Incline/Decline Set, Starter, or Riser. Any of these pieces can be cut to fit your needs. For example, perhaps you want a 5% grade that levels out and then descends at a 4% grade over 30 inches. Starters only come in 24 inch increments, so that leaves 6 extra inches to fill for a smooth Incline/Decline. To achieve this, cut 6" off the tip of a 4% Starter and cut 6" off the end of a 1" Riser. Stack the cut pieces together and butt against the full Riser and 4% Starter.



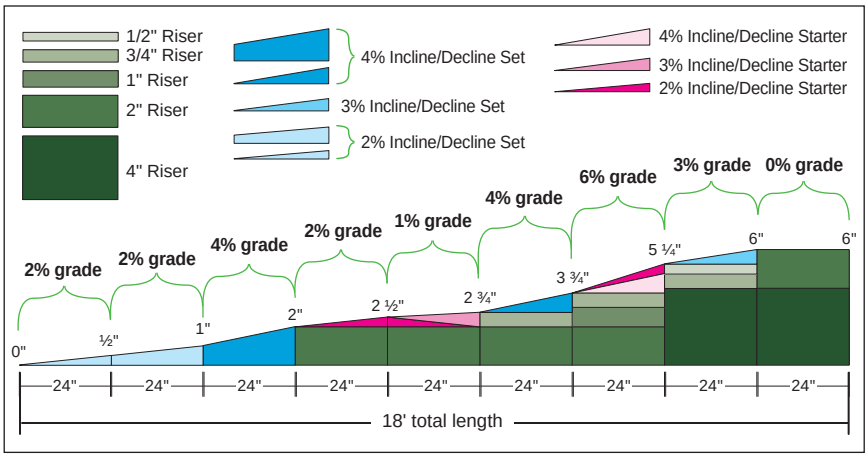
Changing Grades Mid-Incline

Another benefit to using Incline/Decline Starters is that you can change the percentage of grade in the middle of an incline or decline. The illustration below shows a 2% grade changing to a 4% grade, leveling out and then descending at a 3% and then 4% grade. This allows for a truly realistic height gain.



Rise to Any Elevation

Use a combination of Risers and Incline/Decline Sets and Starters in a stair-step fashion to obtain any elevation as shown in the illustration below. You can even create a 1% grade by stacking a 3% and 2 % Starter in opposite directions.



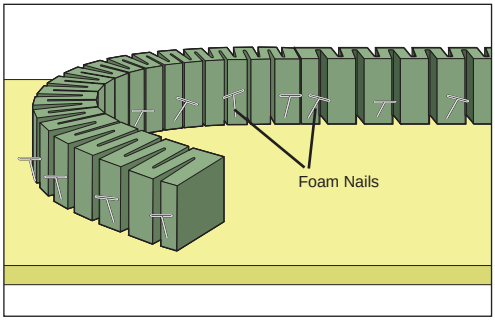
INSTALLING SUBTERRAIN ONLINE VIDEO

The most important rule of installation is to test before you glue. Testing your track will be discussed at the end of the chapter. Pin your pieces in place as you go with Foam Nails. Test your layout once everything is pinned in place.

INSTALL RISERS

Begin installation with Risers. Center Risers over the track outline drawn on your base. Butt the Riser sections together. Pin the Risers to the base with Foam Nails. Space Foam Nails 8-10" apart on straight sections and outside curves. For tighter inside curves, space Foam Nails 4-6" apart.

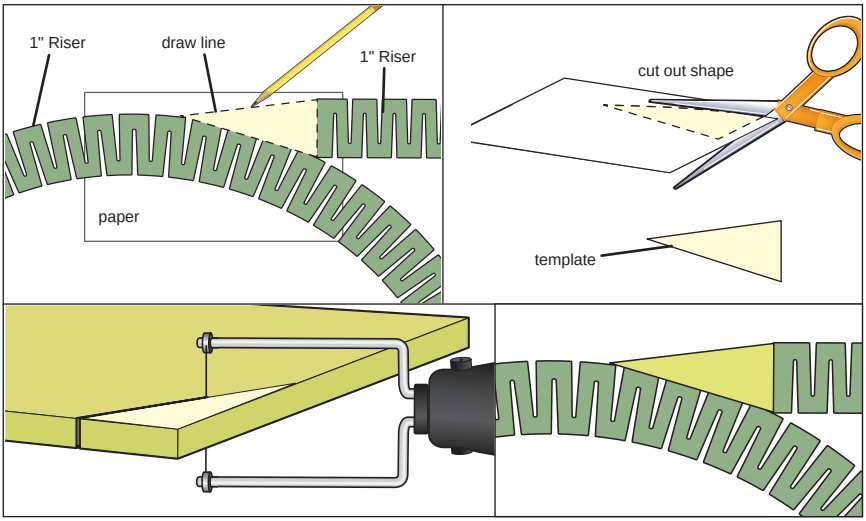
When cutting Risers to fit together end to end, an exact fit is not necessary. Small gaps between Risers will be covered later with Plaster Cloth and Track-Bed (page 46). Gaps can also be filled with Foam Putty. Note that Risers installed around a curve may tend to lift up on the inside edge. Pin these firmly in place.



If your plan calls for bridges, leave the correct space between Risers for each bridge. Check the manufacturer's instructions for each bridge, or review the Bridges section (page 53).

DIVERGING RISERS

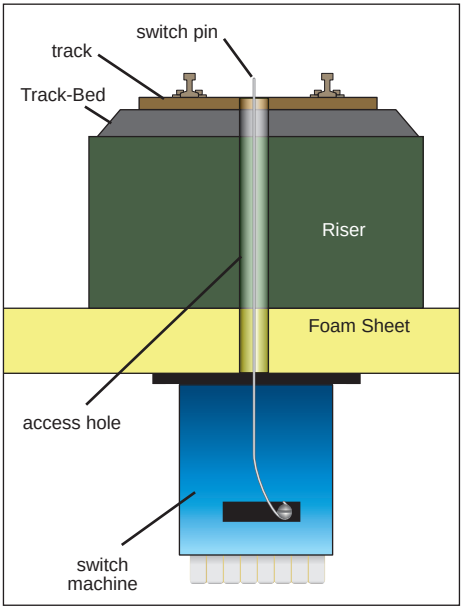
Your plan may have several loops and include features such as crossovers, intersections, turnouts and overpasses. There will be triangular gaps between Risers when creating these features. These gaps can be filled using a solid block of foam or a thinner piece supported with smaller scraps.



SWITCH MACHINES

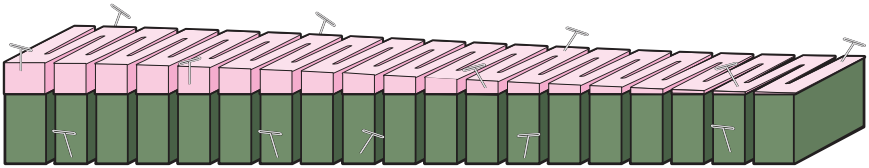
Switch machines allow a modeler to change the position of the track for a switch or turnout. They are available in a wide variety of styles and installation will be different depending upon the style. Always check the manufacturer's instructions before installation.

Typically, the switch machine will need to be attached to a piece of Masonite that has a slot notched in it for the switch pin to reach the track and move back and forth. The Riser or Foam Sheet that the track rests on will need to be notched to fit the Masonite and the layout base will need a hole cut into it for access from under the layout. Take a look at the illustration to the right for an example of how to install a common style of switch machine. Most switch machines will be easier to install when you are installing your Risers.



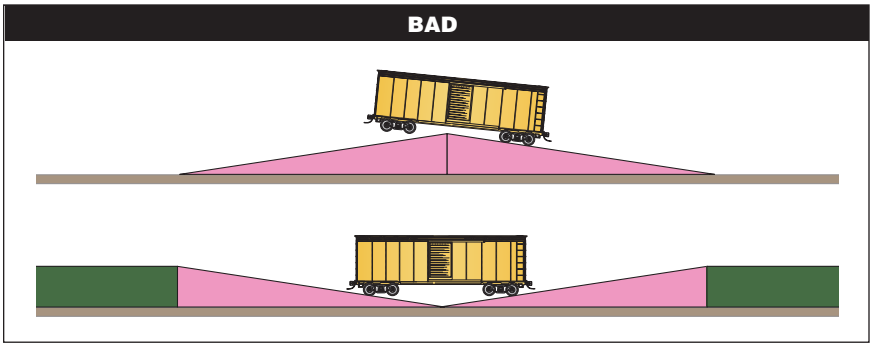
INSTALLING INCLINES/DECLINES

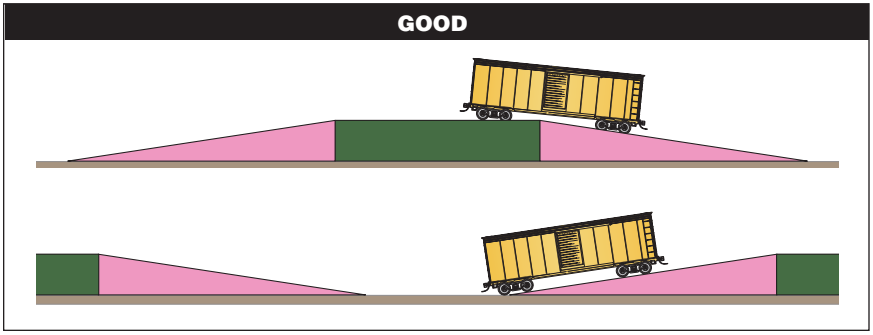
Center the Inclines/Declines on top of the Risers and pin them to the Risers with Foam Nails. As with Risers, you may need to cut Inclines/Declines to fit. Use your Hot Wire Foam Cutter or Foam Knife.



Where an Incline/Decline Starter or the first piece of an Incline/Decline Set meets a Riser, there may be a small ridge or bump. This is usually not a problem as it will be smoothed over later with Plaster Cloth. If you are concerned about the gap, you can fill it with Foam Putty, a lightweight filling compound designed to have the same characteristics as foam when dried.

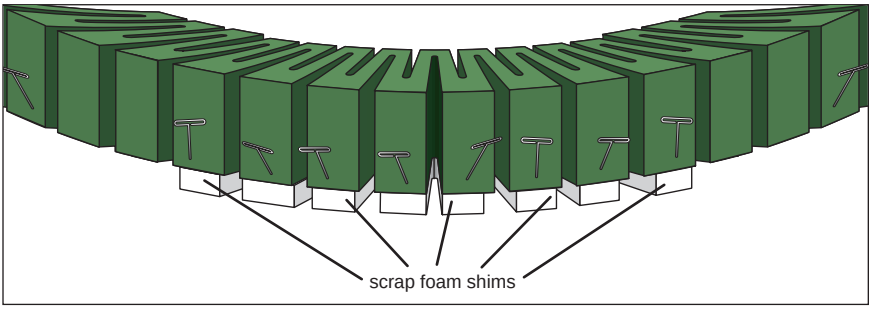
Do not install an Incline and Decline so their tapered ends meet or their thick ends meet. The angle is too difficult for train wheels to maneuver and will cause derailment. Foam Putty will not fix this. Always allow a level space between an Incline and Decline for proper train function. Make sure the flat space is at least the same length as your longest piece of rolling stock to prevent derailment.





BANKING RISERS AND INCLINES/DECLINES

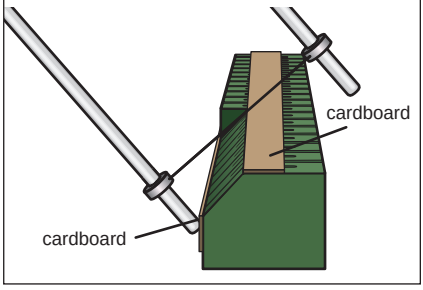
Real roads and railroads are often banked slightly on curves. Some modelers choose to bank their layout's roads and track to enhance realism. Insert shims under Risers or Inclines/Declines around the outside of curves. These shims will be glued in place after testing your layout.



TRIMMING RISERS, INCLINE/DECLINE SETS AND STARTERS ONLINE VIDEO

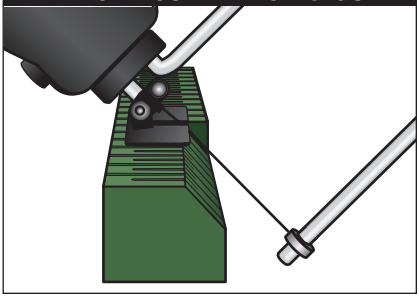
Trimming Risers and Inclines/Declines should not be necessary unless their position interferes with pre-existing landscape features, such as gullies or mountains. This should only occur if you are building on an existing layout, which already has terrain features installed. If it is a tight fit for a Riser, it is likely to be a tight fit for your train. Be sure to test before committing glue to the layout. However, if interference occurs, you do have some leeway to modify Risers and Incline/Decline Sets and Starters.

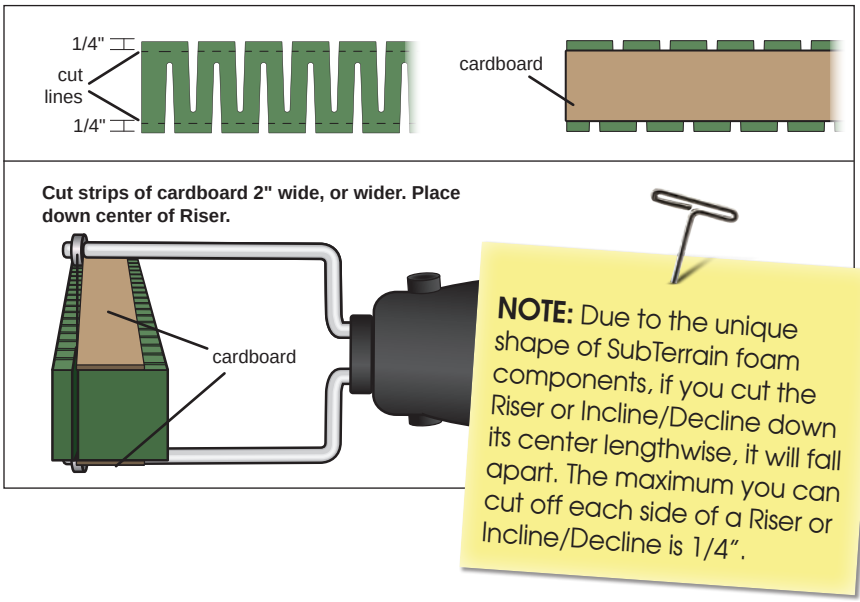
USING HOT WIRE FOAM CUTTER WITH STRIPS OF CARDBOARD



Risers and Inclines/Declines can also be beveled at the top to provide a narrower surface for laying track. This can be especially useful for N scale modelers and creating gullies and ditches along the track side. Cut bevels prior to installing foam. If you plan to do a lot of beveling, try the Bow & Guide. Attach the Bow & Guide to your Hot Wire Foam Cutter. Set the angle of the guide to the angle of the desired bevel.

USING HOT WIRE FOAM CUTTER WITH FOAM CUTTER BOW & GUIDE





NOTE: Due to the unique shape of SubTerrain foam components, if you cut the Riser or Incline/Decline down its center lengthwise, it will fall apart. The maximum you can cut off each side of a Riser or Incline/Decline is 1/4".

BUILD STREETS AND ROADS

A realistic layout needs streets and roads leading to the industries, towns and other buildings. Roads can have more dramatic grades and turn or bank more sharply than tracks. They can be included almost anywhere. If you want a steep incline leading directly into a deep decline, roads are where you can do this.

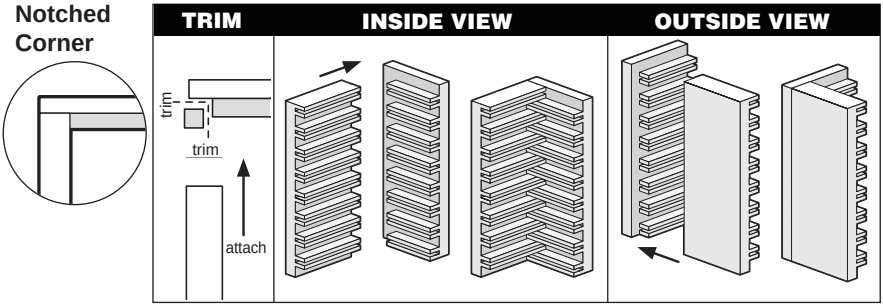
Building roads is easy. Use any combination of Risers, Incline/Decline Sets and Incline/Decline Starters in the same manner as they are used to support track. Place two Risers side-by-side to make wider roads if desired. If the roads on your layout bear no significant weight, they may be suspended and supported with pieces of scrap foam. If you are using Road Risers, use 2" Support Panels and Sticky Spots to elevate your roads. Later, streets and roads will be covered with Plaster Cloth and paved with the Road System (pages 93-100).

INSTALLING PROFILE BOARDS ONLINE VIDEO

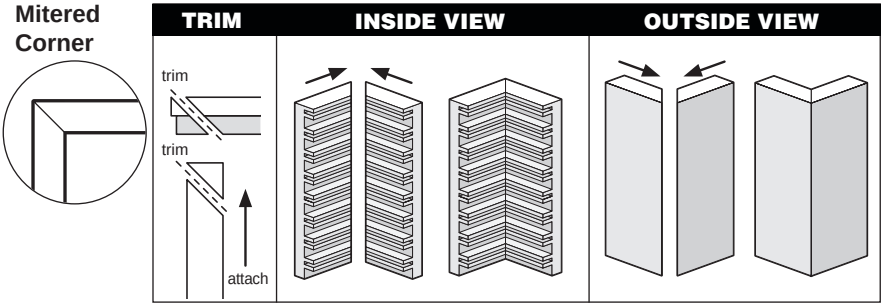
Profile Boards are designed to interlock at corners by turning the adjoining boards upside down. Pin the Profile Boards to the base with Foam Nails. For a seamless joint, the Profile Boards can be cut at a 45° angle (mitered) at the corner using the Hot Wire Foam Cutter with the Bow & Guide attachment. If your corners are not mitered, cut 1/2" x 1/2" strips from Profile Board scrap. Fill the void at each corner where the Profile Boards meet and trim to the height of each corner. You can also notch the corners of the Profile Boards for a flush fit.

Profile Boards may extend past the end of the base. If this happens, trim the end of the Profile Board with the Hot Wire Foam Cutter or Foam Knife. Use a straight edge to ensure a straight, square cut.

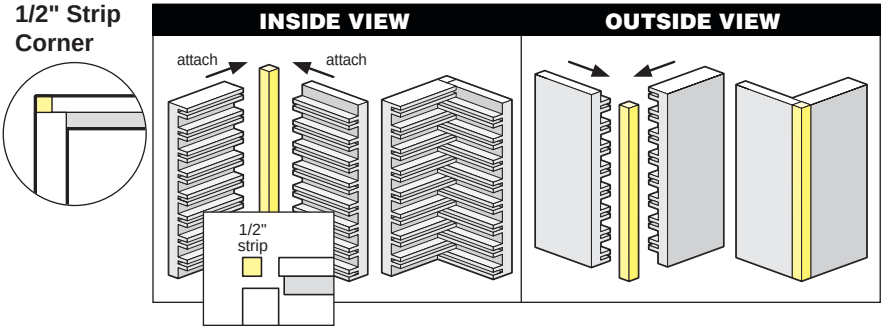
Notched Corner



Mitered Corner

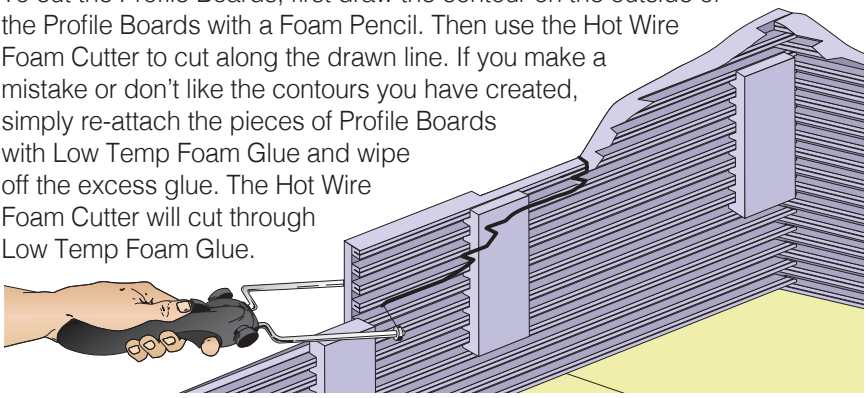


1/2" Strip Corner



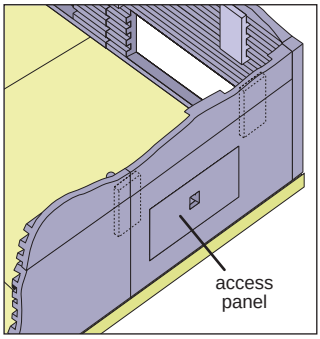
CUT CONTOURS

To cut the Profile Boards, first draw the contour on the outside of the Profile Boards with a Foam Pencil. Then use the Hot Wire Foam Cutter to cut along the drawn line. If you make a mistake or don't like the contours you have created, simply re-attach the pieces of Profile Boards with Low Temp Foam Glue and wipe off the excess glue. The Hot Wire Foam Cutter will cut through Low Temp Foam Glue.

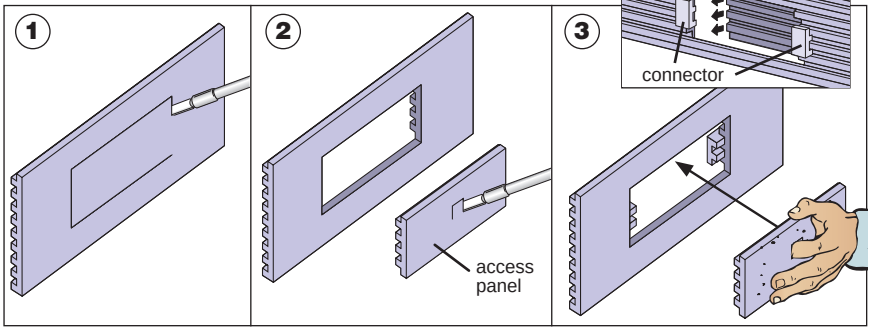


CREATE TUNNELS, OVERPASSES AND ELEVATED AREAS ONLINE VIDEO

Tunnels are useful features on layouts because they create a view block where the train can disappear and reappear. Before creating a Tunnel, consider a couple of things. For cleaning and derailments, you need a way to access the track within your tunnel. The SubTerrain system makes creating this access easy because you can simply cut an access panel into a Profile Board that will allow you to reach into the tunnel. Plan to create access panels in your layout planning phase.

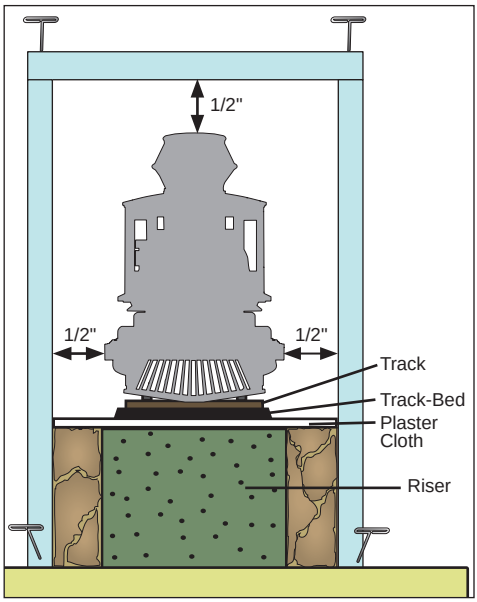


You can make tunnels out of Foam Sheets, Modeling Sheets, Tunnel Liner Form or Shaper Sheet. Using Shaper Sheet for terrain contours, like tunnels, will be discussed further in Chapter 2 (page 69).

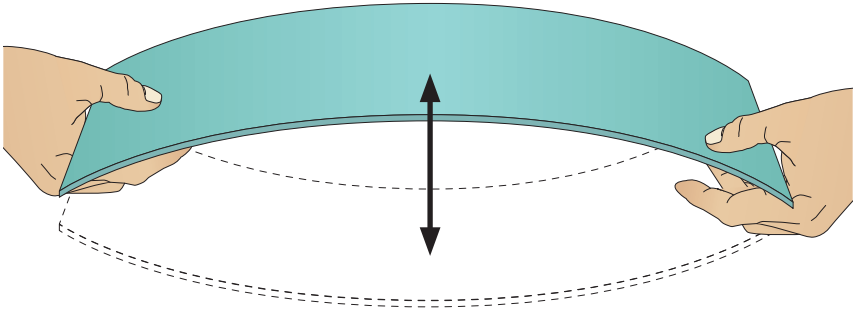


TUNNELS WITH FOAM SHEETS AND MODELING SHEETS

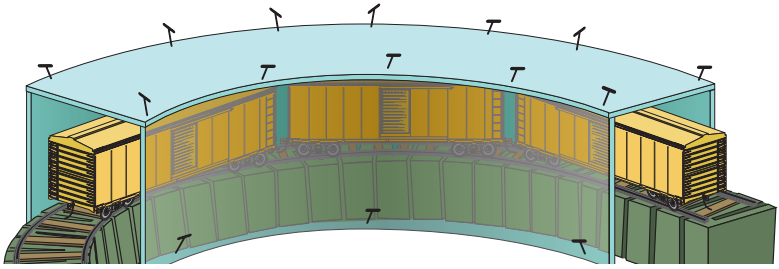
Cut Foam Sheets to form tunnel sides and ceilings. These will support terrain contours and keep the track area clear. Pin the foam in place with Foam Nails. To ensure adequate clearance between tunnel sides and track, place the walls at least 1/2" away from the Risers. Allow 1/2" in height for the track and Track-Bed (page 76) to be installed. Use scrap pieces of 1/2" foam as spacers.



If your tunnel curves, you will need to bend the tunnel wall, creating a vertical curved area. Cut a 1/4" Foam Sheet or any size Modeling Sheet to the desired height. Gently flex the foam back and forth. You will hear it “give” as you flex it. When testing your layout, check for clearance to make sure there are no problems when a train goes through the tunnel.

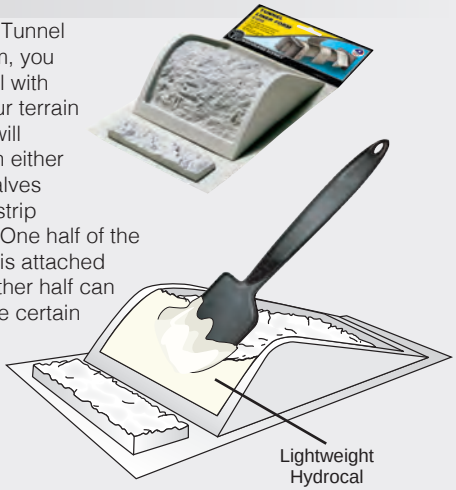


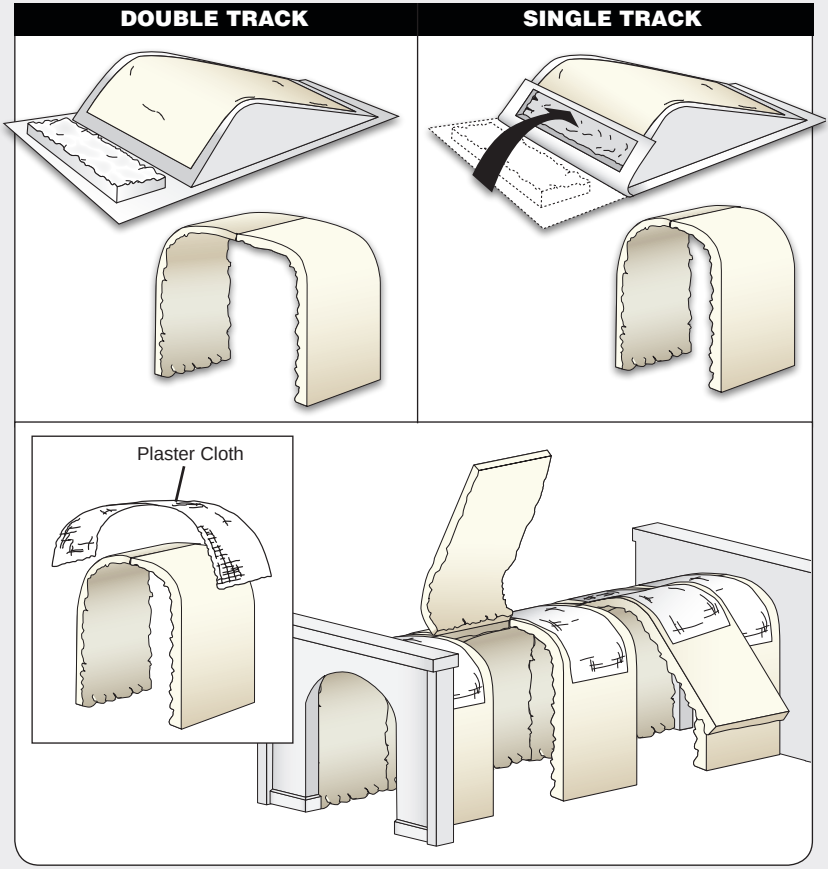
Before permanently attaching the tunnel sides and ceiling, you will need to install the track in areas covered by the tunnel. Chapter 2, Terrain, will cover installation of track in tunnels. Be sure to read ahead before you permanently install your track.



Tunnel Liner Form

Another tunnel formation option is the Tunnel Liner Form. With the Tunnel Liner Form, you can create plaster castings of a tunnel with realistic texture that will blend with your terrain features. Each casting from the form will produce one half of a tunnel section in either single or double track width. These halves are then connected on the top with a strip of Plaster Cloth, which forms a hinge. One half of the tunnel will remain stationary. This half is attached directly to the terrain base while the other half can be raised for repairs to the track. Make certain you have a way to access the section of the tunnel that opens. Use the Tunnel Liner Form with Lightweight Hydrocal® Plaster, Shaper Sheet Plaster or Super Strength Plaster (pages 62-63).



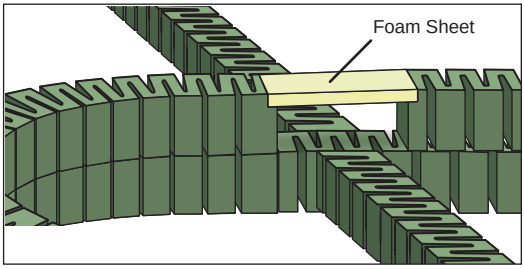


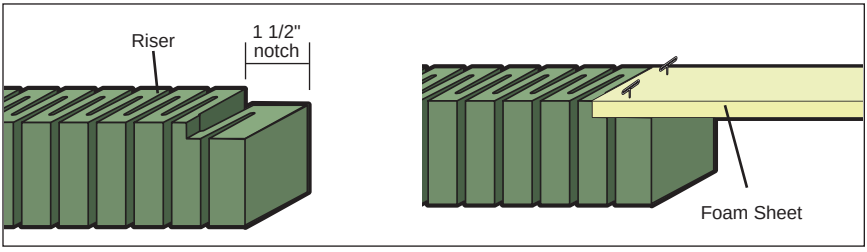
OVERPASSES

A layout may call for track or roads to pass over or under each other. If your layout calls for this kind of overpass, keep in mind that you will need adequate clearance both horizontally and vertically. The amount of clearance will depend upon the scale of your layout. Check trains or vehicles that will pass through. Inclines/Declines (4") are the ideal height for an HO scale layout overpass.

When creating an overpass it is important to adequately support the upper track or road. Use at least 1/2" Foam Sheets for the upper support. If the gap is large you may wish to use thicker foam for proper support. Cut a piece of Foam Sheet 2 1/2" wide (the width of a Riser) and 3" longer than the length of the opening.

Now cut notches in the tops of the Riser at either end of the overpass. These notches should be 1 1/2" long. Nestle the Foam Sheet into the opening on the Risers and pin in place.





BRIDGES

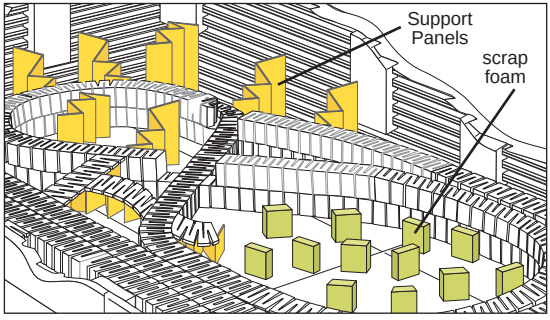
Bridges differ depending on model and manufacturer. Always review the bridge manufacturer's instructions before installation. Paint the bridge before installation. Once your bridge is painted, attach the bridge to Risers. If your bridge includes a track section as part of the bridge, attach it to the layout when you install the track. If your bridge has a flat deck on which track will be laid, it should be installed along with the Track-Bed (page 76).

Some bridges have a thinner or narrower area where the bridge is to be attached to the layout. Examine the underside of your bridge. Use a Foam Pencil to mark your layout where the bridge will rest, then place it on the layout. Double check the bridge's positioning and alignment. Check to be sure it is at the right elevation to meet your track and also is positioned correctly on each side where it connects to the layout. Notch the foam or install shims wherever necessary to make sure the bridge is placed correctly. When you are satisfied with the bridge's position, glue the bridge in place.

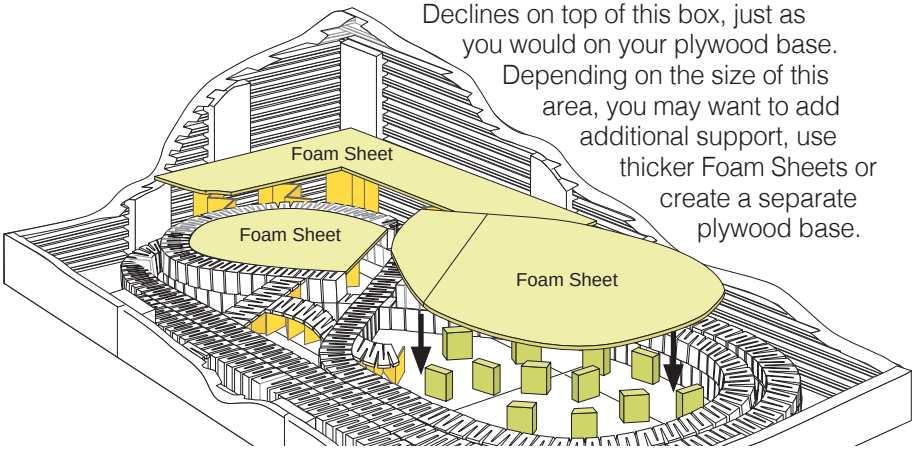
CREATE LEVEL ELEVATED AREAS

When creating towns and parking areas or placing buildings, you might want an elevated flat area. Decide where the area will be located and what shape it should be. If the elevated area must fit the contours of a Riser or other feature, trace the contour on a sheet of paper, then transfer the shape to a Foam Sheet. Cut the contour with a Hot Wire Foam Cutter or Foam Knife.

Support Panels can be cut to size and used under Foam Sheets to create elevated flat areas. You can also cut several small pieces of foam from scraps if you need a different height. Pin the foam in place to test the height of your supports.

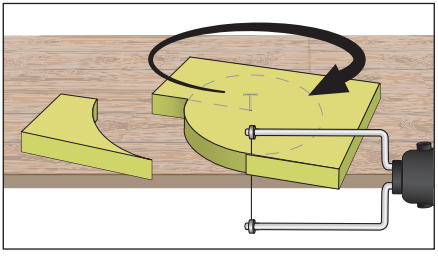


It would also be possible to build a separate elevated area. Construct a "box" out of Foam Sheets to support this area. Place this box on your layout. Use Inclines/Declines to reach this elevated area. Install Risers and Inclines/Declines on top of this box, just as you would on your plywood base. Depending on the size of this area, you may want to add additional support, use thicker Foam Sheets or create a separate plywood base.



CUTTING FOAM CIRCLES

It is easy to cut perfect circles from Foam Sheets with the Hot Wire Foam Cutter. Use a Foam Nail to pin a piece of foam to your work table. The Foam Nail should be the same distance from the edge of the table as the radius of your circle. Hold your Hot Wire Foam Cutter against the edge of the table and rotate the piece of foam around the Foam Nail. As the foam rotates, the Hot Wire Foam Cutter will cut a perfect circle.



TEST YOUR LAYOUT

Once all of the Risers and Inclines/Declines are firmly pinned in place, test your track. Lay the track sections directly on top of the SubTerrain Risers and Inclines/Declines. Pin track in place using Foam Nails. Stick Foam Nails in at an angle or push them all the way in to avoid interfering with your train.

Use rail joiners to mechanically and electrically join the track sections together. Be sure to use insulated rail joiners where appropriate to ensure proper wiring and current flow. Run wiring neatly down the sides of Risers and Inclines/Declines and along the base to the power supply. Connect all necessary wiring to the track, turnouts and power supply. Follow the wiring instructions for your track plan, power supply and turnouts, or review one of the many books on wiring available from your local hobby shop.

Now you can test-run your train. Check for derailing. Since Risers and Incline/Declines are not permanently installed, they can be removed, repositioned and re-pinned as necessary.

This is also a good time to be sure your engine will pull your train up steep grades. Check Risers and Inclines/Declines to be certain they are centered under the track and the track joints all fit together tightly. Adjust as needed.

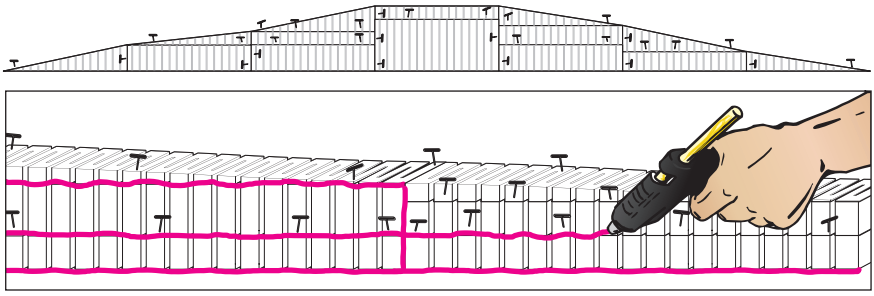
ADHERING FOAM COMPONENTS

ONLINE VIDEO

Once you are satisfied with how your understructure functions, it is time to permanently install the SubTerrain foam components.

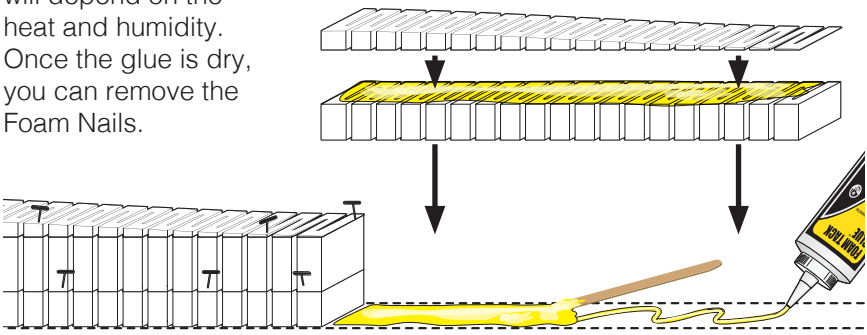
USING LOW TEMP FOAM GLUE

If you use Low Temp Foam Glue, run a bead of glue around where each foam component connects to the next one. This glue will set quickly. It is usually not necessary to move or disassemble your work in order to apply the glue. This technique will allow you to test your work and make changes as necessary before permanently gluing anything in place. You can also use Low Temp Foam Glue between sheets of foam, as well as between foam and other products. Remove Foam Nails once the glue is dry.



USING FOAM TACK GLUE

Foam Tack Glue must be spread on the surface of materials in order to adhere together, so you will have to take your work apart in order to apply the glue. This glue also sets more slowly than Low Temp Foam Glue, so you will want to use Foam Nails until the foam sets. Drying time will depend on the heat and humidity. Once the glue is dry, you can remove the Foam Nails.



CONTACT CEMENT

Glue requires air to dry. If you spread Foam Tack Glue on a Foam Sheet and attempt to place another Foam Sheet over it, the glue will not dry in the center. When you are using Foam Tack Glue to adhere foam components, consider using it as contact cement. Using Foam Tack Glue as contact cement creates an instant bond between the foam components and allows large surfaces to be adhered to each other.

To use Foam Tack Glue as contact cement, spread an even layer of Foam Tack Glue on the two surfaces that will be glued together. Allow the Foam Tack Glue to dry until it is clear and tacky. The maximum working time is 1 hour. Once it is clear and tacky, align and press the components together. The glue will bond the two surfaces together almost instantly. Work in manageable sections. If the maximum working time is exceeded and the glue dries out, simply spread another layer over the first and start the process over. Always use this method when sandwiching large sections of Foam Sheets together.

PRE-ASSEMBLE RISERS AND INCLINES/DECLINES

Simplify installation of Incline/Decline Starters and Risers by pre-assembling sections. Start with the lowest section and work toward the highest. Stack Risers and Incline/Decline Starters to desired height. Glue these together with the Low Temp Foam Glue Gun, or Foam Tack Glue. Install these pre-assembled sections just as you would Incline/Decline Sets.