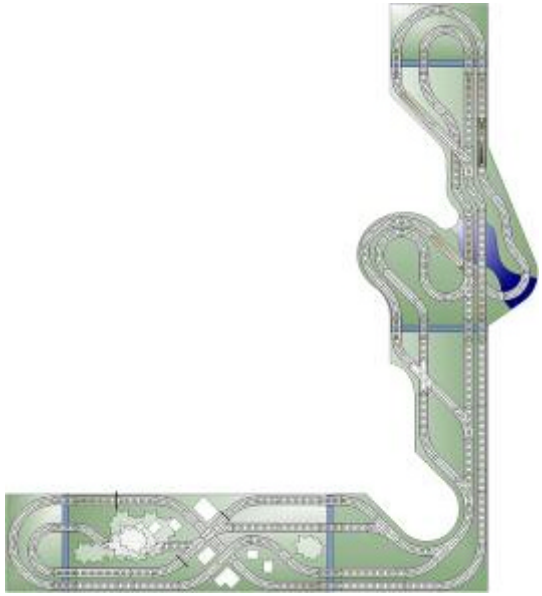
Wood Track Modules

A Modular Standard for Wood Track Tables and Shelf Railways



First Edition, December 22, 2008

Introduction

Our family has set up large wooden train layouts for neighborhood kids, preschool classes, and church events over the years. It is such a delight to watch a child's face alight when they see a large train layout that they can actually interact with. Model train shows are great – but these running displays are rarely intended for small hands to touch or play with.

A large wooden railway presents challenges though. Awkward little feet totter through, trip over track, and frustrate other children. Add to that the strain that develops at critical points as different areas of a large layout are pushed against – popping connectors and breaking track. A large layout takes considerable thought and time to conceive and set up too.

Raised train tables offer a partial solution, but most are far too large to transport and quite impossible to reach across. A few might be clamped together to create a larger table, but they need a flush edge to facilitate running tracks between tables. Since few homes and even fewer apartments have a large area that can accommodate a 4'x8' or larger train table in the middle of the room, smaller or narrower train tables need to be available as an alternative…

Model railroaders have developed a number of solutions that can be adapted for wooden railways. Modular segments are one solution to transporting large layouts. Modules also allow for reconfiguration and collaboration with others with mating segments. Another strategy for limited space and accessibility is a wall or shelf railroad. This allows for easy access to all tracks from one side and enables the layout to be placed against a wall instead of occupying the center of a room.

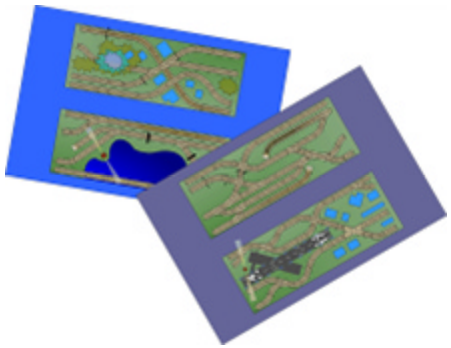
In looking further, I was surprised that I was unable to find narrow wood track tables or a wood track module standard. So having given this considerable thought, I submit the following as a standard... for both portable modules and shelf railways.

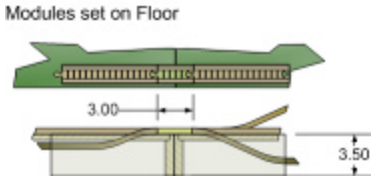
Module Characteristics

Segments are based on a standard 18” x 48” box that can sit on the floor or be raised to coffee table level for ease of play. Sections can also be incorporated into a shelf railroad along a wall – important for households unable to devote space for the very large play tables commonly offered. Adjacent sections can be clamped together or bolted to prevent stress on the track used to join modules.

This size simplifies construction using standard plywood sheets, allows sections to be easily carried in a backseat, and accommodates full radii using 6½” curve tracks. Even more important, the entire width of the table is usable from both sides. This allows more interaction and engagement and expands the complexity of the layouts possible.

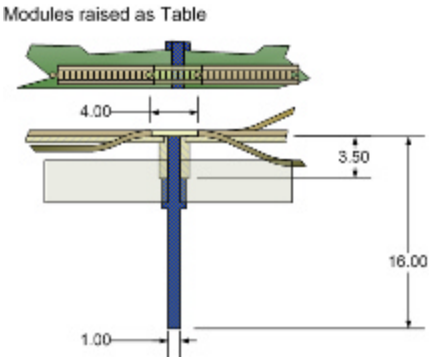
Using standard modules, segments can be reconfigured into a wide range of layouts. By adding new segments – or collaborating with others in your area – exciting and dynamic layouts can be set up at your church, school, or train show. Since moving around sections takes a little time, one strategy is to create a tile for each segment and manipulate these until you have a plan to act on... A friend of mine made me some for $2 a pair and they are really very neat – almost as much fun as playing with trains! If you would like to purchase a set based on the modules shown in this document, visit www.nicecoaster.com





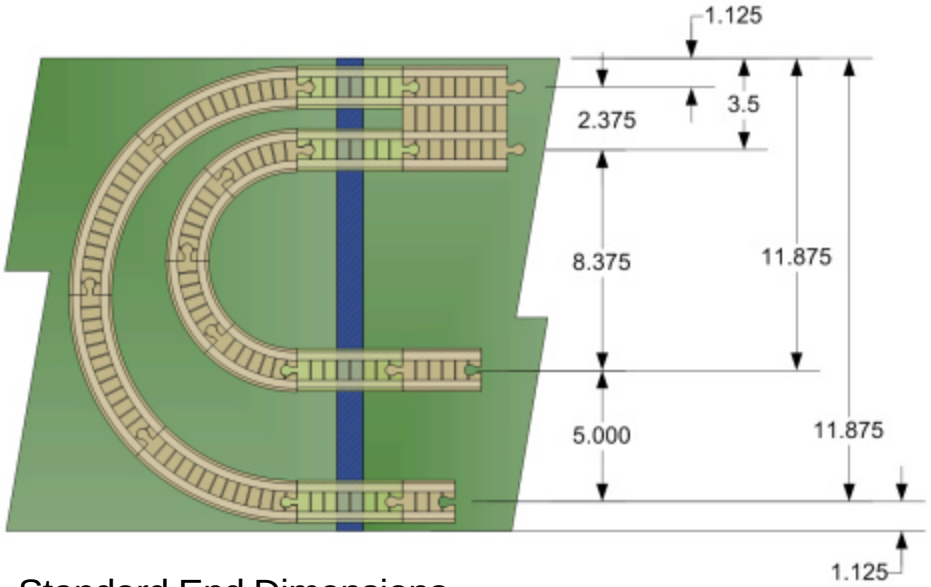
Modules on Floor

3” couplers used to join



Modules on Legs

4” couplers used to join



Standard End Dimensions

Based on a Large and Small Half Circle joined by a standard Double-Wide track

Safety

Unlike modular HO and N Gauge setups, these tables are meant to be played with interactively...by children of all ages. The modules should be rugged and support the weight of several children who may be determined to stand on it when you aren't watching. Child safety is the most important consideration, so it is underscored here at the very front of the document.

There are many safety guidelines for toys, playgrounds, cribs, and much more. It is essential that each modular segment be safe and secure. No element should poke, pinch, tangle, strangle, be swallowed, or trap a head, hand or finger. Paint selection is also an obvious consideration - oil paints must be avoided. Be certain to skim through available online resources or consult an expert as appropriate. Several great resources are listed below to help you get started...

http://www.cpsc.gov/cpscpub/pubs/toy_sfy.html

http://www.cpsc.gov/cpscpub/pubs/playpubs.html

SAFETY CHECKLIST

Use this simple checklist to help make sure your home is a safe place to play.

3. **Never attach**–or allow children to attach–**ropes**, jump ropes, clotheslines, or pet leashes; children can strangle on these.
4. Check for **hardware**, like open "S" hooks or protruding bolt ends, which can be hazardous.
5. Check for **spaces** that could trap children, such as openings spaces should measure less than 3.5 inches or more than 9 inches.
7. Check for **sharp points** or edges
8. Remove **tripping hazards**
9. Regularly **check play surfacing** to make sure in good condition
10. Carefully **supervise children** to make sure they are safe

U.S. Consumer Product Safety Commission
Washington, DC 20207

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Washington, D.C. 20207

To report a product hazard or a product-related injury, write to the U S Consumer Product Safety Commission, Washington, D C 20207, or call the toll-free hotline 1-800-638-2772 A teletypewriter for the hearing and speaking impaired is available on 1-800-638-8270

Write the U S Consumer Product Safety Commission, Office of Information and Public Affairs, Washington, D C 20207

Module Construction Details

The following standard segment details are what I used when constructing mine. Using an identical paint color for the first few inches at each end helps to integrate the segments in every possible configuration. I have read recommendations that flat paint should be used if painting surfaces (ends) that will be clamped together to prevent them from sticking together, but a satin or gloss finish will be easier to clean and more resistant to marks for the top surface of the table.

Use 4” tracks to join raised sections (assuming a 1” leg inserted) and 3” tracks when butted together on the floor.

Detailing Ideas

Edges and building sides can be covered with custom images – digital prints glued to the side and sealed – for added realism. This is a great way to refurbish buildings and bridges that have had a rough life in the toy chest.

Module Electrical Details

There are some great things that can be done with LED lighting – lighted buildings, sequential runway lights, a flashing lighthouse and airport beacon, pulsing buoy markers – but safety has to come first.

It is tempting to run 12 Volt DC jumpers between tables from underneath but that could be troublesome or unsafe. Jumpers could be 'hidden' by running these through the butted segment ends where they would not be accessible when the modules were clamped up, although this probably only makes sense for a permanent display.

A simpler and safer alternative is to power individual segments using 9 Volt batteries. This way, any 'powered' segments are truly compartmentalized. A Transformer and electrical connection to an outlet might be fine for a shelf railroad, but is sure to be a problem in the middle of a room full of kids... A small lockable panel below the module to hold the 9 volt battery ensures no contact with electrical connections. Add a switch to turn the lights on and off. Obviously lights should be positioned in a protected place. I put mine flush with a surface or behind lexan so they cannot get pulled on or crushed.

Lighthouse Flasher

Cycling flasher that simulates a rotating lighthouse beacon.

http://www.bakatronics.com/shop/item.aspx?itemid=575

Building Lights

LED lights turn on and off sequentially giving the buildings a "Lived in Look". Time between light changes can be set from 1 to 15 minutes on the circuit board.

http://www.bakatronics.com/shop/item.aspx?itemid=665

Steady or Chasing LED Kit for Airports & Beacons

Runway and Taxiway Lighting, Airport Beacons, Buildings

A couple of options for runways and buildings.

http://www.bakatronics.com/shop/item.aspx?itemid=234

http://www.bakatronics.com/shop/item.aspx?itemid=233

http://www.bakatronics.com/shop/item.aspx?itemid=578

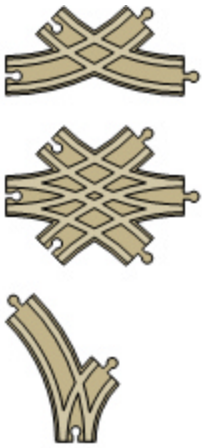
Typical Tracks

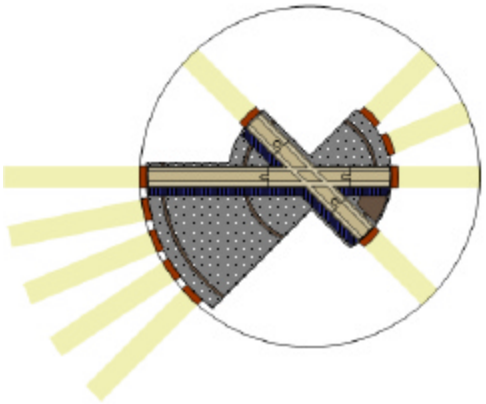
I used Visio to lay out my modules. That allowed me to be creative and create physcal tiles for the modules to use for preparing layouts. I prefer the Clickity-Clack Track that Learning Curve abandoned years ago (litigation may have been responsible.) This is still available on-line through eBay and other sources used. The dimensions are the same as for smooth track from Learning Curve, Brio, and other manufacturers from what I've seen.

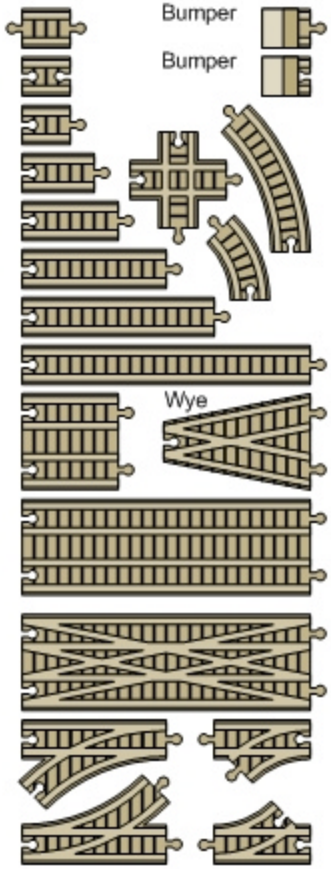
You may need to use a miter box to cut a few tracks to close any gaps. I've trimmed some of my adjacent crossing pieces to get them to space correctly and fix small gaps in straight sections interrupted with switches.

You may also want to create some of your own special track sections (a riser that curves to the left or right, a 22½° curve or crossing track, a custom turntable or slider, etc.) Rockler sells router bits that facilitate making custom track pieces. You can also use these bits to create 2½" straight pieces from any broken straight pieces on hand – something often needed to get lengths to come out right. You can also make additional crossing tracks from standard 4" straight tracks this way too...

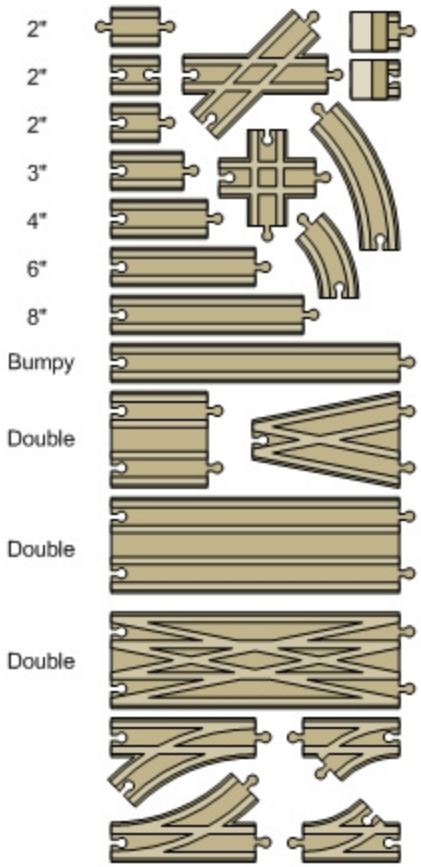
Some Custom Track Ideas...







Clickity-Clack Track
(Common pieces shown)

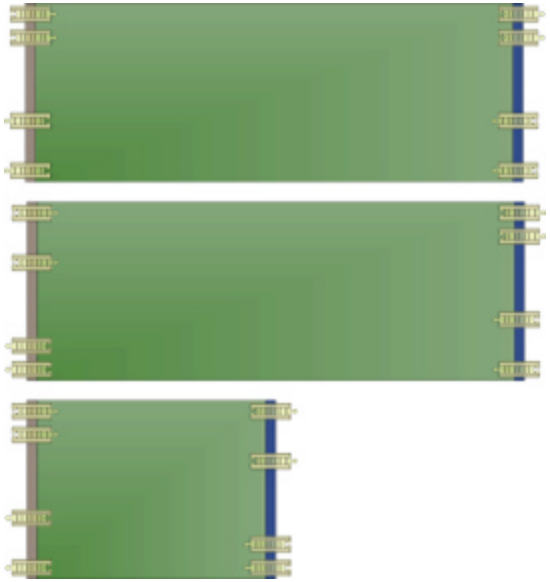


Smooth Track
(Common pieces shown)

Creating modules

Using standard end dimensions, straight, crossing, wye, tee, and other modules can be imagined. These can be **standard segments** (closest tracks enter and leave segment along same edge) or **crossover segments** (closest tracks switch edge from far to near). Only two crossover segments are needed to really add variety.

Below are some typical arrangements that really work in this 18" wide format without modification. Using custom or cut track pieces expands your options dramtically. Shorter and longer segments can be used to accomplish creative solutions as well.



Standard Module

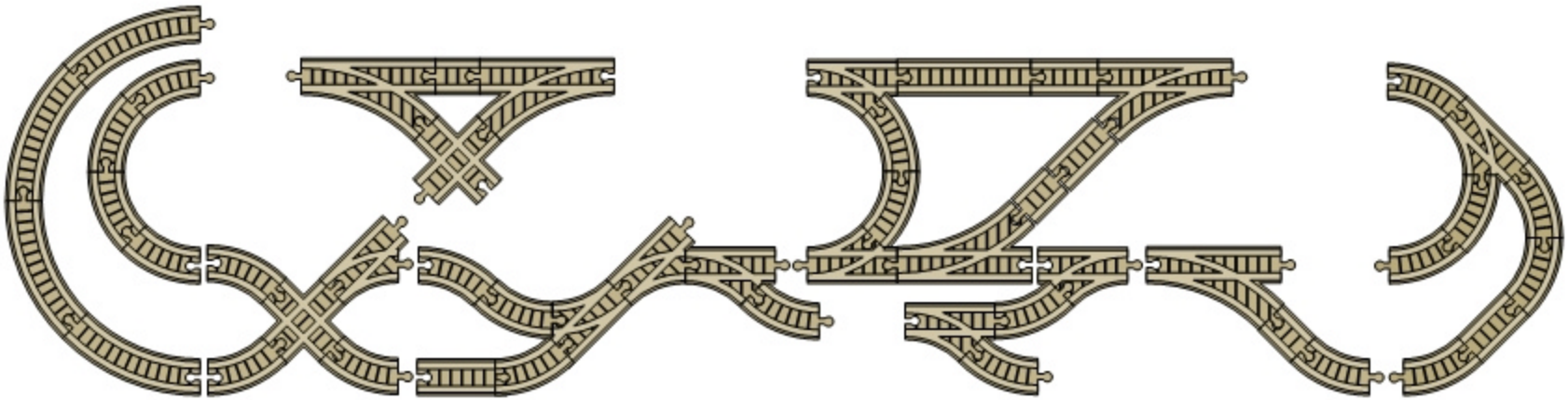
Tracks stay on same edge

Crossover Module

Type I

Crossover Module

Type II (short segment shown)



Track Blocks

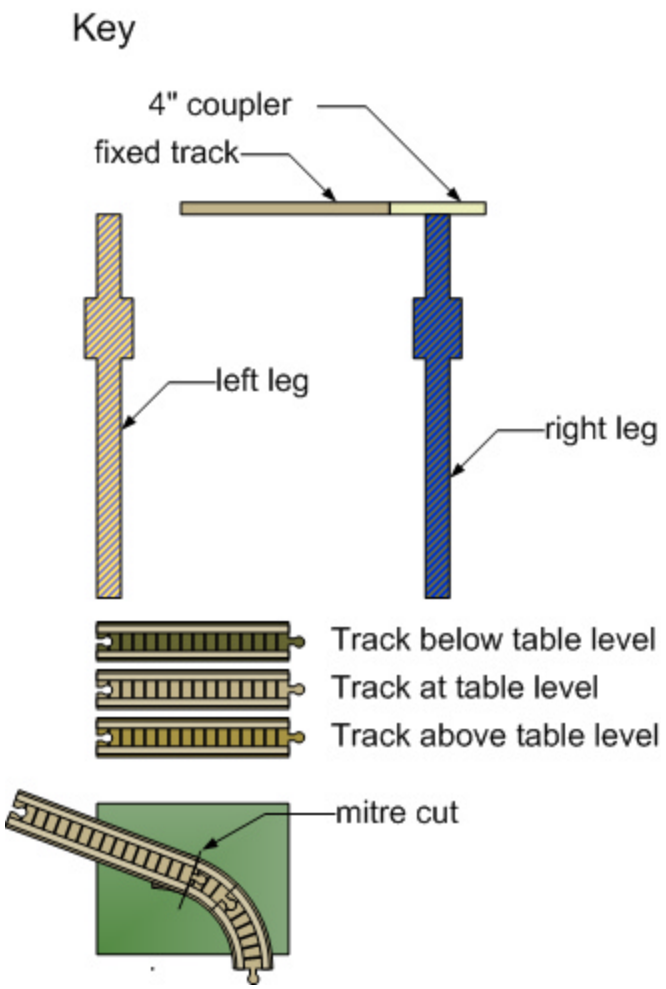
Typical transitions and blocks of track that do not require custom cuts

Key to conventions used

Following are some of the conventions used throughout this standard. For the simplest segments, care was taken to highlight where cuts may be required to achieve the layout. For the advanced sections, mitres are not shown.

The individual modules illustrate a leg at each end along with couplers need to join adjacent sections. Of course, as the modules are joined, only one leg is needed per segment added. The right leg is shown in blue to simplify counting the number of legs required to complete the layout.

Another challenge was showing where tracks bridge over or duck under the table level. This is shown using shaded variants.



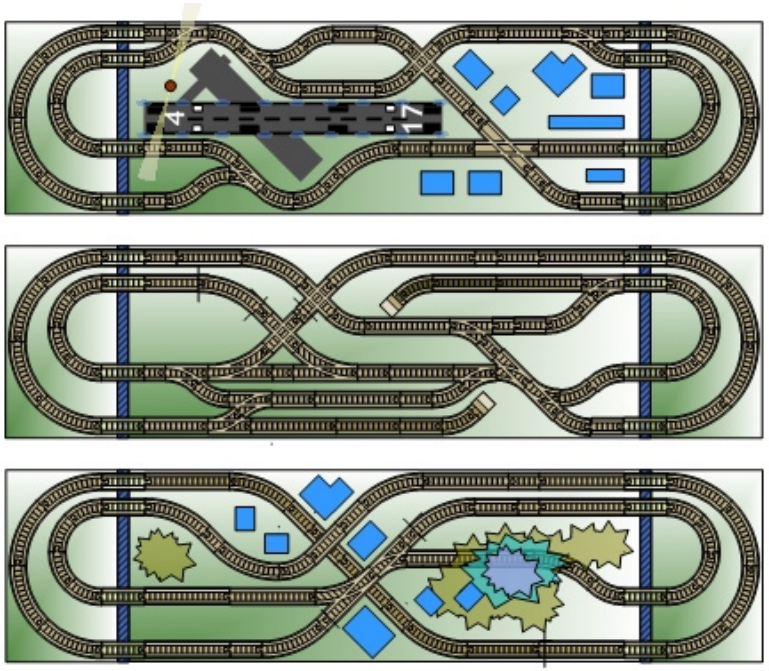
Standard Modules

Modular segments to get started with...

The following radiused ends and three modules follow the standard. Each has an individual character and style. Both ends and one standard module have a simple, flat play surface that are easy to construct. The other two incorporate ramps that drop below the main playing surface. Half-height ramps for sidings – made by shortening standard ramps – can be leveraged as well, though this can be omitted to simplify construction.

Several layout ideas follow for what I would describe as a starter set. They are easy to construct, simple to lay out, and provide plenty of creative layouts. They are also ideal for a shelf layout.

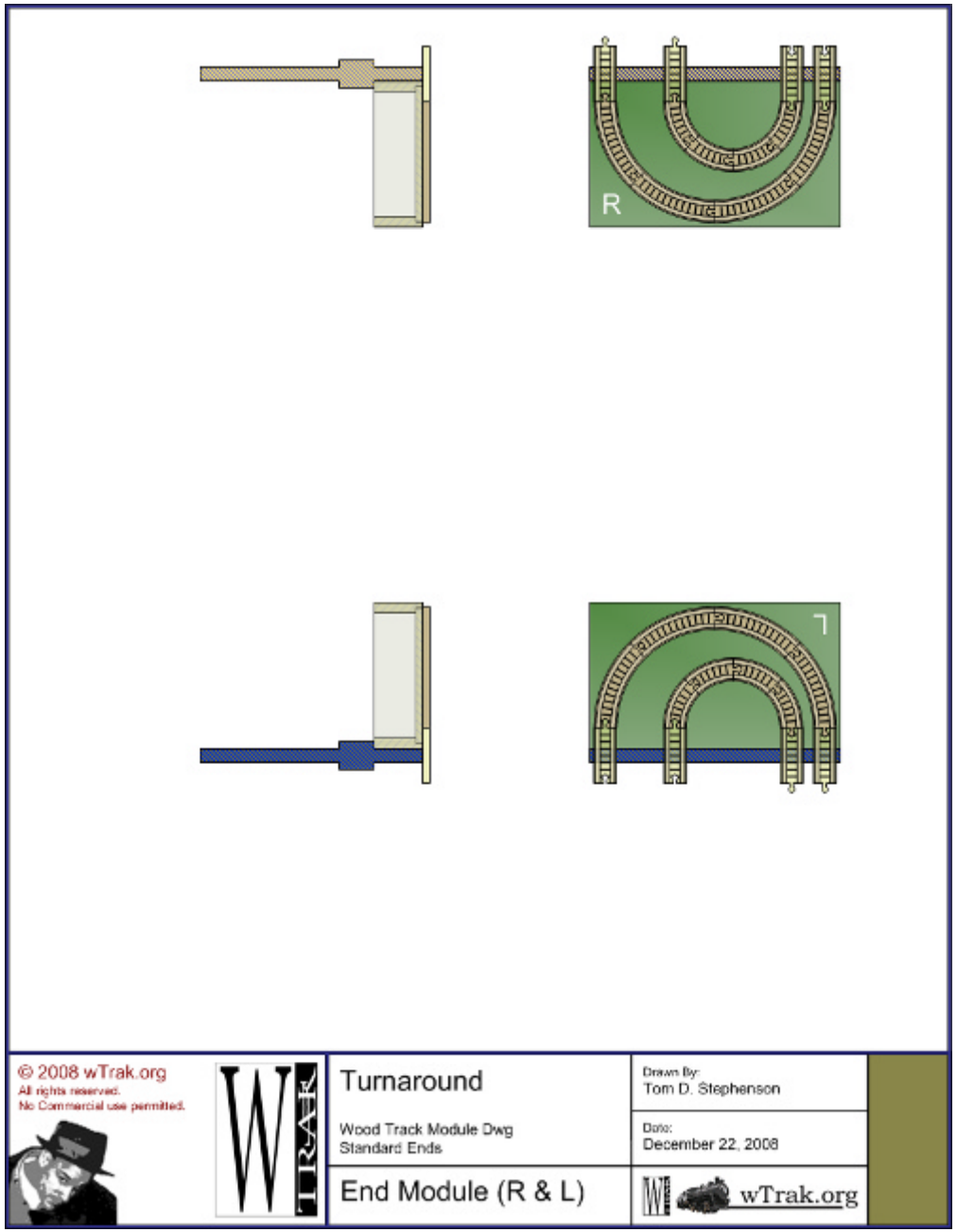
Microsoft Visio was used to develop these. The template and layouts are available online at www.wTrak.org



Turnaround

An turnaround module is needed at each end of a layout to ensure continuous play – and the most obvious solution is a half-radius.

You may wish to have two pairs to facilliate separate tables. They are very easy to construct.

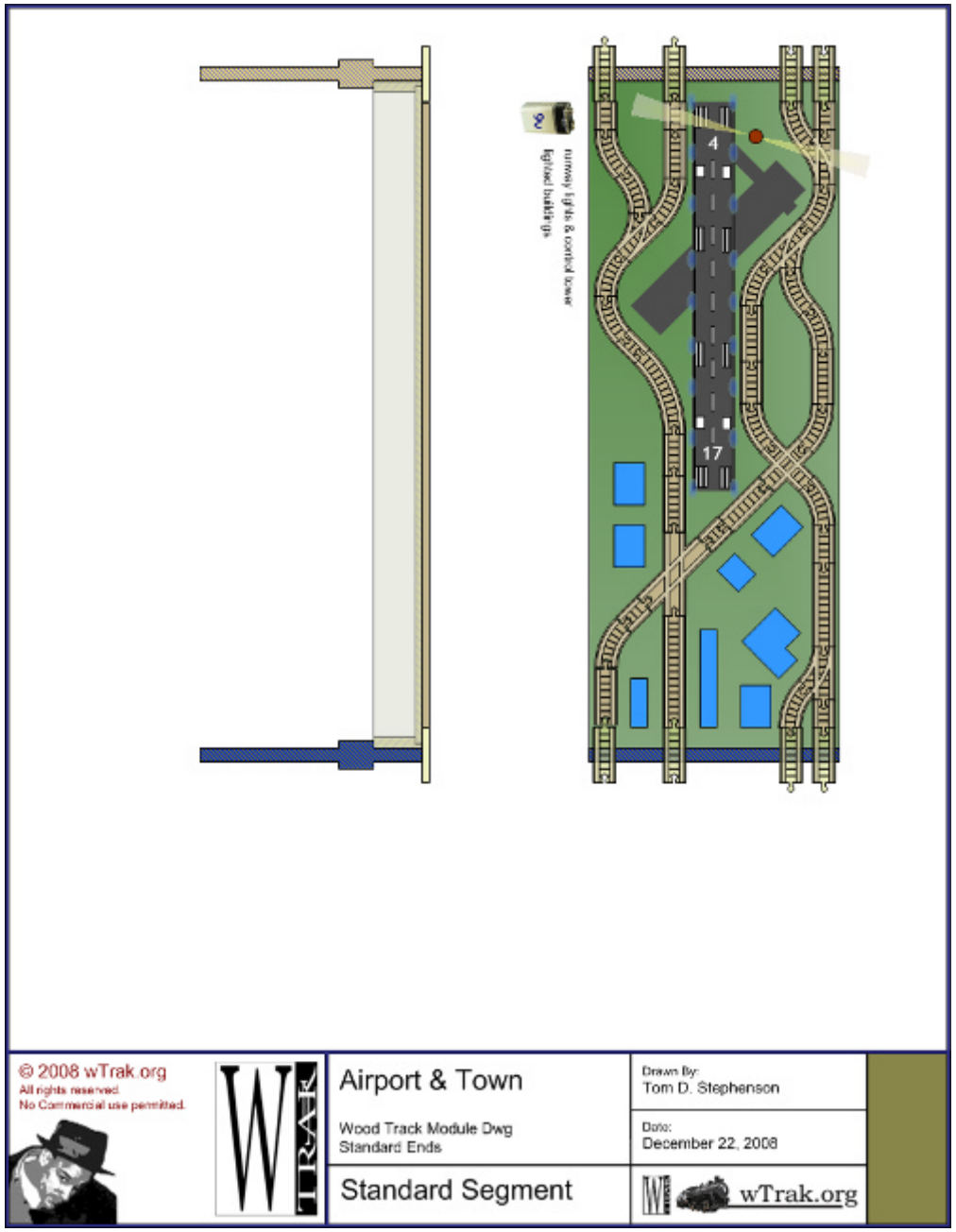


Airport & Town

Everybody loves an airport (except during holidays) so this simple, straight segment routes trains around a rural airfield and through a neighboring town. The tracks merge and branch making it easy to shift trains from one line to another through this section.

For those willing to invest a little more effort, it presents an opportunity to add sequentially lit runway lights, a flashing landing beacon, and lighted village buildings.

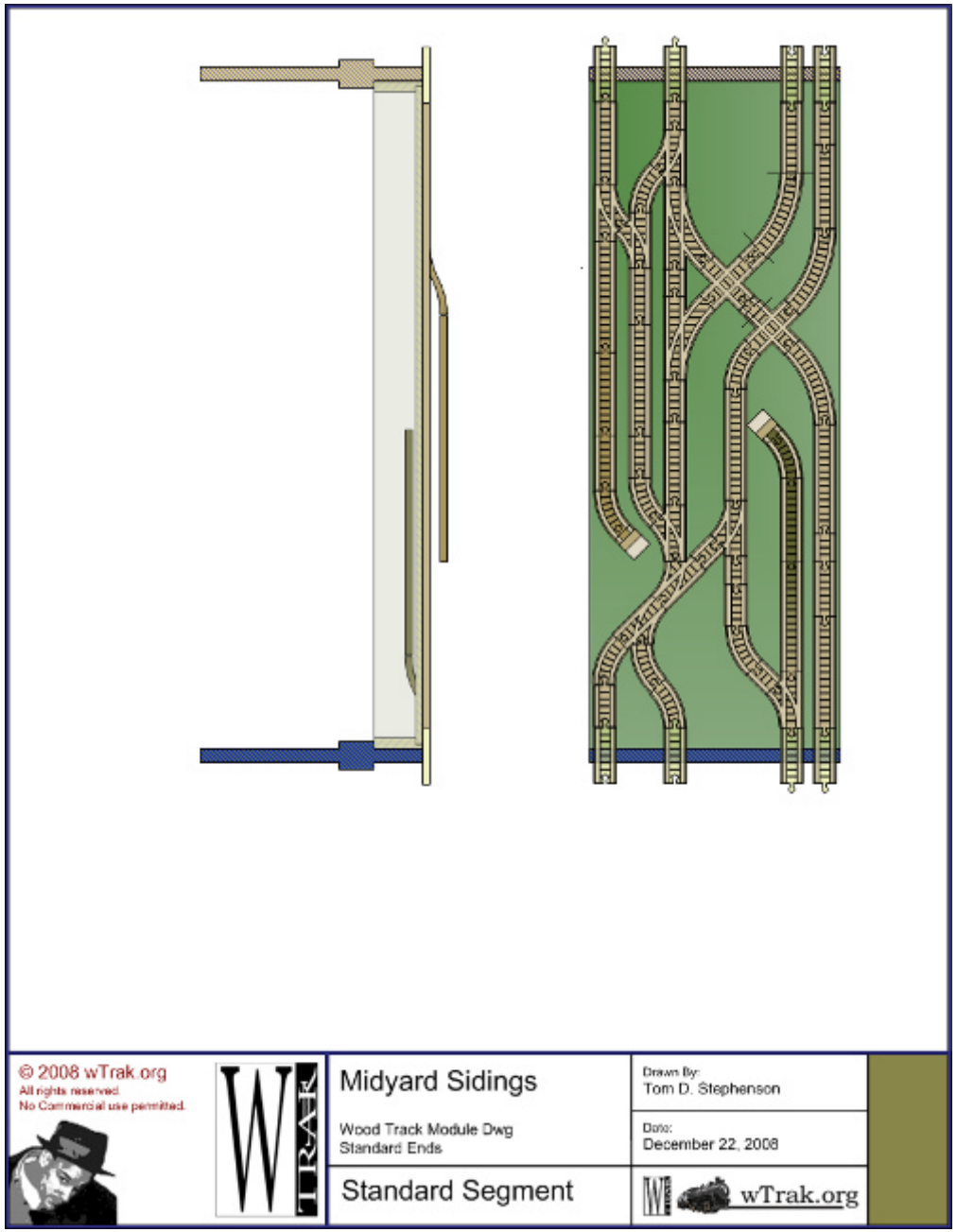
This module is flat and does not require trimming any tracks, making this a great first effort.



Midyard Sidings

Switches and sidings allow other trains to pass by and add interest.

This module can be flat, but adding a half-ramp up and/or down for the sidings is makes it even more interesting. You may need to make a couple of trim cuts to avoid gaps around the double crossovers. Still an easy first effort.



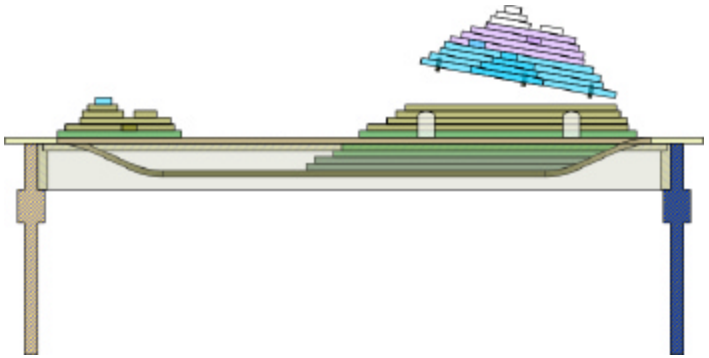
Mountain Village

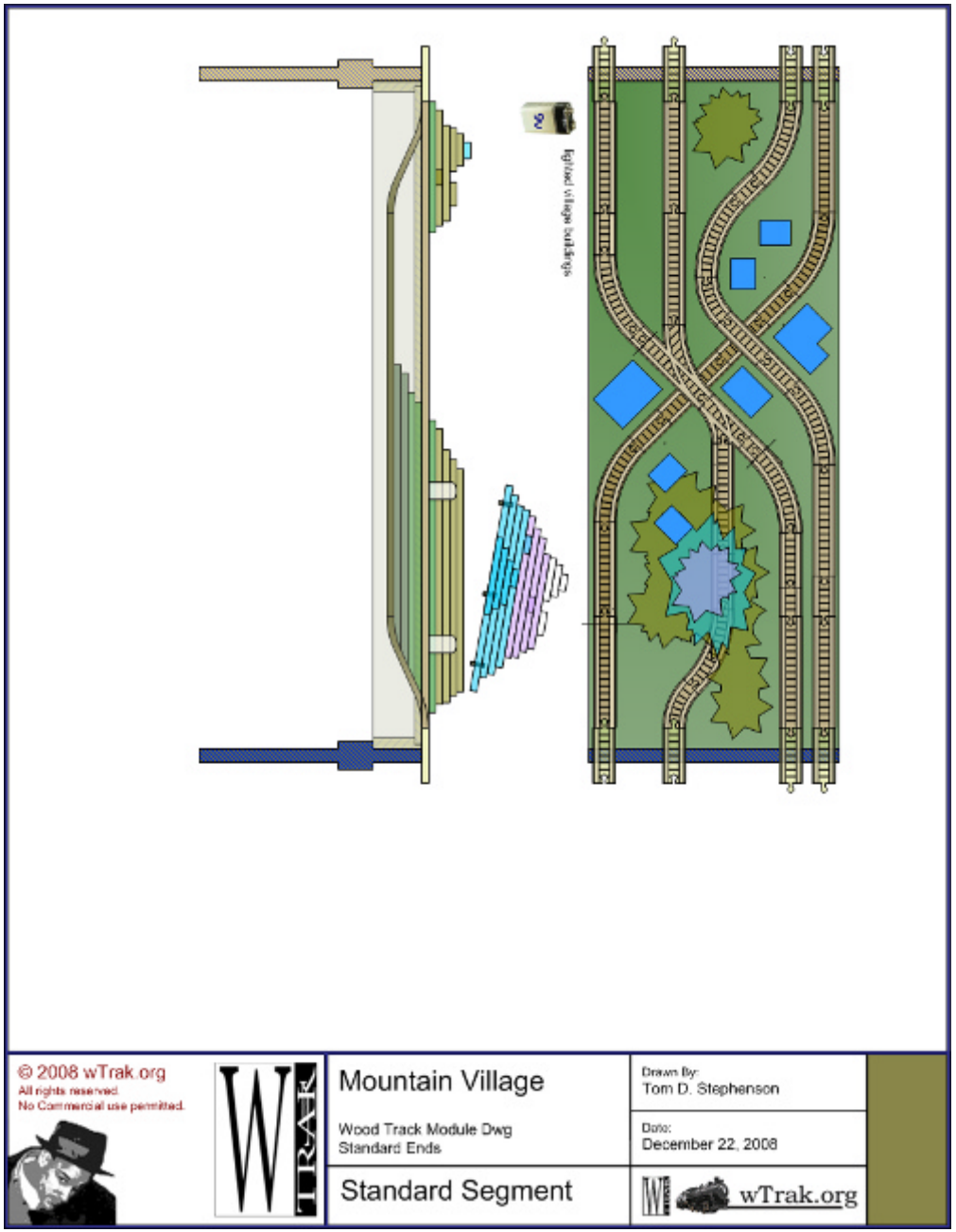
Designed with one track dropping below table-top level, this could be reversed to ascend instead to make the module easier to construct. Having a recessed track allows the base of the mountain to drop another 2½" though and adds even more drama to this segment!

An alpine village at the base of a mountain and passthru tunnel add depth and contrast. The village can be lit with LED white and flame lights for added warmth. Safety should trump creative details though.

The mountain can be constructed many ways, but a countour map style of stacked outlines is especially rugged and effective. Edges can be softened using a roundover or chamfer router bit. You might also try wood chisels and use doweled and glued blocks for a more realistic mountain. Sharp chiels, eye protection, and a first-aid kit are recommended if you embark on this path...

For transport and stacking, the portion above the 2½" level can be separated and set onto the mountain base using steel dowel pins for alignment and stability. Another great option is to use led lights in the 'ceiling' of the tunnel. A miniature mine train and shaft can be added and lit too...

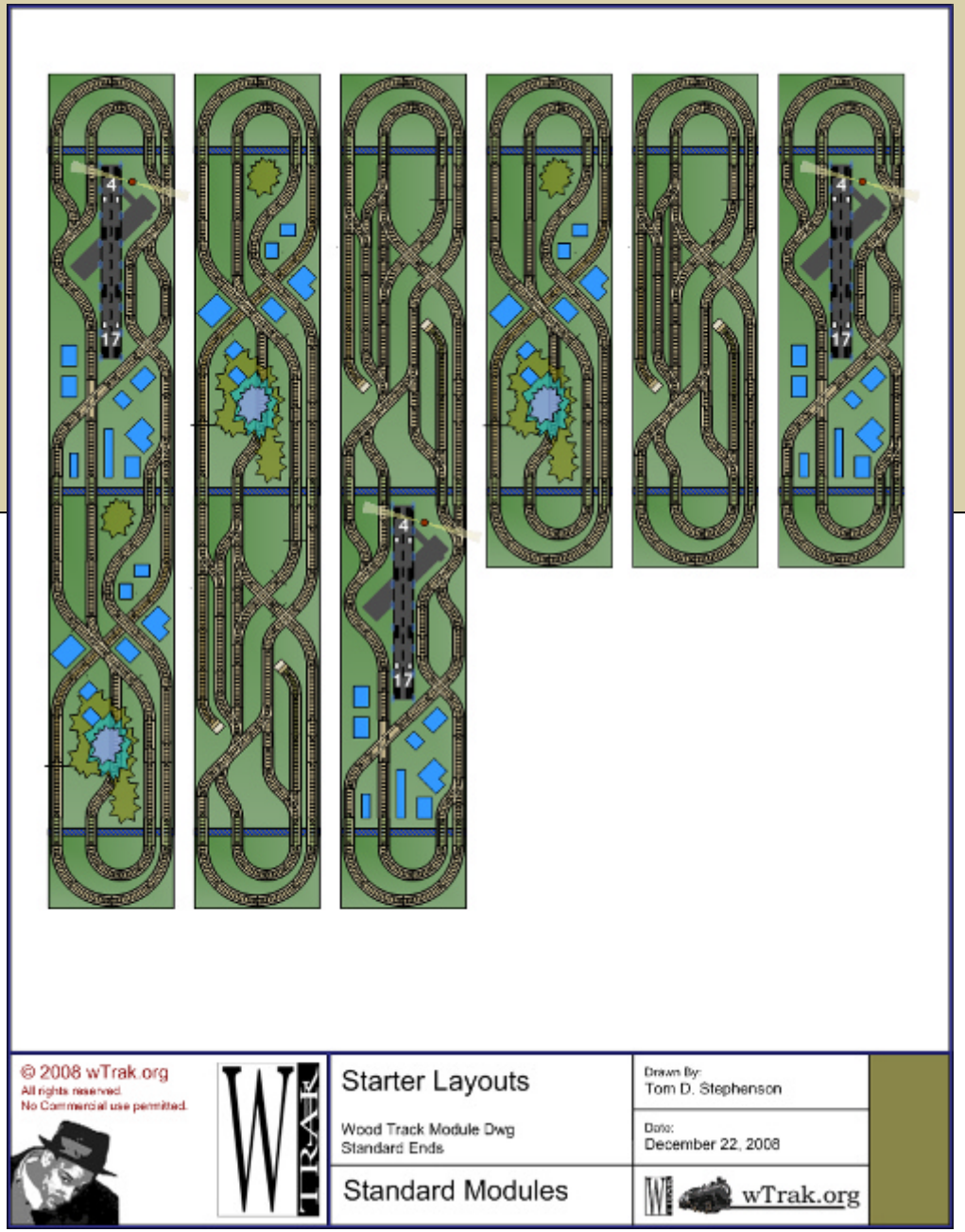




Standard Module Layouts

Shown are six layouts that can be accomplished using two turnarounds and one or two of the simplest modules. Additional layouts can be achieved using all three standard modules together. Add another pair of turnarounds and two separate tables are possible.

These layouts are all less than 10' long and 1½' wide – perfect for a shelf railway that would fit most rooms. You could even place one above a second and double your fun in the same footprint!



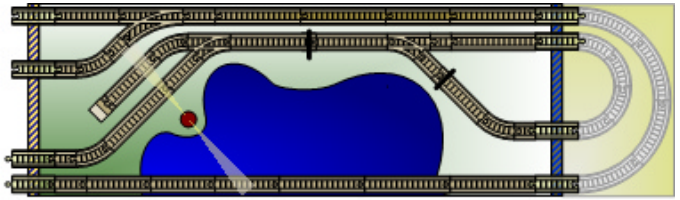
Expansion Modules

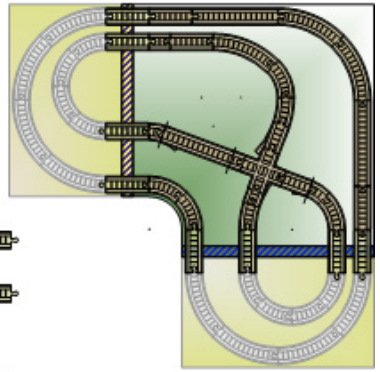
Modular segments that mix things up a bit...

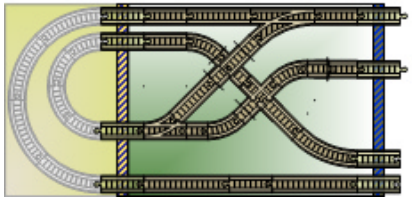
These next three modules include a corner (you may want to build two) and a pair of crossover segments that allow the standard segments to be rotated 180° and back again – dramatically expanding the number of possibilities.

The '*Bay and Bridge'* module can be constructed as a flat segment and painted. But recessing the bay and incorporating acrylic or laminate for the water, it becomes dramatic and engaging.

I found it desirable to custom mitre the track sections for both the '*Corner (short)'* and '*Criss Cross'* segments to ensure a clean, tight fit. It is challenging to achieve so much in such a confined space...







Bay & Bridge

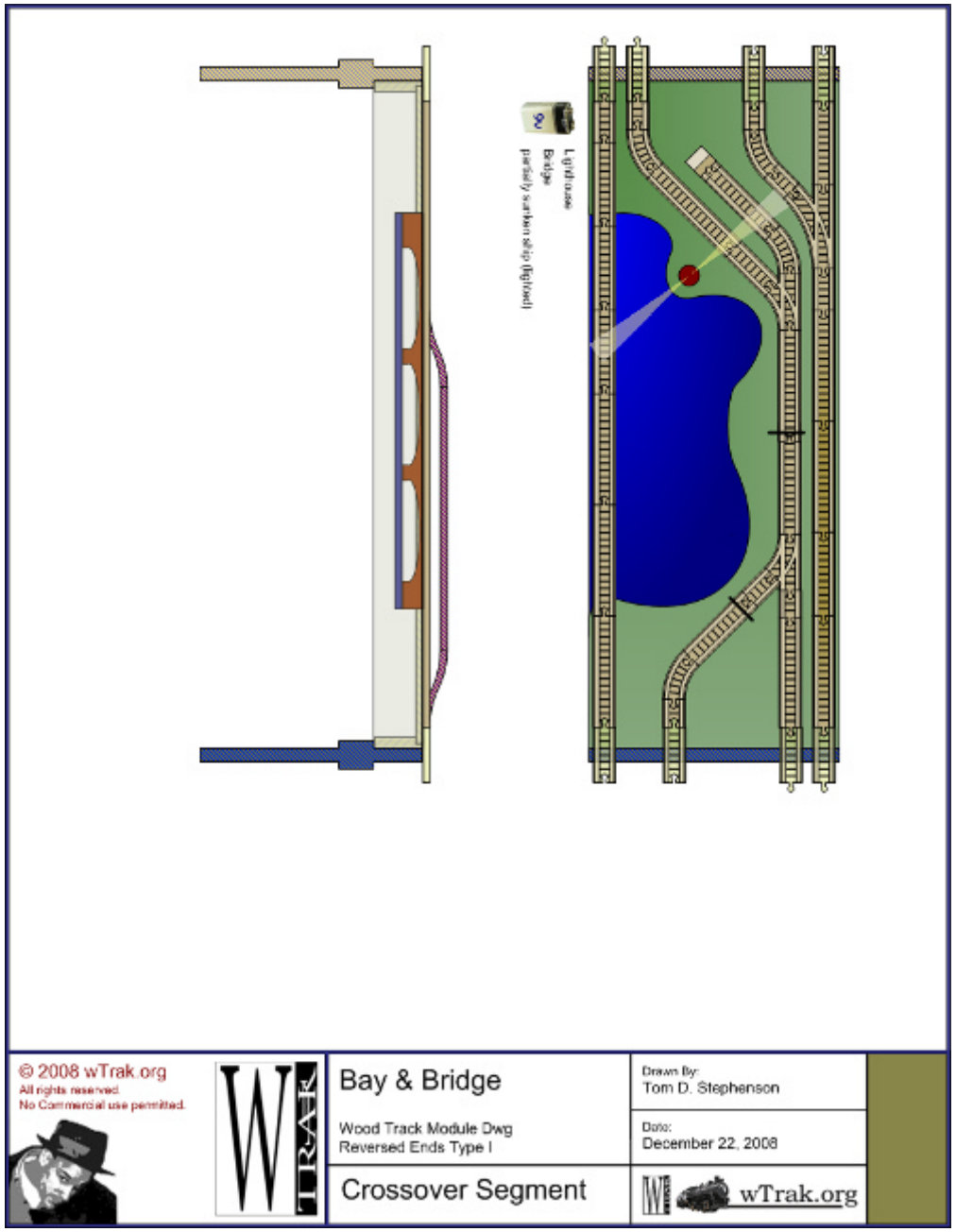
This crossover segment switches which edge the closest tracks run along. A second crossover segment is required to switch them back.

The paths of the tracks are clean and straightforward – a welcome break from the complexity of other modules. But the addition of water (perhaps acrylic with a digital photo underneath or laminate) and a long bridge add a visual focal point. A lighthouse, partially submerged ship, flashing buoy, and waterfront village can be added as well. How about a simulated whirlpool?

The bridge could be a dramatic and custom element. A basic plate/girder construction is strong and simple, but I can imagine a swing bridge here too.

Unless you plan to weld steel or braze aluminum, any variant of a truss bridge is probably to fragile to be practical. A series of 'concrete' arches or 'cantilevers' could probably be made to last though.

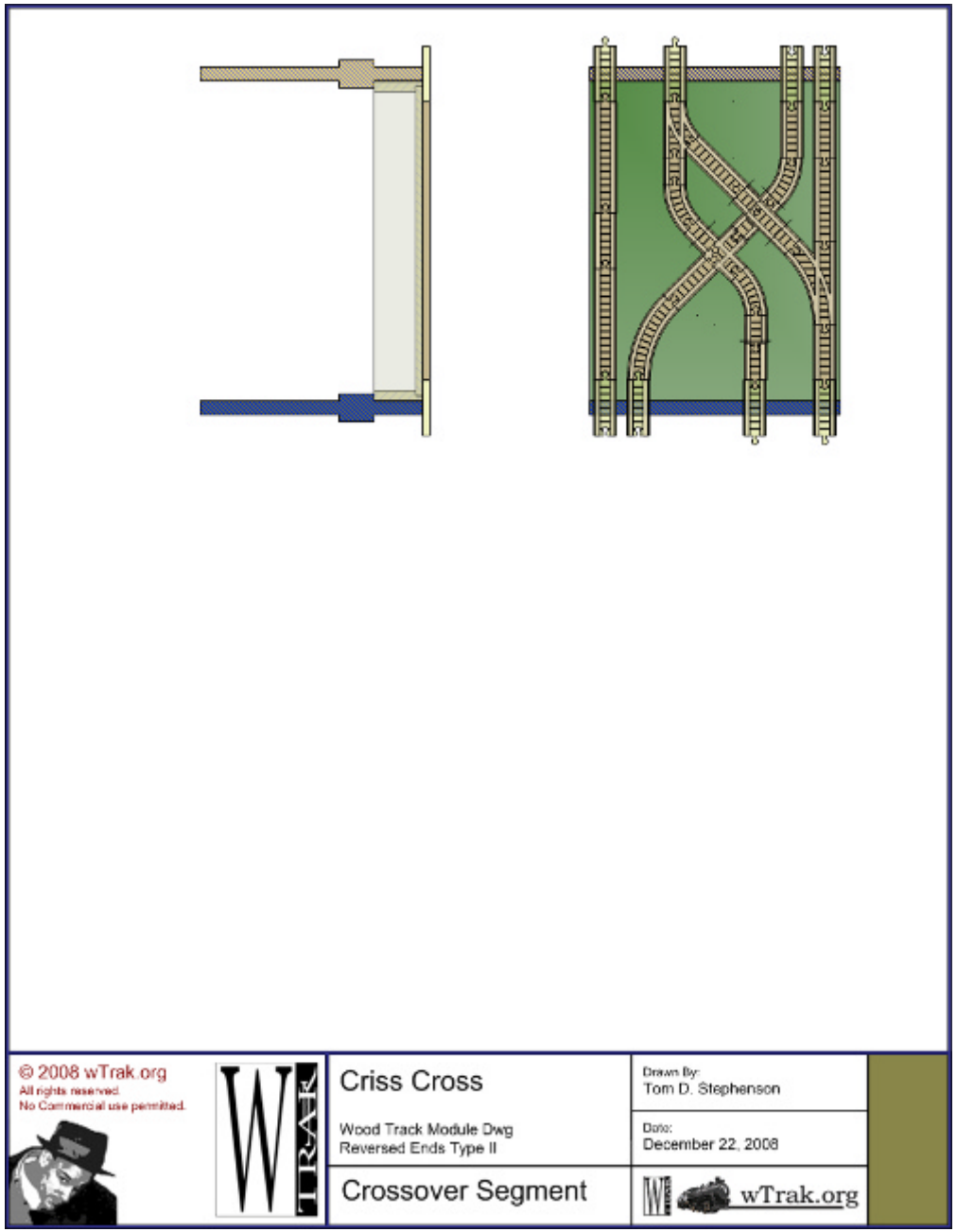
There is enough lead-in space to go underwater too. Create a tunnel opening at each end and leave the side open for kids to shuttle the train under the bay itself.



Criss Cross

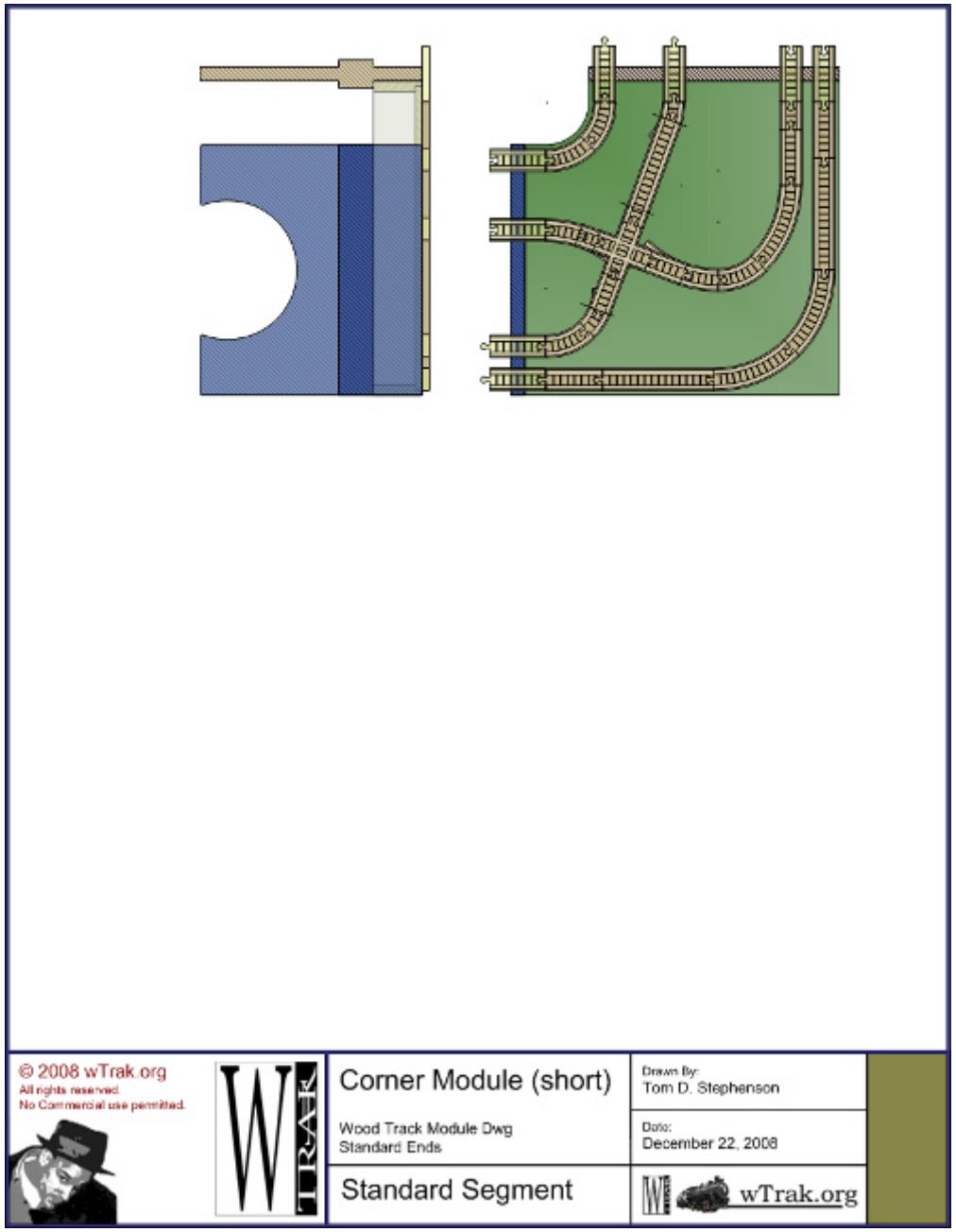
This short segment has a thru-track along one edge and mixes things up for the other tracks. Combined with a second crossover segment, the possibilities for module orientation and arrangement double.

It is necessary to do some track mitres to make the connections smooth and gap-free. But the module is flat and simple to construct. Leftover table space can be used for imaginative buildings. a gully, or other special features.



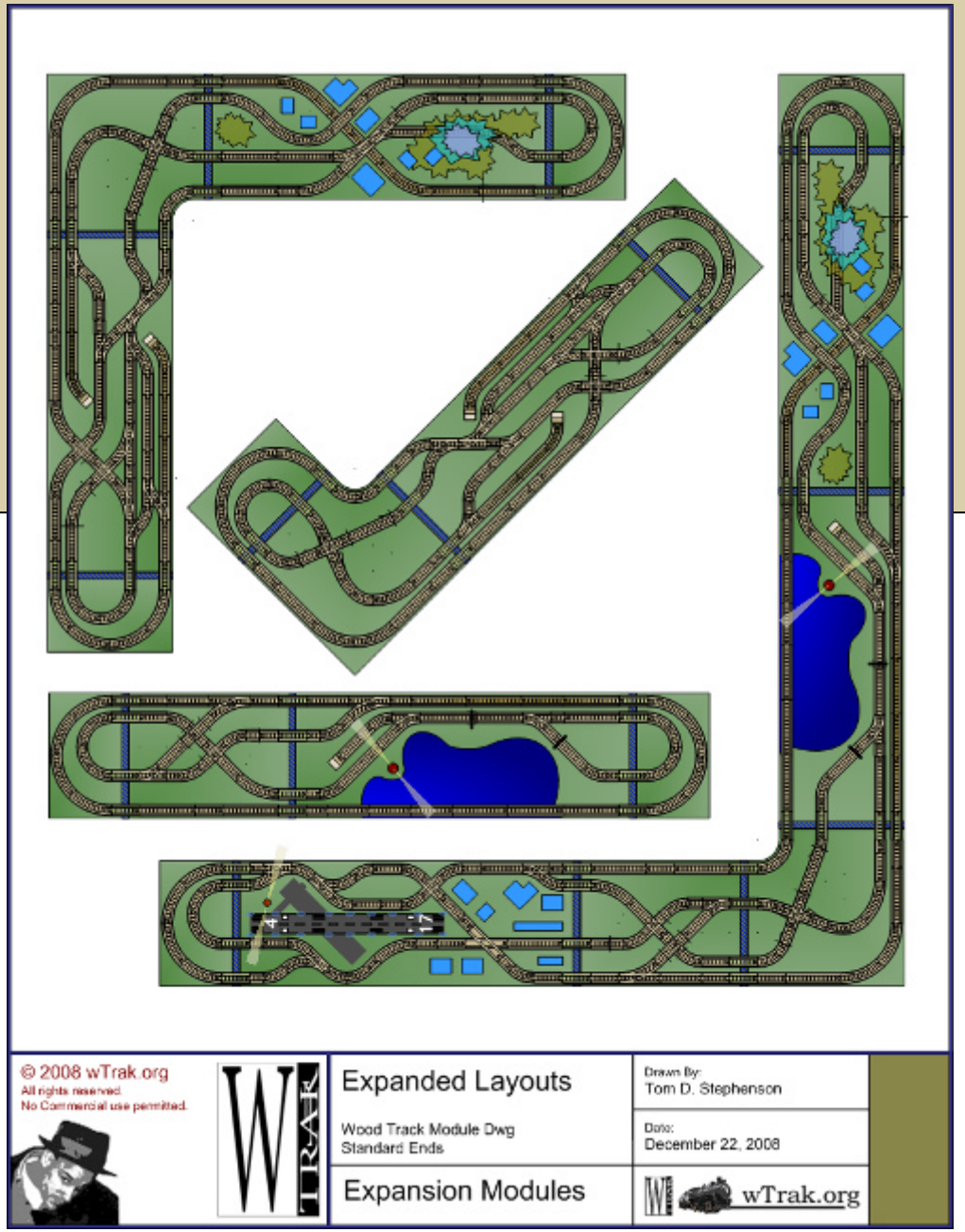
Corner (short)

This is a critical piece – unless you have a long unused hallway. Having two is better and they're simple to build. There are several track variations that can be achieved – even in this limited space.



Expanded Module Layouts

Shown are just a few of the dozens of layouts that can be accomplished using the two crossover and corner modules with the standard modules. Given enough floor space, there are a lot of possibilities!

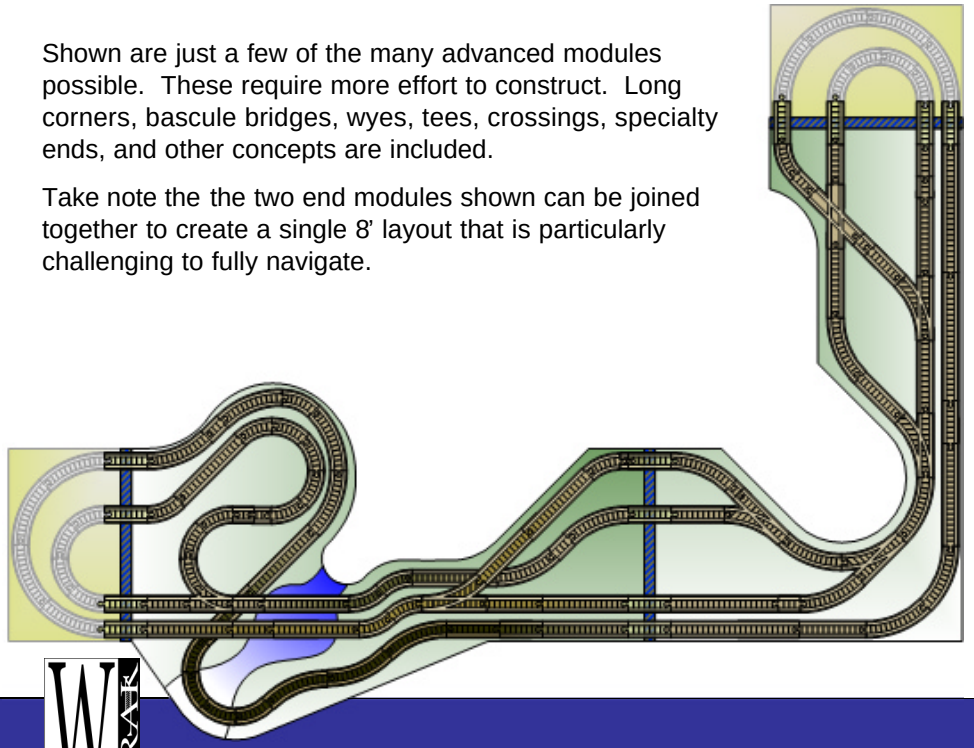


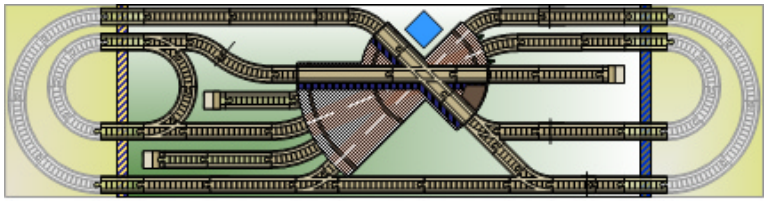
Advanced Modules

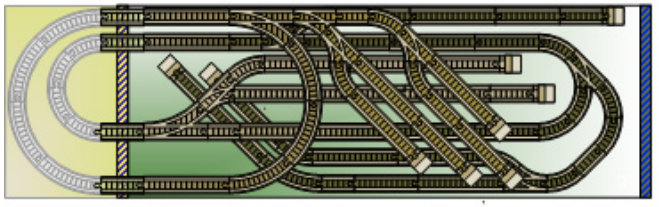
Pushing the envelope

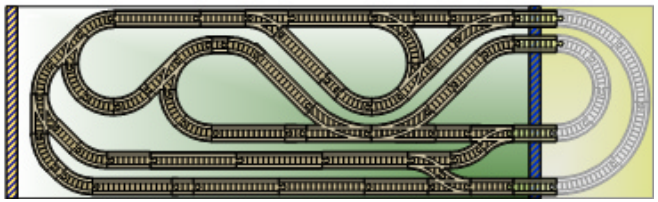
Shown are just a few of the many advanced modules possible. These require more effort to construct. Long corners, bascule bridges, wyes, tees, crossings, specialty ends, and other concepts are included.

Take note the the two end modules shown can be joined together to create a single 8' layout that is particularly challenging to fully navigate.





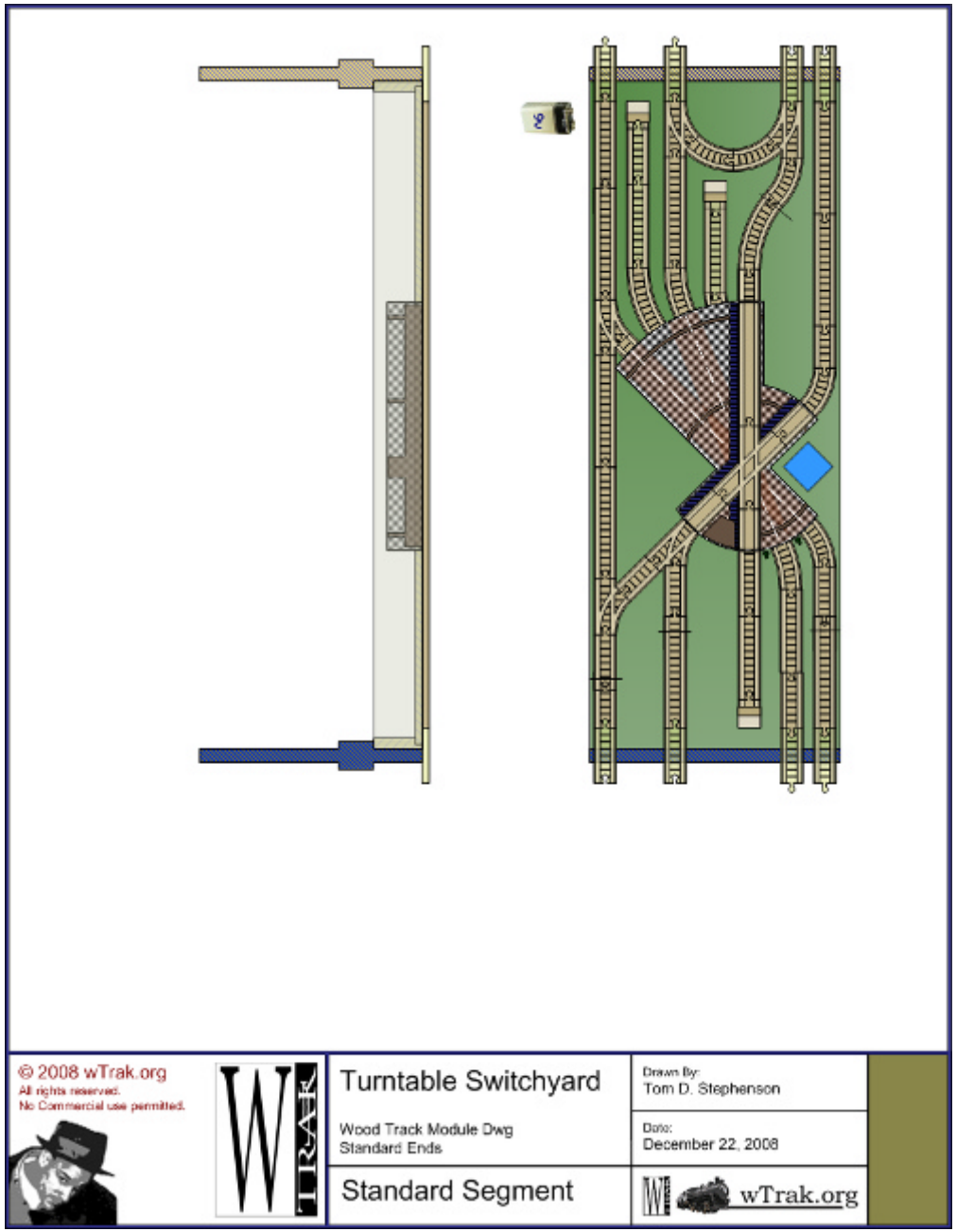




Turntable Switchyard

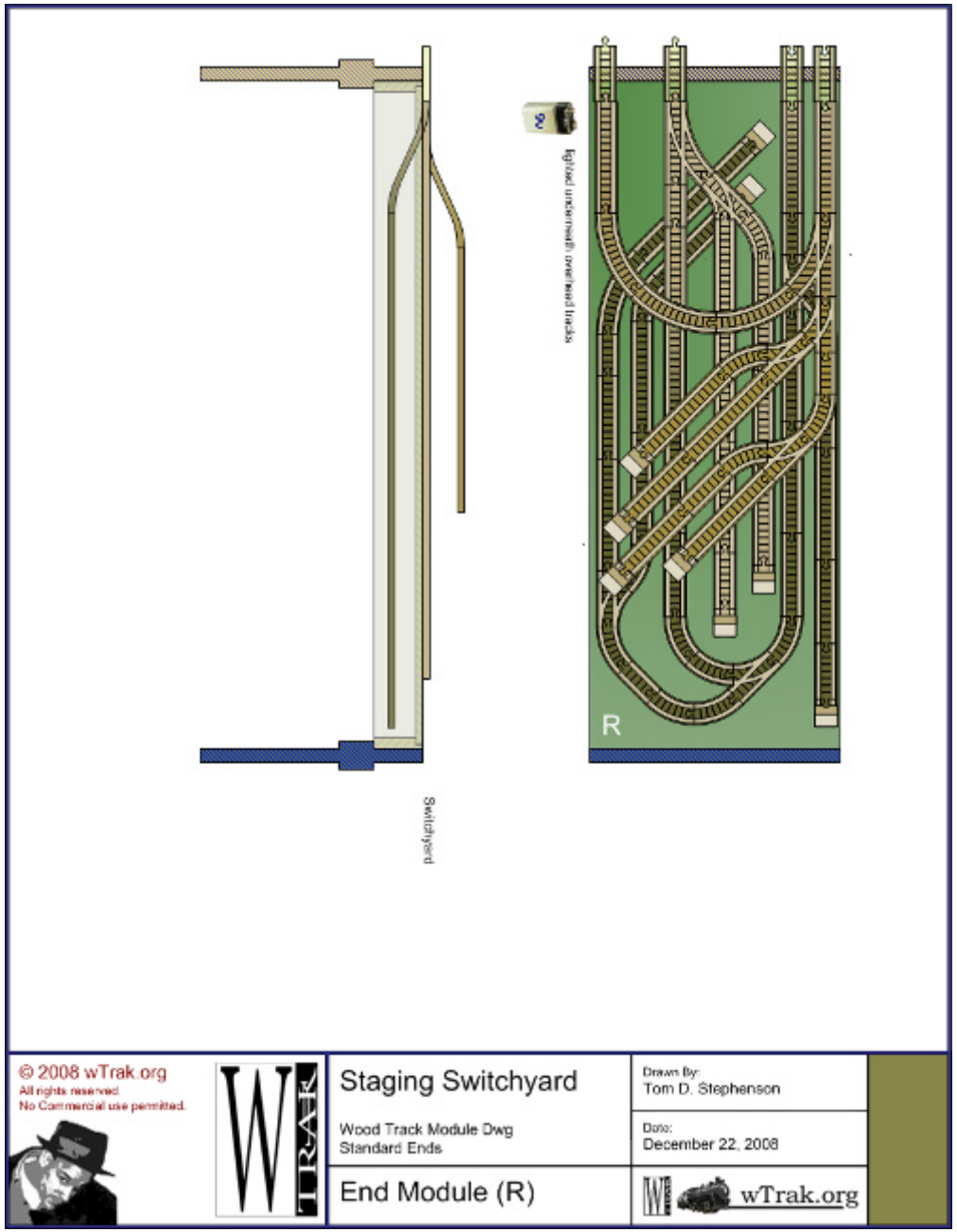
Probably the most fun to design and most challenging to build, a recessed turntable is something special to include. It can be driven by a worm gear using a button on the side or turned manually – either way this feature is the centerpiece.

Several of the branch lines require the turntable to be adjusted to allow passage. Only one path can bypass the turntable completely. Another characteristic of this turntable is the asymmetry which adds still more interest.



Staging Switchyard

This is a challenging segment to construct and navigate. Particularly useful for making up trains to navigate through the table – a start and finish point. Placing lights underneath the elevated tracks will add depth and focus.



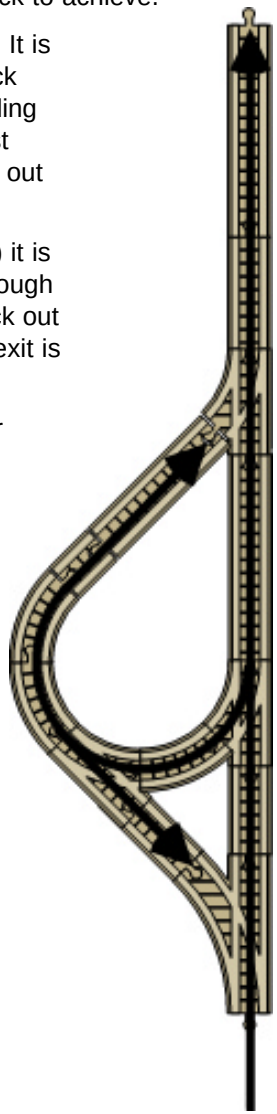
Rerouting Endyard

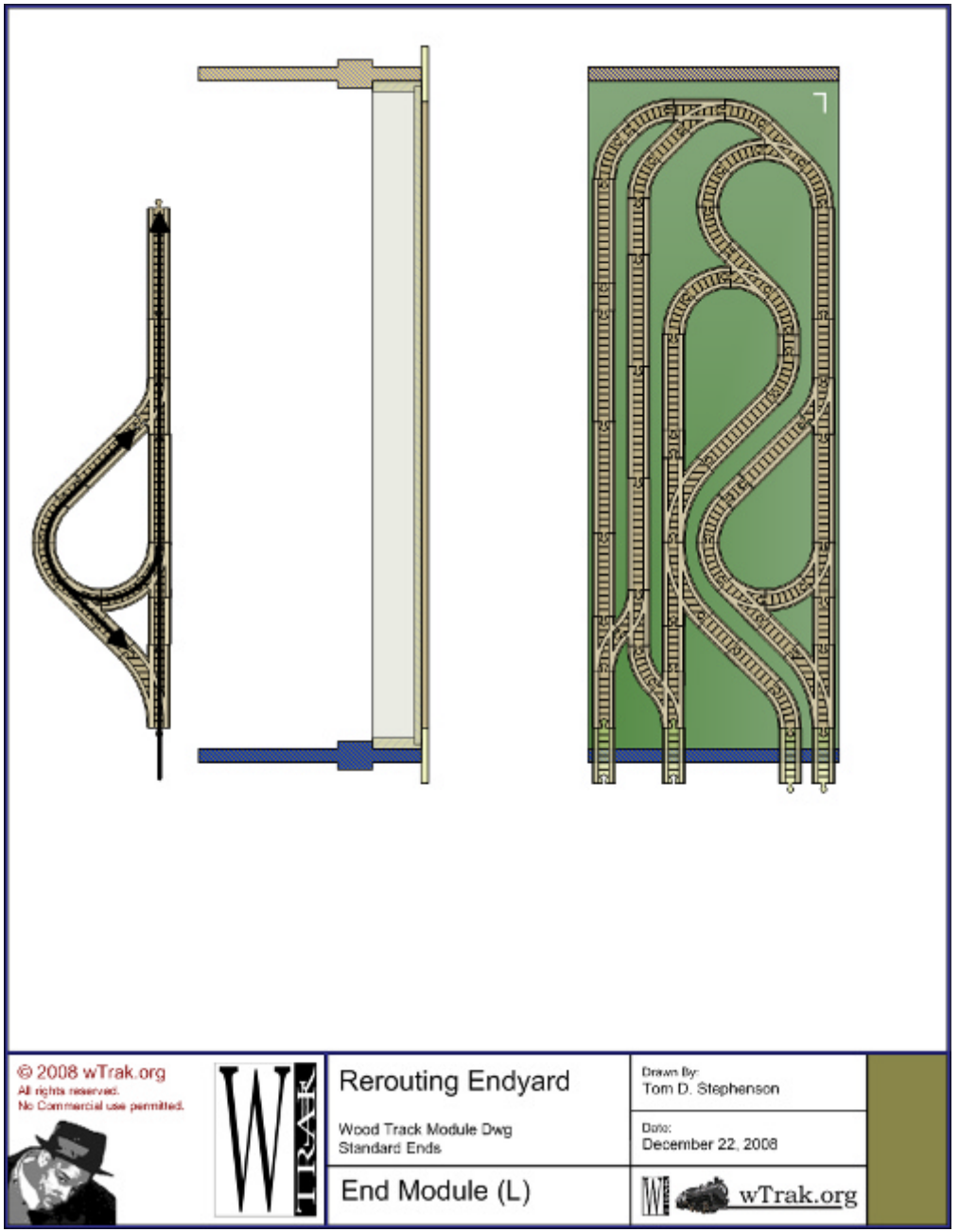
This is an easy segment to construct but requires a fair number of mitre cuts on the track to achieve.

This is a special arrangement. It is possible to come in on any track and leave on any track – including the track you came in on. Most return routes are easy to figure out but a few are subtle.

For one track (right edge track) it is necessary to come in, back through the loop, and then proceed back out (see image to right) but every exit is available!

A great module to challenge for older kids with.

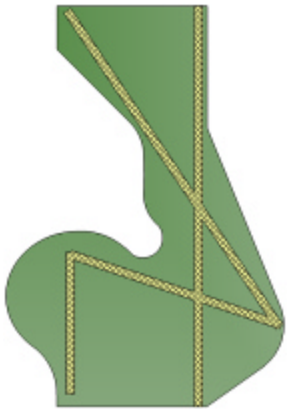




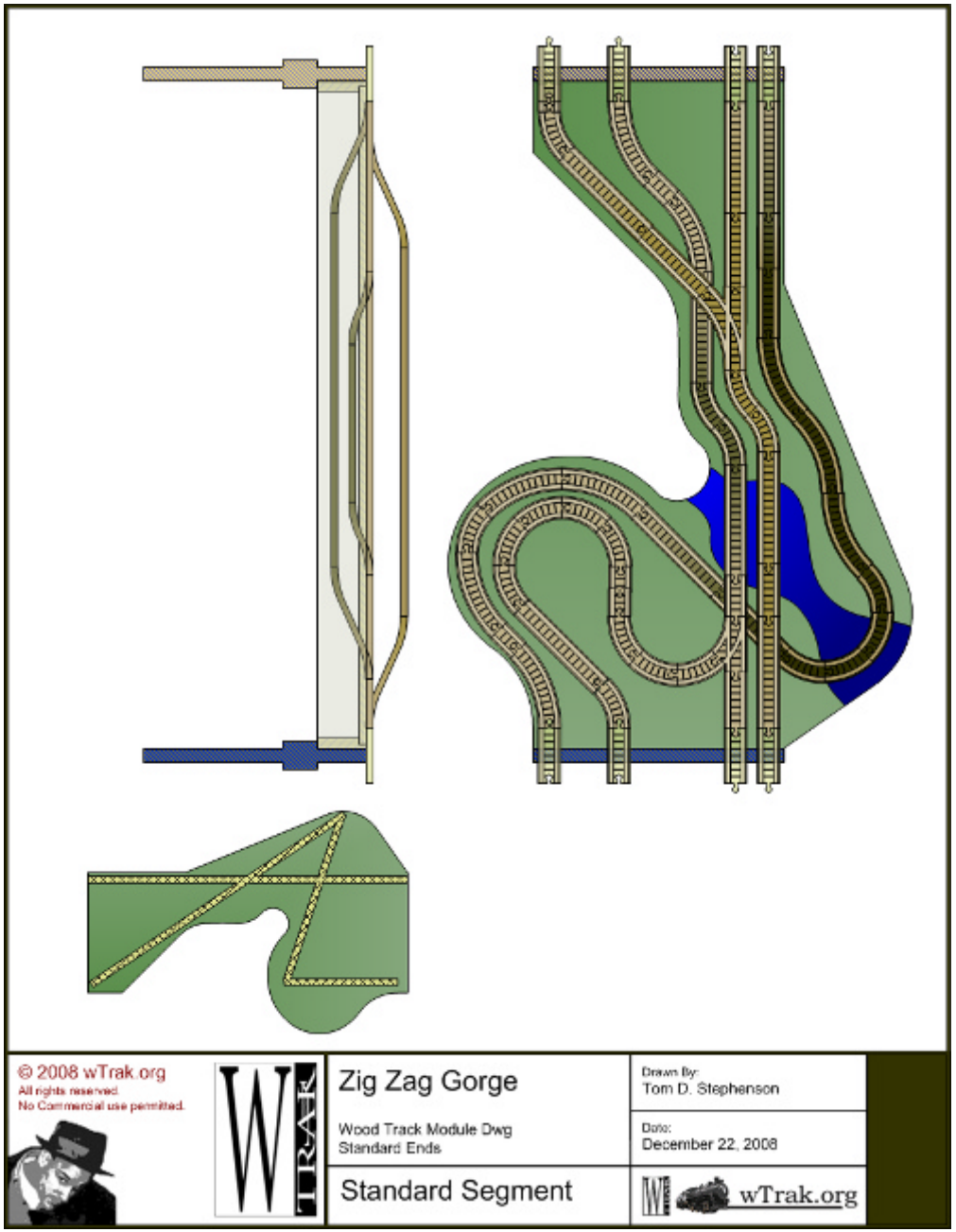
Zig Zag Gorge

Here is a module that is both difficult to construct and challenging to navigate. Multiple levels meander through and around a deep gorge, hairpin turns, and bridges galore...

Stiffening this module takes some creativity. I'm considering using aluminum channel (actually hollow bar) to provide additional stiffness within a wood box as shown. This would provide the necessary strength and stiffeness since the height of the module narrows through the gorge.



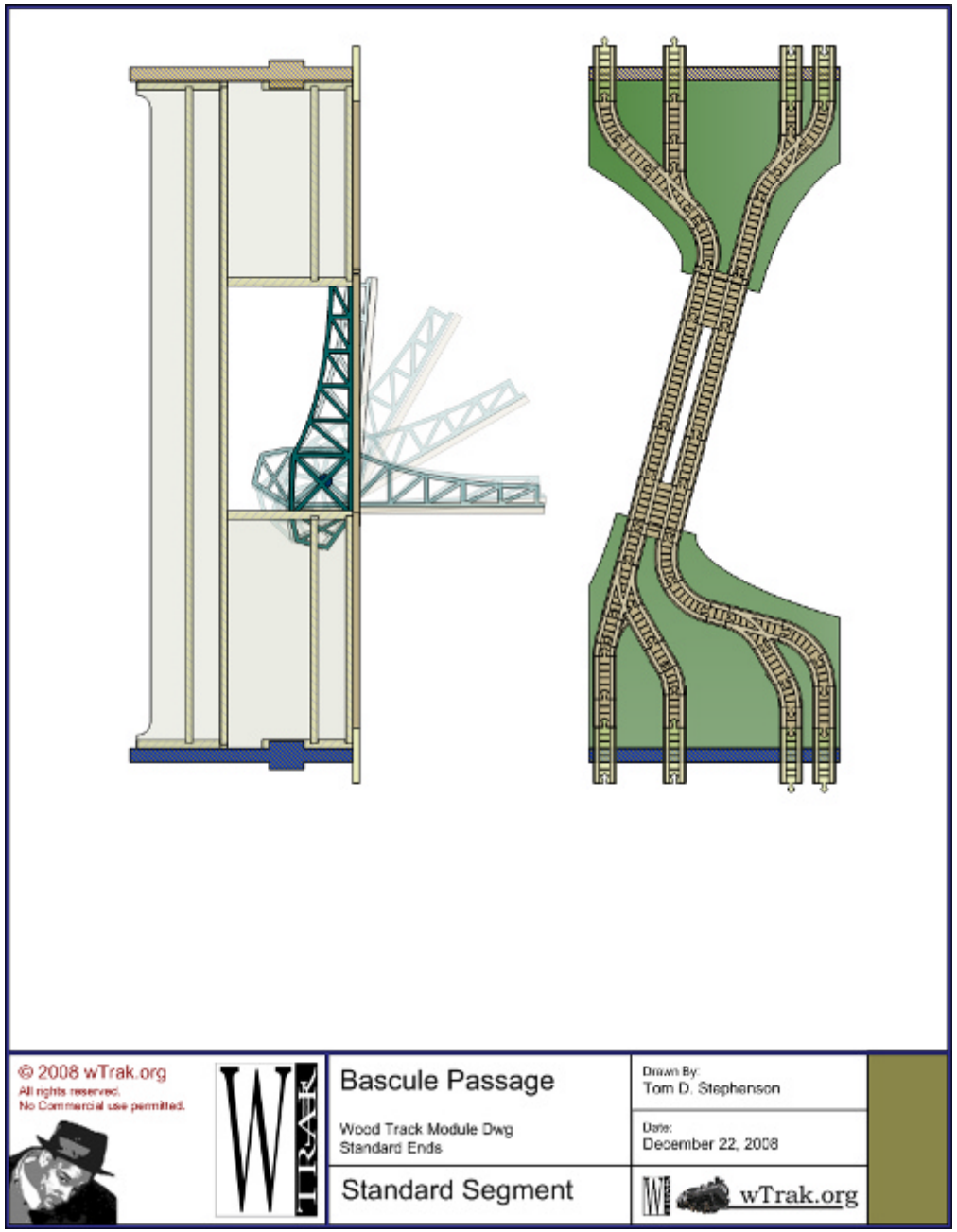
I am also planning to use shallow steel channels encased in wood for the bridges to ensure they are sufficiently rugged and robust.



Bascule Passage

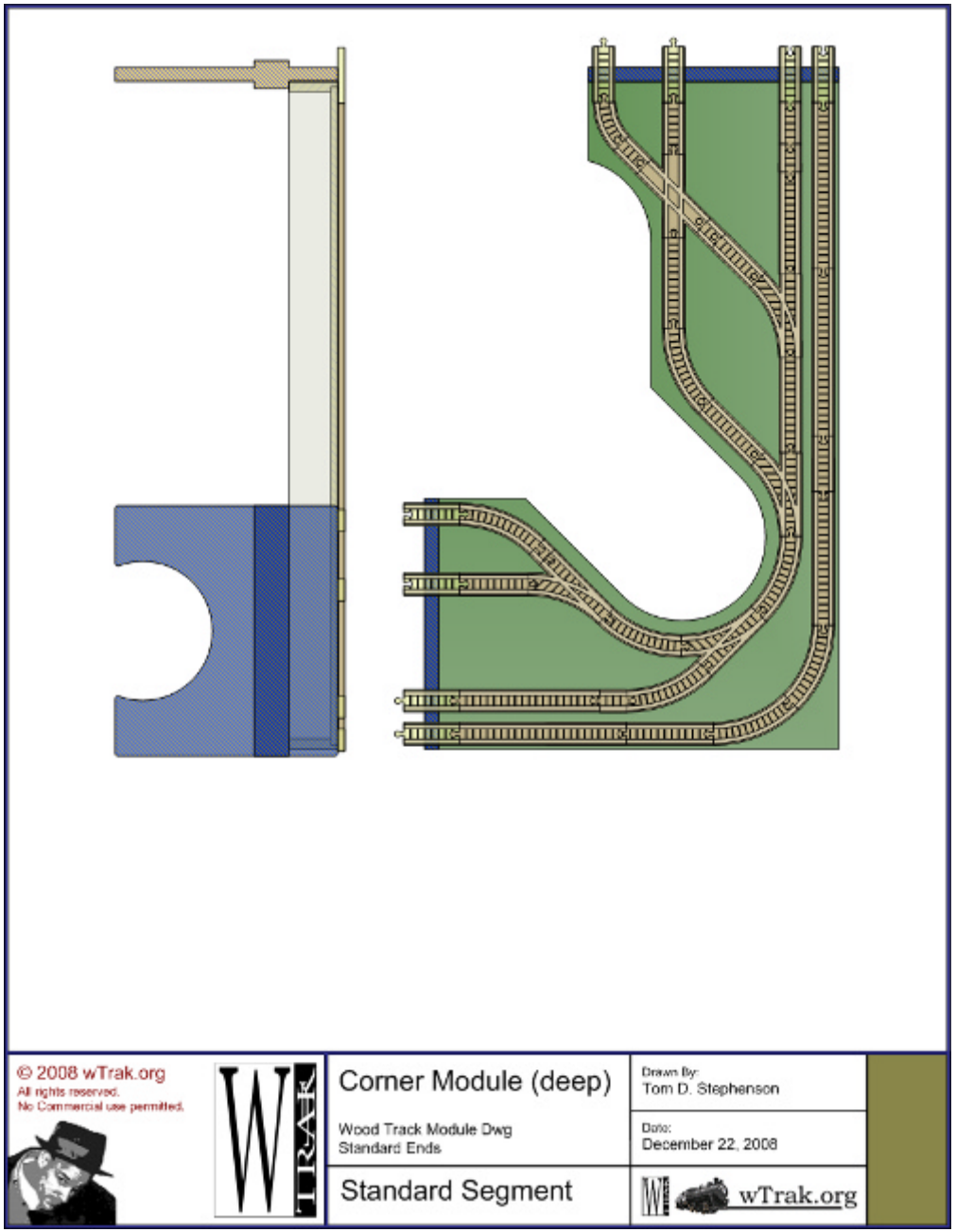
This segment features a bascule bridge that can be raised to allow passage for children to step through the module to the other side...

This module is intended to be used only at the elevated level to accommodate the swing of the bridge and internal structural reinforcement.



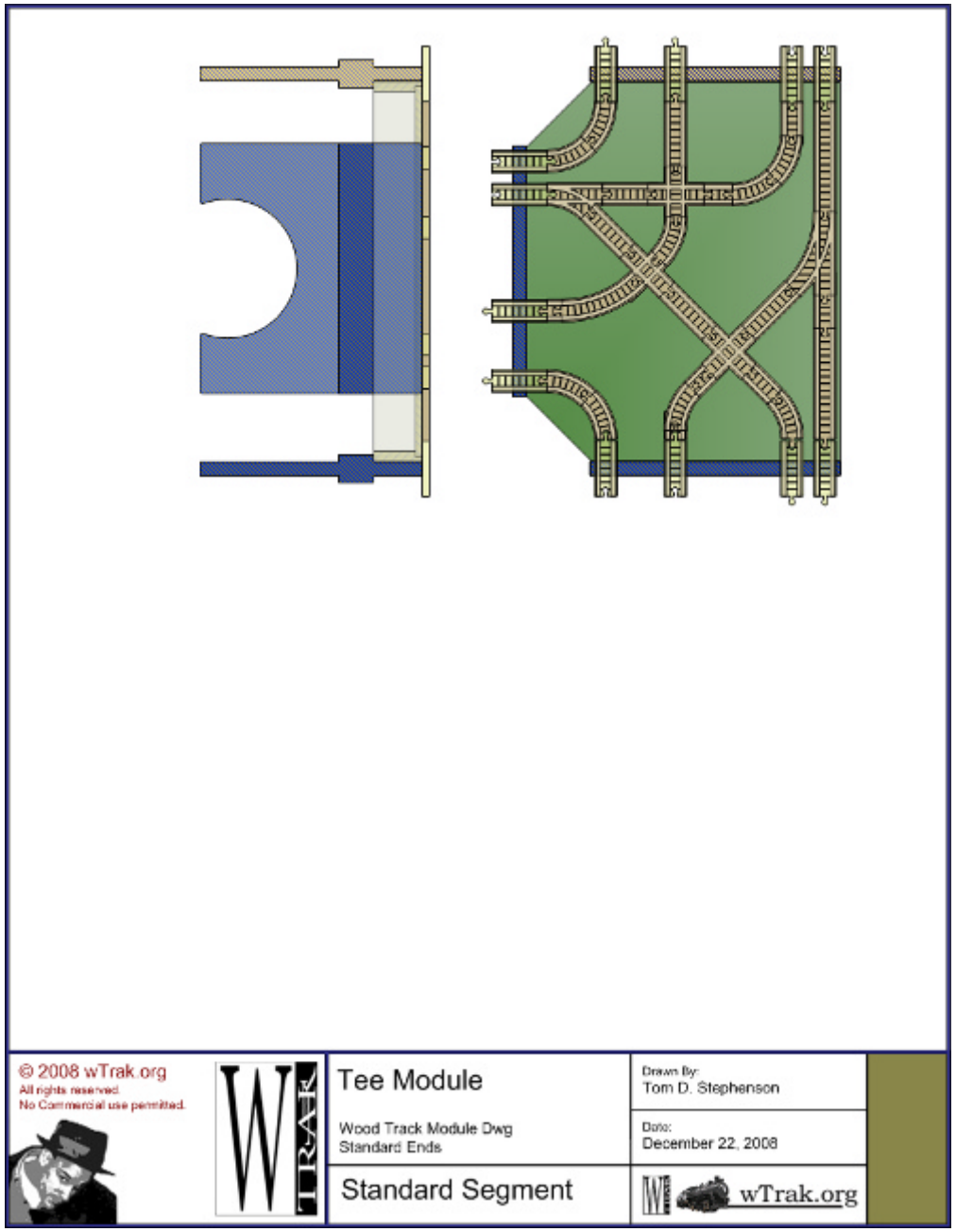
Corner Module (deep)

Like the short corner module – but with more room to develop transitions. The elbow of the corner is deeper to accommodate young engineers...



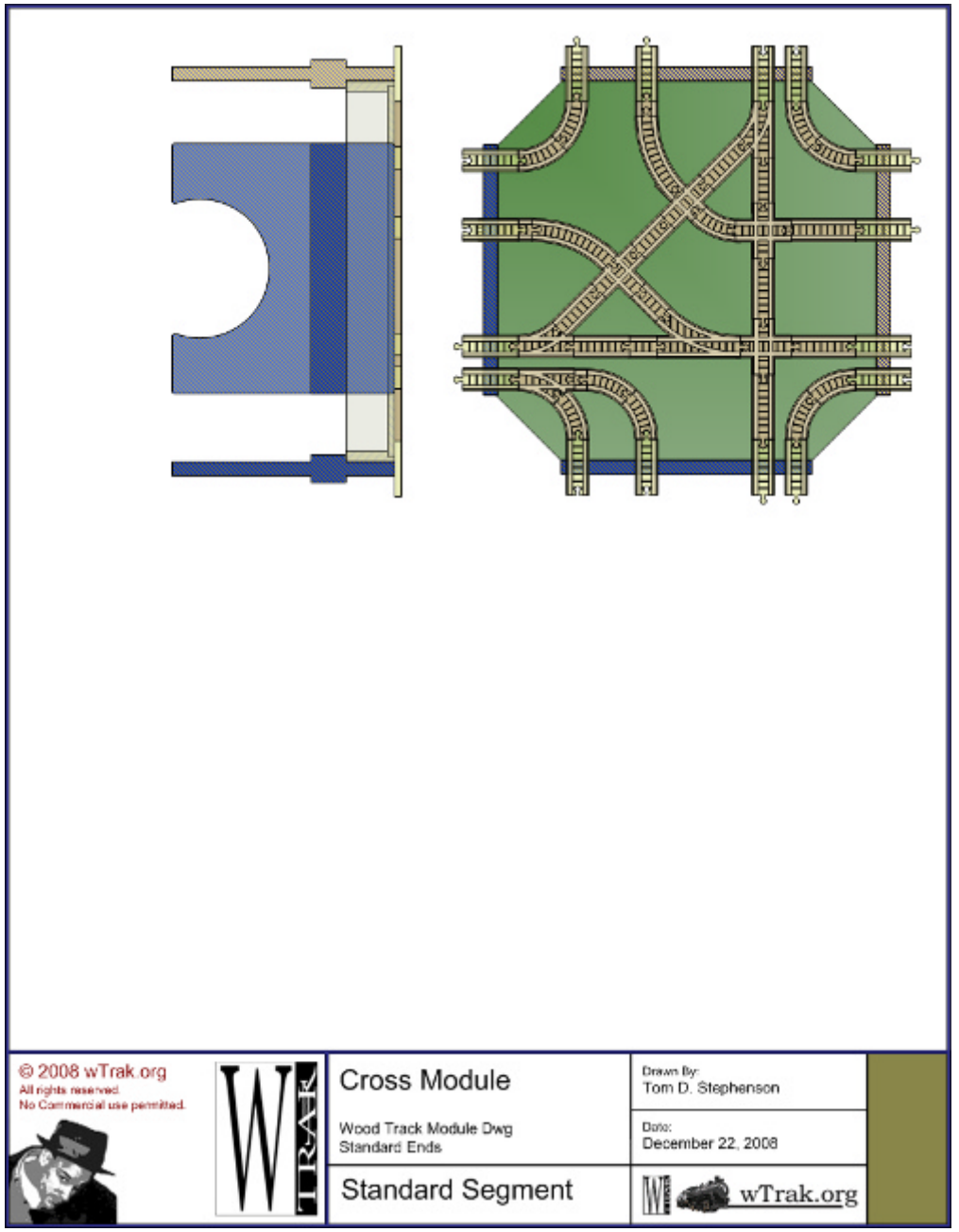
Tee Module

Very handy for branching outward midway along a wall.
When used, three end segments are required.



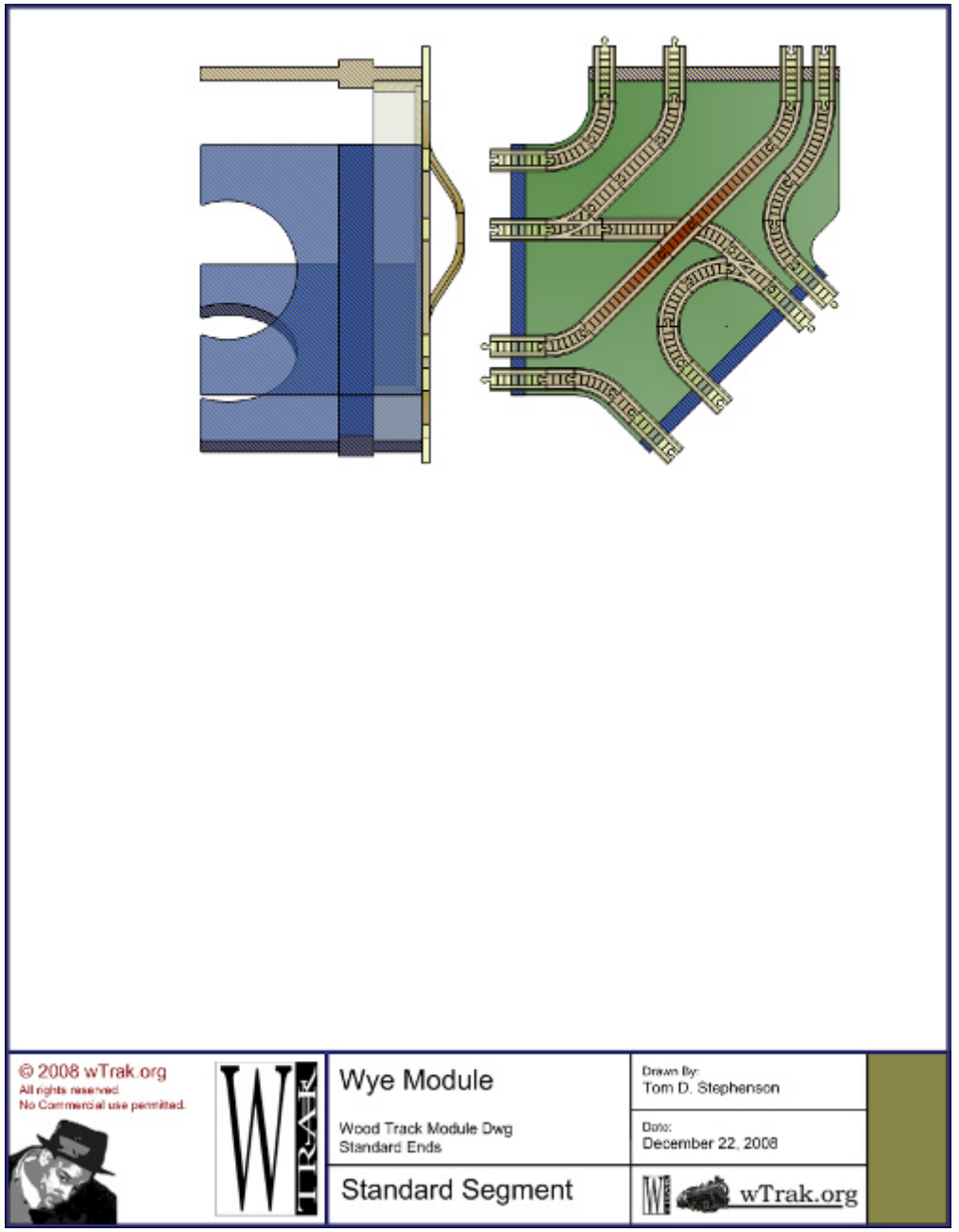
Cross Module

Similar to a Tee module with an extra branch. If used, four end segments are required.



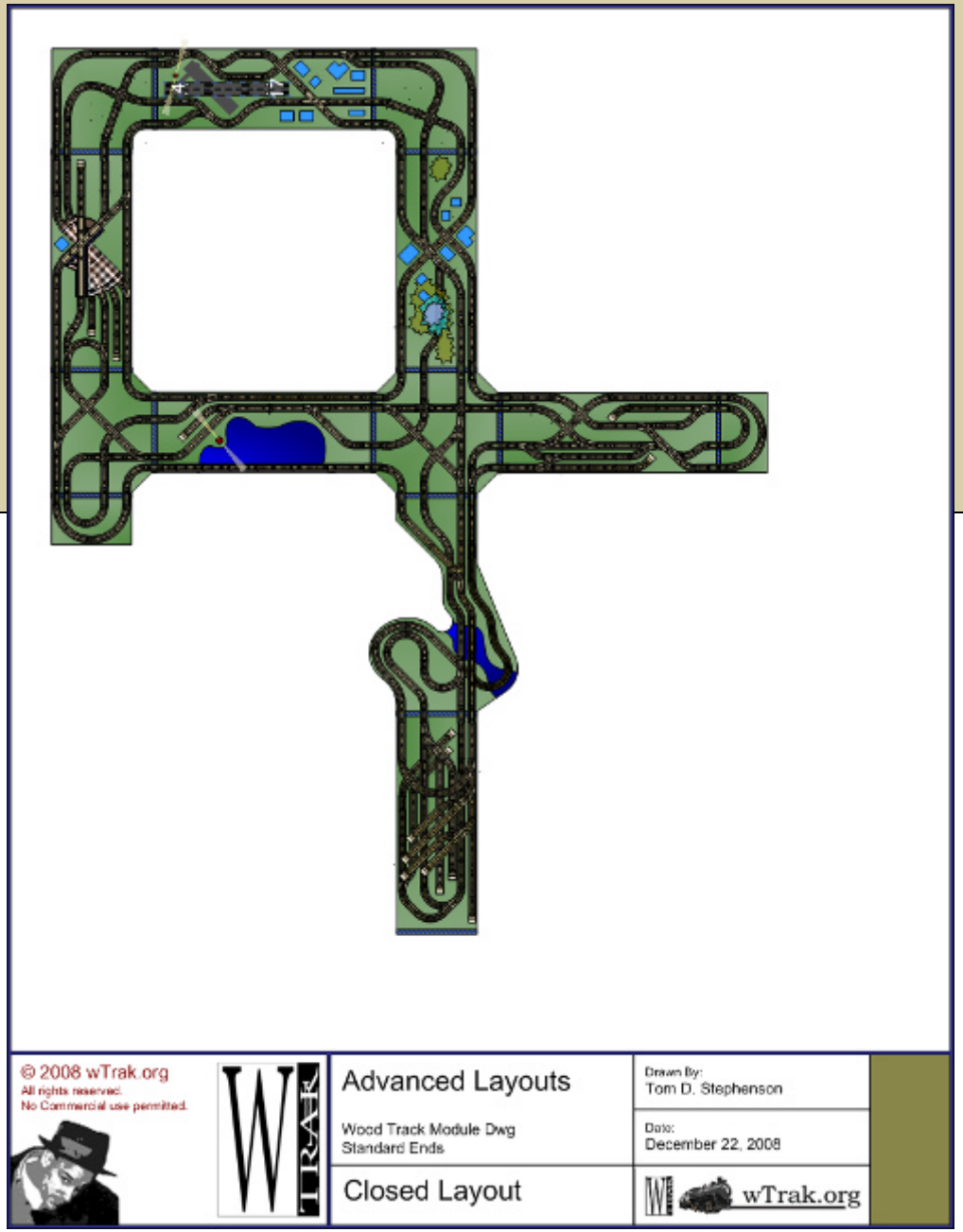
Wye Module

This is really just a Tee that angles off. It lends itself mostly to a mid-room layout if you have lots of space you can fill...



Advanced Layouts – Closed

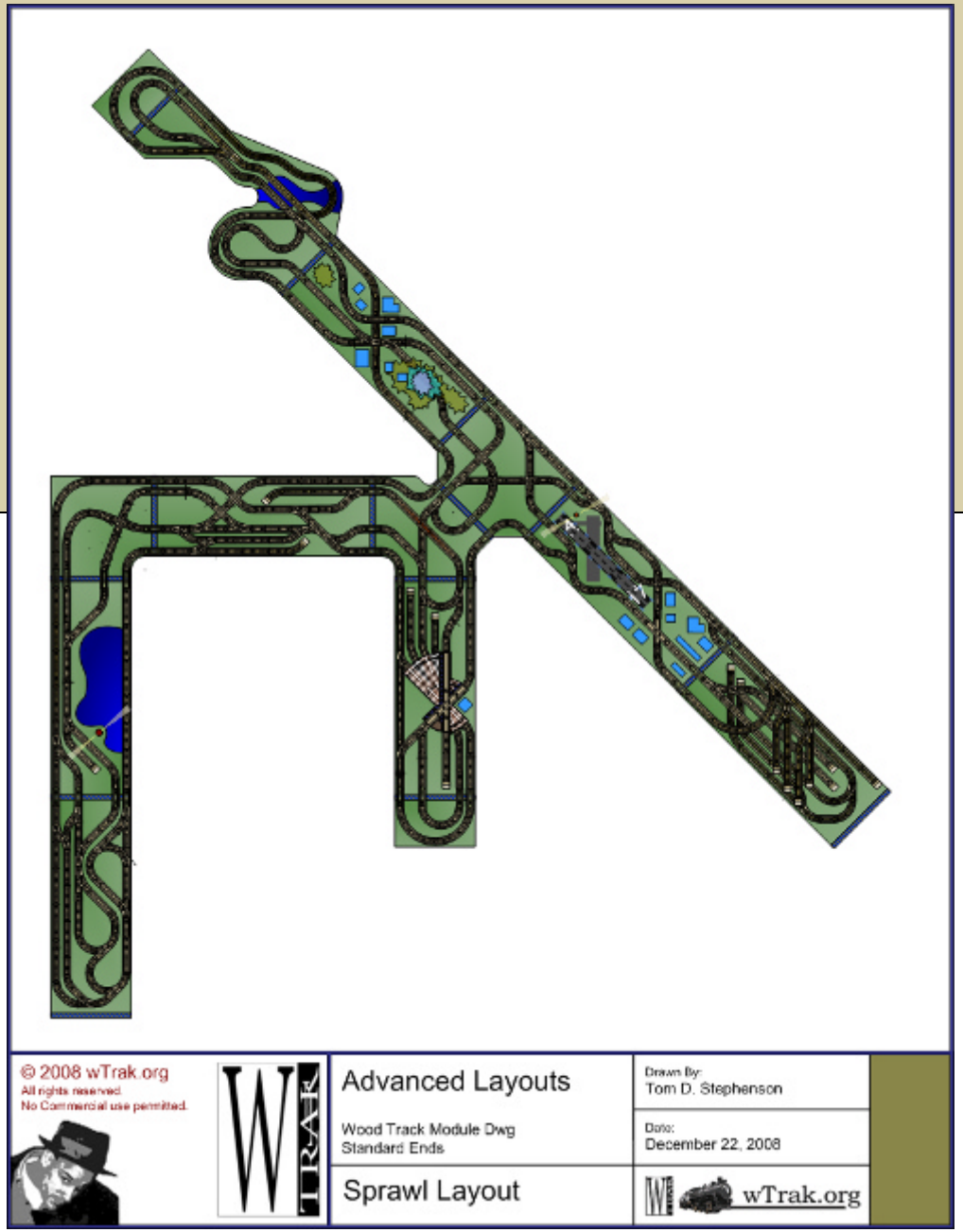
Adding the most challenging modules to those presented earlier, this closed layout is possible. A 'drawbridge' segment with hinged track would be very useful to provide improved access into the center area. Another solution is a segment with a merged line that descends close to floor level and then climbs again at the other end – or a swing bridge – that allows kids to step into the 'box'.



Advanced Layouts – Sprawl

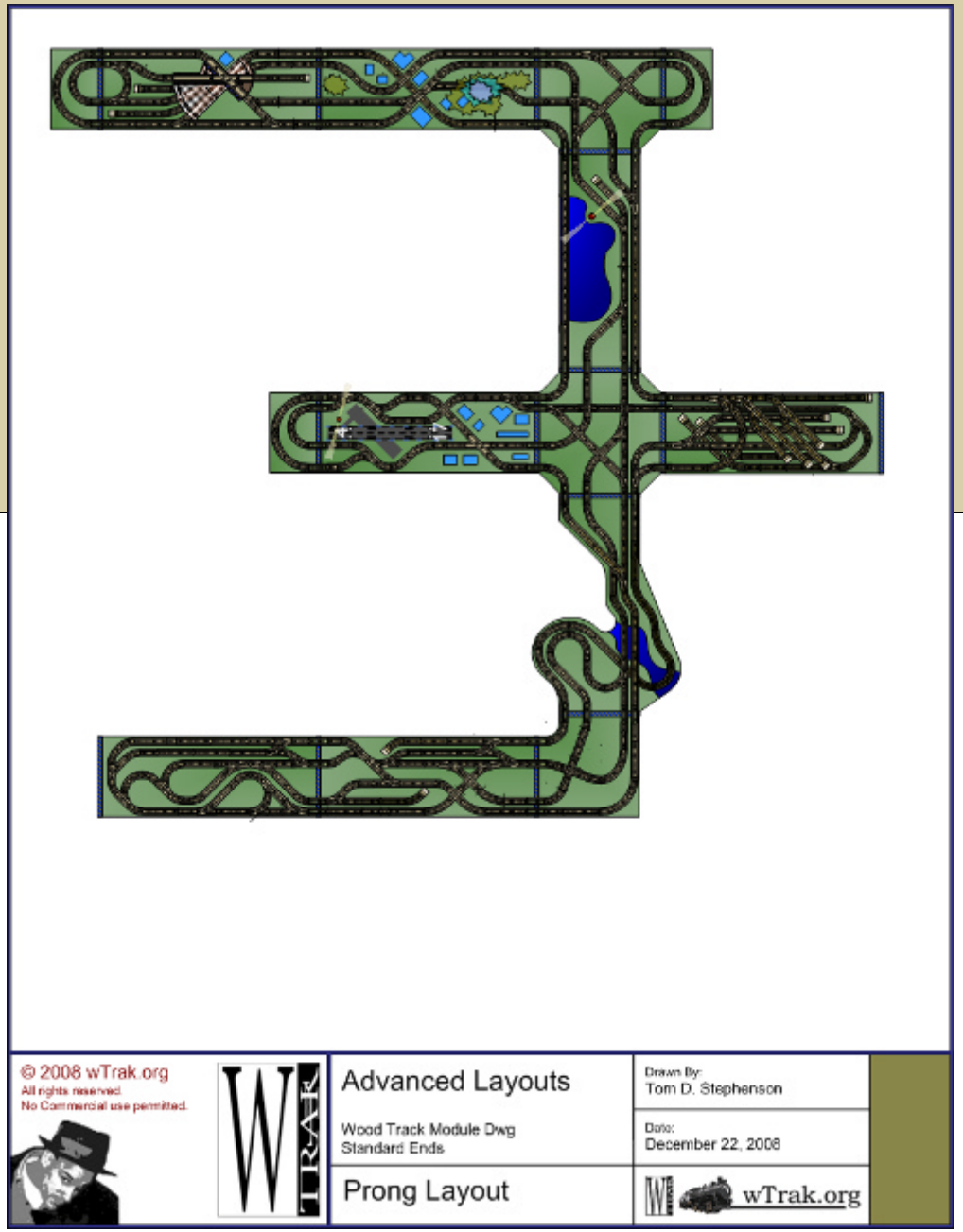
This sprawling layout uses only one of each of the modules outlined. The middle of this configuration allows some of the lines to return back to the branch they originate from.

Add a few more corners and end modules and the layout can really become something to behold! Or design and build your own modules to go far beyond even the ideas shared here...



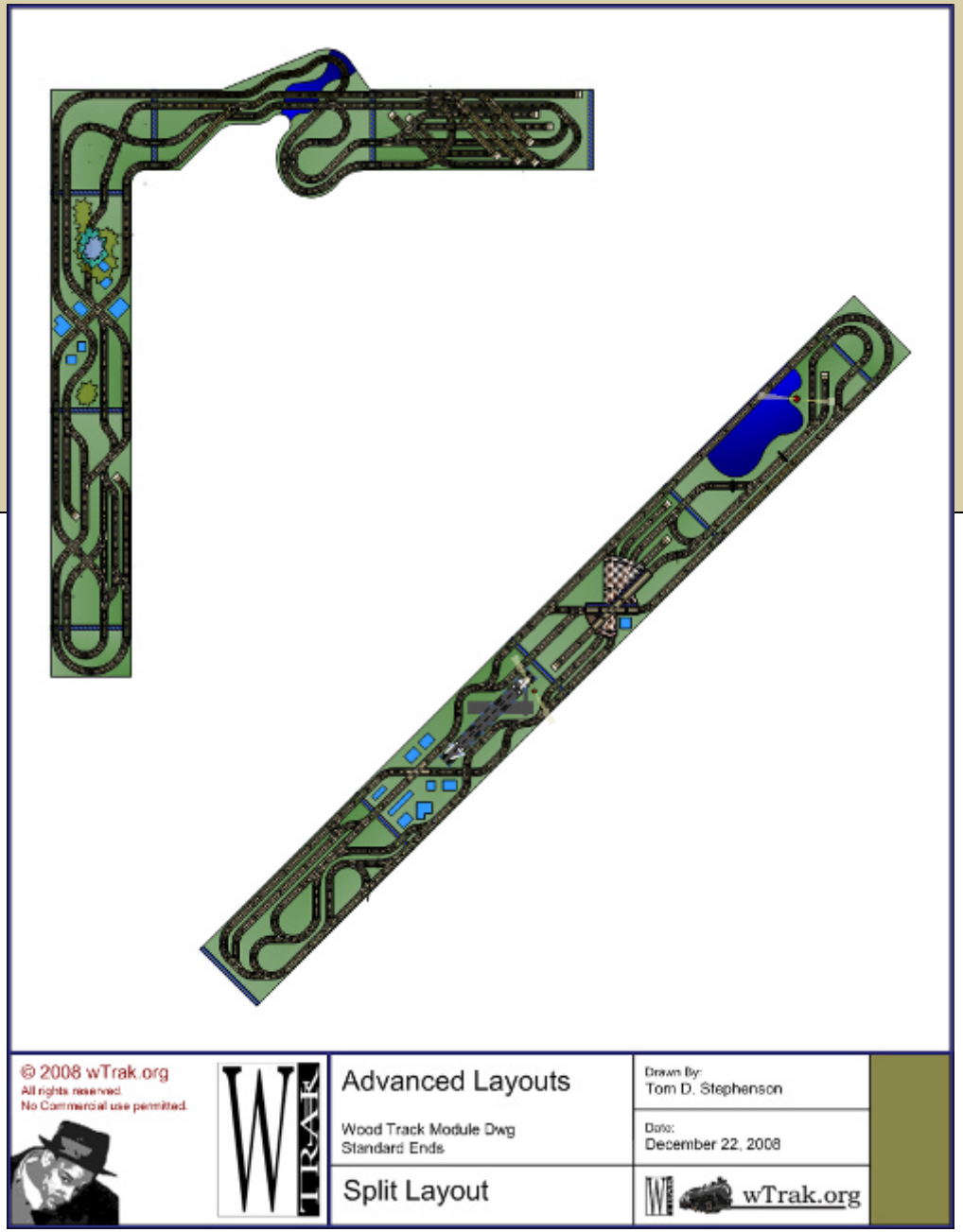
Advanced Layouts – Prong

This configuration places the shunting switchyard and airport on side branches off the middle of the line and the rerouting endyard and turntable switchyards at the ends of the line. Unlike many of the layouts, most of the tracks run the entire length of the line without intermediate shortcuts.



Advanced Layouts – Split

For younger kids, a divided layout allows a simpler routing and two lines to choose from.



Contact Information

If you would like to talk or share ideas, drop me a note at tom@wTrak.org and I'll reply, usually the same day.

Resources

A Visio file with the track sections used in this standard proposal is available online.