

# Layout Design **BOOTCAMP**

by Byron Henderson for the Layout Design SIG

Model railroad layout design isn't rocket science, but it's also not a simple matter of plopping down track components in a haphazard maze. One of the biggest problems designers encounter is taking the steps of layout design out of order. (And by the way, the ready availability of model railroad CAD can often make it worse!)

Everyone will have a method that works best for them, but for this Bootcamp we'll discuss the design process in three roughly-defined phases: Conceptual, Structural, and Detail. Let's look at them in turn.

These notes discuss the concepts in general, and then include on-line and print references for many of these ideas.

Hey, what about "Gs and 'Ds"?"

John Armstrong's exercise of "Givens and 'druthers" has been around the hobby for many years and it's still important. The preferences, wants, and interests explored through a G&D exercise help inform the Conceptual phase. And the Givens of space realities, minimum radii, etc., etc. are critical to the Structural and Detail phases. So this three-step approach isn't a replacement for Givens and 'druthers, instead, these are the steps that turn Gs&Ds into a layout design. Let's consider the first of these, the Conceptual Phase.

**Conceptual Phase – the most critical**

Put down that pencil or computer mouse! The early stages of layout design are no time for detailed rendering. Instead, this phase is focused on theme and concept. How will visitors and operators experience the layout? What signature elements of your real or imagined prototype do you wish to convey? What will be the purpose of the layout; for example, operations-oriented, model railfan, or just fun to run while sipping a frosty beverage?

Capturing and distilling your layout conceptual vision is a time for free-flowing creativity, which unfortunately is difficult for most model railroaders. Unbounded sketches, free-hand maps, collections of favorite prototype or model scenes in a file can all be tools for creativity. The goal in this phase is to identify and *prioritize* signature elements of the real or imagined prototype, be they scenes, traffic types, topography and scenery, etc.

Most model railroaders give this phase scant attention, instead rushing headlong into drawing track plans. But this is often the most important phase in determining the success or failure of a design.

**Structural Phase**

Despite the name, this has nothing to do with either benchwork or model structures; rather it is the point in the process where we start to select from the ideas developed in the Conceptual Phase and begin placing them on paper (or electrons). Sadly, this is also the phase where we must start making compromises.

In this phase, we now begin to "frame" the layout design by defining the boundaries of the modeled areas. How long a prototype distance? How many towns/locations? What kinds of facilities? Strictly location-by-location or "compressively selected": choosing only the most modelgenic locales, even if it means changing order or leaving out some sites?

With some idea of the scope of the real or imagined prototype to be modeled in mind, the choices begin. Is your priority in having a layout that "looks like" or "works like" the real thing in terms of fidelity. Having both is possible, but requires more resources in the form of space, time, money, and complexity.

In addition, there will likely be a need for additional model layout realities in the form of staging yards, access space, crossovers, or other elements necessary for the proper operation of the layout. Fidelity, scope, and functional layout realities always find their balance with the available resources -- sometimes with unexpected (and unhappy) results!

**Cornerstones and PICS**

As we begin to better define the layout in the Structural phase, we can turn to some layout design "best practices" that can make layouts more realistic to view and or operate. For operations-oriented layouts, I consider these to be the four cornerstones:

- Prototype inspiration
- Staging
- Large industries
- Interchange

For model railfan and scenery-oriented layouts, the key elements can be slightly different. We can think of the acronym PICS:

- Plausible scenes
- Independent / isolated vignette(s)
- Scenery contours
- Staging

**Savvy Standards**

One of the key decisions is the standards to be used for rendering the layout "footprint" in the Structural phase. Choosing too large a value for minimum radius, turnout number, and so on can be just as constraining as

choosing one that is too small – if it doesn't work for the theme we've defined and in the space available.

A handy tool at this stage is to think in terms of "lineals" (popularized by master design Don Mitchell, among others). These are based on the typical and maximum design-length train. This linear length becomes our "measuring stick" for passing sidings, yard track lengths, distance between "towns", etc.

When are we gonna draw something?

OK, now we're getting to the point where we're ready to render a to-scale "footprint" sketch roughly locating the layout's major elements (yards, crossings, towns, large industries, etc.) Here are some of the things to consider as we begin fitting chunks of the concept in the space:

- Now it's to scale – so don't cheat!
- See the space, **not** rectangles
- Schematic choice (e.g., point-to-point, loop-to-loop, etc.) that fits the concept and theme
- Signature track alignments
- Grade check (*realistic*, with transitions)
- Size elements (based on standards)
- Capture obstructions in benchwork
- Draw curves to find some straight track
- Footprint (try a spiral -- Island? Shelf? Yes!)
- Orientation (Which way is East? Should it be consistent around the layout?)
- Room for people (resist temptation to scrimp on aisles)
- Reach and access
- Staging location and connections
- Serendipity
- Iterate until it works well

Details, details

After quite a bit of work with footprints and the placement of the overall components of the layout, we're ready to turn to the details. This is the phase where most model railroaders **begin** their design, and doing so leads to many unsuccessful track plans.

Yard throats, passing sidings, and industrial configurations *are* important, but only in *support* of the vision and theme defined in the Conceptual Phase and *within* the framework of the Structural Phase.

[Additional resources for these detailed topics may be found at the end of this handout.]

Won't LDEs solve the whole thing?

A major recent focus in design thinking is the idea of Layout Design Elements (LDEs): defined as segments of real railroads that may be dropped into a layout design. While it is true that most designers will be better off with one of these as a starting point, indiscriminately

popping down LDEs and connecting them together may result in unexpected operating problems if *other* key elements, such as a distant runaround, are inadvertently left out.

For this reason, it can be helpful to make distinctions between the elements of the prototype (e.g., a yard, a station, a junction) and the functional layout requirements that might be necessary for a satisfying layout (such as staging, crossovers, runarounds, et al).

It's worth noting that model railroaders tend to operate much higher densities of traffic on their model layouts than were supported by the real railroad. If the real-life town never had more than one train in town at a time and the demands of the op session lead to three at once, the "pure prototype" track configuration may not support the desired operation. This is a case where a track or two beyond the prototype design may be necessary.

Similarly, the oft-stated suggestion to model a stretch of railroad from division-point yard to division-point yard is impractical for all but the larger spaces and particular prototypes.

An introduction to layout design thinking

Many more model railroaders would be successful in layout design if they recognized that while they may be tempted to spend the bulk of their effort on the Detail phase, the most important work happens in the Conceptual and Structural Phases.

Theme and concept layouts are most successful when they communicate the builder's vision. Communicating a sense of time, a feeling of place, and an impression of purpose make the layout more realistic and more rewarding to the operator and viewer.

We hope this clinic has helped you think about layout design in new ways. This Bootcamp is really only "basic training", there is much more to learn for those who wish to build their understanding of model layout design best practices and real-life railroad concepts.

Thanks for joining us today!

General References

Layout Design SIG -- [www.ldsig.org](http://www.ldsig.org)

Operations SIG -- [www.opsig.org](http://www.opsig.org)

Articles (alphabetical by author)

"Choices: looking back at 20 years on the Yosemite Valley" by Jack Burgess; *Model Railroader*, Jan. 2000.

"Blueprint for a Model Railroad" by Paul Dolkos; *Model Railroad Planning*, 2005

"Research in the Information Age" by Henry Freeman; *Model Railroad Planning*, 2001

"Prototype Track/Industry Maps as a Design Resource" by Byron Henderson; *Layout Design Journal* # 26; March 2001. Published by LDSIG (see above).

"From Surf Line to San Diego" by Keith Jordan; *Model Railroad Planning*, 2001

"The Third Subdivision of Nickel Plate's St. Louis Line" by Tony Koester; *Model Railroader*; September and October 2000.

"Special Freight Yards Issue" by various authors; *Layout Design Journal* #7, June 1992. Published by LDSIG (see above).

#### Books (alphabetical by author)

*Track Planning for Realistic Operation* by John Armstrong, 3<sup>rd</sup> Edition (Kalmbach, 1998)

*Creative Layout Design* by John Armstrong (Kalmbach, 1978 -- out of print)

*Freight Terminals and Trains* by John A. Droege, 1925 (out of print -- has been reprinted by the NMRA)

*Realistic Model Railroad Building Blocks* by Tony Koester (Kalmbach, 2005)

*Designing & Building Multi-Deck Model Railroads* by Tony Koester (Kalmbach, 2008)

*The V&O Story* by W. Allen McClelland (Carstens Publications, 1984)

*The Model Railroader's Guide to Freight Yards* by Andy Sperandio (Kalmbach, 2004)

*How To Build Realistic Layouts: Freight Yards* (MR special issue) by various authors (Kalmbach, 2007)

#### Selected references by topic

Because Armstrong's *Track Planning for Realistic Operation* is cited so often in the following, it is abbreviated as *TPRO*. *TPRO* chapter and page citations, where noted, are for the 3<sup>rd</sup> Edition. Other citations are found above or are written out in full.

Additional introduction is found in the Layout Design SIG's on-line "Primer":  
<http://macrodyn.com/ldsig/wiki/index.php?title=Category:Primer> (type into your browser as one line)

#### Givens and Druthers

LDSIG On-line Primer

#### Conceptualizing designs

*The V&O Story*; McClelland

*TPRO*; pp. 97-99, Appendix A

#### Choosing layout design standards

*TPRO*; Chapter 6

NMRA Standards and Recommended Practices:

[www.nmra.org/standards/sandrp/consist.html](http://www.nmra.org/standards/sandrp/consist.html)

#### Cornerstones and PICS

[www.layoutvision.com/id8.html](http://www.layoutvision.com/id8.html)

#### Yard topics

*TPRO*; Chapter 2; also pages 125-7

*The Model Railroader's Guide to Freight Yards*;

Sperandio

Layout Design SIG Special Yards issue *Layout Design Journal* #7, June 1992

Craig Bisgeier's "Ten Commandments" for yards:

[www.housatonicrr.com/yard\\_des.html](http://www.housatonicrr.com/yard_des.html)

*Freight Terminals and Trains*; Droege

Structural design sketching, including Armstrong's "Squares"

*TPRO*; Chapters 7 & 9

Schematic choice (e.g., point-to-point, loop-to-loop, etc.)

*TPRO*; Chapter 8

Drawing circles (to find some straight track)

*TPRO*; pp. 117-121 (figures)

Orientation: "Which way is East?"

*Layout Design News* #20; Summer 1998; p. 8

Layout Design Elements

*Realistic Model Railroad Building Blocks*; Koester

Aisle Considerations

*Layout Design Journal* #20; Winter 2000; p. 13;

Chris Bond

Industrial trackage

*TPRO*; Chapter 1

"Sure Spots"

*Layout Design News* #8; August 1991; p. 9;

Rick Mugele

Switchbacks

[www.layoutvision.com/id16.html](http://www.layoutvision.com/id16.html)

Easements "How-to"

*TPRO*; pp. 75, 116

Multi-Deck layout design ideas

*Designing & Building Multi-Deck Model Railroads*;

Koester

*TPRO*; pp. 91-93

Modular & Sectional Ideas

Free-Mo (US) [www.free-mo.org](http://www.free-mo.org); [Fre-mo \(EU\)](http://www.free-mo.org)

NTrak [www.ntrak.org](http://www.ntrak.org)

NMRA module standards:

[www.nmra.org/standards/modules/ms\\_intro.html](http://www.nmra.org/standards/modules/ms_intro.html)

(And many more ...)

Small & Starter Layouts

Carl Arendt's Micro Layouts site:

[www.carendt.com/](http://www.carendt.com/)

Alternatives to the HO 4X8:

[www.layoutvision.com/id28.html](http://www.layoutvision.com/id28.html)

To contact the LDSIG:

[www.ldsig.org](http://www.ldsig.org)

LDSIG Member Services

668 Snyder Hill Rd

Lititz PA 17543-8945

To contact Byron:

[www.LayoutVision.com](http://www.LayoutVision.com)

Email: [layoutvision@gmail.com](mailto:layoutvision@gmail.com)

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