Model Railroad Planning & Design

Ric Zimmerman
So, You’re Going to Build a Layout

• Congratulations, BUT WAIT, there’s more!
  – Don’t touch that hammer, or head to Smitty’s just yet.
• Before you can really get into the construction phase of layout building, you must do some serious planning and preparation
EARLY PLANNING

STEP 1

• What do you want from your model railroad?
  – Quick, temporary entertainment
  – Opportunity to build a detailed diorama
  – An operational, miniature transportation system
EARLY PLANNING
STEP 2

• How much space can you allocate to the model railroad layout?
  – A spare bedroom (< 9x12 feet/100 sq ft)
  – Part of a basement or family room
  – Attic space
  – Full basement (> 25x60 feet/1500 sq ft)
EARLY PLANNING

STEP 3

• What scale are you going to use – HO, N, O, or G
  – Scale impacts size
  – Minimum layout width in HO is approximately 40” to reverse directions (18” Radius)
  – Point-to-point on a shelf as little as 6” wide (except corners)
EARLY PLANNING
STEP 4

• What are your interests?
  – What timeframe do you wish to model?
    • Steam era, transition era, or modern
  – Passenger operation, switching, etc.
  – Continuous running or point-to-point?
  – Is there a special area you wish to model?
  – Do you want a specific railroad?
What Era?
What type?
Specific Railroad?
CREATING AN INITIAL CONCEPT

STEP 5a

• Begin to envision a concept in your mind
  – What type of railroad will you model-
    prototype, freelance or “proto-freelance”
  – What part of the country do you want to model
  – Long open runs or many cities?
CREATING AN INITIAL CONCEPT
STEP 5b

• What kind of terrain do you want?
  – Farm land
  – Industrial district
  – Mountains (Appalachians or western mountains?)
    • Forest covered or barren rocks?

• Each provides special challenges
  – Local railroads
  – Space requirements
  – Structures
Genres

Prairie/Farm Land

Industrial (Switching)

Mountains (Rockies)

Mountains (Eastern)

Gerry Albers
DEVELOPING THE CONCEPT

STEP 6

• To assist in clarifying the concept:
  – Create and outline of your ideas
  – Get a map of the area you want to model and draw the railroad’s route
  – Recommendation: Write a short history
    • When did it start and its current status
    • What other “real” railroads are in the same area
    • What types of motive power are in the current inventory
    • What industries are served
    • Match locale with railroad
DEVELOPING THE CONCEPT

STEP 7

• Research, research, research
  – Review the general area you plan to model
    • What is the terrain like
    • Mountains and valleys or flatter farm land
    • If farm area, what type of crops (affects structure types)
  – If prototype or proto freelance
    • What are the large cities or small towns
    • What are the structures like
    • How are they constructed – brick, frame, or both
    • What types of industries and what do they produce

• If possible, visit the area, take pictures and notes
STARTING THE TRACK PLAN
STEP 8

• Ready to start?
• First and foremost, how much space is available for your layout
  – Accurately measure the area you will use
  – Draw a border on your plan and commit to this area
    • Family needs may dictate smaller space than you envision
    • Committing to the allocated space critical in planning
    • You will have the desire to expand, sooner than you think
• Once the planning is done, the “die is cast” and……………..
THERE’S NO TURNING BACK NOW!
UNDERSTANDING THE LIMITATIONS
STEP 9

• Next step – read available materials
  – Many track plan books available from sources
  – Read, read, read -
    • Paul Malloy’s *Trackwork Handbook*
    • John Armstrong’s *Track Planning for Realistic Operation*
    • NMRA data sheets, standards and recommended practices

• Other sources listed at the end of the presentation
TRACK PLANNING TOOLS
STEP 10a

• FOR THE BEGINNER

• Many pre-packaged plans available
  – Sources:
    • Model Railroader magazine
    • Atlas Model Railroad Co. (http://www.atlasrr.com/)
    • Local Hobby Shop (LHS)
    • Public library
  – Some packages available with necessary track

Example: Atlas Plan #19

• A Switching Layout 12X6
• 18” shelves
• Source: Atlas Model Railroad Co.
TRACK PLANNING TOOLS

STEP 10b

• FOR THE INTERMEDIATE MODELER
  – Try modifying an existing plan
    • Using basic plan, change some of the dimensions and/or the other elements
    • Add an engine servicing area or a reverse loop
    • Change the size of the basic plan, adding more area
  – Drawing a new plan
    • Not recommended initially (opinion)
      – Unless scale is precisely maintained errors will appear during construction
      – Drafting tools or computer programs are required to obtain an accurate plan
      – Drafting is difficult unless properly trained
    • Tools can be expensive, if not already available
Plan #19 Modified
(Colorado Central #1)

- Modular switching layout 6x12
- On 24” shelves
- 3 modules for mobility
- Built in 1978; moved 7 times (including overseas); abandoned 2011
TRACK PLANNING TOOLS

STEP 10c

• FOR THE ADVANCED MODELER
  – Create a plan using Computer Aided Design (CAD) Tools
  – Computer programs are expensive and serve only one purpose, but they do a great job
    • Can have large learning curve, but not necessarily
    • Provide accuracy and planning ease once learned
    • Good tools have templates for turnouts, crossings, etc.
    • Provide accurate radii of curves
    • Ability to change portions of the plan without having to re-draft the plan
    • Several available programs listed at end of clinic
Colorado Central #2

- Started planning in 2011
- Currently under construction
- Three levels, 5 power districts
- Three interchanges (C&S, DRGW, DoD)
- North Yard (Staging) in adjoining room
- Approximately 135 feet of mainline
- Over 90 turnouts
- Operating under DCC
- Plans drawn using Empire Express on a Macintosh
- As many as 12 iterations for each part of the plan
COMMIT TO YOUR PLAN!!!

STEP 11

• Once decided, **STICK TO THE PLAN!!!**
  – Deviating or trying to expand the plan during construction will lead to errors, some of which can be unrecoverable
  – Minor “tweaks” can be added/adjusted

• If expansion is an option, establish where and how before the plan is complete
  – Can be added at a later date, etc
PLANNING FOR CONSTRUCTION

STEP 12

• Ready to start building? Wait! There is still some planning to do.

• Some factors to consider
  – Additional lighting
  – Backdrop before benchwork
  – Height of layout
  – Leveling the baseline
  – Type of benchwork construction
BACKDROP & LIGHTING
HOW HIGH?

• Determine height of layout at start
• Eye level or “bird’s eye view?”
• Who is going to operate the layout
  – Youngsters dictate lower level
  – Optimum Layout Elevation range = H - 28” to H – 17” (Where H = Height of average viewer)
    • Therefore: Optimum viewing level for a 6’ person ranges from 40” to 60”

Source: Designing and Building Multi-Deck Model Railroads
Tony Koester, Kalmbach Books
LEVELING

• Since basement floors are rarely level, it is important to establish a level base
  – Use laser level
  – Snap a line
  – If you have a drop ceiling that is level, measure down
STARTING CONSTRUCTION
STEP 13 (LAST ONE!)

• REMEMBER -- Plan first; build after planning is done
  – Measure twice (3 is better), cut once
• Now you can head for Smitty’s and the lumber yard
• GOOD LUCK!
BONUS
SOME ADDED CONSTRUCTION TIPS
UNDER TABLE WIRING

• Whenever possible, wire the layout with it on its side
The 4X8 Trick

- Saves space lost in corners
- Can be placed in the corner of a room for easy accessibility
Source Material

  - Many available NMRA links
  - Basic Model Railroad Benchwork, The Complete Photo Guide by Jeff Wilson
  - Basic Trackwork for Model Railroader, The Complete Photo Guide by Jeff Wilson
  - Designing and Building Multi-Deck Model Railroads, by Tony Koester
  - Introduction to Model Railroading by Jeff Wilson
  - Available at your Local Hobby Shop and (possibly) the public library
- Online: [http://www.atlasrr.com/Code100web/index.htm](http://www.atlasrr.com/Code100web/index.htm)
- Magazines
  - Model Railroader
  - Railroad Model Craftsman
- Yahoo Groups - [http://groups.yahoo.com/](http://groups.yahoo.com/)
  - [http://dir.groups.yahoo.com/dir/1600063576](http://dir.groups.yahoo.com/dir/1600063576)
Track Planning Computer Programs

- Cadrail™ Sandia Software ([www.cadrail.com](http://www.cadrail.com))
- 3D Railroad Concept and Design, Abracadata Ltd:
  - [www.abracadata.com](http://www.abracadata.com)
  - [www.theliquidateher.com](http://www.theliquidateher.com)
- 3rd Planit ([www.eldoradosoft.com](http://www.eldoradosoft.com))
- RR-Track, R&S Enterprises ([www.rrtrack.com](http://www.rrtrack.com))
- XTrkCad.org
- Empire Express, Haddon Software (Macintosh) ([www.haddonsoftware.com](http://www.haddonsoftware.com))