



Allen McClelland

# Model Railroad Planning & Design

Ric Zimmerman

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# 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?

Denny Lamuska



What Era?  
What type?  
Specific Railroad?



Dave Holl

# 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



# Northern Colorado



# 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 you 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



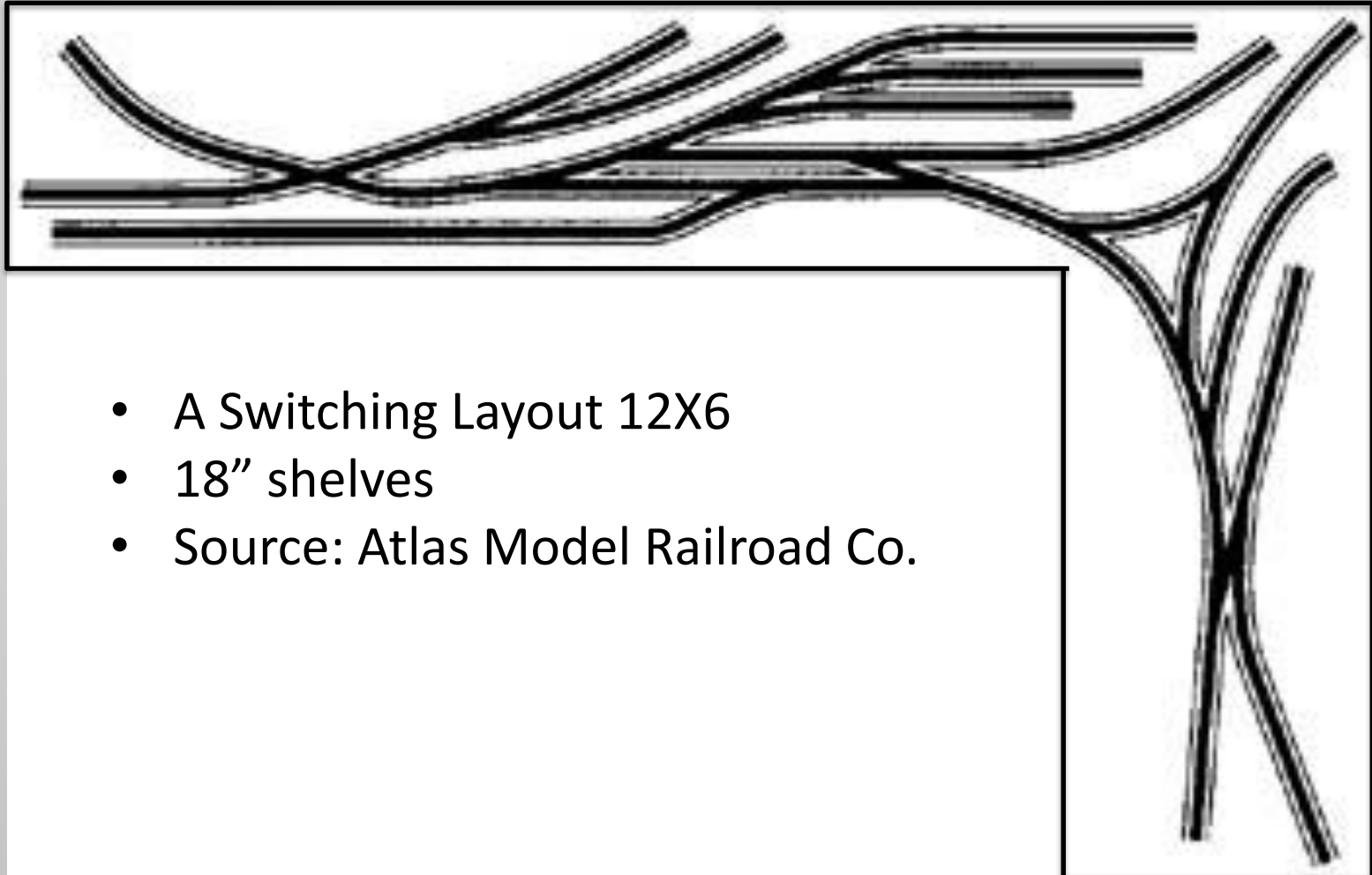
# TRACK PLANNING TOOLS

## 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

<http://www.kalmbachstore.com/modeltrains-railroading-model-railroading-books-track-plans-and-layout-planning.html>

# Example: Atlas Plan #19



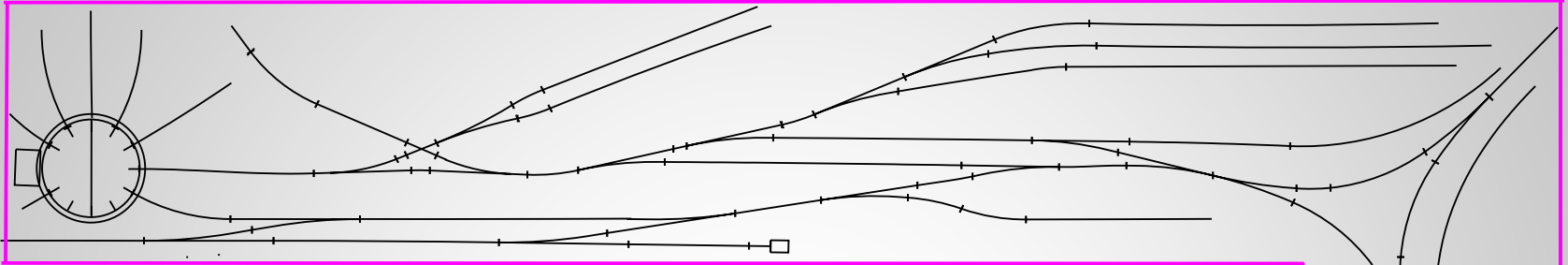
# TRACK PLANNING TOOLS

## STEP 10b

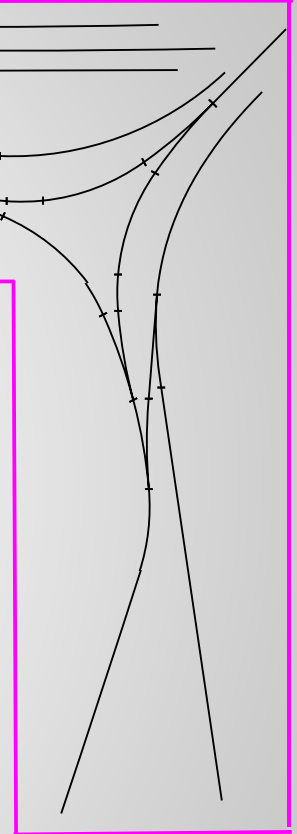
- **FOR THE INTERMEDIATE MODELER**
  - Try modifying an existing plan
    - Using basic plan, change some of the dimensions and/or the other elements
    - Add an engine servicing area or a reverse loop
    - Change the size of the basic plan, adding more area
  - Drawing a new plan
    - Not recommended 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



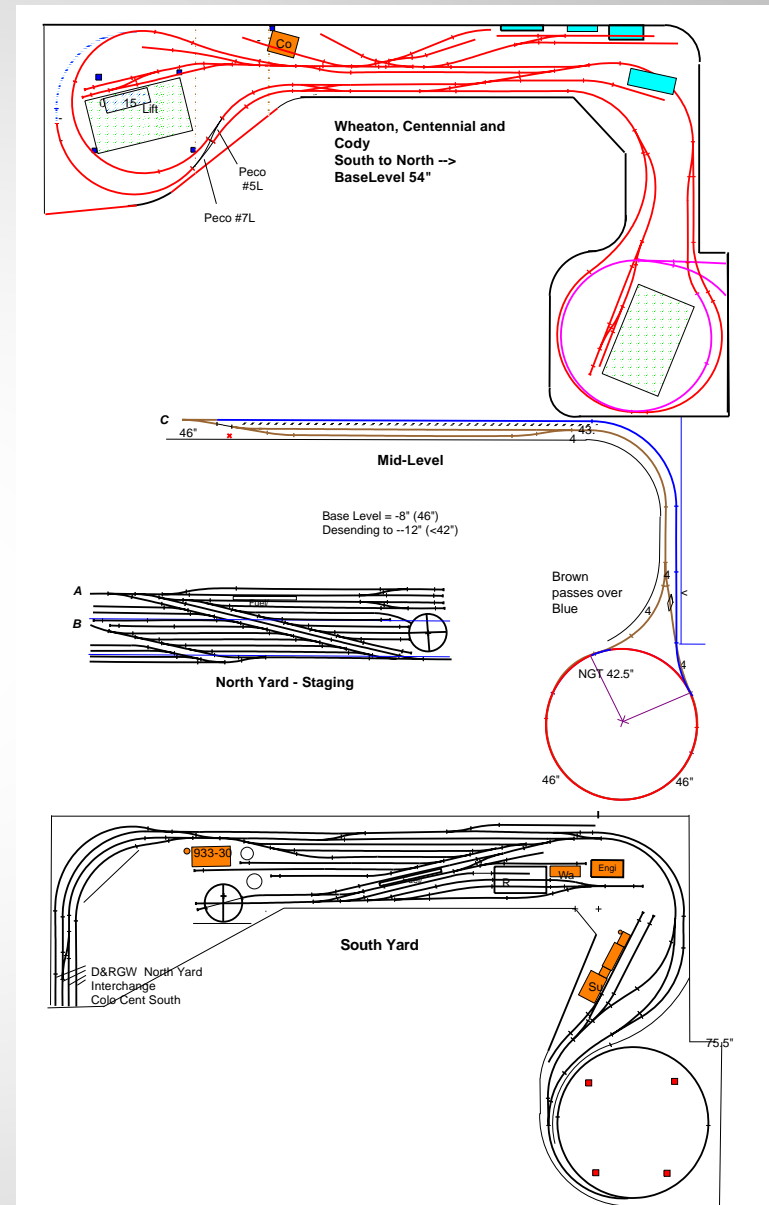
# TRACK PLANNING TOOLS

## 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



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# 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

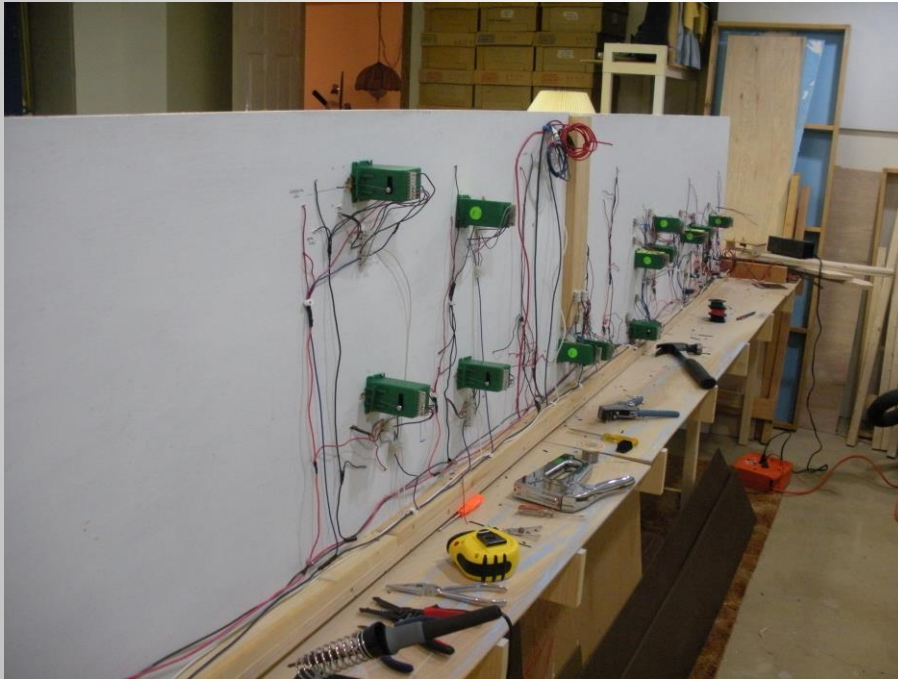
## STEP 13 (LAST ONE!)

- **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

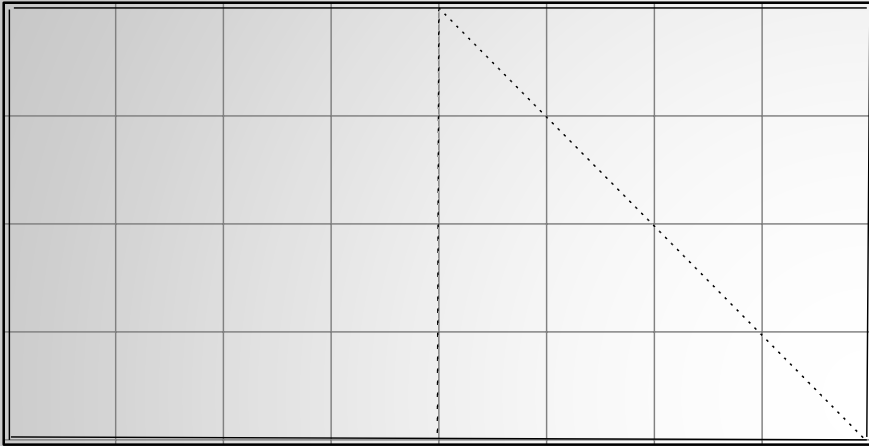


Upper Level

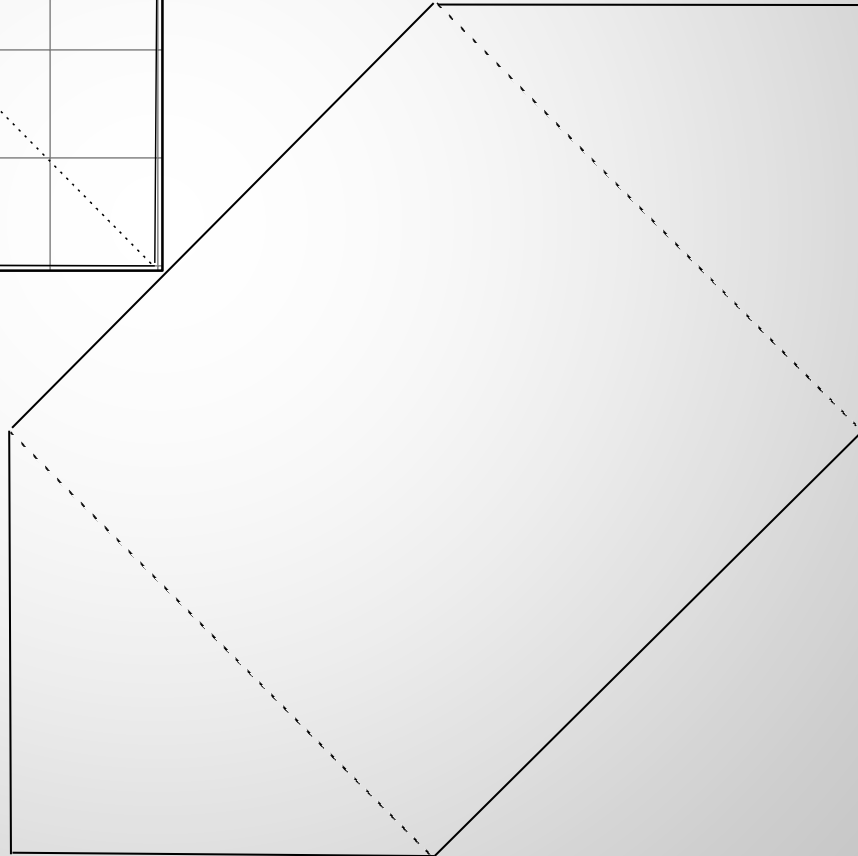


Lower Level

# The 4X8 Trick



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



# Source Material

- NMRA – Div 3 web site <http://www.modelraildayton.com/index.shtml>
  - Many available NMRA links
- Kalmbach Publishing – numerous books on model railroading at <http://www.kalmbachstore.com/modeltrains-railroading-model-railroading-books.html>
  - 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>
- Magazines
  - Model Railroader
  - Railroad Model Craftsman
- Yahoo Groups - <http://groups.yahoo.com/>
  - <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.theliquidadeher.com](http://www.theliquidadeher.com)
- 3<sup>rd</sup> 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))

