

Modeling an Elevated Railway

By

Brian W. Sheron, MMR

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There are Three Types of Railways

- Surface
- Elevated
- Underground

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- Surface Railways - first choice when land costs are low
- Elevated Railways - Generally less expensive than underground railways. Used in urban areas where there are not landmarks, right-of-ways are available, etc.
- Underground Railways - used in urban areas where elevated railways are not practical or feasible

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What is an Elevated Railway?

- An elevated railway is a railway built on structures that support the tracks off of the ground
- They are usually built high enough so that roads and often low buildings can exist below them
- They can serve traditional railroads or they can serve interurban transit railroads

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For this Clinic, I will be Focusing on Elevated Subway Lines

- An elevated railway is typically referred to as an “EI”
- An elevated subway is simply an elevated railway for transit cars that are also used in underground subways
- The main elevated subways in the U.S are in New York City and Chicago

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- Subways usually are powered by an electrified third rail
- Obtaining power from a third rail is cheaper and more durable than overhead power lines (catenary)

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Modeling an Elevated Railroad

- There are four main elements to model:
 - The structure supporting the track
 - The track, third rail, & cover boards
 - Details (stations, signals, walkways, railings, electrical equipment, etc.)
 - The subway train

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Modeling the Structure That Supports the Track

- Structures that support the track are made from reinforced concrete or from a variety of structural steel components, such as I beams, H-beams, open and closed girders, and can be riveted, bolted, and/or welded in place

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What Follows are Photos of Typical Older Overhead Railway Support Structures

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Several Things to Note

- Track support structures were likely designed and built over existing roadways, and are customized as necessary
- They typically use wide web I-beams with web reinforcements along their length for track supports
- Upright supports are primarily H-beams or square girders

Paint seems to be primarily shades of gray or green

Signs of weathering (rust and peeling paint) are common on the steel components

Modeling the Support Structure

- Support structure can be scratch-built or built from a kit
- Micro-Engineering makes several “City Viaducts” elevated track sections
- Prices range from about \$25 for a 90’ single track section to about \$55 for a 150’ double track section



Micro Engineering 90' Double Track City Viaduct

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Several Micro Engineering Double Track City Viaducts Joined Together

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Elevated Tracks on Vic Smith's City Edge Layout

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- **Pro**

- **Relatively quick assembly**
- **Good detail**
- **Realistic-looking**

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- **Con**

- **Upright width and elevation are fixed. May not work if you are adding the EI over an existing road or they need to be modified**
- **Curved sections are not available**
- **No variety in design**
- **Overall cost can be expensive depending upon the length of your overhead railway**
- **Rail is not included**

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Scratch-building

- **Pick a design for the track support structure**
- **As seen previously, structures vary significantly and can be mixed designs**
- **The internet is a good source for photos that show a variety of track support structures**

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- **Make sure that there are structural plastic components available that model the prototype structure components**

Plastruct and Evergreen are good sources for plastic in structural shapes

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- I decided to scratch-build my track support structure
- Note that I previously built an overhead subway for the City Terminal Zone section of my Long Island Rail Road layout about 15 years ago

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Overhead Subway Line on the City Terminal Zone Section of my Layout

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Elevated Subway under Construction on the City Terminal Zone Portion of my Layout, Circa 2006

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Current View of the Elevated Subway on the City Terminal Zone Section of my Layout

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- My proposed elevated subway needed to be retrofit to run above “Flatbush Avenue” in Brooklyn on the Atlantic Branch of my Long Island Rail Road
- Trackage would be a double track, point-to-point line with a station stop at each end
- An objective was to minimize the view blockage of the retail stores on “Flatbush Avenue” caused by the track support structure

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A View of “Flatbush Avenue” in Brooklyn on my Layout Before Installing the EI

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Another View of “Flatbush Avenue” Before Installing the EI

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Another View of “Flatbush Avenue” Before Installing the EI

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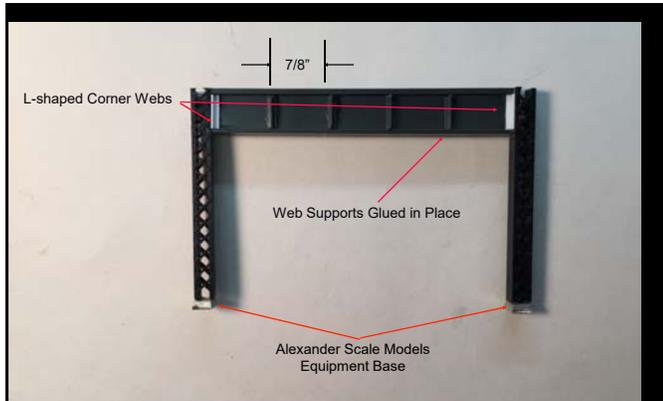


Building the Supports

- Central Valley Steel Bridge Girders were used for upright Supports (Kit #1902-5)
- Plastruct 90031 5/8" I-beams were used for crossmember and track supports
- Plastruct #90084 1/8" tees were used for I-beam web braces

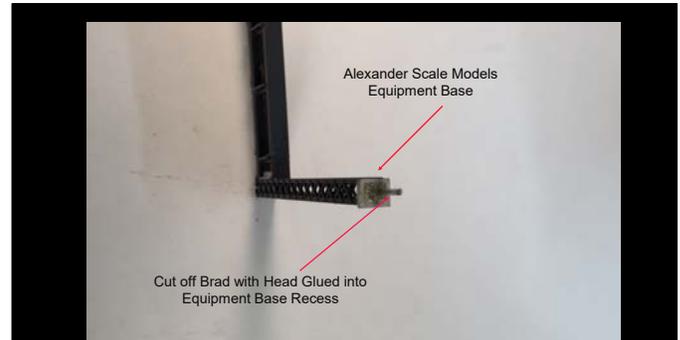
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- Plastruct #90503 3/32" styrene angles(L-shaped beams) were used for I-beam cross member web braces at I-beam ends
- Alexander Scale Models Equipment Bases #3113 were used for upright support bases
- Small brads with pointed end cut off were used for upright support locating pins



Upright Support Structure

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Cut-off Brad with Head Glued in the Recess of the Alexander Models Equipment Base Serves as a Locating Pin.

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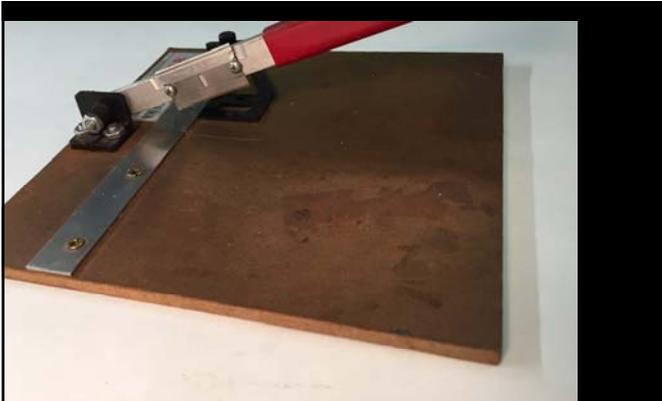
Several Completed Uprights in Place
Painted a medium gray and weathered with rust colored weathering powders

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Building the Horizontal Track Supports

- Horizontal track support beams are Plastruct 5/8" I-beams (15" long)
- Two beams support one track
- T-shaped web supports were cut to length and glued in place every 7/8" (note: because of the number of web supports needed, a NWSL "Chopper" is almost mandatory)

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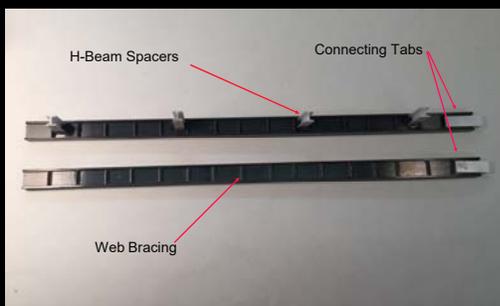
NWSL Chopper

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- I-beams were spaced apart such that ties from flex-track would rest across about 1/2 of the flange width

Plastruct H-beams were cut to length and glued between beams every 4" to keep I-beams properly spaced

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Horizontal I-Beams with Web Bracing and H-Beam Spacers Glued in Place

White rectangular tabs on right side are used to connect with adjoining I-beams

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- Easiest to first locate the upright supports
- One horizontal beam was then put in place, connecting it to the end of the preceding beam, but not gluing it
- Second horizontal beam was then put in place, also connecting it to the preceding beam but not gluing it

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- Once both beams are properly positioned, glue them together at the H-beam locations

When dry, glue another pair of 15" horizontal support beams to the first pair to create a horizontal track support section about 30" long

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Constructing the Track Supports

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Finished Horizontal Track Support

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- Once a 30" horizontal track support section was constructed, the next step was to paint and weather it
- Once the section was painted and weathered, it was set back in place on the layout

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Adding the Track

- I used Atlas Code 83 Flextrack
- Track was attached to the horizontal track support I-beams with contact cement
- The top part of the I-beam web flanges of the support structure and the underside of the track were coated with contact cement and left to dry (about 15-20 minutes)

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- The horizontal track support section was then set in place on top of upright supports
- Holding the track section at a shallow angle, the track end was connected to the existing track with rail joiners
- Once connected, the track was carefully set down on top of the horizontal support beams web flanges

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- Make sure the track is centered. You should be able to move it slightly to align it as necessary after it has been set down
- Once the track is glued to the horizontal support structure, remove the horizontal structure and track so the third rail and cover boards can be installed at the workbench

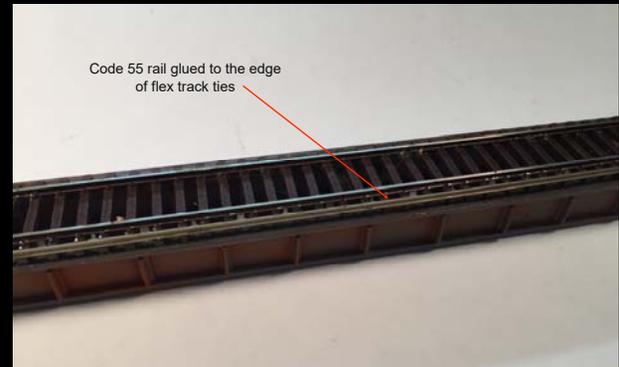
Adding a Third Rail

- A prototypic third rail is mounted on insulators a set distance from the rails
- A prototypic subway running on an electrified 3rd rail will not have sharp curves, so truck interference with the third rail is not an issue
- Electric trains typically have pickups on both sides of the trucks, so the third rail can be located on either side of the track

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- **Code 55 rail was used to model the third rail and glued to the edge of the ties with contact cement**
- **Third rail insulators were not modeled because they would not be seen once the cover boards were installed**

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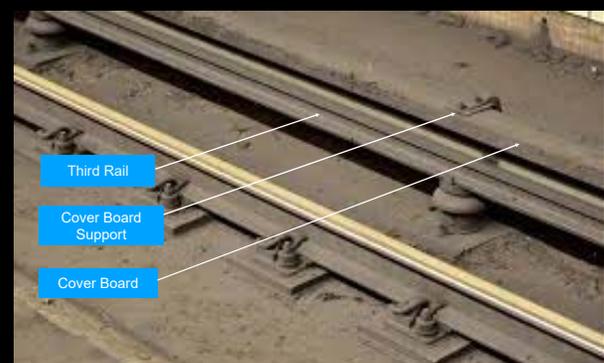
Code 55 Rail Glued to the Edge of the Atlas Code 83 Flextrack Ties

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Modeling the Cover Boards

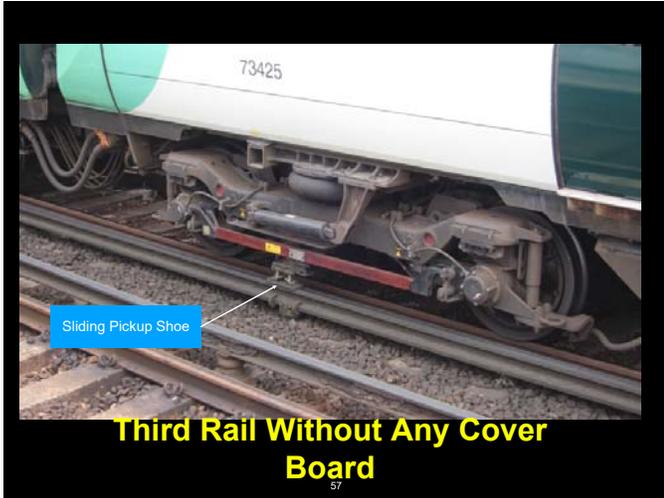
- **Cover boards are wooden boards or other material that cover (but do not touch) the third rail**
- **Purpose is to protect third rail from elements and protect people from inadvertently touching the third rail!**
- **Not all third rail electrified trains use cover boards**

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Third Rail with Cover Board

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- Material for model cover boards can be strip basswood, strip styrene plastic, or possibly brass strips
 - Each has its own pros and cons
 - Cover Board supports can be easily made from industrial grade staples
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- Wood cover boards are prototypic on some third rail electric railroads
- gluing metal supports to wood strips can be “challenging”
- Strip styrene plastic can also look prototypic of wood, metal or composite cover boards
- Liquid plastic cement will hold the metal supports in place. All-purpose glue can then be applied for permanent bond

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- Cover boards made from thin plastic strips can warp and interfere with trucks, so care must be taken when installing to make sure they lie flat

Thin Brass strip is rigid and metal supports can be soldered in place

Brass is more expensive than basswood or strip plastic

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- My previous experience with gluing metal supports to strip basswood was not great
- I decided to use strip styrene plastic for my cover boards
- Note that glue used for supports and painting can cause styrene to warp
- This is not a problem if supports are not spaced too far apart

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Styrene Strip with Support Posts Glued in Place and Painted

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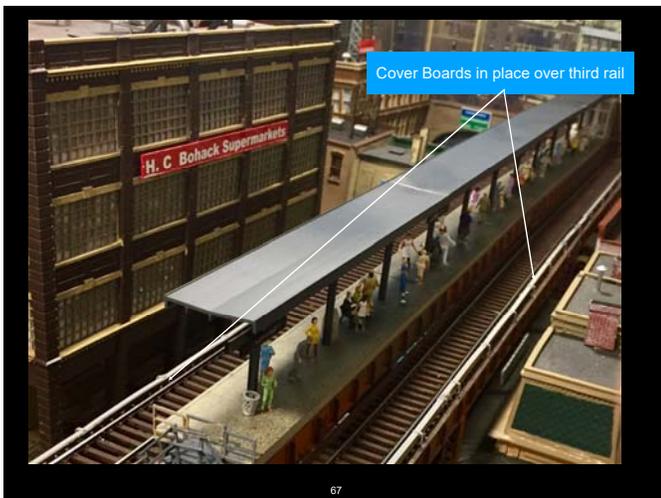
- Drill hole in I-beam web and locate first support
- Mark where second support will go and drill hole. Continue until the cover board is installed. Glue the supports into the holes in the I-beam flange
- After third rail and cover boards are installed, the completed section of track and track support structure can be permanently installed

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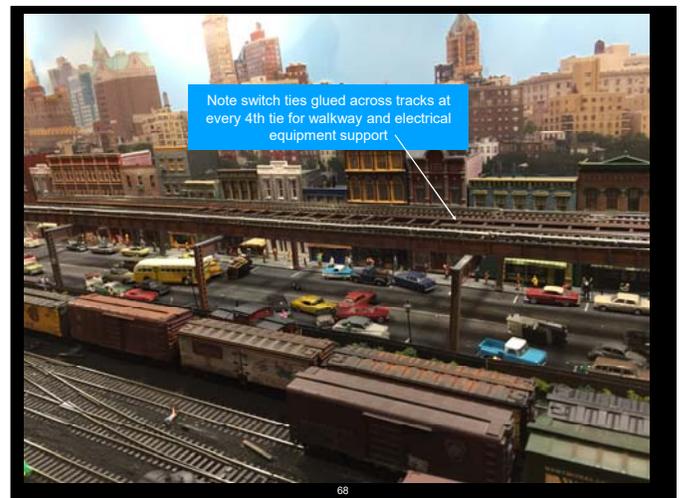
- Once the completed track and track support structure were installed, I glued switch ties, cut to length, between the dual rail sections at every 4th tie

These would provide the supports for the walkways and also electrical equipment

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Construction Underway

Note third rail coverboards are in place on foreground track

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Progress Continues

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Almost at the Other End!

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Building the Stations and Station Platforms

- On a double track line, station platforms can be on outside of each track or in center between the two tracks
- Available space on my layout dictated that there should be a single station platform between the two tracks
- Platform height should be even with subway car doors

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- Station platform must be long enough such that passengers can exit from all of the doors on all of the cars on the train
- I used Walthers Cornerstone Suburban Station Platform Kit 933-4099 for stations
- Kit comes with 4 platforms
- When butted together, platform length was exactly the length of a 4 subway car train!

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- Platform is 1-5/8" wide, so double track spacing at stations should be such that subway cars just clear platform edge when in station
- Short 5/8" I-beams placed on top of track support structure cross beam

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- 5/8" I-beams then glued on top of cross beams the length of the station platform

When station platform is placed on top of I-beams, platform height (surface) just matches subway door entrance

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- On each station, an entrance structure was scratch-built at one end
- Passenger access to the platform entrance is by stairways from the street
- At elevated subway terminal that ends against layout room wall, a stairway would need to be visible

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Passenger Access to Station

- I searched internet for appropriate photo of elevated subway access stairway (fortunately I found one)
- Resized to proper scale as necessary
- Cut to fit and glued in place

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Photo Found on Internet

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Printed Out on Photograph Paper and Cropped to Fit

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Photograph Glued in Place

Walkways and Railings

- Both underground and overhead subways provide walkways next to the tracks for worker access and passenger egress in event of an emergency
- These can be made of wooden planks (older type) or steel grids (more modern)
- Railings are provided for safety

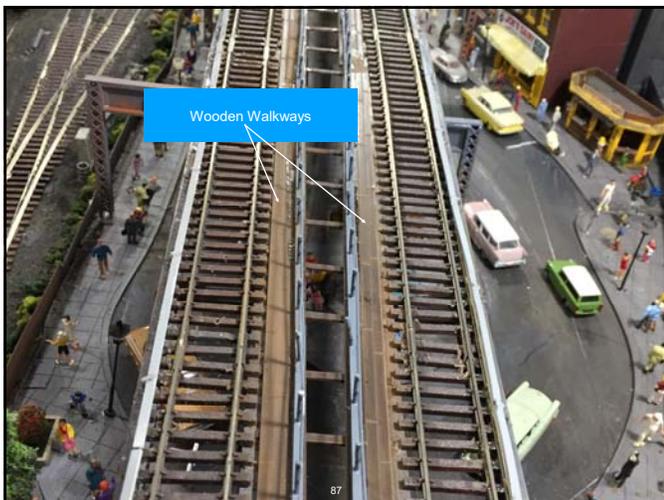
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- Walkways were modeled using Evergreen #4125 V-groove siding (0.125" spacing, 0.040" thick)
- V-groove siding was cut lengthwise into strips to simulate 4 planks (4 groove widths) and staggered horizontal lines were cut into the strips to simulate plank ends
- Walkways were painted dark brown, glued in place, and weathered

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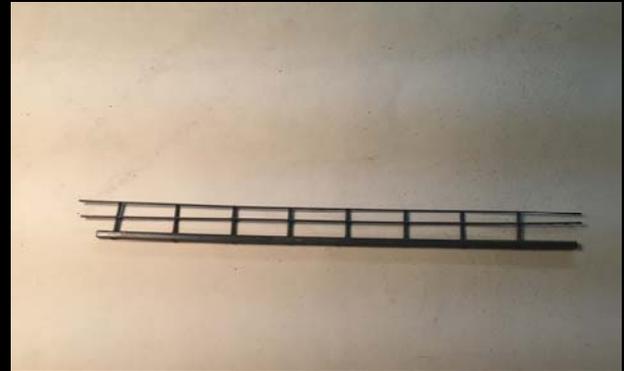
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- Railings are made from styrene rod
- Upright posts are Evergreen #221 3/64" diameter rods
- Railings are Plastruct #90852 0.025" diameter rods
- Base is Evergreen or Plastruct 0.100" square strips

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- NWSL Chopper was used to cut uprights to desired height
- Drill holes in 0.100" square strip every 7/8", insert uprights and glue in place
- Glue railings to uprights

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Railing Section

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Railings Installed Along Right-of-Way

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Signals

- Subways use different signal lights from surface railroads
- Lower and closer to the track than surface railways
- Long, narrow, oval shape

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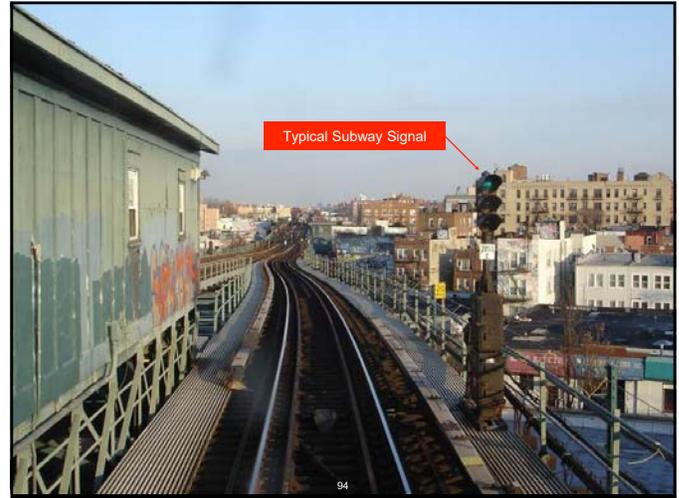
- Some minor variations in design

Some systems use dwarf signals

A good description of the NYC subway signaling system can be found at

https://en.wikipedia.org/wiki/signaling_of_the_New_York_City_Subway

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How to Model in HO Scale?

- I was not aware of any available HO scale signals prototypic of elevated subways
- Searching eBay, I found several vendors that sell signals that look similar to elevated subway signals
- These needed to be modified (remove upper and lower platforms and ladder)

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Inexpensive Signal Found on eBay

Green, yellow, & red LED lamps operate on 12VDC



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Signal with Ladder, Platform and Base Removed



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Signals Installed on the Elevated Track

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Subway Trains

- In HO scale, there are several options
- Life-Like (now Walthers) made a Proto 1000 4-car subway train set (DC without sound). These have been discontinued but are still available on eBay
- Funaro & Camerlengo makes an unpowered NYC R-19 subway car kit #104 (~\$50)
- Some brass subway car sets were imported by Model Traction Supply, are occasionally advertised on eBay, and are expensive (over \$1000)

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Walthers Proto 1000 "Redbird" Four Car Subway Train Set

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- Mike's Train House (MTH) makes a number of 2-car and 4-car NYC subway train sets, both DCC-ready and with DCC and sound
- Sets that have DCC and sound have a "conductor" that will announce various New York City stations
- Different sets have different sets of station stops

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- Sets with DCC and sound are also programable so they will start and stop at preselected locations on your layout.

New sets with DCC and sound run about \$300, but I've seen new sets being sold for less on eBay or occasionally on sale at Trainworld.

Unfortunately, MTH recently announced they are closing

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MTH 4-Car Subway Train Set

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Summary

- Overhead railways are not difficult to build and will add more railroading action to an urban scene
- Modelers have many options to choose from regarding the design of the track support structure, station platforms, etc.
- This clinic just shows an example of one construction method

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Finished!

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Under the EI

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- This clinic can be found on the Potomac Division web site
- Go to Potomac-NMRA.org and click on the "clinics" link on the top of the page
- A two-part article on the construction of my elevated subway can be found in the September-October and November-December, 2020 issues of "The Local" (<http://mer-nmra.com/MEReLocalsCurrent.html>)

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• Thank you for your attention

Any questions?

I can be reached at

BWSheron@mac.com

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