

The Susquehanna Valley Line Railroad

Proudly serving the up steam communities with car float service

Written Description – Material and Methods of Construction

Benchwork, Fascia, Roadbed and Track

The around the wall portion of the Susquehanna Valley Line Railroad layout is supported by cantilevered joists attached to the wall studs of the room. A photo of a small group of these cantilevered joists is shown in Figure 3-1. Each cantilever joist is made from 3/4 -inch 5-ply plywood with a 1-inch x 1-inch dimensional lumber cleats attached to the side of the joist to provide a means to screw up into the bottom of the plywood subroadbed. The joists shown in the photo are the first three joists under the left end of the Newberry Industrial Area. The lower leg of each of these joists supports the tiered tracks of the Enola, PA staging area of the layout. The subroadbed is composed of two laminated layers of 2.5-inch wide 3/8-inch AC plywood centered under the center line of the track. Figure 3-2 shows the installation of some of these strips of laminated 3/8-inch plywood on the joists shown in Figure 3-1.

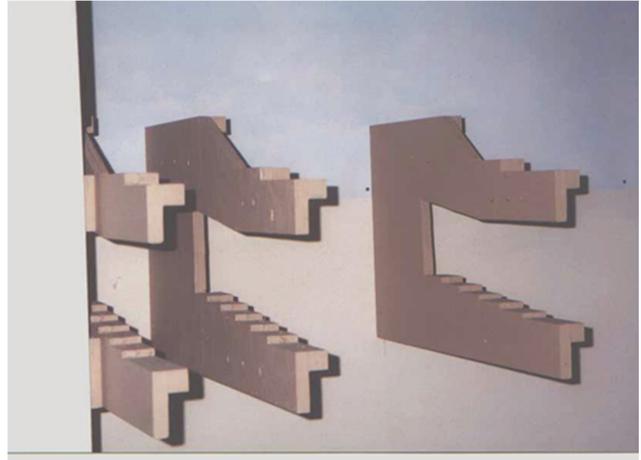


Figure 3-1 Cantilevered joists



Figure 3-2 Plywood subroadbed installation

The Newberry Industrial Area resides on a single piece of 3/4-inch AC plywood which rests on the top of the cantilevered joists shown in Figure 3-1.

All plywood surfaces, except those to which an adhesive would be applied, were painted as required by the SVL Construction Ground Rules.

The Riverside Yard including the car float dock and apron, and the Front Street Industrial Area are located on a peninsula that fills the center of the layout room. These areas are mounted on 3/8-inch AC plywood which is supported by a grid of 4-inch wide strips of Luan plywood which in turn is supported by three 1.5-inch square legs. The grid is also attached to one of the cantilevered joists on the east side of the layout. The grid, shown in Figure 3-3, provided a stable and very light-weight support structure for the peninsula. The tracks on the Riverside peninsula are mounted on a second layer of 3/8-inch plywood.

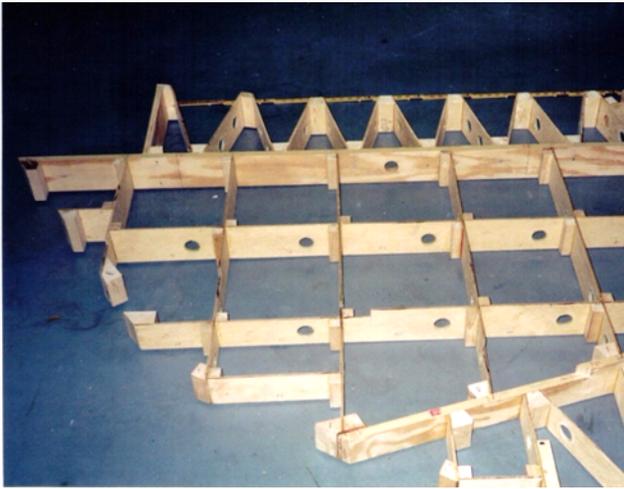


Figure 3-3 Luan plywood grid

result was a curved piece of fascia which fit around the turntable end of the peninsula with ease.

Micro Engineering code 70 and 83 weathered track and turnouts are used on the SVL and are mounted on one or two pieces or sheets of VinylBed. VinylBed by Hobby Innovations is a thermally stable and flexible material made from ground up vinyl and has excellent sound deadening properties. Strips of VinylBed are profiled with either a ballast profile or a roadbed profile. Figure 3-5 shows the two



Figure 3-5 VinylBed ballast and roadbed profiled pieces

predominant pieces of VinylBed that were used under the tracks on the SVL layout. The bottom piece shows the roadbed profile and the upper piece has the ballast profile. For flat areas such as the Newberry Industrial Area and the Riverside Yard area 1/8-inch sheet VinylBed was used. Per the SVL Ballast and Roadbed, and Ballast Profile and Drainage Plans (See Section 3 Appendix, page 3-13) all the mainline track and the branch line track up to Newberry are mounted on strips of 3/16-inch roadbed-profiled VinylBed which then has 1/8-inch single-track ballast-profiled VinylBed attached on top of it. The tracks on the long passing siding at Faxon, the siding at Pine Street, the interchange leading to Milton, and the truncated spur towards Lock Haven are all mounted on strips of 3/16-inch ballast-profiled VinylBed. The track height elevation difference of 1/8-inch (10.9 prototype inches) provides a clear visual discriminator between what is main-line track and what is non main-line track.

Contact cement was used to secure all the tracks and turnouts to the unpainted plywood. No contact cement was applied under the points of each turnout.

The fascia on the SVL layout is 3/16-inch Masonite. In most cases the Masonite was attached directly to the ends of the cantilevered joists shown in Figure 3-1 or to the blocks shown in Figure 3-3. The radius at the end of the peninsula where the turntable is located is 5.75-inches which required special consideration. A jig, shown in Figure 3-4, was constructed; the Masonite was then thoroughly soaked with a garden hose and then clamped in the jig until it was dry. The



Figure 3-4 Masonite forming jig

Lesson Learned: Woodworking is one of my hobbies and the construction of the multitier cantilevered joists provided much pleasure; however a major issue was uncovered during the front side expansion of the Newberry Industrial Area. Figure 3-6 shows the Cadrail™ design for the joist to the right of the joists shown in Figure 3-1 above. The issue is the diagonal edge on the joist separating the Newberry Industrial Area (top most tier) and the inner main line track. Had the joist been constructed using the red line in Figure 3-6 the attachment of the new scenery base would have been easier without affecting either the structural integrity of the joist or the location of the cleats for the main line tracks.

Landscape - Foundation

The support base under all of the landscape, except in the Riverside Yard and the Newberry Industrial Area, is 1-inch pink foam insulation board that has been extensively sculpted. The ground surface was created with Sculptamold mixed with dirt-colored paint and applied with a small brush or paint scrapper and then brushed lightly with water. See Figures 3-7 and 3-8.

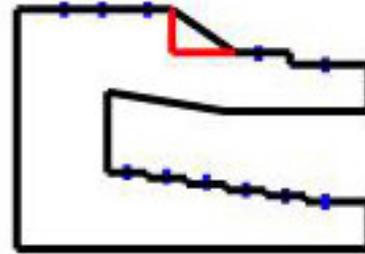


Figure 3-6

The ground under the small parkland area between the retaining wall above the dock and the retaining wall adjacent to the Riverside Yard was created using tile grout.



Figure 3-7 Foam insulation and Sculptamold foundation

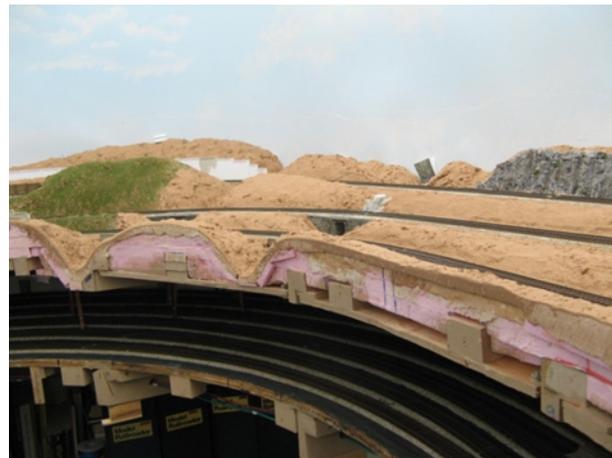


Figure 3-8 Color matched dirt paint

The paint used on all the landscape terrain areas was color matched at a local Home Depot center from photos of dirt taken in the Central Pennsylvania area.

Landscape – Ground Cover

The following ground cover products were applied to the landscape foundation discussed above to establish a good representation of the ground cover in Central Pennsylvania:

- Woodland Scenics clump foliage, and bushes (various shades of green)
- Woodland Scenics talus (various sizes)
- Scenic Express Flock and Turf (various shades of green)
- Timberline Scenery Forest Floor Ground Cover

Lesson Learned: Use Aleen's Tacky Glue instead of a white glue and water mixture to secure clump foliage and bushes to the landscape foundation. The use of the tacky glue on the base of the ground cover product avoids the upper part of the clump foliage or bush from becoming stiff as happens when the foliage product is secured with the white glue and water mixture, and thus presents a more natural appearance.

Landscape - Trees

The 310+ trees in the scenery area were created from Woodland Scenics SuperTree armatures. The trees were soaked in a 1:6 mixture of matte medium and water, and hung upside down to dry and straighten. The trees were sprayed with a flat gray primer and then misted with a Rustoleum Weathered Wood spray. The following table presents the types of Woodland Scenics (WS) and Scenic Express (SE) foliage materials that were secured to the tree armatures with Aquanet extra hold hair spray. Mixes A, B, and C were used primarily on the mature full growth trees along the backdrop. Mixes D, E, and F were used for the small and medium trees growing on the new hillsides created by the cuts in the mountain side. NMRA Data Sheet "D2a.1 Trees and Shrubs – General" was used as a reference during the construction of the trees.

Foliage Material	Mix A	Mic B	Mix C	Mix D	Mix E	Mix F
SE EX806b Coarse Green Grass	✓	✓				
SE EX811b Coarse Spring Grass	✓		✓			
WS T64 Coarse Turf Medium Green	✓				✓	
WS T65 Coarse Turf Dark Green		✓				✓
WS T63 Coarse Turf Light Green			✓	✓		✓
WS T45 Fine Turf Green Grass				✓		
WS T44 Fine Turf Burnt Grass					✓	
WS T49 Blended Turf Green						✓
Noch 07140 Leaves	✓	✓				
Noch 07142 Leaves	✓		✓			

Following the application of the foliage materials the exposed tree trunks were painted a second time with a 1:1 mixture of acrylic Grey and Raw Umber paint to enhance the coloration of the trunks. The last step in my tree construction process was to weather the newly painted trunks with Bragdon Weathering Powders in order to enhance the variation of the trunk-to-trunk color.

Landscape - Ballast

All ballast used on the SVL layout is from Smith and Sons. Per the SVL Ballast and Roadbed Plan (see Section 3 Appendix) all the mainline track is ballasted with Penn-Ohio #50 rock ballast. The branch line up to Newberry is a mixture of fine and coarse dark cinders. The established area of the Newberry Industrial Area is ballasted with a mixture of fine dark cinders with the addition of a small amount of fine brown cinders to simulate dirt having worked its way up through the initial cinder application. The new team track and the clean out track in the newer part of the Newberry Industrial Area are ballasted with fine dark cinders. The Riverside Yard non- A/D tracks, the drill, barge approach and reacher tracks are ballasted with a mixture of fine and coarse dark cinders. The A/D tracks are ballasted with Penn-Ohio #50 rock ballast.

Particular attention was paid to the height of the cinders. The new clean out track in Newberry has ballast just short of the top of the rail principally as a safety measure given the likelihood of train personnel walking extensively around the cars on the clean out track. The same height of ballast was

installed around the four whisker tracks near the turntable and the service track. All other tracks had the ballast just to the top of the ties.

Most of the ballast was secured with a 4:1 mixture of warm water and Elmers White glue, preceded by a wetting with 70% isopropyl alcohol. The branch line up to Newberry, which was the first track section to be ballasted, used a 4:1 mixture of warm water and Behr deep tint base paint.

A very neat, straight and clean interface was maintained between the outer edge of the ballast and the landscape along the main line tracks. The similar interface along the non-mainline tracks did not get as careful attention. The SVL, as reported earlier, is financially stable presently; but careful attention is paid to expenditures and in particular landscape maintenance along the branch line tends to be an opportunity for cost cutting measures.

Landscape – Walls

There are two different style walls on the SVL layout. The first is a natural rock wall that is a plaster of paris casting. Figure 3- 9 shows the frame was used to create the initial casting. The vertical wires attached to the frame were used to simulate the holes for the dynamite.

The second style wall on the layout is a paneled concrete wall. There are two of this style wall as shown in Figures 2-25 and 2-26. The first is along the upper end of the branch line leading to the Newberry Industrial Area and was built as part of the original construction of the railroad. The second wall was more recently installed as a result of the track expansion along the front of the Newberry Industrial Area and protects the inner main line track. Both of these walls were built with styrene pieces, which were then painted and weathered with Bragdon Weathering powders. Each wall has drain holes along the lower edge to allow drainage from the gravel backfill behind the wall. Broken pieces of rock and weeds are at the base of each wall. Figure 3-10 shows the back support pieces which each have a 1:20 cant to them. Figure 3-11 shows one of the walls with the styrene “concrete panels” installed but missing the capstones on the top of the wall.



Figure 3-9 Rock wall casting in frame

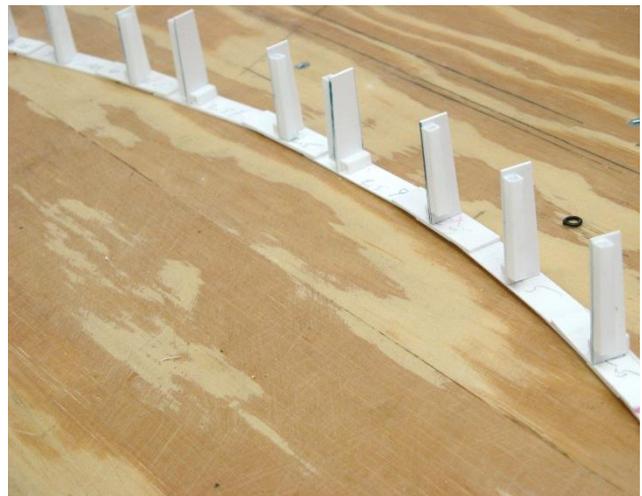


Figure 3-10 Frame showing the backside support pieces for the concrete panel wall



Figure 3-11 Concrete panels installed on frame

insure that there would be uniform light on the backdrop and layout. Also the fixtures closest to the edge of the layout were located so that the light from those fixtures would illuminate the operator side of any car to allow for easy car identification during operating sessions. The fluorescent tubes are Chroma 50 with a 5000K and 90 CRI rating. Each of the parallel sets of fixtures is on its own circuit, and all of the fluorescent tubes are fitted with UV shields.

The second ceiling lighting configuration is a string of blue incandescent lights which are used for nighttime operations. This string of lights is on its own light circuit.

Heavy duty aluminum foil was glued to the top side of the dropped ceiling panels immediately over the aisle ways. The purpose of this extra effort was to take a small amount of the fluorescent light off of the aisle ways thus providing a lighting contrast between the aisle ways and the actual SVL layout. Figure 3-12 shows the aluminum foil on the top side of the dropped ceiling panels in the area of the layout presented for judging.



Figure 3-12 Heavy duty aluminum foil on the top side of the dropped ceiling panels

rods interface with a fiber optic cable whose other end is near one of the LEDs illuminating the upper floor of the Rischel building. Figure 3-13 shows the fiber optic cable configuration inside the building.

Landscape – Figures

Woodland Scenics Dock Worker and Road Crew figures are used on the layout, as well as Preiser US Railway Personnel, Track Workers, and Seated Figures.

Lighting - Overhead

Overhead lighting above the dropped ceiling consists of two different configurations. The daytime lighting is created by means of a parallel set of single-tube fluorescent fixtures. The single-tube fixtures were arranged so that the end of any fixture was never immediately opposite the end of the fixture that it was parallel to. This extra degree of design helped

Lighting – On Layout

Selected interior rooms in the buildings in the Newberry Industrial Area are illuminated with LED lights to represent on-going manufacturing / maintenance work. The exterior over-the door lights, the lights high up on the coal tippie, and the lights on the poles adjacent to the Newberry office, turntable, fire equipment shed, and the water spout are miniature incandescent lights from Miniaturics. The side lights adjacent to the loading doors at the Rischel Furniture building are the ends of Plastruct acrylic rods. The interior ends of the acrylic

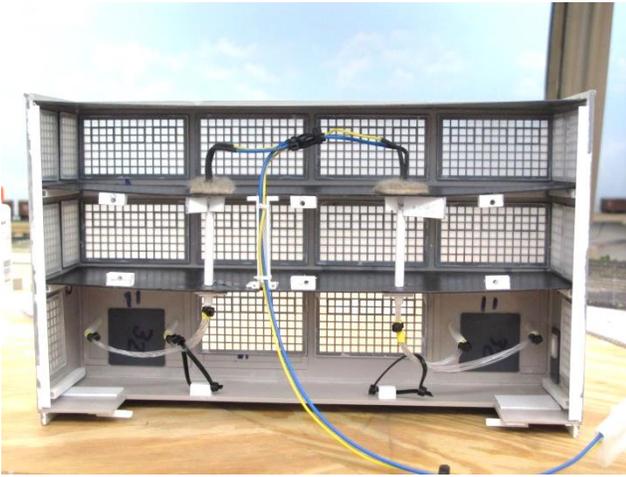


Figure 3-13 Fiber optic cables inside Rischel Furniture building

construct sections of the wall of the sand bin. The Newberry yardmaster's office is a LASERkit by American Model Builders.



Figure 3-14 Sand bin wall gluing frame

Water in the two streams coming out of the mountain was made with a single pouring of Mod Podge followed by several layers of Golden Medium Gel. The top layer of gel had a miniscule amount of sky blue acrylic paint mixed in it. The two streams which come from the backdrop down to the fascia are shown in Figures 2-17 and 2-18.

The waterfalls were made from Aleen's Tacky Glue applied to a strip of waxed paper. After the glue dried white cotton was glued to the underside of the waxed paper. White paint was lightly dry brushed on top of the falls to create the final appearance.

Retaining walls

The eleven + feet of wooden retaining walls on the SVL layout were made with strips of 6"x6", and 6"x8" Northeastern Scale lumber. A gluing frame similar to that shown in Figure 3-14 was used to create the sections of each wall. The bolts on the support posts are Grandt Line nut and bolt castings. A section of one of the wooden retaining wall is shown in Figure 2-24.

Structures

All of the structures in the Newberry Industrial Area are Walthers kits as noted in Section 2. Each building has its own foundation which sits on the plywood base under the Newberry area and below the top of the ballast. All the digital print buildings had foundations added to them.

The coal tipple and the fire equipment shed in the Riverside Yard, and the loading platform along the team track in the Newberry Industrial Area are scratch built using Northeastern Scale lumber. The small sand house is constructed with a styrene base with Northeastern Scale Lumber glued to the outside. Figure 3-14

shows the white styrene gluing frame used to

Water

The water in the Susquehanna River, see Figure 2-12, was made from four pourings of Unreal Details Magic Water. Mod Podge and Golden Medium Gel were patted on the water surface to create the realistic appearance of a slowly moving river.

The puddles in a few depressed areas of the ditches along the track were made with Mod Podge.

Water in the two streams coming out of the mountain was made with a single pouring of Mod Podge followed by several layers of Golden Medium Gel. The top layer of gel had a miniscule amount of sky blue acrylic paint mixed in it. The two streams which come from the backdrop down to the fascia are shown in Figures 2-17 and 2-18.

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Dolphin and Springlines

The mooring dolphin and the docking springlines shown in Figure 3-15 were made out of 3/16" dowels. The planking on the car float side of each springline is Northeastern Scale Lumber which is secured with Grandt Line nut and bolt castings.

Background

The background around the entire SVL layout is a single piece of pattern felt. After thoroughly being soaked with a garden hose, Masonite panels were bent in the ad hoc frame shown in Figure 3-16. When dry the panels were attached to supports shown in Figure 3-17 and the pattern felt was then tacked to the sheet rock and to the Masonite panels. The pattern felt was then painted a sky blue color which faded to a lighter blue at the horizon. New London Industries cloud stencils were used to create the clouds. The mountains were painted using the techniques described in the Chris Lyons video listed in the references below. Figure 3-18 shows the mountains prior to the planting of the trees.



Figure 3-15 Docking springlines and dolphin



Figure 3-16 Masonite panel in frame while drying

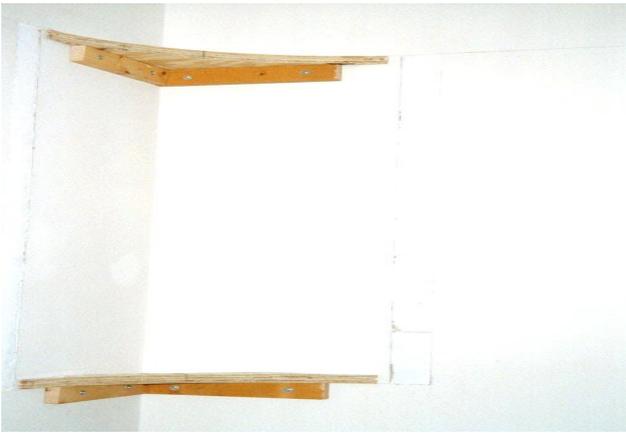


Figure 3-17 Masonite panel corner support brackets



Figure 3-18 Mountains painted per the Chris Lyons video

Design Tool

All the design work on the SVL layout was done with Cadrail™ by Sandia Software. Design files were developed for the following items on the SVL layout.

SVL track plan

Team track loading platform

Ceiling grid plan

Water runoffs

Power panel layout

Catch basin behind upper concrete panel wall

Cantilevered joists

Coal tipple cellar entrance

Control panels

Milepost markers

Ash and coal pits

Park bench

Coal tipple

Peninsula luan grid

Sand house, bin and tower

Rischel Furniture loading dock

Concrete panel walls

Rischel Furniture steps

Modifications to the Lowery Electric building

Scenery area

Printout for plugs under Newberry Industrial Area buildings

Reference material

CD-s

1. "Easy Backdrop Painting - Rolling Hills" by Darryl Huffman
2. "Building Waterways on your Model railroad" by Dave Frary and Bob Hayden

Model Railroader Special Issue Magazine / Book

1. "How to Build Realistic Layouts" – 3 Common Culverts article by Lance Mindheim
2. "How to Build Realistic Scenery"
3. "How to Build & Detail Model Railroad Scenes" by Lou Sassi – Chapter 6 "Power to the People"
4. "The Pennsy Middle Division in HO Scale"
5. Model Railroader's How-To-Guide "Painting Backdrops for Your Model Railroad"

Model Railroader magazine

1. "Modeling Culverts" by Rand Hood, March 1997

Internet Source

1. <http://shortlinemodelers.com/layouts-dioramas/scenery/rail-racks> - Rail racks
2. <https://www.youtube.com/watch?v=5hnyQ3LKEL8> - Background painting by Chris Lyon
3. <https://www.youtube.com/watch?v=wgInYtjXWvk> - Background painting by Chris Lyon

NMRA

1. NMRA Data Sheet D2a.1 Trees and Shrubs – General

The Susquehanna Valley Line Railroad

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Materials List

Northeastern Scale Lumber	Tacky Glue
Evergreen Styrene	White and Yellow Glue
Nut / Bolt / Washer Castings	Matte Medium
HO Pallets	Goo
Chain Link Fence	KingMill Ent. Digital Building Prints
LEDs	Walthers Background Building Kits
Hand Trucks	Walthers Car Float Kit
Fire Hydrants	Walthers Car Float Apron Kit
Eyebolts	Walthers Building Modular Kits
Doors	Yard Office Kit
Windows	Trackside Oil Tank Kit
Wood Crates	Diamond Scale Turntable
Lamp-shades w/bulb	Smith & Sons Rock and Cinder Ballast
Pipe Railing	VinylBed
33" Wheelsets	Micro Engineering Track and Turnouts
55 Gallon Drums	Berkshire EZ-Line
½ Full Garbage Cans	Stone Abutment
Power Poles	Retaining Wall
Shingles	Pier Retaining Walls
Water Column	Field Grass
Smoke Jacks	Thread
Pulleys	Brass Wire
Shovels	Brass Tubing
Figures	Toule
Chain	SuperTrees
Shanty	Pine Trees
Tie Plates	Coarse and Fine Turf
MU Hoses	Bushes
Hayes Bumpers	Clump Foliage
Stairs	Leaves
Ladder	Forest Floor Ground cover
Roof Detail Set	Talus
Men at Work – Blue Flag Signs	Paints – acrylic, enamels, house
Storm Sewer Grates and Inlets	Weathering Powders
Angle Cock	Wooden Dowels
Chimneys	Sculptamold
CA	Corrugated Aluminum

Cotton
Magic Water
Mod Podge
Gel Matte Medium
Heavy Duty Aluminum Foil
Tile Grout
Pink 1" x 4' x 8' insulation panels

Masonite
Pattern Felt
MicroMart adhesive backed Cinder Block
Chroma 50 Fluorescent tubes
Fiber Optic Cable
Satco Ceramic Blue Party Bulbs
India Ink and Alcohol Solutions

Appendix

Susquehanna Valley Line Railroad

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Ballast Profile and Drainage Plan

ID	Track Type	Ballast Profile	Drainage
1	Main line - not in yard	High profile	Yes
2	Main line - A/D tracks	High profile	No-French drain in yard
3	Main line- Siding	Medium profile	Yes
4	Passing / Spur / Interchange / Approach	Medium profile	Yes
5	Drill, approach, reacher	Medium profile	Yes
6	Yard	Low profile - ballast level with tops of ties	No-French drain in yard
7	Industrial areas	Low profile	No
8	Street	Tracks very slightly above street level	Yes - normal street drainage w/storm drains
9	Branch	High profile	Yes
10	Staging level	Medium profile	No

11 Yard lead High profile Yes

Roadbed and Ballast Plan - Details

Plan ID #	Tracks	VinylBed Roadbed type	VinylBed Subroadbed type	Ballast type	Ballast Product used
1	Main line – not in yard	1/8-inch single track	3/16-inch single track	Mainline ballast	Smith & Sons Penn-Ohio #50
2	Main line - Arrival & Departure tracks at Riverside Yard	1/8-inch single track	3/16-inch multi track	Mainline ballast	Smith & Sons Penn-Ohio #50
3	Pine Street siding, and spur track	3/16-inch single track	None	Fine and coarse dark cinder ballast,	Smith & Sons 8300 & 8301
3	Faxon passing siding	3/16-inch single track	None	Fine and coarse dark cinder ballast,	Smith & Sons 8300 & 8301
4	Farm Run siding in NE corner	3/16-inch single track	None	Fine and coarse dark cinder ballast,	Smith & Sons 8300 & 8301
4	Interchange approach from TO at Milton, and interchange tracks	3/16-inch single track	None	Fine and coarse dark cinder ballast,	Smith & Sons 8300 & 8301
4	Milton to hidden TO heading down to staging level	3/16-inch single track	None	Mainline ballast	Smith & Sons Penn-Ohio #50
5	Riverside Yard drill, approach and reacher tracks	3/16-inch single track	None	Fine and coarse dark cinder	Smith & Sons 8300 & 8301
6	Engine tracks off of TT	1/8-inch sheet	3/16-inch sheet	Fine dark and brown cinder ballast	Smith & Sons 8300 & 8400

Plan ID #	Tracks	VinylBed Roadbed type	VinylBed Subroadbed type	Ballast type	Ballast Product used
6	Service track	1/8-inch single track	None	Fine dark and brown cinder ballast	Smith & Sons 8300 & 8400
6	Riverside Yard tracks	1/8-inch sheet	None	Fine and coarse dark cinder ballast	Smith & Sons 8300 & 8301
7	Newberry Industrial Area tracks	1/8-inch sheet	None	Original Newberry Industrial Area - Fine dark cinders with light mixture of fine brown cinders to represent a dirt impregnated cinder ballast	Smith & Sons 8300 & 8400
				Expansion area - Fine dark cinders	Smith & Sons 8300
7	Front Street Industrial Development Area siding tracks not in street	1/8-inch Single track	None	Fine dark cinders	Smith & Sons 8300
9	Branch line - Newberry Junction to Newberry Industrial Area	1/8-inch single track	3/16-inch single track	Fine and coarse dark cinder	Smith & Sons 8300 & 8301
10	Staging yard ladder, reverted loop and hidden approach tracks	3/16-inch sheet	None		
11	Riverside Yard lead and crossover to drill	1/8-inch single track	3/16-inch single track	Mainline ballast	Smith & Sons Penn-Ohio #50