

# Stephen Cavanaugh's Western Pacific Railroad

Article and photos  
by Jack Burgess

A pair of Union Pacific SD40-2s cross the bridge at Keddie with TGW (Tidewater Grain West), a westbound grain train. The leg in the background is the Highline which heads toward Oregon.

Stephen Cavanaugh's Western Pacific Railroad will be

one of the many layouts available to attendees of X2011 West, the 2011 NMRA National Convention, in Sacramento July 3 to 9, 2011.

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**S**tephen Cavanaugh has been model railroading for 40 years or so and is now building his third layout. All have been based on the Western Pacific Railroad. He has been able to fill his layout space with a lot of mainline track without resorting to a non-sincere or spaghetti bowl track plan through some very impressive track planning and engineering.

**Jack:** Stephen, tell me about your layout.

**Stephen:** I'm modeling the Western Pacific Railroad in a 22 by 32-foot, three-car garage. The layout uses a multi-deck-mushroom design which provides me with 320 feet of main line and an additional 108 or so feet on the Highline. It runs from Oroville in the Sacramento Valley through the Keddie Wye and up to Portola. Just beyond Portola is a reversing loop in the eastern desert. From Keddie, the Highline

continues up to a reversing loop north of the town of Crescent Mills. So, I'm basically modeling the WP from the foothills up through the Feather River Canyon and on up to the desert together with the Highline.

**Jack:** So the main line came up the Feather River from Oroville to the Keddie Wye. Where did these two other legs go on the prototype?

**Stephen:** The Highline went north to Oregon while the other leg went east to Portola and eventually on to Salt Lake City, Utah to interchange with the

Denver and Rio Grande Western and Union Pacific railroads.

**Jack:** So there is staging at the end of each of the three legs connecting at the Keddie Wye?

**Stephen:** There is currently a stub-end staging yard under construction just beyond Oroville, a small staging yard in the reversing loop on the Highline, and staging yard and a reversing loop in the desert east of Reno Junction.

**Jack:** You told me that this is your third WP layout. When were the others built?

**Stephen:** My first layout was built in 1980 and torn down around 1982. The second was started in 1983 and appeared in *Model Railroader* magazine in 1994. This layout was started in about 1997.

## Mushroom Design

**Jack:** You mentioned your mushroom design. Can you explain what that is?

**Figure 2:** The westbound TGW rolls past the distinctive railroad offices and twin water tanks at Keddie.

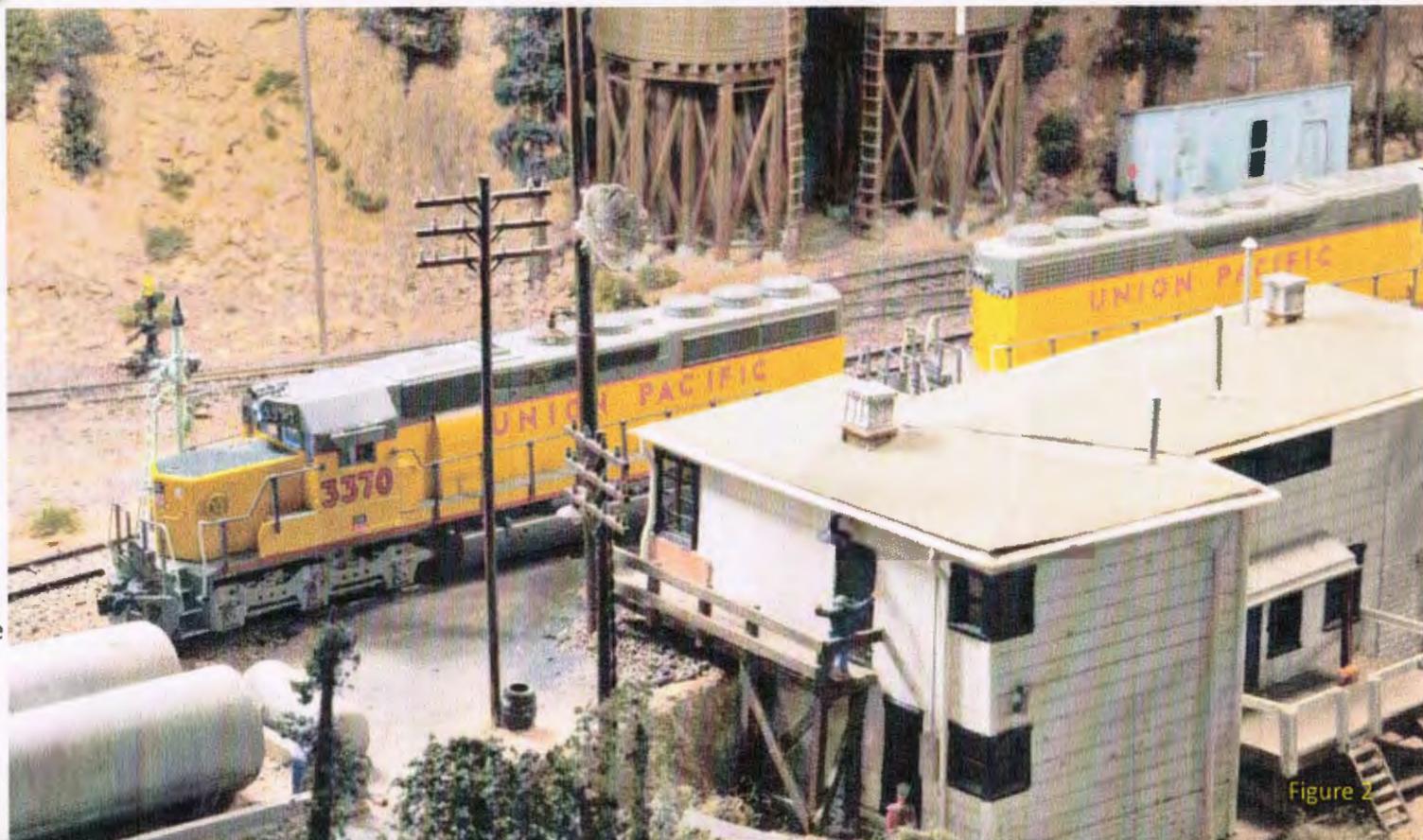


Figure 2



Figure 3

**Stephen:** A mushroom design is something that Joe Fugate, publisher of Model Railroad Hobbyist, and a few others have done. I know of only 4 or 5 mushroom design layouts and they are pretty rare. Basically, it is a design where you have one scene on a lower level and another scene above which

cantilevers over it but is viewed from the opposite direction. The two scenes thus cannot be viewed from the same location. On a traditional multideck shelf layout, there might be two levels but both face the viewer.

**Jack:** But you do have sections where two adjacent levels face the viewer?

**Stephen:** Yes, but that was just done to gain extra mainline length so mine might be called a "hybrid" mushroom design. In essence, I built another level on top of a mushroom design to get more running room.

**Figure 3:** The caboose of an east-bound train of empty grain cars passes the signals at Quincy Junction. Waiting on the interchange track is Quincy Railroad No. 4, an Alco S1 switcher.

**Jack:** What do you see as the advantages and disadvantages of a mushroom design?

**Stephen:** Well, you certainly get more running room or linear mainline length to the railroad. But you add more complexity and a lot more carpentry.

**Jack:** Since this is your second mushroom design layout, you obviously think it is worth the extra design and construction complexities.

**Stephen:** Yes, it also adds a lot of cost for the decking and so forth. Interestingly, after I built my first mushroom design but before starting over on

this one, I was able to look at it with a clean slate of sorts and ask myself, "What would you do differently?" Basically, this design is very similar to my previous layout but I learned some things on the first one as I built it which were incorporated into this layout.

**Jack:** Did any of your friends have an influence on your layout design?

**Stephen:** Obviously, you get bits and pieces from different people but probably the one person who had the largest influence was Jim Providenza. He continually said "Longer sidings, longer sidings!" He kept stressing to include

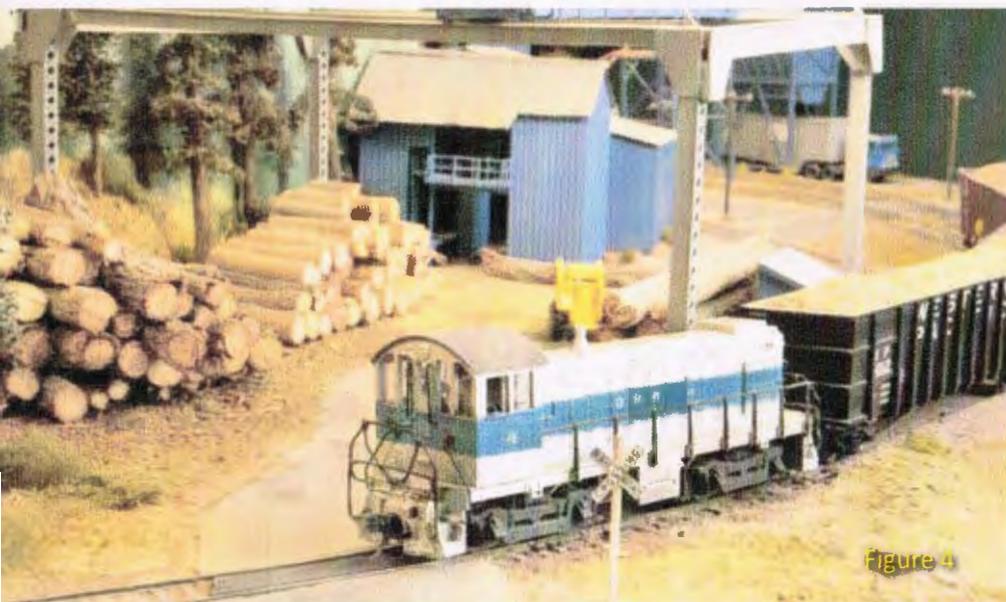


Figure 4

**Figure 4:** Quincy Railroad No. 4 switches some woodchip cars at the Sierra Pacific Industries mill at Quincy. This mill trackage is reached by a short 5½% downhill grade (the same as the prototype) from Quincy Junction.

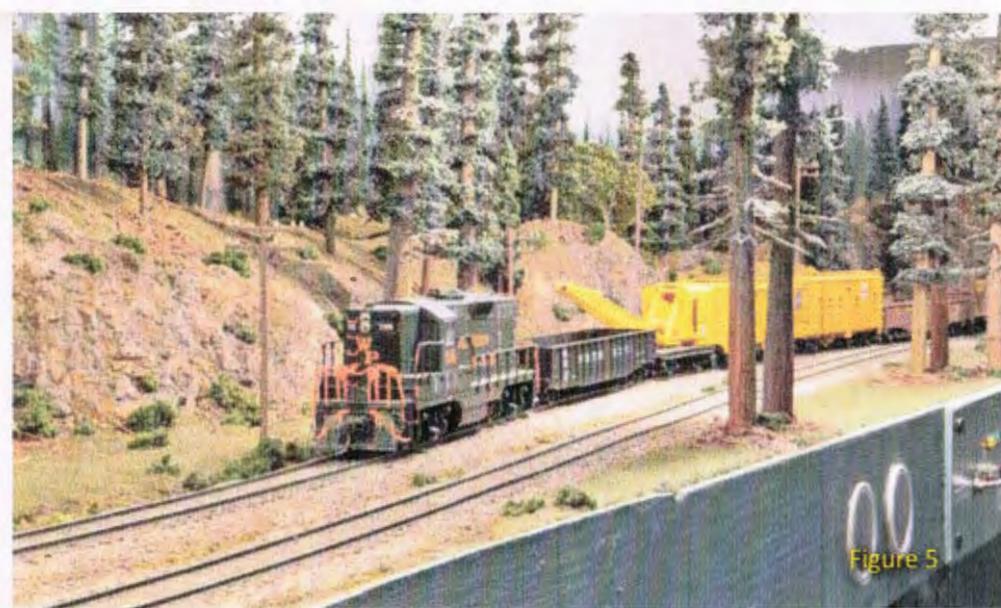


Figure 5

**Figure 5:** A westbound work train passes the siding at Sloat.

longer sidings for operational purposes, even at the expense of curved turnouts, which one should normally avoid.

**Jack:** Did you take his advice?

**Stephen:** Of course! I tried to. Obviously, you want as much input as you can in layout design and I tried to do that as much as possible but, like most layouts, there are trade-offs for what you can do.

**Jack:** Did you completely design everything before you started or did you just have a concept and develop things as you went along?

**Stephen:** Well, I had the benefit of knowing what worked and what didn't work from my second layout which was also a mushroom design. So, I could just expand from that. Basically, the layout was designed around Keddie

to some extent. But I quickly learned that if you built Keddie accurately, with all of the curves bending the right way and the same length as the prototype, with the bridges full-size, and with the complete Keddie yard, it would take up pretty much the entire three-car garage. So I compressed that a bit in order to get more than just the Keddie Wye into the layout. I wanted some of the canyon in too, so that quickly lead to a mushroom design in order to get more running room.

**Jack:** How is your layout lit since you have so many levels?

**Stephen:** One of the trade-offs of a mushroom design is that you need to light it pretty well and incorporate lighting into the design. I'm using 120v incandescent lights with dimmers and with alternating blue and white bulbs.

They are built into the fascia above the scene you are lighting. These bulbs are all installed in porcelain bases for safety reasons since they put out a lot of heat. Basically, I have one 25 watt bulb every 24" if the scene is 24" deep and 24" high. If it is deeper or higher, I might use a 40 watt bulb instead to adjust the intensity of the lighting. The dimmers are 1000 watt for the incandescent bulbs and 600 watt for the blue bulbs which are used to simulate nighttime lighting.

**Jack:** What do you do about the heat buildup from the incandescent lights?

**Stephen:** I've installed an air conditioner system to mitigate that problem. I like incandescent lights since you can dim them – compact fluorescent light bulbs don't dim well. But heat is a concern.

**Jack:** Have you had help building your layout or have you done everything yourself?

**Stephen:** The vast majority was done by myself, roughly 95%.

**Jack:** Many modelers say that a layout is never finished. What major projects do you still have to finish?

**Stephen:** I will be installing a signaling system and I need to finish the staging yard at West Oroville. I also have more buildings to complete. I'll have plenty to do once I retire!

**Jack:** If you had a chance to go back and do things differently now, is there anything you would change?

**Stephen:** While I don't think that I'll have a chance to start over now, we all have our dream layouts. For my dream layout, I would prefer to have a layout space which was taller. One of the trade-offs of a mushroom design is that the layout should be raised high

enough so that you can walk under portions of it. By raising it high, you are of course nearer to the ceiling. That

*Continued on page 57 ...*

**Figure 6:** A westbound work train passes Quincy Junction. A pair of bulkhead flat cars are on the interchange track. Because this scene is directly above Serpentine Canyon, which is open to view from the opposite side of the mushroom, the control panel is on a long tether that allows it to be removed to access it for wiring and repairs.

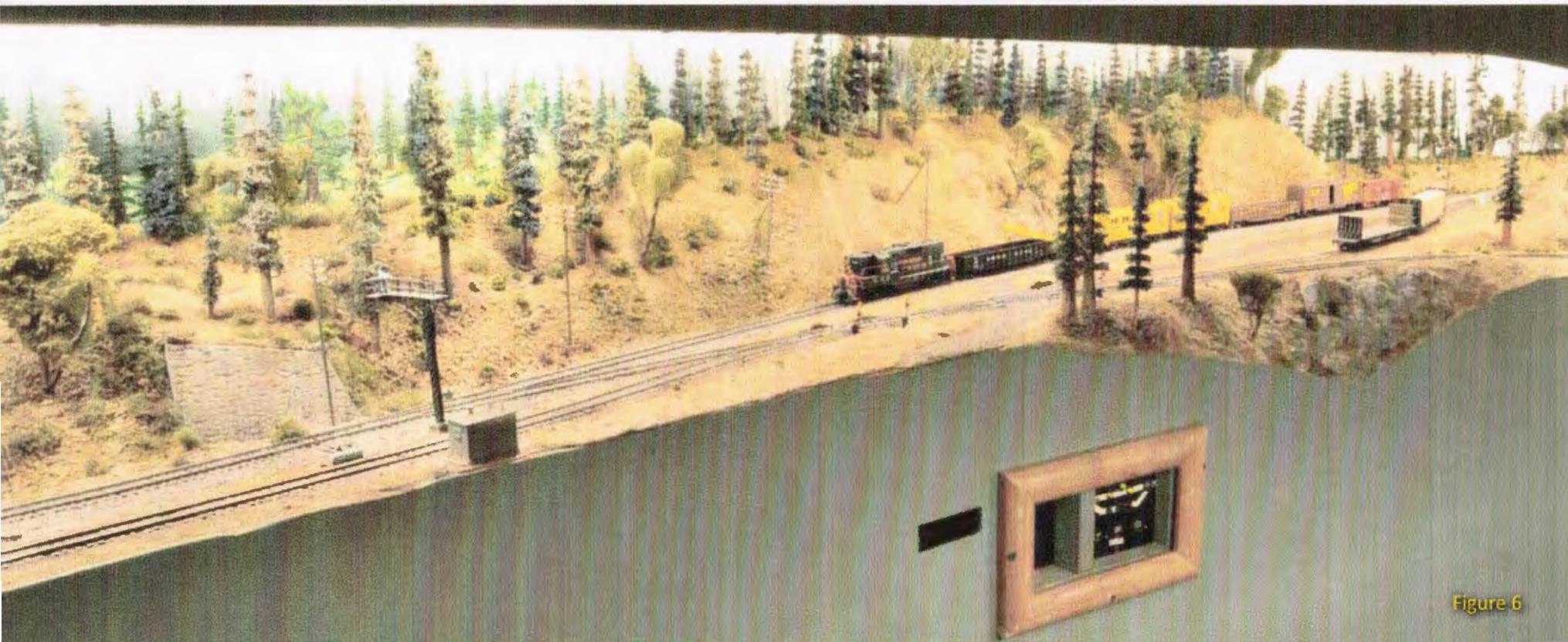


Figure 6

Stephen Cavanaugh's

# Western Pacific Railroad

## Layout Statistics

Era: 1970s

Locale: Western Pacific's Feather River Canyon route

Style: Prototype

Configuration: Double-decked mushroom

Location: Garage

Scale: HO

Trackplan: Point to (staging) loop

Size: 30' x 22'

Min. Radius: 30"

Track: Flex

Turnouts: #4, #5, #6, and #8

Control: DCC - NCE radio

Mushroom layouts are a lot more complicated than a single deck or a traditional multi-deck layout. Stephen's WP layout is a combination of mushroom and multi-deck design, making it difficult to understand. Check out the 3D Click n' Spin computer model of the layout's decks to help get a feel for it.

While squeezing about 15 lbs of layout into his 10 lb garage Stephen made an interesting innovation in the stacking of decks. Note how the photo of Serpentine on the lower level reveals a back-drop sloping forward from back to front. The upper side of this back drop supports the hills behind the tracks at Quincy Jct. on the middle level.



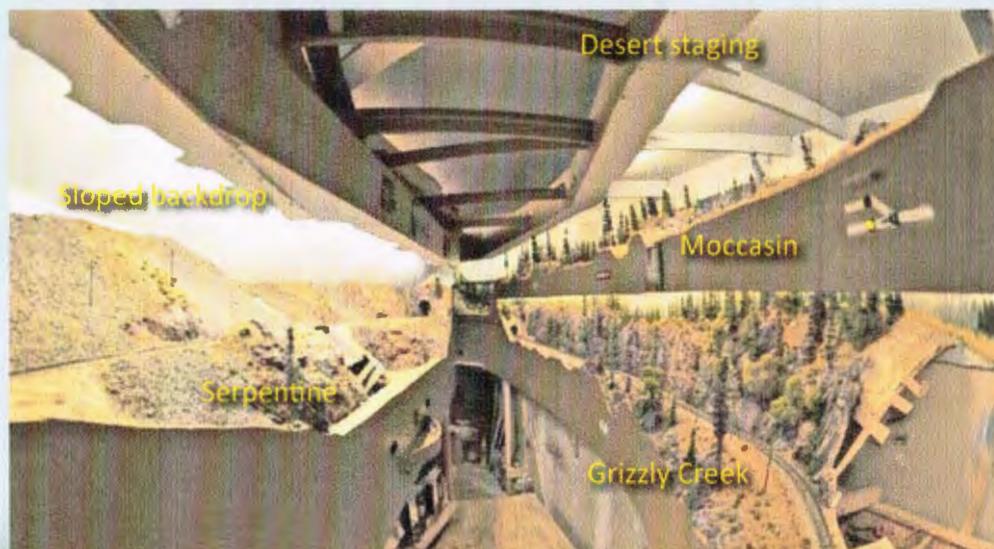
Directly above Serpentine Canyon's sloping backdrop on the left, the hills behind Quincy Junction on the middle level. Note the elevation changes between Grizzly Creek, Serpentine, and Moccasin.

**S**tephen Cavanaugh lives in Tracy, California and works as an alarms electrician for the Lawrence Livermore Lab.

Stephen has been a fan of the Western Pacific since his early years at Chico State University where he often had the chance to visit the nearby Feather River Canyon. Stephen has always had an interest in railroads, particularly the Western Pacific Railroad.

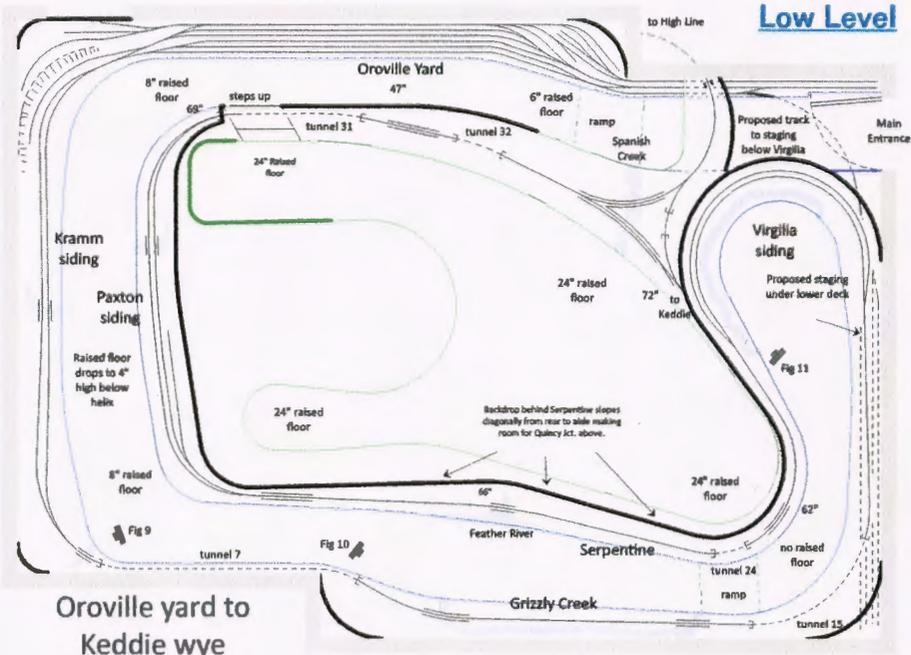


He has two grown children, a daughter, Stephanie, and a son, Scott. This is his third Western Pacific layout.



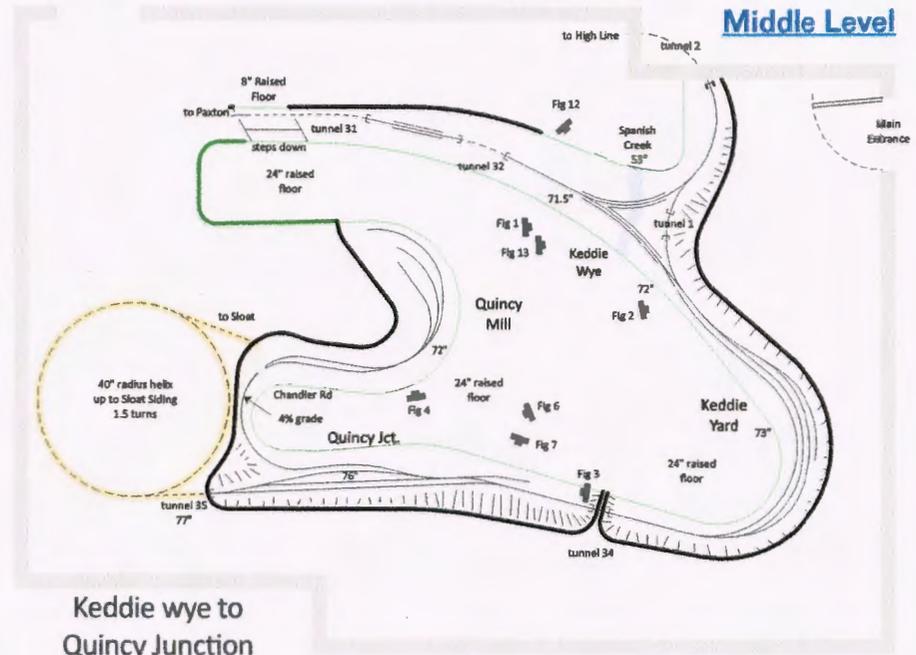
Trackplans for each of four levels – they are zoomable or 'click' their title for a .pdf file of that level

**Low Level**



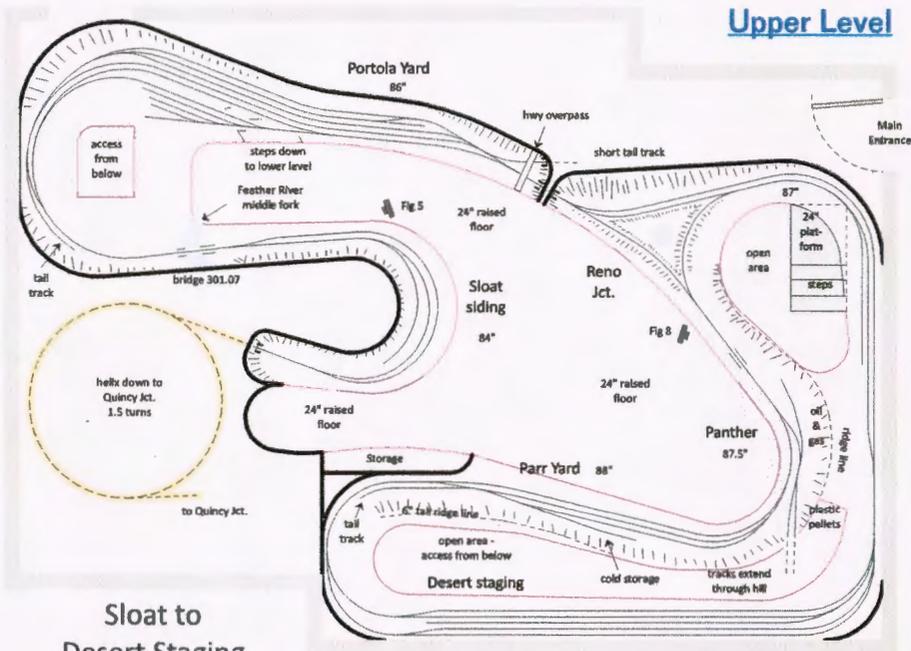
Oroville yard to Keddie wye

**Middle Level**



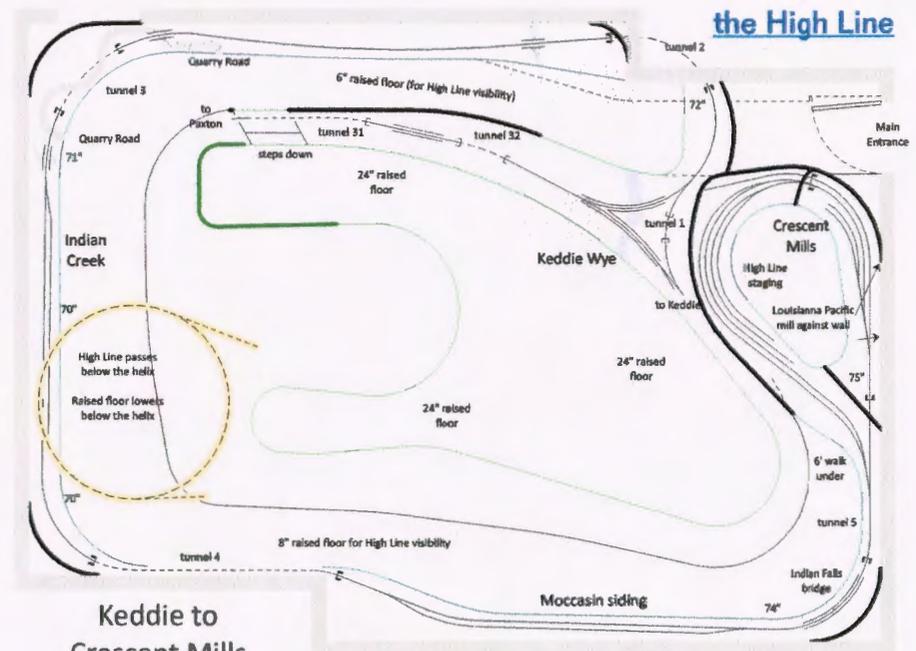
Keddie wye to Quincy Junction

**Upper Level**



Sloat to Desert Staging

**the High Line**



Keddie to Crescent Mills

plans not exact scale

... Continued from page 54

tends to reduce the amount of vertical height you have between levels. If I had more vertical space, I would use that to increase the space between the levels, especially in the lower Feather River Canyon areas in order to show the depth of the canyon itself. That would allow more vertical height for the mountains.

**Jack:** So what are your track elevations from the floor?

**Stephen:** The lowest level at Oroville is about 47" above the floor and track climbs up to the highest point at the desert which is about 40" above that or about 7½ feet above the floor.

**Jack:** So that requires a raised floor in areas so that you can see and operate the layout?

**Stephen:** Yes and no. In places, I raised the elevation of the layout so that

**Figure 7:** The lack of access under a deck due to the mushroom design and the fact that another scene might be under this level can make locating switch machines difficult. Thus, the switch machine for the turnout at the west end of the siding at Quincy Junction is surface-mounted behind the retaining wall. Access is via a lift-out section of scenery; the pine tree was built to form a handle to remove the lift-out.

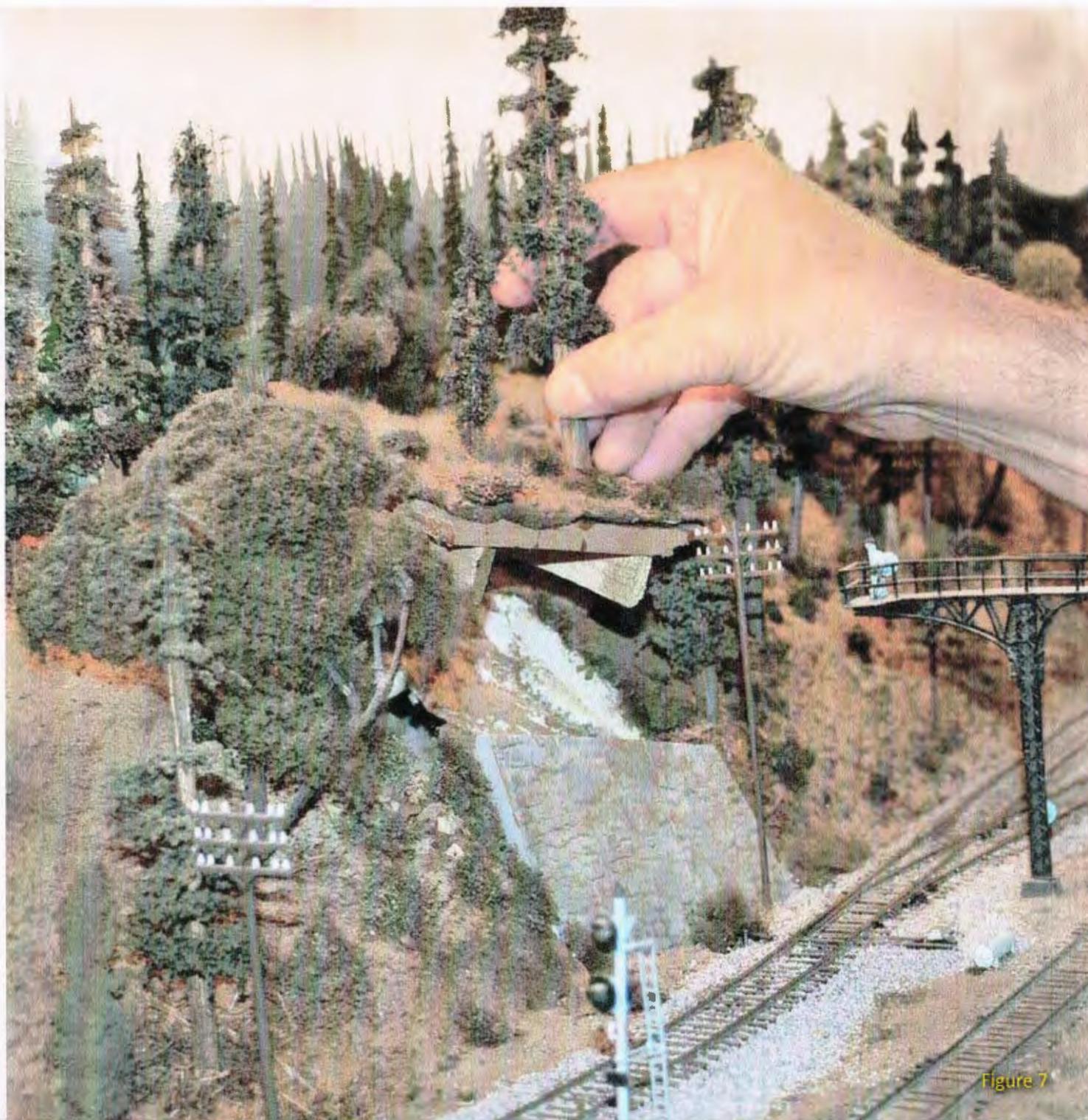


Figure 7



Figure 8

**Figure 8:** A solitary UP business car trails a Western Pacific GP20 in the old silver and orange paint scheme as they cross an arroyo and head down the Reno branch. While Steve knows that this business car and diesel were never on the railroad at the same time, they still make a striking train.

people could walk under portions of it, such as the lower level Keddie yard. But in other places, I raised the floor using decks so that visitors and operators could see it at a reasonable level. For example, in the area of Reno Junction, you are standing on a deck which is 24" high. That puts the upper level around chin height.

## Modeling the Western Pacific

**Jack:** So, what attracted you to the Western Pacific Railroad?

**Stephen:** I pretty much grew up in Livermore, California and the WP ran through Livermore. But also, going to school in Chico State, we used to go up to the Feather River Canyon a lot and I always liked that area.

**Jack:** Are you modeling a particular era or year?

**Stephen:** Yes. Basically, it is set for the spring of 1981, mainly because of the orange-nose paint scheme on the WP diesels at the time. I choose spring to have the contrast between the grass dying out and turning yellow in the foothills while the grass in the upper canyon would still be green.

**Jack:** Was it just the mixture of paint schemes that you liked which caused you to pick that year?

**Stephen:** Yes, the WP had three paint schemes including the orange and silver which was used earlier, followed by the green with orange stripes on the nose which they had the last few years before they merged which is the era that I'm modeling. That was followed by the green with orange nose scheme with the block WP initials on it. So both green paint schemes are correct.

**Jack:** I noticed that you have a lot of UP and BN engines. Are those all pool locomotives?

**Stephen:** Yes, both the UP and BN ran through pool units on the WP. In the early 1980s toward the end of the WP, UP power was commonplace as the merger approached. During 1981, BN power would be coming down the Highline while the UP power was coming west from Utah.

## Scenery

**Jack:** What is your main interest in the hobby?

**Stephen:** What do I like doing the most? Scenery.

**Jack:** Your rockwork is impressive and also varies from place to place. Why is that?

**Stephen:** The Feather River Canyon is, as far as scenery goes, pretty spectacular. You have a lot of variety in the types of rocks in the canyon includ-

ing granite, decomposing granite, and loose shale.

**Jack:** How did you do your rock castings?

**Stephen:** This work was spread over nearly a dozen years with different techniques. The original rock castings were done with crumpled up heavy-duty aluminum foil. Then I switched to Bragdon Enterprises rock molds ([www.bragdonent.com](http://www.bragdonent.com)) which are very good. Originally, I'd put the molds on wet.

Later, I'd cast them, let them dry, remove them from the mold and then I'd apply them to the hardshell in a checkerboard pattern using Liquid Nails or glue. One advantage of that method is that you can also stain or paint them while they are flat and also glue loose rock to the crevices in the castings and glue it in place while the casting is still flat.

**Jack:** Do you use stains or paint on the finished rock castings?



Figure 9

**Figure 9:** An eastbound grain train with Burlington Northern pool power pulls out of the siding at Kramm. Kramm is in the foothills east of Oroville yard.

**Stephen:** I've used both paints and dyes and also hair spray.

**Jack:** Hair spray?

**Stephen:** The plaster is pretty porous and will absorb whatever you put on it. After I'd stain or dye a rock casting

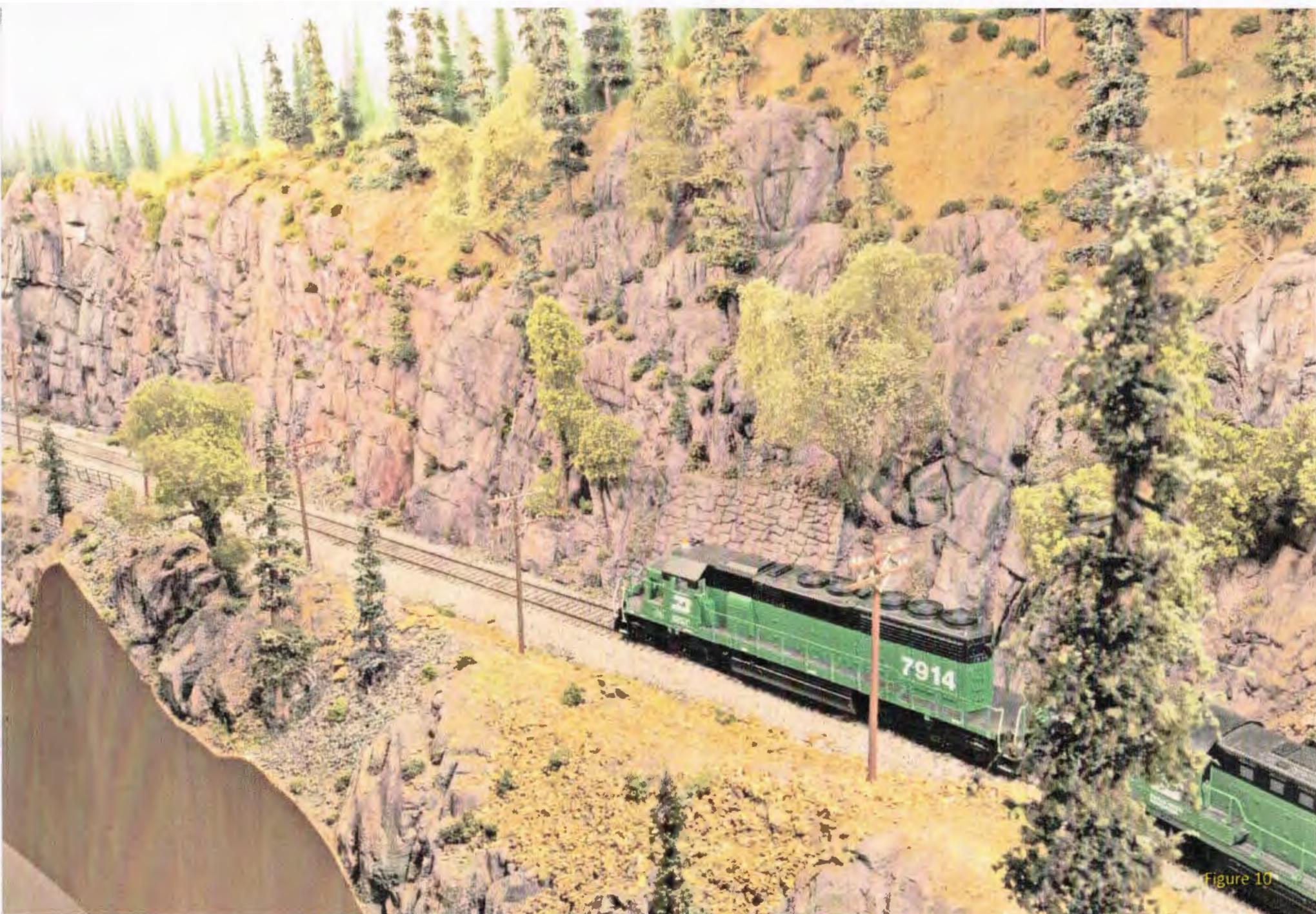


Figure 10

Figure 10: A pair of BN units, an SD40-2 and an Alco RS-11, head up the lower Feather River Canyon near Grizzly Creek.



Figure 11

**Figure 11:** The same grain train continues east toward Keddie and is now passing the siding at Virgilia. It will take the Highline toward Oregon once it reaches the Keddie Wye.



**Video playback problems? [Click here ...](#)**

a couple of times, I'd spray it with a coat of hair spray in a spackle pattern so that you have areas which are somewhat sealed by the hair spray and other areas which more porous. After the hair spray is dry, you then put on a second wash on the areas which weren't sealed by the hair spray which gives you a subtle shading effect.

**Jack:** The Keddie Wye bridge is obviously a signature element of modeling the WP in the Feather River Canyon. How did you build it?

**Stephen:** The towers of the main line bridge are made up from Central Valley bridge parts and are correct as far as the design of the prototype and the height of each leg of each tower. The Highline bridge towers are of a different type and were scratch built from styrene. The bridges themselves were built from Micro Engineering horizontal plate girders. Once complete, the bridge was installed and the scenery fitted around the bottoms of the towers.

*Continued on page 63 ...*



Figure 12

Figure 12: Looking down at the Keddie Wye bridge as a westbound work train waits for an Oregon-bound train on the Highline to clear.



Figure 13

... Continued from page 61

**Jack:** I notice that you are running an NCE DCC system. Have you thought about adding sound decoders to your diesels?

**Stephen:** I have a few engines with sound decoders but I think that with a multideck layout, the sound can be distracting, especially if a train is passing by you on another deck.

**Jack:** Thanks for having me over, Steve.

**Figure 13:** A matchup of detouring SP and UP locomotives are on the head end of a train headed north toward Oregon on the Highline bridge which is one leg of the Keddie Wye.

**Stephen:** You're welcome!

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