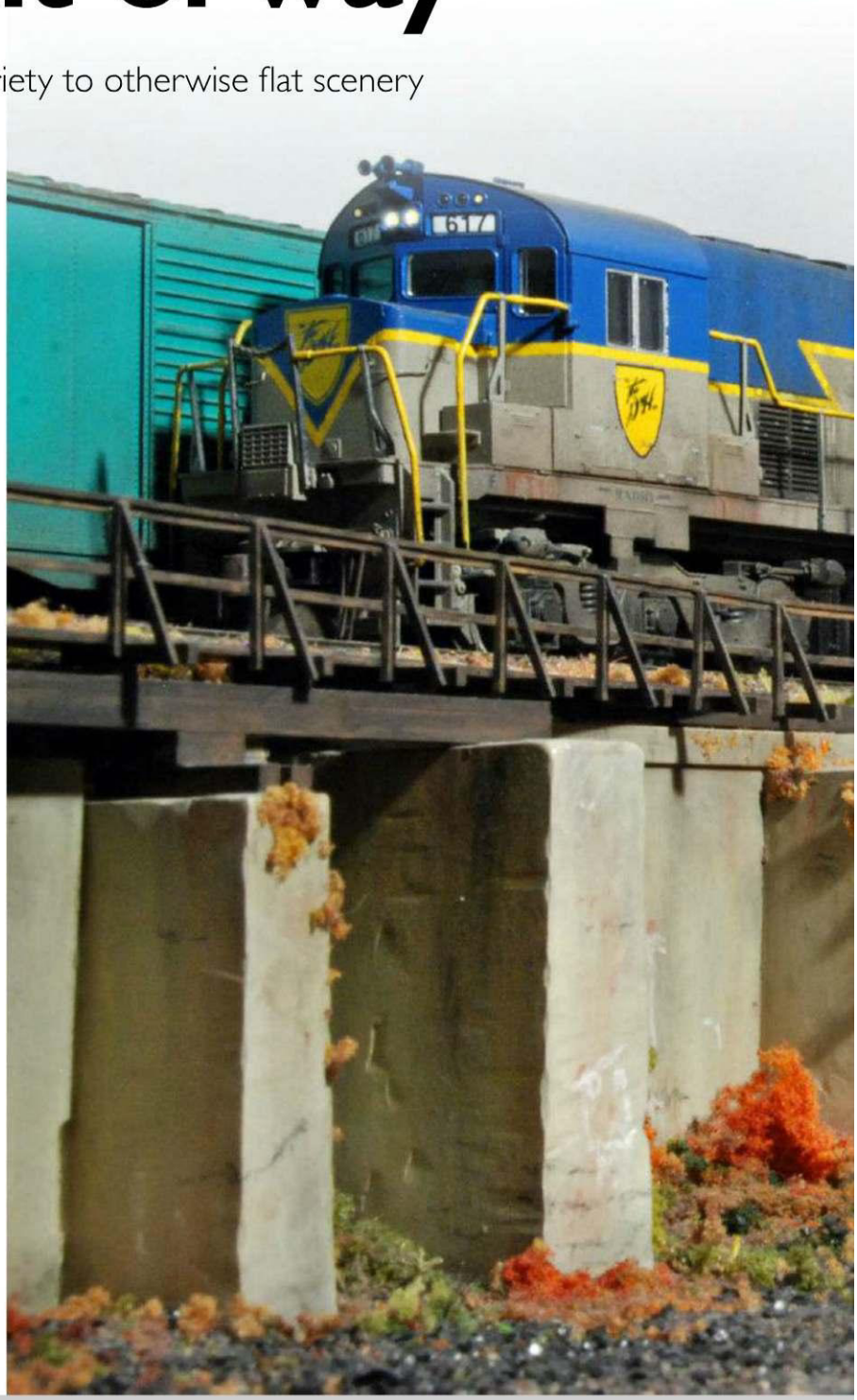
Elevating the right-of-way

A method to add visual variety to otherwise flat scenery

By Dominic Bourgeois
Photos by the author



Model railroaders are eternally confronted with a limited amount of space. When representing larger cities, we often cram the available real estate with track and fit buildings into the intermediate spaces as best we can, often to the point of just having flats against a backdrop. Those among us who wish to include more structures will sometimes resort to separating the street and track levels. More often than not, however, we will put the city above and the tracks below. But why?

Two suspects: The first is convenience, which goes hand-in-hand with a lack of planning. We build the benchwork, lay the track, wire it, and start running trains. Cities? Well, there's still room above the tracks over there ... .

The second is less obvious: We simply don't know better. As modelers, we should always spend time studying the world around us and the way it works to better represent it. We would learn, for instance, that grade separation projects in urban areas almost always result in elevated tracks.

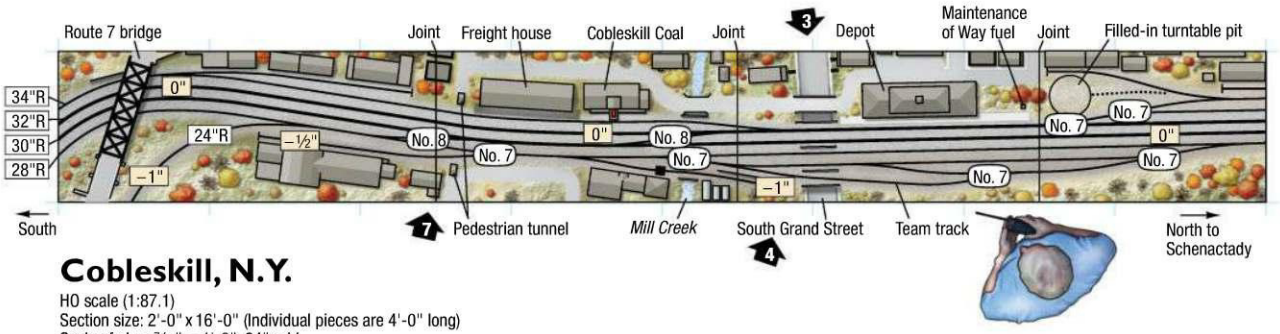
Unless the topography is quite abrupt, in which case there would be a roughly equal amount of cut and fill to take advantage of earth-moving economies, it's easier to elevate a railroad right-of-way than to raise a large number of streets, complete with ramps and changes to nearby buildings. Worse still would be excavating a trench and dealing with drainage issues, sewer modifications, underpinning and support of nearby structures, and tunneling.

Schenectady, N.Y.

Schenectady, N.Y., once home to the American Locomotive Co. (Alco), is a

2. Northbound AM-1 behind Lehigh Valley run-through power rumbles over State Street in downtown Schenectady. The road is dropped below grade for clearance, and the buildings at left were progressively foreshortened as they got closer to the backdrop.

1. A pair of HO scale Delaware & Hudson Alco Century 628s heads south over the Liberty Street overpass in Schenectady, N.Y., on a bright autumn day in 1975. Dominic Bourgeois explains how he elevated the D&H right-of-way through his model of Schenectady's downtown.

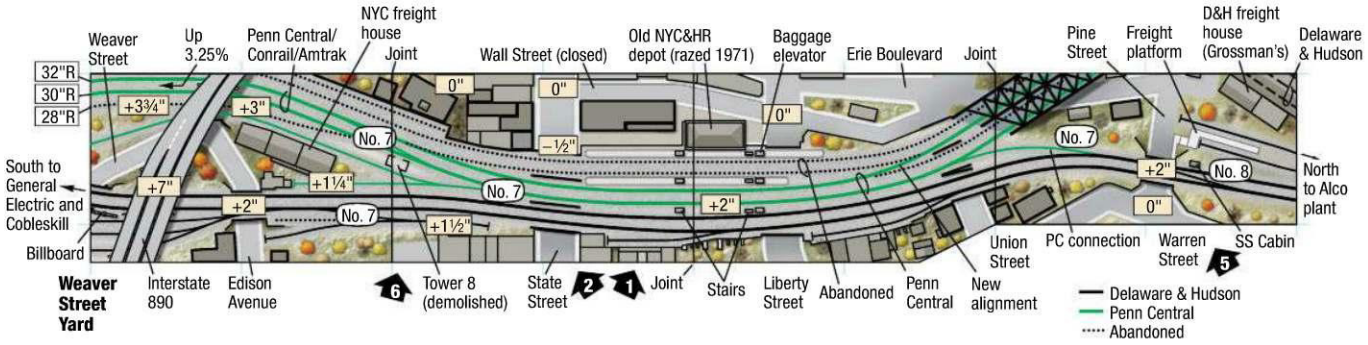


Cobleskill, N.Y.

HO scale (1:87.1)
Section size: 2'-0" x 16'-0" (Individual pieces are 4'-0" long)
Scale of plan: 7/16" = 1'-0", 24" grid
Turnouts no. 6 unless noted
Numbered arrows indicate photo locations
Illustration by Rick Johnson
Find more plans online in the ModelRailroader.com Track Plan Database.

Schenectady, N.Y.

HO scale (1:87.1)
Section size: 2'-0" to 2'-6" x 16'-0" (Individual pieces are 4'-0" long)



The layout at a glance

Name: Delaware & Hudson 2nd Subdivision
Scale: HO (1:87.1)
Size: 2'-0" (or 2'-6") x 16'-0"
Prototype: Delaware & Hudson
Locale: New York State
Era: 1975
Style: sectional
Mainline run: not applicable
Minimum radius: 30"
Minimum turnout: no. 8 (main), no. 6 (others)
Maximum grade: D&H 2 percent, PC 3.25 percent
Train length: 18 feet
Benchwork: ¼" plywood subroadbed on 1 x 2 grid (Schenectady), ½" plywood on 1 x 3 joists (Cobleskill)
Height: variable
Roadbed: cork and Homabed over plywood
Track: handlaid codes 70 and 83
Scenery: extruded-foam insulation board, corrugated cardboard and white glue
Backdrop: digital prototype photos
Control: MRC Prodigy wireless Digital Command Control

3. The plywood base was cut away at South Grand Street and the road, sidewalk, and abutments were installed as a complete assembly.

good example of a typical grade separation project in an urban context. Both the New York Central (NYC) and the Delaware & Hudson (D&H) railroads had their rights-of-way elevated through the city's downtown between about 1906 to 1909 as a joint project.

The D&H entered Schenectady at grade, climbed along a fill punctuated by occasional viaducts, and finally arrived at a shared passenger station via a series of viaducts and concrete retaining walls before exiting town in similar fashion.

The NYC came off a hillside, stayed above street level through downtown and the station, then headed off on a fill toward its bridge across the Mohawk River. There have been some track reductions, and the station was demolished in 1971 (a standard Amtrak design replaced it in 1979), but the rest of the infrastructure remains relatively unchanged to this day.

Most of the street viaducts, predictably, were built of similar and rather simple plate girders. Nevertheless, each one presents a distinct personality: The girders are of deck or through type, sometimes skewed, and may feature smaller girder or beam end spans over the sidewalks supported by a row of cross-braced columns between the street and the sidewalk. They culminate at a massive skewed four-track NYC through-truss bridge over Erie Boulevard (formerly the Erie Canal) next to the station area. The NYC also used a concrete arch for one of its spans near the hillside.

While most buildings on the outskirts tend to be far enough away from the tracks, downtown structures are often situated right against the retaining wall. Many were modified as part of the project to incorporate track-level loading docks. An unloading trestle once existed across from the

station. Its concrete piers have survived, as have many other vestiges of now-defunct rail activities.

Imagined constraints

In addition, both railroads' alignments are quite curvilinear: The track was raised well after downtown Schenectady had already been built, so existing buildings, streets, canals, and other facilities had to be avoided. One can only imagine the complexities of planning and executing such a project while maintaining vehicle and railroad traffic through a highly congested area. Period photos show a lot of temporary track and wood trestlework. Modelers don't face the same constraints, but implying that such prototypical constraints exist should yield a more interesting result.

There are other circumstances that may dictate a raised right-of-way. Even in smaller towns more typical of our model railroads, the necessity to cross a navigable river or canal will force a railroad to raise its approaches. Both the NYC and D&H cross the Mohawk River in Schenectady, although only the NYC needed a raised approach. In some cases, railroads may raise their rights-of-way to ease the grades out of a town in a valley. While railroads most often elect to use fills and retaining walls, as we have seen in our example, trestles are sometimes necessary.

Other interesting possibilities present themselves. The Interstate highway system is often elevated through cities. Where highways cross railroads, the heights reached can be impressive. Schenectady has one modest example near the General Electric plant, where the former NYC crosses over the D&H, and Interstate 890 spans both.

Modeling opportunities

For modeling, elevated track offers many advantages. Foremost is economy of space. An elevated right-of-way is expensive to construct, and every effort is made to keep it as narrow as possible. Customers are crowded around the track, and their spurs are generally parallel to the main line instead of going off at an angle. A rail line a few tracks wide will still allow room for many buildings, even on a minimum-width shelf-style layout.

Visually, elevated track puts the trains on center stage, where they can readily be viewed and appreciated. When a train rolls through downtown Schenectady, everybody notices it.

Where a little more room is available and more visual interest is desired, some spurs and branch lines can and do ramp down to grade to reach customers and facilities. Schenectady had many examples, one of which even crossed under the D&H main line to reach part of the Alco plant. The grades could sometimes be spectacularly steep, such as those reaching the D&H's freight house. Bridge builders will appreciate the opportunity to indulge themselves.

4. Low-nose Alco RS-36 5015 and RS-11 5006 pause on the South Grand Street overpass by the D&H depot in Cobleskill, N.Y. Elevating the right-of-way gives bridge fans an excuse to break out the girders, beams, and columns.

Embankments also offer interesting modeling opportunities. Sometimes there's not quite enough room for a full embankment. In those cases, a low retaining wall is erected at the base of the fill and a natural slope (at the "angle of repose") extends from the top of the wall up to roadbed level.

Over time, some settlement and erosion of embankments invariably occurs, and such problems are countered by maintenance-of-way crews by adding wood tie cribbing to raise the roadbed surface or retain ballast. This was done in many places in Schenectady. Steel beam or tube piles or old rails may also be driven vertically at close intervals near the top of an embankment to stabilize it, and steel sheet piling may also be seen.

Pre-cast concrete cribbing or large concrete blocks may be added at the bottom of a fill over time to help contain it. Signal installations often exceed the normal roadbed outline, so wood or galvanized steel walls may surround signal bases at the roadbed shoulder. In multiple-track territory, it's usually preferable to erect signal bridges rather than widening the roadbed to provide extra clearance between tracks for signals.

Representing a grade-separation project that's under construction with its inherent operational complications would make an interesting modeling project. Such a scene might include constrained and tightly curved temporary tracks, temporary trestles or walls, and steep grades, all resulting in speed restrictions and traffic congestion.

Cobleskill, N.Y.

Not all grade separation programs need be as involved as the one in Schenectady. Twenty miles south of

Learning points

- Looking to the prototype for interesting modeling features can pay big dividends.
- Grade-elevation projects were common in many cities as rail and road traffic increased.
- Considerable planning is required to properly locate turnouts and other features.
- Building layout sections before permanent space becomes available ensures progress.
- Referring to prototype drawings of track arrangements eases design chores and adds realism.

5. A General Electric U30C and a U33C rumble over Pine Street as they team up to shove freight BNW-3 (Boston–Norfolk & Western) out of Schenectady. The elevated right-of-way adds considerable interest to the scene. The NYC bridge is visible behind the trees.

Schenectady along the same D&H main line, Cobleskill, N.Y., was the stage for another grade separation project some years later. Though far less ambitious, this project did feature many interesting elements worthy of consideration by modelers.

As it arrived from the north, the main line was raised on fill and bridged New York Route 7 on a ballasted through-plate girder bridge. It then dropped into town, where each street crossing seemed to be dealt with in a different manner.

Several crossings were simply closed, but one street was given a pedestrian overpass of light steel-truss construction with a stairway at each end. South Grand Street, a main artery near the passenger station, was excavated to duck under the D&H's shallow deck plate-girder span.

To minimize the excavation's impact on adjacent buildings, the railroad was itself raised about 3 feet, which required some modifications to the station and nearby spurs, including the installation of concrete crib walls. Another closed street was replaced with a pedestrian tunnel. At the south end of town, Route 7 again crossed paths with the D&H, but this time it was the road's turn to leap overhead on a through-truss bridge.

Modeling Schenectady

I modeled downtown Schenectady on a set of sections for a future layout representing the D&H Second Subdivision's path through the city as it existed in 1975. While compressed, all of the important features were incorporated into the model.

I had not initially planned to do so, but I eventually incorporated a model of the grand Beaux Arts-style station because it was more worthy of representation than the parking lot one would have found in its place in 1975.

I planned the module framework for lightness and flexibility. It consists of 1 x 2 joists glued under a ¼" chipboard base representing the natural grade. Continuous 1 x 2s, set parallel to the track, support the ¼" plywood roadbed from each side. The roadbed supports were interrupted at each viaduct, but overall the grade/support/roadbed structure forms a rigid box-girder assembly.

I know what you're thinking – ¼" roadbed is way too flimsy. And so it is. I placed additional 1 x 2s where the roadbed is more than two tracks wide, never leaving more than a few inches unsupported.

In addition to its lightness, the assembly allowed me to easily make modifications to the elevated roadbed when adjustments became necessary, such as when I cut openings for stairways down from the station platforms. A utility knife readily cut through the thin plywood, avoiding the use of a saber saw; the vibrations would have undoubtedly damaged the completed scenery. It also represented the prototypically shallow bridge decks better than ½" or thicker material would have.

The track had to be carefully laid out during initial construction, since it was also necessary to cut a square hole in the chipboard base at every location for Tortoise by Circuitron switch motors. It was also necessary to ensure that no switch points sat directly atop a bridge or viaduct.

Occasionally, I had to cut away a slice of roadbed when trying to fit some retaining walls or structures into

the scene. While they're all selectively compressed to some degree, I wanted to keep as many of the structures as possible three-dimensional rather than representing them as flats. I resorted to foreshortening in a few cases.

Buildings so treated look fine from the aisle, but the walls perpendicular to the layout edge are compressed horizontally, but not vertically. It's more difficult do that with kits, but I scratchbuilt nearly every building, so my options were open. To me, this technique is visually less obvious than the more common forced perspective practice of using smaller-scale models in the background.

While the construction method provided the necessary overhead clearance for secondary streets, major streets required more headroom. At State Street, for example, I cut a long slot in the baseboard to allow the pavement to drop below the natural grade level, as does its prototype. The sidewalks required less headroom and remained at grade level.

All of the viaducts were either scratchbuilt from styrene or heavily kitbashed from Micro Engineering and Central Valley Model Works components. The retaining walls and bridge abutments consist of .040" sheet styrene, but some of them around the station were also faced with some out-of-production brick sheet and some trim to match their prototypes.

The styrene walls are randomly gouged at the edges with a knife to represent chipped concrete, and some cracks were carved in where appropriate. They were painted with now-discontinued Polly Scale acrylic paint (Concrete, lightened with Reefer White) [Testor's Corp. offers similar paints in its Model Master line. – *Ed.*] and weathered with black, brown, and gray powdered pastels. I rubbed on white streaks of pastel and pulled them down with a brush to represent efflorescence: the salts and other minerals leaching out of the concrete. Wooden and metal guardrails were fashioned from strip styrene and appropriately painted.

I made some segments of earthen embankments from extruded-foam insulation board, but I later switched to other materials because I was concerned about toxic gases should the foam board ever burn.

Modeling Cobleskill

I built the Cobleskill sections using a more conventional cookie-cutter technique: ½" plywood on closely spaced 1 x 3 joists. The joists are notched along the front at the tops, because the ground tends to drop away from the tracks on that side. They're also notched at the bottom to provide extra clearance for lighting because these modules are planned for an upper deck.

6. A parking lot along the D&H in Schenectady affords railfans a place to watch the action. Wood cribbing helps hold up the embankment that supports Penn Central Electro-Motive Division E8 267, now in Amtrak service, taking a train east to Albany–Rensselaer on PC rails beyond the D&H main line.

The front framing member is a 1 x 4 that's cut as necessary along its top to conform to the various grade level changes. There's no rear member. Instead, I glued and screwed a 1 x 2 under the back end of the joists, leaving a 3" gap for future wall-mounted brackets to slip directly under the plywood instead of under the joists, thereby saving headroom underneath. In some locations where the ground is lower, I mounted the plywood between the joists, flush with their tops.

For the South Grand Street viaduct, I cut away the plywood entirely and glued in a piece of hardboard to support the track. A 1 x 3 was secured under, and perpendicular to, the joists below roadway level to stabilize the assembly.

The span's styrene plate-girder and floor assemblies were installed above the hardboard, while a simplified version of the deck's underside was glued underneath. The overall floor sandwich is slightly thicker than its prototype, but that isn't noticeable. Thinner sheet steel or aluminum might have worked better as a base for the deck.

The roadway and the abutments were so complex that I built them at my workbench and slipped them in under the bridge after they were assembled, painted, and weathered. They were fashioned from 1/16" illustration board instead of styrene.

7. Dominic has included finely crafted lineside details such as the brick walkway entrance that allows pedestrians to cross under the busy D&H right-of-way at the former Grove Street crossing in Cobleskill.

A lot of advance planning and measuring was necessary, given the slopes, stairways, upper-level sidewalks, and the slightly skewed configuration of the span. The scenery was then built up to the abutments after installation.

Although there's a little more work involved with elevating the track, the textures and materials, not to mention the change in grade, add considerable interest to a model railroad, and help tell the story of how the prototype fits into the scene. **MRP**

Dominic Bourgeois, who with wife, Christine Robinson, resides in Montreal, Que., is vice president of an architecture firm. He also wrote Delaware & Hudson – Bridge Line Freight 1960-1983, Vol. I *and* II *(Railroad Explorer). He can't remember not being interested in trains.*