The Colorado & Southern Railway
Northern Division

The Colorado & Southern Railway's Northern Division from Denver to Cheyenne is now part of the Burlington Northern Santa Fe Railroad, and passes through Westminster, Broomfield, Louisville, Boulder, Longmont, Berthoud, Loveland, and Fort Collins on its way north. In the late 1950s, a diesel motive power shortage forced the C&S to continue Main Line steam service long past its demise on other railroads. This brief return to steam was well documented and later published by area railfans. The two works that inspired me to model the C&S Northern Division are Goin' Railroading by Margaret Coel and Sam Speas, and The Last Steamers of the Colorado & Southern by WB Video Productions.

Design

The HO scale C&S Northern Division began as my attempt to capture the look and operation of this prototype as it was in 1958 in a 13-foot by 16-foot room. There are several scenes from photographs I want to reproduce, and I want to duplicate the train order operation as well. I've also decided to augment operations by including more passenger trains, re-opening the coal mines around Louisville (closed in the 1930s), and keeping Boulder's narrow gauge Denver, Boulder & Western Railroad in operation (dismantled in 1920).

The original design was created over a period of about 2 years, on a personal computer with a computer aided design program (Generic CADD). I created 2 major designs in a total of 26 evolutionary versions before deciding I was ready to build. (Minor changes have occurred as I've built the layout, but by and large it is version 26.) The design includes curve easements as described in John Armstrong's Track Planning for Realistic Operation, and gross scenery planning.

The layout is designed for walk-around command control operation. Schematically, it is point-to-point, with an option for continuous running for display. The Main Line runs from Denver to Longmont, with a 7-train staging yard representing Longmont and points north, and a 4-train staging yard for connections south of Denver. I also have a 2-train staging yard for CB&Q connections east to Chicago, and a staging track for the UP connection into Boulder. To catch the flavor of the prototype, I've attempted to duplicate the trackage and industries in each town.

In 2008, I expanded into the adjacent room, resulting in a 13-foot by 27-foot space. This tripled the Main Line run and added two more passing sidings, with a scale mile between each – allowing realistic train order operation. I ran through 9 expansion plan iterations before settling on the resulting double-deck design.

C&S Rice Yard in Denver features 2 arrival/departure tracks, 5 classification tracks, and an engine facility with turntable and roundhouse. Trains from south staging (South Denver) reach Rice Yard by a 3-turn helix. From Rice Yard, the C&S Main Line proceeds north over Cherry Creek, past three-track Union Station, and through the industrial Platte River valley. Prospect is a major junction point, where the C&S Main Line, Denver Union Terminal Railway trackage south to Union Station, and the CB&Q Main Line east to the CB&Q freight yard and Chicago all come together. The C&S Main Line precedes north through Fox and Utah Junction.

At Utah Jct., signals protect against Denver & Rio Grand Western trains crossing the Main Line. Utah Jct. sits beside the Rio Grande's North Yard, where the two railroads interchange cars. Traveling north, we pass Broomfield, the large Monarch No. 2 coal mine at Coalton, and Louisville, home of the Hecla coal mine.

Continuing north down Burke's Hill, the 2% ruling grade for southbound traffic, the Main Line passes the Public Service power plant at Valmont. Just north of Valmont, the Main Line crosses Boulder Creek on a beam bridge featured in the March, 2016 Model Railroader.

Just beyond the bridge is the wye at Ara, the junction point for a long spur into Boulder, shared with the Union Pacific Railroad. At Boulder, the C&S interchanges with the narrow gauge Denver Boulder & Western Railroad, which serves mountain mining communities west of town. With this mix of standard and narrow gauge, Boulder features 3-rail operation and transfer tracks for ore, coal, machinery, pipe, and other freight.

From Ara, the Main Line proceeds another 1.5 scale miles on the lower deck north through Niwot and into north staging (Longmont).

Construction

Construction began in May, 1991 with the help of a 1/4 scale printout from the CAD drawing. Staging yards are built with L-girder benchwork as described in Linn Westcott's How to Build Model Railroad Benchwork, while the upper deck uses open grid benchwork to minimize its thickness. The center peninsula is suspended without legs, a handy feature in a crowded room of operators.

The original backdrop is a 50-foot long roll of 30 inch wide metal flashing, which I thought would be a good way to eliminate seams. During installation, small creases developed which led me to replace some sections with 1/8 inch Masonite. The backdrop for the 2008 expansion is 0.060" styrene sheet, which I cut and spliced to make a continuous canvas. Hand painting has been the result of study, trial, and error -- mostly error! In Boulder, I used projected slides for faithful reproduction of my hometown's landmark backdrop.

All trackwork is complete. Roadbed is 1/2 inch homosote (cut to the roadbed profile in most areas) glued to 1/2 inch plywood. I used "Homabed" for the 2008 expansion roadbed instead of cutting my own from homasote. Main line curves are banked with 1/16 inch stripwood. Turnouts are hand laid using Tony Koester's method from the December, 1989 Model Railroader, with Peco and Micro Engineering turnouts in the 2008 expansion. Almost all are operated by Hankscraft stall motors; turnouts in Boulder are thrown with switch stands from Railway Engineering. Railcraft nickel silver flex track is used between turnouts. I use code 83 on the Main Line, code 70 on sidings, the Boulder spur, and Rice Yard, and code 55 on spurs and narrow gauge track. Staging yards are Atlas flex track and Mark III turnouts operated with a capacitive discharge machine and diode matrix.

All scenery is essentially complete (more details can always be added). Structures are either models of the prototype (Daniels and Fisher, Valmont Power Plant, Rice Yard Coaling Station and Turntable), free-lanced versions of actual buildings (CB&Q freight house, Public Service Denver Steam Plant, Hecla Mine), or fictitious (Denver Mining Supply Co.). In Boulder, I made a special effort to match the prototype with photos, Sanborn Fire Insurance Maps, and other historical sources to replicate buildings and track plans.

Control & Animation

To enhance realism and play value, I've added many lighting, sound, and motion effects to the C&S Northern Division. The heart of this realism is the Lenz DCC system I use for controlling my locomotives. I've also installed

SoundTraxx and other sound decoders in all engines, such as C&S 634 (steam) and C&S 700-D (diesel). Check out the firebox flicker in the steamer and the bass from the extra speakers in the diesel B-unit! I've built my own "home brew" throttles, both wired and wireless. They are simpler to use, and are programmed with additional features.

Lighting in the both rooms is fully automated, controlled by a personal computer (PC). The PC drives dimmable soft-white LED light bulbs for "Colorado sunshine", including dawn and dusk transitions and a "full moon" effect. I can program 5 minute days for layout tour demos, and synchronize to a fast clock for operating sessions – starting at any time of day and adjusted for seasonal daylight. The LED bulbs save a significant amount of electricity and heat over the original incandescent bulbs.

The PC lighting interface circuit also drives 8 building lighting circuits wired to each town site. I have 1.5 volt circuits for bulbs on building exteriors and switch stands, and 2.5 volt circuits for interior bulbs (salvaged from a Christmas light string) and street lights. Each circuit is under software control, so I have 8 different building lighting sequences throughout the day and night in each town. For example, I have a one shift factory, a two shift factory, a saloon, an early-to-bed/early-to-rise farm house, and night security sequences.

Hecla Mine is a focal point for animation. The mine features an operating tipple that can load a 50-ton hopper or GS gondola with real black diamonds in about 10 seconds, depending on the skill of the operator. This is an auger driven mechanism, built with a wiper motor from an auto junk yard, and featured in the July, 1999 Model Railroader. The Hecla Mine boiler house encloses a geared motor that drives cables over the sheave wheels at the top of the 105 foot tall mine head/shaft house and down into the shaft. The motor is driven by a timer circuit, continuously running and stopping. (The Monarch #2 Mine also features an operating tipple and rotating sheave wheels.)

The C&S is also the proving ground for Boulder Creek Engineering's animation products. Look for early versions of the **WeighStation™ Track Scale**, **TrainBoss™ Talking Defect Detector**, **HotShot™ Speedometer**, and **BrassHat™ Announcer** in action on the layout.

Other animation highlights include caboose marker lights that turn on with a smoke jack switch (June, 2003 Model Railroading), Rice Yard and Louisville track scales, Rice Yard coaling tower chutes that extend and retract on weighted cables at the flick of a switch (July, 2004 Model Railroader), sound and motion for water, oil, and sand in Rice Yard, moving switch targets and illuminated lanterns at night, Centralized Traffic Control (CTC) for CB&Q staging, and an interlocking plant and train announcements for Denver Union Station.

Operation

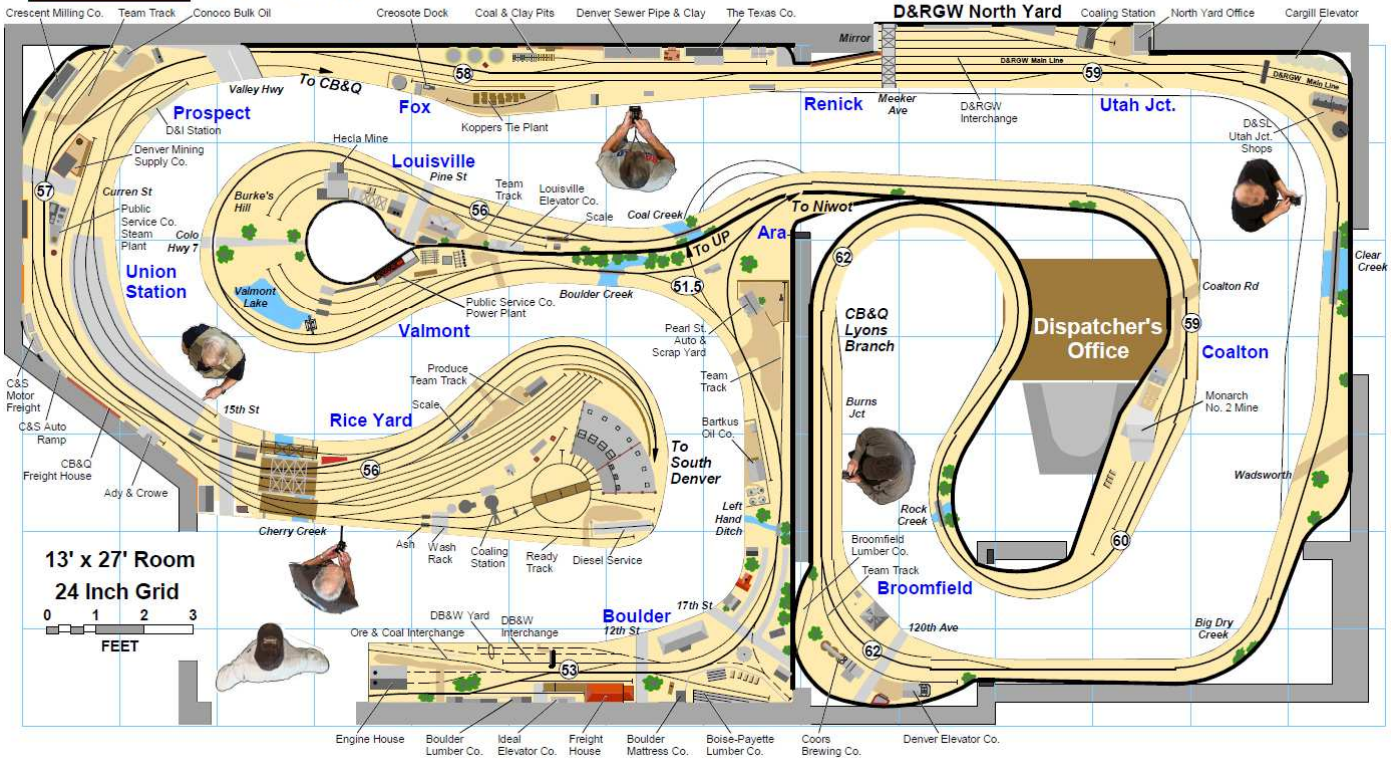
The C&S Northern Division had its first operating session on April 19, 2000, and has hosted more than 150 sessions to date. I use car cards to generate traffic, and time table and train order (TT&TO) operation. We have one Station Operator for all stations – observing the Main Line through security cameras, reporting ("OSing") passing trains to the Dispatcher, and copying and delivering orders for trains. A slow-paced 4:1 fast clock sets a relaxed tempo for operations, allowing time to enjoy the sounds, animation, and prototypical TT&TO practices reminiscent of the C&S in 1958. All in all, a fun experience for everyone.

February, 2023

Colorado & Southern Ry.
Northern Division
HO Scale

Upper Level

58 Elevation (in)



Colorado & Southern Ry.
Northern Division
HO Scale

Lower Level

58 Elevation (in)