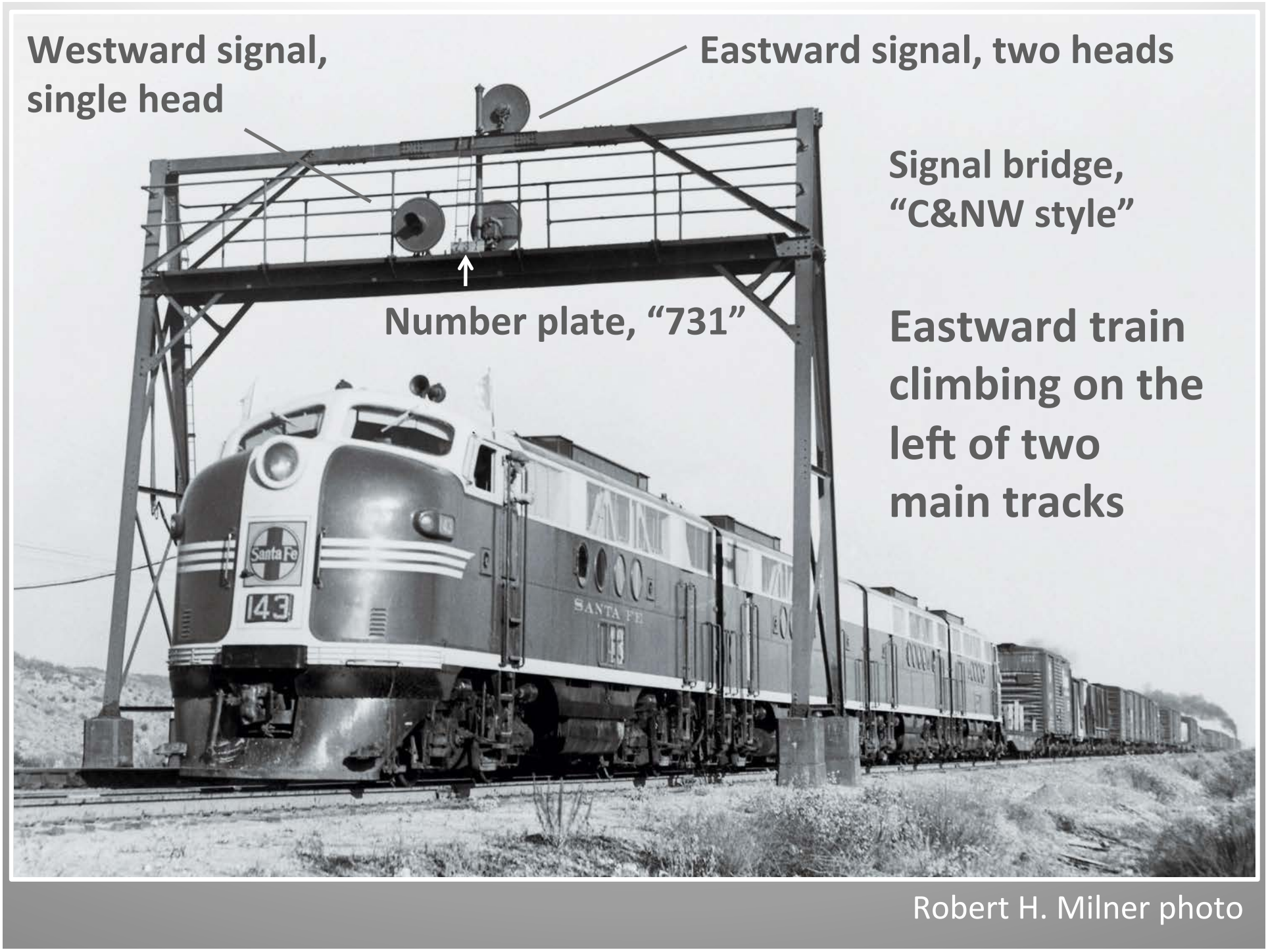
Planning For Signals, a Prototype Modeling Approach

by Andy Sperandeo

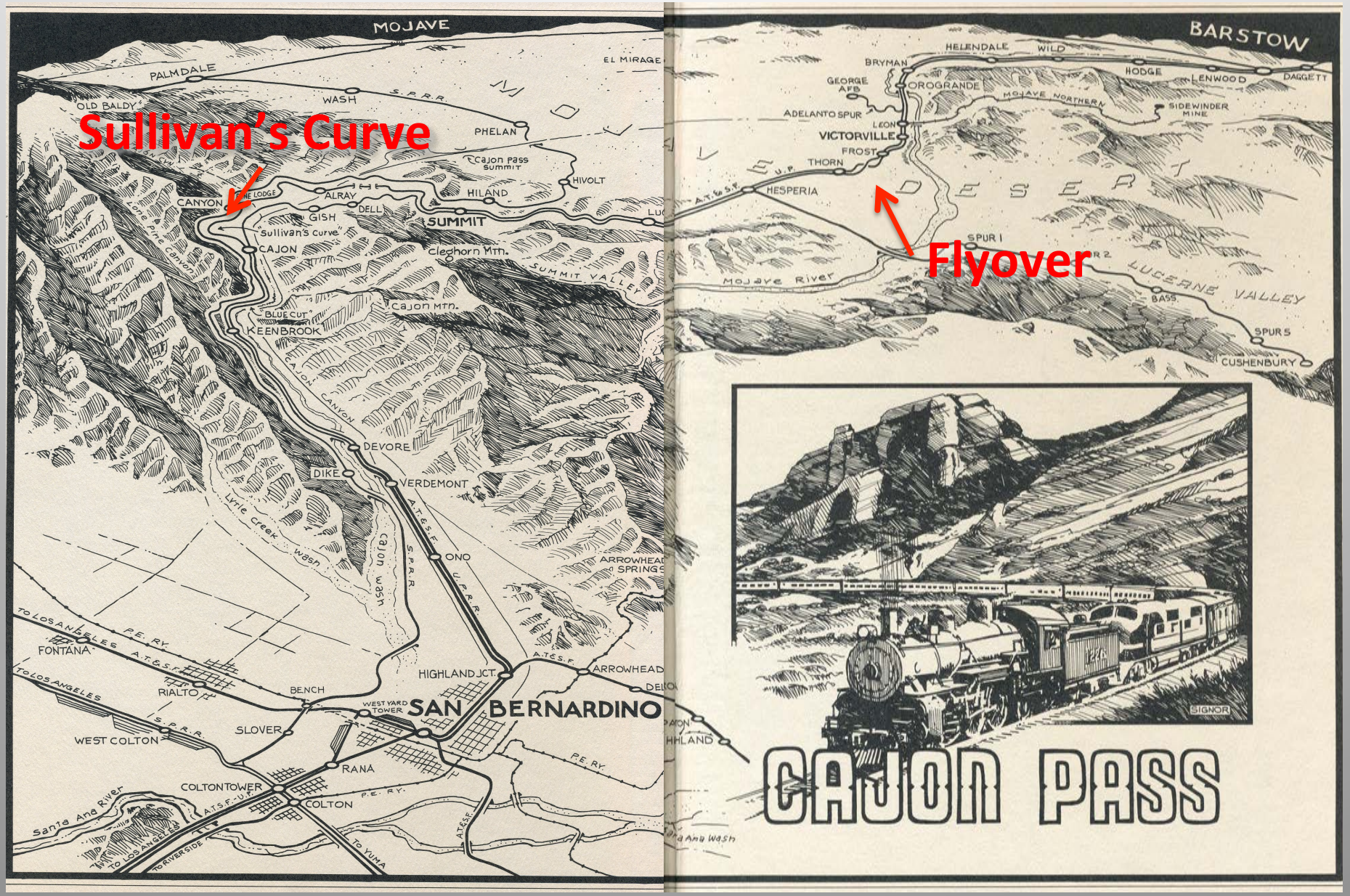
Presented for the

East Coast Santa Fe Modelers 2013 Meet, Doylestown, Pa.

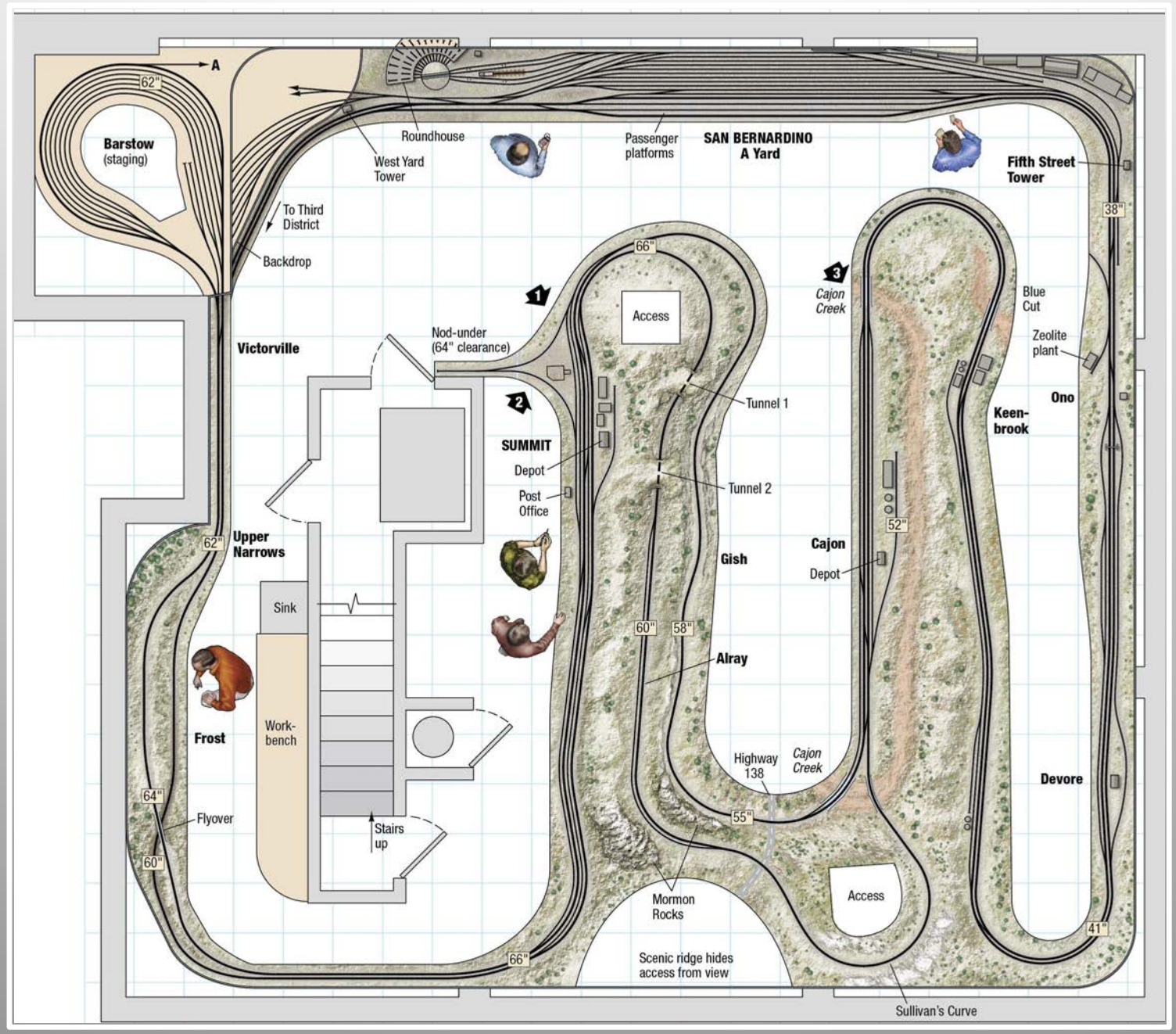


Robert H. Milner photo

First District, Los Angeles Division, Atchison, Topeka & Santa Fe Ry.



Map by John Signor, from *Cajon, Rail Passage to the Pacific* by Chard Walker



HO scale, approximately 40 x 40 feet

My “big three” goals in signal modeling

- **Signals will function prototypically and contribute to realistic layout operations.**

- **Signals will be accurate models of their prototypes, as much as any locomotive or freight car.**

- **Signal locations will conform to the placement of the prototype signals in relation to the modeled tracks.**

Sources

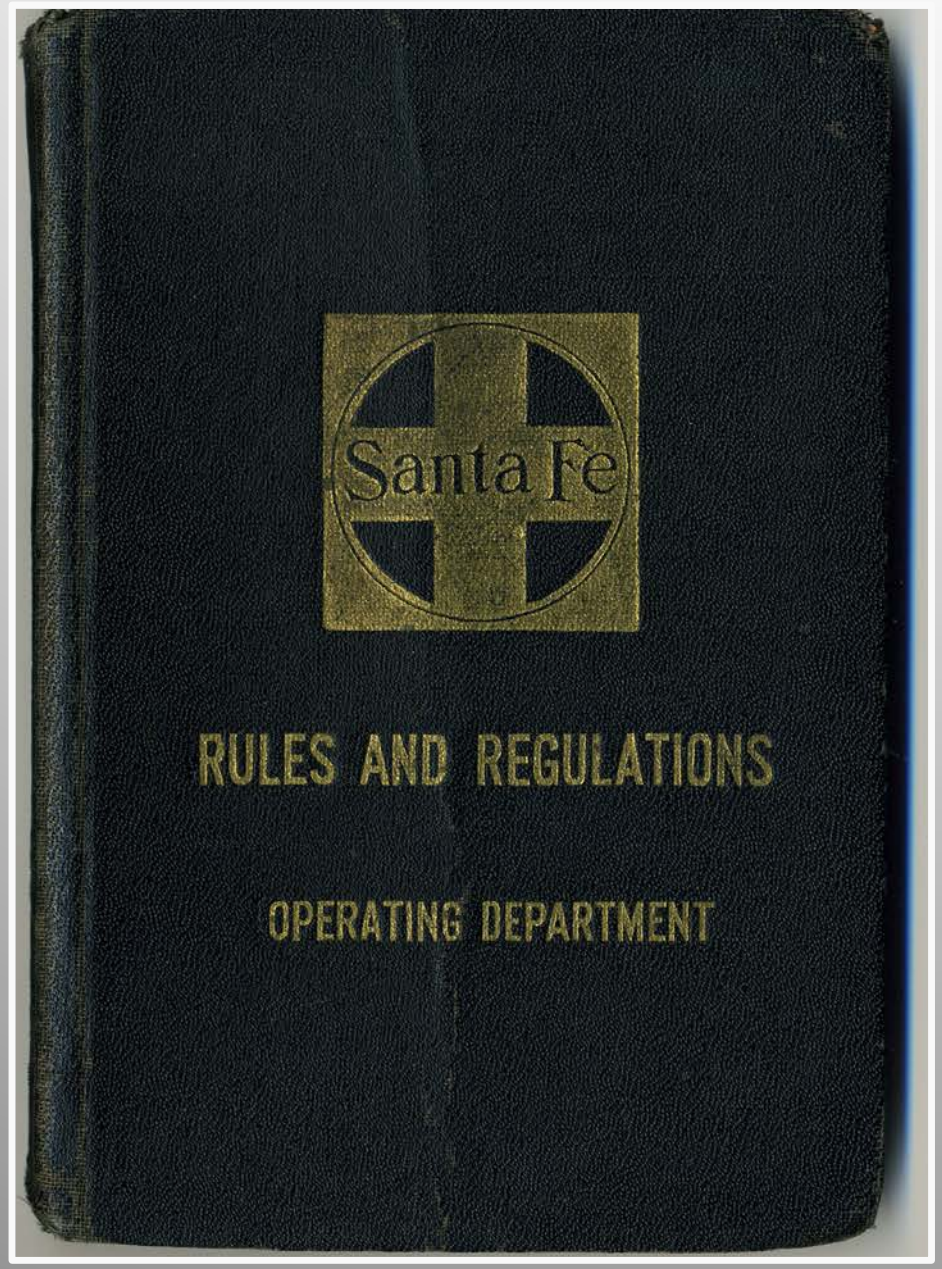
- Operating rule book – shows signal aspects and indications in use in period modeled.

- Employee timetable – identifies basic signal system in use and states local rule modifications.

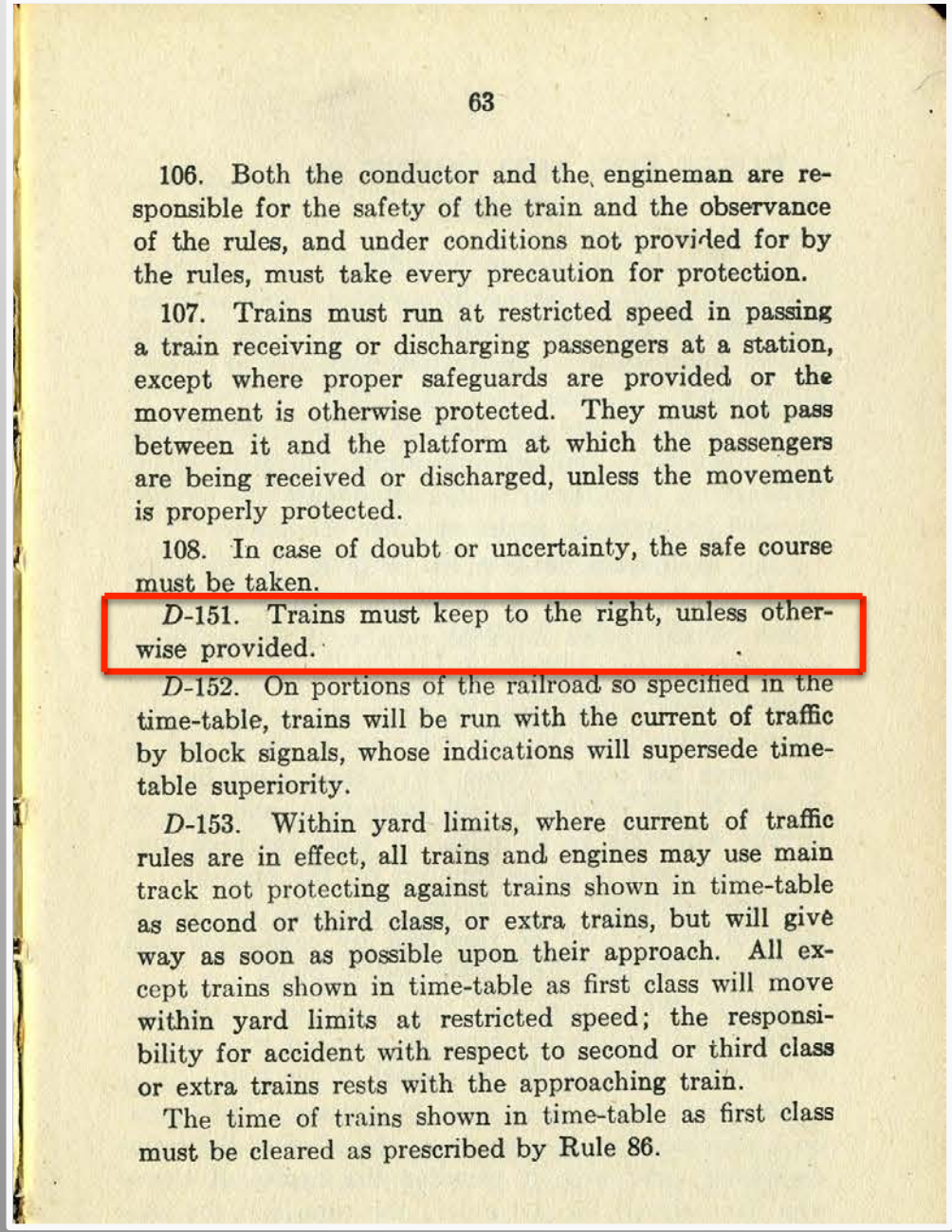
- Photographs – show signal types and details.

- Track charts – specify signal locations relative to track layout and mileposts.

- Recollections of retired railroaders – verify or correct conclusions drawn from other research.



RULES AND REGULATIONS
of the
OPERATING DEPARTMENT
Revised
1927



63

106. Both the conductor and the engineman are responsible for the safety of the train and the observance of the rules, and under conditions not provided for by the rules, must take every precaution for protection.

107. Trains must run at restricted speed in passing a train receiving or discharging passengers at a station, except where proper safeguards are provided or the movement is otherwise protected. They must not pass between it and the platform at which the passengers are being received or discharged, unless the movement is properly protected.

108. In case of doubt or uncertainty, the safe course must be taken.

D-151. Trains must keep to the right, unless otherwise provided.

D-152. On portions of the railroad so specified in the time-table, trains will be run with the current of traffic by block signals, whose indications will supersede time-table superiority.

D-153. Within yard limits, where current of traffic rules are in effect, all trains and engines may use main track not protecting against trains shown in time-table as second or third class, or extra trains, but will give way as soon as possible upon their approach. All except trains shown in time-table as first class will move within yard limits at restricted speed; the responsibility for accident with respect to second or third class or extra trains rests with the approaching train.

The time of trains shown in time-table as first class must be cleared as prescribed by Rule 86.

_D_-151. Trains must keep to the right, unless otherwise provided.

SURGEONS OF THE SANTA FE COAST LINES HOSPITAL ASSOCIATION

DR. JOHN N. OSBURN, Chief Surgeon, Los Angeles, Cal.

. LAWRENCE CHAFFIN, Assistant Chief Surgeon, Los Angeles, Cal.

DR. R. J. FLAMSON, Assistant Chief Surgeon, Los Angeles, Cal.

RDON GARNETT, Local Surgeon	Los Angeles
S. HIBBEN, Local Surgeon	Pasadena
W. HAYES, Local Surgeon	Monrovia
A. ADAMES, Assistant Local Surgeon	Monrovia
H. CHAMBERLAIN, Local Surgeon	Glendora
D. THOMASON, Local Surgeon	San Dimas
RROL W. WHITE, Local Surgeon	La Verne
B. CRAIG, Local Surgeon	Upland
S. CHERRY, Local Surgeon	Rialto
N. BAYLIS, Division Surgeon	San Bernardino
L. HAENSZEL, Local Surgeon	San Bernardino
H. GUARTNEY, Emergency Hospital	San Bernardino
H. SMITH, Local Surgeon	Colton
W. LAWLER, Local Surgeon	Victorville
MAN E. THAYER, Assistant Local Surgeon	Victorville
M. PARKER, Local Surgeon	Barstow
A. GRAYBILL, Assistant Local Surgeon	Barstow
A. CARD, Local Surgeon	Riverside
J. LORD, Assistant Local Surgeon	Riverside
MES FARRAGE, Local Surgeon	Corona
RRY C. REYNOLDS, Local Surgeon	Arlington
H. BRUNEMEIER, Local Surgeon	Placentia
W. OLSON, Local Surgeon	Fullerton
H. GORAR, Assistant Local Surgeon	Fullerton
H. LANG, Assistant Local Surgeon	Fullerton
GLENN CURTIS, Local Surgeon	Brea
W. UTTER, Local Surgeon	Anaheim
WIN H. KERSTEN, Assistant Local Surgeon	Anaheim
OMAS B. RHONE, Local Surgeon	Orange
RNE W. CARLSON, Assistant Local Surgeon	Orange
A. MILLER, Local Surgeon	Santa Ana
P. STRAYHORN, Assistant Local Surgeon	Santa Ana
H. ESSLINGER, Local Surgeon	Capistrano
D. HOSKINS, Local Surgeon	Oceanside
D E. ABBOTT, Assistant Local Surgeon	Oceanside
C. DICK, Local Surgeon	Del Mar
H. SAVAGE, Local Surgeon	(Solana Beach) Del Mar
S. HARBAUGH, District Surgeon	San Diego
G. HOLLANDER, Local Surgeon	San Diego
S. MARSDEN, JR., Assistant Local Surgeon	San Diego
W. GEISTWEIT, JR., Ear, Nose and Throat Specialist	San Diego
ORGE L. KILGORE, Eye Specialist	San Diego
D. ROLF, Local Surgeon	National City
ORGE S. McNAMARA, Assistant Local Surgeon	National City
NNETH DOLE, Local Surgeon	Redlands
B. REID, Local Surgeon	Perris
RMAN BAER, Local Surgeon	Elsinore
MES LONG, Local Surgeon	Hemet
R. POWELL, Local Surgeon	Fallbrook
RTIN B. GRAYBILL, Local Surgeon	Escondido
W. BEEMAN, Local Surgeon	Torrance
B. SMITH, Local Surgeon	Wilmington
HN C. COTTRELL, Local Surgeon	Long Beach
H. ANTHONY, Local Surgeon	Inglewood
C. BRUFF, Local Surgeon	Whittier

Kits are located at Summit, San Bernardino, Corona, Los Angeles, Oceanside, Diego, on all locomotives, and with all regularly assigned extra gangs.

F. B. GRIM,
Assistant Superintendent,
San Bernardino, Cal.

J. P. DONOVAN
Assistant Superintendent,
Los Angeles, Cal.

A. B. COAKLEY, F. N. STUPPI, Trainmasters, San Bernardino, Cal., S. G. JACKSON,

L. B. FREBORG, E. R. ROBERTSON, Trainmasters, Los Angeles, Cal.

W. B. CASH, Chief Dispatcher, San Bernardino, Cal.

C. E. MACHEN, G. H. FERRYMAN, W. S. LOIT, J. C. SELINGER, M. H. SWANSON, F. E. JACKSON, E. O. CRUM, A. C. KIDD,

E. L. MAYS, E. M. BUTLER, E. H. COLEMAN, C. W. BURTON, C. W. MAIER, F. O. PIERCE, E. N. THOMAS, W. D. EAKIN,

J. E. BERRY, W. E. EBERT, istant Chief Dispatchers, San Bernardino, Cal.

Dispatchers, San Bernardino, Cal.

The Atchison, Topeka and Santa Fe Railway Co.

COAST Santa Fe LINES

LOS ANGELES DIVISION

TIME TABLE No. 131

IN EFFECT

Sunday, August 31, 1947

At 12:01 A. M.
Pacific Standard Time

This Time Table is for the exclusive use and guidance of Employes.

E. E. McCARTY, General Manager, Los Angeles, Cal.

F. A. BAKER, Asst. General Manager, Los Angeles, Cal.

A. J. SMITH, Superintendent, San Bernardino, Cal.

EASTWARD

104	238	4	18	2
Passenger	Passenger	[illegible]	[illegible]ner	The Scout
Arrive Daily	Arrive Daily	[illegible] Daily	[illegible]ally	Arrive Daily
PM 8.27	PM s10.40	PM s11.10	PM s11.25	AM 12.20
8.19	10.31	11.01	11.17	12.12
8.14	10.25	10.55	11.12	12.07 AM
8.06	10.16	10.46	11.05	11.59
8.02	10.11	10.41	11.01	11.54
7.58	10.04	10.34	10.57	11.49
7.51	s 9.56	f10.26	10.50	11.41
7.44	9.48	10.18	10.43	11.34
7.40	9.43	10.13	10.39	11.28
7.35	9.38	10.08	10.34	11.20
7.26	9.29	9.59	10.25	11.10
7.17	9.16	9.46	10.16	10.58
7.07	9.05	9.35	10.06	10.48
7.01	8.57	9.27	10.00	10.40
6.55	8.48	9.18	9.52	10.30
6.51	8.42	9.12	9.48	10.25
6.48	8.36	9.06	9.44	10.19
6.43	8.31	9.01	9.40	10.13
6.38 PM	8.25 PM	8.55 PM	9.35 PM	10.08 PM
Leave Daily	Leave Daily	Leave Daily	Leave Daily	Leave Daily
(45.6)	(36.8)	(36.8)	(45.2)	(37.6)

Automatic block system

TIME TABLE

NO. 131

August 31, 1947

STATIONS

AUTOMATIC BLOCK SYSTEM

DOUBLE TRACK

BARSTOW
6.1
LENWOOD
5.7
HODGE
9.2
HELENDALE
4.9
BRYMAN
5.4
ORO GRANDE
5.1
VICTORVILLE
4.3
THORN
4.1
HESPERIA
5.2
LUGO
5.5
SUMMIT
3.8
ALRAY
4.7
CAJON
3.7
KEENBROOK
4.7
DEVORE
2.5
VERDEMONT
2.5
ONO
3.5
HIGHLAND JCT.
1.9
SAN BERNARDINO

(82.8)

Average speed per hour

Within the following limits there is no superiority of trains; all trains and engines must move at restricted speed:

Barstow—Between East and West Towers; and not to exceed 10 MPH between Signal 7453 and West Tower.

San Bernardino—Between 5th Street Tower and interlocked signal opposite yard office west of passenger station.

Trains will keep to left between San Bernardino and overhead bridge aA-40-X, between Thorn and Victorville.

Between Barstow and San Bernardino trains will run as prescribed by Rule D-152.

Double track extends through Barstow passenger yard. Tracks are numbered one to seven. Beginning at station, No. 1 is westward main track, No. 4 is eastward main track.

Double track extends through San Bernardino passenger yard. Tracks are numbered one to six. Beginning at station, No. 1 is westward main track, No. 4 is eastward main track.

On eastward track, automatic signals are three-position, indicating "Proceed", "Medium speed" or "Restricted speed" from Signal 782 east of Highland Junction to Signal 572-A, west of Summit, inclusive.

Rule 830 (b): At Summit, westward trains finding Signal 561 on westward main track in "Stop" position must wait five minutes before proceeding, unless the signal changes to indicate "Proceed".

At Summit, helper engines off passenger trains, after moving to clear will remain standing until train helped has departed.

Westward freight trains must stop at [illegible] both Cajon and Devore to cool wheels and inspect train, except these stops may be eliminated when trains handling 3500 tons or less with four unit diesel locomotives, and trains handling 3000 tons or less with three unit diesel locomotives, provided dynamic brakes in operation on all units.

Double track

At following stations, crossover switches are equipped with electric locks:

Victorville—Switches between westward and eastward main tracks, just east of station;

Summit—Switch from eastward siding to westward main track, opposite station.

To operate switch, remove lock from lever and wait three minutes.

Trains will keep to left between San Bernardino and overhead bridge aA-40-X, between Thorn and Victorville.

Between Barstow and San Bernardino trains will run as prescribed by Rule D-152.

Trains will keep to left between San Bernardino and overhead bridge aA-40-X, between Thorn and Victorville.

Bridge aA-40-X between Thorn and Victorville

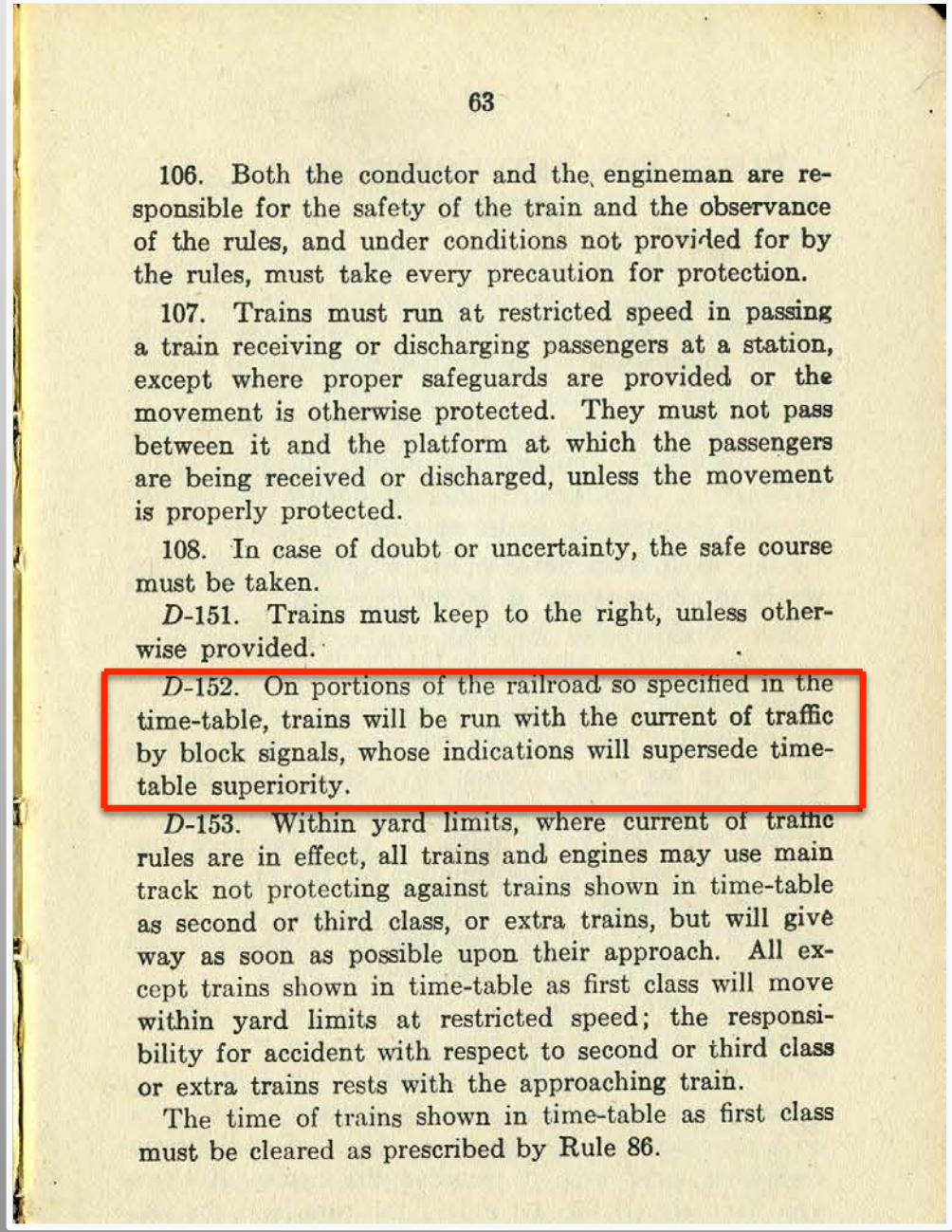
Second 23, December 1, 1951. Robert Hale photo

Trains will keep to left between San Bernardino and overhead bridge aA-40-X, between Thorn and Victorville.

Between Barstow and San Bernardino trains will run as prescribed by Rule D-152.

Trains will keep to left between San Bernardino and overhead bridge aA-40-X, between Thorn and Victorville.

Between Barstow and San Bernardino trains will run as prescribed by Rule D-152.



63

106. Both the conductor and the engineman are responsible for the safety of the train and the observance of the rules, and under conditions not provided for by the rules, must take every precaution for protection.

107. Trains must run at restricted speed in passing a train receiving or discharging passengers at a station, except where proper safeguards are provided or the movement is otherwise protected. They must not pass between it and the platform at which the passengers are being received or discharged, unless the movement is properly protected.

108. In case of doubt or uncertainty, the safe course must be taken.

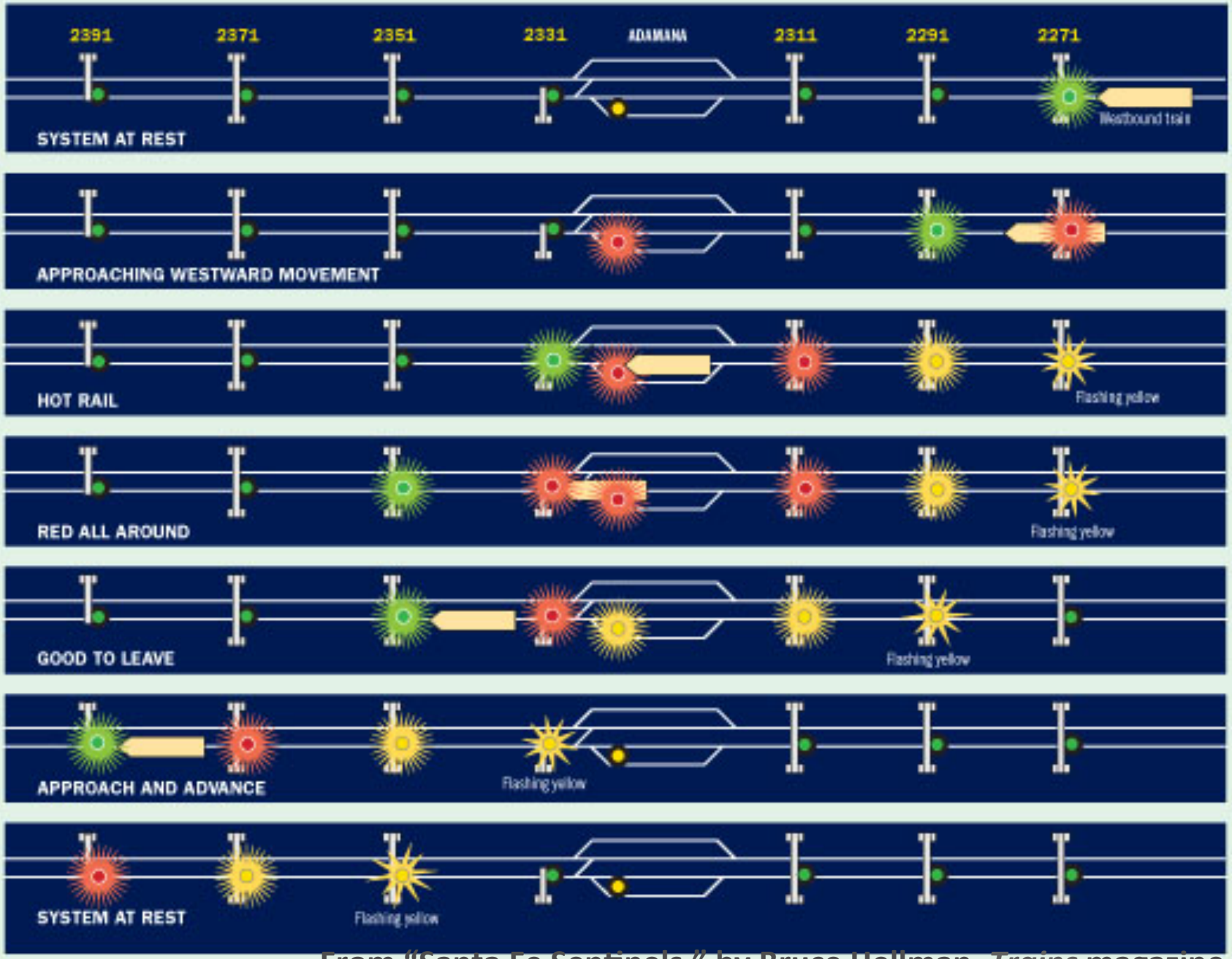
D-151. Trains must keep to the right, unless otherwise provided.

D-152. On portions of the railroad so specified in the time-table, trains will be run with the current of traffic by block signals, whose indications will supersede time-table superiority.

D-153. Within yard limits, where current of traffic rules are in effect, all trains and engines may use main track not protecting against trains shown in time-table as second or third class, or extra trains, but will give way as soon as possible upon their approach. All except trains shown in time-table as first class will move within yard limits at restricted speed; the responsibility for accident with respect to second or third class or extra trains rests with the approaching train.

The time of trains shown in time-table as first class must be cleared as prescribed by Rule 86.

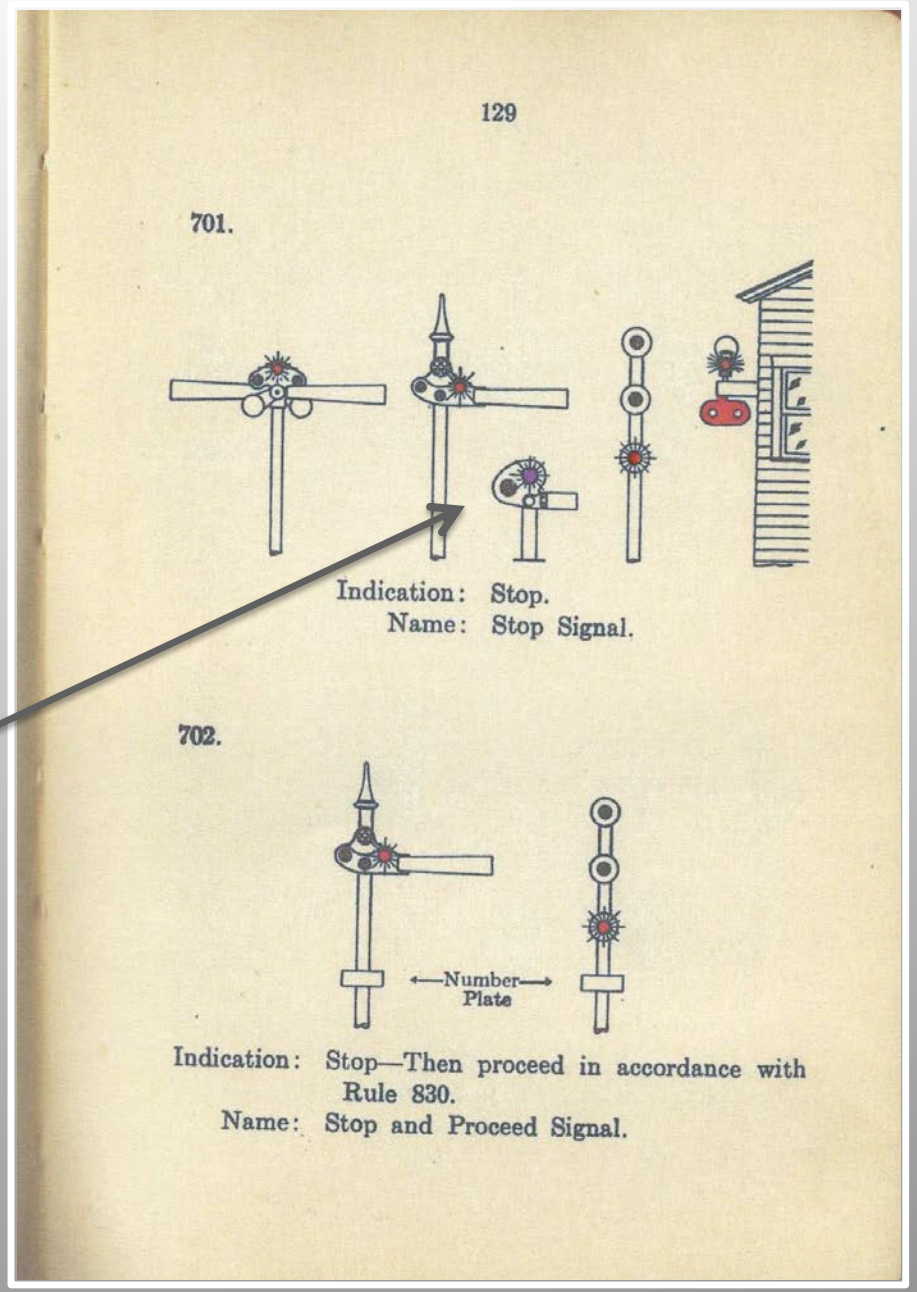
***D*-152. On portions of the railroad so specified in the time-table, trains will be run with the current of traffic by block signals, whose indications will supersede time-table superiority.**



From "Santa Fe Sentinels," by Bruce Hellman, *Trains* magazine

Rule 701, Stop Signal. This aspect, without a number plate, is an "absolute signal."

Illustration shows purple light in dwarf signal for "stop" indication.



129

701.

Indication: Stop.
Name: Stop Signal.

702.

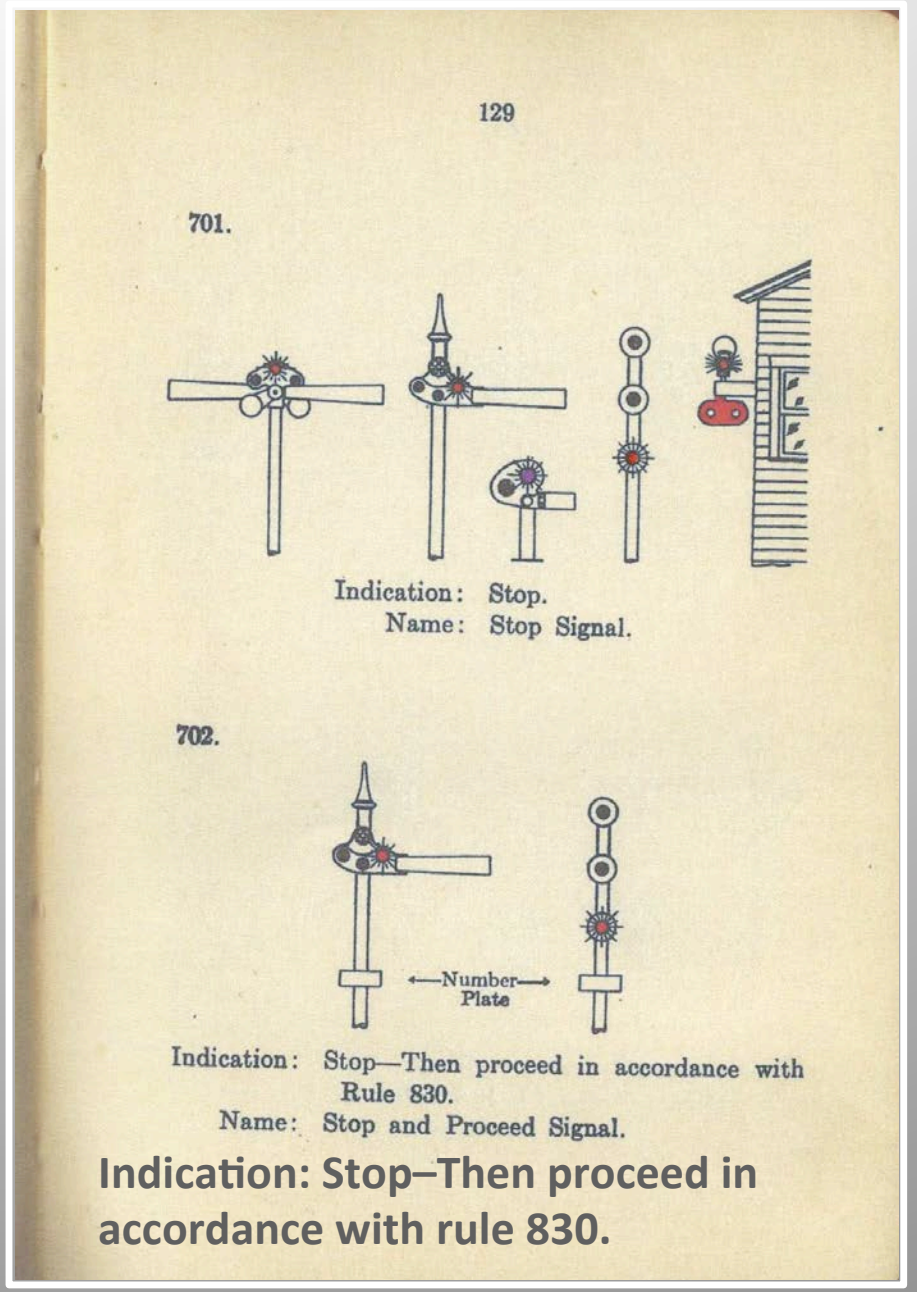
←Number→
Plate

Indication: Stop—Then proceed in accordance with Rule 830.
Name: Stop and Proceed Signal.

25. Rules 10(f) and 701: Red lights will be used in dwarf signals to indicate "Stop".

Special instruction 25. Rules 10(f) and 701: Red lights will be used in dwarf signals to indicate "Stop."

Rule 702, Stop and Proceed Signal. The number plate makes this a "permissive signal."



129

701.

Indication: Stop.
Name: Stop Signal.

702.

←Number→ Plate

Indication: Stop—Then proceed in accordance with Rule 830.
Name: Stop and Proceed Signal.

Indication: Stop–Then proceed in accordance with rule 830.

AUTOMATIC BLOCK.

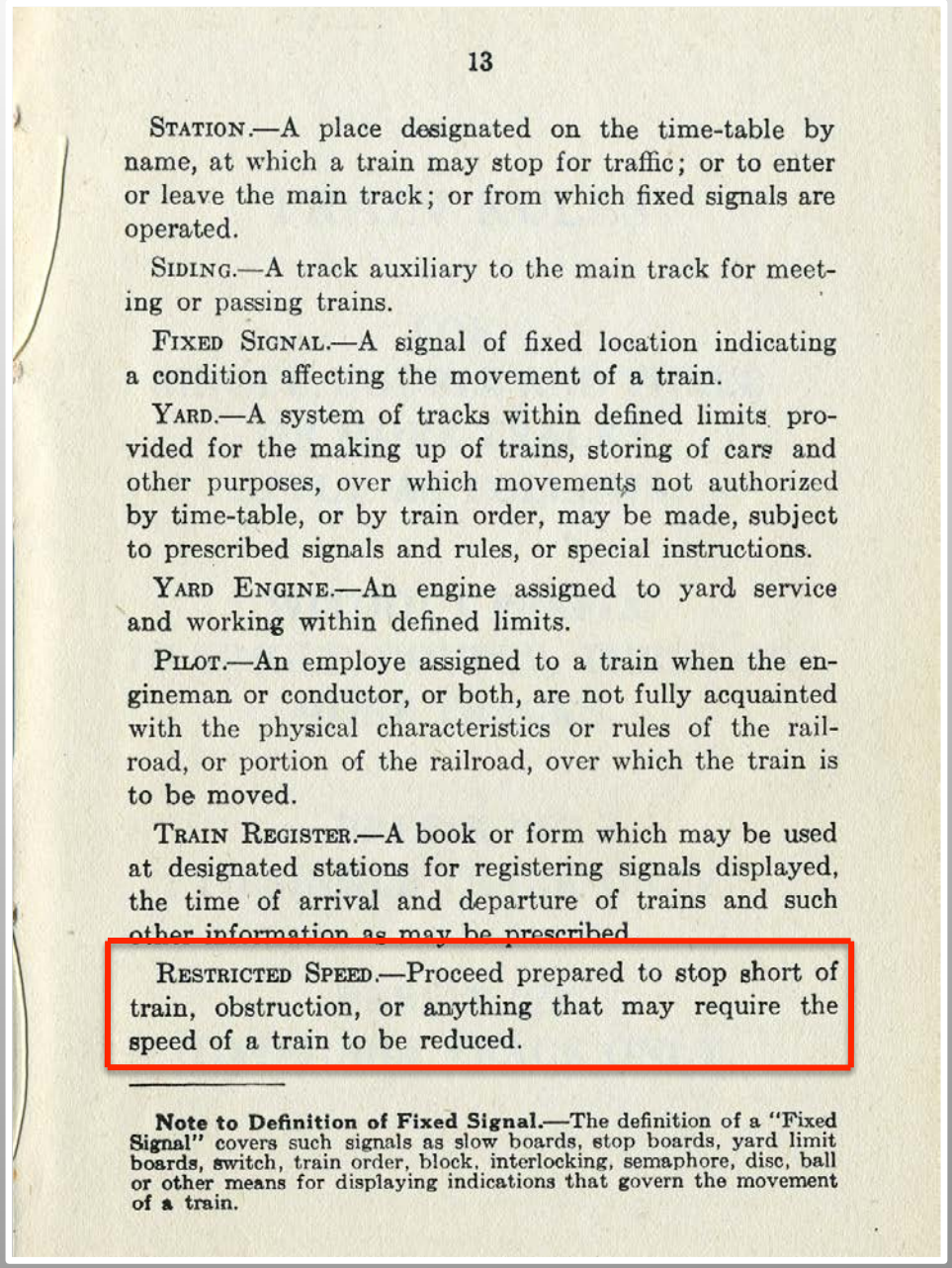
830. When a train is stopped by a stop and proceed signal it may:

(a) On single track, send flagman ahead immediately, wait five minutes and follow at restricted speed except that when next governing signal in advance can be plainly seen to indicate proceed and track is clear, train may at once proceed at restricted speed. Flagman need precede train only to a point where next governing signal in advance can be seen to indicate proceed and track seen to be clear.

(b) On two or more tracks proceed at once at restricted speed.

830. When a train is stopped by a stop and proceed signal it may:
(b) On two or more tracks proceed at once at restricted speed.

RESTRICTED SPEED – Proceed prepared to stop short of train, obstruction, or anything that may require the speed of a train to be reduced.



13

STATION.—A place designated on the time-table by name, at which a train may stop for traffic; or to enter or leave the main track; or from which fixed signals are operated.

SIDING.—A track auxiliary to the main track for meeting or passing trains.

FIXED SIGNAL.—A signal of fixed location indicating a condition affecting the movement of a train.

YARD.—A system of tracks within defined limits provided for the making up of trains, storing of cars and other purposes, over which movements not authorized by time-table, or by train order, may be made, subject to prescribed signals and rules, or special instructions.

YARD ENGINE.—An engine assigned to yard service and working within defined limits.

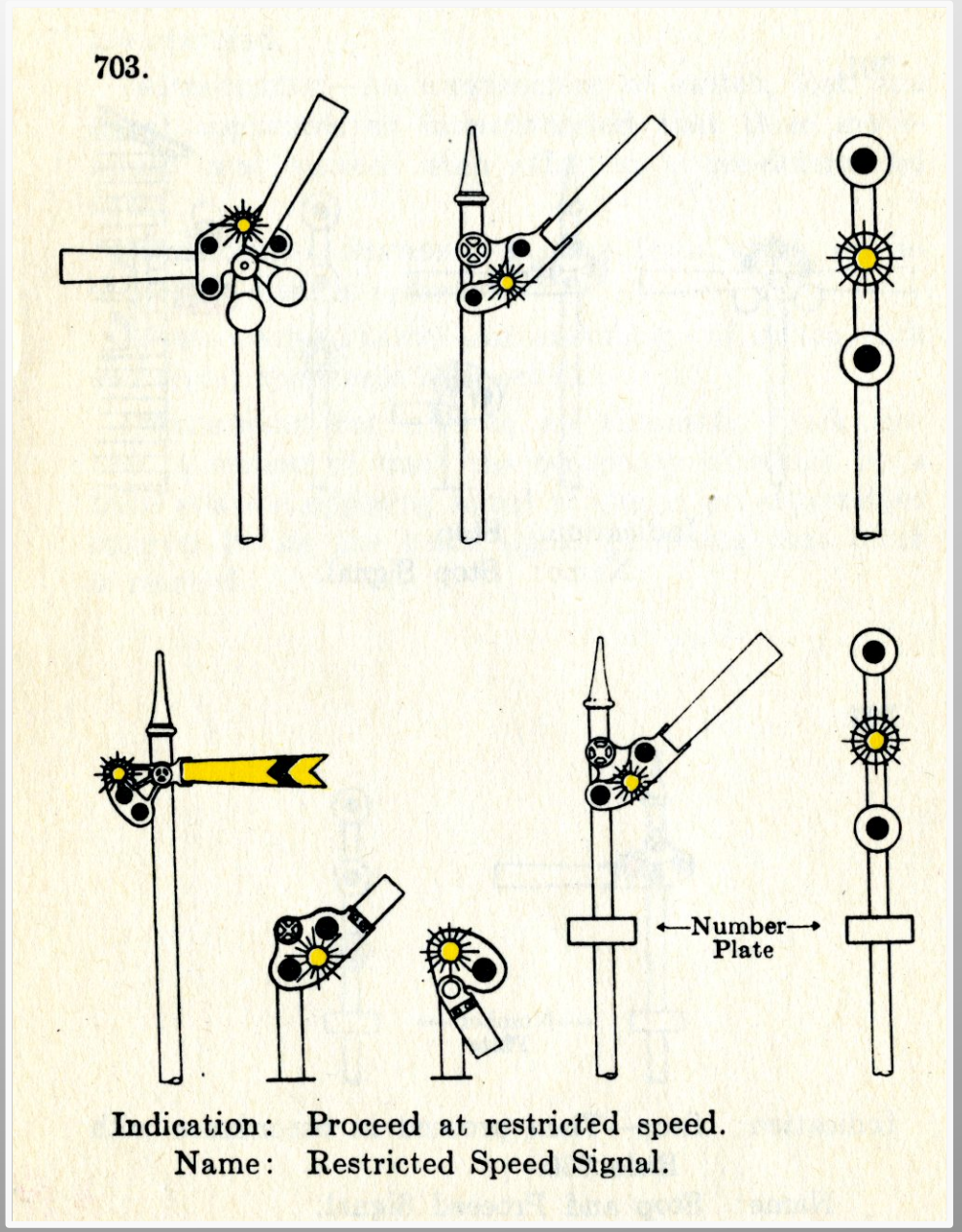
PILOT.—An employe assigned to a train when the engineman or conductor, or both, are not fully acquainted with the physical characteristics or rules of the railroad, or portion of the railroad, over which the train is to be moved.

TRAIN REGISTER.—A book or form which may be used at designated stations for registering signals displayed, the time of arrival and departure of trains and such other information as may be prescribed.

RESTRICTED SPEED.—Proceed prepared to stop short of train, obstruction, or anything that may require the speed of a train to be reduced.

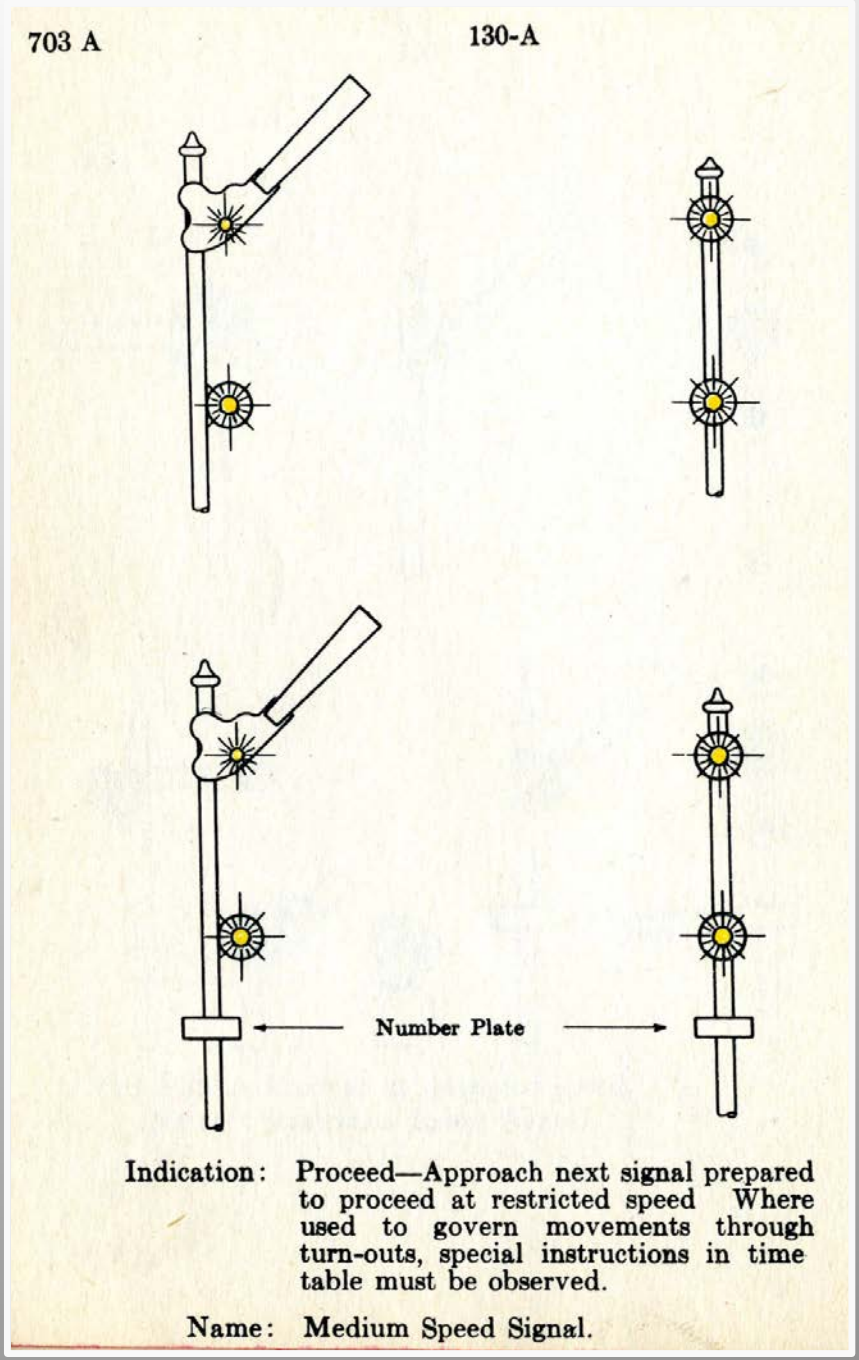
Note to Definition of Fixed Signal.—The definition of a "Fixed Signal" covers such signals as slow boards, stop boards, yard limit boards, switch, train order, block, interlocking, semaphore, disc, ball or other means for displaying indications that govern the movement of a train.

Rule 703, Restricted Speed Signal. Although the number plate is still called out, it is not significant for the indication of this signal aspect.

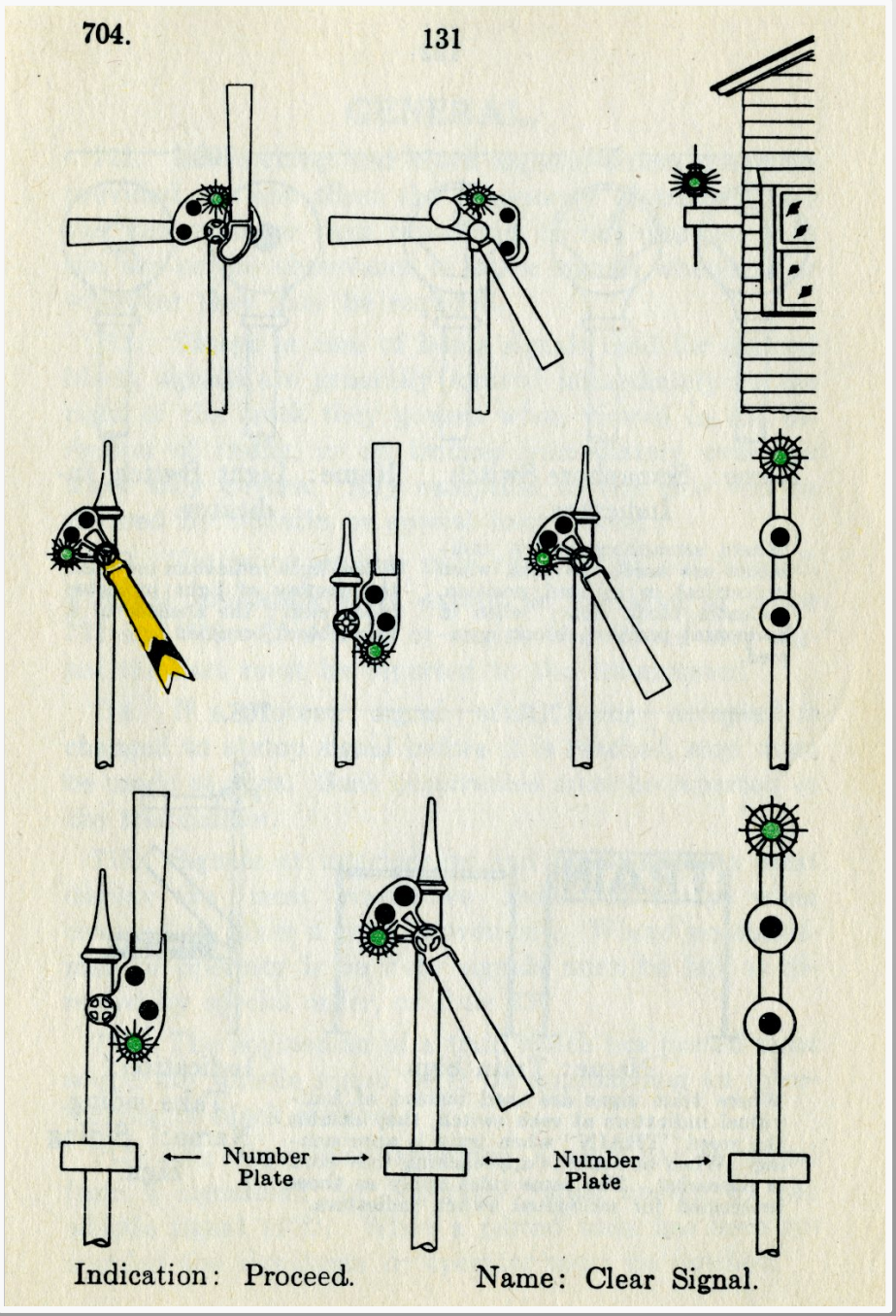


Rule 703 A, Medium Speed Signal. Inserted between restricted speed signal and clear signal to provide two-block protection in a special circumstance.

Indication: Proceed – Approach next signal prepared to proceed at restricted speed.



Rule 704, clear signal. Indicates that there are at least two clear blocks ahead, with rails intact and turnouts lined for the main track.



EASTWARD

FIRST CLASS

104	238	4	18	2
Passenger	Passenger	California Limited	Streamliner	The Scout
Arrive Daily	Arrive Daily	Arrive Daily	Arrive Daily	Arrive Daily
PM 8.27	PM s10.40	PM s11.10	PM s11.25	AM s12.20
8.19	10.31	11.01	11.17	12.12
8.14	10.25	10.55	11.12	12.07
8.06	10.16	10.46	11.05	AM 11.59
8.02	10.11	10.41	11.01	11.54
7.58	10.04	10.34	10.57	11.49
7.51	s 9.56	f10.26	10.50	11.41
7.44	9.48	10.18	10.43	11.34
7.40	9.43	10.13	10.39	11.28
7.35	9.38	10.08	10.34	11.20
7.26	9.29	9		
7.17	9.16	9		
7.07	9.05	9		
7.01	8.57	9		
6.55	8.48	9		
6.51	8.42	9		
6.48	8.36	9		
6.43	8.31	9		
6.38 PM	8.25 PM	8 P		
Leave Daily	Leave Daily	Leav		
(45.6)	(36.8)	(3		

TIME TABLE

NO. 131

August 31, 1947

STATIONS

BLOCK SYSTEM — DOUBLE

BARSTOW
6.1
LENWOOD
5.7
HODGE
9.2
HELENDALE
4.9
BRYMAN
5.4
ORO GRANDE
5.1
VICTORVILLE
4.3
THORN
4.1
HESPERIA
5.2
LUGO
5.5

Within the following limits there is no superiority of trains; all trains and engines must move at restricted speed:

Barstow—Between East and West Towers; and not to exceed 10 MPH between Signal 7453 and West Tower.

San Bernardino—Between 5th Street Tower and interlocked signal opposite yard office west of passenger station.

Trains will keep to left between San Bernardino and overhead bridge aA-40-X, between Thorn and Victorville.

Between Barstow and San Bernardino trains will run as prescribed by Rule D-152.

Double track extends through Barstow passenger yard. Tracks are numbered one to seven. Beginning at station, No. 1 is westward main track, No. 4 is eastward main track.

Double track extends through San Bernardino passenger yard. Tracks are numbered one to six. Beginning at station, No. 1 is westward main track, No. 4 is eastward main track.

On eastward track, automatic signals are three-position, indicating "Proceed", "Medium speed" or "Restricted speed" from Signal 782 east of Highland Junction to Signal 572-A, west of Summit, inclusive.

Rule 830 (b): At Summit, westward trains finding Signal 561 on westward main track in "Stop" position must wait five minutes before proceeding, unless the signal changes to indicate "Proceed".

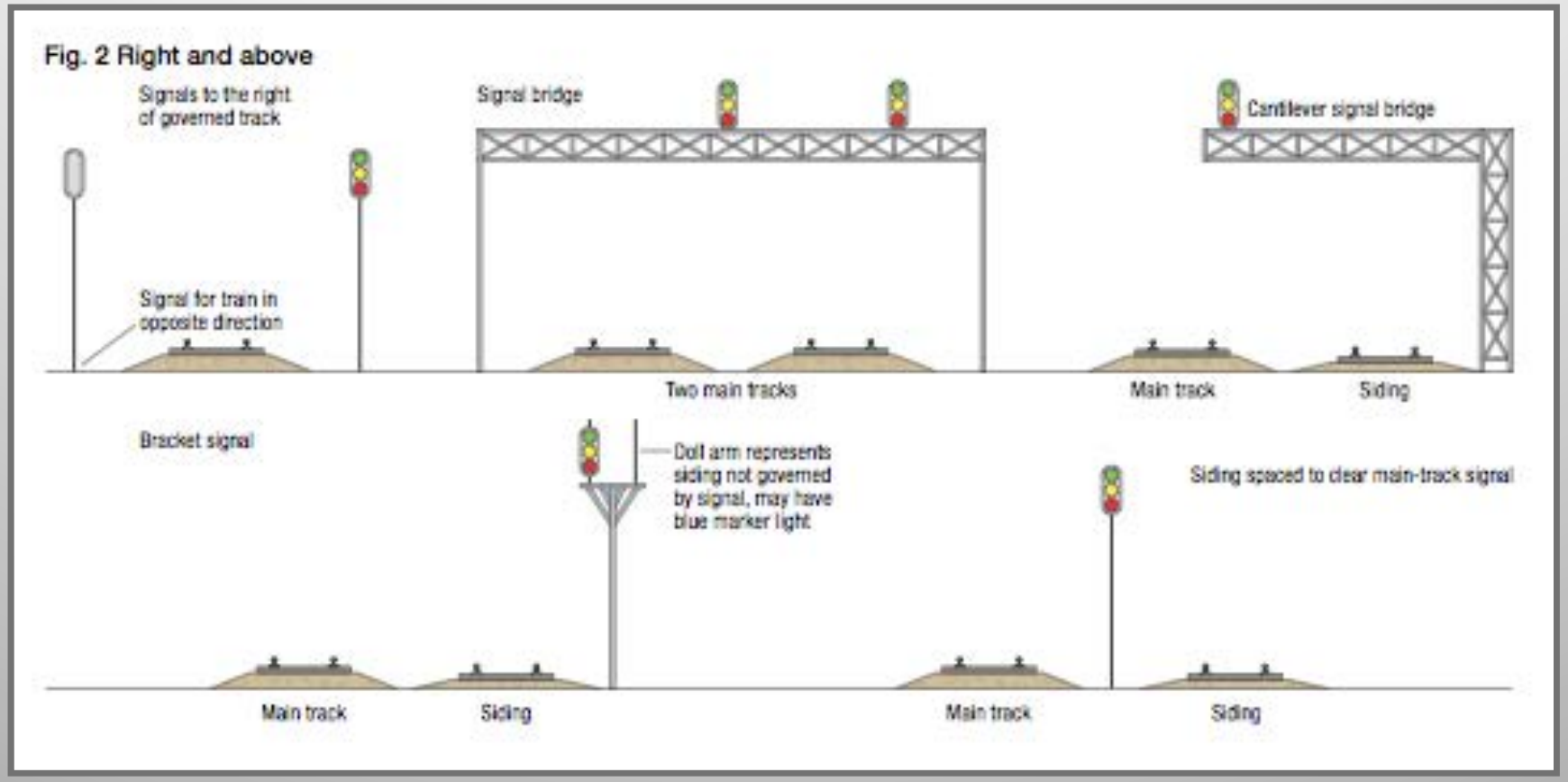
At Summit, helper engines off passenger trains after moving

On eastward track, automatic signals are three-position, indicating "Proceed," "Medium speed" or "Restricted speed" from Signal 782 east of Highland Junction to Signal 572-A, west of Summit, inclusive.

"... from Signal 782 east of Highland Junction to Signal 572A, west of Summit, inclusive."

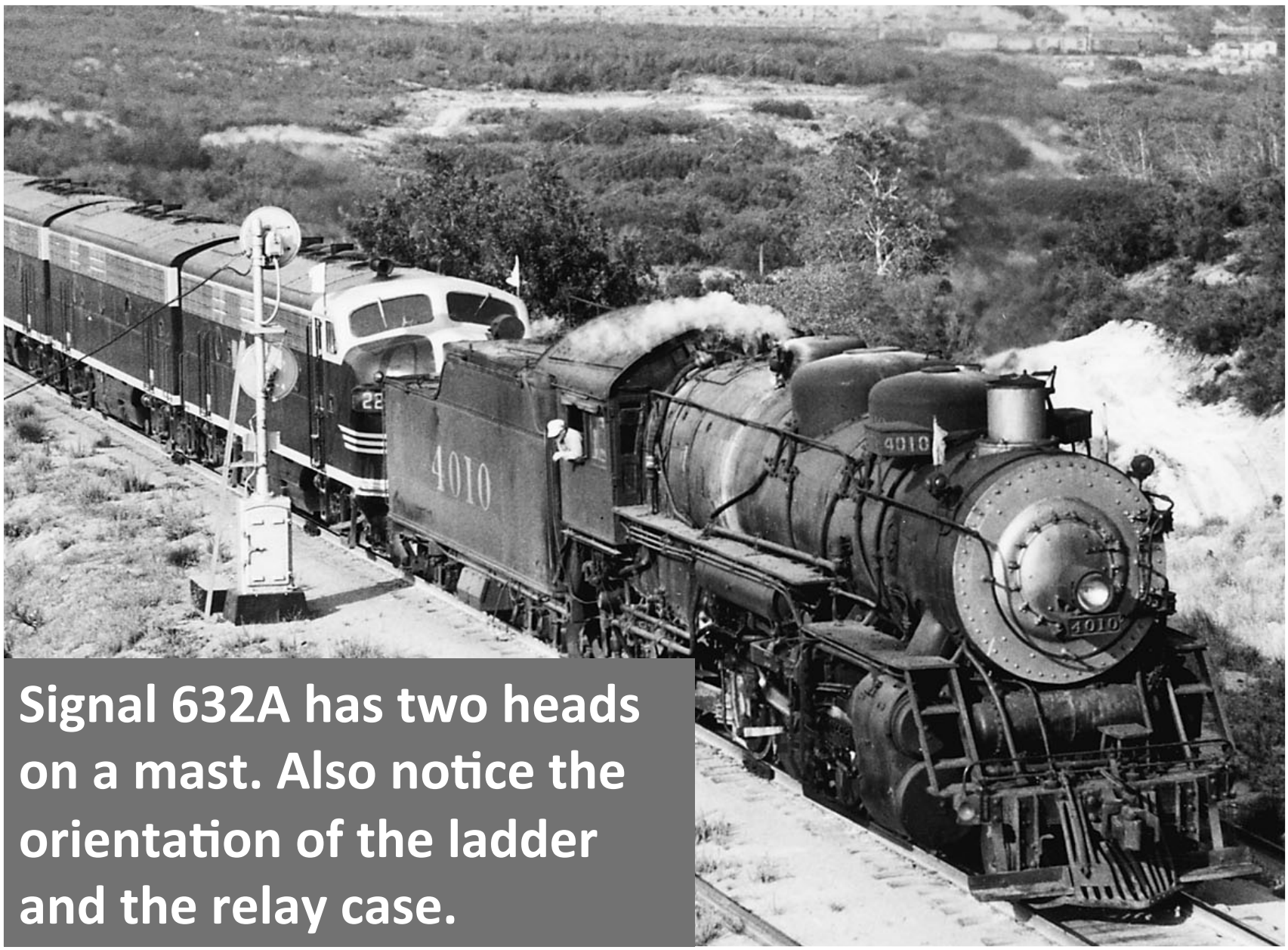
Cantilever signal 636 over the eastward track below Cajon. Two heads let it display a yellow-over-yellow "Medium Speed" indication.

Joseph J. Lynch photo



"Right and above" location of signals with regard to the governed track, from Mike Burgett's article, "Where to place trackside signals," in *How To Build Realistic Layouts, Model the Trackside Scene*, illustrating the rule that applied until March 1985.

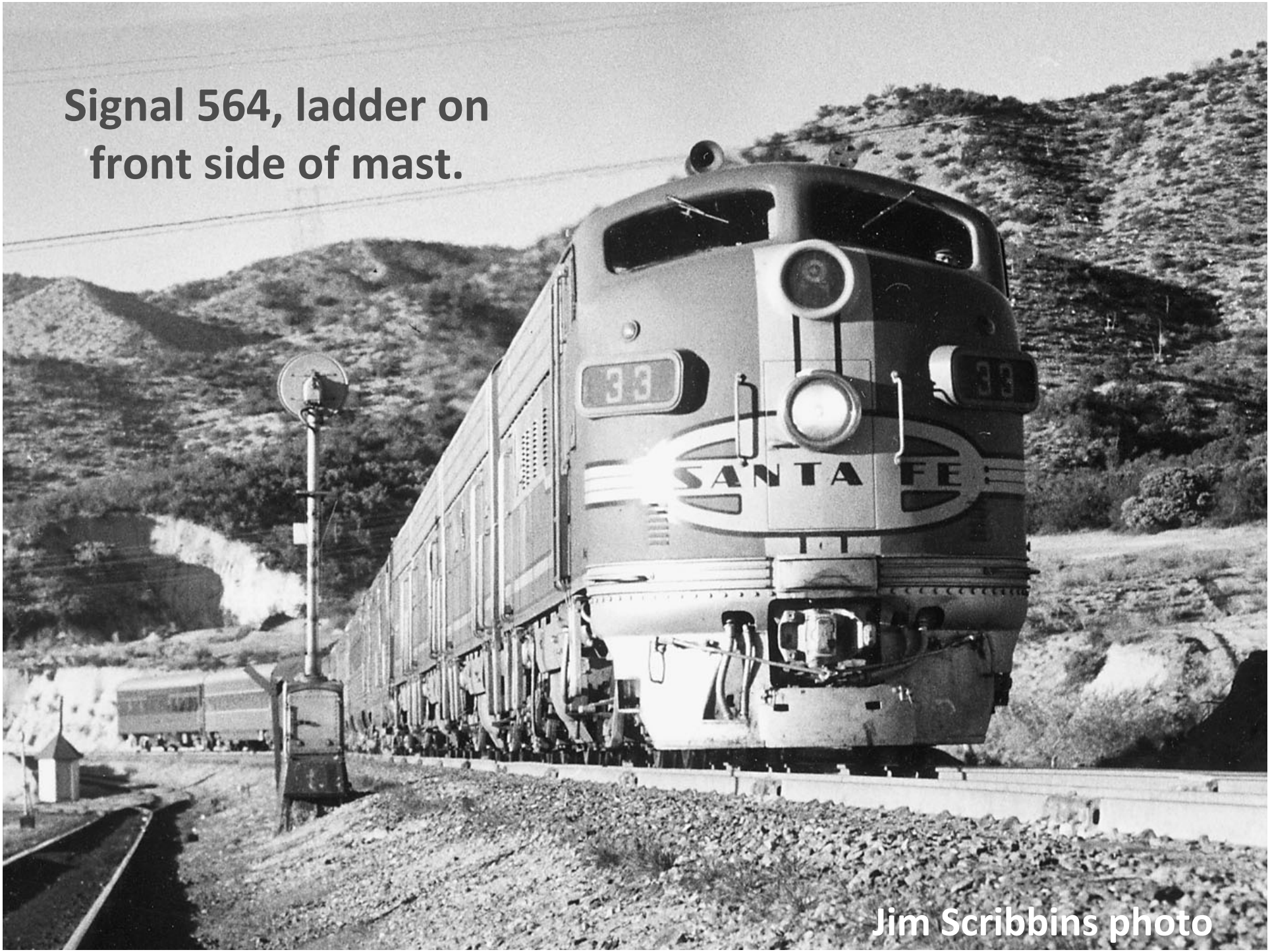
Signal 632A, above Cajon where the eastward and westward tracks are on separate grades. David P. Morgan Library photo



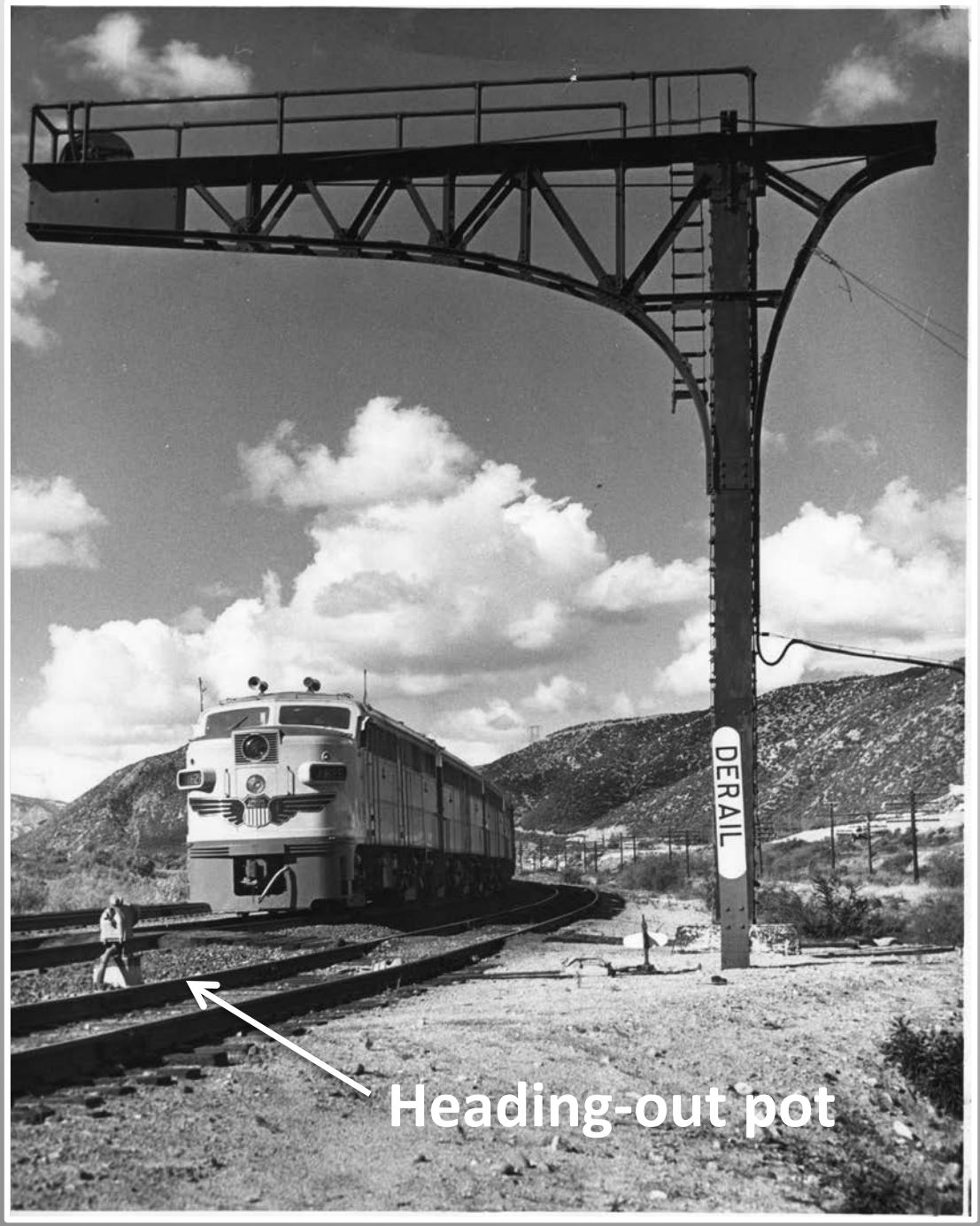
Signal 632A has two heads on a mast. Also notice the orientation of the ladder and the relay case.

Signal 564 below Summit, with one head displaying red, yellow, and green aspects.

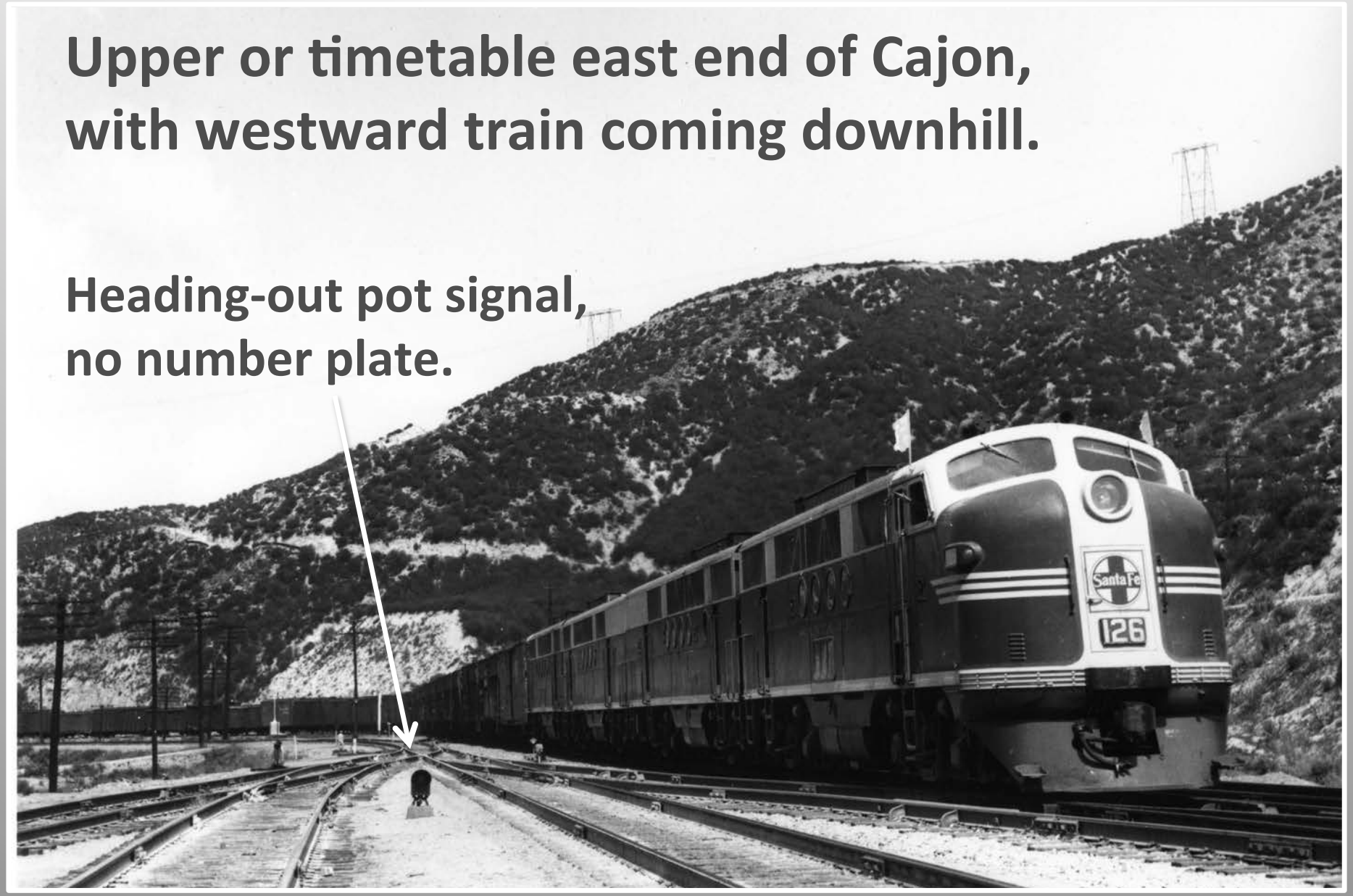
Walter H. Thrall photo


Signal 564, ladder on front side of mast.
SANTA FE
Jim Scribbins photo

Signal 601 on westward track near Highway 138 grade crossing, with type R-2 three-light head on the mast of a former semaphore. David P. Morgan Library photo



Cantilever signal 631, governing westward main track at lower end of Cajon, with type H-2 searchlight head. Also note the dwarf or pot "heading out" signal. Don Sims photo

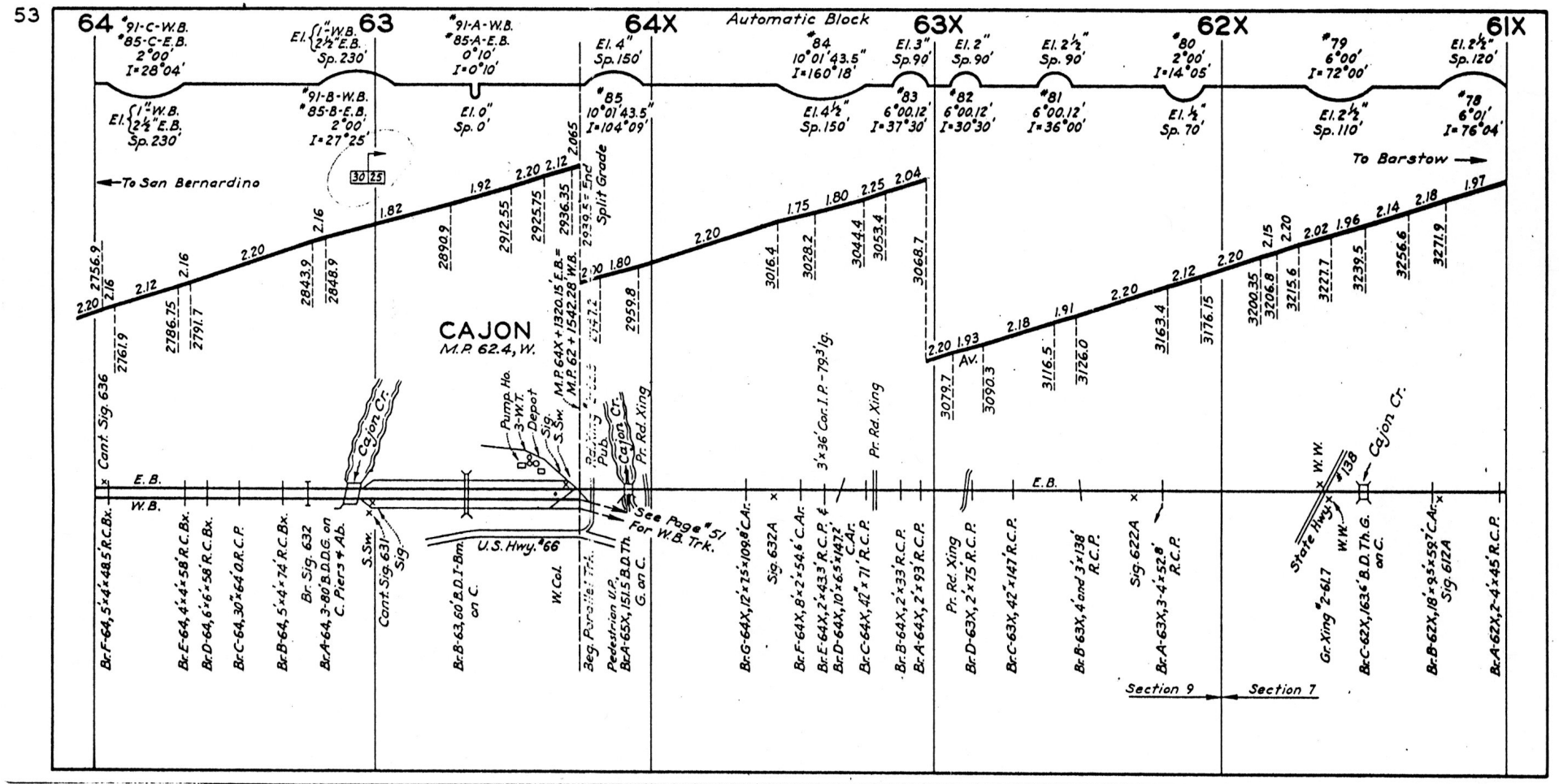


Eastward siding

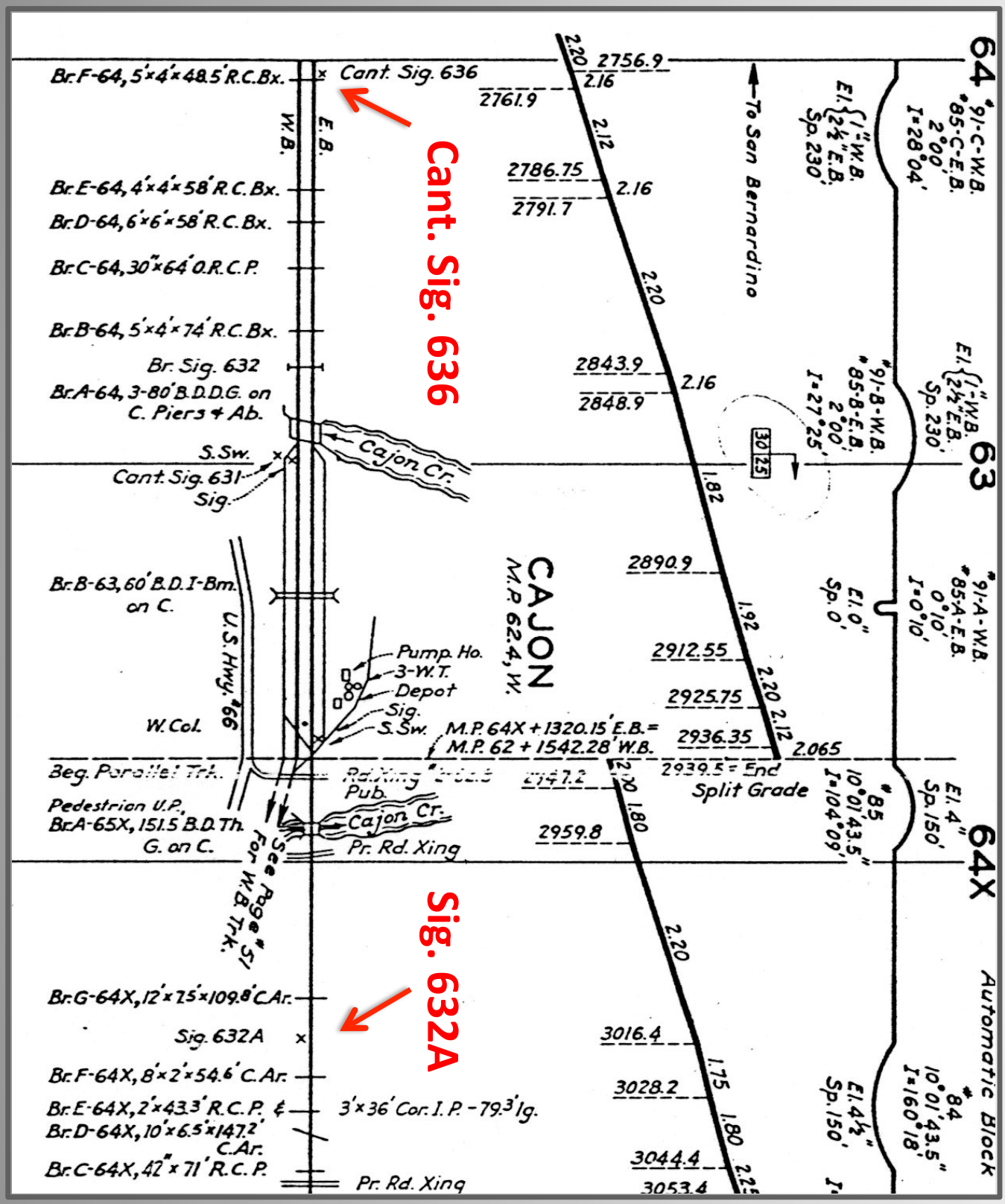
Robert F. Collins photo

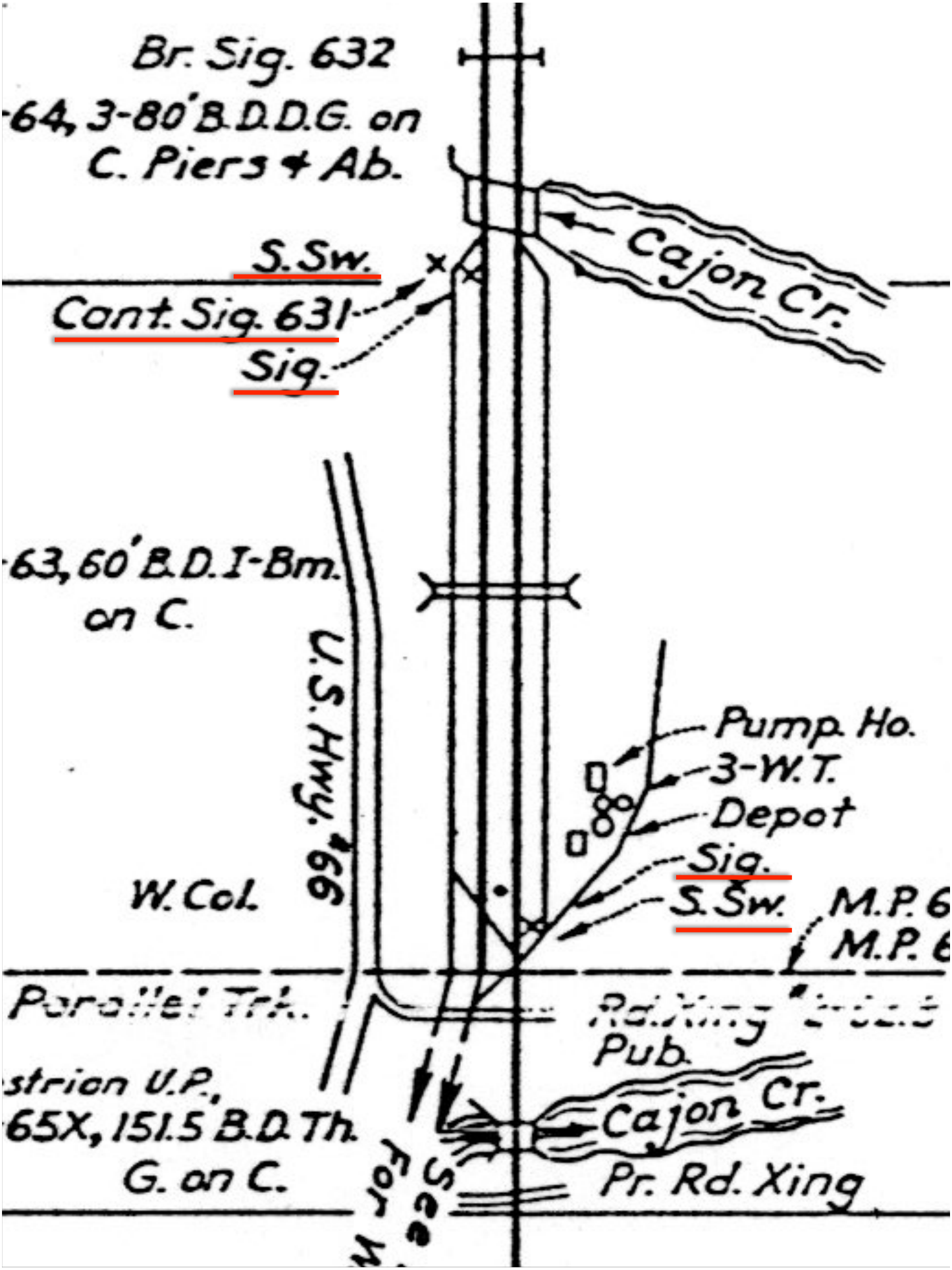
Bridge signals at Blue Cut.

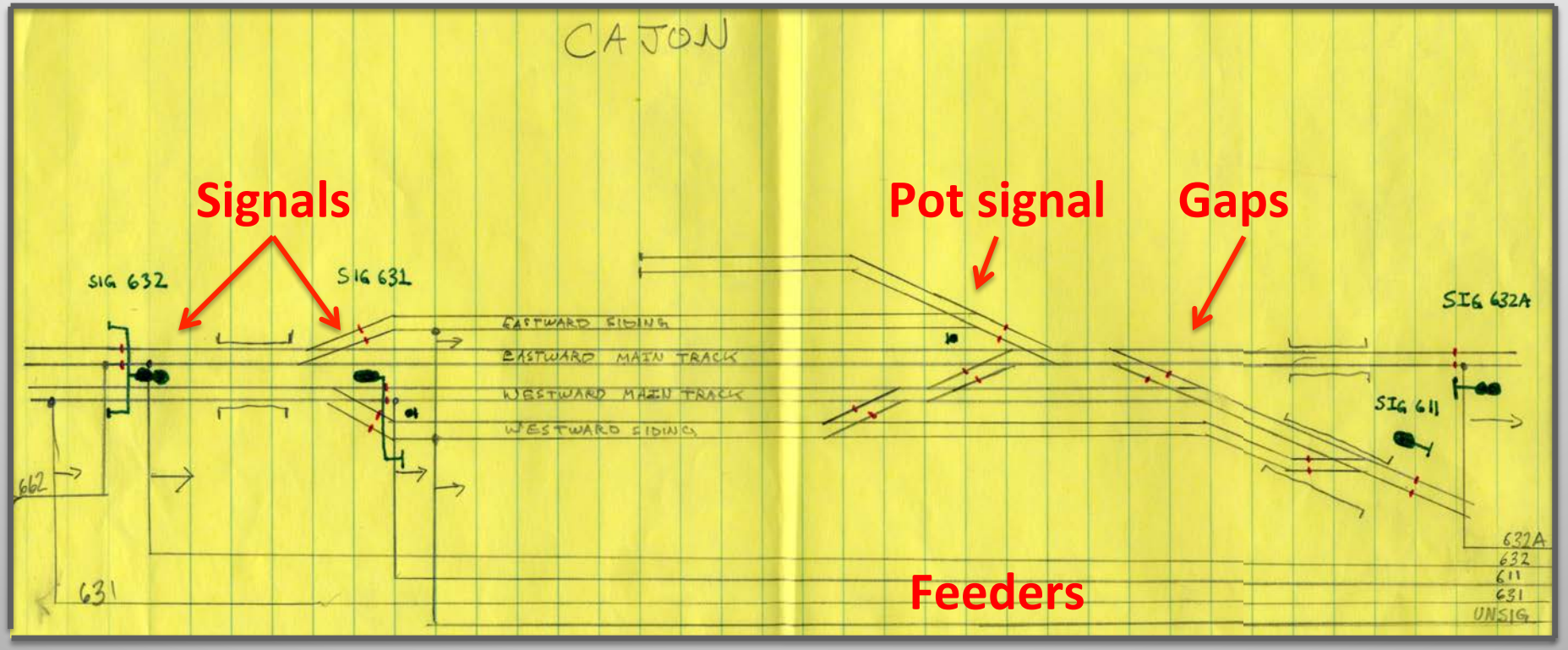
Santa Fe Ry. photo



Track chart page from Los Angeles Division 1951 track charts published by the Santa Fe Railway Historical & Modeling Society.


Br. F-64, 5'×4'×48.5' R.C.Bx.
Cont. Sig. 636
W.B.
E.B.
Br. E-64, 4'×4'×58' R.C. Bx.
Br. D-64, 6'×6'×58' R.C. Bx.
Br. C-64, 30"×64' O.R.C.P.
Br. B-64, 5'×4'×74' R.C. Bx.
Br. Sig. 632
Br. A-64, 3-80' B.D.D.G. on C. Piers & Ab.
S. Sw.
Cont. Sig. 631
Sig.
Cajon Cr.
Br. B-63, 60' B.D. I-Bm. on C.
U.S. Hwy. 66
W. Col.
Pump Ho.
3-W.T.
Depot
Sig.
S. Sw.
CAJON
M.P. 62.4, W.
M.P. 64X + 1320.15' E.B. =
M.P. 62 + 1542.28' W.B.
Beg. Parallel Trk.
Rd. Xing Pub.
Pedestrian U.P., Br. A-65X, 151.5' B.D. Th. G. on C.
Cajon Cr.
Pr. Rd. Xing
See Page "51" for W.B. Trk.
Br. G-64X, 12'×75'×109.8' C.Ar.
Sig. 632A
Br. F-64X, 8'×2'×54.6' C.Ar.
Br. E-64X, 2'×43.3' R.C.P. &
Br. D-64X, 10'×6.5'×147.2' C.Ar.
Br. C-64X, 42"×71' R.C.P.
3'×36' Cor. I.P. - 79.3' Ig.
Pr. Rd. Xing
To San Bernardino
2761.9
2786.75
2791.7
2843.9
2848.9
2890.9
2912.55
2925.75
2936.35
2939.5 = End Split Grade
2959.8
3016.4
3028.2
3044.4
3053.4
64
63
64X
Automatic Block
Cant. Sig. 636
Sig. 632A


Br. Sig. 632
-64, 3-80' B.D.D.G. on
C. Piers & Ab.
S. Sw.
Cont. Sig. 631
Sig.
Cajon Cr.
-63, 60' B.D. I-Bm.
on C.
U.S. Hwy. 66
Pump Ho.
3-W.T.
Depot
Sig.
S. Sw.
W. Col.
M.P. 6
M.P. 6
Parallel Trk.
Pub.
Cajon Cr.
strian U.P.,
65X, 151.5 B.D. Th.
G. on C.
Pr. Rd. Xing



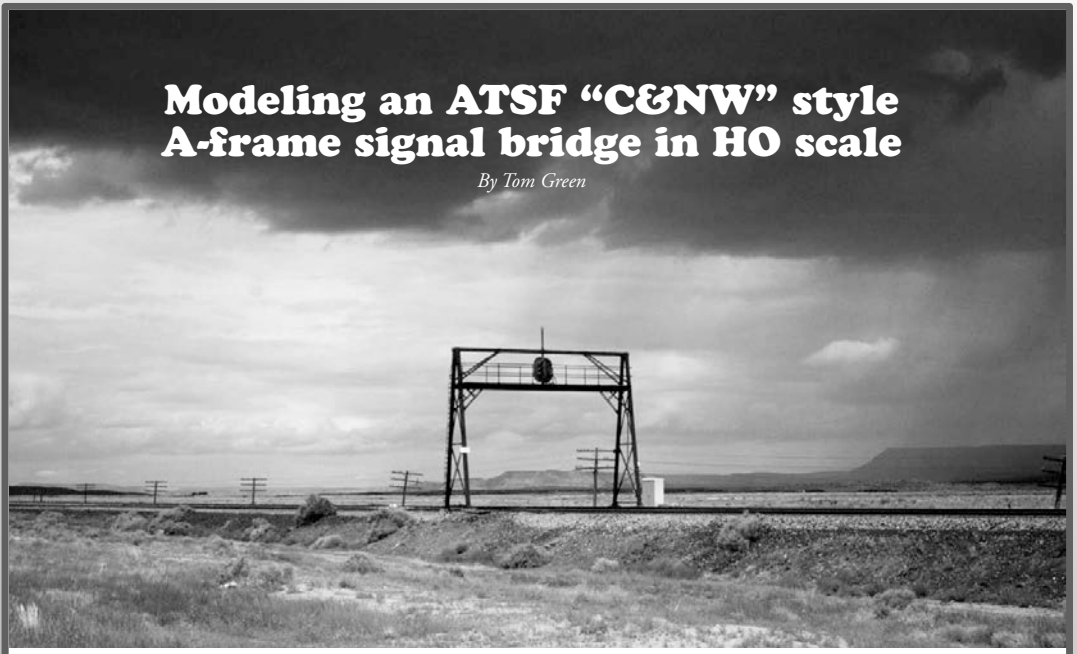
Sketch of layout wiring to support signaling at Cajon. Lower or south rail on each track is the control rail, and the north rail is the common rail.

Cantilever bridge, signal heads.

Heading-out pot.

Modeling an ATSF "C&NW" style A-frame signal bridge in HO scale

By Tom Green



A Santa Fe icon of the Southwest. The signal bridge at Mile Post 111, between Bluewater and West Baca, New Mexico, on the First District of the Albuquerque Division, is silhouetted against threatening skies during the summer "monsoon" season of 1983. *-Tom Green*

This article is adapted from a clinic originally presented at the 2007 SFRM&HS convention in Oklahoma City. I built several models of these unique "C&NW" style A-frame signal bridges in brass, and will discuss the lessons learned in such an effort.

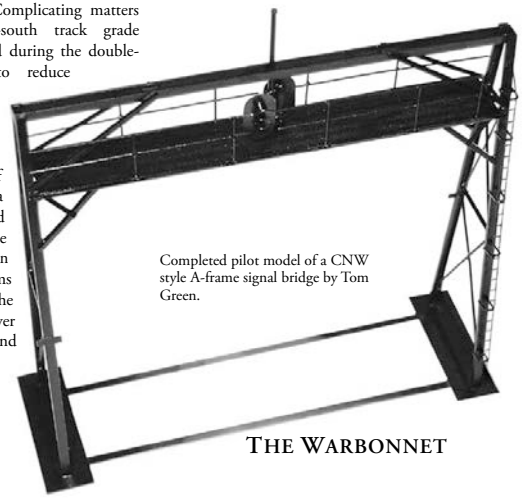
The Prototype

While examples of the A-frame signal bridges could be found in many locations across the Santa Fe system, I was particularly attracted to the signal bridges located on the First and Second Districts of the Albuquerque Division between Winslow and Albuquerque.

An automatic block system was installed across these districts in various segments between 1914 and 1932. Not only was this one of Santa Fe's most important lines, but double track was selected for some of Santa Fe's earliest signalling efforts as it was acknowledged to substantially increase capacity over non-signaled double track by eliminating the 10-minute spacing rule (Rule 91) and in its place substitute Rule D-152 (later called D-251) where trains would run on signal indication.

Much of the double-track Albuquerque Division was left hand running due to a flyover bypassing a horseshoe curve on the Supai grade at Gleed, Arizona, between Crookton and Pineveta. Built during the double-tracking east from Seligman in 1911-1912, this placed the eastbound traffic on the north side. Complicating matters were several north-south track grade separations, developed during the double-tracking program to reduce gradient. These were located between Baca and Thoreau, and Gonzales and Perea, New Mexico, east of Gallup, and in Arizona between Welch and Supai/Sereno, in the difficult Johnson Canyon area between Williams and Ashfork and the aforementioned flyover between Crookton and Pineveta.

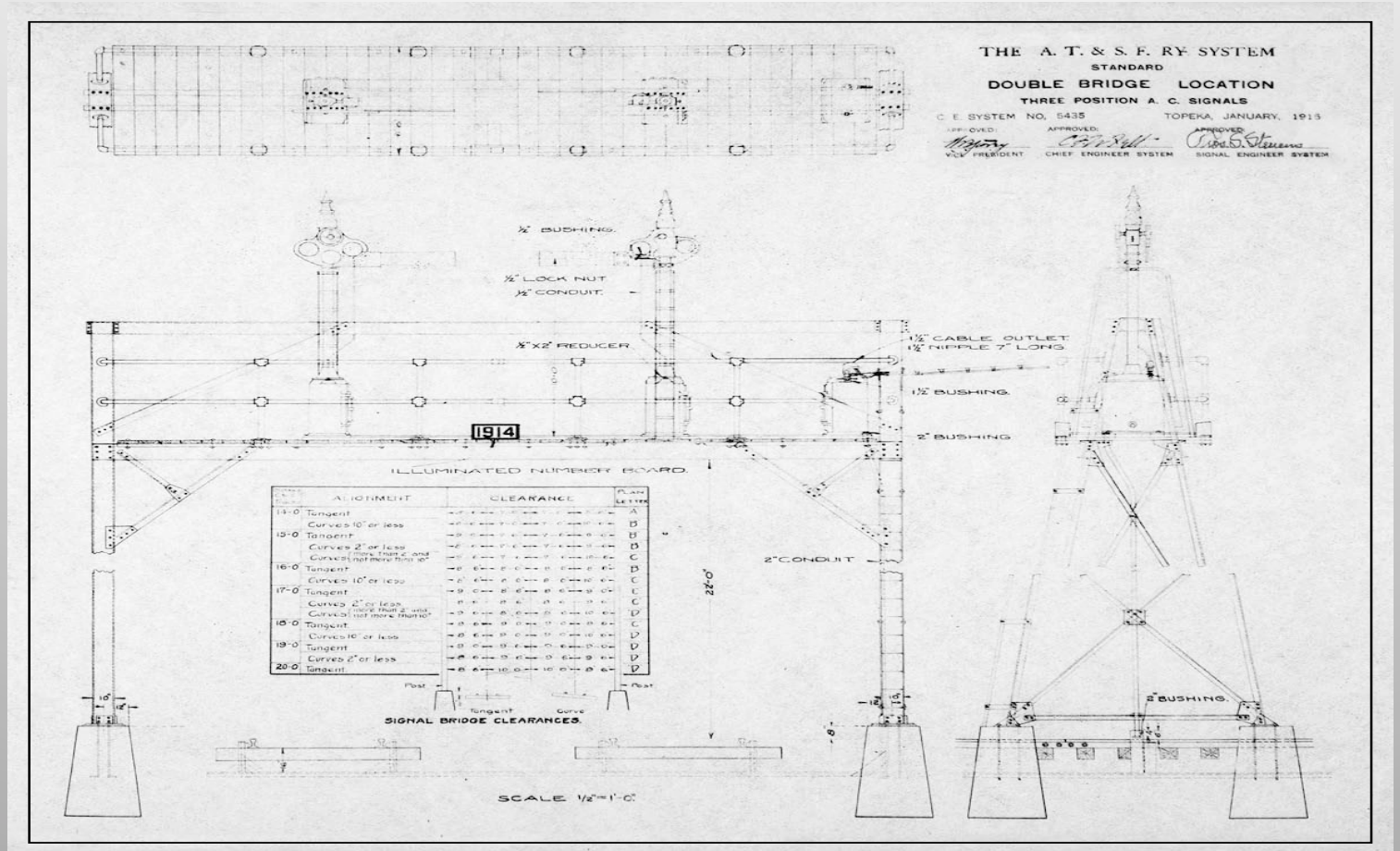
Because of left hand running, placing the signals to the right in the direction of movement would prove to be a costly proposition. There were several options: construct up to five additional flyover arrangements; widen track centers at specific locations to accommodate ground signals (or grade a consistently wider right of way with



Completed pilot model of a CNW style A-frame signal bridge by Tom Green.

Article by Tom Green from Second Quarter 2008 SFRH&MS *Warbonnet* mazgazine.

Chicago & NorthWestern freight in Milwaukee, circa 1930s. David P. Morgan Library collection.



Plan for signal bridge dated 1915 fitted with T-2 upper quadrant semaphores. Note illuminated number board. *-Keith Jordan collection*

for over 70 years, and thousands upon thousands of trains passed through their latticed metal portals, from the red ball freight trains and heavyweight limiteds of the 'twenties, to the *Super Chiefs*, *GFXs* and the *Super C* to the Super Fleet trains that closed out the Santa Fe era on what is now known as the "BNSF Transcon."

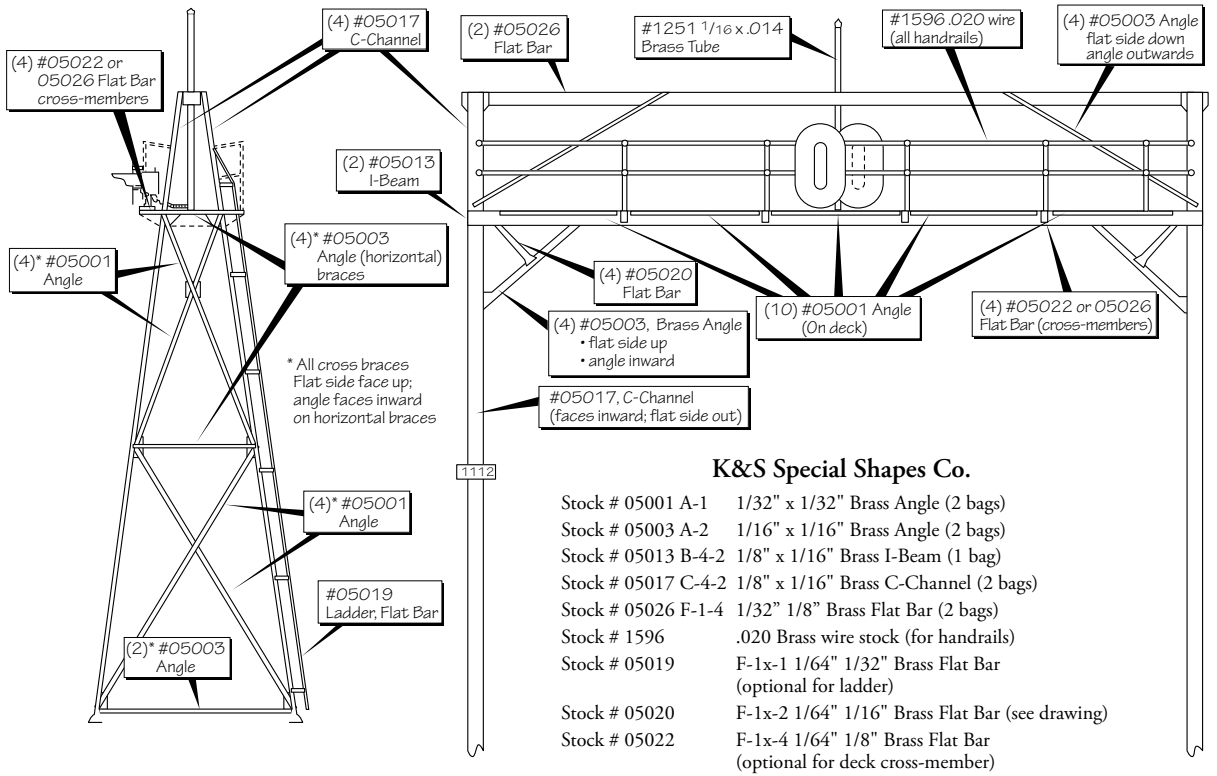
Sadly they are gone now. The signal bridges on the First District were removed by the Santa Fe itself during the 1983-84 reverse-CTC/TCS installation between Defiance and Belen, and those of the Second District by 2001 under BNSF. But that's why we model! Since no model of the prototype CNW-style bridge was available, I was determined to construct some of my own in HO scale.

Planning the Model

In an effort to build a pilot model, I selected a prototype, which I photographed in August 1983 located at Mile Post 111.2 on the First District near Baca, New Mexico.

First I obtained the ATSF "C&NW" type full bridge plan from Russell Crump. Then I used a proportional divider to scale the pictures into a drawing, calibrated from a known measurement (the standardized target face) on both the plans and the photos. With the calibration set on the tool, it was then applied to create a new drawing based on comparison of the original plans (reduced to scale by photocopier) and the reference photos of the signal bridge. Right away I saw some differences.

Parts List for ATSF "C&NW" Type Signal Bridge



K&S Special Shapes Co.

Stock # 05001 A-1	1/32" x 1/32" Brass Angle (2 bags)
Stock # 05003 A-2	1/16" x 1/16" Brass Angle (2 bags)
Stock # 05013 B-4-2	1/8" x 1/16" Brass I-Beam (1 bag)
Stock # 05017 C-4-2	1/8" x 1/16" Brass C-Channel (2 bags)
Stock # 05026 F-1-4	1/32" 1/8" Brass Flat Bar (2 bags)
Stock # 1596	.020 Brass wire stock (for handrails)
Stock # 05019	F-1x-1 1/64" 1/32" Brass Flat Bar (optional for ladder)
Stock # 05020	F-1x-2 1/64" 1/16" Brass Flat Bar (see drawing)
Stock # 05022	F-1x-4 1/64" 1/8" Brass Flat Bar (optional for deck cross-member)
Stock # 05010 H-4	1/8" Brass H-column (1 bag) optional

Various Manufactures

1/16" x .014 brass tube (for signal mast)
Diamond pattern brass "sheet" stock (for deck)

Signal Head Sources

N&G Railway Signal Co. *(not commercially available)*
Class 5 SP Searchlight Signal *(plastic and brass)*
Tomar Industries *(plastic and brass)*
Century Foundry *(white metal and brass)*
Suncoast Models *(white metal and brass)*

Required Tools

2 Needle nose pliers *(one for, and one not for soldering)*
Micromark #82147 Xacto 'mini' square
Micromark #60513 Flush cutting 'Rail Nipper'
Flat and Square miniature files
Micromark #83516 Therma-Boost Dual wattage Soldering Iron
Silver Solder and Flux (*Tix or equiv*)
Micromark #10116 HO scale ruler (*or NMRA*)
Dremel Tool with cutoff wheel
Assorted small drills (61-80) and pin-vise

Recommended Tools

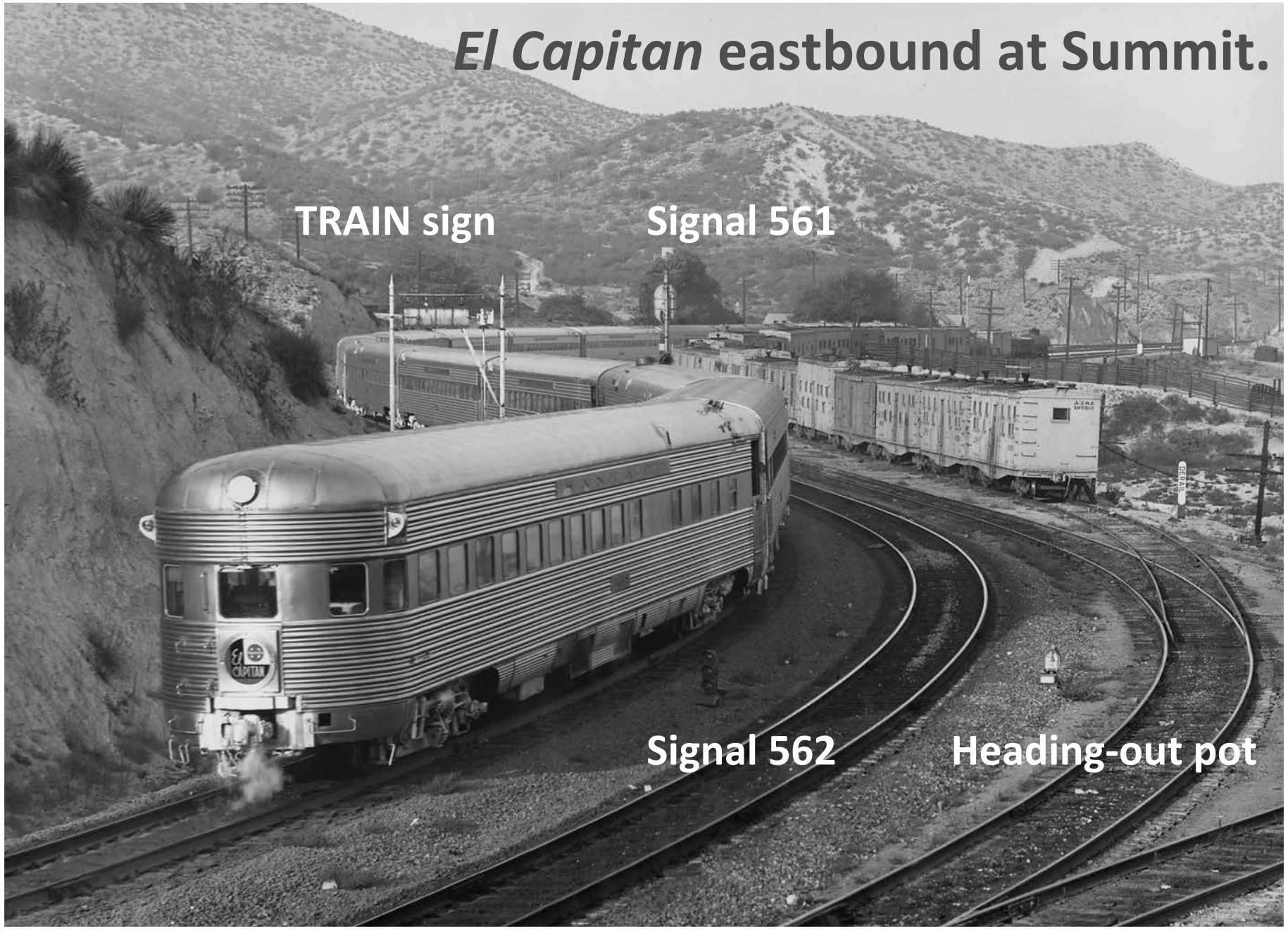
Micromark #14129 Proportional divider
Micromark #83261 Thin Beam Square
Resistance soldering unit w/hand piece or tweezers (American Beauty or equiv.)
NWSL micro sanding wands (240, 400 and 600 grit)
#1-72 screws, washers, bolts - and die and tapping fixtures

Custom searchlight signals from N&G Signal Co.

Signals 572A through 632A.

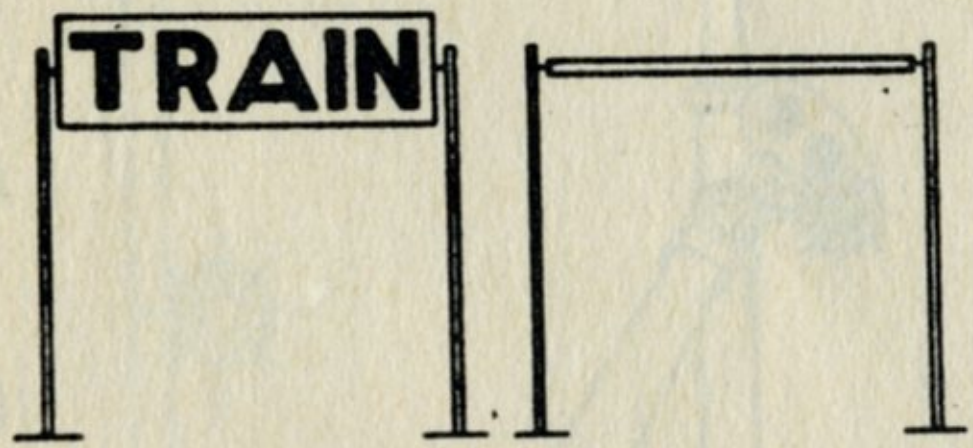
Signal 564.

El Capitan eastbound at Summit.



Robert Hale photo

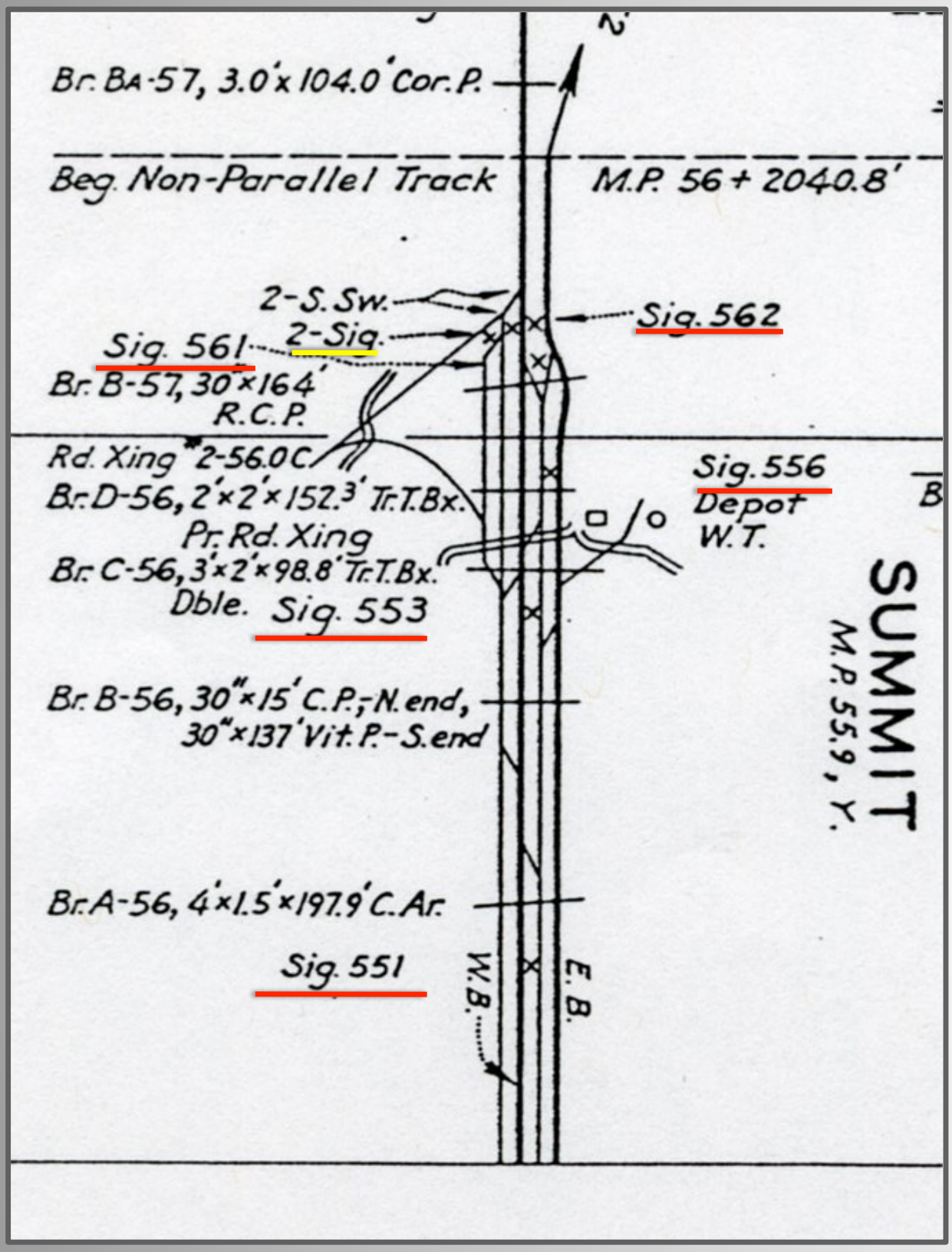
707



Name: Train Sign.

Where train signs are used instead of individual indicators at each switch, they exhibit the word "TRAIN" when train is approaching. When no train is approaching this word is concealed. The same rules apply as those prescribed for individual switch indicators.

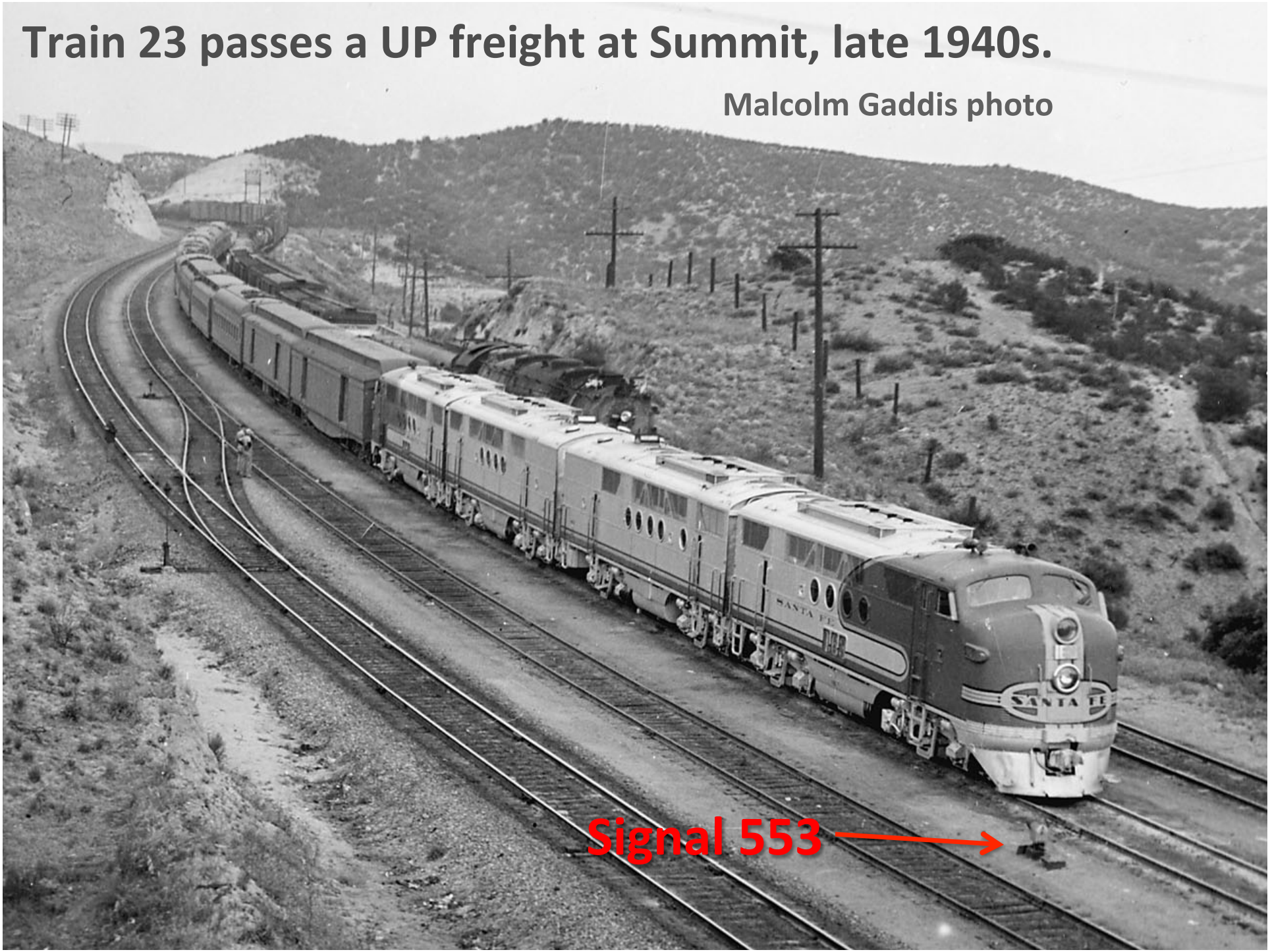
Rule 707, Train Sign – Where train signs are used . . . they exhibit the word "TRAIN" when train is approaching. When no train is approaching this word is concealed.

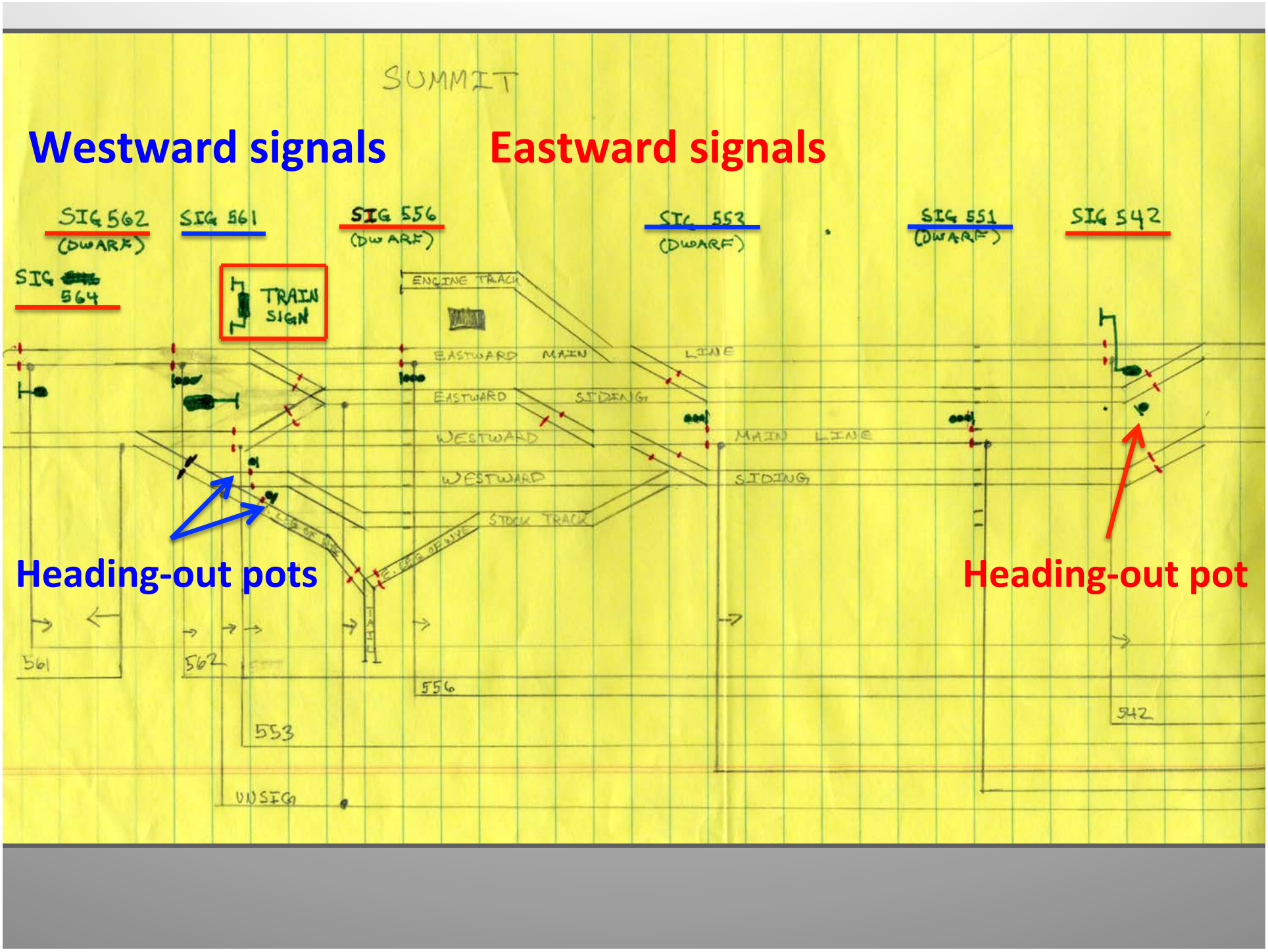

Br. BA-57, 3.0'x 104.0' Cor. P.
Beg. Non-Parallel Track
M.P. 56 + 2040.8'
2-S. Sw.
2-Sig.
Sig. 561
Br. B-57, 30"x164'
R.C.P.
Sig. 562
Rd. Xing 2-56.0C
Br. D-56, 2'x2'x152.3' Tr. T. Bx.
Pr. Rd. Xing
Br. C-56, 3'x2'x98.8' Tr. T. Bx.
Dble. Sig. 553
Sig. 556
Depot
W. T.
SUMMIT
M.P. 55.9, Y.
Br. B-56, 30"x15' C.P.; N. end,
30"x137' Vit. P. - S. end
Br. A-56, 4'x1.5'x197.9' C. Ar.
Sig. 551
W.B.
E.B.

Summit ca. 1950, David P. Morgan Library photo

Train 23 passes a UP freight at Summit, late 1940s.

Malcolm Gaddis photo




SUMMIT
Westward signals
Eastward signals
SIG 562
(DWARF)
SIG 561
SIG 556
(DWARF)
SIG 553
(DWARF)
SIG 551
(DWARF)
SIG 542
SIG 564
TRAIN SIGN
ENGINE TRACK
EASTWARD MAIN LINE
EASTWARD SIDING
WESTWARD
WESTWARD
STOCK TRACK
MAIN LINE
SIDING
Heading-out pots
Heading-out pot
561
562
556
553
542
UNSIG

Signal 561 (N&G) and TRAIN sign (David Haines).


Thanks for your attention, and I'll be happy to answer questions.
3243
3243
Cantilever Signals 741 and 742 in 1951. Don Sims photo