

The Sentinel



A QUARTERLY MAGAZINE PUBLISHED BY THE BALTIMORE & OHIO RAILROAD HISTORICAL SOCIETY

\$8.00

VOLUME 46, NUMBER 4

FOURTH QUARTER 2024



President's Report to Members

Fellow Members:

Welcome to the Fall season where days are getting shorter and cooler. It is also a very busy time for most of us, so here's what's up for the next three months. The annual convention in St. Louis will be completed by the time you get this issue. The 2025 convention will be in Martinsburg West Virginia in early October. We are reviewing the contract for the hotel, and bus companies have already been contacted for pricing. The Annual Model Train Flea Market at world headquarters will be Saturday, November 23rd. Our model train holiday display will be December 14th in the Denton Auditorium at World Headquarters.

We have now established a relationship with a new web provider. A new website will be developed with many of the functions you the membership have requested. This site will have online payment for new and renewal memberships and company store orders. Travers Stavac, Craig Close, and Chris Winslow have spent many hours getting the details worked out for the site; hopefully it will be up and running next year.

The new storage building is moving along under the direction of the society's board. We have established contact with a contractor and met twice to explain expectations and construction requirements. Drawings and a quote for the shell construction should be in our hands by September 19th. If everything goes well, we will begin construction in the Fall.

Membership has been a constant discussion amongst the board. We have begun to do outreach at shows to recruit new

members. At the RPM meet in St. Louis, board member Nick Fry signed six new members, and at an Ohio train show board member John Howard signed up two new members. I will be at the Great Scale Train Show in Timonium Maryland on October 12th and 13th. If you can help, let me know. As members of the society we need to sell the benefits of being a member, and recruit new members for the future. If there is a community function, set up a table to show the history of the B&O, and the membership benefits of belonging to B&ORHS. I would like our goal for the society, meaning every member, to recruit annually between 20 to 25 new members.

Publications are progressing with Henry Freeman working on the 2026 and 2027 calendars. Nick Fry, author of the St. Louis Division book, should have it ready for delivery by the first of the year. Work responsibilities have overwhelmed Nick's time, but he is close to finishing. We retrieved the research material for the dining-car book from Joe Nevin's family, and material is being reviewed by a potential new author—more to come on this book. Dale Corn is working on a second Baltimore book covering the final decades before CSX dissolved the B&O in 1987. The second Baltimore book will be a 2027 release.

Since I last wrote to you we have received several large estates including artifacts, books, documents, and model trains. These large contributions have overwhelmed our means of storage. Shortly, Andy White will be sending an email list

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The official publication of
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 RAILROAD HISTORICAL SOCIETY**
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The Baltimore and Ohio Historical Society is a nonprofit corporation dedicated to preserving and disseminating historical information about The Baltimore and Ohio Railroad.

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FRONT COVER: Sentinel Service M-55c 466036, last reweighed at Mount Clare in March 1949, and M-55c 466377, Cumberland Maryland, circa 1949. (B&ORHS Archives)



B&O M-55C 466032 built in August 1945 and last repacked on March 11, 1947, New Orleans, Louisiana, 1947.

(Elliott Kahn photograph, B&O RHS Archives)

Sentinel Service

Siding to Siding Dependability

By Brian Rochon

Introduction

Today, detailed information is routinely expected concerning when products we have ordered will arrive and where they are on their journey to our homes and businesses. In the days before Global Positioning System tracking data, radio frequency identification tags, digital computers, and the Internet, however, the availability of such data was difficult to imagine. And the idea of a railroad providing their customers with this level of service could be considered revolutionary.

After the end of World War II, the Baltimore and Ohio Railroad (B&O) was looking for ways to win new freight business. The New York Central Railroad had introduced their Pacemaker Service for less-than-carload (LCL) freight in 1946, with two trains daily between Buffalo and New York City, while the Pennsylvania

Railroad began advertising its Merchandise Service for LCL freight by applying a banner paint scheme to many box cars starting in 1947. Although the B&O did not rename its own LCL program known as Time-Saver service until March 1950, they introduced what they termed “a revolutionary new method of handling carload freight” with their Sentinel Service on March 3, 1947.

The Sentinel Service came about as a result of a survey the B&O conducted prior to World War II, which noted “what the majority of shippers wanted most was more definite assurance of when cars would actually be picked up from their sidings or team tracks and delivered on the sidings of consignees.” Of equal importance, was a means of notifying shippers when shipments were delayed. A detailed system was developed “whereby a shipment leaving originating

siding at a certain time and date will be delivered at the destination siding not later than a specified time of a certain day.”

Planning for the new service began immediately after the war, and trial service between three seaboard and seventeen interior cities began in June 1946. By the end of 1946 the Traffic Department was ready to provide shippers with traffic plans.

Putting the Pieces Together

The principal components of the system were 1) the Sentinel Service (SX) Operating Manual (available from the Company Store as Item 75106), 2) B&O Blue Books of Sentinel Service for principal cities, 3) Personalized Traffic Plans and, 4) Automatic Records.

SX was the code adopted to identify Sentinel Service to B&O personnel. It was also the Morse code symbol for dollars.

The SX Operating Manual contained general instructions for the service and specific instructions, by terminal, for both eastward and westward service as well as placement schedules. The instructions included commodity and lading restrictions, assembling and dispatchment, tonnage restrictions, and reporting requirements.

The Blue Books were prepared for each principal city served, and distributed to regular B&O shippers and receivers by B&O freight representatives. Each edition included a listing of all local B&O freight station agents and other points of contact, a full-page facilities map for the city, a list of terminal facilities, team tracks, specialized facilities (e.g., automobile unloading). They also established cutoff times for shippers, placement times at public and private facilities in destination Sentinel cities, and placement times at interchanges for interline and switched business. The books were bound in loose-leaf form, allowing the easy insertion of new or supplemental information.

The B&O Blue Books were directories for use by both online and offline customers. They contained information regarding public facilities, interchange points, maps, schedules, and traffic plans prepared by B&O representatives. Placement schedules were given for all of the facilities shown on the maps and the total transit time from the siding to the public facility or interchange point was listed. Every Sentinel City and B&O Gateway was described in detail.

Sentinel Service origins and destinations with DAY-DELIVERY SCHEDULE

TO FROM	Akron, O.	Baltimore, Md.	Buffalo, N. Y.	C-S-D* Cherry Run, W. Va.	Chicago, Ill.	Chillicothe, O.	Cincinnati, O.	Clarksburg, W. Va.	Cleveland, O.	Columbus, O.	Connersville, Ind.	Dayton, O.	Decatur, Ill.	East St. Louis, Ill.	Fairmont, W. Va.	Hamilton, O.	Huntington, W. Va.	Indianapolis, Ind.	Lima, O.	Louisville, Ky.	Newark, O.	New York, N. Y.	Parkersburg, W. Va.	Philadelphia, Pa.	Pittsburgh, Pa.	Potomac Yard, Va.	Rochester, N. Y.	Springfield, Ill.	St. Louis, Mo.	Toledo, O.	Washington, D. C.	Wheeling, W. Va.	Wilmington, Del.	Youngstown, O.	
Akron, O.		3	3	2	2												3					3	3	2	3	3	3	3	3	3	3	3	3	3	3
Baltimore, Md.	2		3		3	3	3	2	2	3	3	3	3	3	2	3	3	3	3	3	3	1	2	1	2	1	3	3	3	3	1	2	1	2	
Buffalo, N. Y.	2	3			3	3	3	2	3					4			3		3	3	3	3	3	2	3	3	4	4	3	2	3	2	2		
C-S-D* Cherry Run, W. Va.	1				2	2	2	1	1	2	2	2	2	1	2	2	2	2	2	2	2	1	1	1	1	1	4	4	2	2	2	2	2	2	
Chicago, Ill.	2	3	3	2				2	3	2		2					2	3	2	2	2	3	3	2	3	3	3	3	3	3	3	3	3	3	2
Chillicothe, O.	3	3	2					2				2	3	2			2	2	2	2	2	3	3	3	3	3	4	4	2	2	2	3	3	3	
Cincinnati, O.	3	3	2	2	1	2				1	1	1	1	2	1	2	1	1	1	1	3	2	3	2	3	3	3	1	2	1	3	2	3	3	
Clarksburg, W. Va.	3	3	2	3	2			2						3						2	3	3	2	3	3	3	3	3	3	3	3	3	1		
Cleveland, O.	3	2	2														3				3	3	3	3	3	3	3	3	2	3	3	3	3	3	
Columbus, O.	3	2	2											2			3				3	3	3	3	3	3	3	2	3	3	3	3	3	3	
Connersville, Ind.	3	2			1										1						3	3	3	3	3	3	3	2	2	2	3	3	3	3	
Dayton, O.	3	2	2		1									3			3			2	3	3	3	3	3	3	3	1	3	1	3	3	3		
Decatur, Ill.	3	2		2	1								1					1	3	1		3	3	3	3	3	3	3	3	3	3	3	3	3	
East St. Louis, Ill.	3	3	2		2	1	3	2										1	3	2	2	3	2	3	3	3	3	3	3	3	3	3	3	3	
Fairmont, W. Va.	3	1													2	3					3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Hamilton, O.	3	2	3	1										3			3			2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Huntington, W. Va.	3	3	3	2	3	2	2	2	3	2	2	2	3	2			3	2	2	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Indianapolis, Ind.	3	2			1								1	1			1	3			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Lima, O.	3	2	2	1										3						2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Louisville, Ky.	3	3	2		1	3		2									2	3	2	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Newark, O.	3	3	2	2	1										2					2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
New York, N. Y.	2	1			3	3	3	2	2	3	3	3	3	3	2	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Parkersburg, W. Va.	2	3	1	3	2									2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Philadelphia, Pa.	2	1	3		3	3	3	2	2	3	3	3	3	2	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Pittsburgh, Pa.	1	2	2	1	2			2	2	1	2			3			2			2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Potomac Yard, Va.	2	1	3		3	3	3	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Rochester, N. Y.	2	3			3	3	2	3						4			3			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Springfield, Ill.	3	3	4	2	2	1	3	2	1					1	3	1	2	1	2	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
St. Louis, Mo.	3	3	2		2	1	3	2									2	3	2	2	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Toledo, O.	2	3	2		1	2								1	2		1	3	1	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Washington, D. C.	2	1	3		3	3	3	2	2	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Wheeling, W. Va.	3	2	1	2	2	1	1							3			2			2	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Wilmington, Del.	2	1			3	3	3	2	2	3				3	3	2				3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
Youngstown, O.	3	3	2	2													3				3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

*Central States Dispatch Route, serving Eastern Pennsylvania, Delaware, New Jersey, New York State and New England via Cherry Run, W. Va., Gateway.
†Camden District only—other districts one day longer.

Today, 32 cities (with more than 600 point of origin to destination services) are served directly by Sentinel Service. The chart shows the road

schedules between Sentinel cities. Cut-off and latest placement times are available from B&O representatives. Ask our man!

Sentinel Service origins and destinations with day-delivery schedule, B&O Carload Freight brochure, September 1953. As an example, a car originating in Baltimore would arrive on the appropriate siding in Chicago within three days. (B&O RHS Archives)



Supervision of Sentinel Service—the most important element of its operation—is centered at the Sentinel Service bureau in the office of the general superintendent of transportation at Baltimore, Maryland.



The automatic records bureau at Baltimore disseminates vital information to the separate traffic offices.

(Both images: Railway Age, November 8, 1947, courtesy of Jim Mischke)

SX

GENERAL INSTRUCTIONS

To maintain the published service appearing in the B&O Blue Book of Sentinel Service distributed to our patrons, there will be no deviation from the following instructions unless authorized by General Superintendent Transportation.

1. APPLICATION OF SX SERVICE

Specific instructions for each city where SX service is in effect are contained in this manual. The instructions for each originating city include the destination cities and gateways where SX service applies. The instructions for each terminal show the handling and reporting of SX cars.

2. COMMODITY AND LADING RESTRICTIONS

A. All carloads from and to the cities specified will receive SX service, except those loaded with the following commodities:

Brick	*Grain for export	Scrap paper
Coal, coke, ore	Lumber in open-top cars	Sewer pipe
Company material	Sand	Tile
Crushed stone	Scrap iron.	

* When instructed by General Superintendent Transportation will be given SX service.

B. Double loads of any SX commodity will be handled in SX service only after being carefully inspected by car inspectors and pronounced by car foreman to be safe for movement. The officer in charge of terminals will notify the Division Superintendent when there are such SX cars to be moved and in what train they will be handled.

C. Open top or flat cars where lading is held with stakes are handled in SX service providing the cars have been properly passed by the inspectors and pronounced by the car foreman as safe to handle.

D. Cars of weak construction will be handled in SX service only after careful inspection by car inspectors and pronounced by car foreman to be safe for movement. If necessary, such cars will be handled on the rear end. The officer in charge of terminals will notify the Division Superintendent when there are such SX cars to be moved and in what trains they will be handled.

E. Triple loads of an SX commodity will not be handled in SX service.

3. SX CAR IDENTIFICATION

Where SX service is in effect, the following will apply:

A. Cars loaded in cities and entitled to SX service as defined in Items 1 and 2 will be identified by the Agent or Clerk attaching a red sticker Form 39-Q to the waybill. In addition, a rubber stamp impression will be made at the top of the waybill indicating "SX—Train—Date."

B. Cars received from connections and entitled to SX service as defined in Items 1 and 2 will be identified by the Yardmaster, Agent or Clerk attaching a red sticker Form 39-Q to the waybill. In addition, a rubber stamp impression will be made at the top of the waybill indicating "SX—Train—Date."

C. The symbol SX will be shown before the initials of each SX car on wheel report, Form 2533 Revised.

4. ASSEMBLING, DISPATCHMENT AND PLACEMENT

A. Switching and assembling of SX cars from private sidings, public facilities and interchange points for dispatchment is covered by cut-off times effective at each originating terminal.

B. Dispatchment of SX cars will be confined to the scheduled trains specified in the instructions for each city and terminal.

C. Placement of SX cars is covered by terminal placement schedules in effect at destination terminals.

(1) For public facilities and interchange points, placement will be made not later than scheduled time.

(2) For private consignments, placement will be made as ordered by Agent or consignee.

5. TONNAGE RESTRICTIONS

SX cars will not be cut out at terminals due to tonnage restrictions; if necessary these scheduled trains will be doubleheaded, assisted by helper engines or additional sections operated.

6. REPORTING SX DISPATCHMENTS AND PLACEMENTS

A. Instructions for reporting SX dispatchments and placements are incorporated under Item 6 of each individual terminal instructions.

B. In addition, each terminal will submit daily "Sentinel Service Cars" report to General Superintendent Transportation.

C. If any discrepancy occurs in the number of SX cars reported on consist and those actually received, the Terminal Superintendent, Terminal Trainmaster or General Yardmaster must account for them in making all reports.

First page of Sentinel Service (SX) Operating Manual General Instructions, June 1946. Only a few commodities were excluded from Sentinel Service. Sentinel Service cars would not be cut out due to tonnage restrictions. (B&O RHS Archives)

The terminal maps showed the various public facilities such as automobile loading and unloading, team tracks, foreign, intra-coastal, coastwise, and perishable deliveries as well as specialized facilities including interchange points, cranes and hoists, grain elevators, and warehouses. All of these facilities were keyed to the latest placement times, allowing customers to know when their shipment would be delivered.

Individual consignors and consignees received customized Traffic Plans covering

their recurring inbound and/or outbound shipments. The plans specified the day and hour that the shipper needed to have their carload ready at their own siding or team track and the exact day and hour that it would be placed on the destination siding. The total transit time, in days, was specified to each location served.

Personalized Traffic Plans provided customers with definitive schedules of transportation time for inbound and outbound traffic. Cut-off times were specified for each

location, allowing customers to know when their loads had to be available for pick up. Shippers could have the names of their consignees in other cities inserted into their Blue Book. Consignors in other cities were handled in the same fashion, allowing B&O representatives to provide each customer with their own private schedule.

Putting the System into Motion

Shippers and consignees received automatic and immediate notification of any interruption to the traffic plan.

Automatic Records provided constant surveillance over Sentinel cars, with the failure of any car to move according to schedule being immediately noted and reported to both the points of origin and destination. When the car was dispatched again, both the shipper and the receiver were promptly notified.

As a train was made up in an origin yard, the waybills were sorted in the yard office and carload shipments eligible for Sentinel Service were tagged with a prominent sticker. When the train was dispatched, a teletype message was sent with each Sentinel Service car receiving an "SX" suffix. The message was sent to Baltimore, to the next point where the train will enter a yard, to the traffic department responsible for the origin point, and to any other interested parties.

The message saved time at reclassification points by providing the yard personnel with the numbers and destinations of the cars, allowing them to determine, in advance, the makeup of the outgoing trains.

If an SX car was not in the particular train which it needed to be in order to arrive at its destination on time, the yardmaster was required to notify the central Sentinel record in Baltimore, by wire or teletype, of the delay, the expected duration, and the cause. Baltimore would then notify the traffic offices serving the consignor and the consignee. A wire or telephone call would inform the parties of the delay.

Signal X-3 telegraphic reports covered cars that had been cut out and had failed to meet required schedules at terminals. Signal X-4 reports covered failures in placement. These reports were directed to the Vice President Operations, C.W. Van Horn.

Certain commodities were excluded from Sentinel Service, including: brick,

7. HANDLING AND REPORTING SX SERVICE FAILURES

If an SX car fails to make scheduled movement account of:

- A. Mechanical defects
- B. Late connections
- C. Other reasons

telegraphic report Signal X-3, Form 2681-C Rev., will be made immediately to General Superintendent Transportation, Superintendent and others concerned, showing:

Train	*Car initials and number	Consignee
Date	Lading	Destination
Station	Consignor	Point cut out
Report number	Origin	Scheduled train missed and cause

* Sentinel cars will be prefixed by symbol SX

When such delayed SX cars are again dispatched, Signal X-3 will be completed and immediately telegraphed to General Superintendent Transportation, Superintendent and others concerned, showing:

Report number	Station
Date	Train dispatched

- A. SX cars cut out on line of road or within terminals for mechanical defects will be handled and reported as follows:
 - (1) Line of road—Superintendent will arrange to have cars repaired and moved on first SX scheduled train. Superintendent will wire Signal X-3, Form 2681-C Rev., to General Superintendent Transportation and others concerned.
 - (2) Terminals—Terminal Trainmaster or General Yardmaster will arrange to have cars repaired and dispatched on first SX scheduled train. Terminal Trainmaster or General Yardmaster will wire Signal X-3, Form 2681-C Rev., to Division Superintendent, General Superintendent Transportation and others concerned.
 - (3) If an SX car cannot be repaired it will be the responsibility of the car foreman to see that the property is transferred no later than the following:
 - 24 hours—for perishables, L.C.L. merchandise, livestock and live poultry.
 - 48 hours—for other SX commodities.
- B. SX cars received late from connections or not available at cut-off times will be handled and reported as follows:
 - (1) At originating terminals scheduled trains handling SX cars will not be held in excess of thirty minutes.
 - (2) At intermediate terminals dispatchment of scheduled trains handling SX cars awaiting connections will be governed by specific instructions of General Superintendent Transportation.
- C. SX cars not making scheduled movement account of train accidents, track obstructions or for any other reason on line of road or within terminals will be handled and reported as follows:
 - (1) Line of road—Superintendent will take whatever action is necessary to expedite the movement of SX cars and will immediately wire Signal X-3, Form 2681-C Rev., showing failure; when such SX cars are dispatched, Signal X-3 will be completed.
 - (2) Terminals—Terminal Trainmaster or General Yardmaster will take whatever action is necessary to expedite the movement of SX cars and will immediately wire Signal X-3, Form 2681-C Rev., showing failure; when such SX cars are dispatched, Signal X-3 will be completed.

8. EXCESSIVE DIMENSIONS

SX cars of excessive dimensions from and to cities receiving SX service will be handled in accordance with instructions of General Superintendent Transportation.

- A. When SX cars of excessive dimensions cannot be dispatched from a terminal via the normal route, but can be handled via the regular established high car route as shown in clearance chart, the Terminal Trainmaster or General Yardmaster will wire Signal X-3, Form 2681-C Rev., to General Superintendent Transportation and others concerned showing the re-routing and dispatchment.
- B. When SX cars of excessive dimensions are cut out at terminals for special re-routing instructions from the General Superintendent Transportation, the Terminal Trainmaster or General Yardmaster will wire Signal X-3, Form 2681-C Rev., to General Superintendent Transportation and others concerned, and when such SX cars are dispatched, Signal X-3 will be completed.

9. STOP-OFF AND RECONSIGNED CARS

- A. Cars destined to an SX city will be given SX service and stop-off privileges, provided the first stop-off point is an SX city. After stop-off has been effected, SX sticker, Form 39-Q, will be removed from waybill and the rubber stamp impression obliterated.
- B. Cars destined to an SX city with stop-off privileges enroute at a point not covered by SX service, will not be considered SX cars.
- C. Cars destined to an SX city reconsigned enroute to another SX city, will be continued through in SX service.
- D. Cars destined to a city not receiving SX service, reconsigned enroute to an SX city, will receive SX service from the reconsignment point through to destination. At the reconsignment point, the Yardmaster will identify the waybill as called for in Item 3 above.
- E. Cars destined to an SX city, reconsigned enroute to a city not covered by SX service will not be considered as an SX car. At the reconsignment point the SX sticker, Form 39-Q, will be removed from waybill and the rubber stamp impression obliterated.

10. LIVESTOCK

Detailed instructions for the handling of livestock in SX service will be found in this manual under the specific instructions for terminals at which livestock is handled.

11. DISTRIBUTION OF INSTRUCTION SHEETS

- As SX service is extended to additional cities, or revisions are made, the following will govern:
 - A. When instruction sheets for new SX cities are distributed to the Superintendents, it will be their responsibility to see that a copy is placed in the hands of each division and terminal officer and employee responsible for the direction of any phase of SX service under their jurisdiction and to know that same is understood and receipt is acknowledged.
 - B. Revised instruction sheets will be forwarded to the Superintendents from time to time. On receipt of the revised instructions, the old sheets are to be initialed and forwarded to the Superintendent's office, and it will be his responsibility to know that the revised instructions are understood.

12. RESPONSIBILITY

The division, terminal and other employees engaged in train operation are charged with the responsibility of maintaining the SX service and complying with the instructions contained in the SX Operating Manual.

Second page of Sentinel Service (SX) Operating Manual General Instructions, June 1946 listing how service failures were to be handled and reported.

(B&O RHS Archives)

coal, coke, company material, crushed stone, grain for export (the General Superintendent Transportation could make exceptions), lumber in open-top cars, ore, sand, scrap iron, scrap paper, sewer pipe, and tile. Of course, the service was provided at regular tariff rates.

Implementation

The service initially served 31 locations, although additional cities were added later. Cherry Run, West Virginia served as the

gateway to points in eastern Pennsylvania, New Jersey, Delaware, New York state, and New England as part of the B&O's Central States Dispatch Route. The New York District, Huntington, West Virginia, and Springfield, Illinois were added, effective March 20, 1950.

At Cherry Run, the B&O linked to their Central States Dispatch (CSD) Route. The CSD coordinated the routes and functions of several railroads linking the northeastern U.S. with all points served by the B&O.

The CSD provided shippers on the Pacific Coast, Northwest, Southwest and Midwest with access to the markets and ports of the Northeast via the B&O gateways in Chicago, St. Louis, and Springfield, Illinois. Similarly, shippers in the Northeast and Mid-Atlantic were provided access to the west.

All of this additional service resulted in increased costs for the railroad. A September 1947 memo to President Roy B. White estimated these at \$1,172,574 per year including:

- \$860,208 per year for extra yard engine hours
- Switching Sentinel cars separately from other cars to assure dispatchment on scheduled trains in priority over non-Sentinel cars
- Switching Sentinel cars to avoid overloading scheduled trains, giving preference to Sentinel cars
- Switching bad order Sentinel cars to and from repair tracks to avoid unnecessary delays
- Change in placement times requiring additional yard engine hours
- Special handling of Sentinel cars from one yard to another in the same terminal to expedite dispatching on scheduled trains
- Special handling of delayed Sentinel cars for placement to keep within assigned placement time
- \$200,052 per year for double-heading trains to avoid reducing tonnage and causing a delay to Sentinel cars
- \$82,740 per year for operating additional trains to maintain Sentinel schedules when regular connections were missed due to late arrivals
- \$26,238 per year for additional clerical help and
- \$3,336 per year for overtime expended in making repairs to Sentinel cars