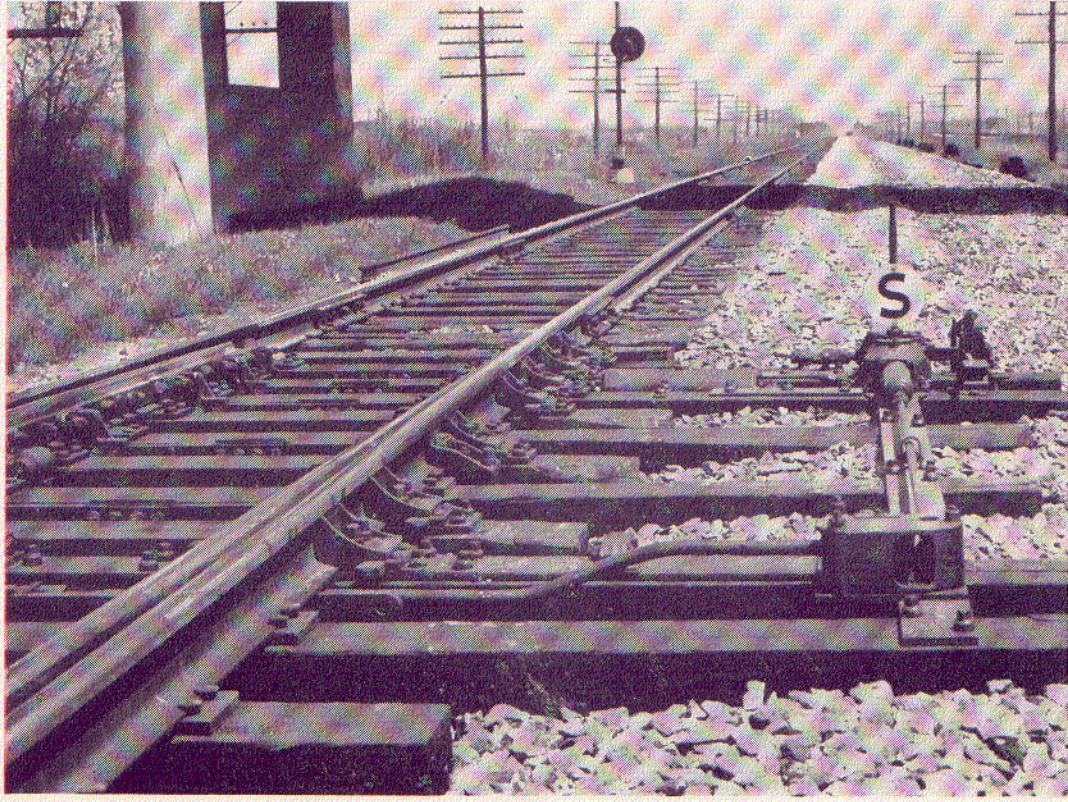


New end-of-double-track switch at UR, showing, in the background, ballast of second main track that was removed

Faster and longer trains and changes in traffic and train movements permit more efficient and economical operation by signal indication on single track, using long sidings

Why the Erie Has Converted 57 Miles of Double Track to Single Track

Out of 65.7 miles of line between Buffalo and River Junction, N. Y., the Erie has converted 56.7 miles from conventional double track to single track with a traffic control system. River Junction is 358 miles from Jersey City, on the Erie's main line between that point and Chicago.

The 65.7-mile line, branching off at River Junction and terminating at Buffalo, has been double track for years. Within the past 10 years, traffic has gradually decreased in this Buffalo-River Junction territory, and at the same time the character of through freight moving between Buffalo and points east has changed, so that traffic is now handled more efficiently in long trains, hauled at increased average speeds by diesel-electric locomotives, rather than in shorter trains by steam locomotives. Recently passenger train service on the Buffalo-River Junction territory was discontinued. These changes reduced the number of trains, as well as the time of trains enroute.

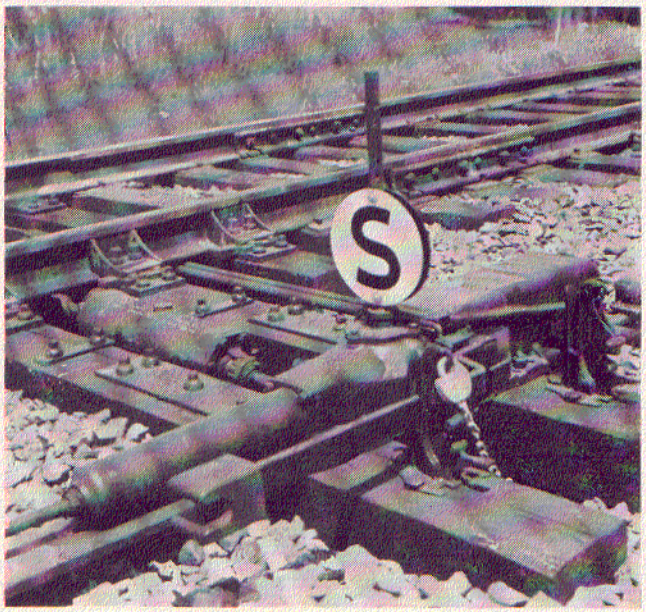
All these considerations led to the decision to change the line over from double track to single track. The incentive to act in 1951 was the immediate need elsewhere for the rail and ties to be removed, as well as to reduce track maintenance expenses. For the project as a whole, the retirements included 47.5 miles of second main track, 2.7 miles of sidings and 17 turnouts. The rail removed included 21.27 miles of 110-lb. laid in 1926-27-28; about 24.37 miles of 112-lb. laid in 1941-48, inclusive; 1.1 miles of 115-lb. laid in 1948; and 0.85 miles of 132-lb. laid in 1949. Roughly 110,000 ties, in condition for reuse in main track, were salvaged. The total salvage value is approximately $575,300, and the expense of the operation is about $136,200, leaving a net salvage of $439,100. The estimated cost of changing the turnouts and other track changes is $37,570, and of the signal changes and additions is $463,347, totaling $500,920. Thus, the salvage of rail and ties paid all but about $62,000 of the entire project cost. The estimated reduction in track maintenance expense is $92,000 annually.

Characteristics of the Line

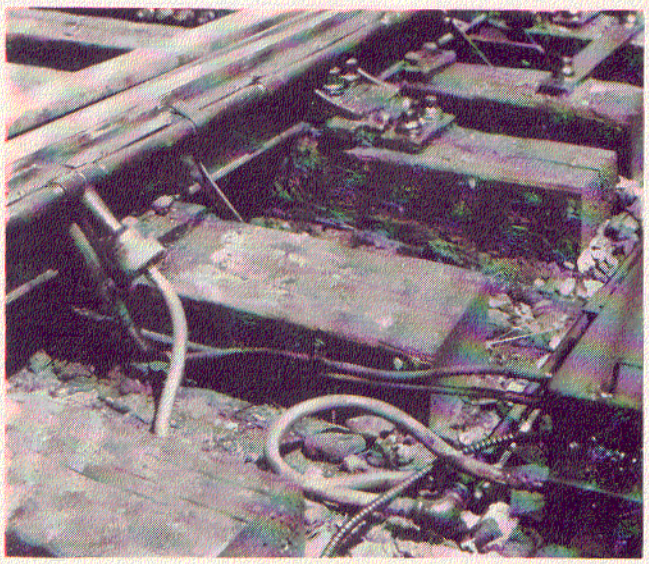
In general, the grade of the line ascends eastward at rates varying up to 0.66 per cent for about 21 miles from "UR" (Union Road) to a point near Darien Center. Then the grade descends for a few miles to Attica, whence there is a grade of 0.75 to 0.94 per cent ascending eastward for about 5 miles. From there on east, the grade is rolling.

When making the changeover, the double-track main line was not disturbed from Buffalo out through the terminal and yard area for 5.8 miles to a new end of double track at "UR" (Union Road) from which point the new single-track line extends eastward. At the east end of the project, double track was left in service for 3.4 miles west from River Junction to Portage, which is the new end of double track. Thus from Portage to Union Road, there is now 56.7 miles of single main track, replacing the double track.

Three scheduled manifest through trains are operated each way daily on this line, but their schedules are such that there are no meets in the Union Road-Portage section. When traffic is heavy, one or two extra trains are operated each way daily. There is a local freight each way



Each spring switch layout includes a new hand-throw mechanism with an oil buffer spring device



Remotely controlled gas-fired switch heaters prevent snow from accumulating and blocking the switches

daily except Sunday. In all, from 6 to a maximum of about 12 trains are operated daily.

A study of train operations indicated an average of about 45 meets per month between opposing trains in this 56.88 miles, an average of about 1.5 meets daily. Further investigation led to the conclusion that there should be two sidings in this territory; and these were formed merely by leaving the second track in place and by installing turnouts to connect to the single main track.

The six manifest freight trains are scheduled to make no meets in the Union Road-Portage territory. Therefore, under normal circumstances, the only trains which take siding are extras and the local freights. Under these circumstances it was decided not to use power switch machines, thereby reducing the cost of equipment for the project. Spring switches, with Pettibone-Mulliken oil buffers, and Union Switch & Signal Style S-21 mechanical facing-point locks were installed at the ends of double track and at the west end of each siding. U.S.&S. Style T-21 switch stands and electric locks were installed at the east ends of the two sidings. At these two switches, derails at the clearance points are pipe-connected to the T-21 switch stands. At the ends of double track and at the ends of sidings, new searchlight signals were installed at locations shown in the track and signal diagram Fig. 1.

The new traffic control system between Union Road and Portage is controlled from a machine in the dispatcher's office at Buffalo. This machine includes levers for controlling signals at the two ends of the two sidings and at the two ends of double track at Union Road and Portage. On the dispatcher's machine there is also a lever corresponding with each of the six switches at the sidings and ends of double track. When establishing control for a signal to direct a train to enter or leave a siding, the switch lever, as well as the signal lever, is thrown to establish outgoing control codes. At the field station, the code established by the position of the switch lever controls a relay that determines the selection between signals. Other levers on this machine control the release of electric locks on hand-throw switches. At the ends of double track, at Union Road and Portage, the spring switches are normally set to route trains from the single track to the right-hand main. A train in the opposite direction approaching on the right-hand main track trails out through the spring switch to the single track. Thus, for trains in either direction, no stop is required to throw switches at these locations.

How a Train Is Put on a Siding

Fig. 2 shows the layout of track and signals at the siding at Alden. When a westbound train, for example, is to be directed to enter this siding, the dispatcher in Buffalo positions his levers and sends out a control that causes westward station-entering signal L44 to display red in each of the two upper units and the letter "S" to be illuminated white in the bottom unit. This same control also causes the signal in approach, 402-1B, to display the Approach aspect, yellow. The "S" unit consists of a cast-iron lamp body with a ground-glass cover, 14 in. in diameter. This unit is normally dark. When the proper control is received from the dispatcher, the letter "S" appears with a white background, on the ground glass cover.

When the train arrives and stops short of signal L44, the head brakeman operates the T-21 hand-throw stand to reverse the switch. Then the letter "S" is extinguished, and the signal displays red-over-yellow, which authorizes the train to enter the siding. After the rear end is in the clear, the rear brakeman places the switch "normal."

When the dispatcher is ready for the westward train on the siding at Alden to depart, he sets his levers and sends out a C.T.C. control which causes the leave-siding dwarf signal, LD48, to display a proceed aspect. The train then trails out through the spring switch without stopping for a trainman to operate the switch stand. As the rear of the train passes through the switch, it is restored automatically to its normal position.

Ordinarily the dispatcher would put westbound, rather than eastbound, trains on siding. However, if need be, he can control the eastbound station-entering signal to direct an eastbound train to enter the west end of a siding. For example, as shown in Fig. 3, the dispatcher sends out a control to cause eastward signal R48 to display red in each of the two upper units, and letter "S" illuminated white in the bottom unit. When the train arrives and the head brakeman throws the switch, the

letter "S" is extinguished, and the signal displays red-over-yellow to direct an eastbound train to enter the Alden siding. When the dispatcher is ready for this eastbound train to depart from the siding, he sets his levers and sends out a control that causes eastbound leave-siding signal RD44 to display red over an illuminated "S" and also effects a release of the electric lock on the hand-throw switch stand. The aspect of the red over "S" authorizes the head brakeman to go to the switch and reverse it, which operation also removes the pipe-connected derail from the track. When the signal displays red over yellow, the train pulls out on the main track and stops to wait for the brakeman to place the switch normal. Ordinarily this operation would be used only for the local freight train or a work train.

This new traffic-control single-track territory includes 23 hand-throw main-track switches leading to house tracks and industry spurs. At each of these switches, there is a manually operated switch-and-lock movement. On each switch stand, there is an electric lock which locks the lever in the normal position. At the clearance point on each of these turnouts to spurs there is a Hayes derail which is pipe-connected to the switch stand at the switch. Short track circuits, about 150 feet long, extend in either direction on the main line from each switch. These circuits enter into the control of the release of the electric lock. Also, the release is controlled by trains on approaching sections of main track in a manner similar to approach locking at interlocking.

Near each of these switches there is a telephone box and a short pipe mast with an indicator and a key controller. Before using one of these switches the conductor of a train must use the telephone to get permission from the dispatcher. When the indicator shows Stop, and the dispatcher has given permission to use the switch with the approach occupied, the conductor inserts his switch key in the key controller and turns it to the right. This initiates a six-minute automatic time release. After this interval the lock is released.

In order to keep the switches clear of snow, gas-fired heaters, remotely controlled from the dispatcher's office as part of the traffic control system, were installed at the switches at the ends of double track and the ends of sidings. These heaters, and the control equipment for lighting them, were furnished by the Rails Company, New Haven, Conn.

This traffic control system project was planned and constructed by signal forces of the Erie, under the direction of W. S. Storms, signal engineer. The major items of signaling equipment were furnished by the Union Switch & Signal Division of Westinghouse Air Brake Company.

Fig. 1

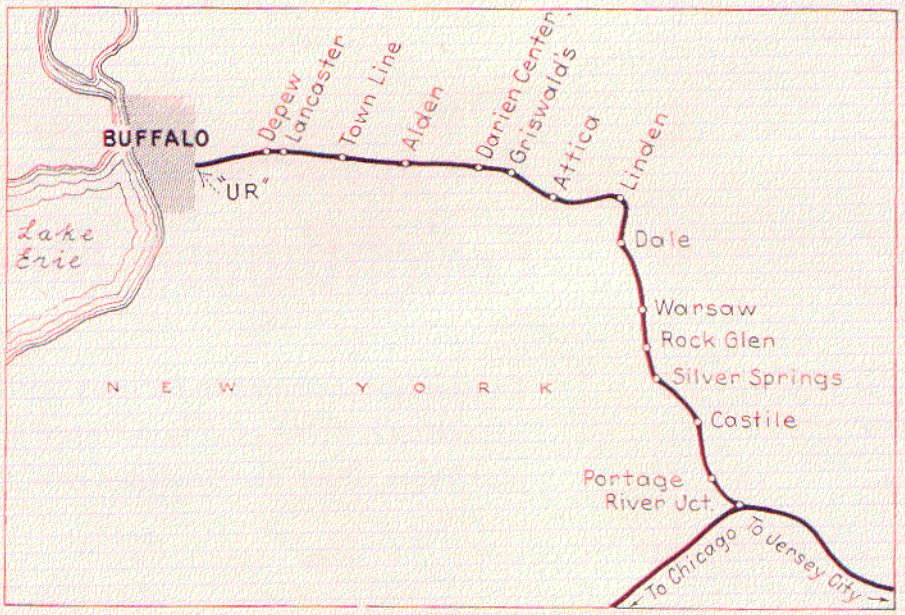


Fig. 1—Map of territory between Buffalo and Portage

Fig. 2—Signaling at sidings and ends of double track

Fig. 3—Signaling at Alden Siding

Fig. 2

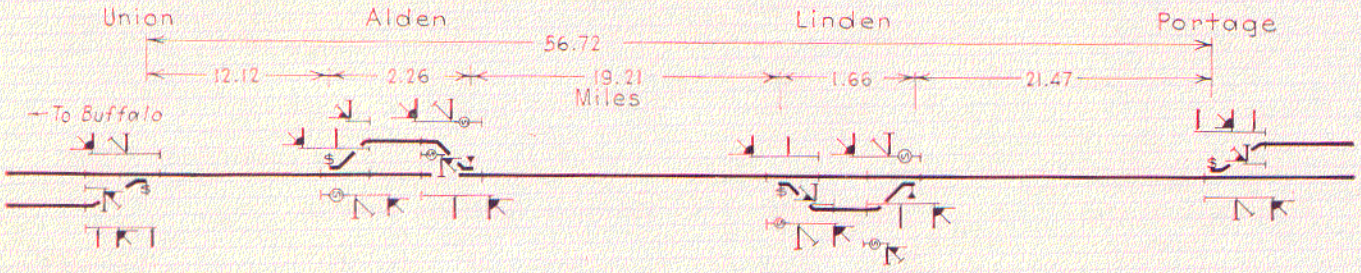


Fig. 3