Improved Protection at Seven Crossings

On the Chicago & North Western at Oshkosh, Wis., where manual gates have been replaced by electric short-arm gates, flashing-light signals and "No-Right-Turn" signs which are normally controlled automatically, with part-time manual supervision

MORE COMPLETE PROTECTION, with automatic control, has been placed in service at seven grade crossings in Oshkosh, Wis., on the Chicago & North Western. Here the double-track, main line runs through residential and commercial sections of the city. Washington street is the principal thorofare, and the other six streets carry normal city traffic. The railroad operates 12 passenger trains and six through freight trains daily, as well as two local freights—except Sunday. To serve industries, the switch engine works in this area several hours each day.

Previously, these crossings were protected 24 hours every day by pneumatic gates controlled manually by men in towers. One man controlled the gates at Waugoo and Otter streets, another man controlled the gates at Merritt and Parkway, and one man was on duty at each of the three other streets—Ceape, Washington and Irving. Thus, five men were employed each of three tricks every day of the week.

In the new project, the short-arm gates and flashing-light signals are normally controlled automatically by track circuits. One man is on duty part-time, for supervisory control, which consists of using manual control to clear the gates to let street traffic pass during switching operations when no move over the crossing is imminent. This supervisory control is in effect six days a week for the times 6:10 a.m. to 12:15 p.m. —1:15 p. m. to 3:10 p.m.—4:05 p.m. to 8:05 p.m.—and 9:05 p.m. to 1:05 a.m.

Roadway Each Side of Tracks

Years ago, as the town of Oshkosh grew up on both sides of the C&NW track, a broad street, 100 ft. wide, was provided, with the double-track railroad down the center, and a paved roadway with sidewalk on each side of the tracks. This arrangement is still in effect for 1,250 ft. from Washington street east to Ceape street.

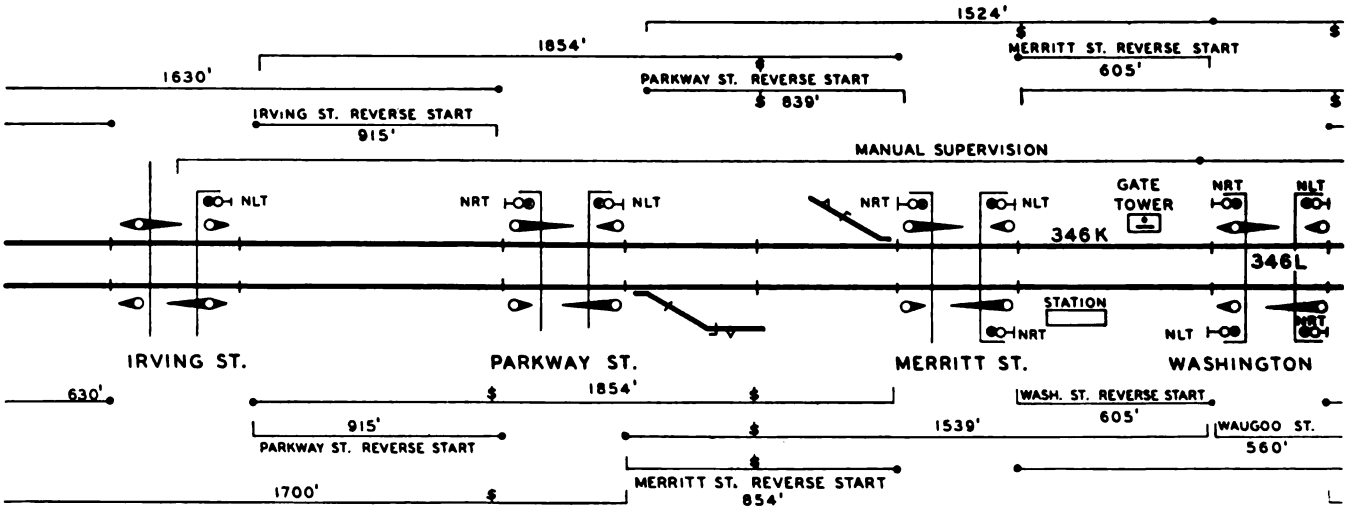
At the crossings in this area, the new gates, with flashing-light signals, are located between the tracks and the paved roadway. Also, for guidance of drivers approaching on the east-west roadways, automatically-controlled signs, reading "No-Left-Turn" or "No-Right-Turn" are located on these roadways approaching each north-and-south cross street. The station is south of the track between Washington and Merritt streets, with platforms on both sides of the tracks extending between these two streets. At the rear of the station, an east-and-west driveway extends between Washington and Merritt streets, so that "No-Left-Turn" and "No-Right-Turn" signs are located at these street crossings. West from Merritt street, Broad street runs west alongside the tracks with a fence on the property line. No street runs along the south side of the tracks in this area.

The gate, in all instances, is at the right of the north-and-south streets, as viewed when approaching the track, and each gate arm is just long enough, when lowered, to extend halfway across the street, thus obstructing the right-hand lane of street traffic approaching the tracks. This leaves the other lane unobstructed to permit automobiles to depart from the crossing. At each crossing the gate mechanism for a street arm also operates a sidewalk arm. A second sidewalk arm on the other side of the street, is operated by a special sidewalk mechanism. A bell is mounted on one of the masts at each crossing.

Normally Controlled Automatically

The track circuit controls are based on 30 m.p.h. maximum train speed. On this double track, trains normally run on the left track. Track circuit controls for normal direction are about 1500 to 1800 ft. long. Train movements against the normal direction of traffic are at slow speed, so that the controls for reverse running are about 560 ft. to 655 ft. long.

When a train enters an approach-control, track section, the flashing-light signals, gate lamps, bell and "No-Right-Turn" signs are operated for a warning period of 5 seconds. Then the gates are released, and are lowered in about 8 to 10 seconds.

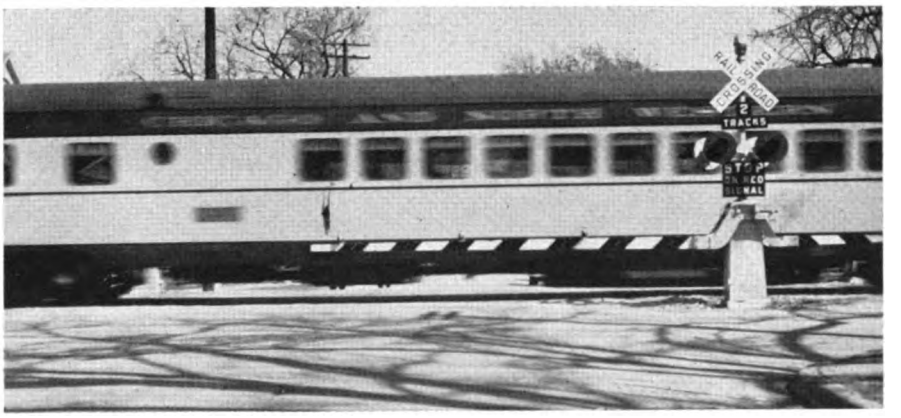


The gates are driven down to 44 degrees. The gates are down a minimum of 10 seconds before a train arrives at the crossing. When the rear of a train clears a crossing, the gates are raised in about 6 to 7 seconds, with 14 volts on the motors.

Eastbound Moves

For a normal eastbound train, when the leading wheels pass the east side of Parkway street, the protection is started in operation at Washington and Waugoo street, and when the leading wheels pass Merritt street, the protection is placed in operation at Otter and Ceape streets. Therefore, when an eastbound passenger train approaches and makes its station stop, with the leading wheels west of Washington street, the gates are down at Washington, Waugoo, Otter and Ceape streets. When the train entered track circuit 346K, between Merritt and Washington streets, a 1 minute 30 second time-element relay started. At the end of this time, and if the train has not started, the gates at Waugoo, Otter and Ceape streets are raised, and the protection is cut out, automatically, so that street traffic, which has been waiting, can proceed. When the train starts, and the leading wheels enter track circuit 346M, the protection is again placed in operation at Waugoo, Otter and Ceape street. Similarly, when a westbound train stops at the passenger station, for 1 minute 30 seconds, a time cut-out causes the gates to be raised at Parkway street.

A switch leading to a team track is located just east of Ceape street. After working this track, the switch engine usually pulls out on the eastbound main track, then reverses direction to go east on this track. A stick relay, controlled through a controller on the switch, cuts out Merritt street protection. A reverse-



GATE OBSTRUCTS street traffic approaching tracks

restart, track-circuit control operates the protection at Ceape street for the eastward move.

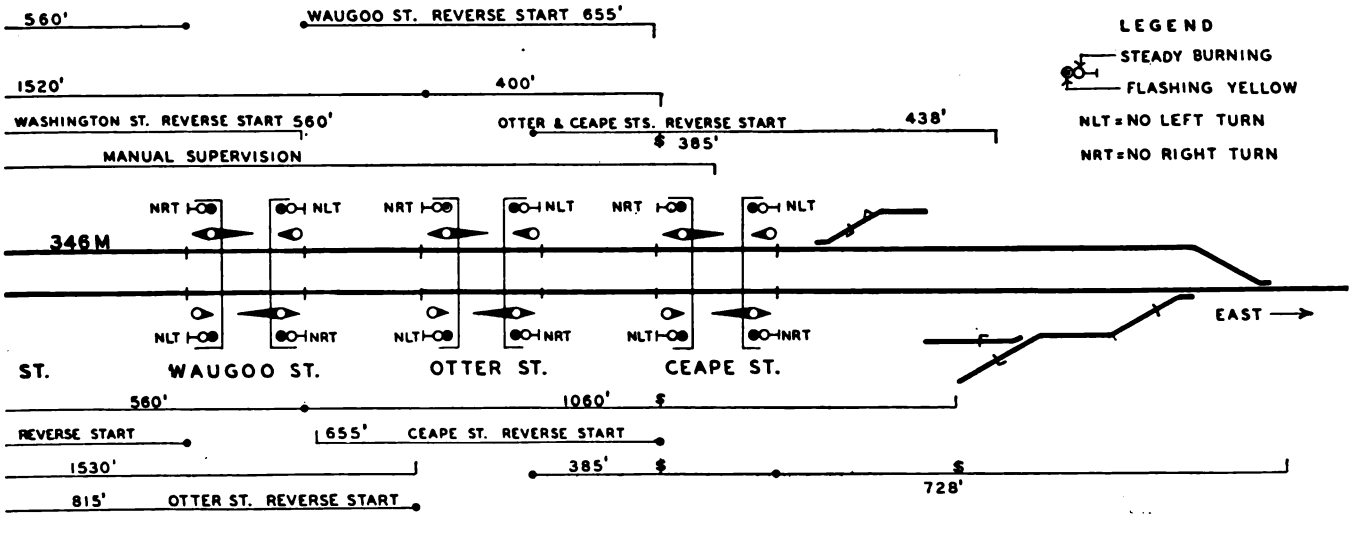
Supervisory Manual Control

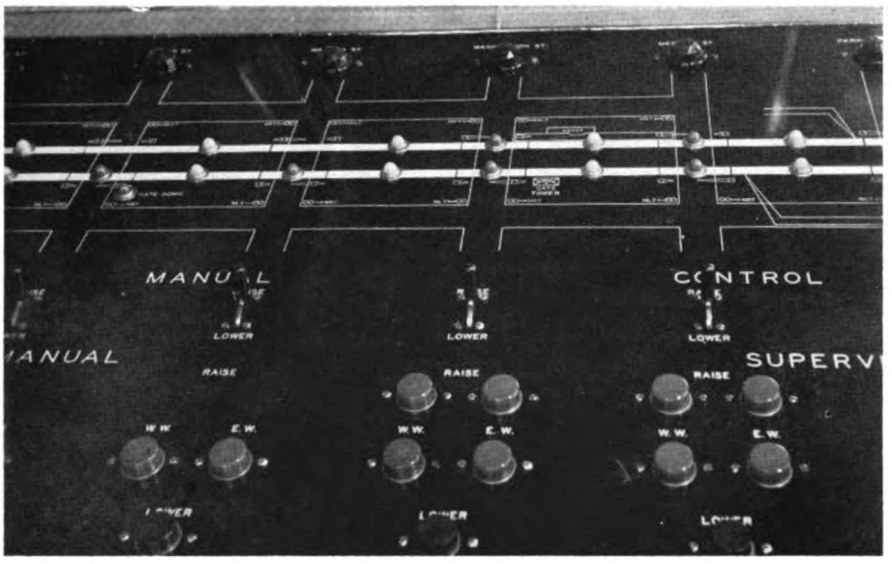
In addition to the automatic track circuit control, the supervisory manual control was installed so that during switching moves, or when trains stop at the depot or end of double-track, the gates could be raised to permit street traffic to proceed. The manual control machine is in an elevated cabin on the north side of the track at the west side of Washington street. The panel of this machine slopes at an angle to provide better visibility. On this panel the tracks are represented by heavy white lines, each approach track circuit being repeated by an amber lamp which is lighted when the corresponding track circuit is occupied. At each crossing on each track there is a short track circuit the width of the street, each of these track circuits being represented by a red lamp.

On this diagram, light-weight white lines show the outlines of the locations of streets. On the panel, below the location representing each street, there is a telephone-type key, which is normally in the raised position. If a motor car is approaching a crossing, the towerman throws the key for that crossing to the down position, which causes the flashing-light signals to operate and the gates to be lowered. After the car passes, he restores the key to the normal position, thus raising the gates.

Below the telephone-type key for each crossing there is a group of four red push buttons (shown grey in pictures). Below these red buttons is one black button.

An example of the use of the supervisory control would be, a switch engine approaching from the west of the eastward main track lowers the gates automatically at Merritt, Washington and Waugoo streets. However, the switch engine stops before reaching Merritt street for the purpose of setting out a car on the factory spur west of Merritt street. Therefore, the towerman pushes the red button for the eastward track which is the lower right-hand red button. This cuts out the protection and raises the gates at Washington and Waugoo streets so that street traffic can cross without further delay. At the time the red





PUSHBUTTONS ARE for supervisory control

button is pushed, a 1-in. red lens, above the track symbol for Washington and Waugoo streets, is lighted as a reminder to the towerman that he has cut out the protection and therefore is responsible for watching the switching. When he sees that there is to be a move toward Washington street crossing, he then pushes the black button below the red ones. This causes the protection to be set in operation automatically and the gates are lowered.

Stick Feature of Controls

In the discussion above, when the towerman pushed the red button, a circuit was closed to pick up a stick relay which sticks up through a back contact of the relay for the track circuit occupied by the switching move. This stick relay cuts that approach out of the controls, so that the gates are raised, but in no case can it cut out the protection if the track circuit on a crossing is occupied. Thus, this one red button and its corresponding stick relay are associated only with the eastward approach section to Washington street and streets beyond on the eastward main track. The other button for the eastward track and its stick relay are associated only with the westward approach on the eastward track. Similarly, two other red buttons are for the westward track at Washington street. The reason for the separate buttons and associated stick relays is to isolate these special controls to the switching move being watched by the towerman. In the meantime, if some other train approaches in the opposite direction on the same track, or in either direction on the other track, the flashing-light signals will operate and the gates will automatically go down regardless of the supervisory controls then in effect.

In the cabinet under the panel is a bank of telephone-type relays which are used in non-vital circuits. Fourteen of these are the stick relays which control the red indication warning lamps as discussed above. The other telephone-type relays are for the control of track-occupancy lamps.

At each crossing there is a cast-iron box, locked with a signal department padlock, which contains a three-position switch. If a failure causes the gates to operate improperly, the maintainer is called as soon as possible. Then the maintainer, or some other railroad employee under the direction of the maintainer, can use the special switch in the box to control the flashing-light signals and gates directly. By moving the switch handle to the right, the gates are raised by direct application of battery to the control relay, cutting around all other relay selections. When a train approaches, the switch handle is moved to the left to lower the gates and operate the flashing-light signals. Then the switch is returned to its normal position on center. The switch must be in the normal or automatic position, which is the center position, to close the cover, because a hole in a block of wood, on the inside of the cover, fits over the handle of the switch. Experience on the Chicago & North Western proves that this special local manual control is an important aid in reducing delays to street traffic when failures cause improper operation of the crossing gates and when maintainers are making periodic inspections and tests.

Power Supply

A 110-volt a.c. power distribution circuit extends the length of this project on two No. 6 line wires. At each crossing, the gate motors and bell are fed by a set of 7 cells of 160-ah Exide lead storage battery. These storage batteries are charged by taper charge Balkite type C-10 rectifiers. At control locations, line circuits and local control relays are fed from 3 cells of 60-ah lead storage battery. The signal lamps which are rated at 10-volt, 18 watts, are normally fed from a transformer, but are switched to the 14-volt battery if the a.c. fails. The track circuits over each crossing are fed from one cell of 80-ah lead storage battery, and the other track circuits are fed from three cells of 500-ah Edison primary battery in parallel.

The line control circuits between the crossings and other control points are in aerial cable, made up of three No. 6 wires and up to 49 No. 14 wires. Where circuits must go under streets to gates or signals, the underground cables are in 3-in. galvanized iron pipe, buried about 2 ft.

The gates, flashing-light signals and supervisory manual-control machine for this project were made by the Griswold Signal Company. The track relays, control relays and motor-driven time-element relays at the crossings were made by the General Railway Signal Company. The installation was planned and constructed under the direction of H. T. Fleisher, assistant chief engineer, communications and signals.