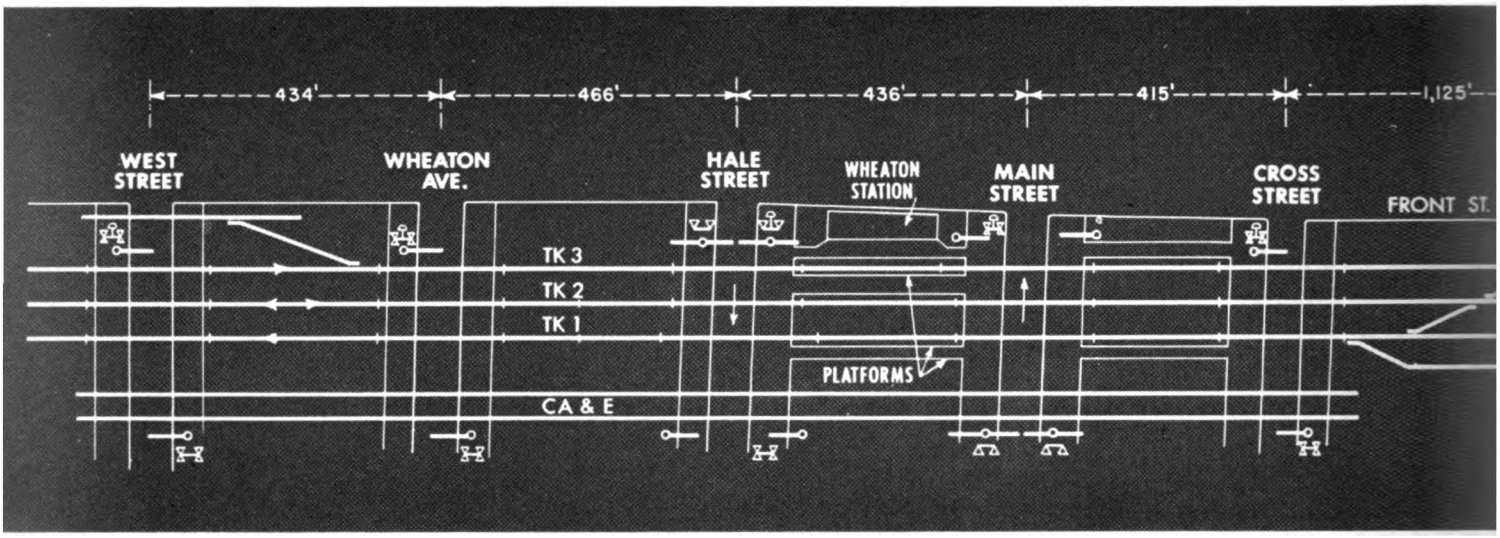


Nine railroad-street crossings in Wheaton, Ill., have automatic protection for vehicular and pedestrian traffic.

North Western Installs Automati

C&NW project at Wheaton, Ill., is part of a $4.5 million highway crossing protection program (RS&C June 1958, page 19) to provide complete automatic protection at 330 crossings in eight states. John H. Dunn, retired editor, went out to Wheaton, got the details on this particular project and wrote this article.

IN WHEATON, ILL., the protection of all nine crossings of streets across tracks of the Chicago & North Western has been completely modernized and changed to full automatic control.

Five crossings were previously protected by pneumatic gates controlled locally by men on duty 24 hours daily in four towers. Four other crossings were protected by automatically controlled wigwags, with a flagman on duty 10 hours daily at each of three crossings and 12 hours at the other one. Now all nine crossings are protected by new electrically operated gates with flashing-light signals, all controlled automatically by track circuits, including selective speed control. These new gates, with flashing-light signals, have increased safety by providing uniform type of protection at all crossings; in service 24 hours every day, with automatic controls. These controls do a better job of controlling the gates with respect to trains on three main tracks, and to prevent unnecessary delay to street traffic, than was possible with gatemen and flagmen.

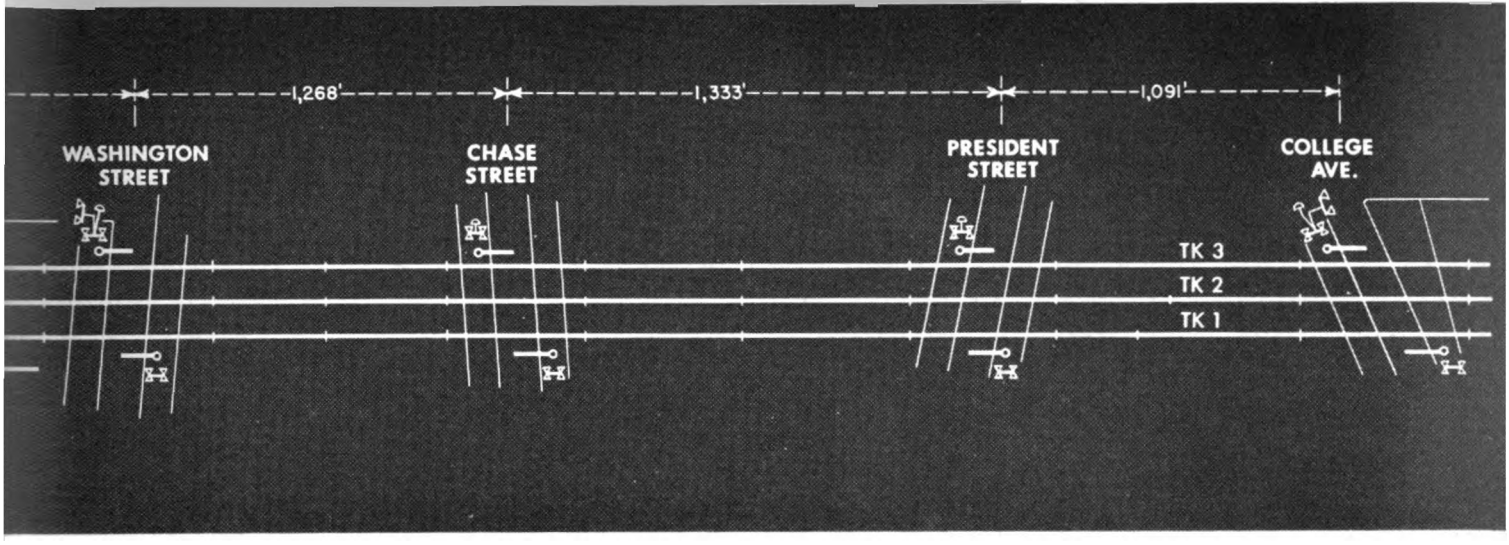
The project was planned and constructed by the C&NW in accordance with regulations and suggestions of engineers of the Illinois Commerce Commission and the police department of the City of Wheaton. The project cost about $363,600. The saving in wages of gatemen and flagmen is $100,452 annually, which is at the rate of about 35.4 per cent annually on the total cost.

Wheaton is 25 miles west of the C&NW terminal in Chicago, on the line west to Omaha. The population of Wheaton is about 17,000. The main business section is just north of the tracks in the four blocks between West and Cross streets. Residential sections are about half north and half south of the tracks. Therefore, vehicle street traffic on the five principal crossings between West and Cross streets is heavy most of the time.

Through Wheaton the C&NW has three main tracks equipped with automatic train control. The center track, No. 2, is equipped for train movements in either direction. The south track, No. 1, is for westward movements, and the north track, No. 3, for eastward movements. The new crossing protection is controlled automatically for train movements either way on each track, reverse moves on the two outside tracks being limited to 20 mph.

Two main tracks of the Chicago, Aurora & Elgin are parallel to and about 50 ft south of the C&NW tracks through the main part of town, which includes the five heavy traffic crossings. At these crossings the same gates and flashing-light signals protect all five tracks.

The protection at seven of the crossings—West, Wheaton, Cross, Washington, Chase, President, and College streets—is according to conventional practice. This includes flashing-light signals with short-arm gates which, when lowered, extend across only the right-hand lane of street traffic approaching the crossing. This leaves the other half of the roadway unobstructed to permit vehicles to depart from the crossing. The gates and the flashing-light signals are assembled as one complete signal with a warning bell mounted on one of the two signals at each crossing. This arrangement applies at



iates at Nine Crossings

all the crossings except the two one-way streets.

Hale street, at the west end of the station platform, is one-way for street traffic, south only. Main street is one-way north only. Representatives of the Illinois Commerce Commission, police of Wheaton and signal department of the C&NW cooperated in planning the protection to be installed for crossings of these one-way streets. At Hale street the pavement is 42 ft wide, which is adequate for four lanes of traffic, all southbound. On the north side of the tracks there are two gate mechanisms, one on each side of the street. Each mechanism has a street arm long enough to reach to center of pavement, so that, with both arms lowered, the entire width of pavement, approaching the tracks, is obstructed. Also on each mechanism there is a set of flashing-light signals facing north, a cross-buck sign, and a "5-Track" sign. Thus, on this one-way street the entire width of pavement is obstructed. Also an approaching southbound vehicle driver sees the same signal aspect and signs either to his right or left, no matter which lane of traffic he is using.

Northbound vehicular street traffic is, of course, prohibited on this one-way street, adequate signs to this effect being displayed at various locations. However, if a vehicle

Switching crew can take manual control of gates when they are working near, but not over the crossing. Each track has its own "raise" and lower pushbuttons.

At one-way streets, sidewalk gate is used. When making repairs, swivel base of gate mechanism enables maintainer to swing lowered arms out of the way.

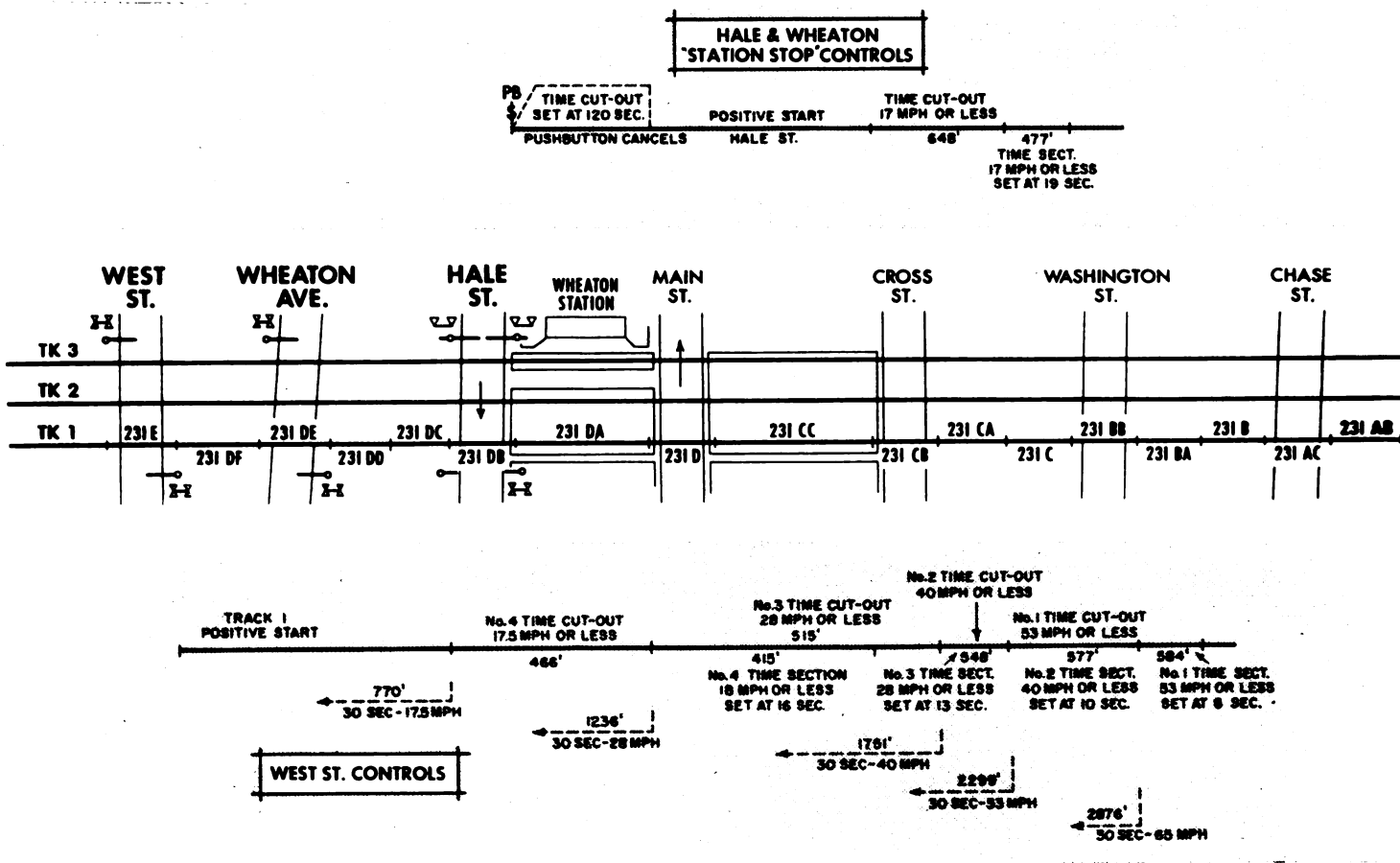


Diagram illustrating use of timing sections and time cutout sections.

driver does go the wrong way, thus approaching the crossing from the south, when a train is approaching he is warned to stop by the flashing-light signals facing south on the south side of the tracks on the east side of the street.

At this street sidewalk gate arms protect all four approaches to the tracks, mechanisms for gate arms only being required for the two locations on the south side of the track. One bell at this crossing is on the gate post north of the tracks and east of the crossing.

The cycle of operation at all crossings is that the flashing-light signals and lamps on the gate arms start operation a minimum of 27 seconds prior to arrival of the fastest train at a crossing, this 27 seconds being increased to 30 seconds at certain crossings to allow for additional time, due to greater distance between signals. Also, the 27 seconds is increased one second for each 10 ft (in excess of 45 ft) of travel for roadway vehicle to pass over and clear the crossing. When a train enters an approach control section the lamps in signals and on arms operate five seconds as a pre-warning; then the gates are lowered to horizontal position in about 8 to 10 seconds operating time. Gates are in all cases in the lowered position a minimum of five seconds before arrival of fastest train at the crossing.

The C&NW passenger station is on the north side of the tracks between Hale and Main streets. Each weekday, Monday through Friday, 45 suburban passenger trains and 16 through freight trains operate through Wheaton. In addition, two local freights pass through and perform switching operations. Because of curves, the authorized timetable speed through the city is 60 mph for passenger trains and 50 mph for freights.

The selective speed-time controls and cutouts were designed so that the protection will be in operation and the gates down the prescribed minimum time ahead of arrival of fastest train, and not too much more for slower freight trains. In general, the speeds are in four groups: (1) above 65 mph, (2) 65 to 52 mph, (3) 52 to 37 mph, and (4) below 37 mph. Other speed groups are involved in station areas.

Basic features of selective speed control are shown in the diagram, which applies for protection at West street for a westbound train on track No. 1. If leading wheels of this westbound train pass through No. 1 timing section (track circuit 231 BA) at an average speed of more than 53 mph, the protection at West street is set in operation when leading wheels enter No. 1 time cutout section. This gives an approach section of 2,876 ft. which is 30 seconds at 65 mph.

However, if the average speed in No. 1 timing section is 53 mph or less, the protection at West street is not cut in when leading wheels enter No. 1 cutout section. Rather, the cut-in is postponed until leading wheels enter track circuit 231 CA. This gives an approach of 2,299 ft, which is 30 seconds at 53 mph. This is typical of a selection between a through passenger train at 65 mph and a through freight at 48 to 50 mph.

Track circuits 231 BB and 231 C, totaling 577 ft, serve as No. 1 cutout section and also as No. 2 timing section. If the leading wheels pass through this section at an average of more than 40 mph, the protection at West street is cut in when leading wheels enter track circuit 231 CA. However, if the average speed in No. 2 timing section is 40 mph or less, the protection at West street is not cut in when wheels enter No. 2 cutout section.

Track circuit 231 CA serves as No. 2 cutout section and also as No. 3 timing section. If the average speed in this section is more than 28 mph the protection at West street is cut in when leading wheels enter track circuit 231 CB. However, if the average speed in No. 3 timing section is 28 mph or less, the protection is not cut in when leading wheels enter track circuit 231 CB or any of the other track circuits in No. 3 cutout section.

Track circuits 231 CC and 231 D serve as No. 4 timing section. If the average speed in this section is more than 18 mph, the protection at West street is cut in when leading wheels occupy track circuit 231 DA in cutout section No. 4. However, if average speed in timing section No. 4 is 18 mph or less, the protection at West street is not cut in when train enters cutout section No. 4.

Thus, if this westbound train reduced speed gradually to pass through the timing sections as discussed, and to come to a stop at the station platform, the protection at West street is not set in operation. When the train is again started, and leading wheels enter track circuit 231 DC, this is positive start which sets the protection at West street in operation.

For Crossings at End of Platform

Hale street crosses the tracks at the west end of the platform. Long passenger trains, 8 to 10 cars, stop with the locomotive on Hale street crossing. Short trains, two to three cars, stop short of the crossing. However, for either long or short trains, safety dictates that the protection should be in service and the gates be down when westbound trains are approaching and stopping at the station platform.

Graduated speed selections, somewhat the same as discussed above, are included in the controls for Hale street when a westbound train on track No. 1 is approaching and stopping at the station. For Hale street the speed must be reduced to 17 mph or less in a timing section, which is track circuit 231 C. Also, the positive start section begins when leading wheels enter track circuit 231 CC. Therefore, the protection at Hale street is in operation and gates are down when train pulls up to station and stops.

If this westbound train is one of the short ones with only three cars, it stops wtih the leading end of the locomotive short of a yellow post and yellow stripes on platform, 30 ft east of the east sidewalk at Hale street. In the meantime, when the leading wheels entered track circuit 231 DA, a time relay set at two minutes was set in operation. At the expiration of this two minutes the gates at Hale street and Wheaton Ave. are raised so street vehicles can cross.

Also a pushbutton manual control is provided in a small box on a post at the yellow stripe on the platform. Any member of the engine or train crew can walk to this box, and, by pushing the "raise" button, cause the gates to be raised at Hale street and Wheaton Ave. at once, without waiting for the two-minute time to elapse. In most instances in which operation of a pushbutton will save time for street vehicles, some member of the crew pushes the button, because nearly all of these C&NW employees are anxious to maintain friendly relations between the public and the railroad.

If the gates have been raised either by automatic or manual control, and the train is ready to depart, the protection at Hale street and Wheaton Ave. can be again set in operation by either of two means: (1) a member of the crew can push the "lower" button in the box, or the train can start slowly so as to enter track circuit 231 DB, which starts 30 ft east of the east edge of the sidewalk on the east side of Hale street. This puts the gates down in time to protect the crossing for a train just being started. In such an instance, the protection at Wheaton Ave. is also in operation when leading wheels enter track circuit 231 DB, the entering end of which is 30 ft east of the east side of Hale street.

The longer suburban passenger trains, with up to eight cars, stop with the locomotive on the Hale street crossing, but short of the entering end of track circuit 231 DC, which is marked by a post 6 ft tall, painted yellow, at left of track. At that location the locomotive and train hold the gates down at Hale street and Wheaton avenue, but an eight second release allows the gates at West St. to be raised to let street traffic move. These gates go down again when train is started and wheels enter track circuit 231 DC.

At the five heavy-traffic streets the mechanisms for short-arm gates have a new special swivel feature. If a gate arm is damaged or broken by a street vehicle, the maintainer loosens four set screws in the corners in the bottom inside the mechanism case. This permits the complete signal to be turned 90 deg on a ball bearing swivel type base. Thus the arm, in the lowered position, is swung around off the street to a position along the curb. Then the arm can be repaired or replaced without interfering with traffic, and without hazard to the maintainer.

Reduce Delays to Vehicles

These special controls to reduce delay to street traffic require numerous timing relays and extra track and control relays. A total of 104 relays are in the case at some crossings, such as those at Hale or Main streets. At such locations the relays are the GRS rack-mounted "B" type, which save a lot of space. At these crossings, the relays, rectifiers, low-voltage transformers, arresters and terminals are in special sheet-metal cases, 9 ft, 8 in. long, 6 ft high and 2 ft deep, furnished completely wired by the Griswold Signal Co. to expedite installation time. Front and rear doors give complete access to rear of racks, etc. Each case has two 5-in. channel steel beams, which requires the use of a concrete foundation at each end, eliminating the necessity of a center foundation. This case has capacity comparable to that of a small sheet-metal house. The case permits access to both front and rear of the B relay racks and thus avoids the necessity for swing type racks.

Batteries are in concrete boxes. At each crossing the operating battery consists of seven 240-a.h. lead type storage cells. Line batteries, where required, each consist of six 120-a.h. lead cells. Each track circuit is operated by one 80-a.h. nickel-iron storage cell.

This project was planned and constructed by signal forces of the C&NW under direction of V. S. Mitchell, Signal Engineer, and under the supervision of E. W. Horning, Grade Crossing Engineer, and G. L. Kasdorf, Signal Supervisor. The gates, flashing-light signals, relay cases and battery boxes were furnished by the Griswold Signal Company, the relays by General Railway Signal Company.