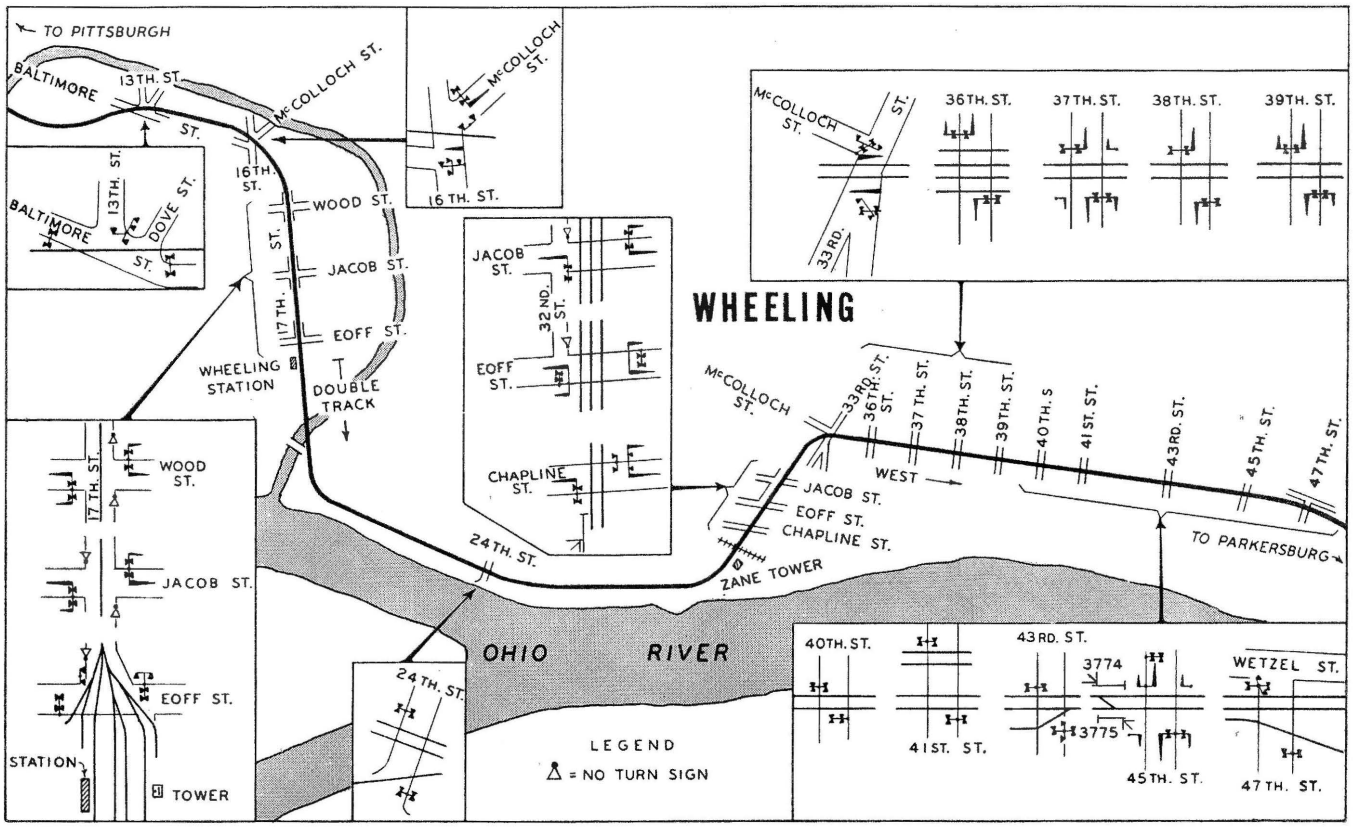


PROBLEM: **How to provide adequate protection at 19 street-railroad grade crossings in a city of 65,000 population with today's high-density vehicular traffic**

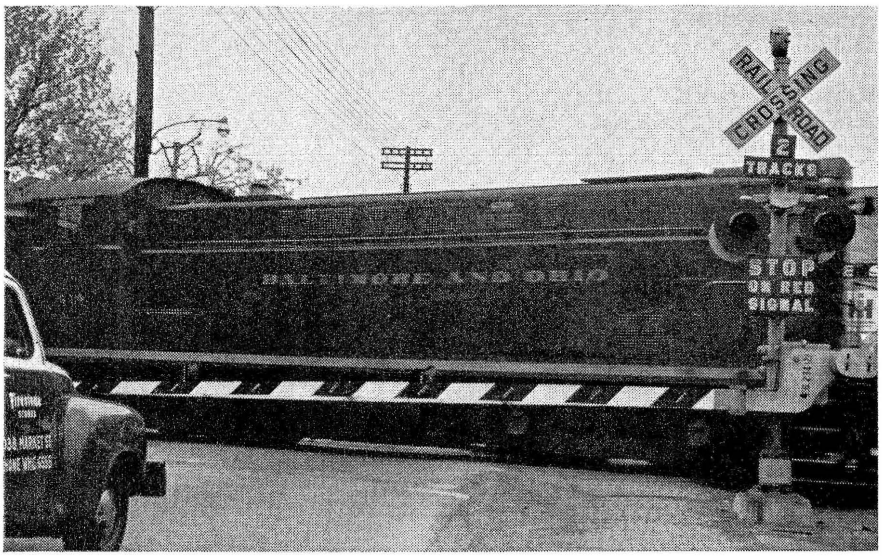
SOLUTION: **Install flashing-light signals with or without short-arm gates at all crossings to provide 24 hr automatic protection. Also install "No Turn" signs to prevent motorists from turning onto tracks in front of moving trains**

Crossing at 45th street; note sidewalk gate at extreme left of picture

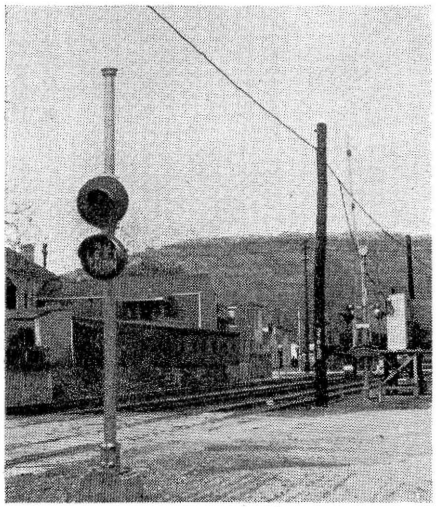
WHEELING, W. VA. IS TYPICAL of other American cities which have experienced a population increase and a corresponding jump in vehicular traffic following World War II. One-way streets were a partial solution to alleviating traffic congestion, but they did nothing for the grade crossing problem. More vehicles were going over the 19 crossings of city streets and the Baltimore & Ohio railroad.

Manually-operated gates were in service 24 hr. daily at four crossings, and 12 hr. daily at eight other crossings. At one other crossing, watchmen were on duty 24 hr., and at three other crossings 12 hr. daily. The three remaining crossings were protected by crossbuck signs.

So far, Wheeling is no different than other cities. But local conditions make the difference. For one thing,



Chapline street crossing has short-arm gate long enough to extend across sidewalk



No turn sign at Eoff and 32nd streets

the city is on the south bank of the Ohio River, which makes for interesting geography. The B&O line from Pittsburgh enters the city from the north, turns west and runs down the center of 17th street toward the passenger station. There it turns south to run parallel to the river for a few blocks and turns to the east, and at McColloch and 35th streets, turns south to run parallel with the river. Wheeling is on the B&O's Pittsburgh-Cincinnati route. The line is single track from the east into the passenger station, and double track from there south through the remainder of the city. Four passenger trains, six freight trains and eight light engine movements are made over the line. There is considerable industry along the tracks, so that numerous switching moves are made over street crossings.

City, state and railroad worked together to solve the common problem of improving the safety at grade crossings, as well as increase the traffic flow to aid in reducing traffic congestion. The city council voted to change an ordinance to permit the installation of automatic protection without watchmen at all crossings. Also, traffic studies were made, and plans formulated as to the type of protection to be provided at each of the 19 crossings.

Flashing-light signals were installed at each of the 19 crossings. At 12 of these crossings, short-arm gates were also installed. "No Turn" signs were installed at those crossings where streets run parallel to the railroad, such as 17th street just east of the depot and 32nd street. Operation of gates and/or flashers is initiated by occupancy of track circuits in approach to a crossing. Length of approach sections is such that the protection equipment will begin operation 30 sec. prior to the arrival of a train or engine at the crossing.

Timed Cut-Outs Raise Gates

Street-to-street timing sections are incorporated in the controls of the gates and flashers. If a train or engine occupies a timing section (between two streets) for more than 1 min., the gates or flashers at the second street ahead of the train will be cut out. For example, a westbound train standing between 37th and 38th streets is on the timing section for 39th street. After standing on this timing section for 1 min., the gates at 39th street will be raised, provided, of course, the train does not cross 38th street. These timing sections are effective only for the assigned direction of traffic on each track of the double track west of the depot. East of the depot, the timing sections are effective in both directions on the single track.

In addition to these timing sections, switch key controls are incorporated into the controls of the protection equipment at each crossing. Thus, if a switch engine approaches a crossing, but does not enter upon the positive start section which extends over the width of the street plus sidewalks, the crossing protection can be cut out. On the double track, a key controller is for each track, so that an approaching train on the other track can lower the gates, if they had been raised by a switch crew.

"CS" Signs and Instructions

At 45th street, the presence of a crossover, home signal and an industry siding switch necessitated cut sections within the normal street-to-street timing sections. At these cut sections are white signs with the letters "CS" in black. If a train has stopped back of this sign, the protection equipment has been cut out by switch key control, and the train is to move over the crossing, the engineer must take 20 sec. in moving from the "CS" sign to the crossing. Timetable instructions concerning these signs and when making switching moves are as follows:

"Crews making switching or back-up movements over these crossings will observe Rule 109A (20 sec. between CS sign and crossing), and see that gates are lowered either by track circuit or key control box before entering the crossing and will see that gates are raised either by track circuit or key control after leaving the crossing.

"Key operated box at 45th street is located on mast of eastward signal No. 3774 and at other crossings on relay case platforms.

"The control for the number of the track on which train or engine is standing is the one to be used.

"Gates will not raise if another train or engine is approaching on another track.

"When track circuits located between the insulated joints on either side of crossing are occupied, gates cannot be raised.

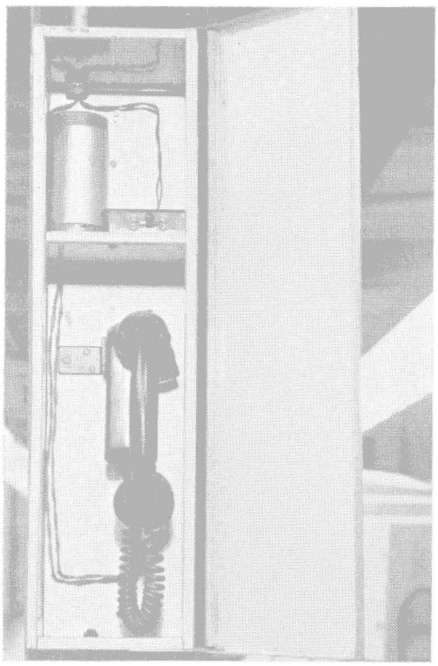
"CS signs are located at 45th street on No. 2 track 200 ft. west of the crossing and No. 1 track at signal 3775.

"Trains stopping for eastward home signal at Zane tower will stop west of Chapline street."

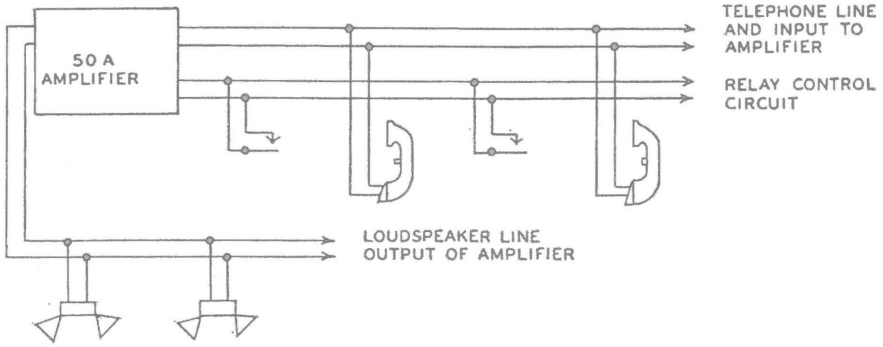
Relay Cases Up in the Air

Because the Ohio river sometimes overflows its banks, the B&O took the precaution of elevating most of the relay cases at the crossings. Fortunately, the river has not flooded Wheeling since this project was completed, so the "raised cases" haven't had the "flood test." They are on angle iron stands which rest on concrete foundations, being about 8 ft.

(*Continued on page 42*)



Phone in column-width box on platform



Relay control circuit connects phone line through amplifier to paging circuit

and at 8 equally spaced locations in the freighthouse and along the two platforms. Loudspeakers are located in the office as well as at 14 other locations in the freighthouse and along the platforms.

How Communications System Works

When the foreman or assistant foreman wants to talk to the checker in any crew, he goes to the nearest of the telephones. He pushes a switch in the box, and pushes on the press-to-talk button on the handset while he speaks into the transmitter to call the name of the man he wants. This call is broadcast on all the 14 loudspeaker locations. When he releases the switch in the box, loudspeakers are cut off, and he waits for an answer to his call.

The man called goes to the phone nearest him to answer. He takes the phone off its hook and presses the push-to-talk button on the handset as he answers. His answer is heard in the receiver of the handset held by the man who has made the call. When the conversation is finished, both men hang up their handsets and close the doors of the boxes.

Thus, in this system, the paging loudspeakers in the freighthouse and on the platform are used for broadcast calling directly to the man wanted, no matter where he is working. Then the telephones are used for person-to-person conversation. Therefore, the calling and answering is direct, without going through a switchboard. Furthermore calls can be originated or answered at any of the phones including the 4 phones in the freighthouse, the 4 phones on the platforms and the 1 phone in the foreman's office.

When the assistant foreman sees that an outgoing car is almost filled, he puts out a paging call to all checkers to establish a new "spot" number. If the lift truck is needed in a car or at a "spot," the assistant foreman puts out a paging call to the operator of the lift truck. On a typical day as many as 12 paging calls or phone calls are made in an hour. In each such instance considerable time was saved not only for a crew, and the foreman or assistant foreman but also this time, that was saved, aids in getting the work done that much sooner, and thus improving service to shippers.

The loudspeakers used in this system are rated at 12 watts. One such speaker is used in the foreman's office. Two such speakers, faced in opposite directions, are used at each of the 4 locations in the freighthouse and at each of the 10 locations on the platforms.

In the office, the telephone is on the foreman's desk, and the special switch is at the end of the desk. In the freighthouse and on the outside wall along the one platform, each phone is mounted in a sheet metal box, 16⅜ in. by 20¼ in. and 6 in deep, with a hinged door at the front. The switch for paging is mounted above the phone in the box. On the south platform, the boxes are 6¾ in. wide, 8¾ in. deep, and 24½ in. long, to be the same as the steel pillars which support the roof above this platform. The telephones in this system are the monophone type made by Automatic Electric Company.

As shown on the sketch herewith, the two-wire telephone circuit is connected to all the telephone locations. Removal of a handset from its hook or cradle connects that phone to the line. Pushing the press-to-talk button on the handset, connects the transmitter through battery to the line in the conventional manner.

Pressing the separate special switch, in the box at each telephone, closes the relay circuit at the amplifier location, connects the telephone circuit through a 50-watt amplifier to another two-wire circuit that connects all the paging loudspeakers. This amplifier was furnished by the Electronics Communications Equipment Company. The circuits to connect the phones, loudspeakers and amplifier, are on the No. 19 twisted pair, run in ¾-in. galvanized iron conduit.

This communications system was planned and installed by Baltimore & Ohio forces under the general supervision of J. H. Wallis, superintendent of communications.

B & O Crossings

(*Continued from page* 24)

above ground. A working platform on either side of the case provides standing room for the maintainer.

Relays are the GRS shelf-type, the timing relays being the thermal type, although a few of the motor-driven type KB were used. Lighting for the flashers and gates is on a.c. with battery standby. West of the depot, commercial power is supplied at various points, but east of the depot, power is supplied from the railroad's 440-volt signal power line. One cell of 120-ah storage battery supplies each track circuit. Seven cells of 160-ah battery are used for controls and operation at a crossing with gates and flashing-light signals. Where flashing-light signals only are in service, six cells of 80-ah battery are sufficient. Batteries used are Exide and Gould, and the rectifiers are Fansteel. Short-arm gates were furnished by the Griswold Signal Co. and the Transport Products Corp. Flashing-light signals, where used without gates, were furnished by the General Railway Signal Company.

Engineering, including plans and specifications, was done under the direction of A. L. Jordan, signal engineer.