



Gulf, Mobile & Ohio Protects All Street

A view eastward at Monroe crossing showing how signal and gate are arranged on mast and on the cantilever arm

freights are operated each way daily. Numerous switching moves are made to set cars on and off passenger trains, especially the locals. Also many switching moves are made between the local freight yard and various industries and warehouses. The tracks pass through the residential and business sections of the city. The pedestrian and vehicular street traffic is very heavy on many of the crossings, especially in the morning and evening hours.

In the downtown section, the railroad tracks run north and south. The passenger station is on the east side of the track, with platforms extending the entire block between Jefferson street and Washington street, 360 ft. South from Washington street to Monroe street, two blocks, the double-track main line is in the center of Third street, with a driveway on each side. The protection of the four street crossings in this area, as shown in Fig. 1, was a serious problem and was handled as a separate project. Previously, each of these crossings was protected by a flagman on the ground, three tricks daily. However, the traffic was so heavy that this form of protection was not satisfactory. Short-arm gates with flashing-light signals were installed at these four crossings, Jefferson street, Washington street, Adams street and Monroe street.

On the basis of 25 m.p.h. train speeds, track circuits were installed to control the signals and gates automatically. However, on account of the numerous train stops and switching moves, supervisory-man-

Special locations of signals---automatic and supervisory-manual controls---signals to hold trains---and loudspeakers to talk to pedestrians or drivers on crossings, are factors which solved local problems

THE Alton Route of the Gulf, Mobile & Ohio will soon complete the installation of flashing-light signals, or gates with flashing-light signals, at four more crossings in Springfield, Ill., and when complete, all of the 27 crossings of the main tracks of this railroad with streets in this entire city, of 81,000 population, will

be protected by modern facilities.

Springfield is on the double-track main line of the G. M. & O. between Chicago and St. Louis. Six through passenger trains are operated each direction daily, and one local passenger train to and from each direction originate and terminate at Springfield. About 6 through

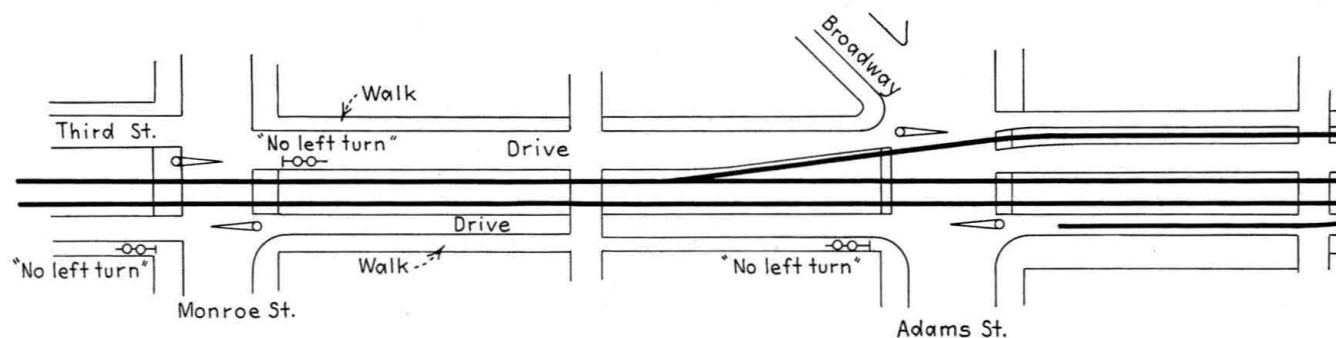


Fig. 1—Plan showing locations of flashing-light signals and gates at the

Crossings In Springfield

ual control was also provided. This control machine is in an elevated cabin east of the main tracks just north of Washington street. This cabin is 7 ft. by 7 ft., mounted on two vertical I-beam supports, 14 ft. above ground level. The cabin is made of sheet aluminum with large hinged windows in each wall.

The panel of the control machine has a track diagram with a lamp to repeat track occupancy of every corresponding track circuit. Below the symbol representing each of the four street crossings, there is a push button, and below that is a toggle-type lever that swings up or down, being normally in the center position. Above the symbol for each crossing, there are three lamps—a green one which is lighted when the gates are up, at the corresponding crossing, a red one which is lighted when the gates are down, and an opal one which is lighted when a.c. power is off.

With the levers in the normal position, the flashing-light signals and gates at the four crossings are controlled automatically by track circuits in the conventional manner. If a switch engine or train stops in an approach control section after the gates are down, the towerman can raise the gates by raising the lever for that street. When he takes his hand off the lever, it returns to the center position by spring action. The gates, however, remain up, the control to accomplish this being through contacts of a stick relay that was picked up when the lever was raised. The stick holds up through the track relay down,

therefore, the control is restored to normal (for automatic operation) when track circuit is unoccupied.

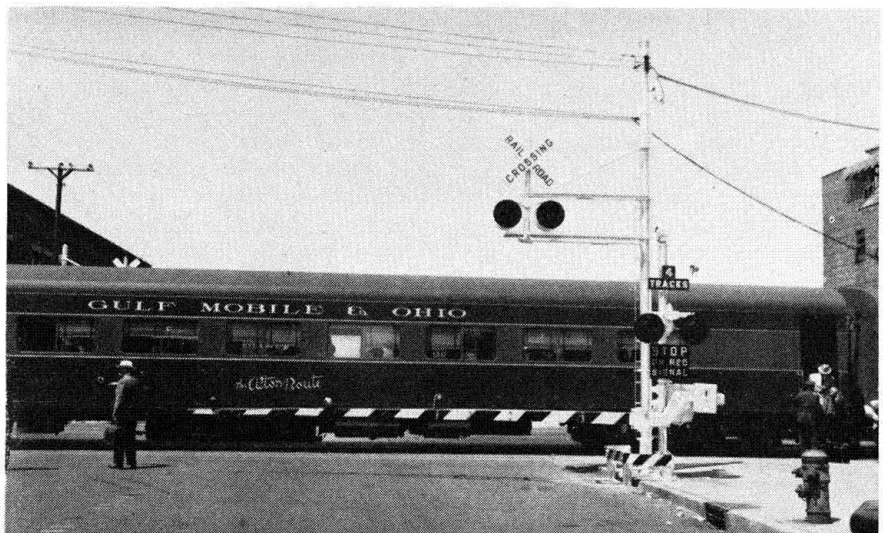
Having used a lever to raise gates with a train or switch engine on an approach, the towerman watches the switch engine, and, if it again starts toward the crossing, he throws the lever for that crossing to the lower position to cause the gates to go down. The lever stays in that position, by spring action, and the gates stay down until the train clears the crossing, and also until he restores the lever to center.

If a crossing is to be protected for an insulated motor car, the towerman can lower the gates independent of track circuit control by moving the lever for that crossing from the center position to the lowered position. After the motor car passes, the towerman places the lever

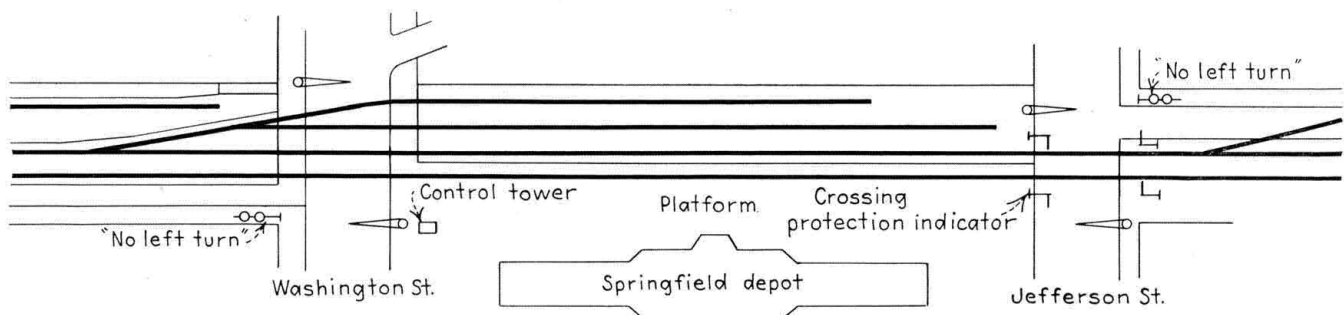
back to center which raises the gates.

All passenger trains stop at Springfield. When a southbound passenger train is approaching, the towerman knows that it is to be stopped with the locomotive between Washington street and Adams street. Therefore, by pushing a forestalling button, he can hold the gates clear at Adams and Monroe street. Then, when the train is ready to go, he pushes a restart button which cuts in the automatic track circuit control to operate the flashing-light signals and lower the gates at Adams street and Monroe street, as the train approaches.

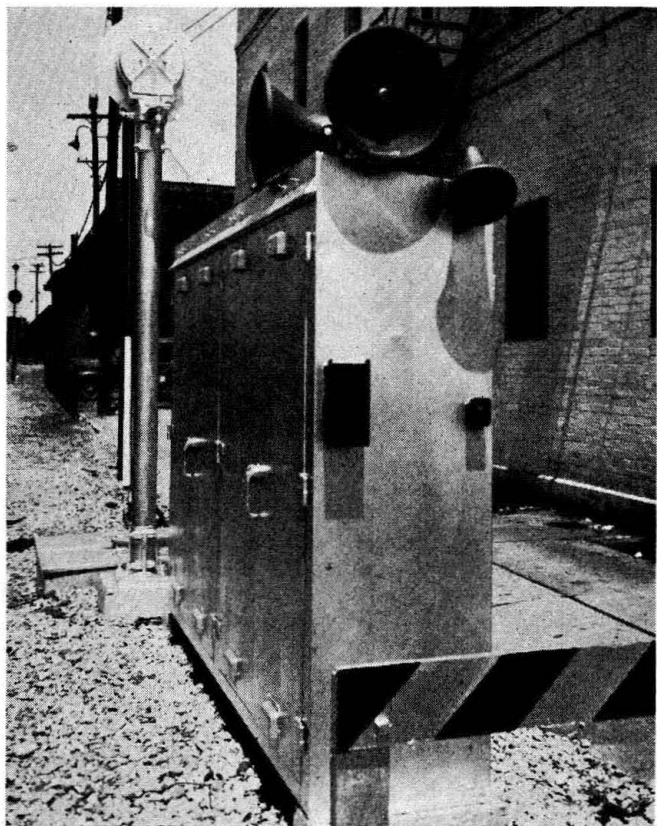
On each track at each crossing, there is a separate track circuit, approximately 100 ft., just about as long as the width of the street. When such a track circuit is occupied, the controls are direct to operate the flashing-light signals, and to hold the gates down. However, at Washington street, for example, the locomotive of a short southbound train may stop clear of the crossing, but the front wheels are on the track circuit over the crossing. To raise the gates, the towerman must do two things simultaneously, (1) push the button just above the lever,



View looking west at the crossing at Washington street



four crossings at Monroe, Adams, Washington and Jefferson



Paging speakers and a talk-back speaker at one of the crossings

and (2) also raise the lever.

Jefferson street at the north end of the station platform carries not only heavy local city traffic, but also the traffic of three through state highways. Northbound trains when making a station stop are stopped with the locomotive just south of this street. In consideration that such a train is not to enter onto the street crossing, there is no need to set the signals in operation and lower the gate because this would obstruct street traffic needlessly. As a definite place short of which such northbound trains must stop, a special northbound crossing protection indicator signal was installed at the right of the track and at the south line of the street. This signal is of the position-color-light type with three 3½ in. lamp units in a horizontal row on a circular disk background 24 in. in diameter, mounted on a mast 8 ft. high. In this indi-

cator, the lamps which are red, are normally approach lighted, and stay lighted until the gates at Jefferson street are down. However, when a northbound train that is to stop at the station is approaching, the towerman forestalls the automatic track circuit control for the crossing protection at Jefferson street, so that the flashing-light signals are not operated, and the gate is not lowered for that train. When the station stop is complete and the train is ready to depart, the conductor waves a hand signal to the towerman, or pushes a button in a box attached to the station, to inform the towerman. Then the towerman releases his manual control of the gates at Jefferson street which then lower automatically by track circuit control. As the gates reach their lowered position, circuit controllers on the gate mechanisms break the circuit which extinguishes

the lamps in the color-position-light crossing protection indicator signal. This informs the engineman that the gates are down and that he can then start his train to proceed over the street crossing.

The local freight yard is located north of Jefferson street and west of the main tracks. When switching cars in and out of this yard, the switch engine makes numerous moves on and off the main track that are not far enough to enter the crossing at Jefferson street. When such switching is under way, the towerman forestalls the automatic track circuit control of the gates at Jefferson street. As long as the gates at Jefferson street are in the raised position, the three horizontal red lamps are lighted in color-position light crossing protection indicator signal "S" at the west side of the southbound main track and just north of Jefferson street. When the switch crew is ready to go south over Jefferson street, or when a through train is approaching, the towerman leaves his controls in the normal position, so that the flashing-light signals are operated and the gates go down as usual when a train occupies the southbound approach sections. In such instances, when the gates are lowered to the horizontal position, circuits are opened to extinguish the red lights in the color-position-light crossing protection indicator "S".

Loudspeakers

In some instances, pedestrians and roadway vehicles have been too close to crossings when trains were approaching. With the thought that in such instances the towerman could give suggestions or orders, loudspeakers have been installed at each of the four crossings. When the towerman has something to announce at a crossing, he presses a button for that crossing and speaks into his microphone, for example, "Back your truck off that crossing at once" or "Do not stop there, drive your car on over the crossing". At

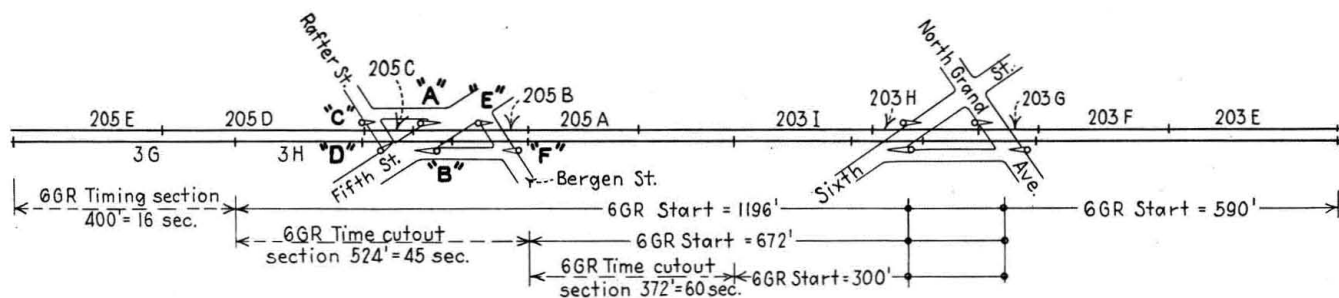


Fig. 2—Plan of crossing protection and controls at crossings in north part of Springfield

each crossing there are two loudspeakers, one directed across the street and the other across the tracks. These are large-sized speakers with 14-in. horns and driver unit rated at 16 ohms, 25 watts, made by University Loudspeakers, Incorporated.

When switching, the conductor of the crew must tell the towerman what moves are being planned so he may know whether to protect certain crossings. This exchange of information can be handled quickly by an arrangement including a talk-back speaker at each crossing which is used in conjunction with a speaker, a microphone and selection buttons in the tower. The talk-back speaker at each of the crossings, and also in the yard office, is a University magnet-type speaker with an 8-in. horn, and rated at 12 watts, 8 ohms. This speaker will pick up what the switchman says and reproduce it in the loudspeaker in the gate tower. If a switchman at a crossing wants to talk to the towerman, he pushes a button which cuts in the talk-back speaker so that the switchman can talk to the gate tower. Then the towerman, pushes the button corresponding to that crossing, in order to cut his microphone and loudspeaker in the circuit to that crossing.

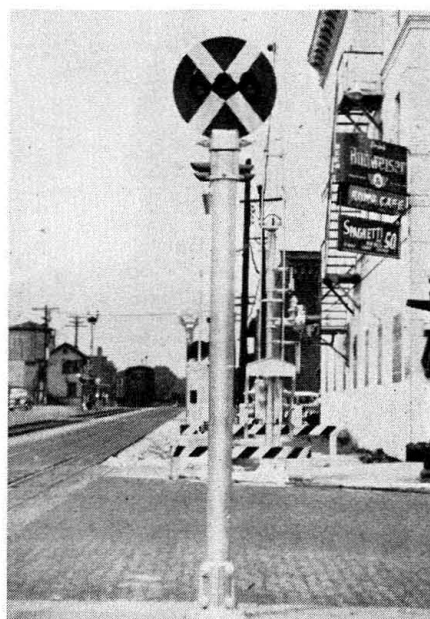
Signals and Gates

The gate mechanisms on this project are the 3566 type, furnished by the Western Railroad Supply Company. The gate arm in each instance is just long enough to extend to the center of the pavement. Automobiles and trucks parked near the curb may obstruct the view of the flashing-light signals. Therefore, at these crossings, flashing-light signals were installed not only on the mast, but also on cantilever brackets extending out over the street, as shown in the pictures.

When planning this project, the local city authorities cooperated in changing the sidewalks and pavement leading to side driveways so that the foundation and mast for each signal and gate is located just clear of the paved portion of the street, and as close as practicable to the nearest main track rail. Thus the signals and gates are in a position to provide maximum protection. City authorities also cooperated in establishing one-way traffic on each of these driveways along the sides of the track. "No-Left-Turn" signals were installed on these drives to permit street vehicles to turn into the street to the

"right", but to protect them from turning to the "left" onto the track if a train is approaching.

As a pre-warning, the signal lamps, the gate arm lamps and the bells are started in operation for 6 sec. before the gate arms are released, and then the arms go down in 10 sec. The gate arms are raised in about 10 sec. At each crossing the gate motors are fed by a set of 16-volt, 160-ah. Edison storage battery, and each track circuit is fed by one cell of 160-ah. Exide storage battery. The white strips on the gate arms and on the barricades around



Crossing protection indicator

the foundations consist of white Scotchlite reflector material, made by the Minnesota Mining & Manufacturing Company.

North of the Station

About $\frac{3}{4}$ mile north of the passenger station, Fifth street crosses the tracks at an angle and Rafter Street and Bergen Street cross the tracks and connect with Fifth Street. This entire crossing area was previously protected by a watchman on duty each trick. This protection was not satisfactory, because of the heavy street traffic, and therefore, flashing-light signals and gates were installed as shown on Fig. 2. This protection is controlled automatically by track circuits. In order to allow vehicles plenty of time to get off the crossing, gate D does not start to lower until after Gates A and C are down.

At North Grand Avenue and Sixth Street, there are four sets of flashing-light signals and gates. The track

circuit controls for the protection at Fifth, Rafter, Bergen, Sixth and North Grand include two-speed control with time cut-outs. The track circuit controls provide for two-speed control, the first start set for 30 m.p.h. and the second start for 15 m.p.h. When an approaching train passes over the time-measuring section at a speed of more than 15 m.p.h., the gates will automatically lower when the train enters the first track control section, and if the speed is less than 15 m.p.h., the first track control section is automatically excluded from the control, and the gates will automatically lower when the train enters the second track control section.

When a train occupies the first track control section for approximately 60 seconds, the gates will automatically be raised, and when the train resumes movement toward the crossing, the gates will again be lowered when the train enters the second track control section, approximately 600 ft. from crossing. When a train occupies the second track control section for approximately 60 seconds, the gates will automatically be raised, and when the train resumes movement toward the crossing, the gates will again be lowered when the train enters the third track control section, approximately 300 ft. from crossing. After a train has once stopped on a track control section and then moves forward, speed of the train must be governed by time table instruction, and must not exceed 5 m.p.h. until the engine or first car reaches the crossing.

Further, in connection with the installations that are straight automatic operation, special circuits were provided so as to prevent the gates from raising part way and then lowering when a train is just receding from the crossing, at a time when a train is approaching on the other main track. This was accomplished by automatically extending the pick-up circuit of the gate control stick relay through the time-measuring sections. This prevents street traffic from starting and gates coming down on cars.

This crossing protection project was planned and installed by railroad forces, under the direction of H. C. Sampson, superintendent signals. The flashing-light signals and gates were furnished by the Western Railroad Supply Company; the relays, rectifiers, and instrument cases by the General Railway Signal Company; and wire and parkway cable by The Okonite Company.