



GATES ARE SHORT-ARM type, that extend across approach lane of traffic only

Centralia Has Protection at All Crossings

New underpass for one main street; gates at four crossings; flashing-light signals at six crossings; and 12 other crossings are closed by barricades

THE CITY OF CENTRALIA, ILL., 14,000 population, has cooperated with its four railroads, and the State Highway Department, in an overall grade crossing project, that is providing increased safety, as well as reduced delay for street traffic.

Formerly, in this city, there were 23 grade crossings of streets with railroads. The double-track main line of the Illinois Central extends practically north and south through the city, the passenger station being east of the tracks south of Broadway Street. Entering the city from the northwest, the Burlington previously ran south in Chestnut Street, parallel with the IC to Calumet Street, then crossed the IC and extended south to Paducah, Ky. Near 13th Street, a connection from the Burlington extends east to Hester Street, to connect with the Southern, going eastward to Louisville. The Southern uses Burlington tracks through Centralia between this connection at Hester Street, mentioned above, and a junction in the north part of the city. The Missouri & Illinois, from the southwest, crosses the Burlington near 7th Street, then connects with the IC, using the IC tracks from there through Centralia.

Through Centralia, the Illinois Central operates 12 passenger trains and about 15 freight trains daily. The Burlington operates two passenger and about 13 freight trains, and the Southern about 6 freight trains daily. The M&I operates two red ball freight trains daily and two local freight trains daily except Sunday. All IC passenger trains stop at Centralia. The maximum speed for trains on any of the railroads between McCord Street and 5th Street is 30 mph.

Three Problems to Solve

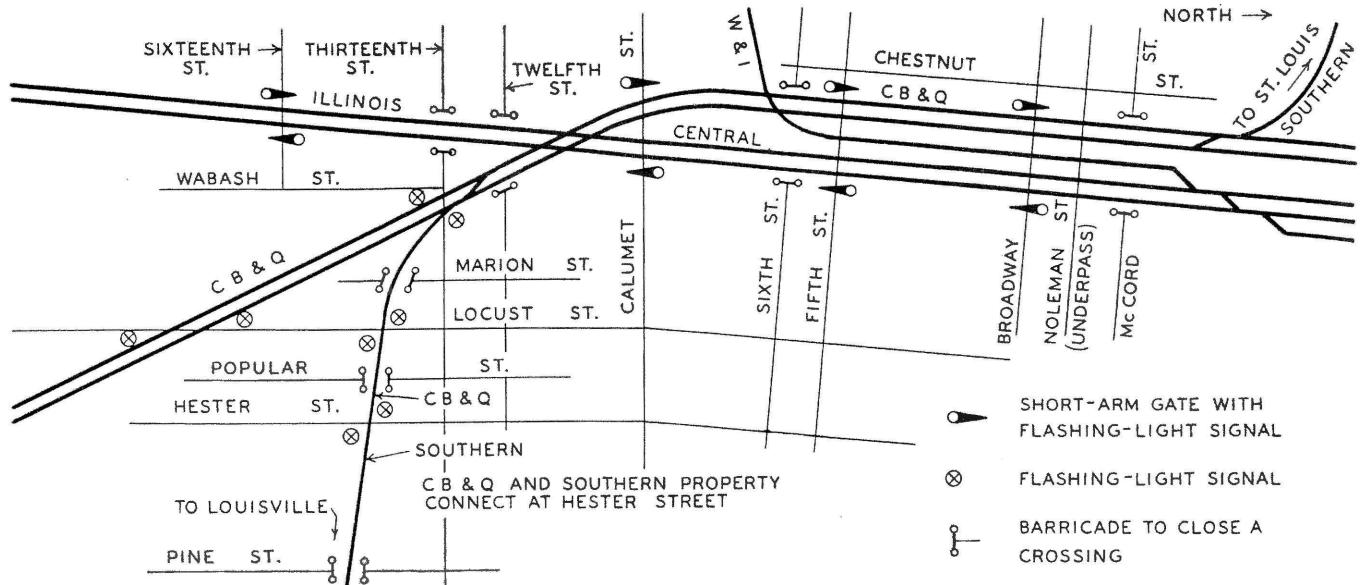
Centralia had three highway-traffic grade crossings problems. Prior to the improvement: (1) State Highway 161 was routed on Broadway Street which is an important business street in Centralia. Because of the heavy flow of traffic, both local and through on this street, delays and congestion resulted when trains were moving over the crossing. To eliminate these delays, the State of Illinois and the Department of Highways prepared a proposal for an underpass for this state highway at Noleman Street, not previously open over the railroads.

(2) The City of Centralia, because of its normal growth and expansion needed to improve Chestnut Street. A satisfactory improvement plan was difficult because the Burlington tracks were located in this street. A proposal was made that these tracks be moved out of the street, which would permit the desired improvement of Chestnut Street.

(3) The important crossings of Broadway, Fifth and Calumet over the tracks of the IC and the CB&Q had long been under discussion between the City and the railroads. All were in agreement that additional protection was desirable; however, proper type of protection could not be installed at all the streets on account of physical limitations because of the Burlington tracks in Chestnut Street.

After many informal meetings between the railroads, the State Highway Department and the City, the Illinois Commerce Commission under the direction of their Chief Engineer R. B. Thomas, with full cooperation of all concerned, made a study of all three problems, and at formal hearings held for this purpose, a record was compiled setting forth the facts and findings in the case. In brief these were as follows:

By moving the Burlington tracks out of the street, proper crossing protection could be provided at three of the important crossings in an eco-



EVERY CROSSING IN CENTRALIA is now protected as shown in this plan, Fig. 1

nomical manner. Such a move would shorten the length of the proposed underpass for the State Highway at Noleman Street, resulting in a substantial economy. Eight streets were to be protected by automatic devices and twelve crossings were to be barricaded to vehicular traffic.

Previously CB&Q watchmen and IC watchmen were on duty at Broadway 7 a.m. to 11 p.m. to protect train movements on their respective roads. At McCord Street, one crossing watchman was on duty from 8 a.m. to 6 p.m. to protect both IC and CB&Q trains.

Improvement Program

Gates and flashing-light signals were installed to protect both the Illinois Central and Burlington tracks, jointly, at the crossings at Broadway, Fifth and Calumet Streets, and to protect the tracks of the IC only at 16th Street crossing. Flashing-light signals were installed at: (1) Beech Street on the Southern in the north part of the city; (2) at 18th Street on the Burlington; (3) at 13th Street on the second line of the Burlington; (4) at Hester Street on the Burlington; and (5) at Hickory Street on the Missouri & Illinois. Flashing-light signals, previously in service were retained as they were on the double-track Burlington at 17th Street and Locust Street, and on the single-track Burlington at Locust Street.

The 12 crossings which were closed by erecting barricades are as follows: Cherry Street and Pine Street on the Southern; McCord Street on the IC and CB&Q; 6th Street on the IC, CB&Q and M&I;



BARRICADES WERE INSTALLED to close twelve crossings

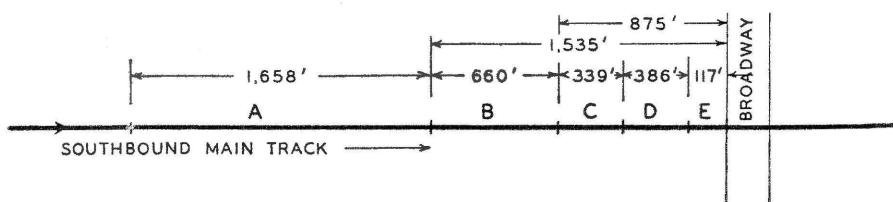


FIG. 2—Time-speed measuring track circuits

12th Street on the IC and CB&Q; 13th Street on the IC; Marion Avenue on the single-track CB&Q; 14th Street on the single-track CB&Q; 12th Street on the IC and CB&Q; Poplar Street on the single-track CB&Q; intersection of 8th and Walnut Streets on the M&I; and Cherry Street on the M&I.

Speed Selection Controls

The crossing gates and flashing-light signals are controlled automatically by track circuits. Freight trains usually proceed through the crossing

protection area at 30 mph or less. The IC passenger trains stop at the station which is south of Broadway. To avoid unnecessary delay to street traffic, speed selection controls were included in the project so that the gates are lowered for about the same time prior to arrival of a train at a crossing, regardless of whether the speed is 30 mph or slower.

Referring to Fig. 2, time-element relays measure the time while the front wheels of a southbound train proceed through the length of each track circuit and this measures the speed. If the front wheels of a south-

bound train pass through the length of track circuit A in less than 53 seconds, the speed is more than 20 mph. Therefore, when the leading wheels enter track circuit B the crossing protection at Broadway is set in operation. On the other hand, if 53 seconds or more expire while the leading wheels are passing through track circuit A, the crossing protection will not be set in operation until the leading wheels enter track circuit C. This gives an approach control of 875 ft. which is adequate for 20 mph or less.

Time Cut Outs

If the train stops in track circuit C, without entering track circuit D, for 45 seconds, the protection will be cut out and the gates will go up. Similarly if the train stops in track circuit D without entering track circuit E for more than 70 seconds, the protection is cut out and the gates will go up. These time cut outs are especially useful during switching movements. When track circuit E is occupied the crossing protection is controlled directly with no cut out.

Route-Selection Control

The freight yard is just south of Centralia, with the northbound main on the east side of the yard, and the southbound main on the west side. The southbound freight trains are routed from the southbound main track to the yard lead via interlocked switch No. 14 reversed, as shown in Fig. 3.

When this switch is normal, for a through move on the main track, the approach control section for the crossing protection at Sixteenth street begins at the southbound home signal No. 1. If the switch No. 14 is reversed, to route a southbound freight train to the yard lead, the approach control for the crossing protection is shortened, to start at "A" which is

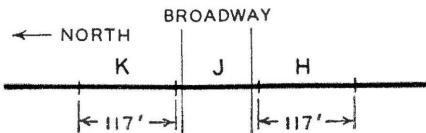


FIG. 4—To cut a train at a crossing

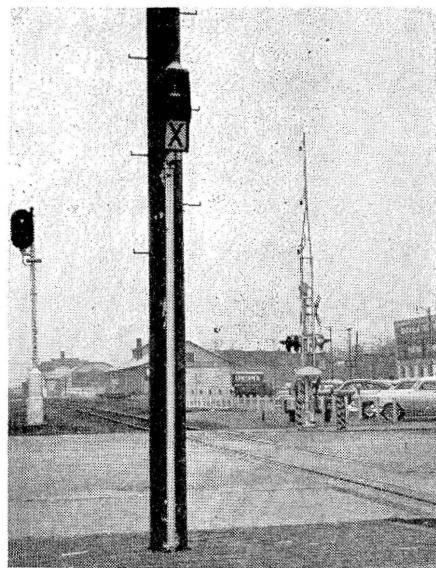
the clearance point on the turnout. This provides adequate warning time because the freight trains reduce speed to about 15 mph to go through the turnout to the yard lead.

To Cut Train at Crossing

Frequently a northbound CB&Q freight may be stopped for 10 to 15 minutes or more at a location that blocks the Broadway crossing. In such an instance the crew cuts the train to allow street traffic to move over the crossing. Special circuits were installed so that when a northbound CB&Q train is cut at this crossing, the protection will be cut out and the gates will be raised. Referring to Fig. 4, the special circuit requires that northbound K stick relay must be up, and track relays K and H must be down, with track relay J up.

Crossing Protection Indicator

To avoid blocking the Broadway crossing during station stops, southbound passenger trains stop with the rear south of Broadway; and northbound trains stop with the locomotive south of a white line at the platform about 110 ft. south of Broadway as shown in Fig. 5. As a northbound train approaches Broadway, the flashing-light signals operate and the gates are lowered in the usual manner. After the locomotive occupies track circuit B for 70 seconds, which insures that the train has stopped, the aspect of wayside train signal "X" changes from "green" to "red," and the gates are raised to allow



INDICATOR AT end of platform

street traffic to proceed over the crossing while the train is making the station stop. When ready to depart, the engineman starts the train slowly, easing the front wheels of the locomotive onto track circuit C. This sets the protection in operation and lowers the gates; then the aspect of the special wayside signal "X" changes from "red" to "green." This wayside signal "X" is made up of two 90-deg. Fresnel lenses, arranged with lamps, in a sheet-metal case that is attached to a wood pole standing in the center of the station platform at the property line on the south side of the street.

Motor Car Protection

During some periods of the day, the traffic on Broadway is so heavy that there might be some difficulty in operating a track motor car over this crossing. Therefore, special circuits and key controllers were installed. When the signal maintainer or track foreman is ready to operate his track car over the crossing, he goes to the key controller stand where he inserts his switch padlock key, and turns it. This sets the protection in operation and lowers the gates. When he removes his key, the gates stay down for 20 sec. and then are raised. This gives the man time to operate his motor car over the crossing. The picture shows two key controller cases on the same pedestal. One is for the IC, and the other is for the Burlington.

The time-element relays are the thermal type; the flasher-relays are the shelf type, on hangers. The remainder of the relays are the plug-in type. At each of the major layouts, such as at Broadway, the relays and

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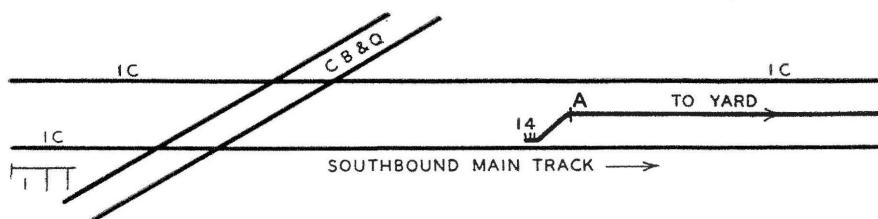


FIG. 3—Route-selection shortens control for slow-speed moves

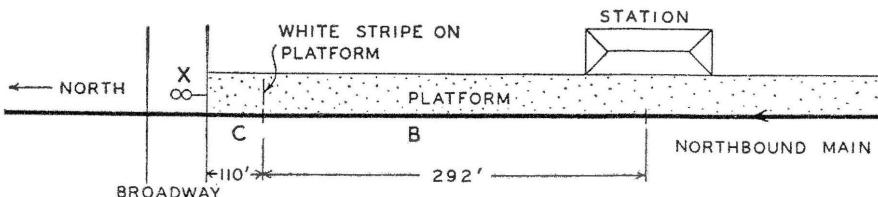


FIG. 5—Indicator tells engineer when crossing is protected



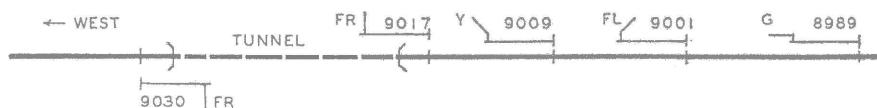
INDICATING LAMP burns steady, then flashes showing motor-car protection is "OK"

approaching within limits) he inserts his switch key in the controller case on a relay, or signal case at the end of the tunnel, turns the key to the right 90 deg., then back, and removes the key. If no train is approaching the tunnel, this action will cause the home signals at each end of the tunnel to display a steady red aspect for 5 sec. and then a flashing-red aspect for 15 min. As shown in Fig. 2, the first signal in approach will display a yellow aspect; the second signal in approach the flashing-yellow aspect; and the third signal in approach, the green aspect.

A normally-dark white indication lamp on the switch-key controller case burns steady for 5 sec. and then will flash 55 times per min., indicating to the motor car operator that the protection system is in operation, and that he has 15 min. to pass through and clear the tunnel. If a westbound train had passed signal

restricted speed" signal, indicating that a motor car is in the tunnel. For a second motor car movement through the tunnel while the home signal is still flashing-red, the operation of the key controller will change flashing-red indication to a steady red for 5 sec., after which the signal will display flashing-red for another 15 min. A train encountering such a signal must stop, then proceed at restricted speed to the next signal, keeping close lookout for track car. When a train passes a flashing-red signal, the flashing-red indication changes to steady red; so as to provide the necessary protection for a train in the tunnel.

When the key controller is operated, a relay and its repeater are released, which transfers the signal lighting circuit to the red aspect and introduces flashing control, all of which are automatically cut out by the 15-min. time element relay. None



8989 (Fig. 2), the motor car operator could not set signal 9017 to the flashing-red aspect, even though he operated the switch-key control. Accordingly, he would know that a train is approaching and he would not enter the tunnel. The same information is, of course, shown by the motor car indicator.

Signal 9017 with a flashing-red aspect is a "stop and proceed at

of these special controls function if the approach relay is down when the key controller is operated. The 15-min. timing is obtained by using a GRS type B time-element relay. The flasher relay is a Union model FN 27. The motor car indicators are the MC-1, position-type. Design and installation of the motor car protection controls was handled by the Union Pacific signal department.

Centralia Has New Gates

(Continued from page 40)

battery are in a concrete house. At other locations the relays are in sheet-metal cases, and the batteries are in concrete boxes. The houses and cases were wired in the IC signal shop at Carbondale, Ill.

At each crossing, a set of 7 cells of 160-a.h. Exide lead storage battery feeds the gate motors. If the a.c. fails, this battery feeds the lamps in the flashing-light signals and on the gate arms. The batteries are on floating charge from Fansteel rectifiers. In each house, the low-voltage transformers, rectifiers, terminals and arresters, are on a $\frac{3}{4}$ -in. plywood panel. Also the thermal time-element relays are on a $\frac{3}{4}$ -in. plywood panel.

The State of Illinois paid for the underpass; the City of Centralia paid about \$31,000 on the expense of moving the Burlington tracks and connections thereto; and about \$29,000 toward the total cost of the new crossing protection.

The Illinois Central prepared the detail plans and did the construction work for the four gate crossings. The protection at the other crossings was installed by the signal department of



KEY CONTROLLER puts gates down

the railroad involved. The gates and flashing-light signals were furnished by the Western Railroad Supply Company, and the relays by the General Railway Signal Company.