

maliciously-inclined persons from pulling these connections over the rail to be mashed by passing trains, the loop along the web of the rail is held in place by a piece of iron wire about 1 ft. long, plugged into the rail at each end by a channel pin. As an extra precaution, in case the stranded bond should be torn off, an auxiliary connection, consisting of a solid bond wire, is bolted to the top of the bootleg and run under the rail, and is plugged into

the gage side of the web. This auxiliary connection is bent below the level of the top of the ties to prevent damage.

The preparation of plans for highway crossing signal installations has been standardized. Only one plan, a general layout, is required for each installation. The detail wiring diagrams are included in a set of standard drawings. One diagram shows the terminal arrangement in a standard case. The wiring for each

of the relays, or combination of relays, is shown on separate standard drawings. Thus, in preparing plans for a proposed installation, one drawing is prepared to show the layout, and then prints are made from only those standard drawings that apply to the requirements of the local conditions.

These installations were made in accordance with the standard signal practice of the Atlantic Coast Line.

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# Crossing Signals on the Southern

The use of the a-c. primary battery power supply system and wooden relay case to prevent frost troubles are features

AS A PART of the Public Works program in North Carolina, crossing signals are to be installed on the lines of the Southern Railway at 28 crossings in North Carolina and 5 in South Carolina. Fifteen of these projects were complete and in service on February 15, and construction is being handled rapidly in the remainder.

## General Features of Signals

As shown in the accompanying illustration, reproducing a photograph made from the highway, the signals as installed on the Southern are of the flashing-light type with back lights so that the indication is shown in both directions along the highway by each signal. Each signal is equipped with a reflector-button sign reading "Stop on Red Signal." A sign indicating the number of tracks is mounted above the signal, and a standard "Railroad Crossing" cross-buck sign is mounted on top of the mast. A crossing bell is mounted on one of the signals at each crossing. The complete signal, therefore, conforms with the standards of the A.A.R. Joint Committee on Grade Crossing Protection shown in Fig. 7 of bulletin No. 1.

On multiple-track lines, as well as on single-track lines, the automatic track-circuit control is arranged so that the crossing signal will operate for trains running in either direction on all tracks, the track circuits being located so as to provide at least 20 seconds operation of the signal prior

to the arrival of the fastest train at a crossing.

On territory where straight alternating-current block signaling is in



Signal at crossing of Highway 21 and Southern track at Pineville, N. C.

service, the track circuits are of the alternating-current type, and the flashing-light signals are operated normally from the a-c. supply. In case of an a-c. power outage, the feed for the signals is automatically cut over to a set of 1,000-a.h. primary cells which are normally on open circuit, and are provided solely as a

stand-by supply. On lines not now equipped with automatic signaling, the track circuits, as well as the signals on the new crossing protection projects, are operated with primary battery as the source of power supply.

As shown in the illustration, the signals are the General Railway Signal Company's Type-XB. The lamp body is made of stamped sheet metal, housing a reflector and a front lens  $8\frac{3}{8}$ -in. in diameter with a  $5\frac{3}{8}$ -in. lens in the back light. The instruments at each crossing are housed in a wooden case and the battery is located in a concrete box. Underground parkway cable is used for the runs between the instrument case and the signals, as well as for the runs to the track connections.

## Construction by Railroad Forces

The signal forces of the railroad prepared the plans and requisitions for the materials. The items of a similar character, for all of the proposed installations in one state, were assembled as one requisition, and bids were secured from the manufacturers. The plans and requisitions were then forwarded to the state highway department which purchased the materials and shipped them to the designated point on the railroad. The signal forces of the railroad handled the construction. The state paid the manufacturers for the materials, and paid the railroad for the labor, these funds being taken from the allotment of Federal P.W.A. appropriations.