Semi-Automatic Gates on the Milwaukee

Installation, including flashing lights and bells, is operated automatically by through train movements and manually for switching movements on any track.

AN INTERESTING installation of crossing protection has recently been completed by the Chicago, Milwaukee, St. Paul & Pacific on the Chicago Terminal division at Narragansett avenue in Chicago. Two main passenger tracks, two freight mains, and eight yard tracks are involved. Railroad traffic includes 42 passenger trains and 25 to 30 freight movements daily, as well as numerous switching movements. The yard tracks involved at this crossing constitute a portion of the Milwaukee's Galewood yard, which handles the make-up of transfer trains and the routing of cars to freight houses and storage tracks in the city of Chicago.

Narragansett avenue is a heavily traveled street, crossing the Milwaukee tracks at right angles. In addition to normal highway traffic, regularly scheduled trolley buses of the Chicago Surface Lines are routed over the crossing. The trolley buses are operated on schedule about every 15 minutes in each direction through-out the major portion of the day. This interval is reduced to about 10 minutes during rush hours in the morning and evening.

Prior to the recent installation, the railroad employed one watchman for each of three tricks at each side of the crossing, and the Chicago Surface Lines employed one man on each trick. Highway protection now includes short-arm gates, flashing lights, bells, and watchmen. In addition, special two-position dwarf signals, interlocked with the crossing protection controls, are provided to govern train movements over the crossing on four freight tracks.

Protective Devices

The railroad tracks in this vicinity extend approximately east and west, while the highway extends north and south. The two passenger mains are on the extreme north, with the two freight mains immediately to the south, as indicated in the accompanying diagram of the crossing layout. South of the two freight mains are the six yard tracks and two additional freight mains. Short-arm crossing gates, each with a single set of flashing-light signals and a bell, are located at the right of the highway, which is 40 ft. wide, in approach to the crossing for highway traffic in either direction. In addition, an extra short gate arm and a double set of flashing lights, mounted back to back, are provided on the right of the highway to approaching northbound traffic, just south of the westbound freight main, between this freight main and the yard track adjacent on the south. This center gate is operated only when train movements are being made on the two passenger or two northerly freight mains. The gate arms are 18 ft. long. Three lamps are used on each gate arm. One lamp is located approximately 2 ft. from the tip of the gate. The spacing between this lamp and the center lamp is 3 1/2 ft., while the third is located about 5 ft. from the center lamp and about 4 ft. from the curb line. Ten-volt, 18-watt bulbs are used in the gate lamps, as well as in the flashing-light signals. An extra set of flashing lights is located at the left of the pavement on the south side of the track. The purpose of this extra set of lights is to provide protection in case a bus or truck obscures the view of the gate and signals at the right. Two watchmen's shelters are provided, one north and one south of the crossing, on the right to ap-
proaching highway traffic. A watchman is on duty in each house, this protection being provided 24 hours a day. The special dwarf signals for governing freight train and switching movements are provided for the eastbound and westbound freight mains and for the two yard tracks on the extreme south.

Automatic Control for Passenger Tracks

The control is automatic on the two passenger main tracks, protection being given for both directions on each track by the use of interlocking relays controlled by track circuits. On the eastward main the approach is 2,886 ft. for normal direction and 2,595 ft. for reverse direction; on the westward main, 2,595 ft. for normal direction and 2,995 ft. for reverse direction. Annunciators are installed for the benefit of the crossing watchmen. They operate only for trains approaching the crossing on the passenger tracks. The approach control circuits provide a minimum of 30 seconds of protection before the arrival at the crossing of a train traveling 60 m.p.h. This warning time includes 5 seconds of pre-warning, during which only the bells and flashing-light signals operate, approximately 10 seconds while the gates are being lowered, and 15 seconds during which full protection is given by bells, flashing lights and gates. Separate crossing track circuits are provided on the two passenger mains. While these circuits are occupied, all control circuits to the gates are broken and the gates remain down.

Manual Control System

In addition to the automatic control installed on the passenger tracks, a comprehensive system of manual control is provided for train movements on the other tracks. A small sheet-steel control box is located in the watchman’s shelter north of the tracks. This might be termed a “master” control box. Mounted on the panel are five indication lights and below them five toggle switches. Two of the lights, one on the extreme right and one on the extreme left, are approach-indicating lights for the main passenger tracks; when a train enters an annunciator circuit the proper indicating lamp is illuminated red and an annunciator sounds. The toggle switches immediately below these lamps are used for cutting out the annunciator bells. The circuits are arranged so that each annunciator bell cuts in again as soon as the annunciator relay is re-energized, thus calling the switchman’s attention to the fact that the toggle switch is in the cut-out position. Restoration of the toggle switch again cuts out the bell and restores the circuits to normal. The two toggle switches on either side of the center are used for cutting around the westbound and eastbound passenger track interlocking relay contacts in the control of the master crossing relay. The lamp above each of these toggle switches is illuminated red when these switches are reversed and protection is cut out. The center toggle switch provides direct manual control of the crossing protection. The lamp immediately above the manual control switch is illuminated green and is flashed by the crossing flasher relay when protection is effected for the crossing.

Lamps and toggle switches, for approach indication on the passenger tracks and bell cut-out, respectively, are provided also at the watchman’s shelter south of the tracks. In addition, a quick-acting double-pole toggle switch is provided at this loc-
cation, which, when operated, de-
energizes the master crossing relay,
causing normal protective action by
the gates, bells and flashing lights
north and south of the crossing. At
the same time, the quick-acting and
double-pole features are utilized to
pick up a normally-de-energized cen-
ter-gate cut-out relay, which prevents
operation of the gate and flashing
lights located between the yard tracks
and the westbound freight main. This
toggle switch is operated when pro-
tection is to be effected for the yard
tracks only. The cut-out feature for
the center gate prevents highway traf-

cic from being stopped on the yard
tracks when protection is to be pro-
vided for train movements over these
tracks.

In order to further simplify man-
ual operation, another set of controls
is mounted in a cast-iron pedestal-
mounted box located between the
west-bound freight main and the yard
tracks, on the opposite side of the
highway from the center gate installa-
tion. The box is locked with a switch
lock. Trainmen may provide protec-
tion for yard movements by opera-
tion of a quick-acting toggle switch,
similar to the one in the shelter south
of the tracks (the same type of pro-
tection being given), or protection
may be established by trainmen for
the main freight or passenger tracks
by operation of a different (manual)
toggle switch, in which case all pro-
tective devices, including the center
gate and flashing lights, operate.

The manual control switch in the
north shelter, the manual toggle
switch at the center control station,
and the two quick-acting toggle
switches, one at the center control
station and one at the south shelter,
are all connected in series so that all
must be in the normal position before
the gates can be raised.

Control for Yard Tracks

For movements on the two main
freight tracks and on the two yard
tracks on the south, which are not
equipped with track circuits, control
is in all cases manual. These tracks
are each equipped with a dwarf sig-
nal which normally displays red as
long as the gates are clear; when the
gates are lowered each of these signals
displays green for a caution-proceed
aspect. On the six intermediate yard
tracks no track circuits are used.
When trains are using these tracks,
the gates are controlled manually.
Rules require that no train or switch
movement on these tracks is to pro-
cede over the crossing without first
having stopped and received a pro-
cceed hand signal from the watchman.

In all cases when a trolley bus ap-
proaches, one of the flagmen must go
out on the crossing, observe whether
trains are approaching, and give a
hand signal. The watchmen and the
manual-control arrangement are nec-
300 a.h. This battery is charged by
an RX-42 rectifier. Each track circuit
is fed by three cells of Edison 500-a.h.
primary battery. The relays, recti-
fiers, etc., are located in a sheet-metal
case as shown in one of the illustra-
tions. All of these relays are Union
DN-11E13 type. On account of the
heavy lamp load, two W-10 trans-
formers are used. The flashing-light
signals and the gate equipment were
furnished by the Western Railroad
Supply Company.

This installation was designed and
installed by the signal department
forces of the Milwaukee, under the di-
rection of L. B. Porter, superinten-
dent of telegraph and signals.