Massachusetts Bay Transportation Authority

Commuter Rail Grade Crossing at Washington Street in Gloucester

September 14, 2022

Agenda

- Overview of Grade Crossings
- How Grade Crossings Operate and Function
- Testing and Inspection Requirements
- Crossing Improvement Actions
- Next steps

Commuter Rail Grade Crossings in Gloucester

- Total of 292 grade crossings on the MBTA commuter rail system
- In May of 2022 service was returned to Gloucester after the reopening of the Gloucester Draw Bridge and improvements from the PTC project were completed. These improvements included upgraded safety infrastructure at crossings.
- Washington street grade crossing has 26 scheduled crossing activations per day

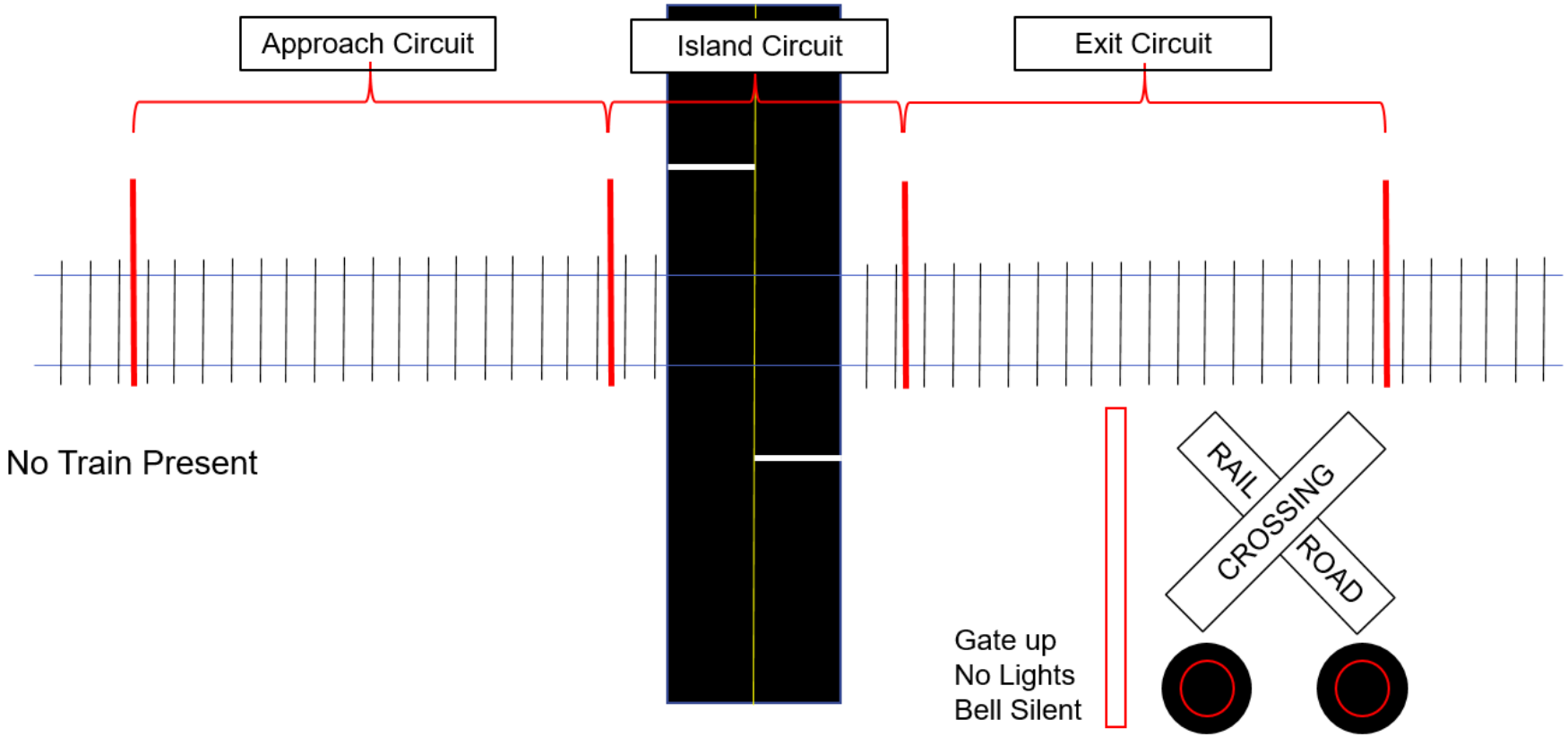
Grade Crossing Protection System

Grade crossings

At each grade crossing, there are 3 separate operating circuits:

- an approach circuit
- an island circuit
- and an exit circuit

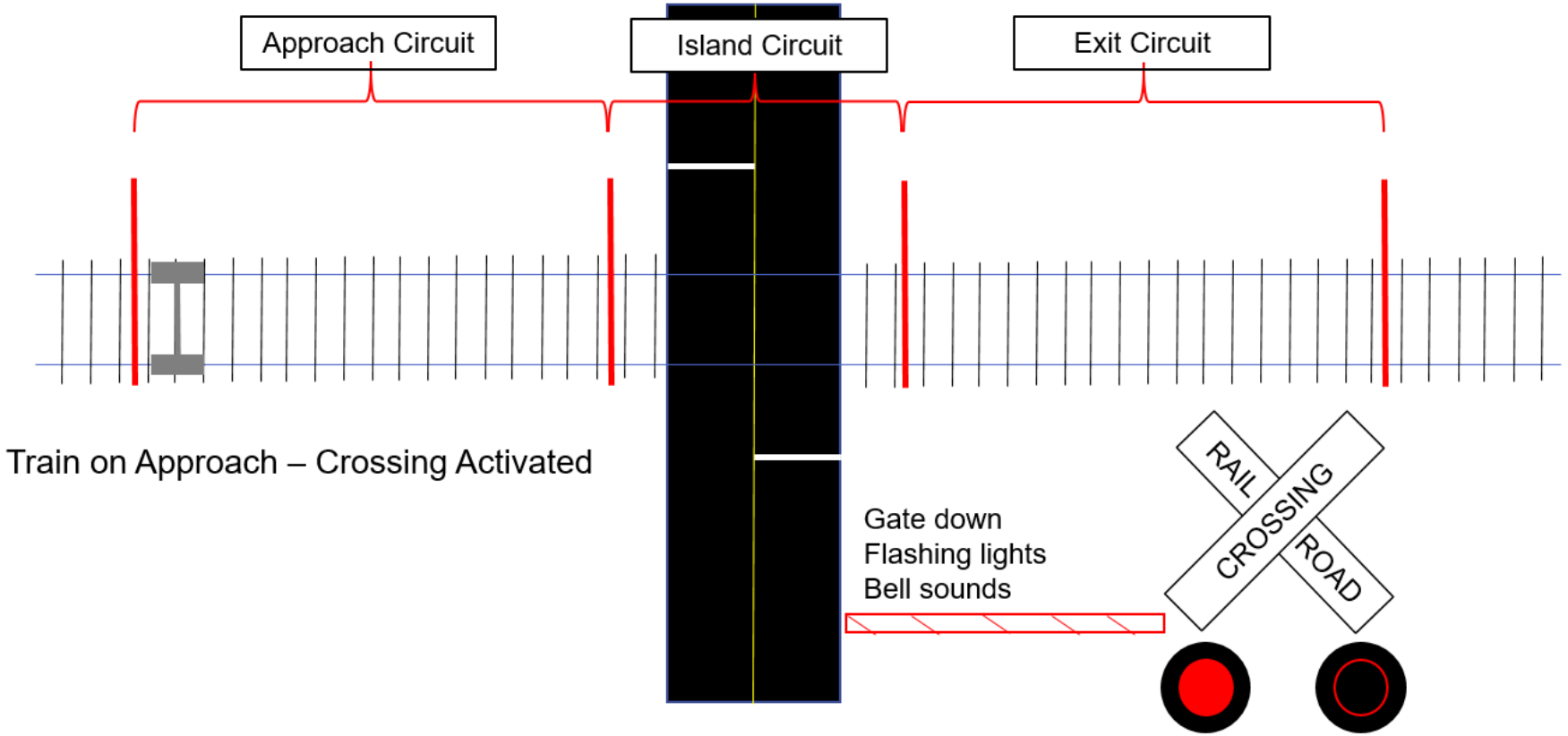
1. **Constant voltage** induced into the rail creates a loop which looks for the presence of a train. This is achieved when the transmitter wire is attached directly to the rail.



Grade Crossing Protection System

2. An audio-tuned frequency shunt at the outer limit of the circuit completes the detection circuit

3. A processor unit monitors the approach circuit looking for changes in voltage. The unit constantly calculates the movement of trains to activate the crossing with a determined warning time

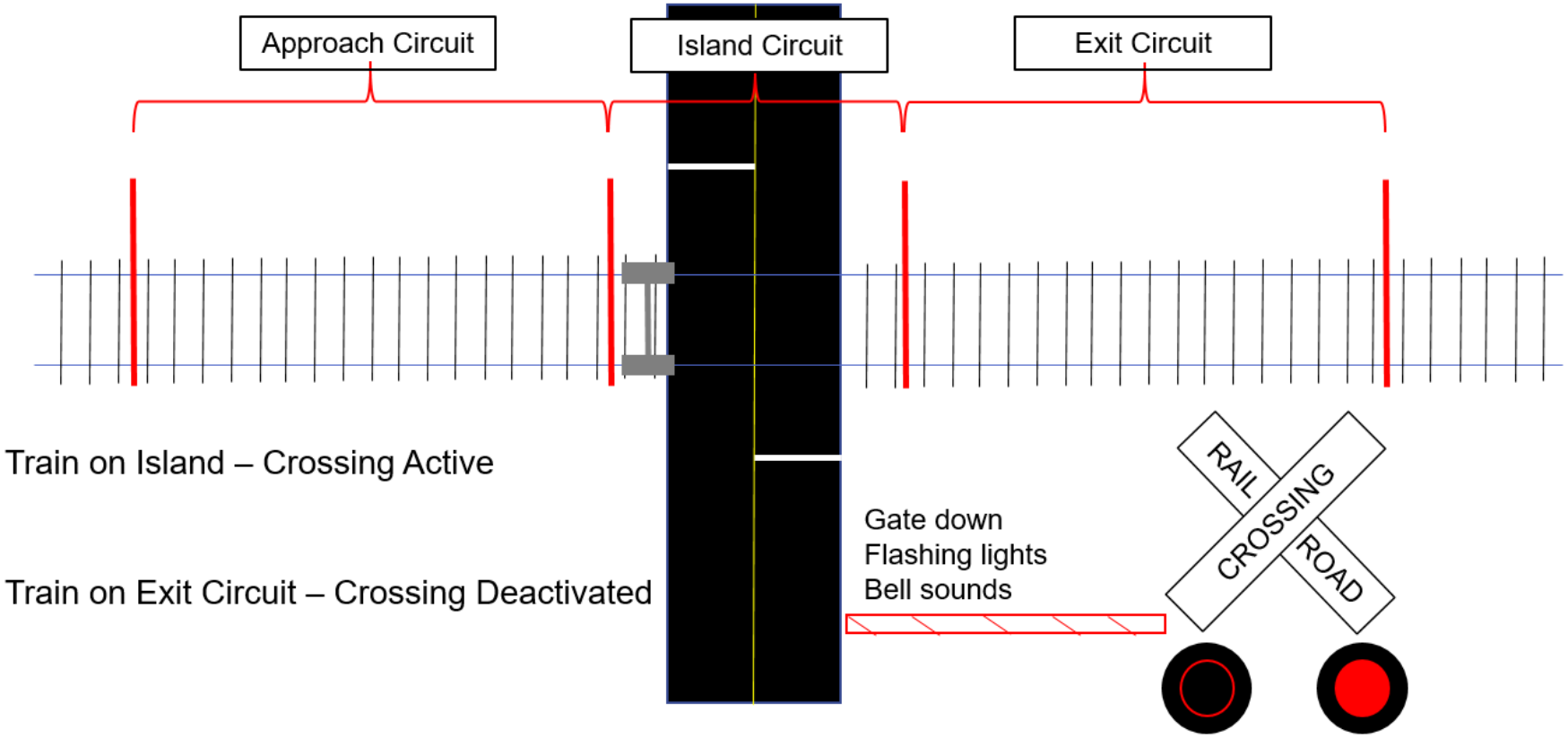


Grade Crossing Protection System

4. Activation and deactivation of safety equipment

A train needs to enter the approach circuit to **activate** the crossing.

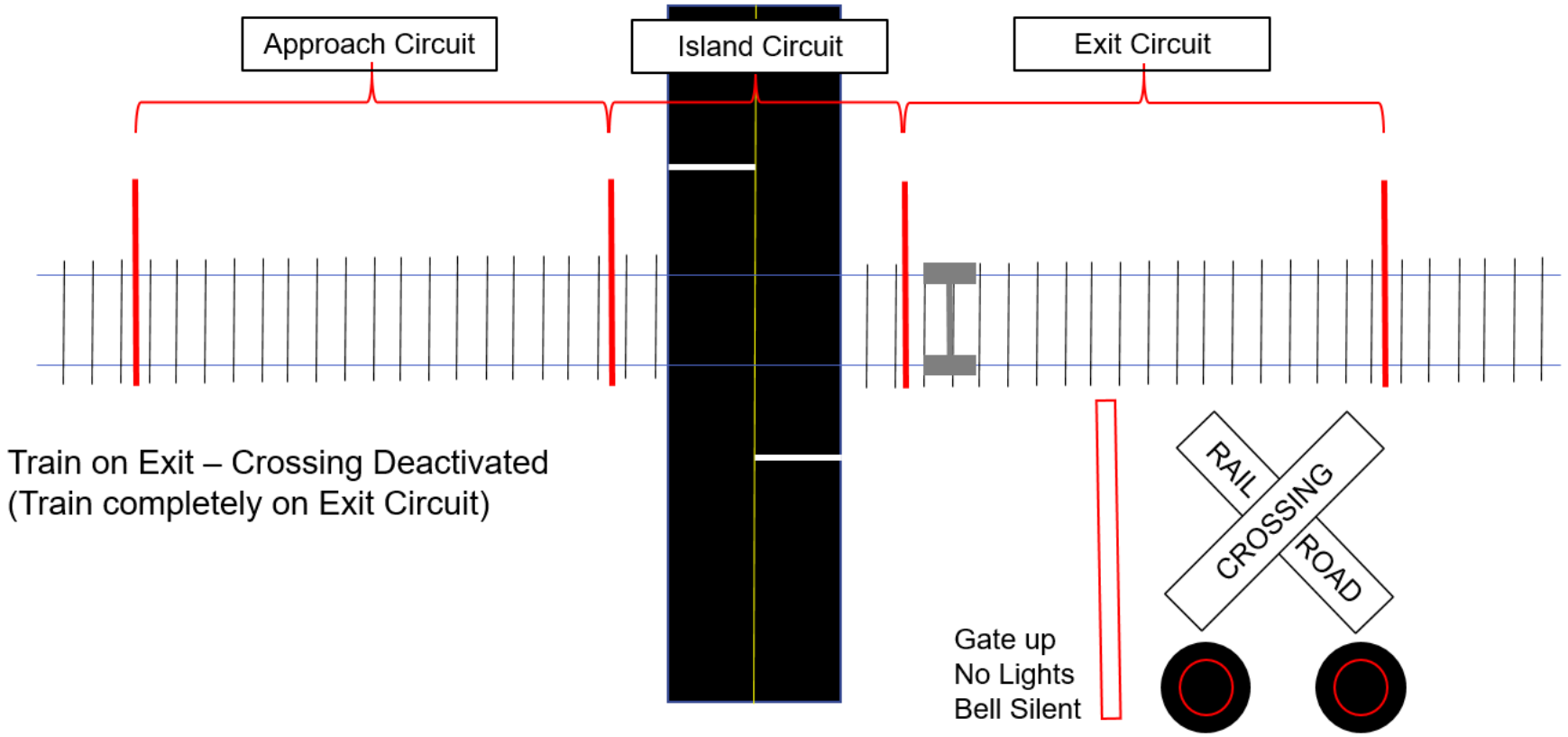
A train must make a full move through all 3 circuits in succession to **deactivate** the equipment at a crossing.



Grade Crossing Protection System

5. De-activation

As the train trails away from the crossing, a return-to-normal voltage allows the processor to calculate the direction of travel and determine when to de-activate safety equipment.



Grade Crossing Protection System – Default to Safe Mode

6. Default to safe mode

When the crossing warning and protection system senses a train (or conditions that suggest the presence of a train) occupying the approach circuit, the crossing will default to **safe mode with the gates in the down position.**

When a crossing is in **safe mode** but there is no train in the area, a signal maintainer is dispatched to the crossing to identify and correct any issues.

Train crews also adopt **"stop and protect"** orders for these crossings until the crossing is returned to normal service, to add an additional layer of protection.

Testing and Requirements

Federal Compliance

- The MBTA operates in full compliance with federal regulations for signal and track inspections and testing and holds itself to additional, more restrictive operating standards which go beyond federal requirements
- Federal Railroad Administration (FRA) inspectors routinely visit MBTA property to ensure compliance of all railroad operating rules

Regular Testing and Maintenance

- All active warning and protection systems at grade crossings are subject to 30-day testing, which includes checking the performance and operation of all vital components including wiring, relays and electronic components
- The scope of the testing regime increases for 90-day testing, annual testing, and every 10 years

Signal Maintainer Training

- Keolis Signal Maintainers must receive extensive training before becoming qualified to work on any MBTA Territory
- Training takes a minimum of 1 year

Crossing Improvement Actions

Actions Taken at Washington St. Crossing in Gloucester:

- ✓ Increased the duration of crossing protection (gates down) for inbound trains by **30 seconds** (from 1.5 minutes to 2 minutes), so that crossing gate arms stay down for the duration of an inbound station stop.
- ✓ Completed additional testing: Yearly testing (26C) > performing as intended
- ✓ Performed additional checks: track connections, insulated rail joints, termination shunts
- ✓ Proactive part replacements when needed or to upgrade: track leads and termination shunts
- ✓ Cleared debris and removed vegetation
- ✓ Cleaned rail heads (will continue through fall)

Crossing Improvement Actions

Actions to be Completed at Washington St. in Gloucester:

- ❑ Track work and drainage: Equipment (vacuum truck) being secured for work to take place on Saturday, September 17th for removal and replacement of contaminated ballast (stone)
- ❑ Awaiting manufacturer analysis for potential further actions
- ❑ Install new 18x24” crossing signs with emergency 800 number
- ❑ Paint new warning striping scheme on asphalt at crossing