# Research in Progress

## Energy Consumption, Cost and Emissions of MBTA Rapid Transit Vehicles

### Research Need

The Massachusetts Bay Transportation Authority (MBTA) spends $38 million on electricity for traction power annually. Sustainable strategies are required to reduce energy consumption, costs and environmental impacts.

### Goals/Objectives

1) Analyze real-time train position and electricity consumption data to quantify the energy use, costs, and subsequent emissions of an electric rail vehicle.

2) Expand current knowledge on how the acceleration of the trains relates to the demand draw of the traction power network.

3) Develop planning metrics for energy use per vehicle mile to assist with planning for future energy demand and Operations & Maintenance (O&M) budgets.

4) Demonstrate the potential of optimal drive cycle changes to reduce energy consumption, costs and emissions.

### Project Information

This project is being conducted as part of the Massachusetts Department of Transportation (MassDOT) Research Program with funding from Federal Highway Administration (FHWA) State Planning and Research (SPR) funds.

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**Project Start Date:**
May 4, 2020

**Expected Project Completion Date:**
May 31, 2021

### Methodology

1) Statistical inference of energy consumption, costs and GHG emissions in relation to train movement and other factors

2) Calibration of energy consumption on pilot line using high resolution on-board instrumentation for movement and energy data

3) Simulation of pilot line train movements

4) Scenario analyses and optimization to demonstrate potential for energy usage reduction with better drive cycles

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