MBTA Regional Rail Modernization Major Project Support Services

Project
MBTA Rail Modernization

Client
Massachusetts Bay Transportation Authority (MBTA)

Location
Boston, United States

Dates & Duration
2021 – 2024
(Ongoing)

Services Provided

- Project & Program Management
- Systems Integration
- Value Engineering
- Risk Management
- Operations Planning
- Benchmarking & Market Outreach
- Cost Benefit Analysis
- Scheduling
- Simulation Modelling and Timetabling
- Energy & Traction Power Demand Modeling

Background

In 2019, Massachusetts Bay Transportation Authority (MBTA) released a vision for modernizing the current Commuter Rail network into an efficient regional rail operating model, providing cleaner, more reliable, more frequent rail service all day, every day, for the commonwealth of Massachusetts, by 2050.

Scope of Work

Network Rail Consulting (NRC) are supporting MBTA with the conceptual planning and development of a Rail Modernization Program, aimed at translating MBTA's vision into reality.

The scope of our planning support included:

- Service strategy development – options for frequencies, stopping patterns and urban/regional service variations, based on ridership demand data;
- Traction power technology study – a holistic system evaluation of the risks and benefits of adopting differing traction power technologies, including Overhead Catenary, Battery and Hydrogen fuel cell;
- Benchmarking of global trends in the Battery Electric Multiple Unit (BEMU) market – development and benchmarking of Battery-EMU characteristics for modeling and identifying significant system constraints / risks;
- Power demand modeling energy assessments and traction power demand on a line-by-line and systemwide basis, to support the intended service patterns;
- Validation of key program technology assumptions by supporting the MBTA with an industry Request For Information (RFI);
- Program phasing and benefits – development of a phased implementation strategy, to minimize risk, maximize benefits, and deliver a minimum viable output as early as possible;

- Program phasing and benefits – production of a Carbon Reduction Roadmap for the phased MTBA Rail Modernization program;
- Business case support – production of a comparative, systemwide cost and risk-benefit analysis of overhead catenary and battery-electric traction alternatives;
- Management approach proposals, leveraging international best practice and lessons learned from the management of large, complex rail infrastructure projects; and
- Summary report and presentation for numerous program stakeholders, including the Massachusetts Transportation Board.

Key Project Outputs

By utilizing battery-electric traction technology, together with a concept of discontinuous electrification, it was possible to identify a capital infrastructure saving of $2-$3bn against the original electrification plan, while maintaining and de-risking the program benefits.

Other benefits from our work included:

- Reduced scope of overhead catenary by approx. 55% (280 single track miles);
- Reduced systemwide operating costs (less traction power infrastructure to operate & maintain);
- Improved system reliability and less single points of failure from a maintenance perspective;
- A credible, phased implementation plan, including test & validation of major assumptions from external industry experts;
- Reduced implementation program duration, leading to earlier benefits realization and less service disruption;
- Significantly reduced risk profile for environmental and construction activity, leading to a higher certainty of program outputs;
- Identification of critical next-step risk mitigation and ‘no-regret’ activities, to strengthen the business case while working within funding constraints; and
- Practical, hands-on support in the production and management of stakeholder response materials.