

## **MBTA Commuter Rail Vision RFP Scope of Services**

### **1. Scope of Services**

#### **1) Review of Previous Studies and Data Collection**

The consultant shall review all relevant studies related to MBTA commuter rail operations, capacity, reliability, and planned and programmed infrastructure improvements. This shall include data collected in the development of the Focus40 Commuter Rail State of the System report, the ongoing MBTA Fleet and Facilities Plan, relevant data from the ongoing Ernst & Young contract analysis, internal planning and design efforts (such as the South Station Expansion, the North South Rail Link Feasibility Reassessment, and South Coast Rail projects) and any municipal or station-specific proposals. The consultant will prepare a list of required documentation to fill in any remaining knowledge gaps to complete this task and meet with MassDOT Planning and MBTA Railroad Operations to develop a data collection plan.

**Deliverables:** A data collection plan for filling in information gaps and a technical memo summarizing relevant data on MBTA commuter rail infrastructure and operations.

#### **2) Future Market Analysis**

The consultant will develop a thorough analysis of factors that are likely to impact the market for service using the MBTA commuter rail infrastructure over a long-term (25 year) time period. The consultant team should have the necessary expertise to inform MassDOT and the MBTA understanding of the following:

- Population and employment trends – the rate of population growth in both suburban communities and Gateway Cities comprising the existing commuter rail network’s customer base; as well as the rate of population and employment growth in the portion of Greater Boston’s core easily accessible from the network or physically proximate to it. This analysis should begin with a review of existing projections developed by the Metropolitan Area Planning Council (both for the 2015 Boston Region Metropolitan Planning Organization’s Long Range Transportation Plan and for the ongoing Lower Mystic Regional Working Group), the University of Massachusetts Donahue Institute’s Commonwealth growth projections, and recent Census trends. In this task, the consultant need not be bound by regional control totals for population and employment within the Boston region, but any departures should be supported by growth projections that are consistent with municipal zoning and an understanding of long-term market trends for suburban and Gateway City housing development.
- Land use patterns – in addition to growth rates across the region, the consultant will also evaluate the potential for shifts in land use patterns that could impact demand for rail service. This analysis will include a high level assessment of the transit oriented development potential on private parcels or underutilized MBTA or Commonwealth parcels within walking distance of the suburban and Gateway City portions of the network. The consultant will also be responsible for gauging the willingness of local governments to support significant station-area land use changes where the market could support it. The consultant’s work should be informed by ongoing study of Gateway City transit-oriented development potential being conducted by MassINC.
- Evolution of first mile/last mile transportation - the rail vision should also identify a range of possible developments in last mile transportation that could significantly reduce the need for station parking capacity and/or enlarge the catchment area of the rail network. These developments include further market penetration of transportation network companies and autonomous vehicles, as well as investments in bicycle accommodation which could result in a much greater role for bicycling (including bikeshare) in the first/last mile. The consultant should build on considerations identified through the Focus40 process.
- Barriers to driving – peak period highway congestion and high parking costs in central Boston are the key drivers of demand for the existing commuter rail system. The consultant will review

regional trends in vehicle miles traveled and highway congestion, as well as the supply and pricing of parking in central Boston. This review will include state and local policies targeted at highway congestion or parking pricing/availability. The consultant will also consider the likelihood of changes and their impact on rail demand in other costs associated with automobile travel, including fuel and tolling.

**Deliverables:** A memo summarizing a range of likely future conditions for the area served by the MBTA rail network, supported by data, and with key factors influencing the direction of market changes identified. The memo will recommend up to three alternative future scenarios to inform demand estimation in Task 6.

### 3) Peer Market Comparison

Both domestically and internationally, the provision of commuter or regional rail service follows several different models. While the size and development pattern of different metropolitan areas can complicate comparisons, the MBTA would benefit from a better understanding of the market conditions under which alternate service models have been successful. The consultant will review the types of service provided in each of the following metropolitan areas (pending new direction from MassDOT/MBTA or suggestions from the consultant):

- Boston (MBTA)
- New York City (Metro-North, Long Island Railroad, New Jersey Transit)
- Chicago (Metra)
- Philadelphia (SEPTA, New Jersey Transit)
- Toronto (TTC)
- London (Overground, others)
- Paris (RER)
- Berlin (S-Bahn)

For each of the “peer systems” the consultant will gather at least the following information:

- Urban core population (roughly the area contiguous with the central city with a transit-supportive population density – roughly 5,000 people/sq mile)
- Rapid transit network mileage
- Urban coverage provided by rapid transit network (percentage of land area or population in the urban core within one mile of rapid transit)
- Commuter/regional rail mileage (both total and within the urban core)
- Urban coverage provided by commuter/regional rail network (percentage of land area or population in the urban core within one mile of commuter/regional rail network only – not rapid transit)
- Population within one mile of non-urban core commuter/regional rail stations (by station and overall average)
- Frequency of service by time period (peak, midday, evening, weekend) by station type (urban core, higher density non-core station, lower density non-core station)
- Ridership (overall, by time period, and by station type)
- Barriers to driving (parking to employment ratios in central business districts, parking costs, gasoline prices, highway congestion)

**Deliverables:** A peer system review memo that identifies the market conditions that lead to higher off-peak ridership, drawing comparisons with the MBTA rail network and market.

### 4) Objectives for a 2040 Rail Vision

The Rail Vision is intended to identify strategies that would better leverage the MBTA’s rail infrastructure

in order to inform a public discussion about the future direction of the network. As such, it is not the focus of this project to prioritize objectives for the future of the network. However, the consultant shall work with MassDOT and the MBTA to identify a range of likely objectives and propose an approach to evaluating consistency with them. This will ensure that the alternatives developed and evaluated in Tasks 5 and 6 are designed to achieve a range of potential objectives, including but not limited to:

- Increase ridership (overall, off-peak)
- Reduce vehicle miles traveled
- Operating costs and fare recovery
- Minimize impacts on maintenance capacity
- Facilitate transit-supportive economic growth in the Commonwealth
- Increase access to opportunity for low-income populations
- Relieve capacity constraints on the core MBTA bus and rapid transit network
- Support overall MBTA investments to achieve a state of good repair
- Minimize impacts on Amtrak intercity service
- Consideration of replacing discontinued service, if applicable

**Deliverables:** A memo identifying a range of objectives designed to meet the goals of the 2040 Rail Vision.

#### 5) Identification of Potential Service Alternatives

The consultant shall work with MassDOT and the MBTA to define future alternatives that could increase the efficiency of the MBTA rail network and utilize the network's excess capacity. Several specific alternatives are identified below. These and potentially other alternatives, including possible combinations of these alternatives, shall be evaluated by the consultant. The evaluations shall include high level concepts for each alternative and up to nine scenarios (alternatives or combinations of alternatives shall be evaluated). The consultant shall consider alternatives' effectiveness of meeting the needs of today's market, as well as the market changes that would be necessary in order to support more aspirational alternatives.

- Urban Rail – high frequency service using shorter trains operating within the MBTA's core rapid transit/bus service area (roughly inside of Route 128); this service could include new infill stations and upgrades to high level platforms at existing stations and could play an important role in relieving capacity constraints on the core MBTA network (key potential corridors currently being evaluated through Focus40)
- Commuter – similar to today's service, providing relatively frequent trains during peak periods with less (or potentially no) service during off peak hours and weekends; designed around the Boston-oriented commuting patterns of suburban commuters and at times when traffic congestion most significantly impacts automobile travel
- Forced Transfer/Hybrid Model – division of the rail network into inner/urban and suburban with the inner portion operating similar to the Urban Rail concept and the outer portion operating as Commuter; most or all trips originating in the suburban portion of the network would transfer to high frequency service upon entering the urban part of the network to continue trips into downtown Boston
- Suburban/Gateway Express – higher frequency off peak trains serving only a few critical stations per line (high density/Gateway City stations, and large park and ride facilities with good highway access) providing more of an express service to those places most likely to see demand for off peak connections between each other or to Boston
- Regional Rail – longer distance service less geared to daily commuters, to potentially include service extensions beyond the traditional MBTA commuter rail service area
- Role in Supporting MBTA SGR – as the MBTA seeks to achieve a state of good repair by 2030, it may be necessary to be more aggressive in suspending service on corridors to expedite the work;

the existing MBTA Commuter Rail network has a potential role to play in rerouting demand away from rapid transit corridors being removed from service.

Using information gathered on other rail systems in Task 3, the consultant will identify the typical operating (frequencies, span of service, etc.) characteristics and capital needs associated with each alternative to inform the analysis in Tasks 6 and 7.

In some cases, a service alternative may be a poor fit for some existing MBTA commuter rail station locations. For example, a high frequency operation may not be appropriate for stations below a certain station area population density at off-peak times when costs and congestion barriers to driving are lower. The consultant will use the peer system analysis conducted in Task 3 to establish population/employment density thresholds to both justify the inclusion or omission of stations under each alternative, and to identify targets that communities would have to meet in order to receive service under certain alternatives.

**Deliverables:** A memo identifying and evaluating future service alternatives, supported by information gathered on other rail systems in Task 3, and with established population/employment density thresholds that help to identify targets that communities would have to meet in order to receive service under certain alternatives.

#### 6) Operations Analysis and Development of Systems Simulation Model

The consultant will undertake an operational analysis of up to eight service alternatives and work with MassDOT and MBTA Railroad Operations to develop a simulation model of the MBTA rail network. While there may be opportunities to build off of the MBTA's existing simulation model, or other previously developed simulations of the MBTA rail operations, the consultant should assume that an entirely new simulation model will be necessary to meet the needs of the rail vision. This model may be developed using the RTC software package employed in most simulations of the MBTA system, or other commercially available railroad simulation software. The consultant shall specify the simulation tools they intend to use and shall bear the costs of purchasing software licenses. Ownership of the simulation model will revert to MBTA Railroad Operations at the conclusion of the rail vision project.

The model developed by the consultant shall:

- Be calibrated from updated schedules, equipment cycles, and associated train sheets to be provided by Amtrak and MBTA.
- Include all Amtrak and MBTA revenue train and non-revenue train movements between the terminals and layover facilities.
- Include all existing stations (and platform types/configurations), layover facilities, and right of way information (signals, interlockings, number of tracks, etc.)

The model will provide MassDOT and the MBTA with the opportunity to test the capability of the existing infrastructure to support service alternatives identified in Task 5. The consultant will be expected to model up to three operating plans using the existing network.

The consultant will also modify model assumptions to test the following system attributes that may be required to meet certain Task 5 alternatives:

- Electrification of the network (full or partial)
- New infill stations, line extensions or elimination of stations
- New signal systems or technology
- New vehicle types (i.e. multiple units)
- Expanded terminal capacity at South and North Stations
- Double or triple tracking of certain corridors

- New or expanded layover facilities

The model will be used to test up to five operating plans over a potential future network with infrastructure changes.

**Deliverables:** a Final Operations Report documenting the assumptions, infrastructure, and operations inputs, and the results and conclusions from the operations analysis and simulation models for up to eight service alternatives.

## 7) Projections of Ridership and Operating Cost Implications of Service Alternatives

The consultant will work with MassDOT, the MBTA, and the Central Transportation Planning Staff to understand the relative demand for up to eight service alternatives utilizing the MBTA rail network identified in Task 5, in addition to the relative operating costs of the alternatives. The consultant will develop service plans for each of the Task 5 alternatives and will develop a spreadsheet model to evaluate each of them in terms of operating cost and ridership. MBTA Railroad Operations will provide all necessary operating cost information to inform this analysis. The Central Transportation Planning Staff and the regional travel demand model may be employed to support this task, but would be limited to future population/employment and land use conditions already developed by MAPC. Therefore, the consultant's development of a spreadsheet model to project demand resulting from different growth patterns will be necessary in order to understand the implications of possible market changes identified in Task 2. These projections will be based on the typical operating (frequency, span of service) and capital (vehicle type, motive power) assumptions associated with these alternatives identified in Task 3 (where applicable), and will assume currently planned surface capacity expansions of North and South Stations.

**Deliverables:** The development of sketch-level service plans for each service model alternative as well as a spreadsheet model to evaluate each alternative in terms of annual operating costs and demand (with demand generated by the CTPS model using existing MAPC projections, as well as up to three alternate future scenarios as defined in Task 2).

## 8) Identification of Capital Investments Necessary to Support Alternatives

The consultant will identify the major capital investments necessary to support each of the alternatives identified in Task 5. In addition to order of magnitude capital costs and lifecycle costs, particular attention will be given to those projects with long lead times and for which MassDOT or the MBTA are currently considering capital investments which may be inconsistent with a specific alternative. At a minimum, the consultant will analyze each of the following capital investment decisions and how they should be considered in the context of each of the Task 5 alternatives.

- **Electrification** – a major investment with health and operational benefits and whose cost exceeds that of bringing the entire commuter rail system into a state of good repair, but one for which there is consistent interest and may be viewed by some advocates as necessary to meet a strict interpretation of state environmental regulations. In order to make such a significant shift, the MBTA would need to make a decision to move forward concurrent with major locomotive replacement as the implementation timeframe would be comparable to the expected life of new locomotives.
- **Vehicle Technology** – even absent full electrification, certain service models (Urban Rail, Gateway Express) may argue for the introduction of multiple units capable of faster acceleration/deceleration, with fewer seats and more doors. Others (Regional rail) may argue for more comfortable coaches with more amenities. The introduction of any new vehicle type would have implications for maintenance facility locations and capacities. This topic should include an understanding of the role that train automation could play under certain operating scenarios (likely Urban Rail service operating on closed corridors without grade crossings).

- **Right of way** – the consultant should identify all infrastructure upgrades necessary to deliver the Task 5 alternative new service model. These may include upgrades to the signal system to accommodate more frequent service with closer train spacing, bridge reconstructions necessary to accommodate certain vehicle technologies, corridors requiring additional tracks including where this would require right of way acquisition, track improvements, etc.
- **Layover needs for each service plan** – MassDOT is currently exploring commuter rail midday layover options for an expansion of southside service that would be possible with the implementation of the South Station Expansion project. The service model alternatives assessed in Task 5 may argue for very different layover needs, in terms of the number and type of trainsets being stored, the ideal location for layovers, and the times of day when layover needs will peak. The consultant will provide a summary of layover implications for each service plan.
- **Terminal Capacity Expansions** – the flexibility to introduce different service types would be expanded by either of the two terminal capacity expansions under consideration today – the South Station Expansion project (for which an FRA grant has been used to complete both state and federal environmental review) and the North South Rail Link (the subject of an upcoming \$2 million feasibility reassessment). Until a decision has been made that the Commonwealth or MBTA plans to advance one of these (if either) to implementation, the MBTA Rail Vision should contemplate how either (or neither) would affect the other service issues identified here.
- **Infill Stations and Geographic Expansion** – service models with more frequency may argue for new infill stations in urban areas or at key locations where park and ride access could be provided. Others would make more distant station proposals that are a poor fit for Commuter Rail (like Springfield, Palmer or New Hampshire) more viable. Consistent with the peer review in Task 3, infill stations or expansions should be pursued where local land use and market conditions are likely to support them, or where local support for increased density, creation of new affordable housing, or preferential treatment for transit on municipal streets exists.
- **Station upgrades** – higher frequency service models would argue for full high-level platforms at all stations, an investment that would also support the MBTA’s Plan for Accessible Transit Infrastructure goals. The consultant will identify what stations would be appropriate for this improvement under certain types of service.

**Deliverables:** A memo identifying and analyzing the major capital investments necessary to support the alternative service plans identified in Task 5, with a prioritization of investments for each service model (identifying which would need to move first). The memo will include order of magnitude capital costs and lifecycle costs.

## 9) Stakeholder Engagement

The consultant will develop an engagement plan designed to reach a diverse range of stakeholders and consider how alternative service scenarios will impact riders differently. The outreach plan will include a series of public conversations around the state to discuss the different scenarios, with at least one meeting per MBTA commuter rail corridor. These conversations will provide an opportunity for the public to offer their feedback about the different service options and infrastructure changes and will also help to drive the final recommendations.

The consultant will also staff and support up to twenty targeted briefings to include the Massachusetts Legislature, local elected officials, regional planning agencies and regional transit authorities, engineering and construction trade organizations, chambers of commerce and other business groups, and organizations representing environmental justice populations, among others. Additionally, the consultant will identify other engagement strategies to ensure that the full range of appropriate stakeholders are given the opportunity to provide input, such as surveying existing commuter rail customers and participating in standing meetings held by other organizations.

**Deliverable:** A public outreach plan that incorporates the viewpoints of a diverse range of stakeholders and documentation of all public feedback.

#### **10) Recommendations and Implementation Plan**

The consultant will work with MassDOT and the MBTA to recommend a combination of service and infrastructure changes based on the analysis, simulation and engagement undertaken in Tasks 1 - 9. The consultant will develop an implementation plan that will identify the steps necessary and timeline to 1) make any changes to service that should coincide with the beginning of the next commuter rail operating contract, 2) deliver any infrastructure changes or major new services that would occur during a new operating contract. This plan must be complete by December 2019 and be of sufficient detail to inform the procurement of the new operating contract.

**Deliverable:** A detailed implementation plan that can inform the procurement of a new operating contract.