

GREEN LINE EXTENSION PROJECT

PROJECT MANAGEMENT PLAN

Preliminary Engineering Phase

REVISION 1 – 08/25/2011



**Massachusetts Bay
Transportation Authority**

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PROJECT MANAGEMENT PLAN – PRELIMINARY ENGINEERING PHASE
ENDORSEMENT PAGE

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Revision Log

Revision	Date of Issuance	Description of Changes	Sections Revised
1 st Draft	April 16, 2010	1 st Draft for Comments	All Sections
2 nd Draft	November 29, 2010	2 nd Draft with FTA/PMOC's 6/22/10 Comments Incorporated and revisions to reflect changes in MBTA/MassDOT contract	All Sections
3 rd Draft	January 4, 2010	Updated ridership numbers based on revised SUMMIT runs and added OMP to list of Attachments.	Section1, Attachment N
4 th Draft	February 14, 2011	Updated to include further info re: Management Control and design standards; includes revised Org Chart.	Sections 2, 3 and 9.
5 th Draft	May 31, 2011	Updated to reflect changes in Gilbane/HDR JV Team procedures including revised org chart, QAP, Management Configuration Plan, Progress Reports, Preliminary Risk Register, Revised Cost Estimate, Draft Real Estate Listing, Attachment additions and changes to Attachment Numbering	All Sections
6 th Draft	August 25, 2011	Updated project schedule (Ch. 3), Attachment A – Key Staff Directory, Revised Attachment E to reflect two separate QA & QC processes: E-1 PM/CM Quality Assurance Plan E-2 PM/CM Design Quality Control Procedures, Attachment H – Sample Project Monthly Progress Report, revised Attachment I – SCC Worksheets, Attachment N – Real Estate Acquisition List,	Appendices

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ATTACHMENTS

- A Green Line Extension Project - Key Staff Directory
- B MBTA Project Management Manual
- C Configuration Management Plan
- D MBTA/MassDOT Project Quality Assurance Plan
- E-1 PM/CM Quality Assurance Plan
- E-2 PM/CM Design Quality Control Procedures
- F Sample Design Consultant Monthly Progress Report
- G Document Control Plan
- H Sample Project Monthly Progress Report
- I Project Capital Cost Estimate (SCC Format)
- J Preliminary Design Risk Register
- K MBTA Procurement Manual for Construction (January 2010)
- L MBTA Procurement Manual for Professional Services (January 2010)
- M MBTA Contract Change Order Guidelines (February 2010)
- N MBTA Real Estate Acquisition Management Plan
- O MBTA Safety and Security Management Plan
- P MBTA Light Rail Transit System Operations and Maintenance Plan
- Q MBTA Commuter Rail Fleet Management Plan
- R MBTA Heavy Rail and Light Rail Operations Fleet Management Plan
- S MBTA Bus Fleet Management Plan

1. INTRODUCTION

Section 324 of the Surface Transportation and Uniform Relocation Assistance Act of 1987 requires that major capital projects prepare and implement a Project Management Plan (herein known as the PMP or the “Plan”). The Massachusetts Bay Transportation Authority (MBTA) and the Massachusetts Department of Transportation (MassDOT) have prepared this PMP that provides a framework for the management of the Green Line Extension project. This PMP defines the details of project management during the preliminary engineering phase of project development, and also provides the framework for managing the subsequent final design, construction, procurement, testing and startup, and revenue service phases. This document outlines the management philosophy, goals and objectives, and organizational structure; defines the responsibilities and roles of project participants; identifies the interactions among project staff and consultants; and specifies the general procedures and management tools that will be implemented to ensure effective project management and successful project completion.

In addition to serving as a clarifying guide for all project participants, this document will serve as a basis for measuring and assessing the project’s performance and consistency with the Plan. As the project advances into preliminary engineering, MBTA, with the support of MassDOT, will provide the necessary resources and expertise to allow for proper and effective management of this project. As design and construction work advances and additional procedures are developed, the Plan will be updated as needed and appropriate.

The development of the PMP will be an evolving process: the PMP will be updated and revised as needed. Per FTA guidance, revisions to the PMP will include periodic updates to the plan, especially related to project budget and schedule, financing, ridership estimates, and the status of local efforts to enhance ridership where ridership estimates are contingent on the success of those efforts. At a minimum, the PMP will be updated prior to advancing into the Final Design and Construction phases. The MBTA will be responsible for the maintenance of and subsequent revisions to the PMP as part of the preliminary engineering phase, with the support of MassDOT.

Procedure for Revisions

The parties requesting the revision will issue a written request to the MBTA stating the proposed change(s) and the reason(s) for the changes. MassDOT and the MBTA will review each request. If the proposed revision(s) is approved, the MBTA will issue the change(s) to all recipients of the manual. A published revision will include:

- A cover memo describing how and where to place the revision in the manual (revision instructions);
- A new cover page with revised date;
- A revised Table of Contents, if required;
- The revised pages of text with revision number and revision date placed at the bottom of the page; and
- A side-bar in the right hand margin of the page for changes to the text.

1.1 Project Description

The Green Line Extension project (the project) is an initiative of the MBTA and MassDOT to expand transit services in order to improve mobility and regional access for residents in some of the region's most densely populated municipalities of Cambridge, Somerville, and Medford, Massachusetts. The purpose of the Green Line Extension project is to improve corridor mobility, boost transit ridership, improve air quality, ensure equitable distribution of transit services, and support opportunities for smart growth initiatives and sustainable development in the project study area of Cambridge, Somerville, and Medford.

The project would provide Green Line service for 4.3 miles beyond a relocated Lechmere Station to College Avenue in Medford and to Union Square in Somerville using a two-branch operation, both to be operated within existing MBTA commuter rail rights-of-way. The proposed Green Line Extension project is shown in Figure 1-1. The project's two branches consist of:

- A main branch, 3.4-miles long, to Medford within the existing MBTA Lowell Line commuter rail right-of-way (the "Medford Branch") with five stations and the terminus at College Avenue in Medford. Intermediate stations are located at Washington Street, Gilman Square, Lowell Street, and Ball Square.
- A second branch, approximately 0.9 miles long, to Union Square in Somerville (the "Union Square Branch"). This branch would follow the existing MBTA Fitchburg Line commuter rail right-of-way and includes a single station at Union Square.

Additionally, the project will include acquisition of 24 new Green Line vehicles and construction of a support facility for storage and servicing of the fleet and existing north side Green Line operations.

Travel Times

Travel times between proposed stations were estimated based on travel distances and estimated speeds. The travel speeds between proposed stations were based on the railroad's physical and operational characteristics. Estimated travel time between each station for the proposed Green Line Medford Branch is shown in Table 1-1.

Figure 1-1 Project Area Map

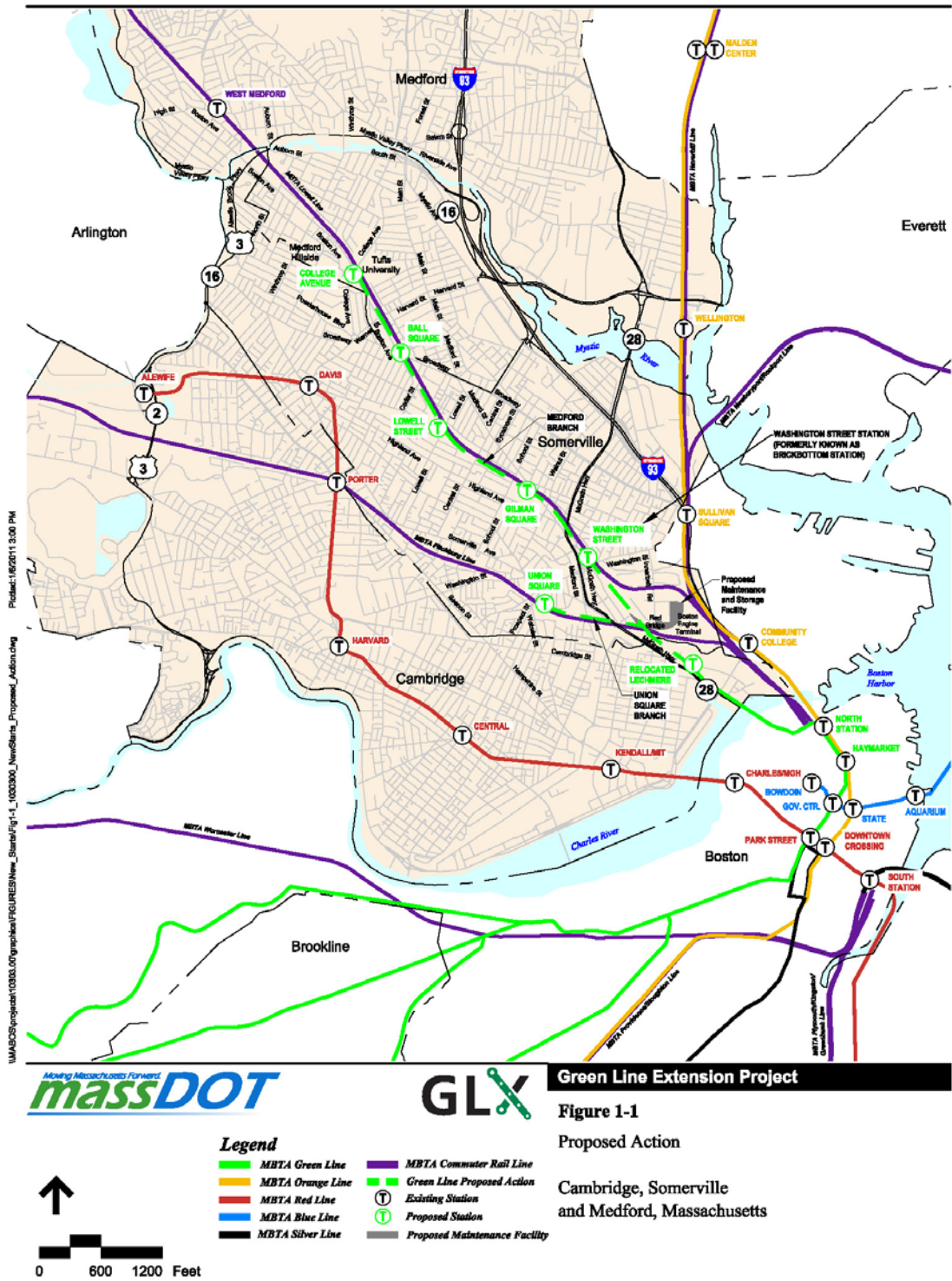


Table 1-1 Proposed Green Line Extension Project: Medford Branch Travel Times

Station	Distance (miles)	Travel Time (minutes)	Dwell Time (minutes)	Cumulative Travel Time (minutes)
Lechmere				
Brickbottom	0.78	2.25	0.75	3
Gilman Square	0.71	1.25	0.75	2
Lowell Street	0.70	1.25	0.75	2
Ball Square	0.49	0.75	0.75	1.5
College Avenue	0.57	1.0	0	1.0
Total				9.5

*Estimated travel time between Lechmere Station and Union Square Station is 4.5 minutes.

Headways

The operating plan for the Green Line Extension project would extend the existing Green Line D branch service from the relocated Lechmere Station to the northwest to College Avenue. The Green Line service beyond Lechmere Station for the Medford Branch would operate on headways equal to that of the existing Green Line D branch service: five minutes in the morning and evening peak periods and ten minutes during off-peak periods. The Green Line service beyond Lechmere Station for the Union Square Branch would operate on headways equal to that of the existing Green Line E branch service: six minutes in the morning peak period, five minutes in the evening peak period, and between nine and 10 minutes during off-peak periods.

Fares

Fares for the Green Line Medford Branch and Union Square Branch under the proposed Green Line Extension project will be consistent with the current fare structure for the MBTA Subway System.

Vehicle Requirements

The Green Line Extension project vehicle fleet will include a mix of three vehicle types: the two current vehicles (Type 7 high-floor cars and Type 8 low-floor cars) and a new "Type 9" low-floor car, which is currently under development. The Type 9 cars will be procured as part of the Green Line Extension project, which will expand service on the existing Green Line. Based on the passenger capacity and the projected ridership and proposed operating plan, it was determined that 24 additional Green Line cars would be needed to accommodate the proposed headways and projected ridership for the project.

Ridership

The Green Line Extension project is expected to generate new systemwide transit ridership of 7,500 boardings per day and a reduction of 25,728 VMT per day (projected to the year 2030).

Table 1-2 shows the daily station boardings and alightings at the proposed stations. More detailed discussion on the project can be found in *Green Line Extension DEIR/EA*.¹

Table 1-2: Green Line Extension Project: Station Level Data

Anticipated Station Level Weekday Boardings and Alightings			Base Year		No-Build (2030)		Proposed Action (2030)	
			Boardings	Alightings	Boardings	Alightings	Boardings	Alightings
Key Operating Characteristics			<ul style="list-style-type: none">Green E ends at LechmereGreen D ends at Government CenterRte 80: Arlington to LechmereExisting Lechmere Station		<ul style="list-style-type: none">Green E ends at LechmereGreen D ends at Government CenterRte 80: Arlington to LechmereExisting Lechmere Station		<ul style="list-style-type: none">Green E ends at Union SquareGreen D ends at College AvenueRelocated Lechmere Station	
System								
Existing	Green Line	North Station	8,700	8,700	12,640	12,640	13,610	13,610
	Green Line	Science Park Station	800	800	1,790	1,790	1,170	1,170
	Green Line	Existing Lechmere Station	6,400	6,400	9,290	9,290	n/a	n/a
Extension	Green Line	Relocated Lechmere Station	n/a	n/a	n/a	n/a	7,100	7,100
	Green Line	Washington Street Station (formerly Brickbottom)	n/a	n/a	n/a	n/a	2,830	2,830
	Green Line	Gilman Square Station	n/a	n/a	n/a	n/a	3,930	3,930
	Green Line	Lowell Street Station	n/a	n/a	n/a	n/a	1,140	1,140
	Green Line	Ball Square Station	n/a	n/a	n/a	n/a	1,850	1,850
	Green Line	College Avenue Station	n/a	n/a	n/a	n/a	2,140	2,140
	Green Line	Union Square Station	n/a	n/a	n/a	n/a	3,570	3,570

¹ Federal Transit Administration and Executive Office of Transportation and Public Works. *Green Line Extension Project Draft Environmental Impact Report/Environmental Assessment and Section 4(f) Statement*. October 15, 2009.

1.2 Legal Authority and Requirements

On November 1, 2009, the Massachusetts transportation agencies underwent a fundamental structural change with the creation of the Massachusetts Department of Transportation (MassDOT). Chapter 25 of the Acts of 2009, “An Act Modernizing the Transportation Systems of the Commonwealth of Massachusetts” consolidated the Commonwealth’s transportation agencies into one umbrella agency, MassDOT. Now, the Secretary and Chief Executive Officer (CEO) oversees four implementing divisions as well as the Office of Transportation Planning. The implementing divisions are Rail and Transit, Highway, Registry of Motor Vehicles, and Aeronautics. In the current structure, the MBTA remains autonomous; however, changes to the structure of its Board place the Authority more in line with the transportation agenda of the Commonwealth as a whole.

MassDOT is the current proponent for the Green Line Extension project. The MBTA, with support from MassDOT, will take the management lead during the preliminary engineering phase of the project. The MBTA will manage the development of preliminary design plans and bid package materials to support procurement of a design-build contractor. MassDOT will be responsible for funding the construction and incremental operating costs for the project. MassDOT will defer to the MBTA’s design, safety, quality assurance, and real estate acquisition guidelines during subsequent phases of this project.

The Green Line Extension is a State Implementation Plan (SIP) project and, therefore, a Commonwealth commitment under the federal Clean Air Act. The funding of this project is a legal requirement of the state. While MassDOT is seeking federal New Starts funding for the project, the Commonwealth will fund the entire project if federal funding is not available.

As the operating agency and ultimate owner of the Green Line Extension, the MBTA will manage the preliminary engineering phase and the final design and construction of the project. The MBTA, with support from MassDOT, is currently seeking a contractor to provide preliminary engineering, program management and construction management services. This contractor hereafter will be referred to as the “Design Consultant.” Upon selection of a Design Consultant, the lead management responsibility for the project will be transitioned from MassDOT to the MBTA. The MBTA will be the entity to procure design-build services and manage the construction of the project. MassDOT will continue to provide oversight on the project as the design-build contract moves forward, and will also help to ensure robust public outreach during the preliminary engineering, final design and construction phases of the project.

The Green Line Extension Program Management Team (PMT), which consists of senior management from the MBTA and MassDOT, will design and oversee the construction of the project in accordance with all applicable federal and state laws, regulations, codes, and guidelines. In addition, the PMT will proactively work to ensure that the project is compatible not only with city regulations, services and facilities, but also with the residential neighborhoods and businesses abutting the project.

1.3 Definition of Terms

This Plan is applicable to the Green Line Extension project wherein the Design Consultant will be contracted to provide preliminary engineering design for the MBTA to solicit a design-build contractor. The MBTA, with support from MassDOT, will oversee the Design Consultant's engineering design in order to achieve cost effective design, construction, maintenance and operations, while at the same time achieving the required level of passenger safety, system reliability and service comfort. Terms used throughout this document include:

- **Design Consultant** – An independent design consultant that performs design work as directed by the MBTA or MassDOT, conducts design reviews and coordinates these reviews with the MBTA and MassDOT Program Managers or designees, third party agencies and utilities.
- **Design Review** – The systematic and orderly review of design documents, drawings and specifications by all project disciplines at pre-established milestones throughout the design phase.
- **Preliminary Engineering** – The preliminary engineering phase will be initiated at the conclusion of the Environmental Assessment. Preliminary engineering is the design phase that takes the project from a conceptual state to a level of design that allows a realistic estimate of project costs, construction schedule, environmental and community impacts. This design phase will also include performance specifications, technical provisions and statements of work for the design-build contractor. Preliminary engineering will bring the project to an appropriate level of design completion for major project components.

2. ORGANIZATION AND STAFFING

To successfully manage the planning, design, and construction of the Green Line Extension project, a fully integrated team of MBTA, MassDOT and Design Consultant staff will be established. Section 2 of the PMP describes the organization and the structure that will be in place during the preliminary engineering phase. It provides a description of the functions, major responsibilities, and qualifications of the senior executives and key managers involved.

The Green Line Extension project Equal Employment Opportunity policy is the same one that is used by the MBTA and MassDOT. This section affirms the project's commitment to fair employment considerations for all applicants considered for employment or procurement activities.

2.1 Project Organization – Preliminary Engineering

The Green Line Extension project will be successfully implemented through the concerted efforts of various organizations and responsible parties, who will work together as an integrated team providing multiple levels of oversight to ensure a successful outcome for the project.

- The Project Management Team (PMT) for the Green Line Extension is the combined senior management staff of the MBTA and MassDOT. The PMT and all other organizations involved in the project will work towards the common goal of successfully completing the project and meeting the expectations of the cities of Cambridge, Somerville and Medford, and other project stakeholders. The PMT will be responsible for managing planning, conceptual and preliminary engineering, and completion of all state and federal environmental review documents as well as all documents and submittals required as part of the FTA's New Starts program.
- The project team will also include a Project Development Group (PDG), which will consist of technical, operations and senior management staff from the MBTA. Technical areas of expertise for the PDG will include, but not be limited to, commuter rail, light rail, planning, systems, power, bus, highway, vehicles, legal, and contracts. The PDG will provide technical and advisory support to the PMT throughout the project.
- In addition to the PDG, the project team will include various key technical, operations and senior management staff from various departments within MassDOT including, but not limited to, the Highway Division, Rail Operation and Planning, Legal, and Public Affairs. These key MassDOT team members will function similarly to the PDG and will provide technical and advisory support to the PMT.
- The PMT will also be supported by the Design Consultant and all associated subconsultants. The Design Consultant consists of an independent design consulting organization that performs design work as directed by the PMT, conducts design reviews and coordinates these reviews with the PMT. The MBTA Program Manager

will be responsible for managing the Design Consultant.

- The project will also involve support and oversight organizations such as the FTA, Central Transportation Planning Staff (CTPS), and the Boston Region Metropolitan Planning Organization (MPO).

The following sections describe the structure, integration, and interfaces of the project organization. These relationships are also shown on the Organization Chart in Figure 2-1. The MBTA and MassDOT organization will be described in Section 2.2, followed by the Design Consultant organization described in Section 2.3.

2.2 Key Agency Personnel

2.2.1 The Program Management Team

The PMT will be an integrated staff of managers and personnel from both the MBTA and MassDOT. The PMT will avoid overlaps in duties and functions and will provide the flexibility to accomplish project objectives effectively and efficiently. The positions of the key MBTA and MassDOT staff that comprise the PMT are shown in Figure 2-1.

The PMT for the Green Line Extension project must meet the goal of completing this project efficiently, safely, within budget, according to scope, and with a high degree of quality.

During the preliminary engineering phase of project development, the MBTA Program Manager will head the PMT. The MBTA Program Manager will be responsible for managing preliminary engineering, development of a design-build procurement package, and other interim components such as design, financial analysis and FTA coordination.

A MassDOT Program Manager has been assigned to support the MBTA Program Manager during the preliminary engineering phase and for the duration of the project. The MassDOT Program Manager will continue to provide assistance to the MBTA during all stages of project development, in order to ensure project continuity.

During preliminary engineering, and before each submittal, the Design Consultant will submit a project cost estimate and schedule to the MBTA and MassDOT Program Managers for their review. At the request of the client, the Design Consultant will provide scope, cost and schedule analysis for any major changes to the project.

MBTA Program Manager

The MBTA Program Manager will coordinate the day-to-day activities of the Green Line Extension project, including managing the Design Consultant throughout the preliminary engineering phase of the project. The MBTA Program Manager will be the single point of contact for all official information on the project. All project activities will be coordinated through the MBTA Program Manager.

Major Responsibilities

- Responsible for managing all day-to-day activities and providing oversight of the Green Line Extension PMT and the Design Consultant.
- Coordinate within the MBTA on project management, project design reviews, etc.
- Responsible for performing a construction cost evaluation at the preliminary engineering design phase submission.
- Manage the planning, scope, design and engineering, and deliver timely, cost-effective, and high quality projects for the MBTA.
- Review progress reports in accordance with the scope to maintain schedule and budget.
- Coordinate with MBTA and MassDOT departments and other key stakeholders.
- Represent the MBTA in dealings with elected officials, outside agencies (e.g. federal and local agencies) and community groups.

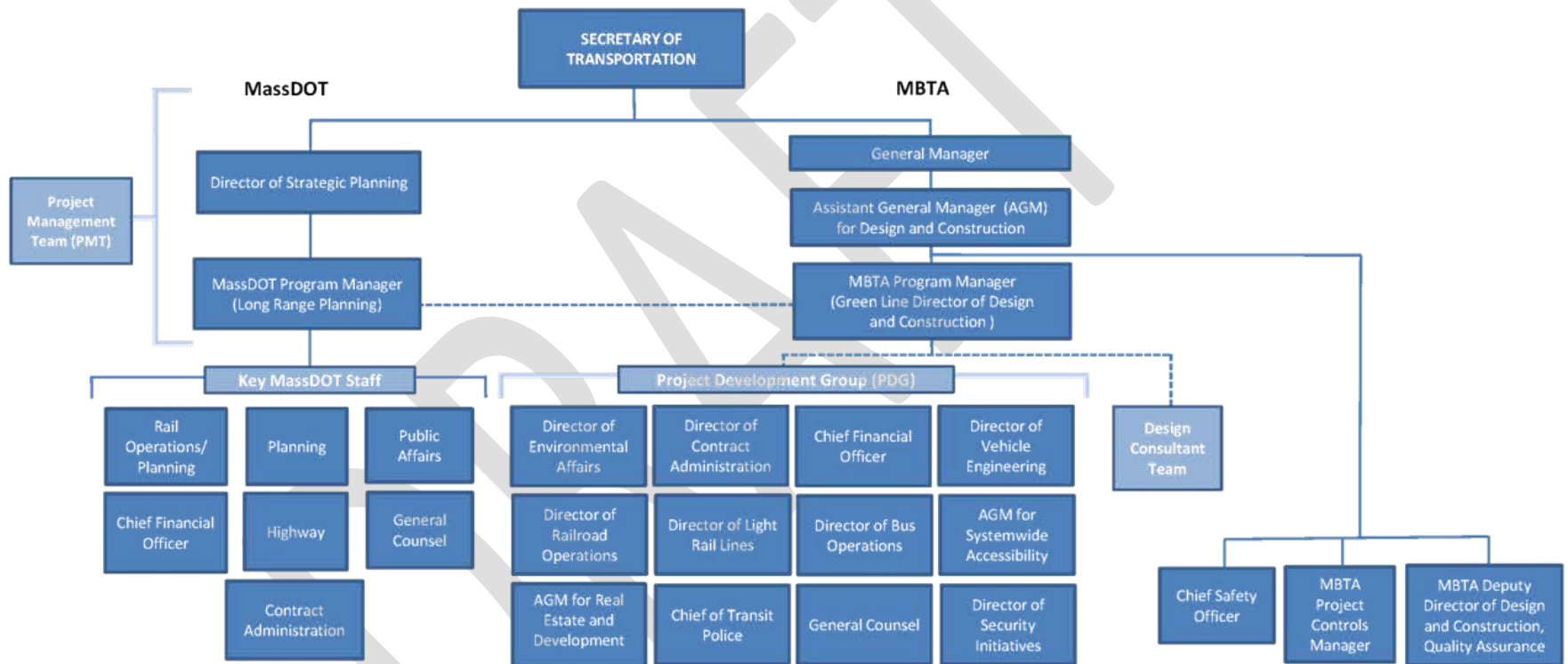
MassDOT Program Manager

During the preliminary engineering phase, the MassDOT Program Manager will support the MBTA in coordinating with appropriate MassDOT staff and act as a liaison with the FTA and the public.

Major Responsibilities

- Coordinate with the various MassDOT departments to ensure the project is developed consistent with MassDOT standards for delivering capital projects.
- Establish performance measures with respect to key program area goals of quality, cost-effectiveness, and timeliness.
- Represent MassDOT in dealings with outside agencies, including the FTA, and community groups.

Figure 2-1 MBTA/MassDOT Green Line Extension Project Organization Chart



2.2.2 Project Development Group (PDG)

During the preliminary engineering phase, the PMT will be supported by staff from various departments within the MBTA having different areas of expertise. Major technical issues and proposed solutions specific to the project design will be presented to a formal working group, the Project Development Group (PDG). The PDG will be comprised of MBTA senior management and technical and operations staff. The positions of the key MBTA staff that will comprise the PDG are shown in Figure 2-1, and a table cataloguing the specific person that holds each position is included as Attachment A.

Members of the PDG will provide advice in their particular areas of expertise/discipline. The PDG will also meet at project milestones in the preliminary engineering phase to ensure that all departments are fully briefed on the project and can comment on all aspects of the project.

Major Responsibilities

- Provide high-level technical support and expertise;
- Review designs, documents, and plans and deal with complex project issues; and
- Provide advice, reports, or assistance with the production of items, such as reports.

Disciplines and expertise represented in the PDG will include, but not be limited to:

- Materials Procurement
- Rail Vehicle Engineering
- Police
- Safety
- Bus Operations
- Commuter Rail Operations
- Subway Operations
- Systemwide Maintenance and Improvements
- Information Technology
- Fixed Route Services
- Government Affairs
- Finance
- Legal
- Development and Real Estate
- Labor Relations
- Budget
- Environmental Affairs
- Organizational Diversity and Civil Rights
- Operations Planning and Scheduling
- Strategic Planning
- Design and Construction
- Operations Support Group – Electrical, Mechanical, Power & HVAC

2.2.3 Other Key MBTA and MassDOT Staff

MBTA Deputy Director of Design and Construction, Quality Assurance

The MBTA Deputy Director of Design and Construction, Quality Assurance reports to the AGM, who has designated the Deputy Director of Design and Construction, Quality Assurance as the person with the responsibility and authority to ensure that the MBTA quality policy is implemented and maintained on projects. The Deputy Director of Design and Construction, Quality Assurance has the necessary freedom, to implement quality related activities in all areas of MBTA projects; to identify quality problems; to initiate, recommend or provide solutions to project management, and to verify implementation of solutions. In matters related to quality on the project, the Deputy Director of Design and Construction, Quality Assurance will have complete and ready access to the PMT and the AGM.

In cases where conflicts regarding quality cannot be resolved between the Deputy Director of Design and Construction, Quality Assurance and the MBTA Program Manager (Director of Design and Construction - Green Line), final resolution will rest with the AGM.

MBTA Chief Safety Officer

The MBTA Chief Safety Officer is responsible for administrative oversight and management of the System Safety Department and is responsible for the coordination with local, state, and federal law enforcement agencies, as well as the MBTA Police. The MBTA Chief Safety Officer ensures the MBTA complies with federal, state, and local, when applicable, laws, statutes, regulations, rules, and guidelines for safety. The MBTA Chief Safety Officer shall direct all programs involving accident and safety investigations, fire and accident prevention, hazard identification, safety audit activities, and construction and environmental safety. The MBTA Chief Safety Officer will be responsible for reviewing the project Safety and Security Management Plan and will serve as the liaison with the Massachusetts Department of Public Utilities – Transportation Division and other external departments/agencies as designated by the MBTA General Manager.

MBTA Project Controls Manager

The MBTA Project Control Manager is responsible for providing technical advice and support in the areas of scheduling, cost estimating, and document control. The Project Controls Manager will be responsible for managing scheduling and estimating activities provided by outside consultants; assisting with review and analysis of project schedules and estimates, and assisting the MBTA and MassDOT Program Managers with monitoring project schedules against actual progress by:

- Comparing baseline and report progress against the schedule;
- Forecasting impacts of proposed changes on schedules and costs;
- Assisting with workarounds and mitigation strategies for implementation by contractors; and
- Implementation of document control systems and procedures.

Key MassDOT Staff

Similar to the PDG in makeup, staff from various MassDOT departments will meet periodically to assist the PMT from preliminary engineering through the startup of revenue operations. Disciplines and expertise from MassDOT that will be represented on the project team will include, but not be limited to:

- MassDOT Highway
- Rail Operations and Planning
- Contract Administration
- Legal
- Public Affairs

2.3 Design Consultant and Subconsultants

The Design Consultant will be retained by the MBTA to provide engineering design, program management, construction management, and support services to the PMT. The Design Consultant is expected to lead several sub-consultant firms. The Design Consultant will be responsible for the preliminary engineering phase of the Green Line Extension project, along with program management and construction management.

The Design Consultant will assist the PMT during the preliminary engineering phase, including the interim components such as design, financial analysis, coordination with the FTA and development of design-build contract documents. Once the preliminary engineering phase is completed, the project will continue with a design-build contract for final design and construction and the Design Consultant will then assist the MBTA with program management and construction management services. Another consultant will be selected as an Owner's Representative for the MBTA before the conclusion of preliminary engineering.

Once a contract with the Design Consultant is issued, updates to the PMP will be prepared and additional information will be provided. All updates to the PMP will be submitted to the FTA for review.

2.3.1 Design Consultant Management Team

The Design Consultant Management Team is anticipated to consist of several key project management and technical staff. The following describes several proposed key management staff for the Design Consultant Team. This section will be updated, as appropriate, upon issuance of a contract with the Design Consultant.

Principal

The Design Consultant will identify a single Principal for this project. The Principal will ensure that the necessary corporate resources are available to support the needs of the project in a timely and effective manner.

Major Responsibilities

- Review project performance and individual performance of team firms.
- Ensure availability of corporate resources.

Project Manager

The Project Manager, who will be responsible for the overall project performance, will support the MBTA Program Manager. The Project Manager will also coordinate with all participants, as required, to build consensus on major project issues. While the Project Manager will report directly to the MBTA Program Manager, the Project Manager will have authority over all Design Consultant project matters; provide the ability to directly address any concerns or MBTA and MassDOT requests; directly interface with the PDG on issues regarding project design, construction techniques, quality, schedule, and budget performance.

Major Responsibilities

- Provide overall project leadership and direction to consultant staff and subconsultant staff.
- Interface with the MBTA and MassDOT through the MBTA Program Manager.
- Interface with regulatory agencies having jurisdiction over the project.

Project Controls Manager

The Project Controls Manager will be responsible for systems and procedures to meet project needs and MBTA and MassDOT requirements. The Project Controls Manager will oversee the project management system to ensure the accuracy and effectiveness of all non-drawing deliverables and adherence to cost, schedule, and contract requirements; and will interface with the MBTA and MassDOT on issues of cost, schedule, staffing, contract administration, scope control, and related issues.

Major Responsibilities

- Oversee project controls and procedures.
- Supervise cost and budget control and contract oversight.
- Prepare the Monthly Project Status Report.
- Develop the project cost estimate.
- Oversee budget and staffing.

Quality Manager

The Quality Manager will be responsible for the development and maintenance of the project-specific Quality Management Plan and monitoring the Design Consultant's performance against the plan.

Major Responsibilities

- Develop and maintain the Quality Management Plan.
- Implement the corrective action system.
- Coordinate quality planning with senior management.
- Provide independent oversight of project activities, including audits.

Engineering Manager

The Engineering Manager will be responsible for the completion of preliminary engineering and development of the design-build procurement package. The Engineering Manager's responsibilities will include addressing the more critical technical issues and proposing solutions for these issues. The Engineering Manager will work directly with the MBTA and MassDOT, keep the Project Manager informed of open issues, and lead the team of various engineering professionals.

Major Responsibilities

- Direct and oversee design in compliance with the scope.
- Manage the interface of the design effort with the MBTA and MassDOT.
- Direct and oversee the inclusion of all technical requirements.
- Ensure that all plans, specifications and estimates comply with MBTA and MassDOT requirements.

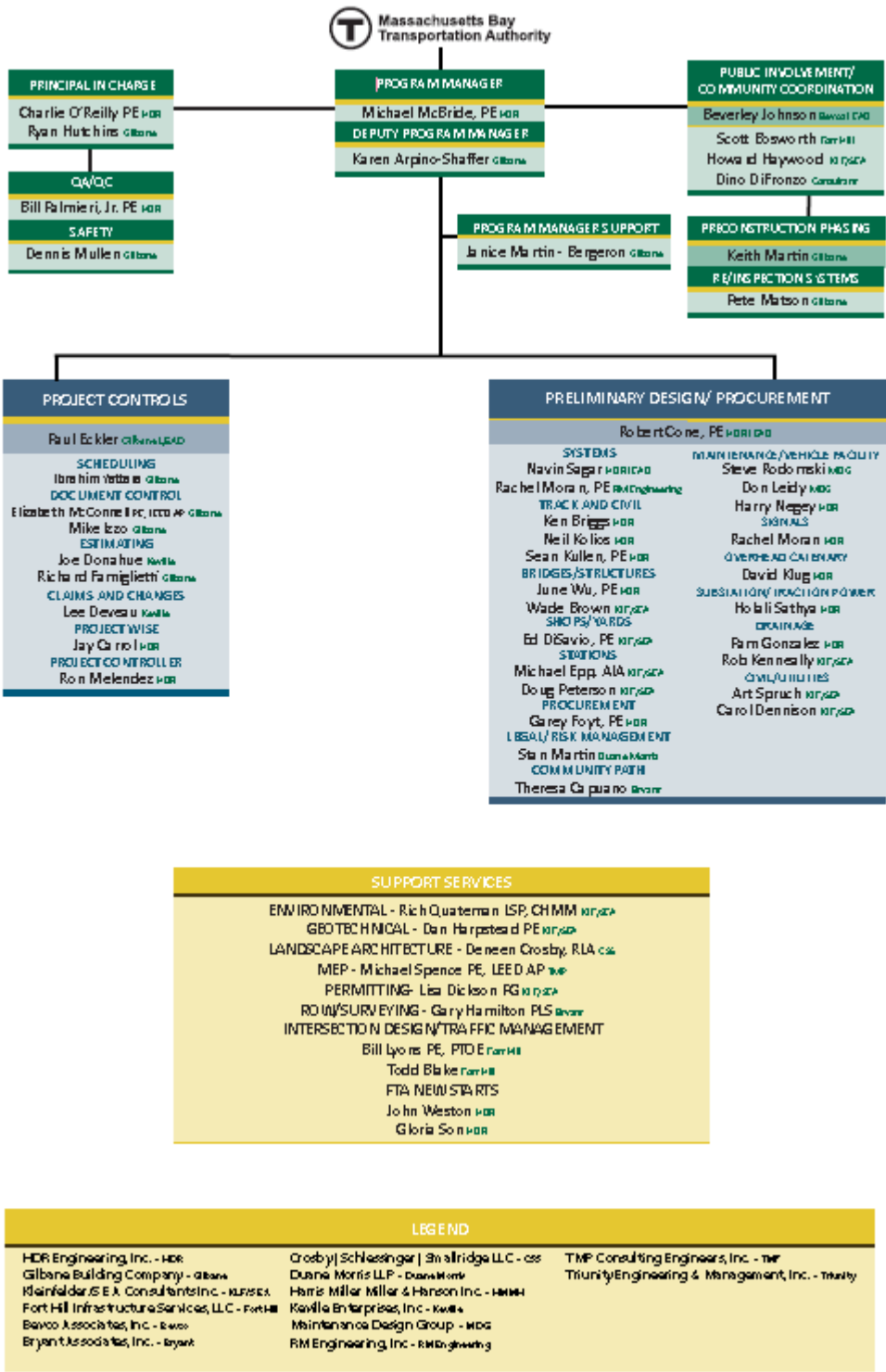
Planning/Policy Manager

The Planning/Policy Manager will be responsible for preparing and retaining documents related to the federal funding process on behalf of the MBTA and MassDOT. In addition, this manager will ensure that environmental compliance and mitigation commitments are being met by the project.

Major Responsibilities

- Develop and maintain documents as part of New Starts and FTA funding requirements.
- Review ridership models and adjust as project design dictates.
- Oversee the development and implementation of documents in compliance with environmental requirements.
- Direct and oversee all planning related efforts in compliance with the scope.

Figure 2-2 Design Consultant Organization Chart



Civic Engagement Manager

The Civic Engagement Manager will be responsible for managing the public outreach and public participation for the project.

Major Responsibilities

- Facilitate and organize public meetings.
- Ensure adherence to the Public Involvement Plan.
- Act as a point of contact for community groups and individuals in the public.

2.4 Governmental and Oversight Agencies**2.4.1 Federal Agencies**

The Green Line Extension is seeking to construct the project in part with federal funds and, therefore, certain federal transportation agencies have oversight and overview responsibilities for the program. These include:

Federal Transit Administration
Transportation Systems Center
Kendall Square
55 Broadway, Suite 920
Cambridge, MA 02142-1093

The FTA is a federal agency granted oversight authority within the United States Department of Transportation. The FTA administers the allocation and use of federal funds for mass transit projects, such as the Green Line Extension project. In accordance with its charter, the FTA will evaluate the project for funding eligibility at several milestones.

The FTA has contracts with consultants to perform Project Management Oversight (PMO) to ensure compliance with FTA requirements. The PMO Contractor (PMOC) for the Green Line Extension project is Kal Krishnan Consulting Services, Inc. The contact for the PMOC is:

Ron Anderson, Sr. Vice President
Kal Krishnan Consulting Services, Inc
900 Wilshire Blvd., Suite 1230
Los Angeles, CA 90017

Beginning with the preliminary engineering phase of the project, both the MBTA and MassDOT Program Managers will maintain coordination with the FTA and the PMOC.

2.4.2 Local Agencies

The Green Line Extension project is located within the cities of Cambridge, Somerville and Medford. The MBTA and MassDOT will maintain coordination with each city's departments of Planning, Engineering and Construction, Transportation, Water and Sewer Commission, and other appropriate departments during the planning, design and construction phases of the project. The MassDOT Program Manager will be the coordinator for this effort.

2.4.3 Regulatory Agencies

The complexity of the Green Line Extension project requires close coordination with federal, state and county regulatory agencies. The following list includes the major regulatory agencies that will be kept apprised of the project design and construction, and may be requested to review and comment on aspects of the project.

- United States Environmental Protection Agency (EPA)
- Federal Transit Administration (FTA)
- Federal Railway Administration (FRA)
- Massachusetts Department of Conservation and Recreation (DCR)
- Massachusetts Executive Office of Energy and Environmental Affairs (EEA)
- Massachusetts Historical Commission (MHC)
- Department of Public Utilities (DPU)

Beginning with the preliminary engineering phase of the project, the MBTA Program Manager will be the coordinator for this effort.

2.4.4 Utilities

This project may affect the right-of-way of various utilities. The following is a list of utilities that may be affected:

- Above Net
- AT&T
- Cambridge Drain
- Cambridge Sewer
- Cambridge Water
- Comcast
- Level 3
- Lighttower
- MBTA (Drainage)
- MCI
- Medford Drain
- Medford Sewer
- Medford Water
- Massachusetts Water Resources Authority (MWRA) Sewer
- MWRA Water

- NGRID Electric
- NGRID Gas
- NSTAR Electric
- NSTAR Electric
- NSTAR Gas
- RCN
- Spectra–AGT Gas
- Somerville Drain
- Somerville Sewer
- Somerville Water
- Verizon

Beginning with the preliminary engineering phase of the project, the MBTA will be responsible for coordinating with the utilities with support from the Design Consultant.

2.5 Equal Employment Opportunity Policy

The MBTA and MassDOT have developed an Equal Employment Opportunity policy, and do not discriminate against any person in employment and/or in access to contracts. Further, it is the MBTA's policy to make certain that all applicants are considered for employment, or procurement opportunities regardless of race, religion, creed, color, sex, age, national origin, disability, or marital status. All consultants will comply with the MBTA and MassDOT policy, as well as the Federal Equal Employment Opportunity policy.

The Green Line Extension project will adopt the Equal Employment Opportunity policy of the MBTA and MassDOT. As defined in this policy, affirmative action will include, but not be limited to, recruitment, hiring, promotion, compensation, benefits, transfers, layoffs, recalls, company sponsored training, education, and social and recreational programs. Goals with specific measurement factors are established to assist management's progress toward finding remedies to any apparent discrimination.

The Green Line Extension project bases decisions on the individual's qualifications as related to the position for which he or she is being considered. In this regard, rules of conduct are enforced equitably and impartially.

3. MANAGEMENT CONTROL

3.1 Functional and Technical Control

Functional control of the Green Line Extension project will be guided by the Project Quality Assurance Plan (PQAP) that will be used by the Design Consultant, the MBTA and MassDOT. The PQAP includes topics such as correspondence control, invoicing procedures, project reporting, file management and other items pertinent to the execution of the project. The format and content of the PQAP will be consistent with the MBTA QA/QC Manual, and will be submitted to the MBTA and MassDOT for review and concurrence. The PQAP will outline in general terms the procedures common to all project participants.

In order to maintain effective, consistent and timely control of all activities by the MBTA and various project participants and enhance the potential for an “on-time and on-budget” completion, the Project Management Team (PMT) will apply “best practices” for Program/Project Control and Reporting. The PMT will work with the MBTA to update the integrated Program Management Control System (PMCS) that tracks and integrates the following critical control elements for each party that is engaged on the overall Green Line Extension project:

- Performance Schedule
- Cost/Budget
- Progress Plan
- Document Control

The PMCS will be revised and updated based on the detailed work breakdown structure (WBS) with individual cost and schedule information provided by each contracting party for its part in the particular WBS element, integrated in a common software platform and established in a hierarchy of tracking and reporting. At the outset of the project the PMT will meet with each project participant to establish the format and detail required for each of the above-noted WBS elements. This information will be incorporated into one overall system that the PMT will maintain and control. This method will enable individuals involved in the project from the General Manager and Assistant General Manager levels (e.g., Level I) down to a Project Manager and Project Budget Analyst level (e.g., Level IV) to review Project Status and Information at various levels depending on their particular needs, while all information is being generated from a common source thereby ensuring consistency of reporting.

The PMCS will enable the quick and efficient control and identification of such issues as the following:

- Dependencies from one party to another
- Upcoming milestones and required performance characteristics
- Critical information need dates
- Key decision points/dates
- Performance and Progress Trends
- Deliverable Status and Requirements
- Impact Assessments for “what if” scenarios

- Exception Reporting
- Financial Status and Cash Flow Projections

The PMT will employ an “Earned Value” system of reporting progress against budget/cost. The PMT shall prepare a monthly status update of the PMCS in order to provide timely management reporting which will enable rapid response and mitigation to adverse trends, problem areas, progress shortfalls, potential progress or cost impacts, etc. before they become Milestone impacts. The PMT will meet with the MBTA and project participants as needed to review planned vs. actual progress, forecasted activity for ensuing periods, areas in need of recovery and upcoming critical milestones.

3.1.1 Technical Baseline/Configuration Control

The technical baseline of the project will be defined by the following levels:

- Level 1: The Green Line Extension project
- Level 2:
 - Discipline
 - Project Management
 - Civil
 - Structural
 - Architectural
 - Systems
 - Geotechnical
 - Construction Staging / Cost Estimating
 - Environmental
 - New Starts
 - Public Participation
 - FTA Workshops
- Level 3: Earned Value Costing Levels within Each Discipline
- Level 4: Detailed Task Breakdown

Configuration Control or Configuration Management will be detailed and tracked at the lowest affected level at which the change and/or modification to the particular element appears. Any necessary change and/or modification to a particular element will be detailed to describe the change and/or modification, the reason the change and/or modification is necessary and anticipated impacts to associated elements. The configuration change must also document the effects (either positive or negative) to both the construction cost and construction schedule. If approved, notification of the configuration change and/or modification will be sent to all Discipline Task Leaders. The Configuration Management Plan is appended to this PMP as Attachments C.

3.1.2 Design Reviews

Design Reviews, as described in the MBTA's design review procedure (as contained in the

MBTA's Project Management Manual, which is appended to this PMP as Attachment B) are an integral part of the design process and necessary to ensure that both the right problem is solved and that it is solved correctly. The quality assurance process for reviews is organized by phase, by discipline and across disciplines. It is both a pro-active and a reactive process; it is pro-active in the systems that are set up and the steps that are required, and it is reactive in the review of data and drawings by senior staff.

Review Systems

The review systems are developed to assist engineering in controlling the design process. These system elements are set up at the beginning of the project to enable efficient and complete project reviews including:

- Deliverables matrices that define what is required for each deliverable by discipline.
- Information management systems that ensure the latest information is available to all parties.
- Issue tracking system to ensure resolution before deliverables are due.
- Identification of responsible reviewer by discipline and by overall deliverable (cross-discipline).
- Review schedules by deliverable, including early, interim and final reviews.
- Creation of project-specific checklists for reviews, both within discipline and cross-discipline.

During the preliminary engineering phase of the project, three major design documents are expected to be prepared and submitted for review: Intermediate Design Submittal; Pre-Final Design Submittal; and Final Design Submittal.

Standards and Criteria Review

The review process used during design will include:

- Review of all applicable codes and standards;
- Review of emerging standards and agreement on their use;
- Agreement on operational and functional criteria;
- Review of study and field investigation results; and
- Review of concept design for key issues and their solutions.

Design Reviews

Design reviews will be conducted for both individual disciplines and for multi-disciplinary coordination by senior staff, utilizing the review system tools including checklists, deliverable matrices and issues lists. Reviews will be both formal on a scheduled basis, and informal as the work progresses. These reviews will include the internal checks from the preparer and reviewer and will also address the need for interdisciplinary reviews and coordination between the departments and groups. In addition to the in-process steps, the project team will conduct high-level design reviews, independent reviews, and peer reviews at critical project junctures. During the preliminary engineering phase of the

project, various working groups will meet regularly to discuss and coordinate various design aspects of the project. The Design Consultant will hold a weekly coordination meeting, and the MBTA will hold a monthly inter-disciplinary design meeting. A Design Working Group, consisting of stakeholders from the public, will meet on a quarterly basis to ensure that stakeholder concerns are also incorporated into the design processes.

Reviews will also be occurring on an on-going basis by the senior staff. Commentary from those reviews, as well as feedback from presentations and discussions with team members, will be documented in an issues-tracking system. The system works to keep all interface disciplines and organizations informed on issues, to engender discussion and provide a way of tracking an issue to resolution. The issues list then serves as a final checklist in reviews. Design reviews will also include peer reviews on an as-needed basis to ensure all professional work was performed within proper standards and will be implemented by credible professionals.

Constructability Reviews

The Design Consultant will participate in or conduct constructability reviews at various points in the design process. Participation may include providing support to a separate MBTA and/or MassDOT review process or may be the actual performance of the review, as directed by the MBTA and MassDOT. It is anticipated that constructability review, as with value engineering, will be done early in the preliminary engineering design phase. This is the point in time at which there is the greatest opportunity to achieve benefits in quality, cost, and time savings. Constructability reviews should also be introduced during the intermediate and final design phases as design details are developed. Each constructability review will be formally documented with all comments, recommendations, alternatives proposals, etc., incorporated together with the proposed response by the Design Consultant.

Constructability review personnel will be located in the Design Consultant's project office. They will function as an integral part of the team from the beginning of the design effort, serving as advisors who offer an owner's view of the project. This eliminates the hand-off from design to construction that occurs in most traditional projects. The construction personnel add value and enhance efficiency from the earliest stages of concept development. The construction staff is an integral part of the team, acting as key resource personnel supporting the MBTA Program Manager. They will participate in all of the in-house quality reviews, bringing the construction perspective to each design element. This on-going direct participation by construction experts with recent local experience will ensure that the issues of constructability, maintainability, and durability are thoroughly addressed during the design process and reflect the realities of the construction and labor market.

Bid-ability Reviews

In addition to analyses of constructability, it is extremely important that documents be reviewed for bid-ability. Near the end of preliminary engineering, the bid documents, consisting of plans; specifications; general and special conditions; and addenda, will be reviewed by the MBTA with support from the Owner's Representative and the Design

Consultant to determine that all required permits and approvals have been obtained. At the time of Pre-Final Design Definition Document submittal, the bid document will also be reviewed by the MBTA and the appropriate departments who will be managing the design-build contractor.

3.1.3 QA/QC Program

For the Green Line Extension project, the MBTA and MassDOT will follow a Project Quality Assurance Plan (PQAP), meeting the requirement of the FTA's Essential Elements of a QA/QC System that outlines and directs the specific auditing requirements that the MBTA and MassDOT will perform during the life of the project. The Design Consultant will also prepare a project-specific Design Consultant Quality Assurance/Quality Control Plan that has been reviewed and approved by the MBTA. This plan will outline the specific procedures that all participants of the Design Consultant will follow in terms of Quality Control. The plan also requires specific quality assurance measures and audits that are performed internal to the Design Consultant.

The PQAP and the Design Consultant Quality Assurance/Quality Control Plan will work in concert and complement one another to ensure the project is delivered with the quality intended. The purpose of the Quality Assurance plans is to formalize responsibilities, organization, procedures and implementation of the program, and to define their relationship to the Quality Control function. Both plans are appended to this PMP as Attachments D and E.

3.2. Cost Control

The Design Consultant will establish and maintain a cost control and reporting system. Through this system, the Design Consultant will provide the MBTA and MassDOT with monthly summary-level cost information derived from approved budgets, current estimates, progress payments and other actual costs. This information is reported in the monthly progress report that the Design Consultant submits to the MBTA and MassDOT Program Managers. A sample Design Consultant Monthly Progress Report will be developed upon selection of the Design Consultant and will be included in Attachment F.

The Design Consultant will prepare project financial analyses, budgets, forecasts, cost estimates, project breakdown schedules, cost reduction evaluations, and financial data to meet the project's specific needs. On a monthly basis, the Design Consultant tracks and evaluates trends and variances in the costs associated with design. Working with the MBTA and the MassDOT Program Managers, the Design Consultant assists in the evaluation of costs associated with construction, administration, utilities, real estate, and other items. In addition, the Design Consultant will recommend adjustments when adverse trends occur.

The Design Consultant Project Controls Manager will take the lead on developing, monitoring and maintaining the various components of the Cost Control System. The Design Control Project Controls Manager, in coordination with the MBTA Program Manager, will work closely with the appropriate MBTA Project Controls and Finance staff to ensure that the project costs

and available contingency amounts are monitored continuously and that there is adequate funding to cover proposed budget changes. Use or reallocation of contingency funds must be approved by the Assistant General Manager for Design and Construction. Cost deviations that will result in increasing the overall Program Budget will have to be approved by the MBTA Board once it is demonstrated that adequate funding exists to finance the proposed change.

3.2.1 Maintaining Baseline Project Cost

The Baseline Program Budget will be developed at the end of the preliminary engineering phase, after the alignment is refined and the project is very well defined. This will be the cost basis against which future cost performance will be measured. design-build contractor bids and performance will be constantly monitored throughout final design and construction to maintain consistency with the Baseline Program Budget.

As part of the federal funding process, the MBTA and MassDOT will request from the FTA a definitive funding contribution to the project. Once this amount is determined, the baseline budget will reflect the project cost line items in accordance with the Full Funding Grant Agreement. These line items may include support and maintenance equipment, real estate acquisition, professional service contracts, construction contracts, force accounts, supporting services and contingencies, as well as other items.

Once the Baseline Program Budget has been established, with a contingency amount consistent with the level of design, any major design changes that impact budget or schedule will undergo an independent review process. The MBTA Program Manager will direct the Design Consultant to analyze submittals associated with redesigns for cost and schedule impacts and identify any potential mitigation measures. If there is a need to increase the overall program budget, approvals from the MBTA Board will be required.

3.2.2 Performance Measurement

During the preliminary engineering design phase, there are two major components associated with the total project cost: the cost of professional services and administration, and the cost of construction. Although the actual cost of the construction will not be confirmed until the design-build contract is awarded, it is the design that influences the cost of construction. It is essential that these costs are continuously monitored and controlled throughout the preliminary engineering phase to ensure that the project progresses within budget.

The fundamental principle of cost management is the establishment of a budget estimate for the scope of work, and introduction of a set of metrics against which adherence to the budget may be measured. For this project, during preliminary engineering the Design Consultant will prepare a Work Breakdown Structure (WBS) for its activities, including specific milestones for preparation/submission of deliverables. Budgets will be applied to the WBS. An Earned Value analysis will be performed on a monthly basis to chart actual progress of specific tasks versus the actual budget spent and the "value earned" for the work that was accomplished. The percentage of work completed will be compared to the percentage of task budget expended. This analysis will be monitored and reported to the MBTA and MassDOT as a part of the Design Consultant Monthly Progress Report.

An Original Program Budget has been established. During the preliminary engineering phase, this Original Budget will be further refined at various stages of design, with a final Baseline Program Budget being developed at the end of preliminary engineering. The project costs will be developed in accordance with project requirements and procedures to ensure consistency of one estimate to another and will be prepared in such a manner to enable the proper evaluation of critical "cost drivers" of the overall project cost. As preliminary engineering begins to further define the specific attributes of the project, these costs will be updated and monitored so that the final Baseline Program Budget may be controlled. These metrics will continue during the design-build contract.

3.2.3 Contingency Management

Contingency funding is a fiscal planning tool for managing the risk of cost escalations and covering potential cost estimate shortfalls. Inclusion of a contingency amount in the cost estimate will minimize the impact of potential cost increases and provide for an earlier discussion of how potential budget deviations can be addressed.

Risks will be defined with specific costs allocated to them, as opposed to just "bumping up" the total cost. A risk allocated cost contingency will be included in the total project cost estimate for the mitigation of all significant risks. Risk management and contingency funding can be utilized to mitigate those risks that cause cost escalations throughout the project.

During the preparation of the Original Budget, a risk assessment was performed for the entire project in order to define and quantify the potential risk areas and types. Risk assessments will continue to be performed periodically throughout the project to update contingency amounts. Some examples of risk assessment areas include the analysis of differing site conditions, utility impacts, hazardous materials, environmental considerations, third-party concerns, geological conditions, market conditions, increased cost of commodities, etc.

When refining the project cost estimate, subsequent risk assessments will include allocating risk contingencies for major cost elements. This will assist in the mitigation of uncertainties and help create a conservative cost expectation. Probability of occurrence, severity and expected dollar value are variables that may be utilized when quantifying risk as a contingency amount. After all known risks have been identified, the cost estimate's contingency-funding levels should reflect the amount of risk associated with the project's major cost elements. Additionally, an overall management contingency can be included to cover unknown, unanticipated risks.

The following are major cost elements for contingencies that should be considered for Major projects: 1) a Construction contingency to cover cost growth during construction; 2) a Design contingency (based on different levels of design completion); 3) an overall Management contingency for third-party and other unanticipated changes; and 4) other contingencies for areas that may show a high potential for risk and change, (i.e., environmental mitigation, right-of-way, utilities, highly specialized designs, etc.). Other areas of interest for contingency cost estimating may include contractor availability and historical contingency levels for similar projects.

Construction contingencies will be established and adjusted based on the assessed risk in exposure to construction cost escalations. Project funding will be reviewed at periodic intervals and unused contingency funds can be released to be made available for other contracts.

Design contingency amounts will be based on the amount of design completed. When the final design is complete, the design contingency amount in the cost estimate will equal zero. Projects under design are not overestimated; the contingency is based on the uncertainty inherent in the remaining design to be completed.

The MBTA Program Manager's responsibilities will include managing cost and schedule deviations from the approved budget and schedule, impacts resulting from the deviations, and initiatives being analyzed or implemented in order to recover any cost overruns or schedule delays. During the preliminary engineering phase of the project, the MBTA Program Manager will authorize use of management contingency and transfers to and from contingency, pending approval from the Assistant General Manager for Design and Construction, and will be responsible for reporting on contingency transfers.

An overall management contingency will be incorporated. This contingency will be a "stand-alone" piece of the cost estimate that is managed by the MBTA and MassDOT Program Managers and will be used for a broad spectrum of uncertainties.

Management of the transfer of costs to and from contingency line items will be administered and tracked carefully by the MBTA Program Manager. Cost transfers will be correlated to the major element type of cost escalation. For example, if work outside of a clearly defined scope is found to be essential and justifiable in the future, then a management decision can be made to pay for the added work from the management contingency or another appropriate contingency. On the other hand, for a specific utility issue that has a utility contingency, careful tracking of this particular contingency can help management better analyze cost overruns.

Reasons supporting contingency transfers will be noted and included in all pertinent reporting. This is so a comparison analysis to the available contingency amounts can be periodically analyzed for contingency usage rates. This analysis will show MBTA and MassDOT Program Managers that a reasonable and sufficient amount of contingency remains to keep the project within the latest approved budget.

3.2.4 Escalation Factor Derivation

The Financial Plan will take the capital costs for the following projects and escalate them to year-of-expenditure dollars (YOES): (1) the Green Line Extension project, (2) other MassDOT SIP Commitment projects, and (3) the MBTA capital projects. The plan will take the capital costs for these project in base year 2009 dollars and escalate them to YOES by applying an average of forecasts of the Engineering News-Record's (ENR's) Building Cost Index (BCI) and Construction Cost Index (CCI) for the Boston metropolitan area.

Note: This section will be updated to reflect the escalation factor analysis once the Financial Plan is complete for the FY2012 New Starts submission.

3.2.5 Contracting Techniques

Contracting strategies must satisfy all objectives of the Green Line Extension project. The selected methods and strategies must accommodate the project schedule and budget, enhance system integration, anticipate the capabilities and limitations of the local contracting community, and satisfy federal, state and local requirements.

In July, 2010, MassDOT prepared a Project Delivery Alternatives Report, which identified different project delivery methods and discussed advantages and disadvantages for each one of them. The report concluded that the design-build method is advantageous over Design-Bid-Build with regard to project duration, cost controls, claims and change orders. The design-build method was approved by the Massachusetts State Legislature as an effective procurement technique in 2002 and since then has been used for various transit projects including the Greenbush project. With direction from the MBTA Program Manager, the Design Consultant will develop design-build contract bid documents under the supervision of the MBTA's Contract Administration Department.

The MBTA Procurement Department will conduct bidding and perform contract award services including: advertising for bids; conducting pre-bid conferences; administering the document addenda; collecting and opening bids; administering bid evaluation and contractor selection and resolving selection disputes. MassDOT will provide support to the MBTA during this phase. The procurement of the design-build contractor will include a Request for Qualifications to identify potential teams who will be asked to submit a proposal, with interviews to be scheduled with each team after the evaluation committee has been given sufficient time to review the proposal submissions.

Since the Massachusetts State Legislature previously approved sufficient funding for the Green Line Extension's local match, the Assistant General Manager for Design and Construction will recommend award to the responsive bidder as determined by the evaluation requirements established for the design-build contract. Consistent with the MBTA's enabling legislation, the recommendation will be made to the MBTA Board, which will approve award of the contract and commit the funds.

3.2.6 Cost Allocation Plan

The Preliminary Project Budget is \$953.7 million in 2010 dollars, as outlined below.

Category	Budget (millions)
Right-of-Way	\$ 67.6
Construction	\$ 487.8
Vehicles	\$ 79.3
Administration/Professional Services	\$ 125.6
Contingency (Unallocated)	\$ 84.6
Total Project Cost	\$844.9

Escalation	\$108,886
<i>*Contingency (Total)</i>	\$ 953,740

Based on the Cost Estimate dated 12/13/2010, and submitted to the FTA.

*The total contingency amount includes the unallocated contingency (\$83.8 million) as well as the allocated contingency as a percentage of Base Yr Dollars (these amounts are included in the Budget values for each category shown in the table).

The estimate includes an unallocated contingency of \$84 million or a total contingency of \$199.7 million, which are 13 percent and 31 percent of the base year dollars for all categories presented in FTA's Standard Cost Category (SCC) sheet, respectively. The cost estimate is included in SCC format in Attachment G.

3.2.7 Cost Accounting Plan

During preliminary engineering, the MBTA Program Manager, with support from the MassDOT Program Manager and the Design Consultant, will be responsible for monitoring project commitments, expenditures, and other costs. The MBTA's Capital Management System will be used to facilitate the gathering and analysis of cost information with exception variance and cash flow projection. The cost tracking system will be based on the WBS detail elements and detailed chart of accounts. Information will be gathered and entered into the system at the account level and summarized or recombined as needed.

The Cost Control System will include the following basic elements:

The **Original Budget** is the program budget for the Green Line Extension project. The cost control system will reflect the baseline budgets as established before and at the end of preliminary engineering, and permit the analysis of revisions to that budget. The system will also reflect the most current budget amounts and allow analysis of cost and expenditures against these budgets.

The **Current Budget** is the current, updated budget value for each budget line item in the cost report. The current budget reflects the adjustments made to the original budget value by budget transfer and/or scope change.

The **Contract Amount** is the current value of a contract as approved and authorized.

The **Contingency** is an allowance for managing the risk of cost escalations and covering potential cost estimate shortfalls. The use of the allowance is authorized by the MBTA Program Manager, pending approval from the Assistant General Manager for Design and Construction.

Estimated Future Commitment is the forecasted additional costs required to complete a specific contract or work package. It represents the estimated difference from the current contract amount to completed services.

Scope Change is the value of approved additions or deletions to the project scope of work as defined for the original budget.

Estimated Total Cost is the anticipated total cost of a contract, which is the sum of its

current contract amount and estimated future commitment amount.

Budget Transfer records the authorized movement of budget funds between the line items defined in the original budget. The net value of a budget transfer does not change the overall budgeted cost of the project.

Variance is the difference in value between the current contract amount and the estimated total cost. A negative number indicates an anticipated cost overrun on the current budget.

Estimate to Complete represents the value of remaining work to complete, including pending change orders.

Incurred to Date represents the total value of earned work to date. It is a cumulative cost figure.

Expended to Date represents the total value of earned work paid to date.

Funding Sources are those sources expected to participate in the funding of the project including the FTA, etc.

Cash-Flow Projection is the estimated cash required to fulfill monthly expenditure commitments.

3.2.8 MBTA Force Account Plan

A Force Account plan will be established at the conclusion of preliminary engineering once the need for and availability of MBTA forces and impacts to the existing transit services during construction can be determined. Additionally the Force Account plan will include estimated MBTA support during commissioning, pre-revenue testing operations, and a contingency associated with each activity. The MBTA Program Manager will request the Force Account Plan from the appropriate departments based on the proposed scope of work. Once funding has been authorized, the lead from Operations Department performing the work will be responsible for ensuring all work stays within the budget. The MBTA Program Manager is the only person who can authorize changes/transfers from existing Force Account contingency.

3.3 Schedule Control

Through the use of several levels of schedules, strict schedule management and control will be the responsibility of the MBTA Program Manager during preliminary engineering, with input from all participants on the Green Line Extension project. This is accomplished through a stringent change control process, and a comprehensive monitoring and reporting system.

The project design schedule will be prepared by the PMT and updated monthly to reflect the progress of the work. The PMT will submit a cost-loaded project design schedule to the MBTA for review and approval. The schedule will include a work breakdown structure (WBS) that organizes the design scope of work into definable elements and activities. These elements and activities would make up each phase of the design scope of work. Using P3 or equivalent software, the PMT will cost-load the schedule to reflect the WBS. For cost

loading, a budget-at-complete value is assigned to each activity. An overall Green Line Extension master schedule will be prepared to include: station design activities along with bridge design and systemwide elements. This schedule will include the construction phase along with start-up and system integration, vehicle procurement and operator training activities.

3.3.1 Types of Schedules

Procedures have been established to provide sound, efficient, timely, and accurate methods of schedule control, monitoring, and reporting. Scheduling provides a planning framework not only for the MBTA and MassDOT staff, but also for federal, state, and local agencies, as well as public and private utility companies, local community groups, businesses, consultants, suppliers and contractors.

The schedules used for the Green Line Extension project will be:

- Master Schedule
- Level 1 – Executive Schedule
- Level 2 – Summary Program Schedule
- Level 3 – Detailed Program Schedule
- Level 4 – Detailed Contract Schedule

3.3.2 Master Schedule (Levels 1, 2 and 3)

The Master Schedule encompasses the entire Green Line Extension project. It incorporates all other schedules, reflects all program components, and includes all known or anticipated logical ties and constraints between project elements. The Master Schedule is an evolving document; as the work progresses, more detailed schedules are developed for approaching phases as they replace the more general schedules in the Master Schedule. The Master Schedule will continue to be developed and maintained by the Design Consultant and endorsed by the MBTA Program Manager, with support from the MassDOT Program Manager, as the official plan for the Green Line Extension project.

The Master Schedule will be developed by integrating various schedules into a single critical path network. It will include detailed schedules for work performed by the MBTA and MassDOT staff and consultants, the FTA, outside consultants, vendors and construction contractors. The various detailed schedules will correspond generally with the scope of work and division of responsibilities identified in the Work Breakdown Structure.

The Master Schedule will be the primary tool for assessing overall project status and will be a critical aid in identifying and managing the interfaces between different organizations, responsibilities and contractors.

Level 1

Level 1 of the Master Schedule will be a one-page schedule summary in bar chart form showing design, bid and award, procurement/construction, systems installation, testing and start-up, and the major milestones for each significant area of the program. A summary graphic of the Master Schedule showing the phases from preliminary engineering through the start-up of revenue service is shown in Figure 3-1.

Level 2

Level 2 of the summary program schedule will be in a bar chart format with one or more bars per contract, showing the typical activities of design, bid and award, procurement/construction, and systems installation.

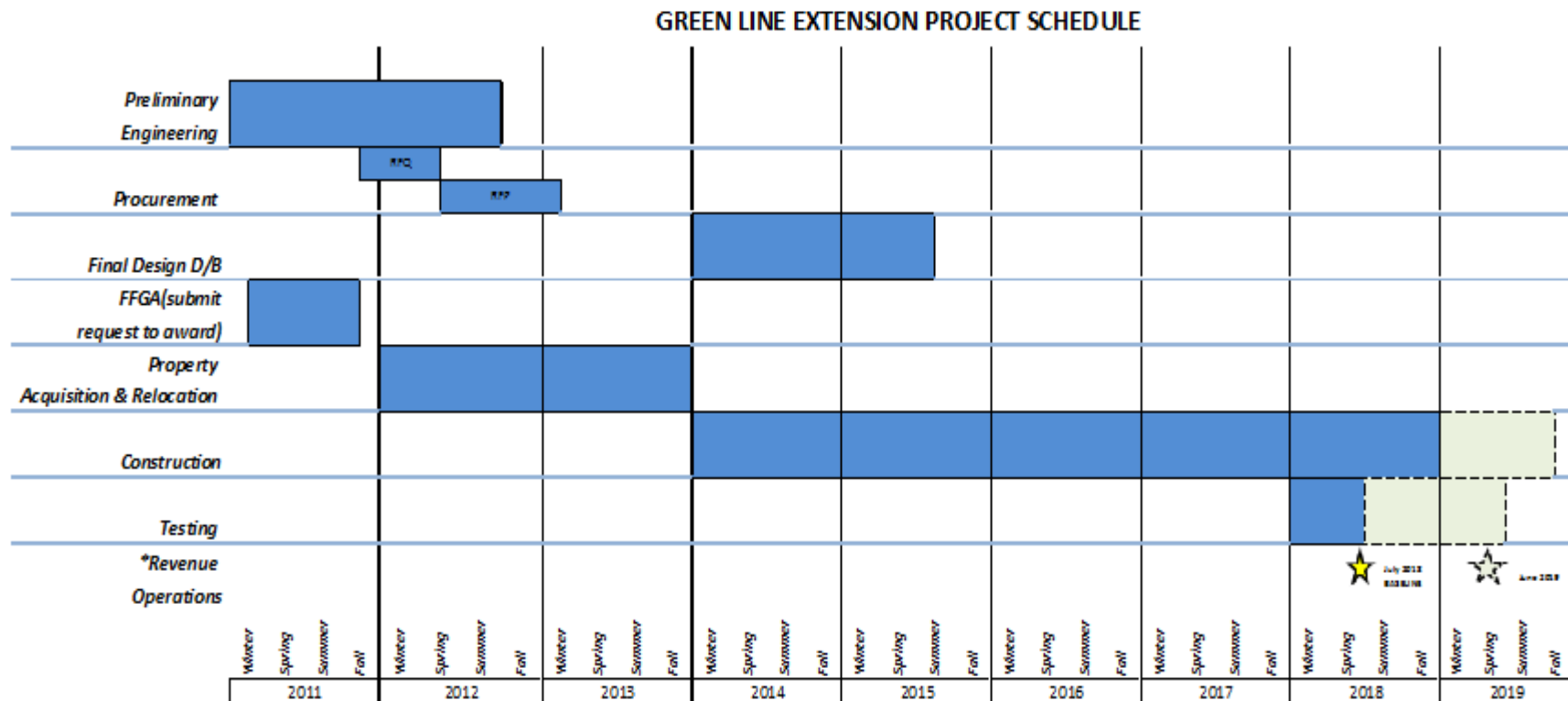
Level 3

The Level 3 Detail Program Schedule will be the most detailed level of the Master Schedule, and is a fully integrated Critical Path Method schedule presented in bar chart format. Level 4 detail will be contained in the individual contractor's schedules, and will be summarized in the Master Schedule.

The Level 3 Detail Program Schedule will outline the individual activities that support the higher level schedules. The Level 3 Schedule will be the working schedule that facilitates planning, contract package determination, contractor monitoring, updating and reporting. Level 3 schedules will be further developed as design progresses. Examples of these individual Level 3 schedules are described below:

- Design Schedule
- Bid and Award
- Construction, Equipment Procurement, and Installation Schedule
- Utilities
- MassDOT and MBTA
- Environmental
- Right-of-Way
- Permits
- System Integration and Start-up

Figure 3-1 – Level 1 Master Schedule

***NOTE:**

The above represents a non-risk adjusted Base Schedule, as reported in the State Implementation Plan. Risk Analysis done to date indicate a 10% probability of meeting the Sept, 2018, a 50% probability of meeting the June, 2019 (which is the date we have used in all of the New Starts Cost Estimate and worksheets) and a 90% probability of meeting a July, 2020 date.

 = Baseline + Contingency

The **Design Schedule** for each contract segment will be developed, maintained, and updated by the Design Consultant. The schedules will be discussed and updated at the project controls meetings.

A **Bidding Schedule** for each contract package will be developed and updated by the MBTA Program Manager and discussed at the project staff meetings. The schedule information will be made available to the construction industry through the bidder's exchange and local industry publications. Advertisement, bid opening, award, and notice to proceed dates will be updated monthly as inputs to the Master Schedule.

Construction, Equipment Procurement, and Installation Schedules will be developed initially by the Design Consultant. After award of the contract, the schedule will be maintained by the contractors.

Utility Schedules will be received from public and private utility companies prior to commencement of their relocation work. Schedule information will be maintained and updated by the MBTA Program Manager.

The Master Schedule will reflect activities performed by MBTA and MassDOT staff. The schedules will include MBTA and MassDOT general, technical, legal and administrative work.

The schedule for any outstanding environmental permitting activities will be maintained by the MBTA and MassDOT Program Managers with input from the Design Consultant, and in coordination with right-of-way and permits staff.

The **Right-of-Way** acquisition and relocation schedule will be maintained by the MBTA Program Manager from information supplied by MassDOT and the MBTA Real Estate Department staff. Using submissions from the MBTA Real Estate staff, the schedule will list every parcel to be acquired for the project and track dates for key events in the acquisition process. The schedule also tracks the key dates affecting status of relocation efforts for input into the overall project schedule.

Information on the schedule for land use, street encroachment, and other permits needed throughout the course of this project will be gathered by the Design Consultant. The information will be transmitted to and maintained by the MBTA and MassDOT Program Managers to enable coordinated plans suitable for timely securing of permits.

3.3.3 Contract Schedules (Level 4)

Level 4 schedules for particular elements of work will be developed by the entity or entities responsible for the work elements. All schedules will identify the critical path and conform to the specific scheduling requirements of the particular contract.

Using standard methods and formats developed for the project, the Design Consultant will integrate the Level 4 schedules into the Master Schedule network. Appropriate constraints will be added to reflect relationships among the various schedules.

3.3.4 Schedule Development, Progress Monitoring

Schedule monitoring will provide a clear indication of schedule performance. Part of the schedule monitoring process is to detect adverse trends early enough to correct them.

During preliminary engineering, the progress of design will be monitored through a series of schedule submittals and reviews, along with weekly meetings of all task managers.

Administrative activities, such as contract preparation and procurement of owner-supplied materials will be monitored through a series of milestones which will be reported and confirmed on a regular basis.

Schedule monitoring of field construction activities will provide a clear indication of and confirmation that adequate work force, materials, tools, and equipment are available for the timely performance of the work. Activities falling outside the expected performance time will be examined in detail, and reasons for delay will be identified. A variance report will provide management with the information necessary for determining appropriate corrective action.

3.3.5 Schedule Reporting

During preliminary engineering, project status, schedule conflicts and changes will be reported on in a monthly progress report prepared by the MBTA Program Manager, with support from the MassDOT Program Manager. This Project Monthly Progress Report will be distributed to the FTA, the MBTA and MassDOT Program Managers and other involved parties. The Project Monthly Progress Report will provide a consistent basis for reporting and evaluation of progress and will allow the various managers to focus on exceptional events and negative trends. The Program Manager's Monthly Report will provide the following information regarding the progress of work performed by the PMT along with the earned value data:

- 1.) Executive Summary of Progress
- 2.) A description of the design work completed during the reporting period
- 3.) Work items and paths that are critical to timely completion of the design phase
- 4.) Anticipated work to start and finish during the next reporting stage
- 5.) Additional design scope items
- 6.) Explanations of schedule delays
- 7.) Anticipated problems and recommended possible solutions
- 8.) Explanation of the variances between the previous schedule updates
- 9.) Statement of the adequacy of remaining design budget and time
- 10.) Earned Value summary analysis and graphs

As the need arises, the MBTA and MassDOT Program Managers will also produce special studies and analyses of particular topics. The format and distribution of such reports will be tailored to the specific needs of the situation.

The MBTA Program Manager will publish and distribute the Project Monthly Progress Report that includes summary schedule and look-ahead information. This report also includes the Level 1 Executive Schedule, and the Level 2 Summary Program Schedule.

An example of the Project Monthly Progress Report is found in Attachment F of this Project Management Plan.

3.3.6 Schedule Updates

The goal of the schedule updating process is to present the most accurate picture possible of the progress achieved by all levels and organizations involved in the program and to demonstrate the effect of this progress on the overall program schedule.

As the project transitions from the preliminary engineering phase and the design-build contractor begins final design and construction, the MBTA Program Manager will have primary responsibility for coordinating the gathering of project status information. All elements of the project organization will supply information to the MBTA Program Manager in accordance with detailed program procedures. Schedule status information will be gathered formally from all team members.

If a change occurs during the design phase and the change is recognized by the MBTA, the PMT shall incorporate proposed change(s) into the appropriate schedule update as a fragment(s). The PMT shall submit a detailed report to the MBTA that discuss the effects of the fragment on the progress of the design work. Upon review and acceptance that a change occurred, the MBTA shall issue an amendment for the change. The PMT shall incorporate the fragment into the schedule update.

With regard to earned value analysis, the PMT will incorporate the cost of the proposed changes into the earned value analysis, which corresponds to the proposed schedule with the fragment. The PMT will perform a revised earned value analysis and submit to the MBTA for review. The detailed report shall include the results of the analysis, the cost curve graph and a discussion that effects the proposed change on the PMT's estimate-to-complete and estimate-at-completion. Upon issuance of an amendment for the change, the earned value analysis will include the cost for the approved changes.

As potential delays or changes become apparent, the MBTA Program Manager, working with the MassDOT Program Manager, will initiate a recovery schedule to determine if the lost time could be recovered or identify how changes to the originally anticipated schedule logic and sequence should best be reflected. In many cases, the MBTA and MassDOT Program Managers will enlist the aid of the responsible participants to research and analyze the delay and to recommend strategies to recover time.

This section will be developed prior to the completion of the preliminary engineering phase.

3.4 Cash Management

MassDOT intends to utilize state bonds to match the federal New Starts share for the Green Line Extension project.

The Green Line Extension project is a State Implementation Plan (SIP) commitment; therefore the Commonwealth is committed to fund design and construction of the project until the

Federal share of the project funding is available. The MBTA will administer the funds for the project as stipulated in an Interdepartmental Service Agreement (ISA) with MassDOT.

3.5 Configuration Management

The Configuration Management Plan is appended to this PMP as Attachment C.

3.6 Configuration Management Planning

The Configuration Management Plan is appended to this PMP as Attachment C.

3.7 Document Control

Document Control is necessary to manage document creation, review, publication, consumption, and disposition or retention. Overall, Document Control will maintain the following documents:

- **Central Files** – All correspondence between the MBTA, MassDOT, Design Consultant, Contractor(s), third parties.
- **Controlled Files** – A controlled set of project documents (plans, specifications, manuals, and procedures), including approved changes.
- **Library** – Reference documentation for use by project personnel, such as the Environmental Assessment, design criteria, standards, maps, etc.

Per MBTA Project Control Standards, the Green Line Extension project will adhere to the following requirements:

- The Project Management Team (PMT) shall provide monthly design schedule updates.
- The PMT shall provide 'bottom's up' cost estimates at each design stage.
- Contract Time Determination Studies shall be provided by the Project Management Team (using the cost estimates as a basis).
- A senior level Construction Cost Estimate review session shall be scheduled in which the PMT will present key aspects to the MBTA. This session will also address risk elements.
- A Cost Estimate Reconciliation Workshop will be implemented.
- A program will be implemented for reporting design project monthly progress, via monthly update reports prepared by the Project Manager, that includes a definition of project scope, cost and schedule status, design amendment status information, cost exposure, major work completed and in progress and a definition of pending issues.

The Document Control Plan is appended to this PMP as Attachment G.

3.8 Baseline Management

Establishing and carefully maintaining baselines for cost, schedules, scope and quality will be necessary to effectively maintain project control. Baseline Management will be implemented through version control and careful monitoring of all documents and artifacts contributing to each baseline. With these multifaceted controls in place the project can be quantitatively measured over time – permitting the project team to monitor the project cost, schedule, scope, and quality and justify any subsequent deviations through examining the project history. A carefully controlled baseline will provide the project team and client with the ability to retroactively audit discrepancies that may occur during any phase of the project lifecycle. Baseline management will work hand-in-hand with change controls (as described in Section 9.8) and the controlled distribution process, ensuring all documents will be released and modified only as authorized.

The Baseline Management approach is identified in the Configuration Management Plan is appended to this PMP as Attachment C.

3.9 Change Management

The Change Management approach is identified in the Configuration Management Plan is appended to this PMP as Attachment C.

3.10 Cost Management

The objective of applying cost management is to ensure the project is completed within budget. Cost Management refers to the process of gathering, tracking and managing the financial resources throughout the project's life cycle. This process relies heavily on accurate estimates and actual data that need to be maintained and updated accordingly. Having quality input data is the key to obtaining reliable cost information for managing resources and making decisions.

Cost Management Module

The Cost Management Module keeps track of how the resources are being deployed and utilized. More specifically it uses the WBS as the key element to break out the budget at the different task levels. The module also defines the funding sources and contingency; incorporates the client's financial codes; presents costs using the FTA Standard Cost Categories; develops workflows for approval of invoices and payments; and links and tracks change notices (CN) and executed change orders that impact the budget at different levels.

In addition, the Cost Management Module tracks the efficiency of the resources being used during the life of the project, calculating earned value to date, budget variances and estimate at completion figures. Cost summaries at the different levels are available and the information is rolled up all the way from task level to the program level.

4. LABOR RELATIONS AND POLICY

This section will be developed prior to the completion of the preliminary engineering phase.

5. RISK MANAGEMENT AND INSURANCE

5.1 Scope

The scope of the MBTA's and MassDOT's approach to Risk Management, and ultimately a decision on which cost-effective insurance coverages should be obtained, is structured and well founded based on significant experience in the development and construction of major capital projects. Risk Management is basically broken down into five distinct activities:

1. Risk Identification
2. Risk Evaluation: Magnitude; Probability; Schedule Implications
3. Risk Mitigation
4. Risk Allocation
5. Insurance Methodology

Managing the risks associated with the project in this manner will allow a more accurate reflection of the costs and contingencies necessary to ensure that a project budget is established that allows for a high probability that the project may be constructed and closed out within the budget and schedule established.

5.2 Risk Identification

Through a coordinated effort between the FTA, the Project Management Oversight Consultant, the MBTA, MassDOT and the Design Consultant, a Risk Register will be prepared identifying all of the possible risks that may affect the project anywhere along the course of its development including design, construction, start-up, operations and revenue service. Risks may span through various aspects including those that are political, design-related, procurement-related, environmental, technical and/or economical.

Prepared by the MBTA, and reviewed by MassDOT, the Risk Register will be used to identify, classify, organize, evaluate and track all levels of risks that may affect the project. Mitigation strategies will then be identified and tracked for implementation at the appropriate times during the timeline of the project. A draft of the Preliminary Design Risk Register is appended to the PMP as Attachment J.

5.3 Evaluation

Each risk identified and listed on the Risk Register is evaluated for its potential effect on

scope, cost and/or schedule of the project. A determination is made as to the:

- Probability of the risk occurring;
- Magnitude of the cost to the project should this risk occur;
- Impact to the schedule should the risk occur; and
- Mitigation strategies that when implemented may eliminate or reduce the cost impact, eliminate or reduce the likelihood of occurrence, and/or eliminate or reduce the potential impact to the project schedule of that particular risk.

5.4 Risk Control

Risk Control is facilitated by maintaining the Risk Register as a “living” document throughout the life of the project. After Risk Identification and Evaluation, controlling of the risks is done through determination of proper and potential mitigation that could be implemented. Those mitigation strategies are tracked and confirmed that they were in fact implemented and results monitored. Then proper Risk Allocation is accomplished through the MBTA’s Terms and Conditions and through the strategy used in the writing of the Technical Specifications/Provisions, i.e., determination of measurement and payment provisions.

Allocation of risk should be to the entity that can best control that particular risk. The MBTA is a body politic and corporate, and a political subdivision of the Commonwealth of Massachusetts. Therefore, as an agency it is inherently conservative and risk adverse. Allocation of risk onto contractors and/or through the purchase of insurance protects the MBTA. However, in today’s construction environment and considering contractors’ growing aversion or unwillingness to take on unquantifiable risks, a more strategic allocation of risk must be made to the entity that can best control or mitigate that risk – and in certain cases that may be the MBTA.

In conjunction with the FTA, PMOC and Design Consultant, the MBTA and MassDOT will go through various workshops to identify, evaluate, control, and allocate the risks of the project. This will be documented through the life of the project and form the basis of determining allocated and unallocated contingencies during the various phases of the project. Specifically, all preliminary engineering work will be audited by reviewing all design materials against the Quality Assurance Plan standards established for this project, and a series of reviews for each discipline will be conducted on a regular basis during each stage of the design phase to ensure that any potential problems are identified early and resolved while staying within the proposed schedule and budget, and meeting the project goals.

5.5 Insurance

The MBTA has utilized both Contractor-Supplied Insurance and Owner-Controlled Insurance Programs on its various capital projects and the determination as to which to use is made on a project-by-project basis.

The decision as to which insurance avenue to pursue for the Green Line Extension project must be made in 2011 in order to facilitate the commencement of construction in 2012. The MBTA's procurement of an Owner-Controlled Insurance Programs policy for the project may take up to one year.

6. ENVIRONMENTAL ASSESSMENT AND MITIGATION

As a potential New Starts-funded project, the Green Line Extension project is advancing through both the National Environmental Policy Act (NEPA) process and the Massachusetts Environmental Policy Act (MEPA) process.

Through the environmental review processes, specific impacts are being identified and mitigation for those impacts are being proposed. The Finding of No Significant Impact (FONSI) will address the commitment of the MBTA and MassDOT to institute and follow through on the appropriate mitigation for the specific project-related impacts that were identified.

A Matrix of Environmental Commitments will be developed and used for documenting the specific actions taken and timing necessary to meet the commitments to mitigation as outlined in the FONSI. On a quarterly reporting basis, the Matrix of Environmental Commitments will be submitted to the FTA, updated with specific progress made on implementation and incorporation of the mitigation strategies into the design and/or planned construction.

As part of the design-build contract, a review will be made of all construction documents to specifically verify that all commitments have been achieved to address environmental impacts and corresponding mitigation.

7. PROCUREMENT OF SERVICES

This section focuses on the development of procurement packages for the design-build contractor that will usher the project through final design and construction. The section also addresses procurement of consultant contracts, affirmative action requirements, and contract modifications. The section is broken down as follows:

- Procurement Methodologies
- Procurement of Design-Build Contracts
- Procurement Packaging
- Procurement of Consultant Contracts
- Affirmative Action Goals
- Contract Modifications

The MBTA Procurement Manuals for Construction and Professional Services have been adopted for this project and are appended to the PMP as Attachments I and J.

7.1 Procurement Methodologies

As discussed previously, MassDOT prepared a Project Delivery Alternatives Report in July 2010, which identified different project delivery methods and discussed the advantages and disadvantages of each of them. The report concluded that, for the Green Line Extension project, the design-build method is advantageous over design-bid-build with regard to project duration, cost controls, claims and change orders. Based on the conclusions of the Project Delivery Alternatives Report, this Project Management Plan assumes design-build as the procurement strategy for the project and the following sections discuss this in greater detail.

A Force Account plan will be established at the conclusion of the preliminary engineering phase, once the need for and availability of MBTA forces and impacts to the existing transit services during construction can be determined. When changes/transfers are needed, the MBTA Program Manager will request the Force Account from the appropriate departments, based on the proposed scope of work, to ensure that all work stays within the budget.

7.2 Procurement of Design-Build Contracts

Construction contracting at the MBTA is governed by the provisions of Massachusetts General Law, which requires the MBTA to solicit contracts for public works projects via competitive bidding through the receipt of sealed bids based on designs presented in the construction procurement documents. Since it is assumed that the project will be executed using the design-build project delivery method, contracting will be solicited with a design-build process based on a “best value” selection.

The contracts will be firm, fixed price contracts to be solicited after public advertisement. The contracts will be negotiated after a “best value” selection is made and the contract documents are confirmed. Best value selection will be based on predetermined selection criteria.

Procurement of design-build contractors will be in two stages:

- 1) A Request for Qualifications (RFQ) will be issued publically to the engineering and construction community after the intermediate design submittal comments are addressed. The updated intermediate design submittal will provide the definition of the project in enough detail to allow for design-build teams to form, seek specialized consultants and subcontractors where needed, and present their relevant qualifications. It is anticipated that three to five teams will be identified based on pre-determined qualification criteria developed by the MBTA.
- 2) Upon completion of the preliminary engineering design, with the appropriate elements being designed to a higher level of detail than a traditional preliminary engineering report and drawings, and development of design-build procurement documents – including a Basis of Design, Design Criteria and Technical and Performance Specifications – a Request for Proposals (RFP) will be issued to the highest qualified teams selected in Step 1 above.

Wherever applicable, the procurement of the design-build contractor will be in accordance with the MBTA's Procurement Policy, which also defines the level and degree of responsibilities. An analysis of the MBTA's current Procurement Policy, however, will be performed during the early phases for compatibility with Alternative Project Delivery Method approaches and, where necessary, modifications will be made for the design-build procurement approach.

7.3 Procurement Packaging

During the course of preliminary engineering, a special focus will be placed on developing appropriate contract packaging strategies that provide for a balance of several factors. Those factors are:

- Fostering a fair and competitive procurement environment;
- Balancing contract size in accordance with the current condition of the surety environment and bonding capacities of contractors;
- Minimizing critical interfaces and creating a logical sequence of construction;
- Packaging special work into packages of sufficient size to gain the interest of out-of-town contractors of the size to reasonably and economically perform the work, while providing contract packages in size suitable for the reasonable and economical performance of the work by local contractors; and
- Packaging work to avoid site access conflicts and system integration conflicts between contractors and minimizing the risk of schedule interfaces as well as clearly defining what work will be done by the MBTA forces and what work will be performed by contractor

forces so that all entities and contractors have the capabilities to properly execute their work to avoid impacts to other entities.

7.4 Procurement of Consultant Contracts

Contracts for support consultants may be required to provide additional and specialized expertise and oversight. This will be achieved through individual consultant contracts. The contracting method used for procuring the consultant services if they are not using federal funds is called competitive negotiation.

A Selection Committee consisting of MBTA and MassDOT representatives from various departments will select the consultants deemed to be in the competitive range based on the written technical proposals, oral presentations and interviews, and cost. The MBTA and/or MassDOT will negotiate with all consultants deemed to be in the competitive range. Final selection shall be based upon the technical ranking and the best and final offer.

If the consultants shall be paid using federal funds, the solicitation will be conducted in accordance with the procedures of the "Brooks Act," which mandates that proposals be ranked on the basis of technical merit. Negotiations shall then be conducted with the top-ranked firm, and in the event they are not successfully concluded, will be conducted in sequence with the technical ranking. The contract will be cost plus fixed fee with a not to exceed amount and shall be placed in accordance with the MBTA's Procurement Policy.

7.5 Affirmative Action Goals

The MBTA and MassDOT establish the affirmative action goals for consultants and construction contracts, within the parameters of State and Federal guidelines that require that construction by third parties be procured by free, open and unrestricted competition.

7.6 Contract Modifications

The MBTA Contract Change Order Guidelines have been adopted for the project and are appended to this Project Management Plan as Attachment K.

8. Procurement of Materials and Equipment

This section will be developed prior to the completion of the preliminary engineering phase.

8.1 Procedure for Procurement of Systemwide Components

8.1.1 Permanent Materials

This section will be developed prior to the completion of the preliminary engineering phase.

8.1.2 Construction Equipment

This section will be developed prior to the completion of the preliminary engineering phase.

8.1.3 Systems Components

This section will be developed prior to the completion of the preliminary engineering phase.

8.1.4 Rolling Stock

It will be necessary to add twenty-four new "Type 9" vehicles to the Green Line Fleet in order to provide revenue service throughout the existing Green Line System and the proposed Extension. The MBTA Vehicle Engineering Department will take the lead on procuring the vehicles. The MBTA process for procuring vehicles includes a Request for Qualifications, technical assessment of the eligible car builders, and a best and final offer submission, which results in a proposal that is brought to the MBTA Board for their approval.

8.2 Quality Assurance Requirements

The Quality Assurance Requirements are included in the Quality Assurance Plan appended to the PMP as Attachments D and E.

8.3 System and Equipment Test and Evaluation Plan

This section will be developed prior to the completion of the preliminary engineering phase.

8.4 Identification of DBE Opportunities

The MBTA Green Line Extension Joint Venture Team for Preliminary Engineering & Design, Program Management, Management of the Design-Build Procurement and Construction

Oversight Services contract had a DBE goal of 16%. The JV Team has achieved and exceeded this goal with the participation of the following DBE/MBE firms:

Company	Fee
Bevco Associates, Inc.	\$166,592.00
Bryant Associates, Inc.	\$1,757,736.00
RM Engineering Inc.	\$943,062.00
Keville Enterprises, Inc.	\$96,927.00
Triunity Engineering & Management, Inc.	\$424,851.00
ARC Eastern Printing	\$75,268.00
DBE Total	\$3,464,436.00
Contract Total	\$21,455,437.00
DBE Percentage	16.15%

9. Preliminary Engineering Program

The preliminary engineering phase will be undertaken with multidisciplinary teams and provide designs that meet the project objectives and the various targets of quality, cost, and time. Design management and planning is accomplished through the project management and control elements as described herein. This section describes the design input and criteria control, design control, design review processes, design changes and CADD and GIS design standards. The use of a value engineering (VE) consultant is stipulated, and the roles of value engineers are defined. Specifically how they will interact with the construction staff, along with the designers, to identify potential cost savings.

9.1 Requirements and Standards

The MBTA will have design requirements for the project, which will include:

- Project Objectives
- Operational Requirements
- Functional Requirements
- Operational and Maintenance Preferences
- Existing Design Standards and Guidelines

The Design Consultant selected to perform preliminary engineering will review all relevant MBTA, city, state, and federal codes and standards and select the most appropriate design criteria for the project. Design standards that will be taken into account during preliminary engineering and subsequent phases include:

- MBTA Standard Specifications;
- All requirements associated with the MBTA/BCIL (Boston Center for Independent Living)

- Agreement; and
- The Draft Design Criteria Memorandum (March 2011) developed for the Green Line Extension during the Advanced Conceptual Design phase.

The Draft Design Criteria Memorandum, which consolidates the criteria for the project, will be updated during the preliminary engineering phase and will be used to complete the design. The Memorandum will identify which standards are associated with each criterion and will list the date and/or version, and will categorize the standards as local, state or federal standards. The Design Consultant will comply with the above-mentioned design criteria as well as the most current versions of all applicable standards and regulations.

Design inputs shall be controlled to ensure that the history of design is maintained and that proper changes are made when they occur. Control is maintained through the process of identification, maintenance, and update of criteria. Identification occurs in design criteria documents, calculations, and design reports. Design inputs may include:

- Functional and Performance Requirements
- Regulatory Requirements, including the Americans with Disabilities Act Compliance Codes and Standards
- MBTA Requirements or Preferences
- Previous Experience
- Proven Methods or Processes
- Engineering Judgment
- Investigation Data
- Existing or Previous Design Data

The design input documents are maintained through the document control process and will be consistent with the Configuration Management policies described in Section 3.5.

9.2 Design Supervision

The overall responsibility for the technical aspects of the design rests with the individual Discipline Design Leads and upwards to the Design Consultant Project Manager.

The Design Consultant will establish a standard method of communication and protocols to ensure that high-level technical decisions are made in an open and expeditious manner. This manner of communication also provides an efficient means for senior project committees to achieve timely decisions consistent with the overall project goals while keeping MBTA and MassDOT management and technical staff abreast of design issues. The process ensures that real-time knowledge is shared, allowing for immediate action in response to changes to the in-process design.

Confirmation of design decisions will be provided by the MBTA Program Managers and upwards through the Director of Design and Construction to the Assistant General Manager for Design and Construction. The overall responsibility for the management of the preliminary engineering design phase of the Green Line Extension project lies with the MBTA Program

Manager.

9.3 Design Coordination – Internal, External

There will be two levels of Internal Design Coordination:

- 1) Internally within the Design Consultant team; and
- 2) Amongst the MBTA, MassDOT and the Design Consultant team.

The Design Consultant will maintain a project office and will provide the PMT and the Design Consultant Team with access to a single network server, or series of interconnected servers, where all criteria, reports, guidelines and procedures, drawings and other documents will be stored. A CADD Manual for the project will dictate protocols for creation, updating and storage of drawings and electronic files. Any changes to base files will require immediate notification to the other team members that a particular base file has changed and they are required to work from the new base file. The disciplines will have regular meetings to review inter-disciplinary issues. The Design Schedule will contain specific milestones where inter-disciplinary reviews will occur.

The Design Consultant will hold regularly scheduled weekly Senior/Technical Management meetings where specific design coordination issues will be discussed and major technical resolutions presented. The PMT will attend these meetings as well. At these meetings, further meetings will be scheduled between the Design Consultant and the various MBTA and MassDOT Engineering and/or Facilities and Operations staff for their input, review and confirmation of specific technical solutions to issues.

As defined earlier, major technical issues and proposed solutions will be presented to the Project Development Group (PDG). The PDG will be comprised of MBTA senior management and technical and operations staff. This group will be responsible for collectively evaluating technical proposals, suggestions, or significant issues requiring resolution. The PDG will then make recommendations to the PMT. During the preliminary engineering phase of the project, the MBTA Program Manager will ultimately be responsible for the project decisions.

To ensure expeditious resolution of design issues and proper coordination, the MBTA Program Manager, with support from the MassDOT Program Manager, will be responsible for the day-to-day activities of the project and regular interface with the Design Consultant. The PDG was formed to have senior representatives with a common goal of advising the MBTA and MassDOT Program Managers on technical and operational issues and to have a forum for discussion and input with various points of view. Similar to the PDG in makeup, staff from various MassDOT departments will also meet periodically to assist the PMT from preliminary engineering through the startup of revenue operations.

9.4 Design Review Process

Design reviews, as described in the MBTA's design review procedure (and as contained in the MBTA's Project Management Manual) and adopted for this project, are an integral part of the design process and necessary to ensure that both the right problem is solved and that it is solved correctly. The quality assurance process for reviews will be organized by phase, by discipline, and across disciplines.

The review systems will be developed to assist the project team in controlling the design process. These systems elements will be set up at the beginning of the project to enable efficient and complete project reviews including:

- Deliverables matrices that define what is required for each deliverable by discipline.
- Information management systems that ensure the latest information is available to all parties.
- Issue tracking system to ensure resolution before deliverables are due.
- Identification of responsible reviewer by discipline and by overall deliverable (cross-discipline).
- Review schedules by deliverable, including early, interim and final reviews.
- Creation of project-specific checklists for reviews, both within discipline and cross-discipline.

During the preliminary engineering phase of the project, three major design documents are expected to be prepared and submitted for review: Intermediate Design Submittal; Pre-Final Design Submittal; and Final Design Submittal.

The standards and criteria review process used during design will include:

- Review of all applicable codes and standards;
- Review of emerging standards and agreement on their use;
- Agreement on operational and functional criteria;
- Review of study and field investigation results; and
- Review of concept design for key issues and their solutions.

Design reviews will be conducted for both individual disciplines and for multi-disciplinary coordination by senior staff, utilizing the review system tools including checklists, deliverable matrices and issues lists. Reviews will be both formal on a scheduled basis, and informal as the work progresses. The requirements for the review and approval of design deliverables will be addressed within the implementing procedures. These elements will include the internal checks from the preparer and reviewer. The procedures will also address the need for interdisciplinary reviews and coordination between the departments and groups. In addition to the in-process steps, the project team will conduct high-level design reviews, independent reviews and peer reviews at critical project junctures. During the preliminary engineering phase of the project, various working groups will meet regularly to discuss and coordinate various design aspects of the project. The Design Consultant will hold a weekly coordination meeting, and the MBTA will hold a monthly inter-discipline design meeting. A Design Working Group, consisting of stakeholders from the public, will meet on a quarterly basis to ensure that

the inputs from the stakeholders are also incorporated in the design processes.

Reviews will occur on an on-going basis by the senior staff. Commentary from those reviews, as well as feedback from presentations and discussions with team members, will be documented in an issues tracking system. The system works to keep all interface disciplines and organizations informed on issues, to engender discussion and provide a way of tracking an issue to resolution. The issues list then serves as a final checklist in reviews. Design reviews will also include peer reviews on an as-needed basis to ensure all professional work was performed within proper standards and will be implemented by credible professionals.

9.5 Value Engineering

The objective of value engineering (VE) is to generate a plan to satisfy the required function of a project at the lowest cost consistent with performance requirements, reliability and maintainability. Value engineering must be performed early in design in order to maximize cost benefits and for the recommendations to be implemented without causing delays to the construction schedule.

A formal value engineering review workshop will be conducted at the Preliminary Design submission. The review will be conducted by an independent value engineering panel consisting of senior technical specialists from various disciplines as selected by the MBTA Program Manager in coordination with the PDG. The value engineering process is independent of both the PDG design review and constructability reviews.

The value engineering review will be conducted through the following approach endorsed by the Society of American Value Engineers:

Pre-Coordination (Pre-Workshop) – The value engineering team coordinator will collect drawings, specifications, and review information. The coordinator will make all arrangements for the study, including logistics and participant scheduling. The Design Consultant will supply the participants with copies of drawings, background reports, detailed cost data, design calculations, specifications, and design criteria. The team members will then familiarize themselves with the project.

Orientation with Design Consultant – This orientation will be included as part of the first workshop session. The Design Consultant will present their design rationale to the VE Team.

Value Engineering Workshop – The VE Workshop will be divided into the following five phases:

1. The Information Phase – The VE Team will become familiar with all detailed data pertinent to the design.
2. The Creative Phase – During this phase, the team will create an extensive list of alternatives (i.e., materials, systems, etc.). There will be no evaluation of alternatives in this phase in order to encourage the free flow of ideas.

3. The Analytical Phase – At this time, the VE Team considers the feasibility of the various alternatives developed during the Creative Phase. Each alternative will be evaluated positively rather than critically with the best ideas selected for further development.
4. The Investigation Phase – The most feasible design alternatives selected in the Analytical Phase are evaluated. Factors such as cost, performance, reliability, aesthetics, and constructability will be evaluated.
5. The Recommendation Phase – The VE Team will draft recommendations for review with the MBTA, MassDOT and the Design Consultant. Following the review of the preliminary report, the recommendations will be finalized in the post-workshop stage, incorporating comments from the MBTA, MassDOT and the Design Consultant.

Following the workshop, the VE team coordinator will prepare a preliminary report summarizing the results of the team investigations for review by the MBTA, MassDOT and the Design Consultant. The coordinator will also make an oral presentation and be available to further review potential recommendations. The PDG will provide concurrence or suggest rejection for each VE Team recommendation. The MBTA and MassDOT Program Managers, however, will be responsible for making all final decisions.

After the MBTA and MassDOT have made final selections, the VE team coordinator will prepare a final report, including a project description, all VE worksheets, the listing of potential savings, and a description of the costs. The report will also discuss the cost of re-design, environmental impact studies, and any other required items resulting from the selected changes. The recommendations made in the report, with the concurrence of the MBTA and MassDOT Program Managers will be forwarded to the Design Consultant. The Design Consultant will implement the report recommendations in the final Design-Build contract procurement package submission.

9.6 Constructability Reviews

As discussed in Section 3.1, Constructability Reviews will be performed during the preliminary engineering phase to ensure that construction issues are considered throughout the design. The constructability review performed prior to issuing the design-build contract documents will be important since they will provides the last chance for incorporating design modifications and revisions before potential design-build teams submit their proposed schedule and budget.

The constructability review will include a thorough review for design errors and omissions, potential constructability issues, use of design standards, and compatibility. Items of particular concern are schedule and project interfaces, drawing interfaces, construction package interfaces, general and special conditions, milestones, long lead procurement items, liquidated damages and penalties, and risk assignment. Contract documents are also examined to verify the contract language is consistent across the various contracts within the project.

The constructability reviews will be performed by members of both the PDG and independent construction specialists from the Design Consultant Team who have not participated specifically in the design. Each constructability review will be formally documented with all

comments, recommendations, alternatives proposals, etc. incorporated together with the proposed response by the Design Consultant.

9.7 Operations and Management (O&M) Considerations and Reviews

During the course of design, all specific elements will be reviewed for conformance with the Schematic Design Report established for the Green Line Extension project (February 2009, and to be updated in 2011). The Schematic Design Report summarizes the proposed conceptual design of the Green Line Extension project. The document also identifies the parameters used as the basis of design as the project moves forward into preliminary engineering, such that those design parameters can meet the current operations and maintenance protocol practiced by the MBTA and other governing agencies. Key design elements include: facilities; roadways and bridges; track; traffic and parking; systems engineering and community path.

During the course of preliminary engineering, special meetings and/or reviews will be held with the appropriate MBTA Operations or Maintenance Departments to review the design and incorporate any comments pertaining to operations management or maintenance, and the Design Definition Document (an evolved document from the Schematic Design Report with updates) will be refined accordingly. Comments will be recorded, dispositioned and tracked to ensure incorporation into the design as it progresses. This validation is to ensure that assumptions made in the analysis pertaining to configuration and/or structure of the project is in fact carried forward in the design.

9.8 Change Control

In order to safeguard the functional operations detailed in the scope of work in the Contract Documents, designs will be based upon MBTA design criteria and standards and will incorporate local jurisdiction requirements and criteria. The MBTA will provide the Design Consultant, as appropriate, with MBTA design input requirements. MBTA-supplied design input documents will be reviewed by the MBTA and any ambiguities in the documents will be resolved between the MBTA and the consultant.

The MBTA will conduct reviews of all design output documents received from the Design Consultant. In addition, the MBTA will approve key Design Consultant personnel, including QA personnel, staff levels, qualifications of specialty design subcontractors, the consultant QAP and conduct quality audit reviews. The MBTA maintains procedures for conducting design reviews of Design Consultant output. The review procedures will ensure that design output documents submitted by the Design Consultant are reviewed by appropriate personnel from MBTA Design and Construction, Quality Assurance, Operations, Maintenance and other MBTA Departments, as necessary.

If the MBTA determines that the proposed design does not meet the general requirements of the design input documents, the MBTA will resolve these issues during the design review process. If there is a compelling reason to deviate from the design input documents, then the

MBTA shall document any deviation. A request to deviate will be prepared outlining the deviation, its justifications, proposed effects, and resulting impact if not granted. The MBTA Program Manager will recommend a modification to the design input documents to the Deputy Director of Design and Construction, Quality Assurance and the AGM.

9.9 Systems Integration

System integration is the bringing together of the component subsystems into one system and ensuring that the subsystems function together as a system. During design, the Design Consultant will develop and maintain a Systems Integration Matrix that will list all critical project components, subsystems and interfaces, and responsibilities by discipline for ensuring that in fact those specific interfaces are considered and addressed in the design.

During the design of project elements, reviews will be conducted by the MBTA, MassDOT and the PDG to ensure compatibility with existing systems. As construction and installation of systems is nearing completion, tests and other checks will be made by contractors to ensure complete system integration.

9.10 Reliability, Availability, Maintainability, Dependability, and Safety

This section will be developed prior to the completion of the preliminary engineering phase.

10. Right-of-Way Acquisition

10.1 Overview

Many MBTA and MassDOT projects require acquisition of property on a temporary and/or permanent basis. Property acquisition costs sometimes represent a large percentage of the project budget. Accounting for property acquisition needs and costs early in a project's design helps avoid costly design modifications and change orders. This procedure describes how the MBTA will manage real estate acquisition and explains how this process is integrated into the development of the project schedule and budget.

An early and accurate understanding of property acquisition and easement needs and costs allow the Design Consultant, working with the MBTA and MassDOT, to develop the most favorable land acquisition plan and an accurate project budget and schedule as part of the preliminary engineering phase. The Project Manager will work with staff from the MBTA's Real Estate Department to acquire a comprehensive understanding of the project's property acquisition needs and costs prior to submission of the Authorized Budget and Schedule. The appraised property value serves as a basis for negotiation with the landowner, and is also the value that is used if it is necessary to acquire property by eminent domain.

During the preliminary engineering phase of the Green Line Extension project, MassDOT will adopt the MBTA's real estate acquisition protocol and the MBTA will take the lead in acquiring the right-of-way needed for the project. It is intended that all acquisitions and/or temporary/permanent easement agreements for the project will be completed prior to the advertisement of a construction contract. The Real Estate Acquisition Plan is included as Attachment L of this document.

10.2 Conceptual to Preliminary Engineering Design Property Acquisition Cost Estimates

Prior to entering into the preliminary engineering phase, the MBTA and MassDOT Program Managers will recommend a Conceptual Budget and Schedule. This recommendation must include an estimate of property acquisition and appraisal costs. In order to ascertain these costs, the Project Manager will meet with Real Estate staff to review anticipated property acquisition needs. They will explore issues such as partial takings versus full takings, and permanent acquisition versus temporary license. Following the meeting, the MBTA Program Manager will request that the Real Estate Department provide a summary of the preliminary estimate of property acquisition costs based upon the property acquisition plans to date. These costs may be determined through the utilization of an independent appraiser and/or review of prior appraisal reports completed in the project area. Also a review of updated city or town assessor's records may help to determine the preliminary acquisition budget for the project.

At the preliminary engineering completion milestone, the MBTA and MassDOT Program Managers and the Design Consultant will have finalized all property acquisition needs. The

Program Managers will also convene at least one meeting prior to this milestone with Real Estate staff and the Design Consultant (and Real Estate Consultant, as necessary) to review the acquisition plans and explore less costly alternatives to those proposed.

The MBTA Program Manager will then transfer the design plans and an explanation of all property requirements to Real Estate staff. A right-of-way Agent is assigned to solicit an independent appraiser to perform the appraisal assignment. Before receiving the appraisers report, Real Estate Department staff will meet with the appraiser to verify the assumptions and methodology to see if it meets the requirements of the solicitation. After receiving the appraisal from the Certified Appraiser, Real Estate staff will review it and clarify the assumptions and methodology. Following the review, the right-of-way Agent will assign a review appraiser to conduct a formal peer review of the assumptions and methodology underlying the first appraisal and conduct a review of the first appraisal. The final recommendation of the review appraiser (Final Appraised Value) will be incorporated into the Authorized Budget and Schedule and will serve as the basis for negotiations with the landowner.

10.3 Negotiation of Final Appraised Value with Landowner

Real Estate staff will forward a formal offer to the property owner based upon the final appraised value or fair market value and negotiations commence. If preliminary agreement is reached but the dollar amount established exceeds the Final Appraised Value, the MBTA and MassDOT Program Managers will follow the budget modification approval procedure defined in the Authorization of Budget and Schedule procedure. Final agreement on price cannot be reached until these approval processes have been completed and the appropriate authorities from the MBTA and MassDOT approve the negotiated settlement.

10.4 License Agreements

Rather than permanently acquiring a property right, the MBTA may, with close coordination with MassDOT, enter into a License Agreement with a landowner whereby the MBTA and MassDOT are granted temporary use of property. Because the MBTA will be administering the design-build contract and construction and has a long history of handling these activities, any License Agreement for the project will be subject to the MBTA process. The MBTA Program Manager and Real Estate staff will determine if the project requires a License Agreement prior to the preliminary engineering milestone. Any funds required for a License Agreement must be incorporated into the Authorized Budget and Schedule and, if required, the approval processes set forth in the Authorization of Budget and Schedule procedures are observed.

10.5 Eminent Domain

If the MBTA, MassDOT and the landowner are unable to agree upon a price for the property in question, the MBTA may acquire the property via the eminent domain process, with close

coordination with MassDOT. All Orders of Taking require MBTA Board approval. Any acquisitions will be identified during preliminary engineering and will be subject to the following MBTA process:

- Real Estate staff will prepare a Board agenda item on the taking.
- If the Board approves the Order of Taking, it must be recorded at the appropriate Registry of Deeds within 30 days of the Board vote, pursuant to Chapter 79 of the Massachusetts General Laws.
- If there are any tenants on the property being acquired, Chapter 79A of the Massachusetts General Laws applies and each tenant must be given four (4) months notice to vacate after the recording of the Order of Taking. In addition, each tenant is entitled to relocation assistance in accordance with state and federal regulations.
- Real Estate staff maintains all acquisition files for a period of at least three (3) years from the sale of acquisition. If an action is filed regarding an Order of Taking, Real Estate staff work with the MBTA's General Counsel's office.

11. Community Outreach Plan

Community outreach and public participation is a critical element to the Green Line Extension project. A detailed Public Involvement Plan has been developed for preliminary engineering and design, which outlines the relationships set up with stakeholders, elected officials and government agencies. Basic information on meetings and media interface is also included.

11.1 Community Outreach Program Objectives

The objectives of the Community Outreach Program are to encourage an exchange of ideas and information on issues related to the project, including design consensus; identify and resolve public issues and concerns as they arise; and generate interest in and support for the Green Line Extension project. MassDOT will be responsible for the overall Community Outreach Program that will be in effect during preliminary engineering. The Community Outreach Program is intended to work alongside the technical and design work efforts and conform to MBTA and MassDOT policies. It requires a careful mix of informational activities designed to inform stakeholders about the progress of the project and receive feedback from stakeholders that will improve the design and mitigate impacts.

11.2 Community Outreach Program

During each phase, outreach activities will be scheduled and structured to reflect the project's demographic and commercial diversity; and to facilitate open communication, problem resolution, and consensus building.

The Community Outreach Program is designed to address the concerns of:

- Residents and businesses of the affected communities, including Cambridge, Somerville and Medford;
- Community-based organizations, neighborhood advocacy groups, and civic groups;
- Elected officials and government agencies; and
- The general public

In addition, the program provides a forum for affected communities and other stakeholders, allowing the PMT to identify and address new or unanticipated local priorities and issues.

A Public Involvement Plan has been developed that describes the elements of the Community Outreach Program for the preliminary engineering design phase of the project. The components of the Program include:

- Targeted stakeholder meetings;
- General information meetings and public hearings for all stakeholders;
- Printed materials, including fact sheets, brochures, and newsletters;
- Web site;
- Email contacts to ask questions;

- Advertisements in community and neighborhoods relative to project milestones;
- Presentations, possibly including three dimensional models so that stakeholders may better visualize the completed project; and
- Earned media to focus on project highlights and progress to date.

During the preliminary engineering phase, the primary emphasis will be on (1) reaching closure on all outstanding issues related to design and (2) presentation of preliminary mitigation measures. As issues specific to individual neighborhoods arise, meetings will be organized with community boards, elected officials, and neighborhood groups to provide information of any plan that may directly affect the public and to solicit their input. Presentations to these local groups will provide insights into local history, construction, and needs, while continuing the involvement with the community.

11.2.1 Preliminary Engineering

The public awareness program that was initiated during previous phases of the project will change emphasis as preliminary engineering activities begin, in order to provide more information on design and construction activities. As part of the Design Consultant Team, full-time community relations staff will be added to support MassDOT in the interactions with the public.

11.2.2 Construction

As the project moves into construction, the MBTA will require that the design-build contractor continue with a robust Community Outreach Program. During this phase, the MBTA and their designees will be actively involved in the widespread dissemination of construction bulletins to alert customers, residents, businesses and other concerned parties about planned construction activities and potential disruptions and inconveniences. These notifications will supplement the newsletters and web site updates. Mailing and informational lists will be updated to verify that the appropriate organizations, agencies, officials, and concerned individuals are receiving project materials, in addition to ongoing meetings.

Appropriate construction staff will meet, as required, and briefing of the various stakeholders will be scheduled, as needed, to make certain that the lines of communication are open and maintained until the project is completed. As construction nears completion, the focus of the public awareness program will shift to support the opening of the Green Line Extension project.

11.3 Interfaces with Elected Officials and Government Agencies

The team will make certain that every agency involved in, or affected by, the project receives all necessary information in a timely, accurate manner.

Contact with elected officials and federal, state, and local agencies will be coordinated through the MassDOT Program Manager, during the preliminary engineering phase.

11.4 Media Interface

MassDOT Public Affairs will handle all media requests during preliminary engineering. They will work with the MassDOT Press Office to provide information, materials, and any other support required to assist with media briefings, announcements, and press releases.

12. Construction Program

This section will be developed prior to the completion of the preliminary engineering phase.

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13. Interagency Coordination

Effective coordination between participating agencies will be an important on-going activity on the project. This section addresses the coordination process through the discussion of the following key areas:

- Interagency Agreements with Utility Providers
- Tracking Interagency Inputs
- Agreements with City and State Agencies
- Protection of Commuter Rail Operations During Construction
- Impact Mitigation
- Easement Agreement

It is the responsibility of the Design Consultant to develop a phasing plan, maintenance and protection of traffic diversions, and utility relocation prior to the start of the construction work. The Design Consultant will appoint a liaison to coordinate with all agencies, and serve as the single point of contact for all matters involving utilities; services; and city, state, and federal agencies. This section will describe the plans and agreements that need to be made with city and state agencies and utility providers in order to expedite the construction process.

13.1 MBTA Interagency Agreements with Utility Providers

The MBTA will enter into Cooperative and Force Account agreements with other agencies and utility providers for the project. These agreements will provide the legal framework for the project and the owners of the affected areas to identify, plan, design, rearrange, and construct facilities in the most cost-effective manner. The agreements will also provide the basis for identifying the scope of work; developing cost estimates; issuing work orders; and authorizing costs and betterment credits, if applicable, and method of payment. They will also define the parties responsible for executing the documented tasks associated with the agreements and the funding source.

During the preliminary engineering design phase, the Design Consultant will coordinate with utility providers to develop preliminary plans and feasibility studies for the rearrangement of the affected utilities and will integrate these proposals with project plans. Utility and MBTA representatives will be included in kick-off discussions for each construction contract and develop schedules for rearrangement of impacted facilities.

A detailed list of utilities that may be affected by the project is shown in Section 2.4.4.

13.2 Tracking Interagency Inputs

The Design Consultant will develop a master list, by project phase, of all involved agencies. A list of contacts within the various relevant agencies or within the departments of the same

agency will be developed. This will ensure that a comprehensive list of existing and planned future contacts is produced. Based upon review of the list, an initial contact will be established via letter and meetings, as appropriate, for each phase of the project. Based upon the initial contacts, required signoffs; deliverables; and approvals for each department or agency will be identified and coordinated with a master project schedule.

13.3 Agreements with City and State Agencies and Authorities

The project will establish procedures for municipal services and the relocation of any municipal facilities impacted by construction. The procedures will secure the city's assistance to the project in the areas of public works engineering, hazardous waste control, traffic engineering, fire safety, and police security.

13.4 Protection of MBTA Operations during Construction

In general, all of the railroads will be in continuous operation throughout the performance of the construction work. The railroads affected by the project include the MBTA Commuter Rail Fitchburg Line and Lowell Line and the MBTA Green Line. The safety and continuity of the railroads' operation will be of primary importance. Where the project includes work across, over, under, or adjacent to active railroad tracks or railroad right-of-way, the contractor will safeguard the traffic, tracks, and appurtenances, and other railroad property affected by its work. Construction will be scheduled and executed in a manner that will enable each of the railroads to maintain its full level of scheduled service to the fullest extent possible. The contractors will be required to submit for approval, plans, computations, a detailed description of the construction procedures, and a schedule for accomplishing the work, including methods of protecting railroad traffic.

Contractors' employees working on the project will be required to attend a one-day railroad safety training class. All project personnel will comply with the rules, regulations and safety requirements of the respective railroads throughout the project. Project personnel will also comply with the processes and criteria identified in the Safety and Security Management Plan that has been developed for the project (appended as Attachment M).

During the construction phase, the construction contractors will also develop, maintain, and implement a plan of operations for maintaining and protecting all passenger and pedestrian operations, concessions, services, and flows. This plan will include working drawings showing the placement of barricades and barriers as well as a detailed narrative describing how the plan is to be implemented and how passengers and pedestrians will receive advisories regarding routings and detours. This plan will also include information on the location and installation of temporary directional signs. The plan will be coordinated with all system and utility work plans. TV monitors, public address speakers, signs, and public telephones will be placed in specific, affected areas.

Attachment A

Green Line Extension Project – Key Staff Directory
(October 2010)

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Green Line Extension Project Key Staff Directory

Project Function	Name
Secretary of Transportation	Richard A. Davey
<i>Project Management Team (PMT)</i>	
MBTA General Manager	Jonathan Davis (Acting)
MBTA Assistant General Manager (AGM) for Design and Construction	Edmond F. Hunter
MBTA Program Manager, Director of Design and Construction – Green Line	Mary R. Ainsley
MassDOT Director of Strategic Planning	Stephen Woelfel
MassDOT Program Manager, Long Range Planning	Katherine S. Fichter
<i>MBTA Project Development Group (PDG)</i>	
MBTA AGM for Real Estate and Development	Mark Boyle
MBTA Director of Contract Administration	Margaret Hinkle
MBTA Chief Financial Officer	Jonathan Davis
MBTA Director of Vehicle Engineering	Jeff Gonneville
MBTA Director of Environmental Affairs	Andrew Brennan
MBTA Director of Railroad Operations	John D. Ray
MBTA Director of Light Rail Lines	Brian Dwyer
MBTA Director of Bus Operations	Cheryl Hinton
MBTA AGM for Systemwide Accessibility	Gary Talbot
MBTA Director of Security Initiatives	Randy Clarke
MBTA Chief of Transit Police	Paul MacMillan
MBTA General Counsel	William Mitchell
<i>Other Key Staff</i>	
MBTA Deputy Director of Design and Construction, Quality Assurance	Jack Donovan
MBTA Chief Safety Officer	Randy Clarke (Acting)
MassDOT Highway	Alex Bardow
MassDOT Rail Operations/Planning	Tim Doherty
MassDOT Planning	Matt Ciborowski
MassDOT Contract Administration	LeAnn Wilson
MassDOT Chief Financial Officer	Arthur Shea
MassDOT General Counsel	Monica Conyngham
MassDOT Public Affairs	Adam Hurtubise

Updated November 2010.

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Attachment B

MBTA Project Management Manual
(To Be Prepared/Updated)

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Attachment C

Project Configuration Plan

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Attachment D

MBTA/MassDOT Project Quality Assurance Plan

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Attachment E-1

Project Management/Construction Management Assurance
Plan

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Attachment E-2

Project Management/Construction Management Design
Quality Control Procedures

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Attachment F

Sample Design Consultant Monthly Progress Report

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Attachment G

Document Control Plan

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Attachment H

Sample Project Monthly Progress Report

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Attachment I

Project Capital Cost Estimate (SCC Format)
(October 2010)

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Attachment J

Preliminary Design Risk Register

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Attachment K

MBTA Procurement Manual for Construction
(January 2010) – for full viewing see ftp site.

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**MBTA Procurement Manual for Professional Services
(January 2010)**

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Attachment M

MBTA Contract Change Order Guidelines
(February 2010)

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MBTA Real Estate Acquisition Management Plan

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Land Acquisitions for Green Line Extension to Medford Hillside

Address	Description	Cause of Impact	Area (sq. ft)	Full or Partial Lot Acquisition
<u>Cambridge:</u>				
South of East Street	NorthPoint parcel	Viaduct	6,963	Partial
East Street	City-owned parcel	Viaduct	1,549	Partial
Water Street	City-owned parcel	Viaduct	1,366	Partial
Monsignor O'Brien Highway	NorthPoint parcel	Track junction	240	Partial
Lechmere Station	MBTA station	Station relocation	N/A	
<u>Somerville:</u>				
1 McGrath Highway	Commercial (undeveloped portion)	Tracks	104	Partial
35 McGrath Highway	Commercial (undeveloped portion)	Tracks	295	Partial
Monsignor O'Brien Highway	Undeveloped area	Viaduct	35,703	Partial
20 Third Avenue	M.S. Walker Wholesale Distribution	Option L	200,972	Full
44-48 Third Avenue	APCA Third Avenue, LLC	Option L	121,540	Full
70 Inner Belt Road	CRG West Parking Lot	Option L	52,248	Partial
200 Inner Belt Road	Fine Arts Storage Partners	Option L	67,834	Partial
24 Joy Street	Vacant	Brickbottom Station	12,000	Full
30 Joy Street	Vacant	Brickbottom Station	6,000	Full
Medford Street	Electrical Substation	Tracks	37,947	Full
350 Medford Street	The Homan's Building (vacant, city-owned)	Gilman Square Station	48,296	Full
20 Vernon Street	Factory/artist studios (parking lot)	Tracks	2,779	Partial

61 Clyde Street	Undeveloped portion	Tracks	4,348	Partial
42 Murdock Street #1, 2, 3	3-family residence/condo (yard)	Tracks	260	Partial
46 Murdock Street	2-family residence (yard)	Tracks	260	Partial
50 Murdock Street	Vacant lot (yard)	Tracks	260	Partial
Rear of 54/56 Murdock Street	N/A	Tracks	260	Partial
675 Broadway (Somerville part)	Lot 2: Veterinary office; Lot 3 Karate studio	Ball Square Station	7,555	Full
662 Boston Avenue (Somerville part)	Auto Repair	Ball Square Station	340	Full
664 Boston Avenue (Somerville part)	Bowling Alley	Boston Avenue (Somerville Part)	340	Full
<u>Medford</u>				
675 Broadway (Medford part)	Lot 2: Veterinary office	Ball Square Station	4,448	Full
662 Boston Avenue (Medford part)	Auto Repair	Ball Square Station	5,927	Full
664 Boston Avenue (Medford part)	Bowling Alley	Ball Square Station	5,927	Full
Boston Avenue	Street ROW (Commonwealth Avenue)	Tracks	1,739	Partial
590 Boston Avenue	Gas station/car wash (lot)	Tracks	285	Partial
474 Boston Avenue	Student offices and café (lot)	Tracks	580	Partial
179 College Avenue	Street ROW (Commonwealth Avenue)	Tracks	180	Partial
Boston Avenue	Street ROW (Commonwealth Avenue)	Tracks	1,205	Partial
Total Number of Parcels: 31		Total Area:	629,750	square feet (14.5 acres)

Land Acquisitions for Green Line Extension to Union Square (via commuter rail ROW)

Address	Description	Cause of Impact	Area (sq. ft)	Full or Partial Lot Acquisition
<u>Somerville:</u>				
1 Fitchburg Street	Retail condominium (lot)	Tracks	954	Partial
McGrath Highway (under)	City-owned parcel	Tracks	954	Partial
120 McGrath Highway	Garage (lot)	Tracks	954	Partial
35 Charlestown Street	N/A (lot)	Tracks	1,132	Partial
174 Somerville Avenue	Shopping mall (lot)	Tracks	1,132	Partial
51 Allen Street	Auto repair	Tracks	31,761	Full
40 Bennett Street	Warehouse (lot)	Tracks	1,004	Partial
Rear of 50 Prospect Street	Storage lot for commercial building	Union Square Station	8,039	Full
50 Prospect Street	Commercial building	Union Square Station	13,037	Full
42 Prospect Street	Vacant	Union Square Station	3,021	Full
Total Number of Parcels: 10		Total Area:	61,988	square feet (1.4 acres)

Attachment O

**MBTA Safety and Security Management Plan (not to be
printed due to confidentiality requirements)**

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Attachment P

**MBTA Light Rail Transit System Operations and
Maintenance Plan**

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Attachment Q

MBTA Commuter Rail Fleet Management Plan

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Attachment R

MBTA Heavy Rail and Light Rail Operations Fleet
Management Plan

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Attachment S

MBTA Bus Fleet Management Plan

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