

STAFF SUMMARY

TO: Board of Directors
FROM: Frederick A. Laskey, Executive Director *Frederick A. Laskey*
DATE: December 16, 2020
SUBJECT: Metropolitan Tunnel Redundancy Program Update

COMMITTEE: Water Policy and Oversight

X INFORMATION
 VOTE

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Preparer/Title

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Director, Tunnel Redundancy

RECOMMENDATION:

For information only.

DISCUSSION:

This staff summary provides an update on the following key ongoing activities to support the Metropolitan Tunnel Redundancy Program:

- Program Staffing
- Preliminary Design, Geotechnical Investigations and Environmental Impact Report
- Community and Stakeholder Outreach
- Expert Review Panel
- Other Ongoing Program-Wide Activities

Staff will provide future updates to the Board at key milestones during the Preliminary Design phase of the Program, such as: recommendation of the proposed tunnel alignment and shaft sites; completion of the Draft Environmental Impact Report; and completion of the Preliminary Design Report and Program cost estimate and schedule.

Program Staffing

The Tunnel Redundancy Department was created in April 2018 with the appointment of the Director, Tunnel Redundancy. The department currently includes seven fulltime positions and two new positions that will be filled effective January 2021. There are four vacant positions. These 13 positions were created to manage and oversee the Program as it progresses. Both the Tunnel Program Expert Review Panel and other large programs, including past MWRA programs, have demonstrated the importance to build staff sufficiently throughout the Program to maintain adequate oversight and control. Staff anticipate requesting Board approval to fill the four vacant positions later in FY21. Tunnel Department staff are also available and do provide assistance to other departments on non-tunnel projects where their expertise is needed. Table 1 includes a description of each position and its primary responsibilities. The Tunnel Department Organization Chart is included as Attachment A.

Table 1. Tunnel Redundancy Department Position Descriptions

Position	Status	Description
Director, Tunnel Redundancy	Filled	Reports to the Executive Director and oversees all aspects of the Metropolitan Tunnel Redundancy Program. The position is responsible for directing the overall progress of the Program and meeting schedules, budget, environmental compliance, safety and technical objectives.
Director, Design and Construction	Filled	Reports to the Director, Tunnel Redundancy and oversees the planning, design, construction, procurement, budget, schedule, and quality management aspects of the Program. The position serves as the chief engineer for the Program. Currently this position manages the \$10.2 million Program Support Services contract for the Program and provides technical oversight of the preliminary design.
Deputy Director, Design and Construction	Filled (Start Date: Jan 2021)	Reports to the Director, Design and Construction and directs the administration of the Tunnel Redundancy Department and oversees constructability and value engineering reviews of design submittals. This work includes overseeing program quality management, schedule and budget controls, risk management, and constructability/value engineering reviews for the Program.
Manager, Design	Filled	Reports to the Director, Design and Construction and manages engineering and design projects for the Program. Currently this position manages the \$15.7 million Preliminary Design, Geotechnical Investigations and Environmental Impact Report contract for the Program. This work includes coordinating the Program with communities and stakeholders as well as internal MWRA departments.
Manager, Geotechnical and Tunneling	Filled	Reports to the Director, Tunnel Redundancy and serves as the geotechnical design manager for the Program. This position manages activities relative to subsurface investigations, and geotechnical and tunnel engineering. Additionally, this position manages engineering and design projects related to the Program and provides geotechnical support to other MWRA projects.
Senior Program Manager, Geology	Filled (Start Date: Jan 2021)	Reports to the Manager, Geotechnical and Tunneling and oversees major geotechnical and geological field investigation programs, and database and mapping activities for the Program. This position will also serve as the Program Geologist during the planning, design and construction of the Program. Initially, this position will oversee the \$4 million preliminary design geotechnical program.
Program Manager, Design	Vacant	Will report to the Manager, Design and will provide engineering support for the Program. This work includes managing the planning and design phases including feasibility and environmental impact reports, detailed plans and specifications, permitting, project schedules, technical assistance, progress review and evaluation.
Project Controls Specialist	Vacant	Will report to the Deputy Director, Design and Construction and will ensure compliance with project control procedures and processes regarding cost, schedule and change management for Program. This position will oversee the program-wide schedule and will evaluate and develop key performance indicators for the Program to track expenditures and progress.
Senior Geotechnical Engineer	Filled	Reports to the Manager, Geotechnical and Tunneling and assists in the planning, geotechnical engineering, design, and construction of projects related to the Program. This work includes performing geotechnical evaluations, managing geotechnical data, preparing geotechnical reports and reviewing work products by others.
Project Manager, Geotechnical	Vacant	Will report to the Manager, Geotechnical and Tunneling and will manage geotechnical engineering, design, and construction projects and tasks related to the Program. This work will include managing geotechnical, geological, and hydrogeological investigation programs and related worked by consultants and contractors.
Project Engineer	Filled	Reports to the Manager, Design and provides engineering support for the Program. This work includes assisting in the development and management of the Program from planning through construction award, performing engineering and hydraulic analyses, and preparing engineering documents and program reports.
Staff Engineer	Vacant	Will report to the Manager, Design and will provide engineering support for the Program.
Administrative Systems Coordinator	Filled	Reports to the Director, Tunnel Redundancy and provides administrative support for the Program.

Preliminary Design, Geotechnical Investigations and Environmental Impact Report

In May 2020, the Board of Directors approved the award of the Preliminary Design, Geotechnical Investigations and Environmental Impact Report (Preliminary Design Engineering) contract to CDM Smith. The Notice to Proceed for this contract was issued on July 6, 2020.

The Preliminary Design Engineering contract includes the preliminary geotechnical investigation (deep rock borings), evaluation of preliminary tunnel alignment and shaft site alternatives, preliminary design, preliminary contract packaging, preparation of the required MEPA filings and development of a comprehensive list of the environmental permits needed.

At the completion of the Preliminary Design Engineering contract, the goal is to have selected the alignment of the proposed tunnels and the location of shaft sites for construction and interconnections with the existing water system, pending land acquisition and final permits.

The Preliminary Design Engineering contract will result in several significant project deliverables including:

- MEPA Environmental Notification Form
- Preliminary Geotechnical Data and Design Reports
- Tunnel Alignment Alternatives Evaluation/Environmental Impact Report
- Preliminary Design Report

MEPA Environmental Notification Form. Staff plan to file an Environmental Notification Form to the MEPA Office for the proposed Tunnel Program in early 2021. The Environmental Notification Form will present the proposed two-tunnel concept and Study Area as shown in Figure 1. The Study Area includes the following ten communities: Belmont, Boston, Brookline, Dedham, Needham, Newton, Waltham, Watertown, Wellesley and Weston. The Environmental Notification Form will also include an Alternatives Screening Report that documents the comparison and selection of the preferred two-tunnel concept to other surface pipe and tunnel alternatives. It is Staff's expectation that the Secretary's Certificate on the Environmental Notification Form will require a Draft and Final Environmental Impact Report that will examine various construction shaft locations and associated alignments for the proposed two-tunnel concept.

Preliminary Geotechnical Data and Design Reports. Geotechnical subsurface investigation will be conducted in two phases during the Preliminary Design at key locations near the tunnel alignment. A work plan for first phase of the preliminary geotechnical investigations is currently being prepared with an anticipated start date of early spring 2021 for drilling of 10 deep rock borings and installation of piezometers. Each boring is anticipated to be about 450 feet deep and is estimated to take about four weeks to complete, including in-situ testing. A second phase of geotechnical investigation will be conducted as the tunnel alignment evaluation continues with additional borings and testing. In addition to the deep rock boring programs, other field work including geophysical survey programs will also be conducted.

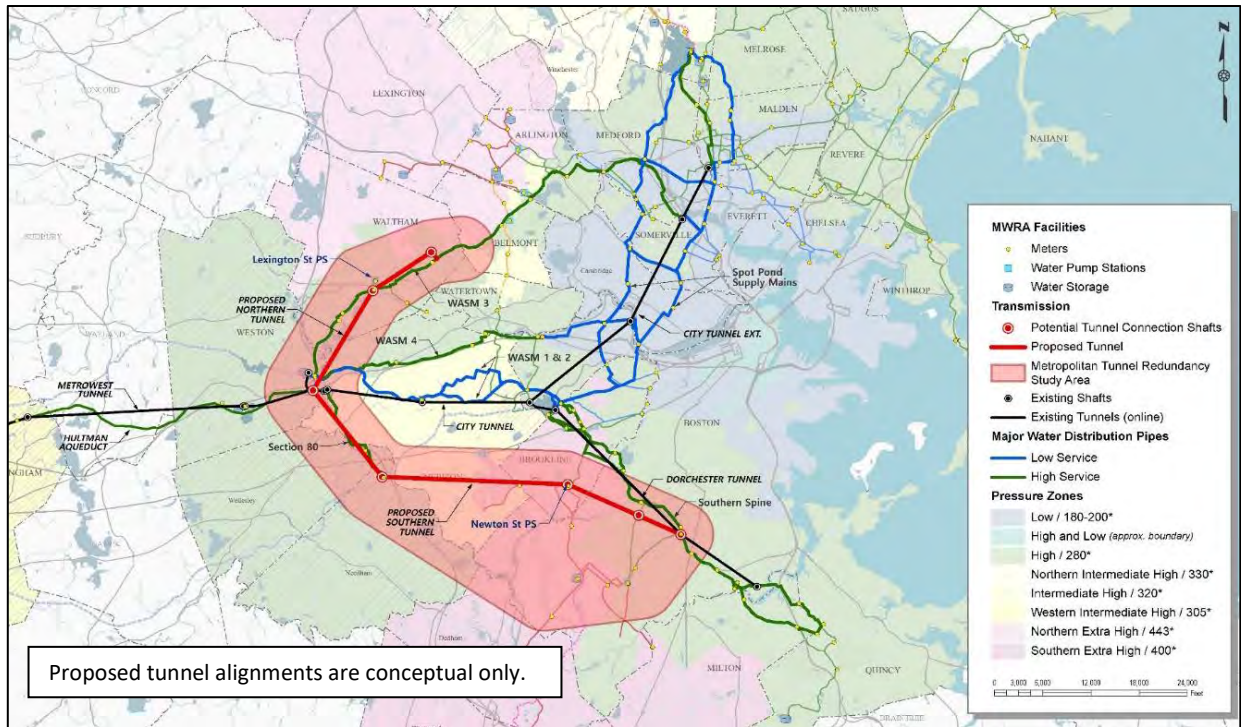


Figure 1. Proposed Two-Tunnel Concept and Study Area.

Tunnel Alignment Alternatives Evaluation/Environmental Impact Report. Staff have begun to identify potential locations for tunnel construction and connection shafts. Alternative tunnel alignments will be developed corresponding to the various shaft site locations. These alternatives will be evaluated based on geology, cost, engineering, operational, environmental and land availability criteria and a preferred alternative and up to two backup alternatives (in the event the preferred alternative is determined to no longer effectively meet the Program goals) will be recommended. The preferred and any backup alternatives will be presented and evaluated in the Draft and Final Environmental Impact Report.

Preliminary Design Report. A draft and final Preliminary Design Report will be prepared to support and provide the technical basis for the information included in the draft and final Environmental Impact Report. The Preliminary Design Report will include design criteria, construction considerations and operational requirements for the tunnels, shafts and near surface valve chambers and pipe connections. The Preliminary Design Report will include a detailed hydraulic analysis of the proposed tunnel using projected future water demands. In addition, the Preliminary Design Report will include preliminary design drawings, proposed construction packaging and schedule, and a preliminary cost estimate. Figure 2 presents the schedule for major preliminary design activities.

Community, Stakeholder and Regulatory Outreach

While the Preliminary Design Engineering contract is underway, MWRA will simultaneously implement its communication plan to ensure that all communities and stakeholders are informed as to the importance of this effort and what can be expected in the years ahead. Staff initiated contact with all ten communities within the Program Study Area to inform them of the Tunnel Program, and have offered to meet with them to provide more information and answer any

questions. Staff proposed to form a working group with representatives of each of the ten communities within the Study Area who will participate in regular meetings with the Program Team, be kept informed on Program progress, and provide opportunity for input. The goals of the working group meetings are to provide a collaborative and transparent process for evaluating alternatives, and yield more informed comments during the MEPA process.

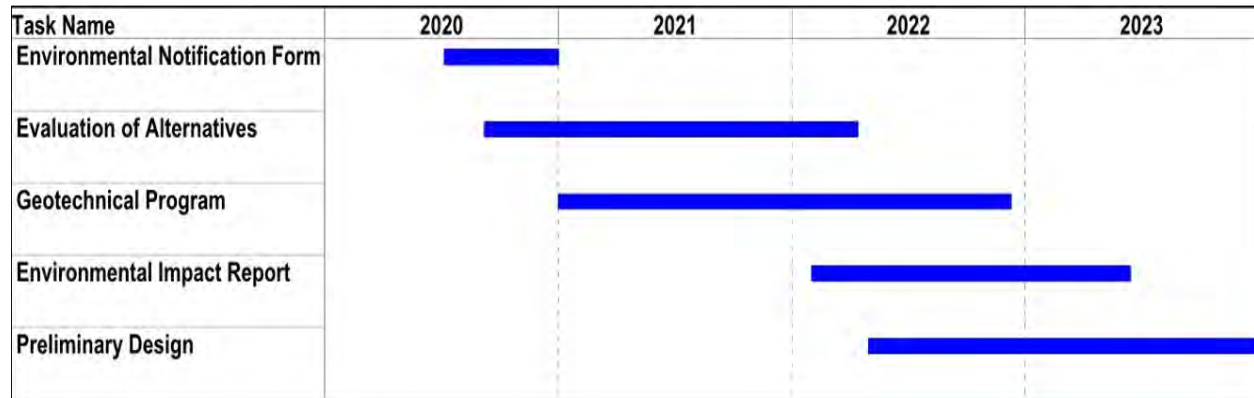


Figure 2. Major Preliminary Design Activities Schedule

In addition to reaching out to communities, staff have also begun to meet with other stakeholders that may be approached for permits, easements and/or land acquisition to support the Program. The state agencies include Mass DOT, the Department of Conservation and Recreation (DCR) and the Division of Capital Asset Management and Maintenance (DCAMM).

The tasks included in the Preliminary Design Engineering contract require substantial amounts of coordination with environmental regulatory agencies in order to ensure the data and documentation generated result in a robust alternatives analysis in the MEPA process. Staff met with members of the Department of Environmental Protection and MEPA to present the proposed Tunnel Program, and discuss the regulatory process. This early interaction with regulators will give MWRA staff the opportunity to address comments and concerns raised by agencies in the earlier MEPA phases.

Expert Review Panel

An Expert Review Panel has been formed to provide recommendations on key program elements such as risk mitigation, communication, program management and tunnel design and construction. The Expert Review Panel includes individuals with national expertise as well as individuals with expertise in local projects including MWRA’s Boston Harbor Project and the Integrated Water Supply Program. In October 2019, staff provided the Board with a summary of the purpose and members of the Expert Review Panel. The following is a list of the members of the Expert Review Panel:

- Richard Fox, Boston Harbor Cleanup Program – Perspective: Large Program; Past MWRA Experience
- Michael McBride, MetroWest Water Supply Tunnel Project – Perspective: Past MWRA Tunnel Program and Construction Manager
- Erika Moonin, Lake Mead Intake Tunnel Program – Perspective: Large Program; Public Agency Project Manager

- Gary Brierley, Rock Tunnel and Shaft Design – Perspective: Tunnel and Shaft Designer
- Gaylin Rippentrop, Rock Tunnel Construction – Perspective: Tunnel and Shaft Contractor

The Expert Review Panel has convened three times since November 2019. The panel will continue to convene on a regular basis throughout the design phase of the Program. Staff prepared a schedule of anticipated topics through Preliminary Design to be reviewed by the Expert Review Panel for its input and recommendations (see Table 2).

Table 2. Schedule of Expert Review Panel with Topics

Approximate Date	Topic	Format	Status
November 2019	Program Introduction/Overview	Workshop	Complete
September 2020	Program Risk Management Plan	Document Review	Complete
September 2020	Preliminary Design Schedule and Work Plan	Workshop	Complete
Winter 2021	Geotechnical Investigation Work Plan	Document Review	Future
Winter/Spring 2021	Tunnel Alignment Alternatives Development	Document Review	Future
Spring 2021	Program Budget and Schedule	Workshop	Future
Fall 2021	Geotechnical Data Review	Workshop	Future
Summer 2022	Draft Environmental Impact Report	Workshop	Future
Fall/Winter 2022	Draft Preliminary Design Report	Workshop	Future
Spring 2023	Value Engineering	Workshop	Future

Other Ongoing Program-Wide Activities

MWRA’s Tunnel Department staff have been developing program-wide standards, procedures and guidelines to ensure that work performed by staff and consultants is efficient, consistent and of high quality. The following is a list of completed and ongoing activities to support the management of the Tunnel Redundancy Program:

Completed Program-Wide Reports, Guidelines and Standards

- Quality Management Plan
- Document Control Plan
- Program Risk Management Plan
- Program Delineation Report
- Existing Geotechnical Data Report
- Geotechnical Field Manual
- Geotechnical Data Management Plan and Geotechnical Databases
- Hydraulic Analysis Reports
- Program Management Plan
- Style Guide

Ongoing Program-Wide Activities

In addition to preparing the above-described documents, staff are regularly working on the following major items:

Program Guide Specifications. Preparing a standardized set of guide specifications to ensure consistency and quality, and to communicate the MWRA's preferences to engineering consultants that will be preparing construction documents. MWRA staff from the Tunnel Department, Engineering and Construction Department, and Procurement Department are developing these guide specifications.

Program Schedule. Developing a detailed Program Schedule to track the progress of both consultant and internal staff activities. Tasks will be linked to identify the critical path; and reports will be generated to inform the team of any activities that need special attention to maintain the schedule.

Program Budget Analysis. Reviewing the Program budget and schedule to identify potential impacts of key variables, such as schedule, ground conditions and tunnel alignment.

Project Controls. Developing key performance indicators for the Program to track expenditures and progress. These metrics will evolve as the Program moves into final design and construction phases.

Contract Practices. The tunnel construction industry has evolved over the years to address issues that are unique to underground construction such as: differing site conditions; geotechnical reports; risk management; dispute resolution; and payment provisions. Staff convened an in-house working group with support from the Program Support Service consultant to review MWRA standard (non-tunnel) construction contract terms and conditions relative to current tunnel industry practices.

BUDGET/FISCAL IMPACTS:

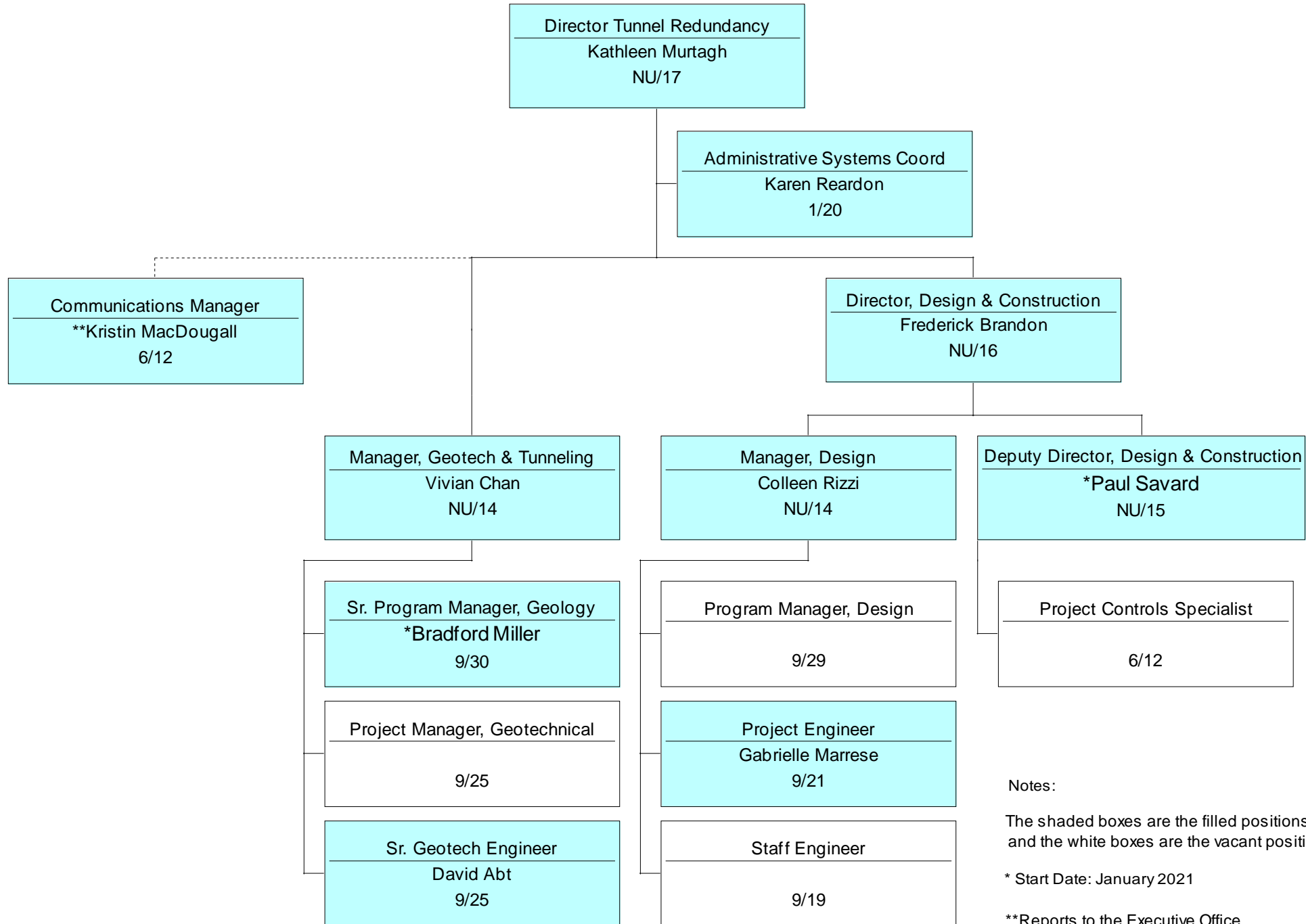
The FY21 CIP includes \$1.5 billion for the Metropolitan Tunnel Redundancy Program. This budget will be refined at the completion of Preliminary Design.

ATTACHMENTS:

Attachment A: Tunnel Redundancy Department, Organization Chart

Tunnel Redundancy

December, 2020



Notes:

The shaded boxes are the filled positions and the white boxes are the vacant positions.

* Start Date: January 2021

**Reports to the Executive Office



*Metropolitan Tunnel Redundancy
Program Update*

December 16, 2020



Program Update

- Program Staffing
- Preliminary Design, Geotechnical Investigation and Environmental Impact Report
- Community and Stakeholder Outreach
- Expert Review Panel (ERP)
- Other Ongoing Program-Wide Activities

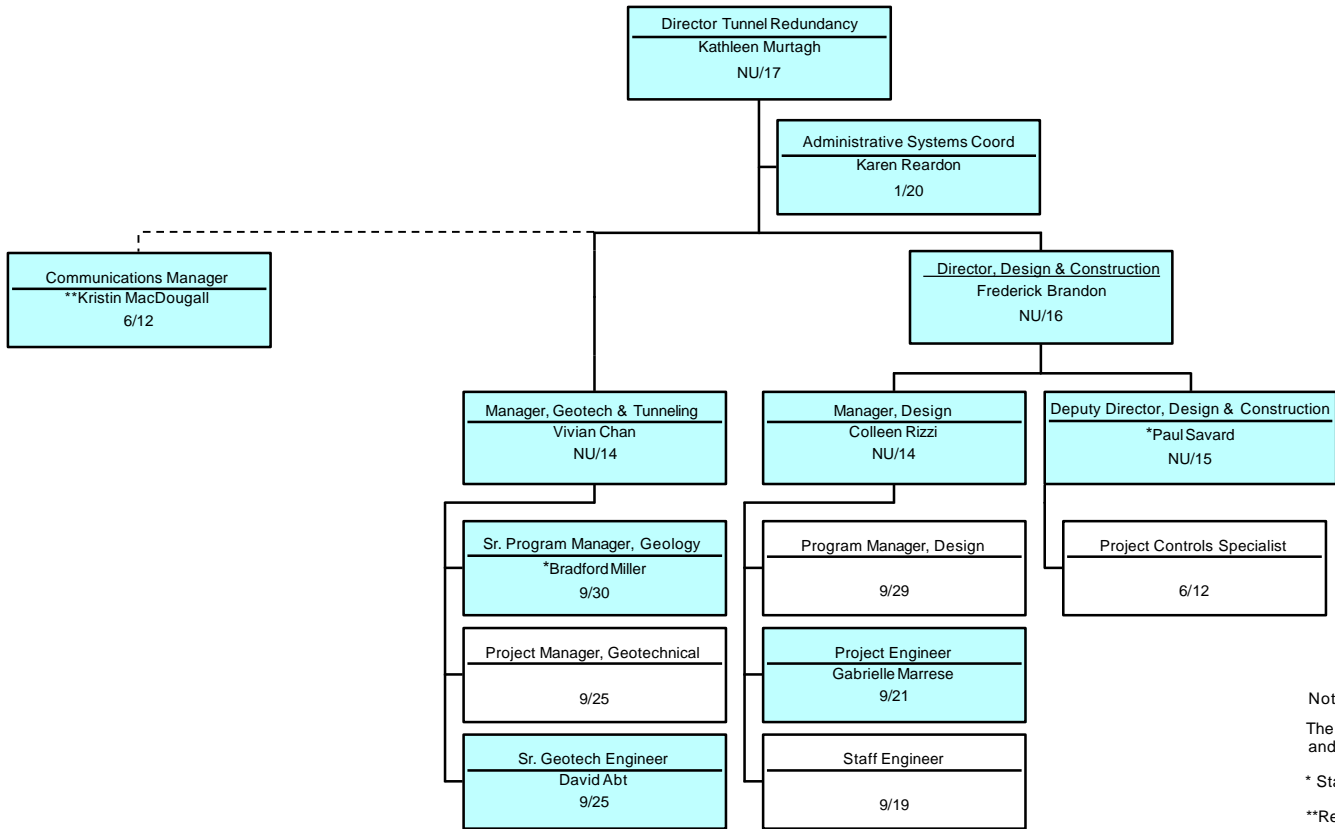


Tunnel Department Staffing Approach

- Build staff capacity to match Program needs
 - Bring expertise and experience necessary to support the Program
 - Plan for the future of the Tunnel Department
 - Grow with the Program
 - Consistent with Expert Review Panel recommendations
 - Approach is consistent with Boston Harbor Project and MetroWest Tunnel
- Tunnel Department staff are assisting with non-tunnel projects where their expertise is helpful



Tunnel Redundancy Department Organization Chart



Notes:
The shaded boxes are filled positions and the white boxes are vacant positions.
* Start Date: January 2021
**Reports to the Executive Office



Preliminary Design Key Activities

Preliminary Design Began in July 2020:

- Duration of 3.5 years
- File Environmental Notification Form (ENF) in early 2021
 - ENF will propose Program Study Area for Tunnel Alignment Alternatives Evaluation
- Evaluation of Alternatives (2021 – 2022) - Select Shaft and Connection Locations
- Extensive Public Engagement – Working Group (early 2021 – 2023)
- Geotechnical Investigations (begin early 2021)
- Mapping and Survey
- Environmental Impact Reports (Fall 2022)
- Preliminary Design (complete by Dec 2023)





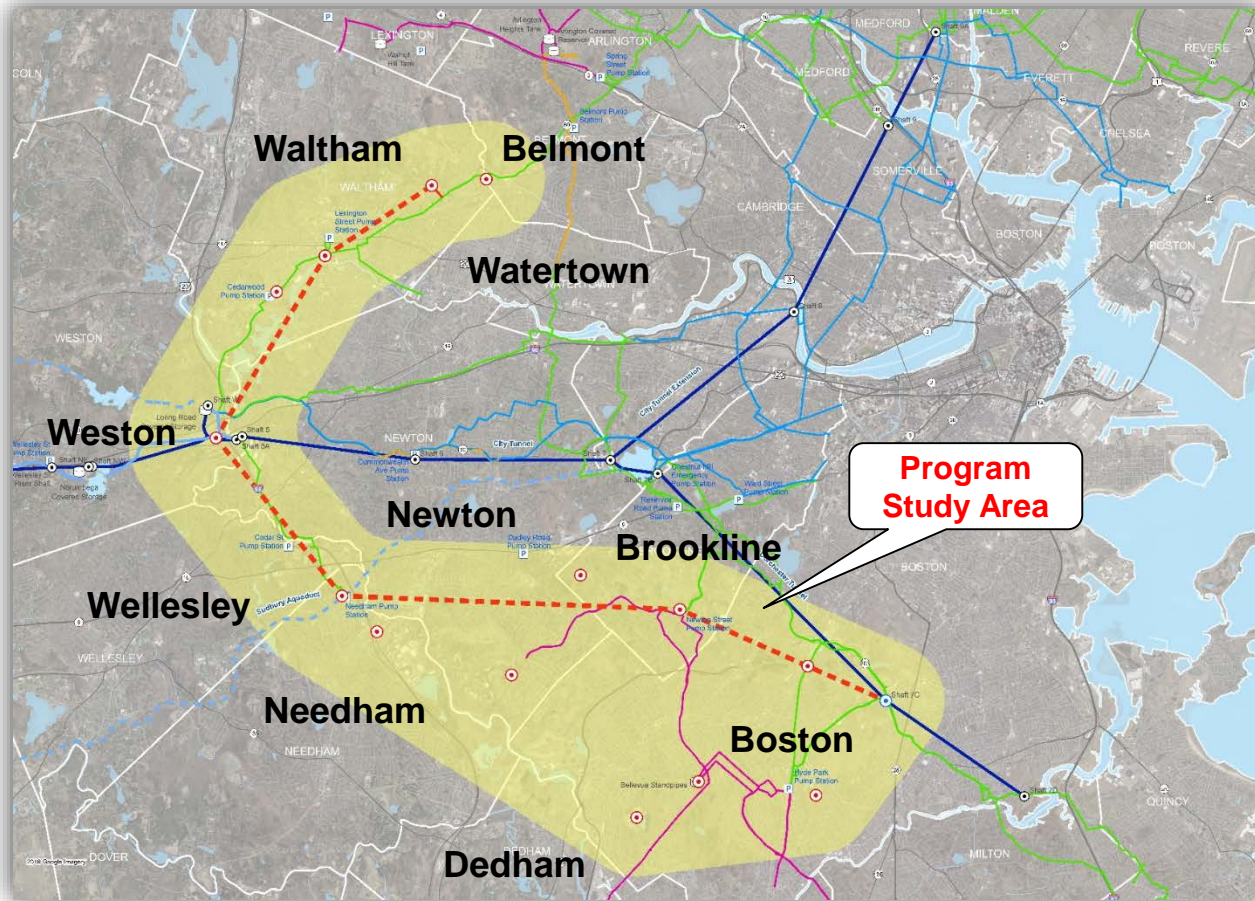
Tunnel Redundancy Program Schedule

- Technical Assistance: 2023
 - Field work – borings, survey, etc.
 - Other “data” collection
- Final Design: begin in 2024
 - Two or more final design contracts
 - Additional geotechnical investigation, survey, State and local permitting
 - Preparation of bid documents
- Construction Manager: begin in 2025
 - Evaluating # of contracts
 - Provides management and inspections of all construction work
 - Experienced with rock tunnel construction
- Construction: begin in 2026 or 2027
 - Two or more tunnel construction packages
 - Each contract lasts 5 years+/-





Program Study Area



--- Conceptual Tunnel Alignment



Tunnel Working Group Concept

- Includes all 10 communities
 - One (or more) representative from each community
 - Initial Working Group for this Program will consist to 10 to 12 members
- Transparent process for evaluating and selecting shaft sites and tunnel alignments
- First Working Group meeting in early 2021, prior to filing ENF
- Monthly meetings through the evaluation of alternatives (Winter 2021 – Spring 2022)





Expert Review Panel Meetings

- November 2019 – Program Kick-Off
 - Program management, staffing, communications, tunneling and geotechnical challenges, contract practices
- September 2020
 - Risk Management Plan
- September 2020
 - Preliminary Design Work Plan and Schedule
- January 2021
 - Geotechnical Investigation Work Plan (Ph1A)





Other Program Activities

Completed Program-Wide Guidelines and Standards

- Program Risk Management Plan
- Program Quality Management Plan
- Program Delineation Report
- Existing Geotechnical Data Report
- Geotechnical Field Manual
- Geotechnical Data Management Plan
- Hydraulic Analysis
- Program Management Plan
- Document Control Plan
- Style Guide
- Program Web Page

Ongoing Program-Wide Activities

- Expert Review Panel
- Program Guide Specifications
- Program Budget Analysis
- Program Schedule Development
- Project Controls
- Contract Practices
- Community and Stakeholder Outreach
- Industry Outreach



Future Board Updates

Plan to update Board at key milestones through Preliminary Design

- Proposed tunnel alignment and shaft sites (late 2021/early 2022)
- Draft Environmental Impact Report (mid 2022)
- Geotechnical program progress (TBD)
- Preliminary Design (multiple, mid-late 2023)
 - Cost estimate
 - Schedule
 - Contract packaging

Additional updates – topics/dates TBD





Thank You

