Metropolitan Water Tunnel Program

Meeting Minutes

Contract Number: N/A **Contract Name:** N/A

Meeting Title: **Working Group Meeting No. 3**

Date	August 4, 2021	Revision	R0
Time	2:00-3:00 PM	Revision Date	N/A
Location	WebEx	Recorded By	Meg Langley (CPP)

Attendees:

Name (organization)	Initial	Name (organization)	Initial	Name (organization)	Initial
Sean Navin (MWRA)	SN	Kristin MacDougall (MWRA)	KM	Thomas Cullen (Weston)	TC
Kathy Murtagh (MWRA)	KMM	Rebecca Weidman (MWRA)	RW	Martin Pillsbury (MAPC)	MP
Fred Brandon (MWRA)	FB	Peter Salvatore (Boston)	PSB	Lexi Dewey (WSCAC)	LD
Paul Savard (MWRA)	PS	Fred Russell (Brookline)	FR	Rafael Castro (JCK)	RC
Colleen Rizzi (MWRA)	CR	John Sanchez (Burlington)	JS	Meg Langley (CPP)	ML
Anne Canaday (MWRA)	AC	Joseph Flanagan (Dedham)	JF	Tom Lindberg (CPP)	TL
Ria Convery (MWRA)	RIC	Jason Mammone (Dedham)	JM	Tim Dupuis (CDM)	TD
Vivian Chan (MWRA)	VC	Lou Taverna (Newton)	LT		
Carmine De Maria (MWRA)	CDM	Mike Chiasson (Waltham)	MC		
Brad Miller (MWRA)	BM	William Shaughnessy (Wellesley)	WS		

Purpose:

The purpose for the third meeting of the Metropolitan Tunnel Working Group was to present the status of the MEPA Process as well as discuss the ongoing and upcoming Metropolitan Water Tunnel tunneling process.

Summary:

The following is a summary of items covered including next steps as applicable:

1. Sean Navin, MWRA Director of Intergovernmental Affairs, opened the meeting, went over the meeting agenda which included an update to the MWRA Tunnel Program and a presentation on tunneling. SN also introduced Carmine De Maria, Community Relations Coordinator, to the group.

2. Fred Brandon, Director, Design and Construction; Tunnel Redundancy, gave a geotechnical program update; the Rock Outcrop Mapping is almost done with two MassDOT sites remaining. The Drilling Program is underway, with four borings drilled to full depth in Wellesley, Needham, Newton, and Waltham. Rock Drilling is ongoing at Waltham and Brookline with upcoming drilling in Waltham, Weston, Needham, and Boston. Borehole testing and instrumentation installation where drilled to full depth is ongoing, as well as shaft site concept designs and tunnel alignment alternatives development. The Draft Environmental Impact Report (DEIR), analysis of shaft sites, and tunnel alignments will begin this Fall. FB asked the group if there were any questions pertaining to the geotechnical program, and with no questions, FB introduced Paul Savard, Deputy Director of Design and Construction, and Rafael Castro, Principal Engineer JCK, and turned the presentation over to them.

3. PS and RC gave a presentation on the tunneling process that will be used by the MWRA Tunnel Program. The intent of the presentation was to give the WG some basic details of tunneling that may help understand the terminology and activities that are expected for the Program and to provide some context for topics to be covered in subsequent WG meetings. PS explained that there are many different types of tunnels, including water conveyance (sewers, stormwater, CSOs), transportation (trains, automobiles, subways), and utility corridors. The MWRA Tunnel Program requires a tunnel to convey water to the Metropolitan Boston area. PS covered a brief history of tunnelling including the progression from hand excavation to current Tunnel Boring Machine (TBM) technology. The MWRA has a significant number of tunnels from the Quabbin Aqueduct to the Boston Harbor Sewer/CSO Tunnels. The Metropolitan Tunnels were constructed using the “technologies of the day” including drilling and basting, raise bore technologies, and muck conveyors.

4. PS turned over to RC, RC presented tunneling technology that would be relevant for the Program including:

    a. Common Terminology - Tunnel construction terminology to include terms such as launching shaft, receiving shaft, connection shafts, tunnel muck, starter tunnel, TBM Assembly, TBM drive, among others.
    b. Sequence of Construction - Typical tunnel construction sequence including site preparation, shaft construction, starter tunnel construction and TBM assembly, tunnel drives and tunnel boring machine (TBM) reception and extraction.
    c. Tunneling Shafts – First, shafts are used to support construction of the tunnels and then to make final connections to the existing MWRA infrastructure. Shafts will range in diameter from about 30 feet in diameter for the launching shaft, 20 feet in diameter for the receiving shaft and 10 feet in diameter for connection shafts. Construction methods will generally

control the size of the shafts. A video showing means for workers to access a deep shaft (240 feet deep) was presented.

d. Shaft Construction Methods – two methods of constructing shafts were presented. Top-down shaft construction (conventional excavation) and bottom-up (raise bore). The sequence for the top-down method involves soil and rock excavation from the surface using conventional excavation equipment and controlled blasting. As an example, a launching shaft for a recent project was shown to describe the different elements that you would see looking from the bottom of the shaft to the surface. The bottom-up method uses a technology referred to as raise boring, which generally constructs a shaft by means of reverse drilling from an already completed tunnel up to the surface. The benefits of this bottom-up method is that the excavated rock is removed from within the tunnel and the method requires very little space on the surface. An animation of a raise bore operation was shown. The sequence for this process is to drill a pilot hole from the surface through the top of the tunnel where a raise bore cutterhead is installed from inside the tunnel and used to excavate the shaft to the surface. This method requires the tunnel to be completed first. In addition to the animation, three photographs were shown and explained by RC; a truck mounted Drill Rig installing a pilot hole through the top of the tunnel; a worker in a tunnel, attaching a raise bore cutterhead; and the raise bore drill on the surface rotating and lifting the raise bore cutterhead to the surface.
e. Tunnel Boring Machine (TBM) Technology - RC next explained the current TBM technology using gripper TBM images from Herrenknect and Robbins. RC explained that a gripper TBM was likely the type to be selected by contractors for use on this Program. Four key elements of the TBM were reviewed including: cutterhead which will rotate slowly to chip the rock; conveyor belt to remove the rock from the cutterhead to the back of the TBM; TBM propulsion system of gripper shoes and jacks used to propel the TBM forward; and rock support equipment such as the rib erector and rock bolt drill in order for the workers to install initial support in the excavated tunnel. An image of a tunnel worker replacing TBM disc cutters was used to show the concentric kerfs on the rock face created by the disc cutters.
f. TBM facts - crew size of 10-15 workers per shift are needed to support tunnel excavation, the speed of TBM advancement will roughly be about 50 ft per day, the diameter of the TBM will be roughly 12 feet diameter to construct a ten-foot diameter tunnel, the length of the TBM and trailing gear combined can be as much as 300 feet long; there are over half a dozen TBM manufacturers worldwide. It takes approximately 12 months to get a new TBM on the job site from the date a purchase order is executed.
g. TBM launching - RC explained how a TBM is launched, explaining that controlled blasting is employed to increase the size of the bottom of the launching shaft. The base of a launching shaft needs to host a vertical conveyor, water pumps, ventilation equipment, and TBM power. RC explained two pictures, (1) lowering the TBM to the base of a Launching Shaft and (2) an image where the TBM is assembled on rails before being moved to the end of the starter tunnel and launched. RC noted to compare the TBM's color at the launch site (white paint) vs the receiving shaft (no white paint left).

h. TBM Drive and Extraction - The TBM keeps tunneling forward until it reaches the extraction or receiving shaft at the end of the tunnel, the TBM breaks through the receiving shaft wall, is dismantled and hoisted to the surface.
i. Tunnel Muck Handling - RC explained how excavated rock (tunnel muck) is typically moved from the back of the TBM to a stockpile on the surface at the launching shaft; using conveyors or muck cars in the tunnel, vertical conveyor in the shaft and radial conveyor on the surface. The surface tunnel muck operation looks much like a quarry muck handling operation.
j. Tunnel Lining - RC ended his presentation explaining tunnel liner construction including three photos to explain the different stages of the liner construction: reinforcement installation and collapsible tunnel forms; and the finished product.

5. RC turned back over to PS who presented images to show what can be expected to be seen at the surface. PS explained the difference between the temporary construction area vs the permanent area. PS explained the various construction equipment needed on site. PS moved onto the environmental considerations or construction impacts, noting that the Program wants to mitigate impacts to neighbors as much as possible. Some work will be 24/7 but mitigation will be put in place for noise as much as possible; controlled blasting will be needed at TBM Construction Shaft Site. Appropriate vibration limits and monitoring requirements to protect nearby homes/businesses will be established by specialists during design and on site during construction. Close coordination with local fire, emergency response, and rescue will also occur. For construction impact on traffic, there will be dedicated haul routes with the most impacted area being at the TBM launching shaft site. Less construction vehicular traffic will be needed at the receiving shaft and at intermediate connection shaft sites.

6. PS passed back to SN who opened up for questions.

a. Martin Pillsbury, MAPC, opened up the questions with one regarding the dewatering tunnel by asking if the discharge is subject to DEP discharge permit. PS answered Yes, and that permitting will be done during the design phase. The Contractor will be responsible to treat the water to meet the receiving water discharge requirements based on the permits.
b. Lou Taverna, Newton, asked where the Program is in the process of selecting shaft sites and narrowing down the potential locations. FB answered that the Program is looking at shaft sites, noting discussions with landowners has begun. The expectation is to be able to share locations of shaft sites with the WG in the Fall. Kathy Murtagh, Director, Tunnel Redundancy, explained that the MEPA process requires the Program to identify the preferred alignment and shaft sites, and then go into preliminary design. The goal is to have preliminary design done by 2023.
c. John Sanchez, Burlington, asked who owns the land at the tunnel depth, which was described as being 300 feet or more below ground. KM explained that the land is owned by surface landowner and that subsurface easements will be obtained from the property owners that the tunnel crosses below. The easements are generally at the depth of the tunnel, 50 ft wide 50 ft tall. The subsurface easements required for the MWRA MetroWest Water Supply Tunnel

project (that was similar to this project and put into service in 2003) were taken by eminent domain and not negotiated individually. Public land was given by legislation.

d. Lou Taverna, Newton, asked if the presentation given today will be uploaded to the Program website. SN answered that, Yes, it will be shared with a little more added to it to make for optimal understanding by the general public.
e. SN asked for further questions, there were none.

7. SN discussed upcoming meetings, September- Preliminary Alternatives and Evaluation Criteria (date TBD); October- Conceptual Designs; Future Topics- shaft sites, community engagement, costs & financing, environmental mitigation, site visits. SN reminded the WG that the MWRA program team can provide individual briefings/presentations at any time. SN thanked the WG for their time and continued partnership. The meeting adjourned at 2:54 pm.

Action Items:

MWRA will send out presentation and meeting minutes.

MWRA will post agenda, presentation, handouts, and minutes to the Tunnel Program website: https://www.mwra.com/mwtp/resources.html#workinggroups

Attachments:

None.