



Metropolitan Water Tunnel Program

How Were Shaft Sites Selected?

Through the Metropolitan Water Tunnel Program, the Massachusetts Water Resources Authority (MWRA) will construct two new water supply tunnels that will allow our aging existing water tunnel system to be rehabilitated without interrupting service. Implementing the Program will require construction of deep shafts, rock tunnels, and near surface valve vaults, and pipeline connection facilities.

Most of the construction will take place deep below the surface, as the tunnel boring machine (TBM) excavates through rock up to 400 feet underground. However, several **shafts** will connect the tunnel to the surface.

Launching and **receiving shafts** allow the TBM to enter and exit the tunnel, while **connection shafts** provide important connections from the new tunnels to our existing water transmission system and to the local communities that we serve. This *Fact Sheet* describes these shafts and how the sites were selected.

What is each shaft site used for?

Launching shafts are the largest shafts to be constructed at approximately 40 feet in diameter by up to 350 feet deep and will be located at the primary staging areas for tunnel construction. Two or three of these shafts may be required. During construction, several acres of land around the launching shaft are required to support TBM assembly, tunnel excavation, excavated material handling, water handling, and tunnel liner installation. After construction, approximately 1.5 to 2 acres may be needed for the permanent top of shaft structure, valve vaults, and near surface pipelines that will provide connections to our existing water distribution system.



Example of tunnel boring activities

Receiving shafts are approximately 25 feet in diameter by up to 350 feet deep and are located at the end of the tunnel segment. These shafts are used to remove the TBM from the ground once it has completed mining and to make a connection to our existing water distribution system. Two or three receiving shafts may be required for the Program. A few acres are needed at the surface of receiving shafts during construction to support removal of the TBM and construction of permanent connections. The permanent footprint at a receiving shaft is similar to a launching shaft.

Connection shafts are approximately 5 to 10 feet in diameter by up to 350 feet deep shafts along the tunnel that are used to make intermediate connections between the tunnel and existing water distribution system pipelines or to existing pumping stations. Approximately six connection shaft sites are planned, each requiring approximately $\frac{1}{3}$ to $\frac{1}{2}$ acre of land for construction, depending on the construction method. After construction, a small amount of land will be needed for the permanent top of the shaft/valve vault and near surface pipelines.

For the launching and receiving shafts, the ideal site needs to be large enough to support planned construction activities, close to major roadways, close to a body of water for discharge of treated water, near MWRA's existing infrastructure to make connections easier, and, as far as possible from environmental, historic, or cultural resources. Since connection shaft sites require less land and construction activities are less, the ideal site is related to proximity to existing water infrastructure (pipelines or pump stations) as well as locating them away from possible from environmental, historic, or cultural resources.

How were shaft sites evaluated?

To achieve the goals of the Program, the tunnel must make hydraulic connections at specific locations that will achieve the primary purpose of the tunnel system: redundancy for our existing aging water tunnel system. When the MWRA identified potential sites at the beginning of the Program, the following questions were considered:

- Is there sufficient acreage to serve the required function?
- How close is the site to highways?
- Who owns the land? (MWRA-owned is prioritized for interim connection sites)
- Is the land available?
- What are the results of a high-level environmental screening?

As the Program moved from engineering concepts to evaluating specific shaft sites, MWRA conducted an in-depth review of each site related to:

Engineering and constructability; Land availability; Potential environmental impacts; Operational flexibility; Potential social/community impacts; Cost and Schedule



Example of final conditions of a shaft

What sites were selected?

Launching and receiving shaft site locations were based on hydraulic analysis, constructability, land availability and the alternative analyses conducted to date, and proximity to necessary connections to existing MWRA infrastructure. These shafts will be located:

- At the WASM 3 pipeline near the Waltham-Belmont town line (receiving or large connection site);
- At the Hultman Aqueduct near of the I-90/I-95 interchange in Weston;
- Within the cloverleaves of the I-95 Needham interchange; and,
- Near Shaft 7C of the Dorchester Tunnel in Boston (near American Legion in Mattapan).

Connection shafts that will provide benefit to our customers and reinforcement to the overall water distribution network will be located:

- At School Street to connect to the Lexington Street Pumping Station in Waltham;
- At the Cedarwood Pumping Station in Waltham;
- Near the Hegarty Pumping Station in Wellesley;
- Near St. Mary Street to connect to the St. Mary Street Pumping Station in Needham;
- At the Newton Street Pumping Station in Brookline; and,
- Near the Southern Spine Mains along the Arborway in Boston.

The location of each launching, receiving and connection shaft site was specifically selected to avoid and minimize environmental, social, and community impacts.

For more information about the Metropolitan Water Tunnel Program, please visit www.mwra.com/mwtp.html or contact our Communications Team at tunnels.info@mwra.com

