



Metropolitan Water Tunnel Program Working Group

Alternatives Evaluation Process and Criteria

December 1, 2021

Please visit the project website
www.mwra.com/mwtp.html



Metropolitan Water Tunnel Program





- Metropolitan Water Tunnel Program Update
- Alternatives Evaluation Process and Criteria
- Alternatives Evaluation
- Upcoming Meetings
- Questions and Comments





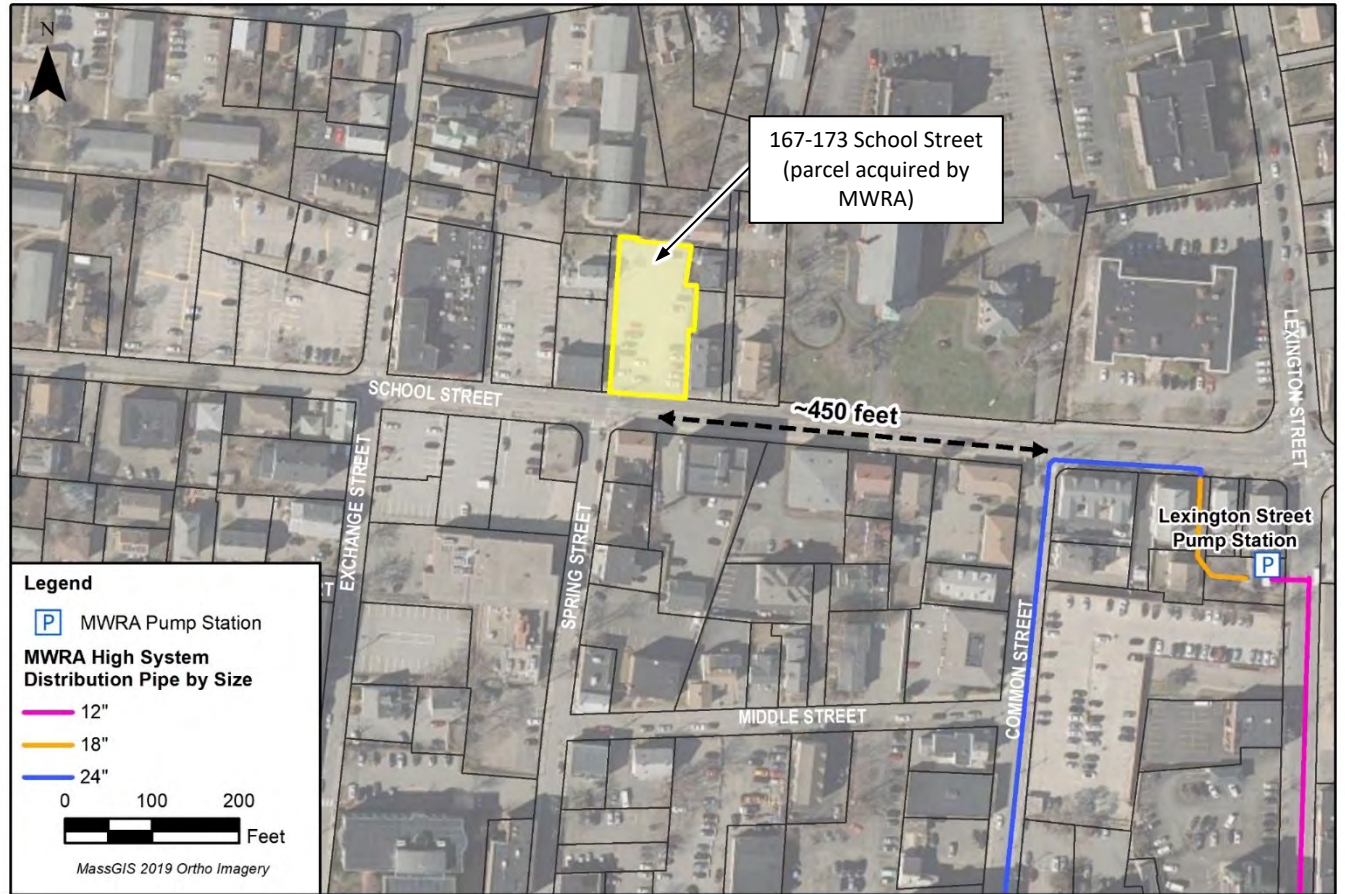
Metropolitan Water Tunnel Program Update

- Program Schedule
 - Preliminary design – thru Jan 2024
 - Begin final design in 2024
 - Targeting construction to start in 2027
- Geotechnical Field Investigation
- MEPA Review Process
- Community & Stakeholder Outreach



Purchase of School Street Parcel

- MWRA acquired a parcel at 167-173 School Street in Waltham
- Site will be used for construction of a valve vault & shaft connecting to the tunnel below. Piping will connect the vault/shaft to existing water mains serving the Lexington St PS
- Previously used as satellite parking for Chateau Restaurant
- Close to existing MWRA infrastructure
- Test Boring currently underway





Geotechnical Investigation Update



Preliminary Design Phase Geotechnical Field Investigation – Overview

Phase 1A Program (Spring - Fall 2021)

- Completed 9 test borings
 - Conducted downhole geophysical survey
 - Conducted bedrock permeability testing
 - Installed Vibrating Wire Piezometers (measure water level)
- Currently completing testing and instrument installation at the last borehole at School St in Waltham
- Performed detail bedrock outcrop mapping at 26 locations
- Conducted 12,940 ft of seismic refraction survey

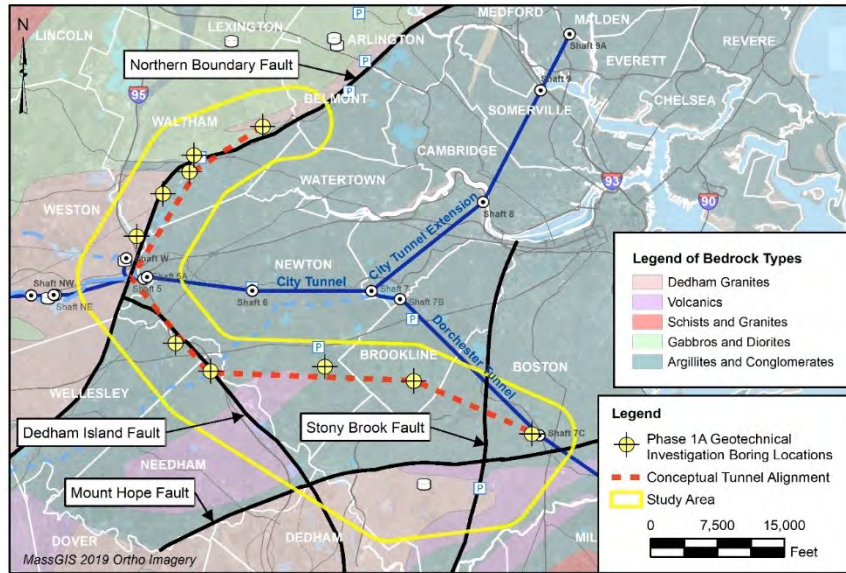


Phase 1B Program (Spring - Fall 2022)

Thank You!



Phase 1A Program – Test Borings



Phase 1A = 10 Test Borings:

- Waltham – Fernald Property - 445 ft
- Waltham – School St - 424 ft
- Waltham – Felton Street - 411 ft
- Waltham – Cedarwood PS - 437 ft
- Weston – DCR, Norumbega Tower Park - 433 ft
- Wellesley – Hegarty PS - 416 ft
- Needham – St Mary St PS - 513 ft
- Newton – Newton South High School - 470 ft
- Brookline – Newton Street PS - 548 ft
- Boston – DCR/Boston Light, American Legion Hwy - 412 ft



Brookline



Needham



Newton



Wellesley



Phase 1A Program – Test Borings



Hard Quartz in Waltham



Pink Granite in Waltham



Roxbury Conglomerate (aka "Pudding Stone") in Brookline

- Drilling of all 10 borings completed (Ph1A)
- Average of 451 ft deep
- >4,110 lf of rock core collected



Detailed Core Logging & Sample Selection



Field Logging



Core Storage at DITP



Phase 1A Program – Seismic Refraction Survey

Non-invasive method used to determine subsurface conditions including variations in top of bedrock



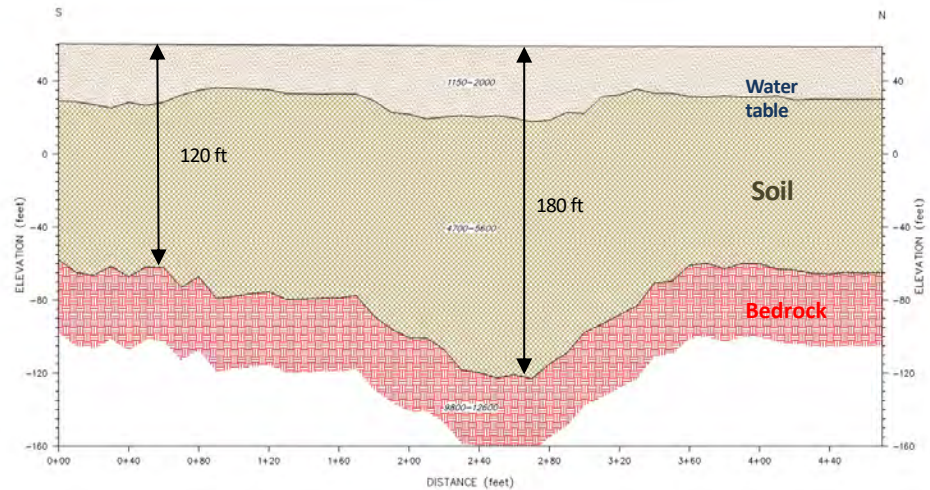
Hamilton Field in Newton



Mount Feake Cemetery in Waltham



McDevitt Middle School in Waltham



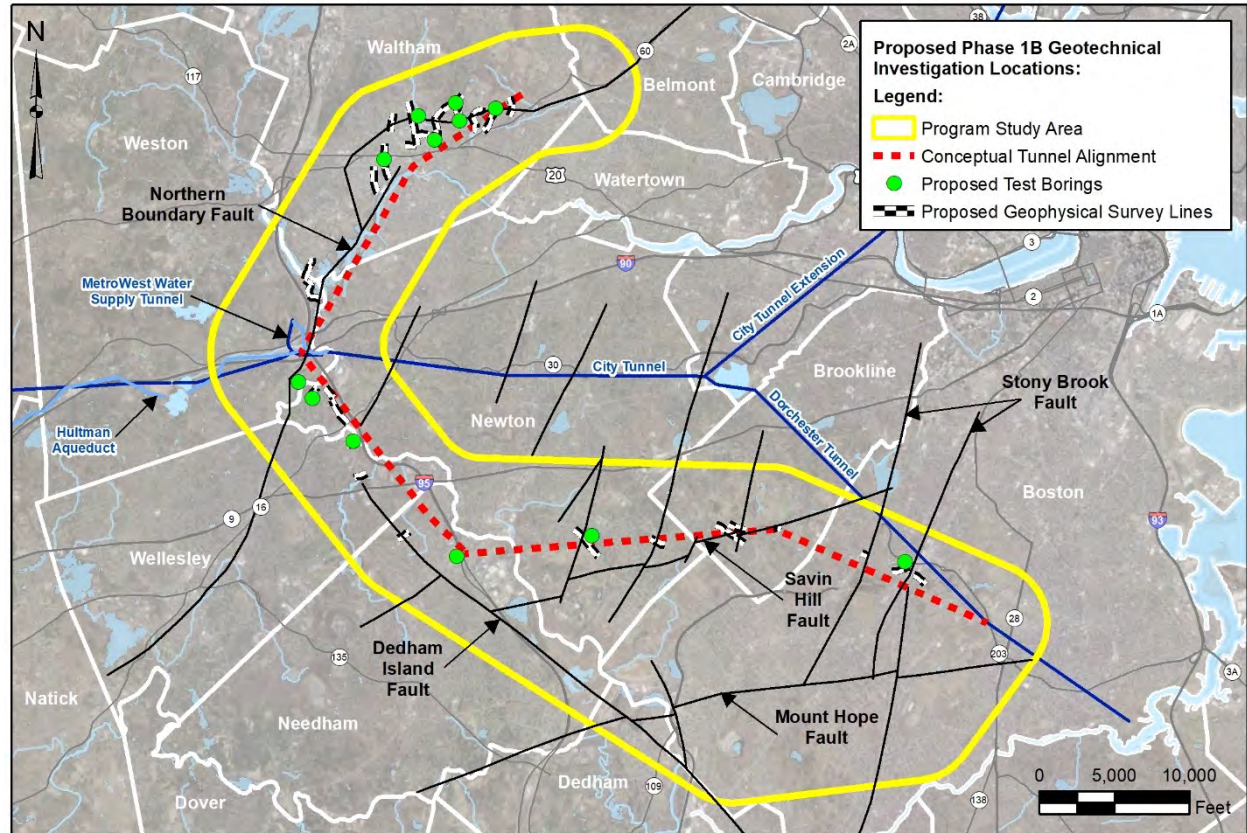
NOTES

- Estimated accuracy (standard deviation) of depth of bedrock is $\pm 10\%$ or 2 feet, whichever is greater.
- The depths determined for bedrock are depths of competent rock; weathered and/or fractured bedrock might occur at shallower depths.
- Surface elevations estimated from plans provided by MMA.
- Data were analyzed using the Generalized Reciprocal Method.



Continue Subsurface Investigation – Proposed Phase 1B

- Phase 1A Program:
 - Provides important data and initial understanding of geologic conditions along possible tunnel alignments
 - Advances our understanding of geologic faults located along these alignments
- Phase 1B Program:
 - Continue data gathering and refinement
 - Support preliminary design





Alternatives Evaluation Process and Criteria



What is (and is not) an “alternative”

- An alternative is a unique combination of specific shaft sites & functions that are linked together to create a complete functional tunnel system with the following items “fixed”
 - Shaft sites and function (e.g., Fernald Property as a receiving shaft site)
 - Direction and ~length of a tunnel segment (e.g., North Tunnel = launch from Tandem Trailer and receive at Fernald Property, ~4.5 miles)
 - Connection points along a tunnel segment (e.g., Cedarwood PS & School St along North Tunnel)
- An alternative does not fix (but has influence on)
 - The final subsurface tunnel alignment, TBD = f(geology & property)
 - Contract packaging, # TBM’s, phasing, sequencing, and schedule

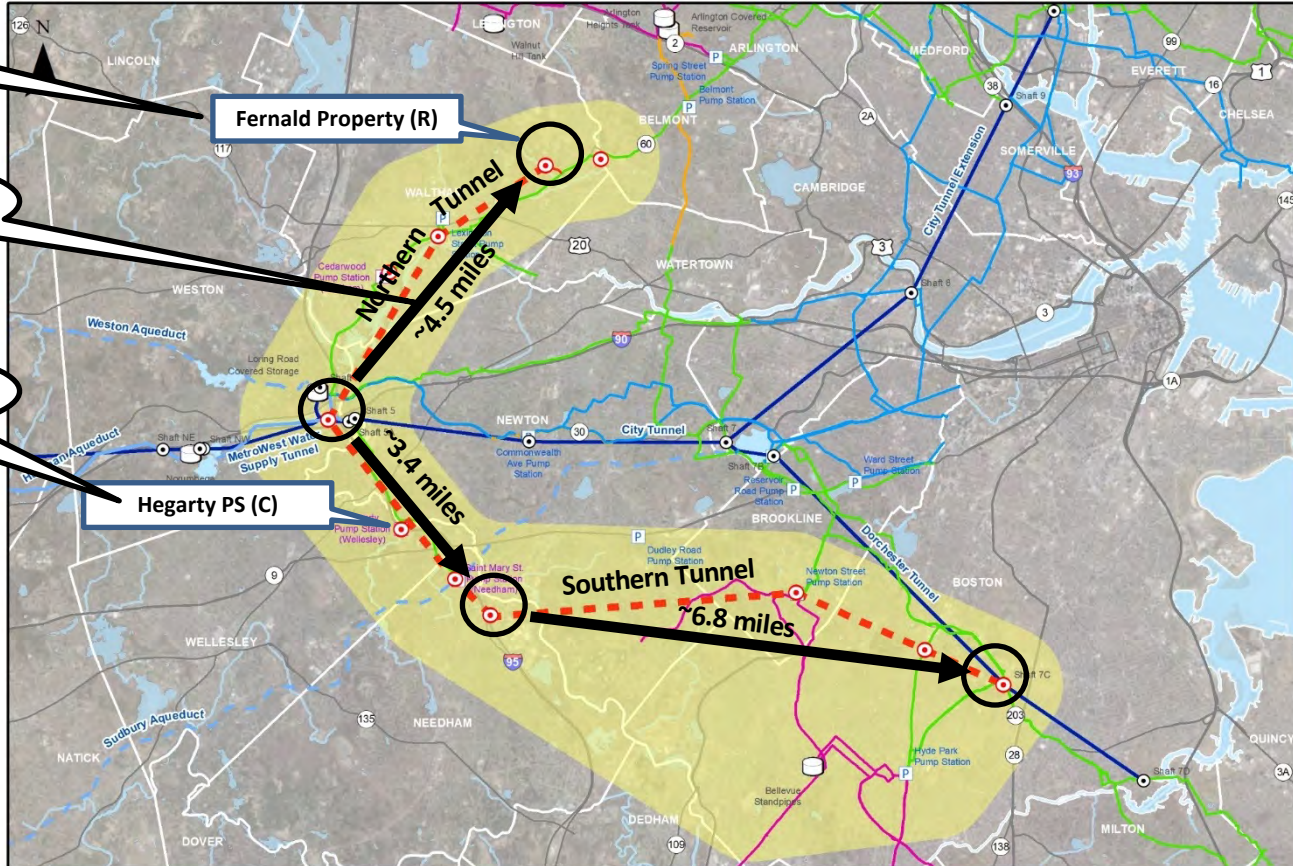


What is an "alternative"

Shaft site and Function

Tunnel Direction and Length

Connection along a tunnel segment





How We Assembled Alternatives and Narrowed the Selection

- Started with Two-Tunnel Concept (North and South Tunnels)
- > 30 alternatives:
 - Program study area, system hydraulics, connection points, possible shaft sites (undeveloped/suitable), link tunnel segments, etc.
- Narrowed to 10 alternatives:
 - Land availability, constructability, operations, environmental & social, reasonableness, etc. etc. etc.
- Reduce from 10 to 3 alternatives (later conversation):
 - All 3 alternatives will be evaluated equally in the DEIR
- Select the preferred alternative:
 - Land availability, more constructability issues, contract packaging/interfaces, phasing, sequencing, schedule, in service, cost, etc.
 - Carried forward to preliminary design



Preliminary Key Locations

Possible Construction Shaft Sites

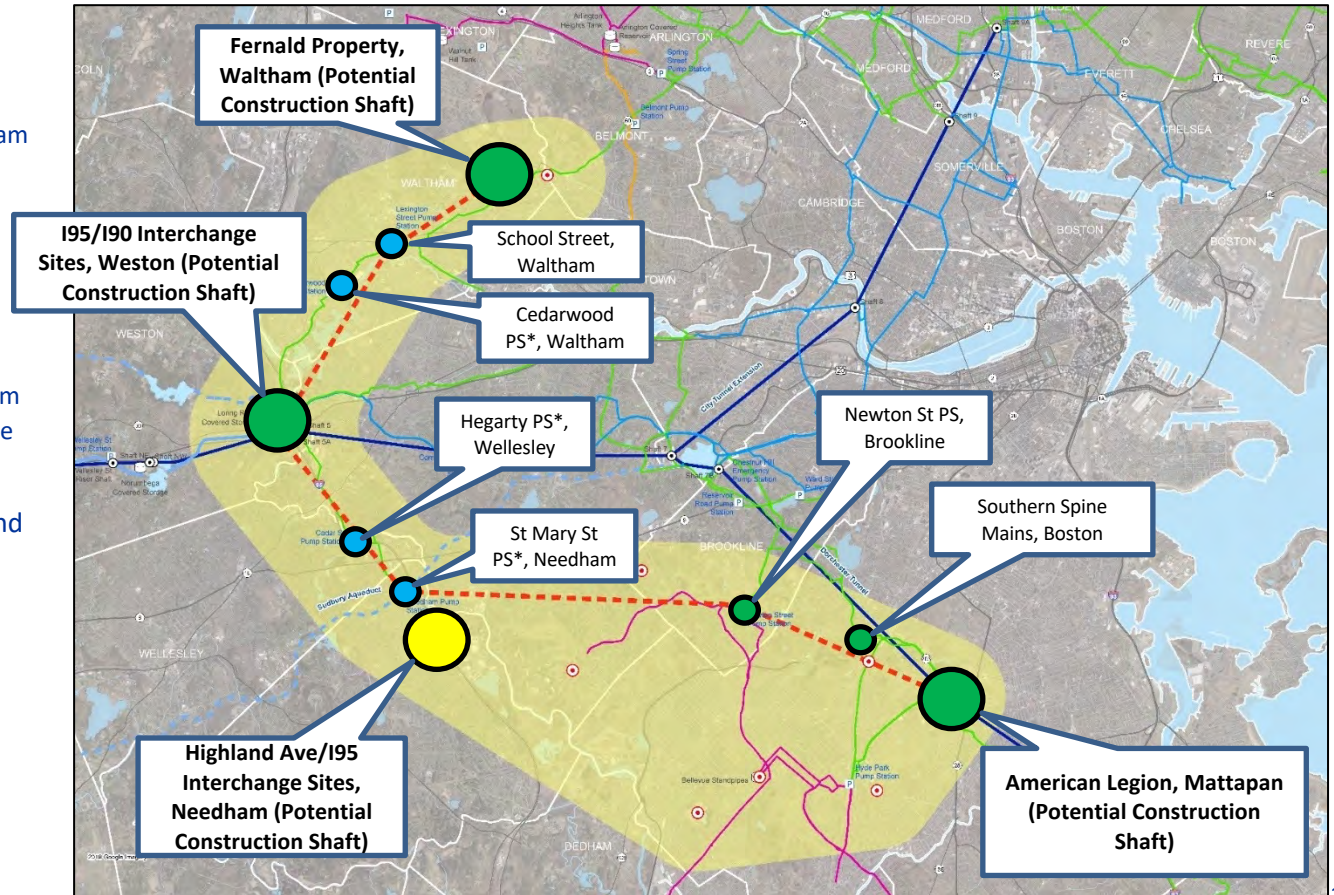
- Fernald Property, Waltham
- I90/I95 Interchange, Weston
- Highland Ave/I95 Interchange, Needham
- American Legion, Mattapan

Possible Connection Shaft Sites

- Lexington St Pump Station, Waltham
- Cedarwood Pump Station, Waltham
- Hegarty Pump Station, Wellesley
- St. Mary Street Pump Station, Needham
- Newton Street Pump Station, Brookline
- Southern Spine Mains, Boston

Final shaft locations subject to permits and real estate acquisition

- * Non MWRA Pump Station
- Required Connection (required for system redundancy)
- Secondary Connection (provides local benefit)
- Construction Shaft (no connection)





Short List of Shaft Sites

Construction Shaft Sites:

- WASM3
 - Fernald Property
- I90/I95 Interchange
 - Bifurcation
 - Tandem Trailer (& Park Road)
 - Park Road
 - Riverside Park (& @ Hultman)
- I95/Highland Ave Interchange
 - NW cloverleaf
 - NE cloverleaf
- Shaft 7C
 - American Legion

Connection Shaft Sites:

- School St, Waltham
- Cedarwood PS*, Waltham
- Hegarty PS*, Wellesley
- St Mary St PS*, Needham
- Newton St PS, Brookline
- Section 39/Southern Spine Mains, Boston

* Non-MWRA PS



Shaft Site Functions

- Launching (L) shaft sites are where the TBM goes into the ground and starts mining. These sites are also the low point on a tunnel and the logical location for future tunnel dewatering (D)
- Receiving (R) shaft sites are where the TBM completes mining and is taken out of the ground
- All proposed shaft sites are hydraulic connections (C) to our system, except Highland Ave
- All top of L and R shaft structures will have isolation (I) valves, including Highland Ave
- Large connection shafts (Lg C) are not big enough to recover the TBM, it must be backed out or abandoned

Shaft Site Functions

- L - Launching Shaft
- R - Receiving Shaft
- Lg C - Large Connection Shaft
- I - Isolation Location
- D - Dewatering Location
- C - Connection Location



Alternatives Evaluation Process





Evaluation Criteria



Constructability/ Engineering

- Availability of Utilities
- Ground Water discharge
- Flushing/Disinfection
- Dewatering
- Construction Dewatering
- Proximity to Highways
- Proximity to Faults
- Length of Tunnel
- Proximity to Sensitive Existing Infrastructure



Land Availability

- Space and Right of Way for Construction
- Space and Right of Way for Permanent Facilities
- Precludes Other Beneficial Uses



Environmental

- Wetlands
- State/Federal Listed Species
- Article 97
- Mass Contingency Plan



Operations

- Flexibility of Operations
- Maintenance Provisions



Social/Community

- Cultural Resources
- Community Impacts/ Environmental Justice
- Traffic Disruption
- Commercial Disruption
- Construction Period Impacts from Air and Noise



Cost

- Relative Construction Costs



Schedule

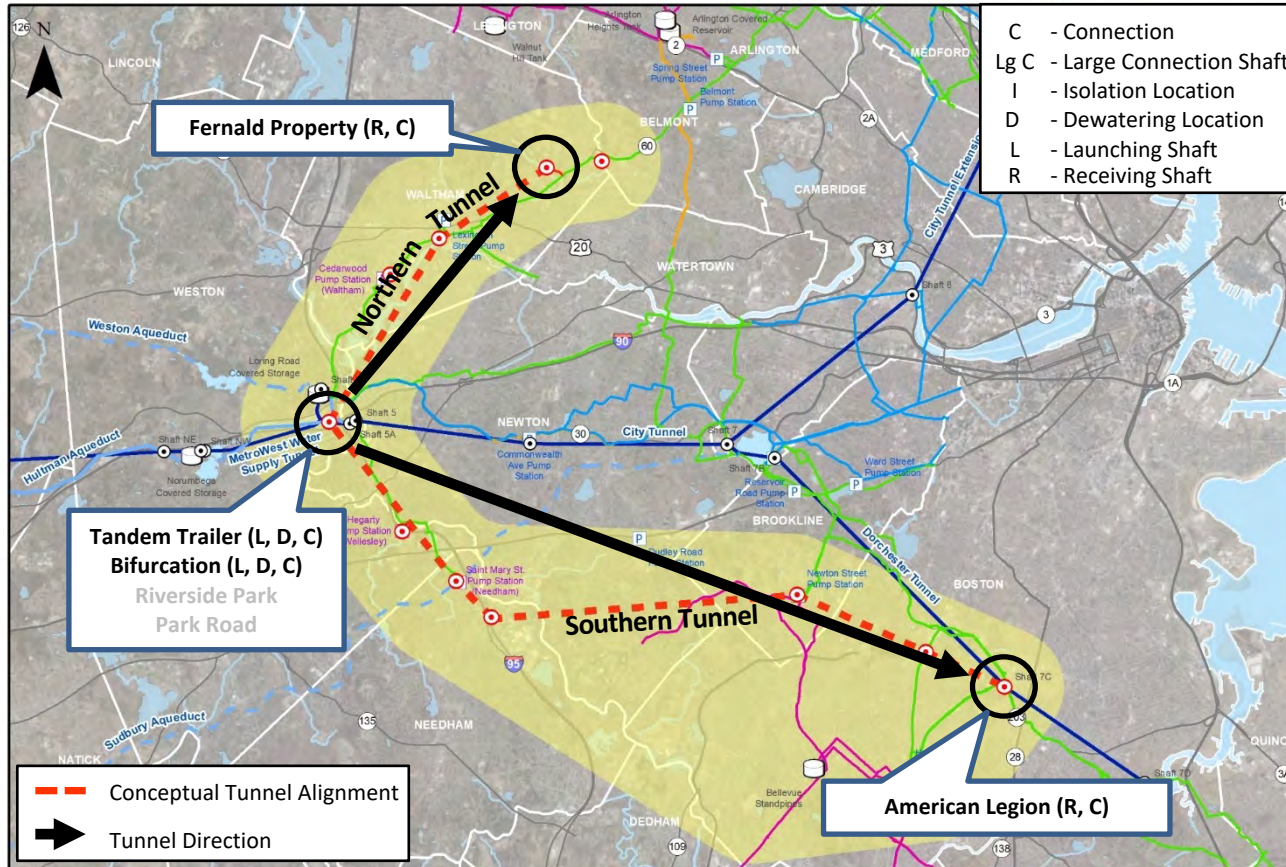
- Timing to Achieve Beneficial Use
- Flexibility of Implementation



Alternatives Evaluation



Alternative 1



North Tunnel – Launch from Tandem Trailer Parcel & Receive at Fernald Property

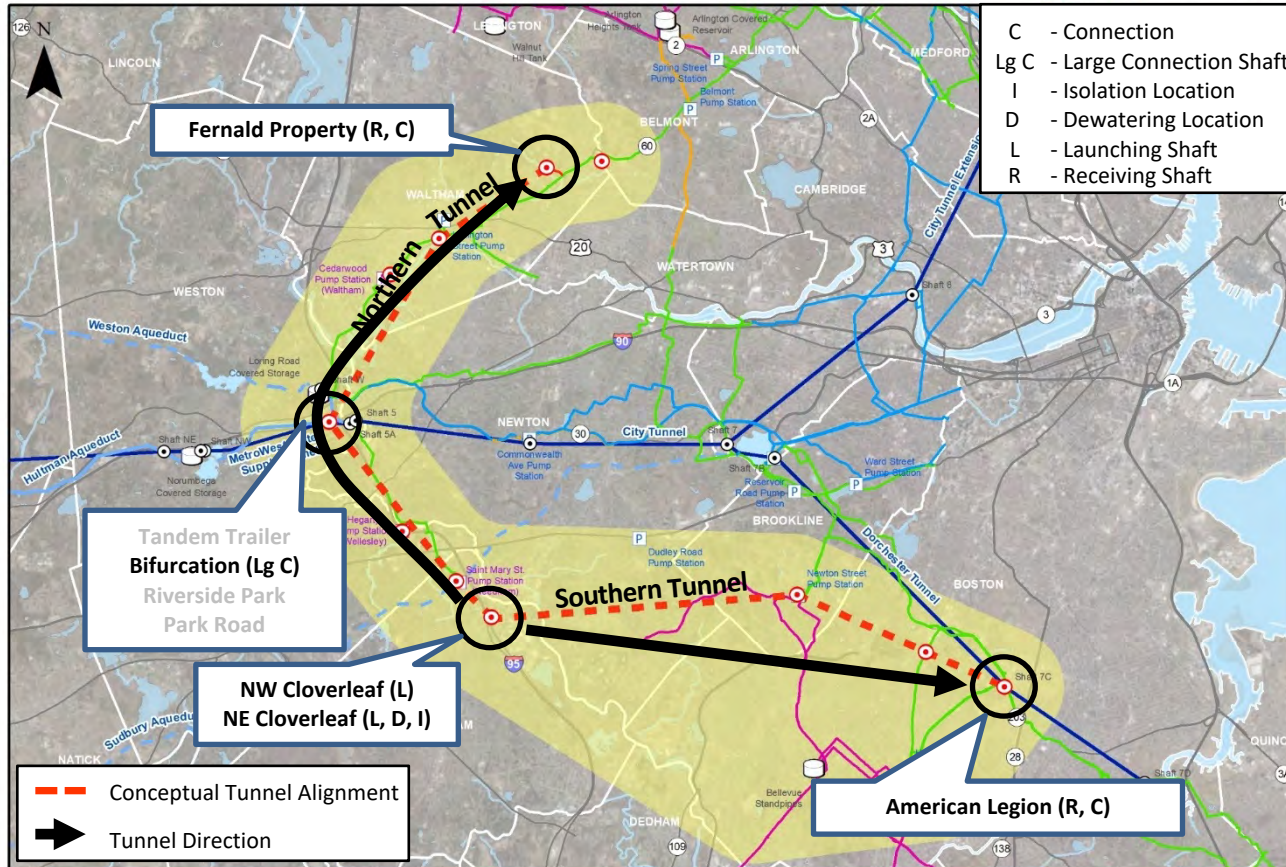
South Tunnel – Launch from Bifurcation Site & Receive at American Legion

Key Considerations

- Very long single Southern Tunnel with constructability challenges
- No dewatering or isolation point within long Southern Tunnel
- Access to Bifurcation Site may be delayed due to MassDOT Bridge Project



Alternative 2



North Tunnel – Launch from NW Cloverleaf & Receive at Fernald Property with a large connection at Bifurcation Site

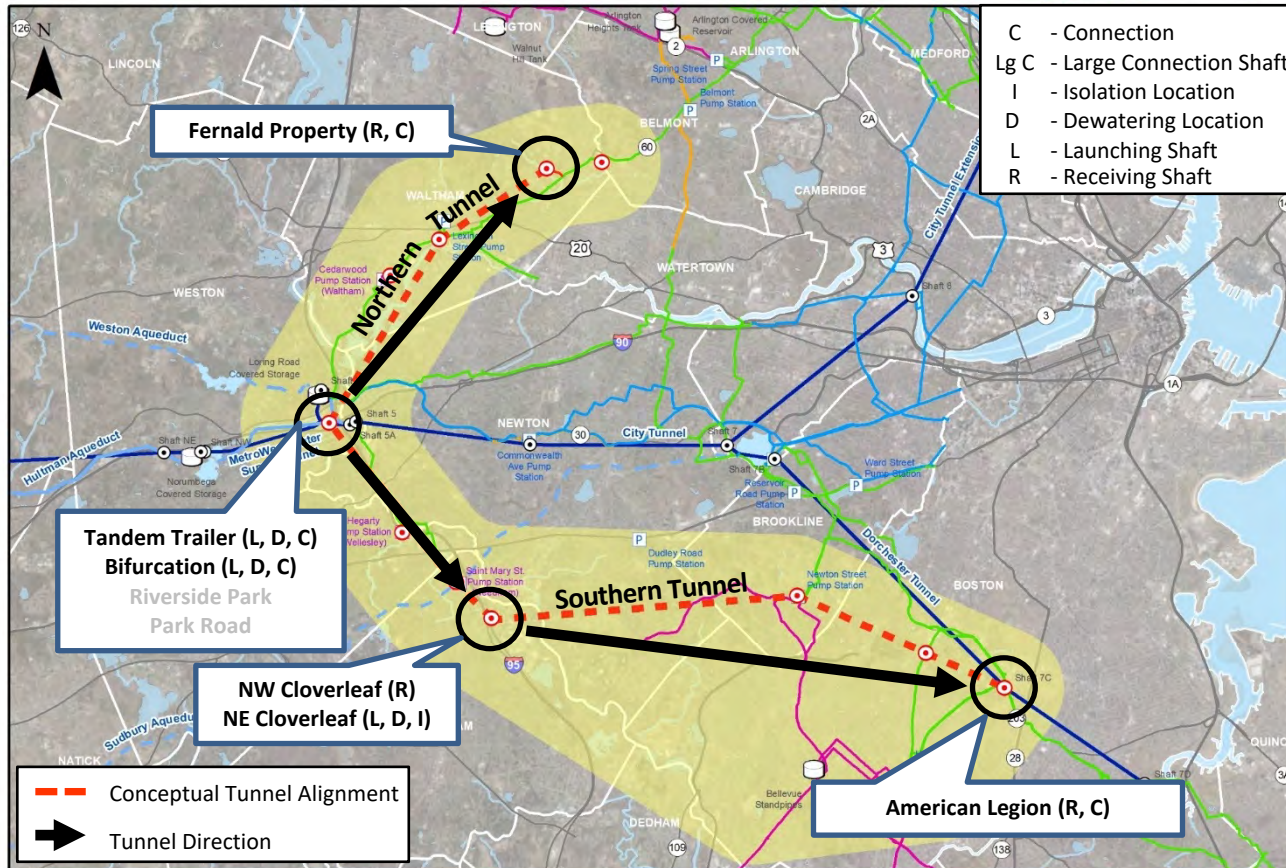
South Tunnels – Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- More equal tunnel lengths
- Does not require Tandem Trailer Parcel
- Launch from NW cloverleaf helps mitigate possible delay at Bifurcation from DOT Bridge Project



Alternative 3



North Tunnel – Launch from Tandem Trailer Parcel & Receive at Fernald Property

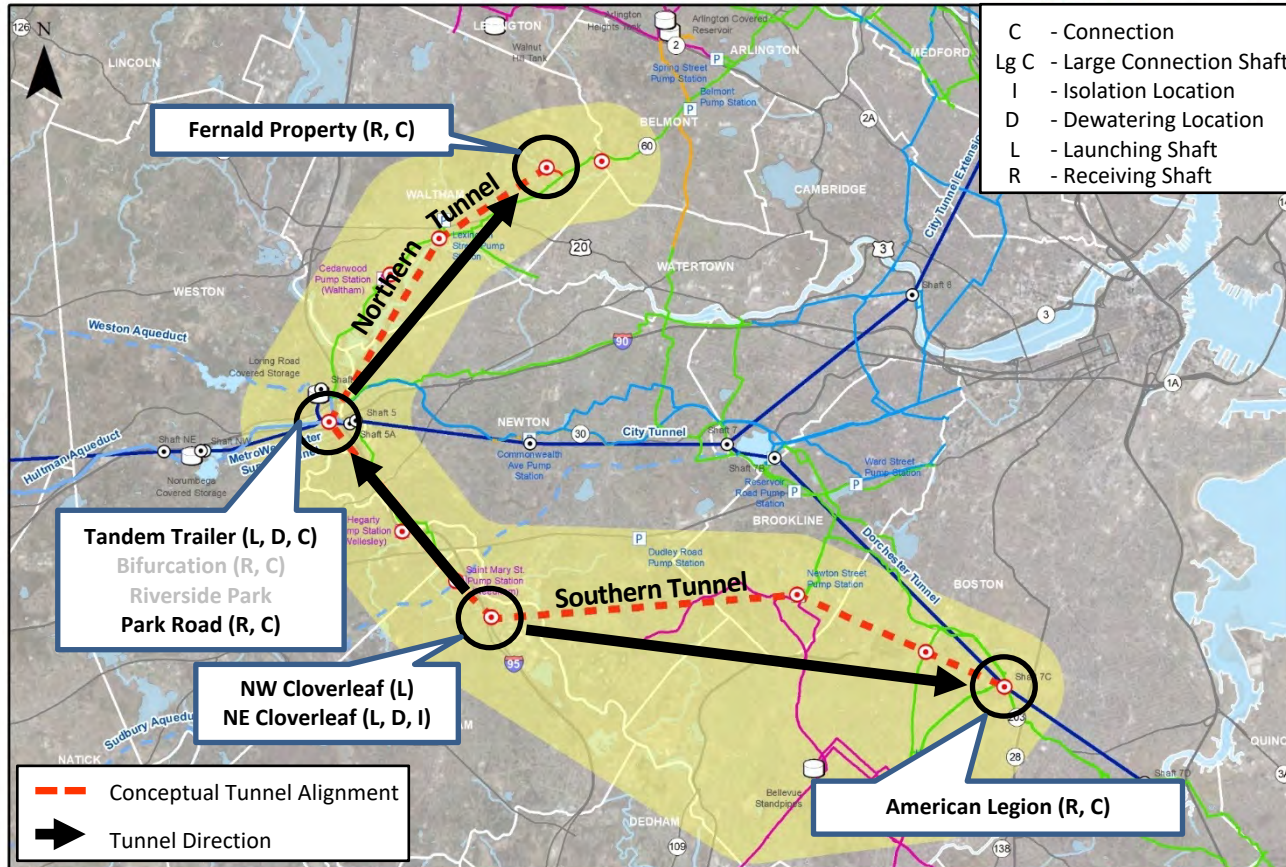
South Tunnels – Launch from Bifurcation & Receive at NW Cloverleaf, Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- Requires Tandem Trailer Parcel
- Access to Bifurcation Site may be delayed due to MassDOT Bridge Project
- Highland Ave splits Southern Tunnel into shorter lengths



Alternative 4



North Tunnel – Launch from Tandem Trailer Parcel & Receive at Fernald Property

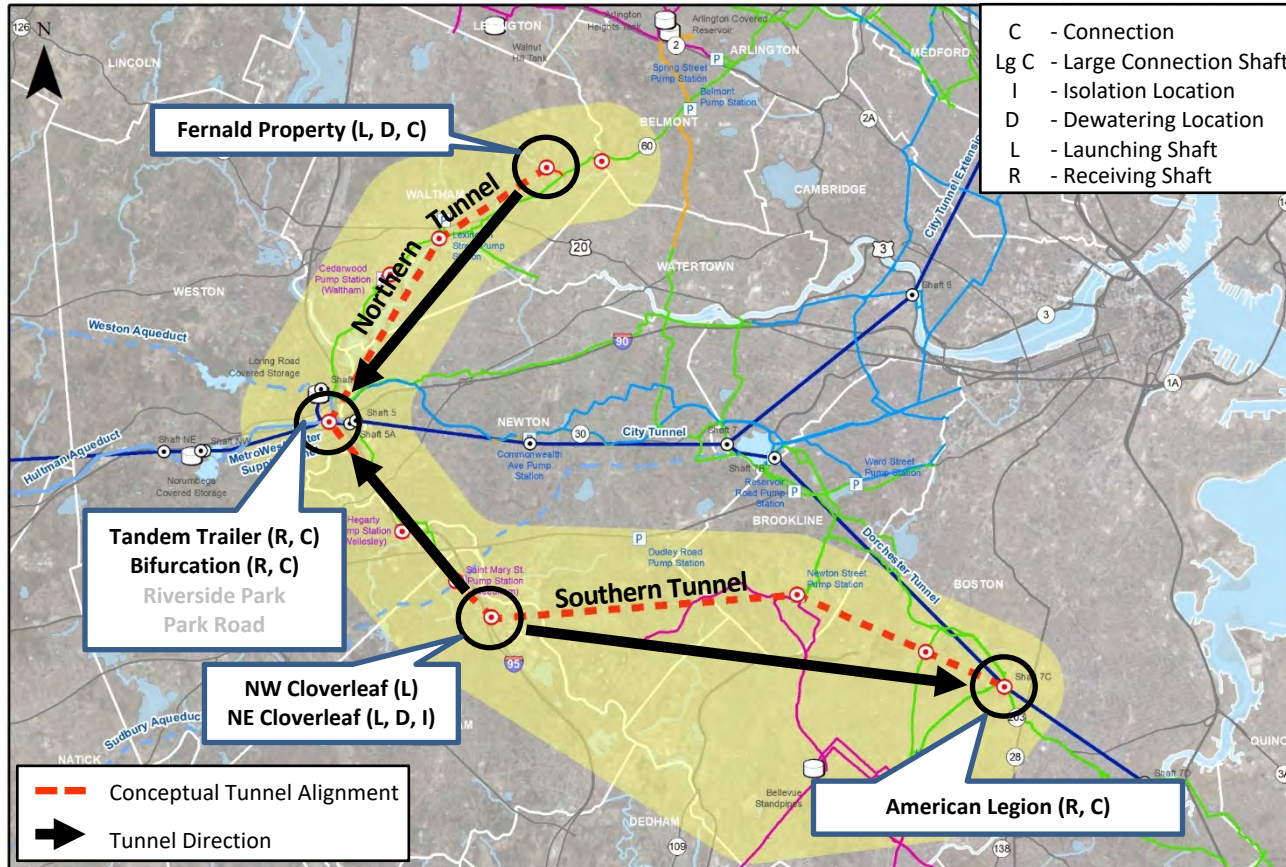
South Tunnels – Launch from NW Cloverleaf & Receive at Park Road, Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- Requires Tandem Trailer Parcel
- No possible impact by MassDOT Bridge Project
- Highland Ave splits southern tunnels into shorter lengths



Alternative 5



North Tunnel – Launch from Fernald Property & Receive at Tandem Trailer Parcel

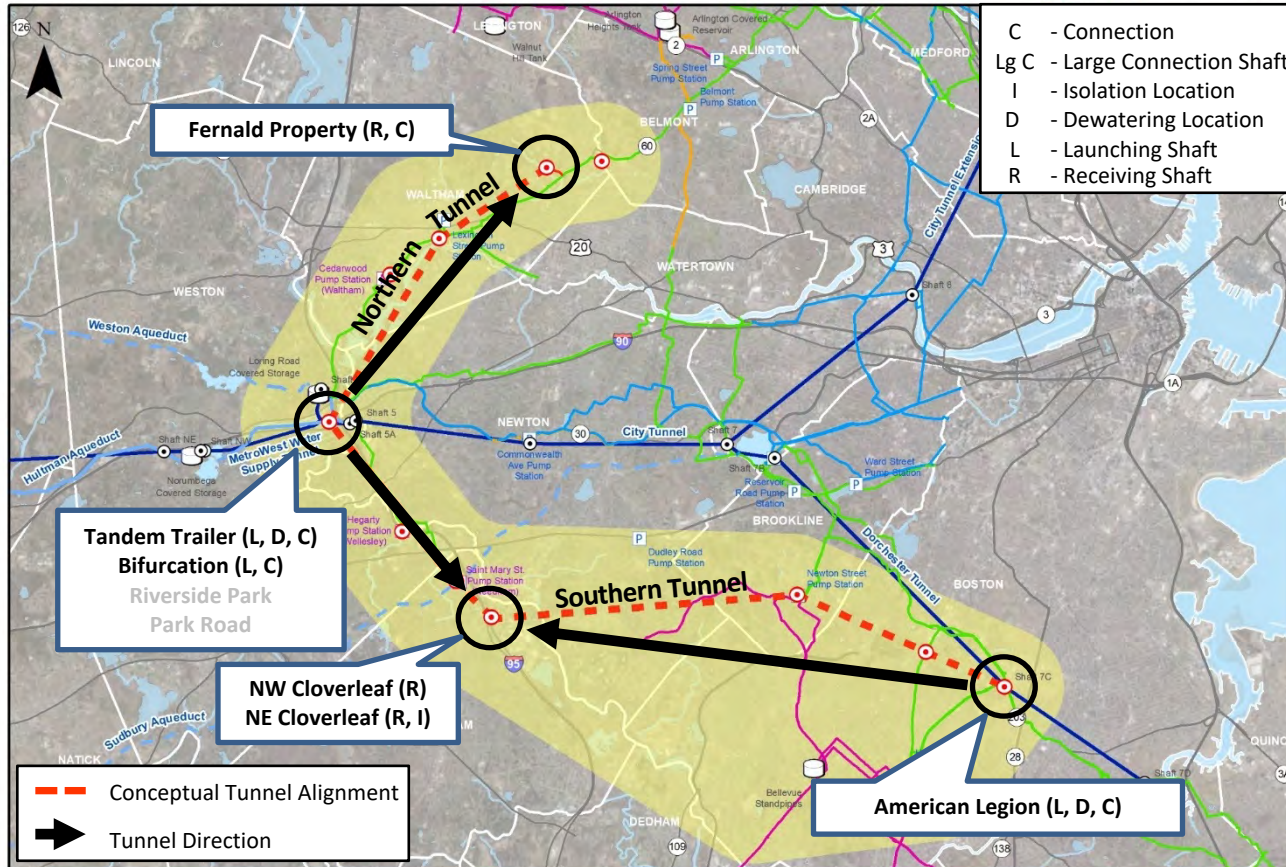
South Tunnels – Launch from NW Cloverleaf & Receive at Bifurcation, Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- Launching out of Fernald Property
- Requires Tandem Trailer Site
- Access to Bifurcation Site may be delayed due to MassDOT Bridge Project
- Highland Ave splits Southern Tunnel into shorter lengths



Alternative 6



North Tunnel – Launch from Tandem Trailer & Receive at Fernald Property

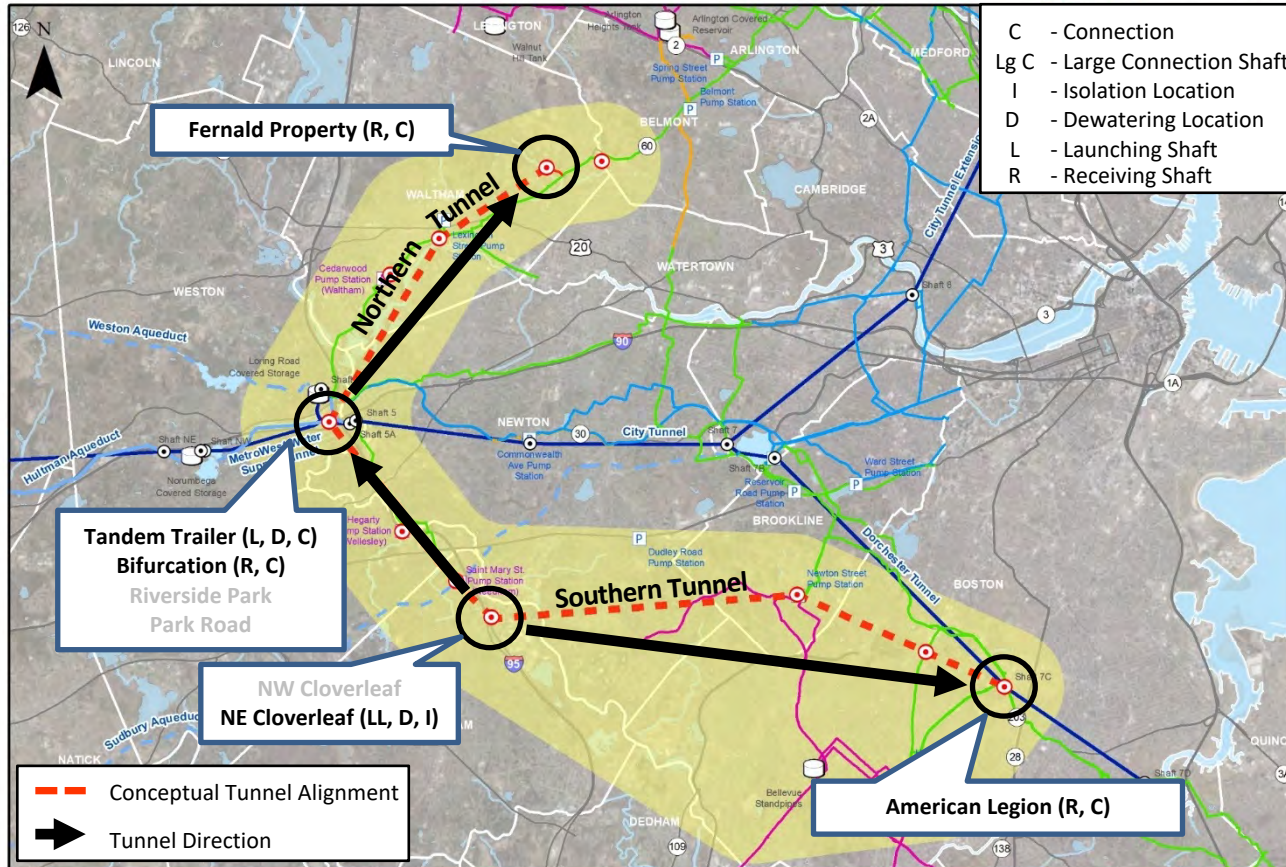
South Tunnels – Launch from NW Cloverleaf & Receive at Bifurcation, Launch from American Legion & Receive at NE Cloverleaf

Key Considerations

- Launching out of Mattapan
- Requires Tandem Trailer Parcel
- Access to Bifurcation Site may be delayed due to MassDOT Bridge Project
- Highland Ave splits Southern Tunnel into shorter lengths



Alternative 7



North Tunnel – Launch from Tandem Trailer Parcel & Receive at Fernald Property

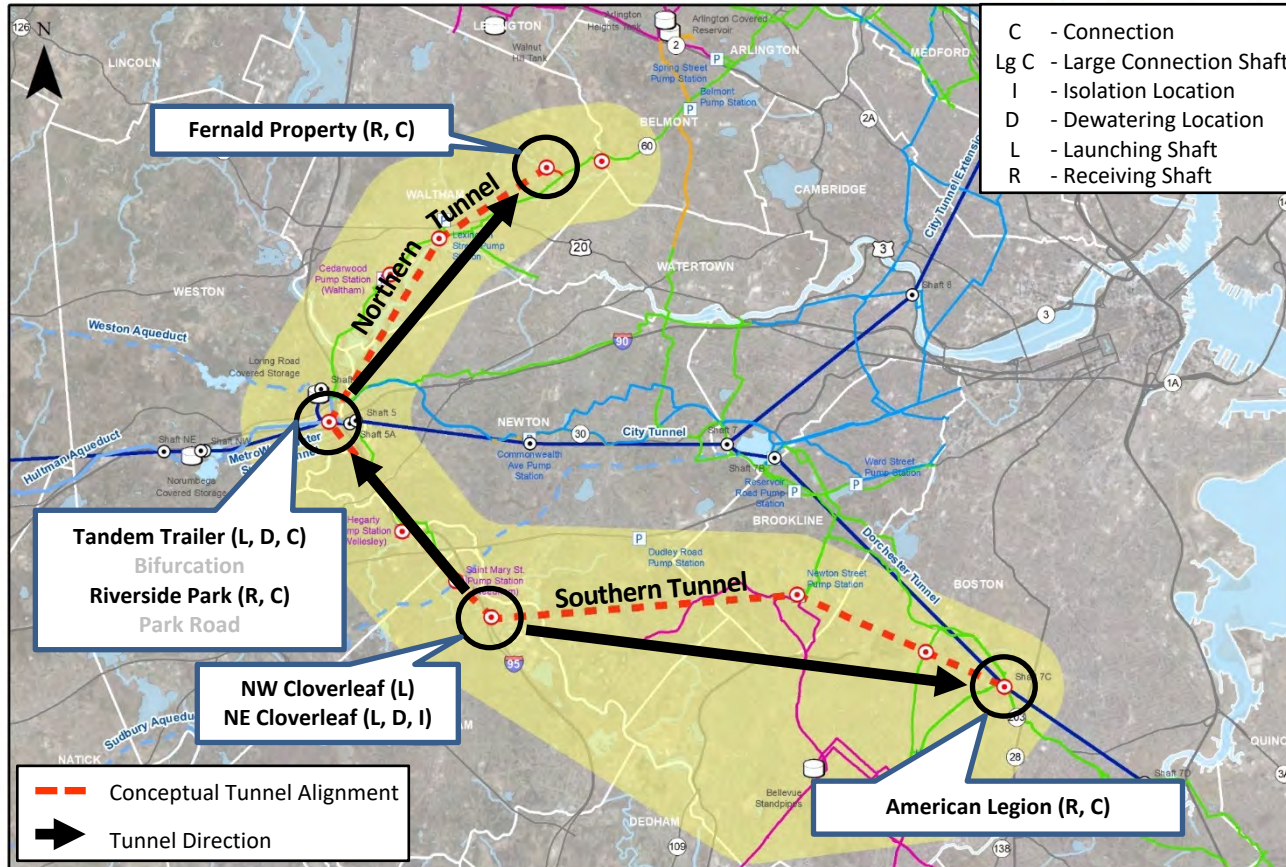
South Tunnels – Launch from NE Cloverleaf & Receive at Bifurcation, Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- Requires Tandem Trailer Parcel
- Access to Bifurcation Site may be delayed due to MassDOT Bridge Project
- Single large shaft with double TBM launch at NE Cloverleaf
- Highland Ave splits Southern Tunnel into shorter lengths



Alternative 8



North Tunnel – Launch from Tandem Trailer Parcel & Receive at Fernald Property

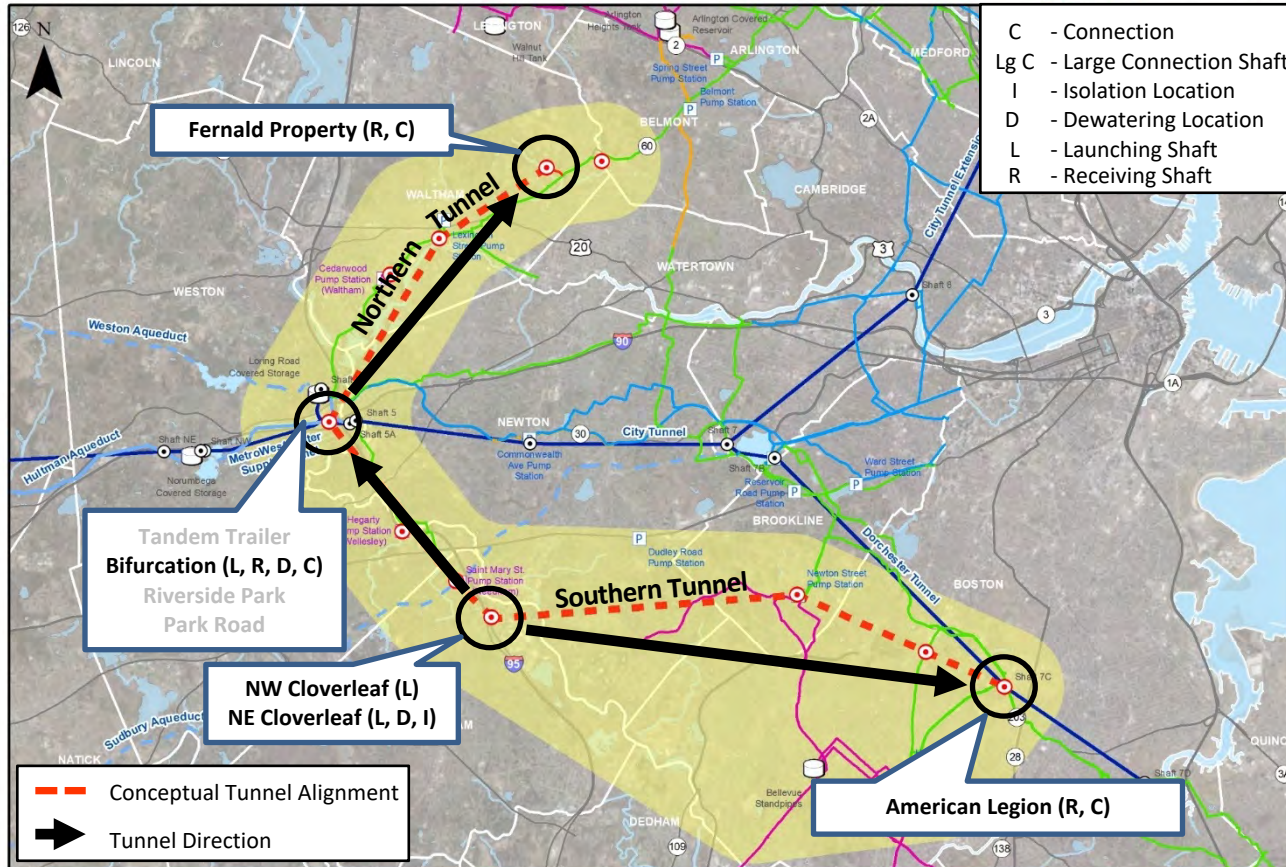
South Tunnels – Launch from NW Cloverleaf & Receive at Riverside Park, Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- Requires Tandem Trailer Parcel
- Not impacted by MassDOT Bridge Project
- Article 97 at active recreation property
- Highland Ave splits Southern Tunnel into shorter lengths



Alternative 9



North Tunnel – Launch from Bifurcation & Receive at Fernald Property

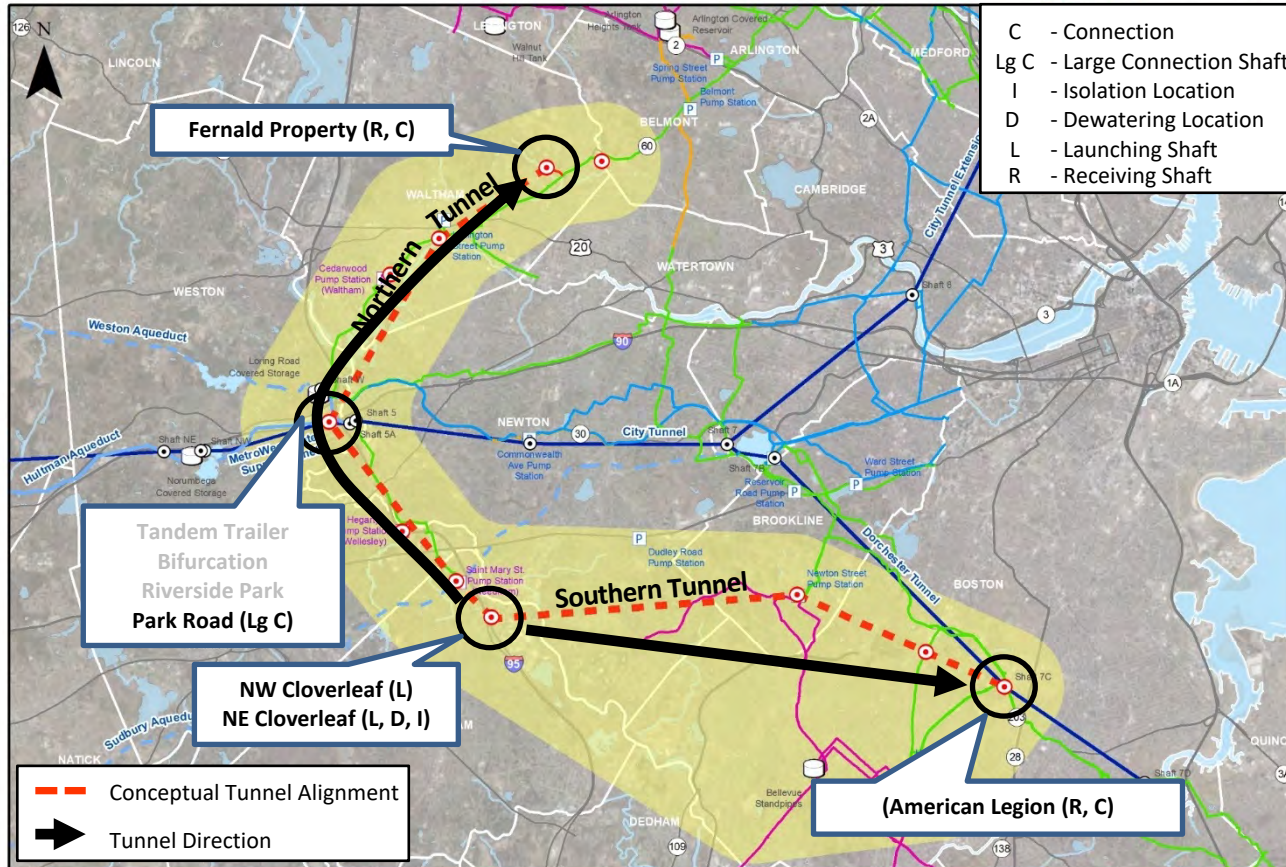
South Tunnels – Launch from NW Cloverleaf & Receive at Bifurcation, Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- Does not require Tandem Trailer Parcel
- Access to Bifurcation Site may be delayed due to MassDOT Bridge Project
- Possible contract interface issues at Bifurcation
- Highland Ave splits Southern Tunnel into shorter lengths



Alternative 10



North Tunnel – Launch from NW Cloverleaf & Receive at Fernald Property with a large connection at Park Road Site

South Tunnels – Launch from NE Cloverleaf & Receive at American Legion

Key Considerations

- More equal tunnel lengths
- Does not require Tandem Trailer Parcel
- Not impacted by MassDOT Bridge Project



Alternatives Evaluation

- Reduced to 10 alternatives based on:
 - Land availability
 - Site function & suitability
 - Functional tunnel segment combinations
 - Social & environmental impacts
 - Risk management & flexibility
- The 10 alternatives underwent an initial evaluation and found to provide redundancy and were considered constructible
- More detailed evaluation to get to 3 short listed alternatives and ultimately to the preferred alternative



Next Steps in Alternatives Evaluation

- Rate each alternative against the evaluation criteria
- Finalize selection of the 3 short listed alternatives to go into the DEIR
- Deeper dive into constructability, phasing, sequencing, schedule, costs, etc. on the 3 short listed alternatives
- Continue Stakeholder Outreach
 - i.e., MassDOT, DCR, Municipalities, Utilities
- Agreement on shaft sites with property owners
- Select the preferred alternative



Fun Stuff

- Shaft site names
- Tunnel names
- Program Logo
- TBM names
- School Education Program
- ...
-
-
-
- Ground Breaking!



Upcoming Meetings

- Spring 2022
 - Preferred and Two Backup Alternatives
- Future topics
 - Environmental Protection at Shaft Sites, Community Engagement Opportunities, Costs & Financing, Site Visits
 - Tell us what you want to hear about/discuss
- MWRA Program Team can provide individual briefings/presentations to your community/organization at any time. Just ask!



Metropolitan Water Tunnel Program

- Contact Us
 - Carmine DeMaria, Community Relations Coordinator
 - 617-305-5725
 - Carmine.DeMaria@mwra.com
 - Tunnels.info@mwra.com
- <https://www.mwra.com/mwtp.html>
 - Meeting notices, agendas, presentations, minutes



Questions/Comments?



Thank you for your
continued partnership!