W A.1
03/13/2024

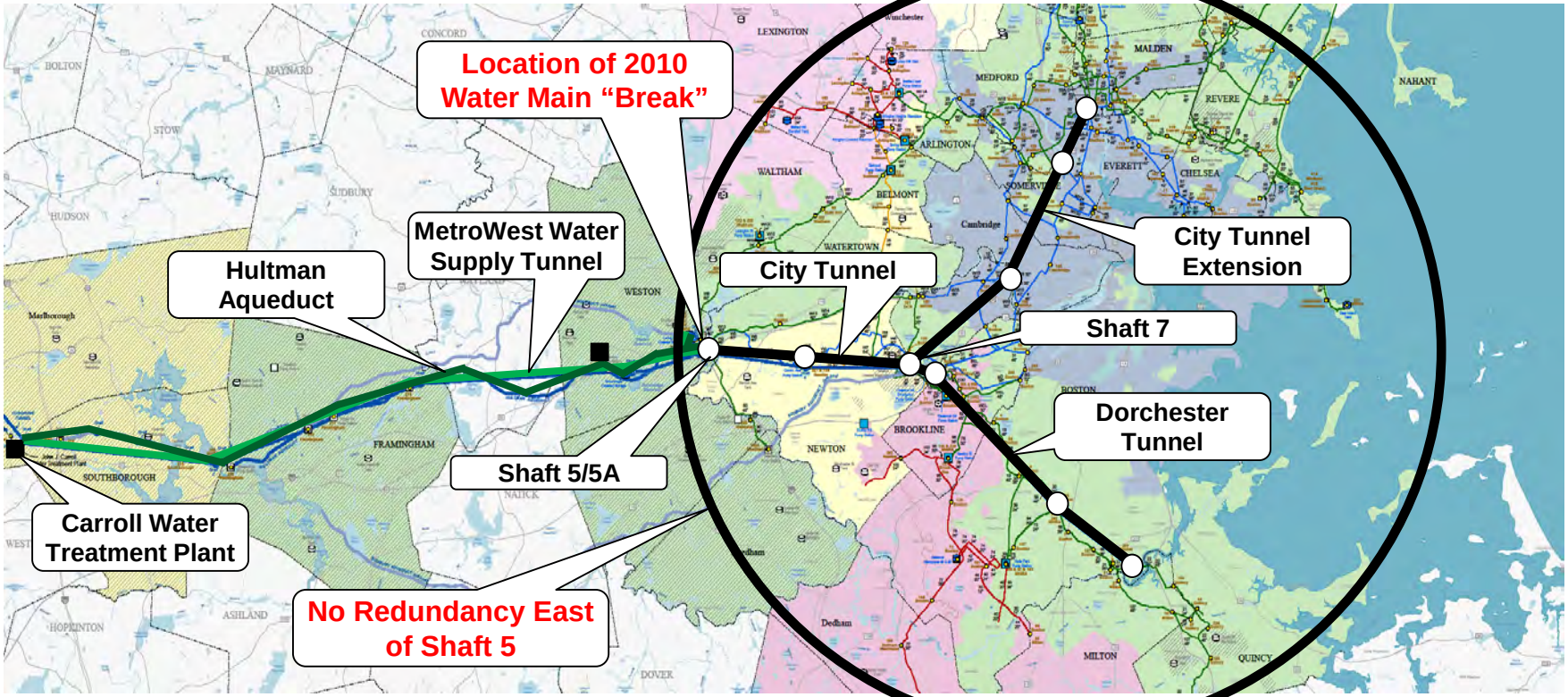
Presentation to

MWRA Board of Directors

Metropolitan Water Tunnel Program
Tunnel Program Needs and Overview

March 13, 2024

Metropolitan Tunnel System Serves About 60 Percent of Water Demand in Metropolitan Area



Metropolitan Water Tunnel Program Purpose

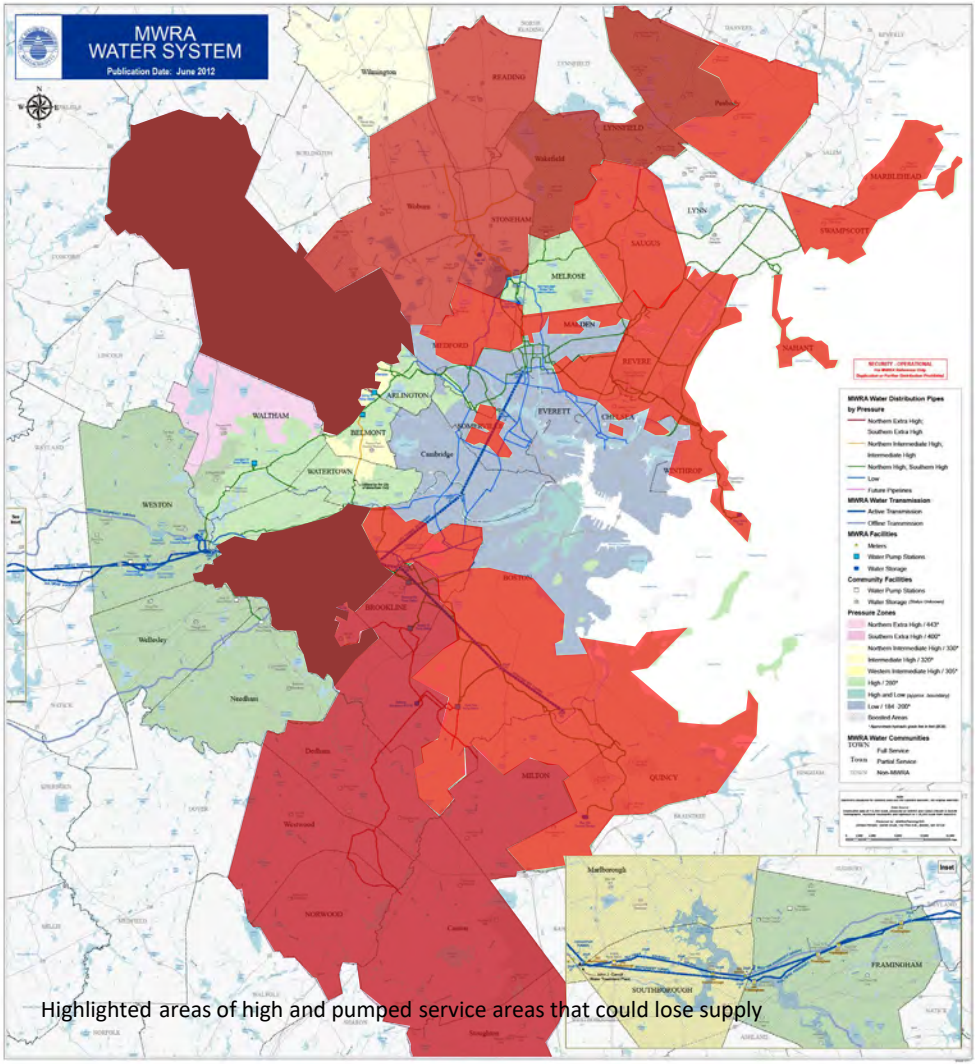
- Our current Metropolitan Tunnel System, servicing the Boston area, is in need of repair
- The tunnels, valves, chambers & pipelines are between 50 – 80 years old

- Currently we cannot maintain our tunnel system east of Shaft 5 in Weston because a shutdown of the entire Metropolitan Tunnel System would be required
- The **Metropolitan Water Tunnel Program** will solve that problem by creating a redundant water tunnel system allowing the old system to be completely taken offline for inspection, maintenance, and repair

Wide-Spread Impact

- Sudden shut down of Metropolitan Tunnel system
- Loss of supply to high service areas
- Pumped Service Areas lose supply as tanks empty
- Whole system would be on boil order

- Economic Impact for Total Water Loss - One Day:
  - $360 million (2024)
- Economic Impact for Total Water Loss - Three Days:
  - $1.1 billion (2024)



Highlighted areas of high and pumped service areas that could lose supply

Metropolitan Water Tunnel Program Goals

Protect Public Health, Provide Sanitation and Fire Protection

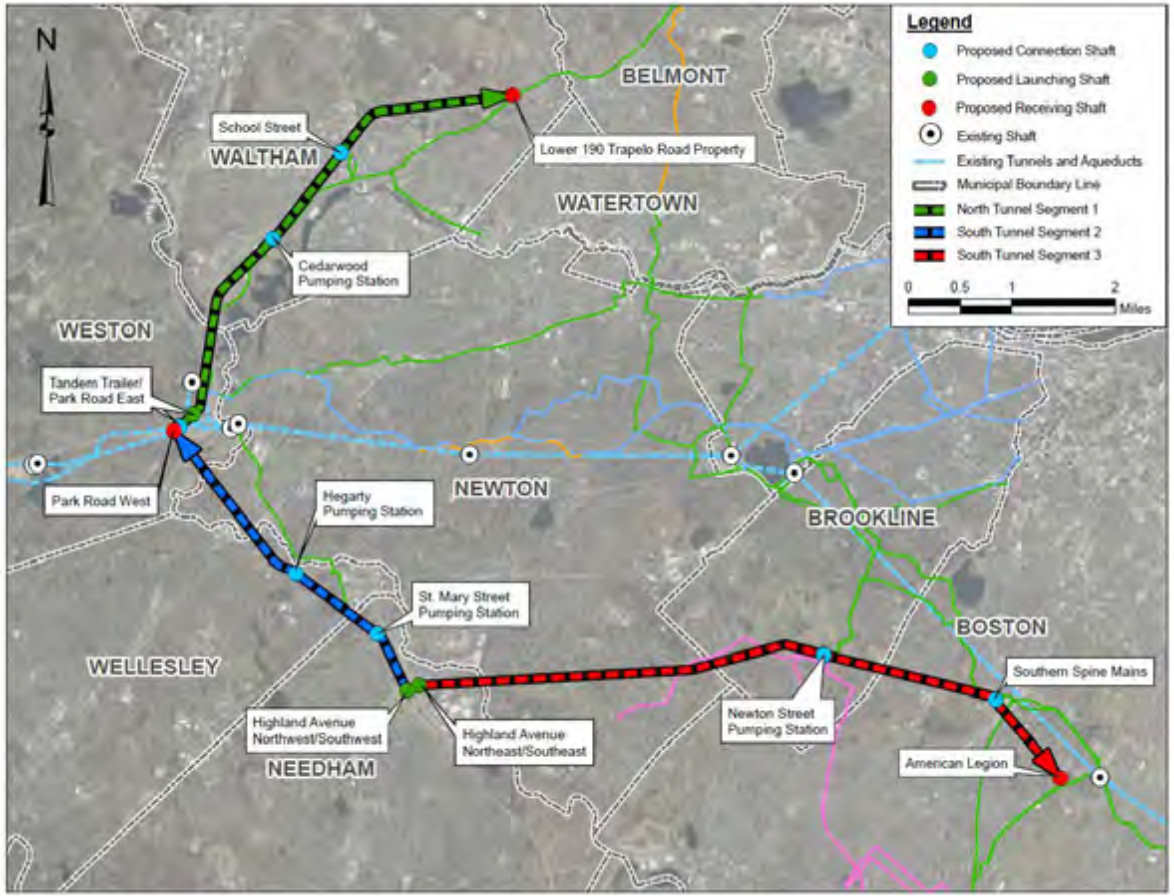
- Provide full redundancy for the Metropolitan Tunnel System:
  - Provide normal water service and fire protection when the existing tunnel system is out of service
  - Provide the ability to perform maintenance on existing tunnels year-round
  - Provide uninterrupted service in the event of an emergency shut down
  - Meet high day demand flow with no seasonal restrictions
  - Avoid activation of emergency reservoirs
  - Meet customer expectations for excellent water quality
- Result in no future boil orders!

Tunnel Program – Since 2017

- 2017 – Board approves Two-Tunnel Concept
- 2018 – Tunnel Department established
- 2019 – PSS consultant and Expert Review Panel
- 2020 – Began preliminary design and environmental review process
- 2021 – Purchased School St property
- 2022 – GSS consultant began an expanded geotechnical program
- 2023 – Completed preliminary design, first bottom-up cost estimate
- 2024 – Complete environmental review process
- 2024 – Begin final design
- Over 10 Board Updates & Tunnel Program Contract Awards since 2017

Metropolitan Water Tunnel Program

- ~15 miles of deep, hard rock, pressure tunnel
- Tunnels will begin in the Weston (I-90/I-95 vicinity)
- Northern Tunnel - ~5 miles, ends in Waltham
- Southern Tunnel - ~10 miles, ends in Mattapan near American Legion Hwy
- Six intermediate connections to existing water infrastructure
- Construction anticipated between 2028 and 2040



Today's Agenda

- Update on Interim Improvements Projects
- Preliminary Design and Environmental Impact Report
- Program Schedule and Look Ahead (including critical path)
- Updated Program Cost Estimate, Proposed FY25 CIP, and Cost Controls
- Contract Structure for Final Design Engineering Services, Contract 7556

W A.2
03/13/2024

Presentation to

MWRA Board of Directors

Metropolitan Redundancy Interim Improvements Projects Update

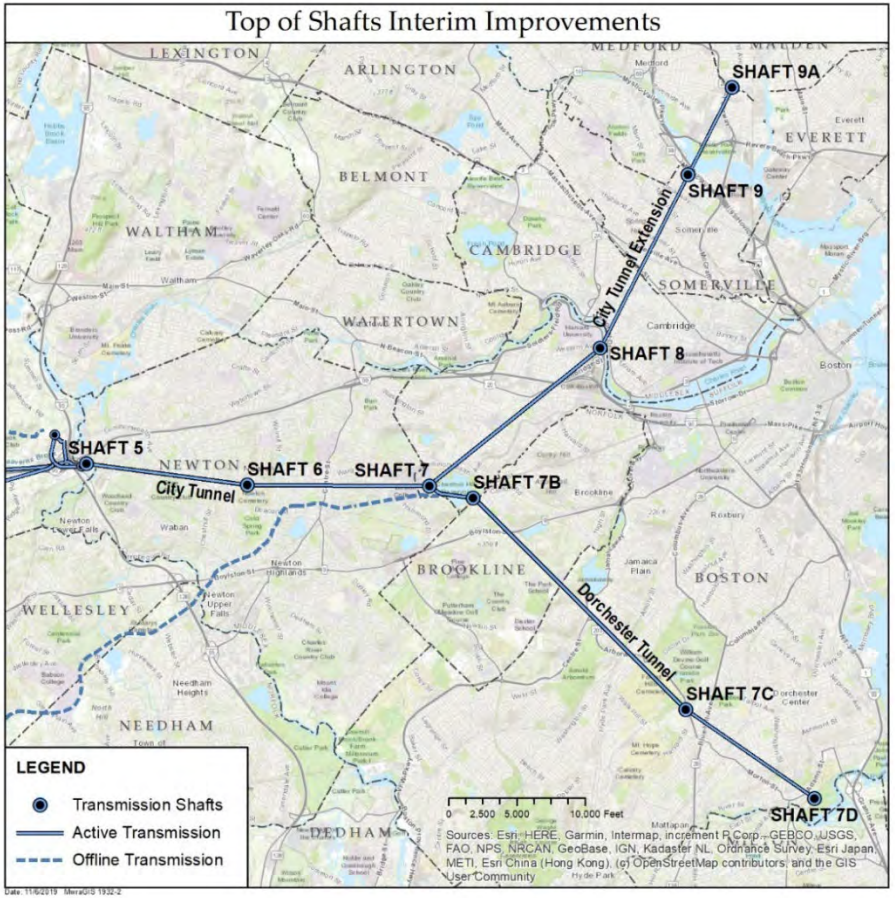
March 13, 2024

Commonwealth Avenue Pumping Station Modifications

- Provides redundancy if City Tunnel taken out of service
- Alternate low service supply from WASMS 1 & 2
- New low service pumps

New Pumps #4 & #5 with AFDs

Location of Metropolitan Tunnel Shafts



Improve and protect critical facilities related to the existing tunnel system.

7671 Shaft 5 – Weston (awarded 2/21 BOD)

Completed work:

- Shaft 6 – Newton
- Shaft 8 – Brighton
- Shaft 9A – Malden

Future work:

- Shaft 7 – Boston College
- Shaft 7B – Chestnut Hill
- Shaft 7C – Dorchester
- Shaft 7D – Dorchester.
- Shaft 9 – Somerville

Shaft 8 Before and After Epoxy Coating

Shaft 9A Air Valve – before and after (installed by Ops)

Contract 7671 Top of Shaft 5 Interim Improvements

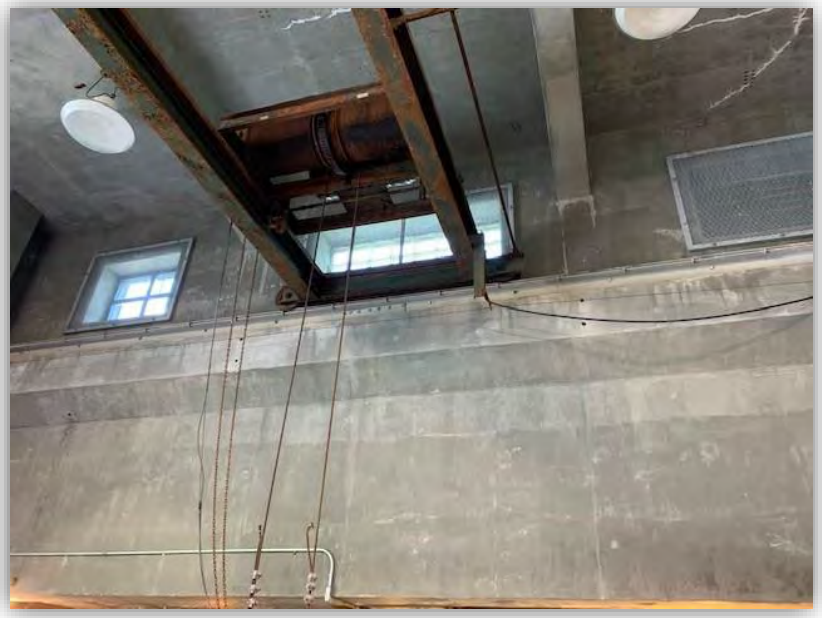
Multiple valve vaults (corrosion protection, bolt replacement, and vault waterproofing)

Underground pump room (abandoned with fill)

Contract 7599 Shaft 5 Building Improvements - Existing Exterior

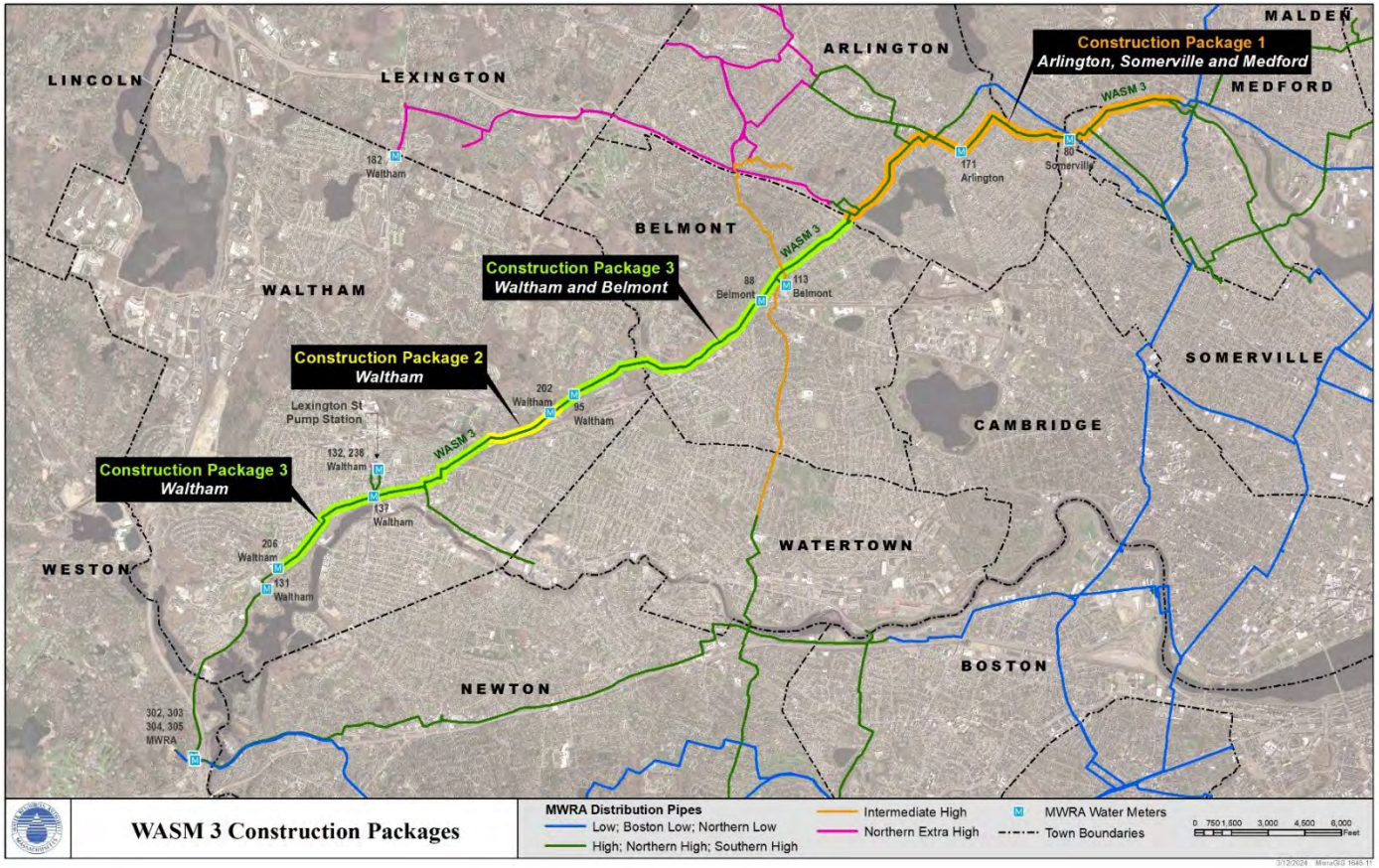
Contract 7599 Shaft 5 Building Improvements Equipment Upgrades

Existing Switchgear



Existing Overhead Crane

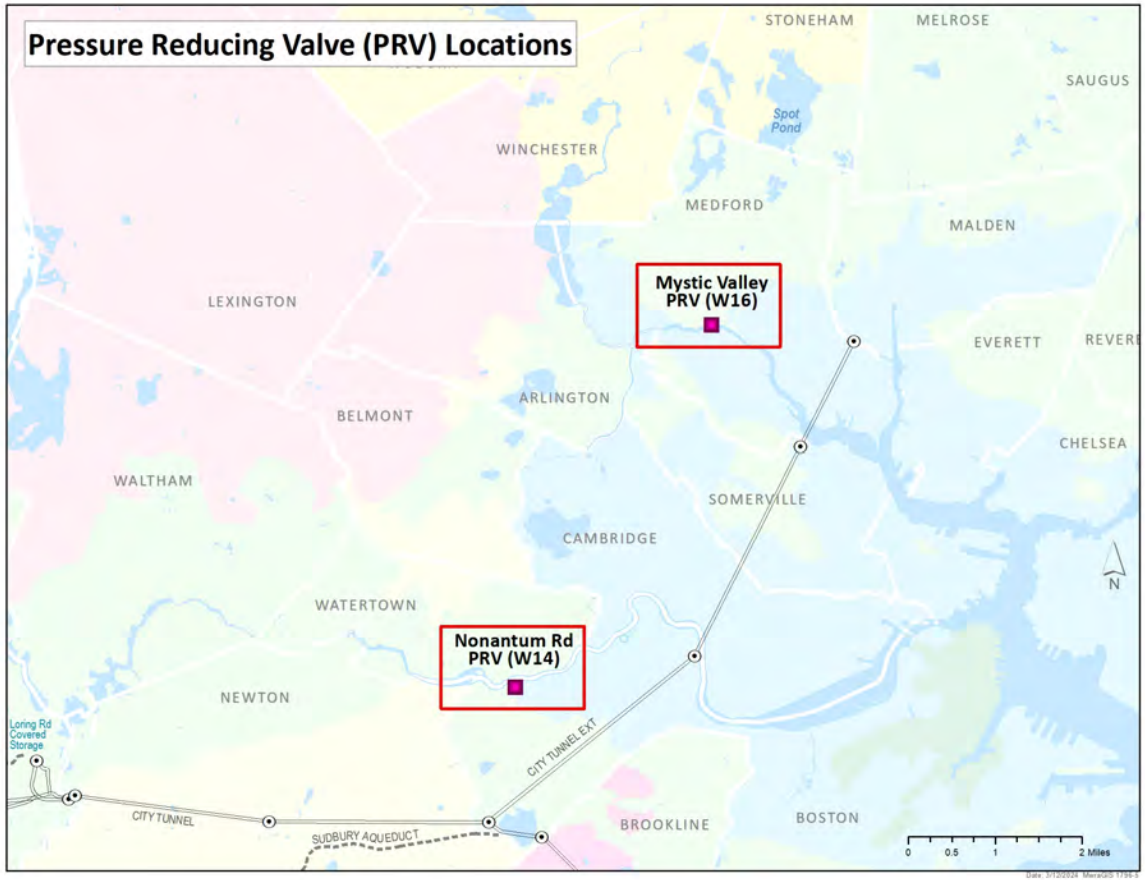
WASM 3 Rehabilitation



WASM 3 - Existing Pipe, Cleaned Pipe, New Cement Lining

WASM 3 - Installation of New 60” Steel Pipe

Low Service Pressure Reducing Valve Improvements

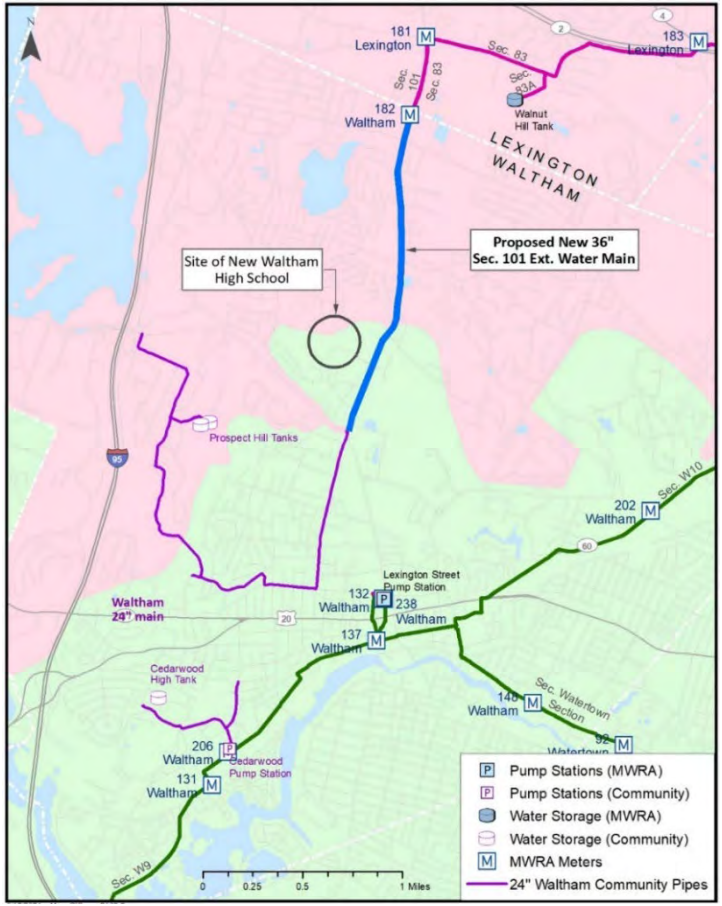


- Increase capacity of water supply via WASM 3 and WASM 4.
- Gillis and Spot Pond pumping stations can supply Northern High Service in event of a tunnel failure.
- Construction nearing substantial completion, April 2024

W14 Nonantum Road PRV Old vs New

W16 Mystic Valley Parkway PRV Old vs New

Section 101 Extension Waltham – Project Overview



Sect 101 Ext. 36-Inch Valve & Manhole Installation Lexington St.

Conclusion

- Tunnel construction is a long term program
- Much work completed since tunnel authorization approved
- Projects reduce risk, improve response capability, resiliency
- Cost of projects in CIP is $120.3M

W A.3
03/13/2024

Presentation to

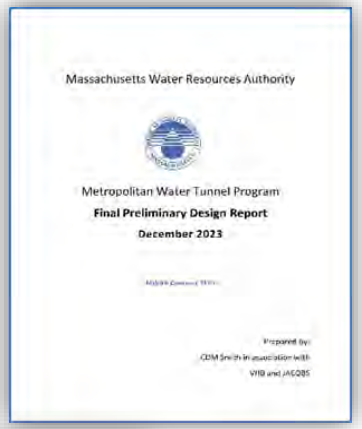
MWRA Board of Directors

Metropolitan Water Tunnel Program Preliminary Design and Environmental Impact Report

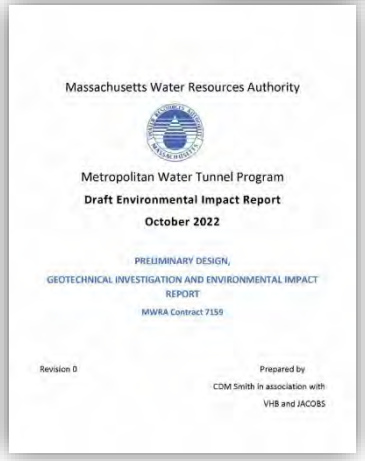
March 13, 2024

Preliminary Design and Environmental Impact Report

- Preliminary Design Report
  - 15 miles of deep rock tunnel
  - 100 Year Service Design Life
  - Preliminary tunnel alignment and profile, valve chambers and surface pipeline connections
  - Construction contract packaging and sequence approach
  - Updated construction cost estimate and construction schedule



- MEPA filings and Environmental Impact Reports
  - Environmental Notification Form
  - Draft Environmental Impact Report
  - Supplemental Draft Environmental Impact Report
  - Final Environmental Impact Report
  - FEIR submitted to EEA February 2024



Preliminary Design & EIR – Performed in Parallel

Key Objectives:

- Shaft site selection
  - Meet system hydraulic requirements, provide full redundancy
  - Provide sufficient space for temporary construction staging and permanent infrastructure
- Establish tunnel alignment (both horizontal and vertical)
  - Minimize overall tunnel length
  - Avoid geo-hazards when possible
  - Maximize length of unreinforced concrete liner
  - Establish readily constructible tunnel segment lengths
- Avoid, minimize, and mitigate impacts to the environmental and communities to the maximum extent practicable
- Establish construction sequence and packaging
  - Promote good competition by qualified bidders
  - Balance risks

Shaft Site Selection Objectives

- During Construction
  - Sufficient size for construction
  - Locate away from sensitive receptors and abutters
  - Close to major highway
  - Near receiving water
- After Construction
  - Landscaped and secured
  - Periodic site visits and maintenance
  - Good neighbor

Shaft Site During Construction

Shaft Site After Construction

Shaft Sites

Construction Shaft Sites

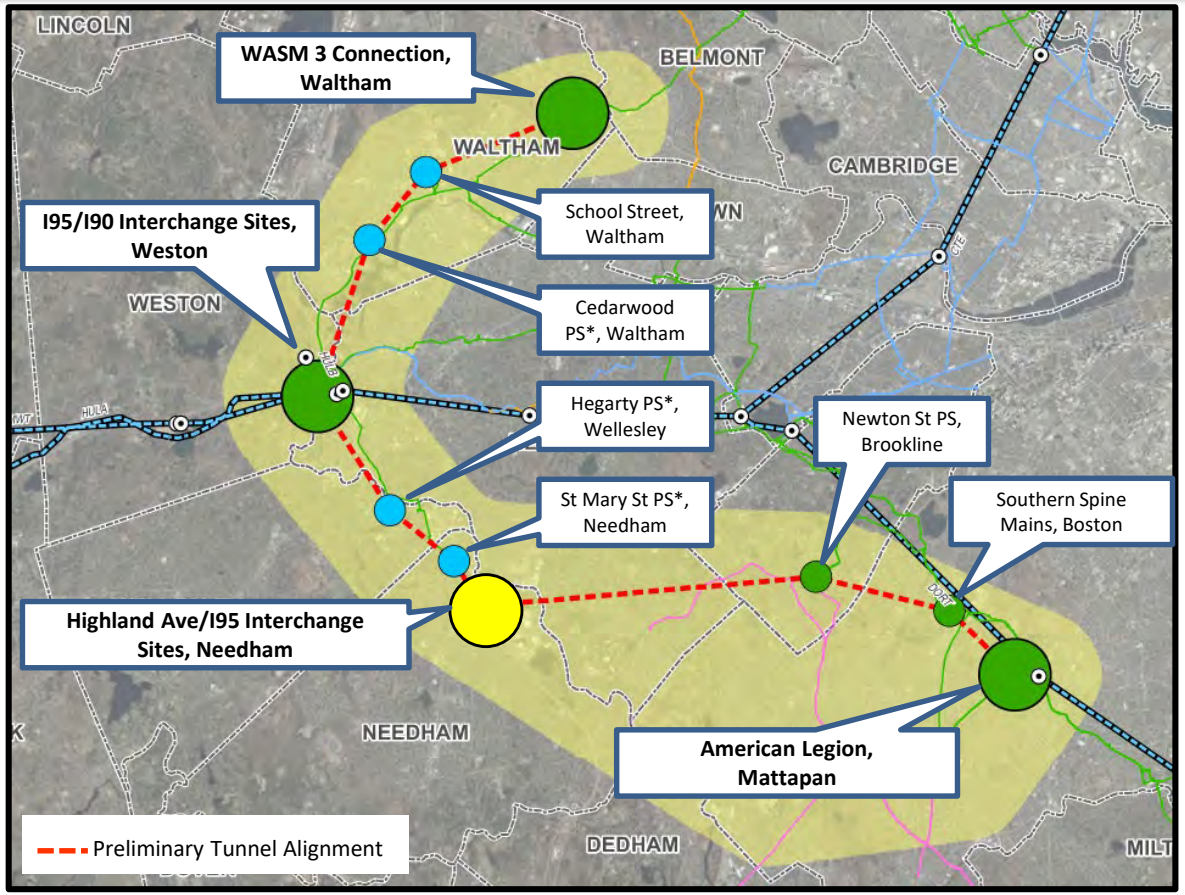
- WASM 3 Connection, Waltham
- I90/I95 Interchange, Weston
- Highland Ave/I95 Interchange, Needham
- American Legion, Mattapan

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

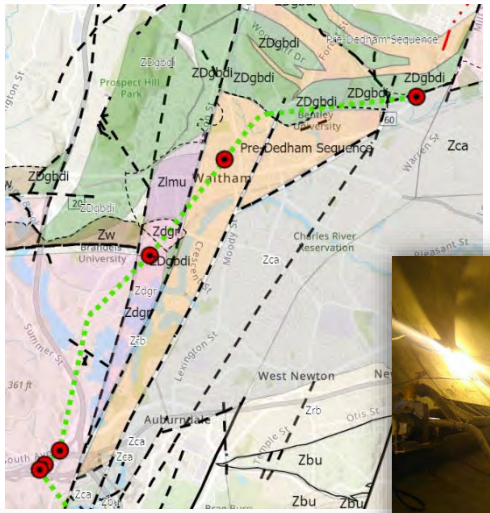


Required Connection (required for system redundancy)
Secondary Connection (provides local benefit)
Construction Shaft (South Tunnel Isolation)

Tunnel Alignment & Segments

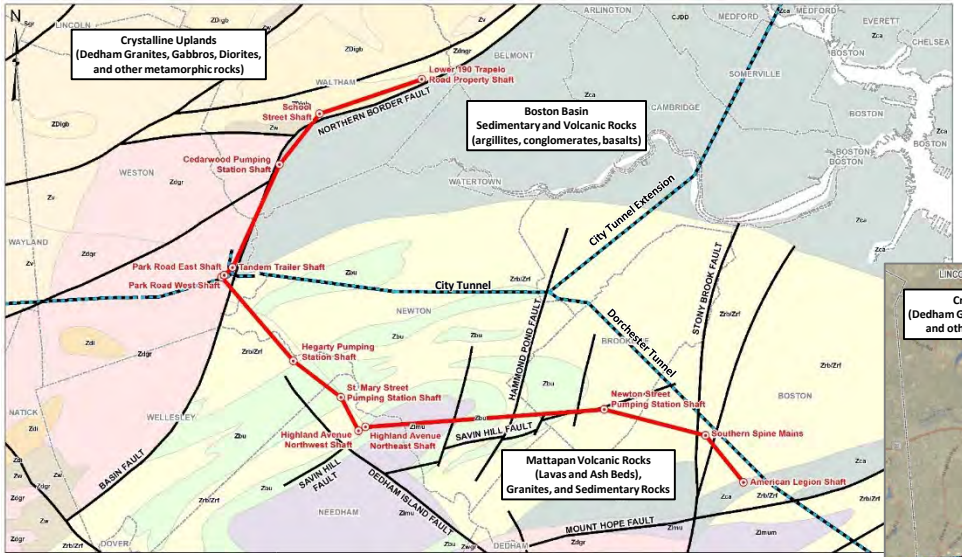
Objective:

- Establish tunnel alignment (both horizontal and vertical) to minimize overall length and maximize unreinforced concrete permanent liner system
- Avoid/minimize mining through difficult ground conditions where possible
- Select segment lengths to shorten overall construction duration and provide added operational flexibility
- Control construction costs by combining tunnel segments into contract packages that minimize contract interfaces and encourage construction flexibility



Geologic Conditions Influence Tunnel Alignment and Construction

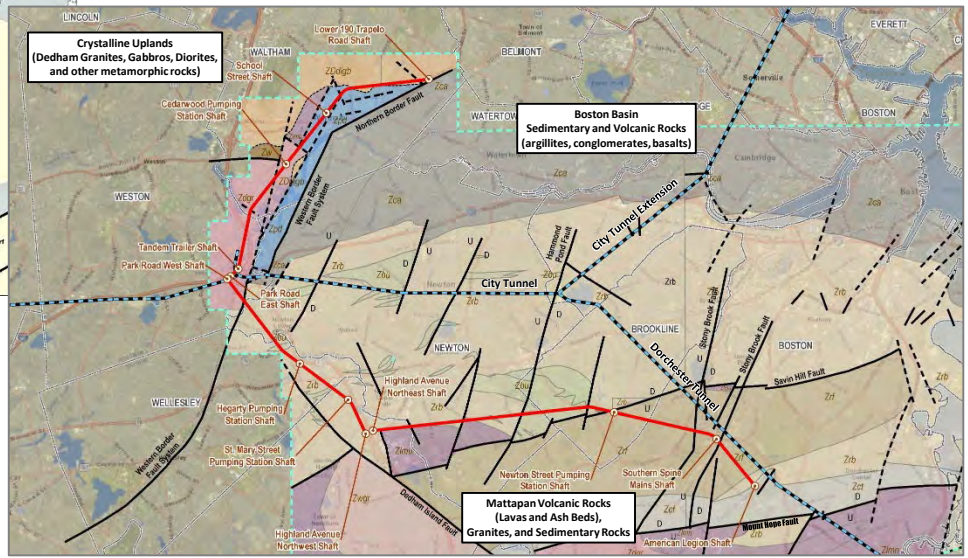
Beginning of Preliminary Design



- Crossing 4 major fault systems
- Poor quality rock w/ thick overburden found in Waltham
- Adjusted tunnel alignment to avoid geo-hazards
- Adjusted estimated tunnel mining production rate to reflect conditions

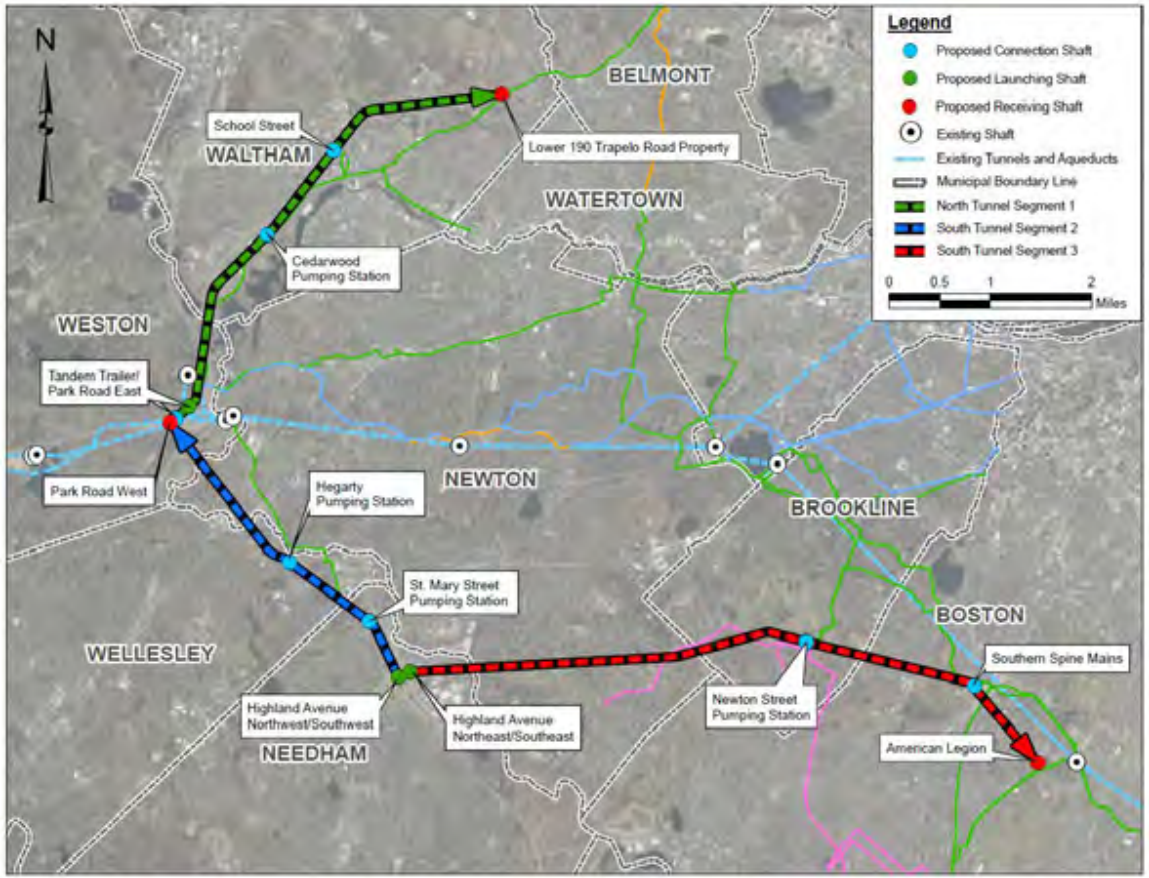
Final Design Stage geotechnical investigations will add to our understanding of geologic conditions and will be used to refine tunnel alignment, construction methods, schedule and costs

End of Preliminary Design



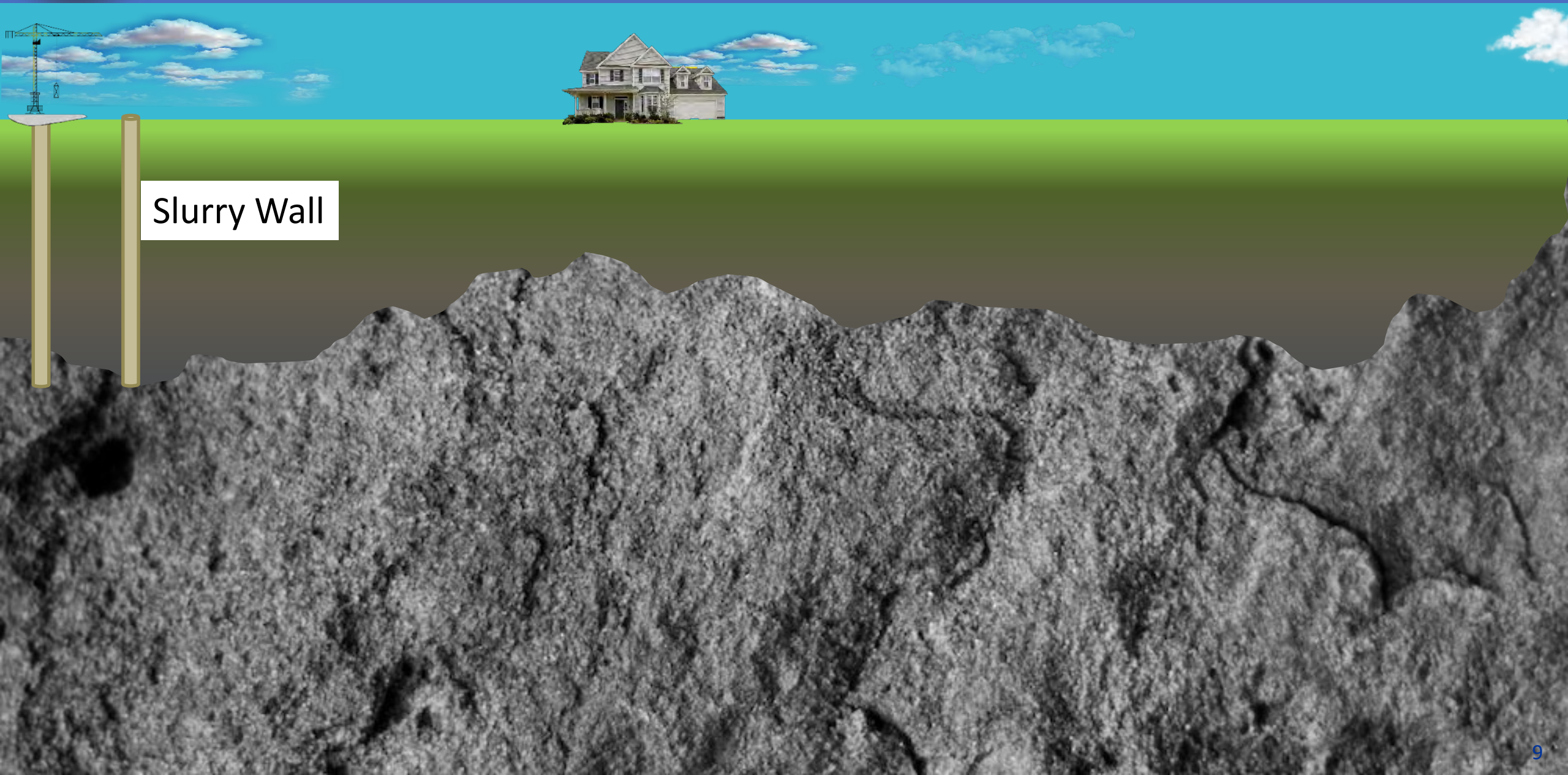
Tunnel Alignment, Segments, and Contract Packaging

- 15 miles of deep, hard rock, pressure tunnel, 250 to 500 feet deep
- Three launching and three receiving shafts
- Three tunnel segments (4.8, 3.4 and 6.8 miles long)
- Six intermediate connection shafts
- Alignment has been adjusted to avoid known geo-hazards
- Two tunnel construction packages
  - North Tunnel (Segment 1)
  - South Tunnel (Segments 2 & 3)
- Contract package sizes should promote good competition

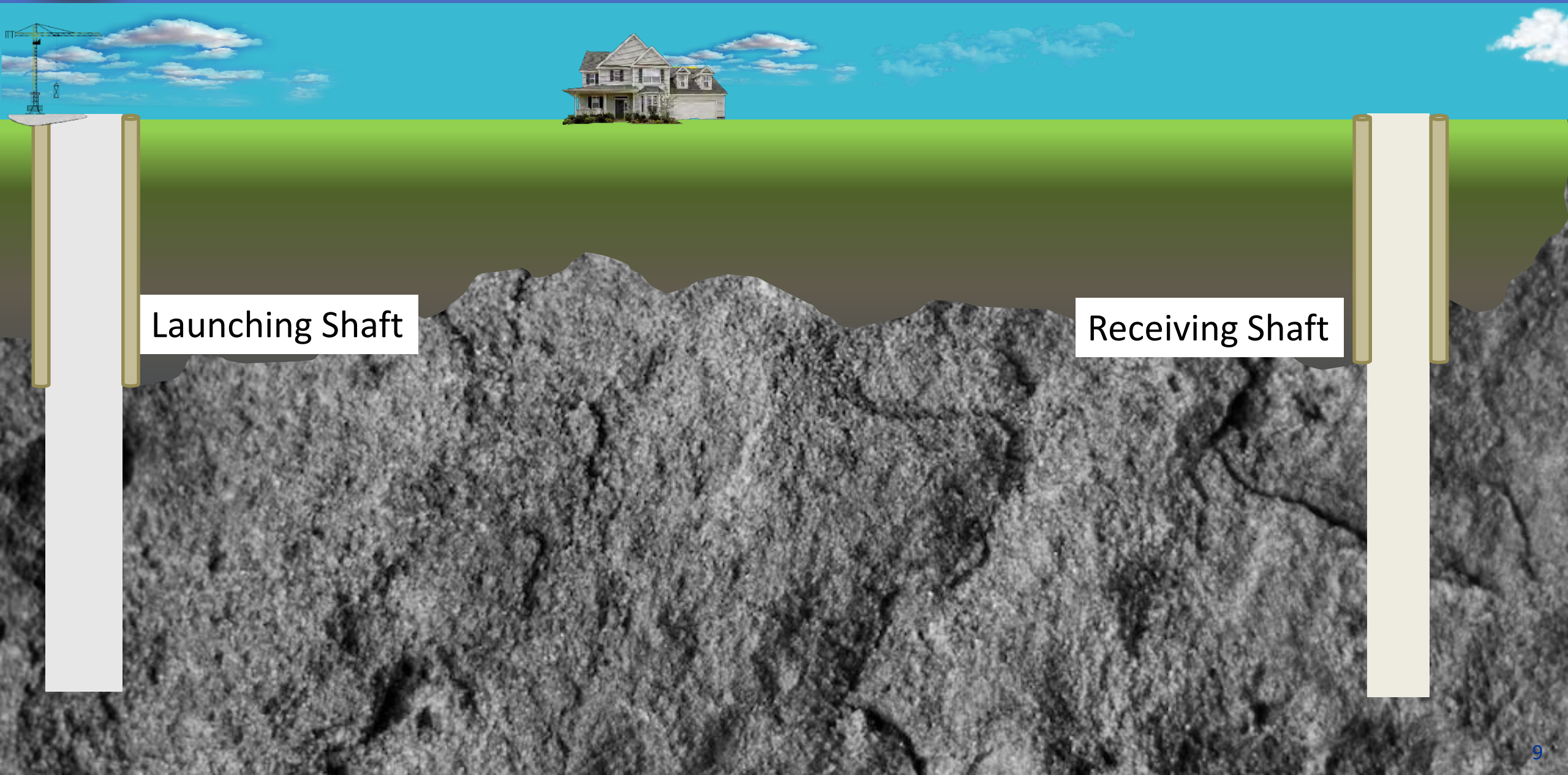


Tunnel Construction

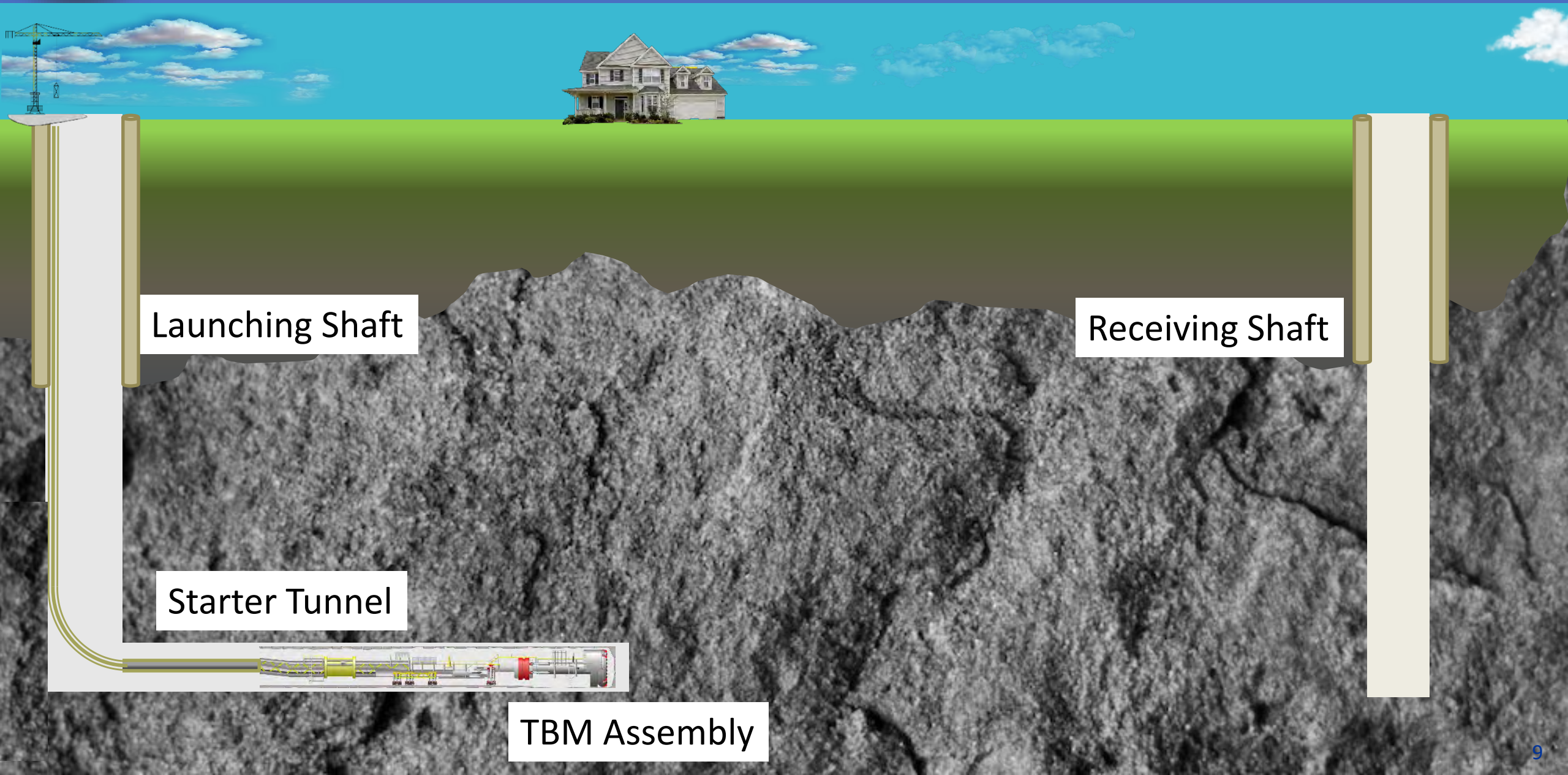
Tunnel Construction



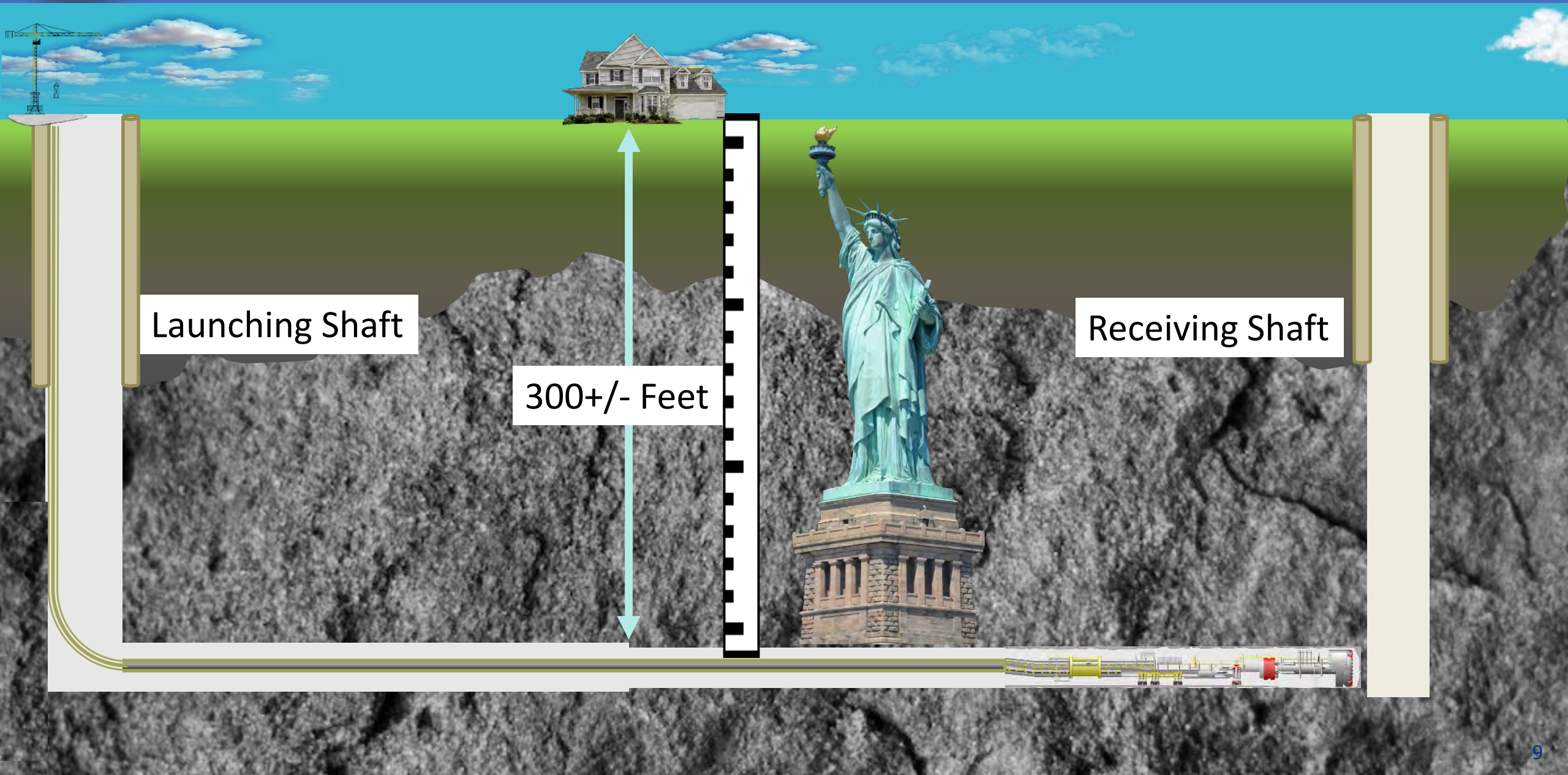
Tunnel Construction



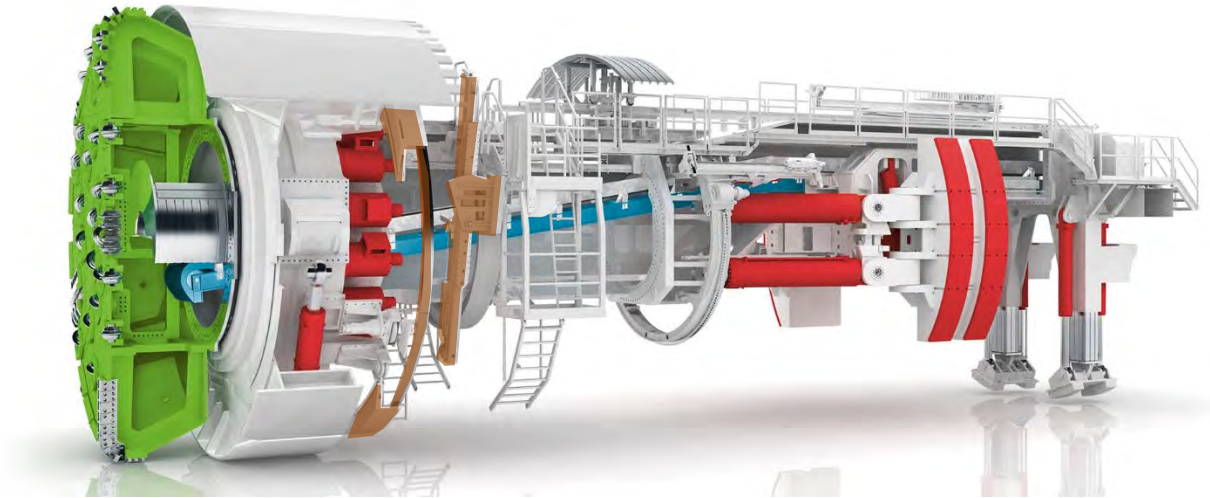
Tunnel Construction



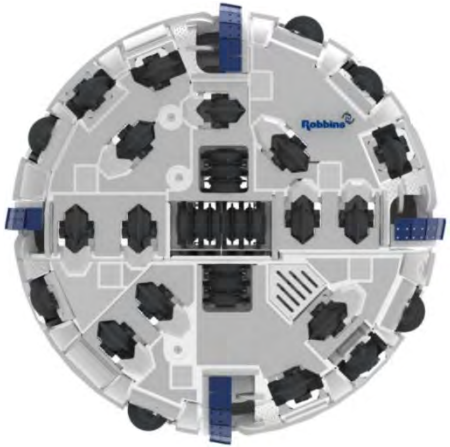
Tunnel Construction



Tunnel Boring Machine

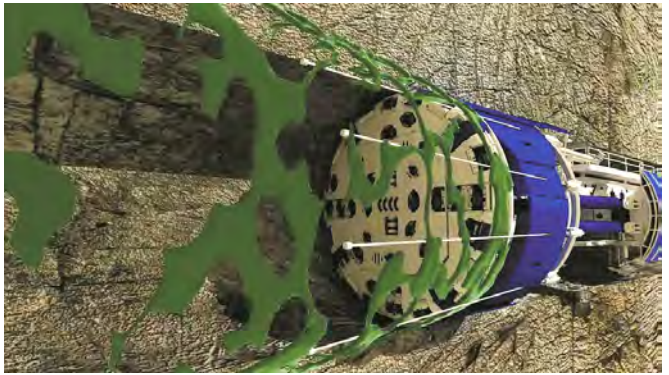


Source: www.herrenknecht.com



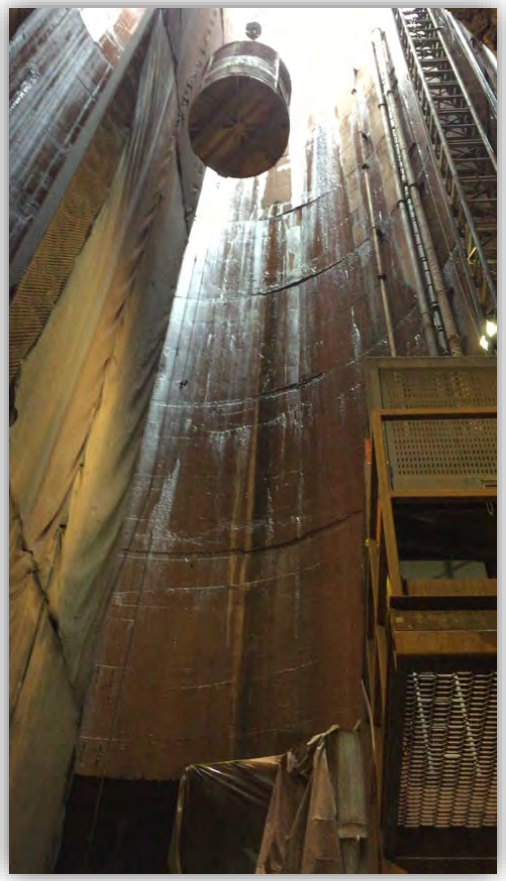
Source: www.robbins.com

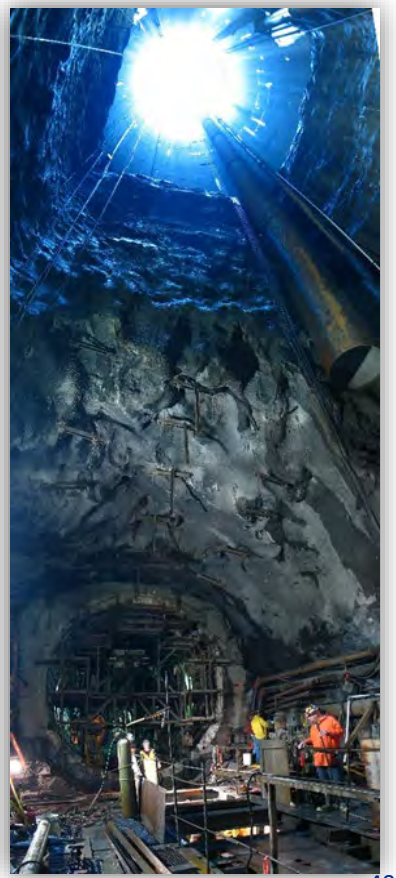
- Cutterhead grinds the bedrock into small pieces
- Conveyors move the broken rock to the back of the TBM
- Self propelled grippers push to side of tunnel, jacks propel forward
- Bedrock is self supporting or supported with rib (rib erector), rock bolts (rock drill), and shotcrete
- Probing and grouting is used to control groundwater



Launching / Receiving Shaft Construction

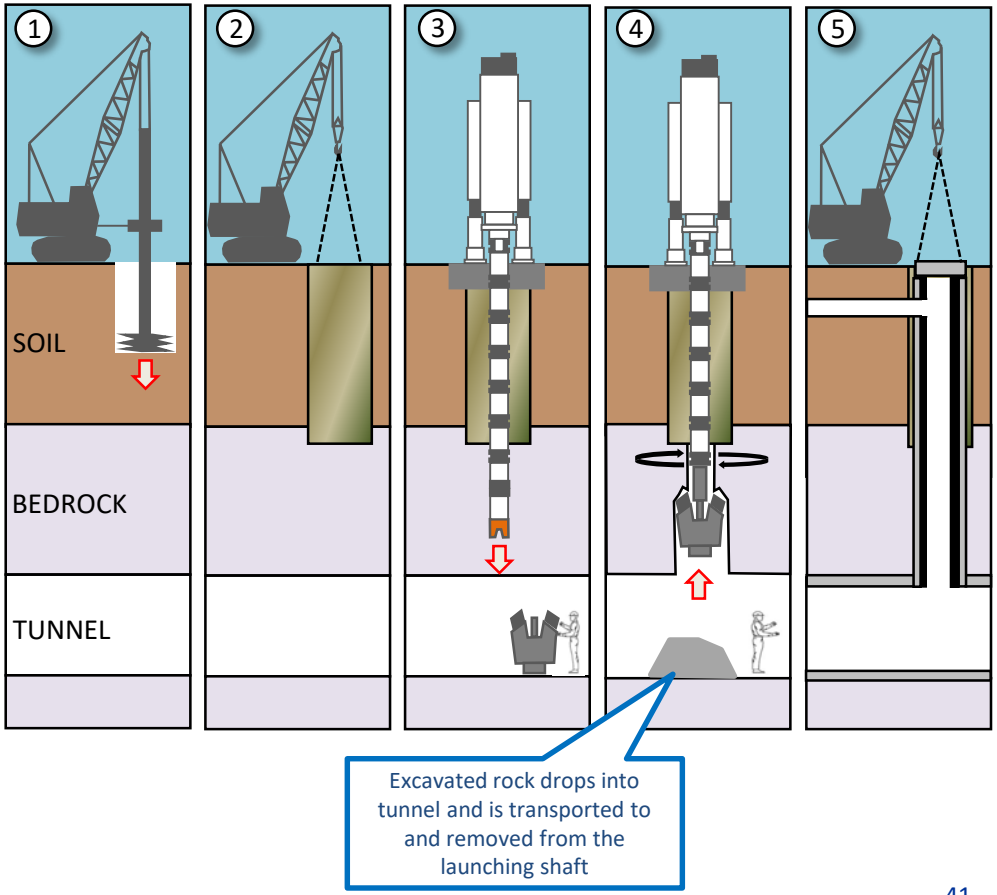
- ~25’ – 40’ diameter, ~250’ – 400’ deep
- Launching shaft is the only access to the tunnel until breakthrough into the receiving shaft
- Constructed by drill and blast methods
- “Cavern” at the bottom of launching shaft is where TBM will be assembled





Intermediate Shaft Construction

- Intermediate connection shafts are smaller diameter
- Use raised bore shaft construction method where possible
- Sequence of Construction (after tunnel has passed below):
  - (1) Auger drill through soil
  - (2) Install steel casing through soil
  - (3) Drill pilot hole in rock
  - (4) Ream larger hole in rock – **spoil drops into and is removed from the tunnel**
  - (5) Install shaft lining
- Benefits of Raised Bore Shaft Method:
  - Smallest footprint at the surface
  - Most excavate is removed from inside the tunnel which limits hauling from the site
  - No blasting
  - Not 24/7



Potential Permits and Approvals

Federal

- National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)
- NPDES Dewatering and Remediation General Permit (DRGP), if needed
- Section 404 Department of the Army Permit (General and Preconstruction Notice)

Commonwealth of Massachusetts

- Massachusetts Environmental Policy Act (MEPA) Review
- Massachusetts Historical Commission (Massachusetts General Law Ch. 9, Section 26-27C)
- Highway Access/Construction Access Permits
- MBTA Right of Way Access License Agreement
- Natural Heritage Endangered Species Program
- Water Management Act Permit
- Chapter 91 Licenses
- Superseding Order of Conditions, upon appeal
- Section 401 Water Quality Certificate
- Distribution System Modification
- Land disposition/easements
- Article 97 Land Disposition Legislation

Municipal

- Wetlands Protection Act Order of Conditions
- Roadway Access Permits/Street Opening Permit
- Hydrant Permit
- Drainage Discharge Permit

Environmental and Community Impacts

Avoid, minimize, and mitigate impacts to the environmental and communities to the maximum extent practicable:

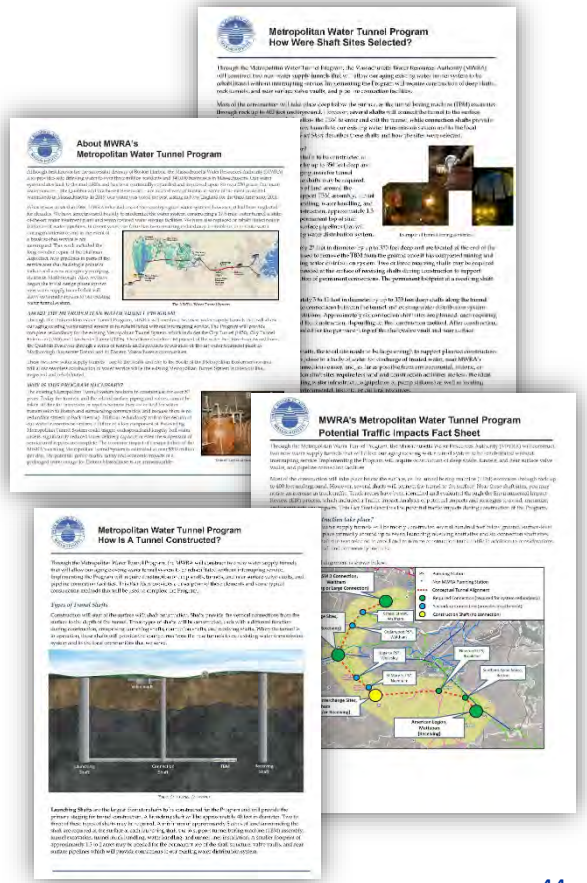
- Shaft site selection considered land use, traffic, noise, hauling routes, proximity to sensitive receptors, EJ communities, etc.
- Prioritized public land (MWRA, DCR, MassDOT) and communities that directly benefit from the Tunnel Program
- Construction methods selected to minimize impacts where possible (e.g., TBM, raise bore shaft construction method)
- Solicited stakeholder input throughout the process to help understand impacts and inform decisions
- Locating launching shaft sites along major highways and near receiving water was key to minimizing impacts
- Shaft sites selected should avoid the need for costly mitigations

Construction impacts are temporary

Redundant water supply is a long-term benefit

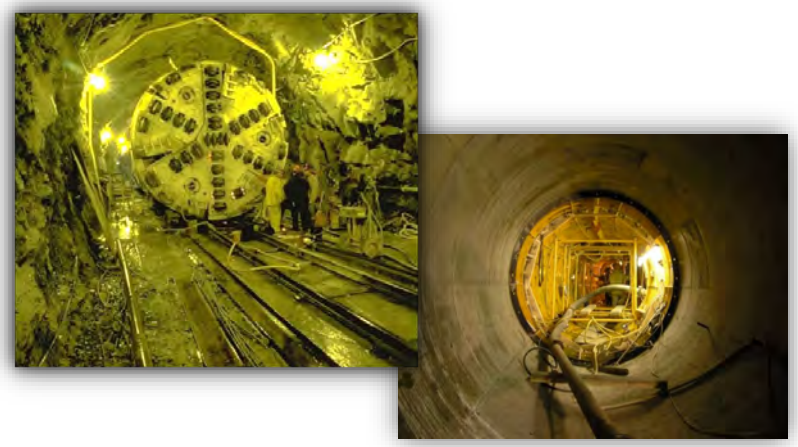
Community & Stakeholder Outreach

- Met with 10 communities in the study area
- Established a Working Group with representative from each community
- Numerous meetings with the 7 communities in which the tunnel will be constructed:
  - Town Management, Public Works, Public Safety/Fire, Conservation Commission, etc.
- Multiple meetings with key stakeholders and permit agencies:
  - EEA, DEP, MassDOT, DCR, DPH, DYS, UMass and DCAMM
- Met with numerous organizations, businesses & private property owners to coordinate field work
- Met with community interest groups
  - WLT, CRWA, neighborhood groups and others
- Established a Website https://www.mwra.com/mwtp.html and email address (for questions) Tunnels.info@mwra.com
- Created multiple Fact Sheets – available in 4 languages
- Outreach will continue throughout design and construction



Key Characteristics of the 2017 Two-Tunnel Concept Maintained

- Hard rock pressure tunnels
- Two separate tunnels:
  - One begins in Weston and ends in Waltham (North Tunnel)
  - One begins in Weston and ends in Mattapan (South Tunnel)
- TBM excavation with two pass construction method
- Set horizontal and vertical alignment to maximum unreinforced concrete liner, limit steel liner
- Probing and grouting to control ground water
- Buried top of shaft structures and valve vaults
- Meets goal of full redundancy



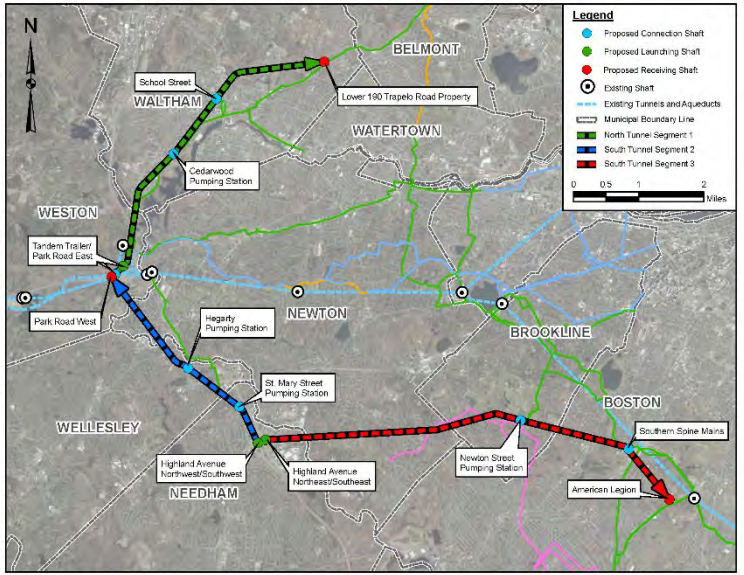
Key Changes Since 2017 Concept

2017 (Two-Tunnel Concept):

- 14 miles, 2 segments, 2 TBM's
- Four intermediate shaft
- One double launching shaft site at I90/I95
- Two receiving shafts (Waltham & Mattapan)

2023 (Preliminary Design / FEIR):

- Accounts for land availability and environmental impacts
- Accounts for geologic conditions
- 15 miles, 3 segments, 2 or 3 TBM's
- Six intermediate shafts, 1 large connection shaft, 2 connector tunnels
- Two launching shaft sites at Highland Ave, one at I90/I95
- Three receiving shafts (Waltham, I90/I95, Mattapan)



2017 Two-Tunnel Concept vs. 2023 Preliminary Design/FEIR

- Benefits of 2023 Configuration:
  - Improves construction packaging
  - Reduces construction schedule
  - Reduces construction contract interfaces
  - Reduces risks
  - Improves community supply resilience
  - Provides added long-term operations capability
- Accounts for land availability
- Accounts for geologic conditions
- Avoids/minimizes/mitigates environmental and community impacts, to the extent practical
- Prioritizes construction sequence to match largest need for redundancy (South Tunnel first)
- Establishes construction contract packaging that should promote good competition
- Constructible tunnel system that will meet redundancy goals

W A.4
03/13/2024

Presentation to

MWRA Board of Directors

Metropolitan Water Tunnel Program
Tunnel Program Look Ahead

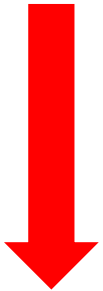
March 13, 2024

Tunnel Program Contracts

Awarded Contracts	Value	Duration	Dates
Program Support Services	$10,247,877	5 years + 2 year extension	April 2019 – April 2026
Preliminary Design (complete)	$15,692,527	3.5 years	July 2020 – January 2024
Geotechnical Support Services	$12,789,889	3 years	January 2023 – January 2026
Rock Core Storage Facility	$6,950,000 (base annual rent) + taxes and operating costs	10 years w/ option to renew	April 2023 – April 2033
Future Contracts	**Proposed FY25 CIP (actuals TBD)**	**Estimated Duration**	**Approximate Dates**
Possible 2nd PSS Extension	$7.5M	One 2 year extension	2026 – 2028
Final Design Engineering Services	$77.8M	5 years	NTP late 2024
Engineering Services During Construction (Amendment)	$40M	~10 years	~2028 – project completion
Construction Manager	$159.3M	~12 years	NTP in 2026
Early Enabling Construction Contracts	$10.6M	~1.5 years	2026 – 2028
Two Tunnel Construction Contracts	$1,626.2M	~6 to 8 years	Btwn 2028 – 2040

Critical Path Tasks

- Geotechnical Investigations
- Land Acquisitions
- Community/Stakeholder Agreements (MOU's)
- TBM Power Supply

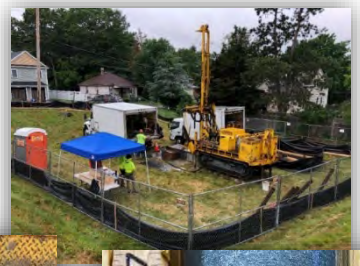


- Tunnel Construction

Geotechnical Explorations

Understanding geologic conditions are essential to a successful rock tunnel:

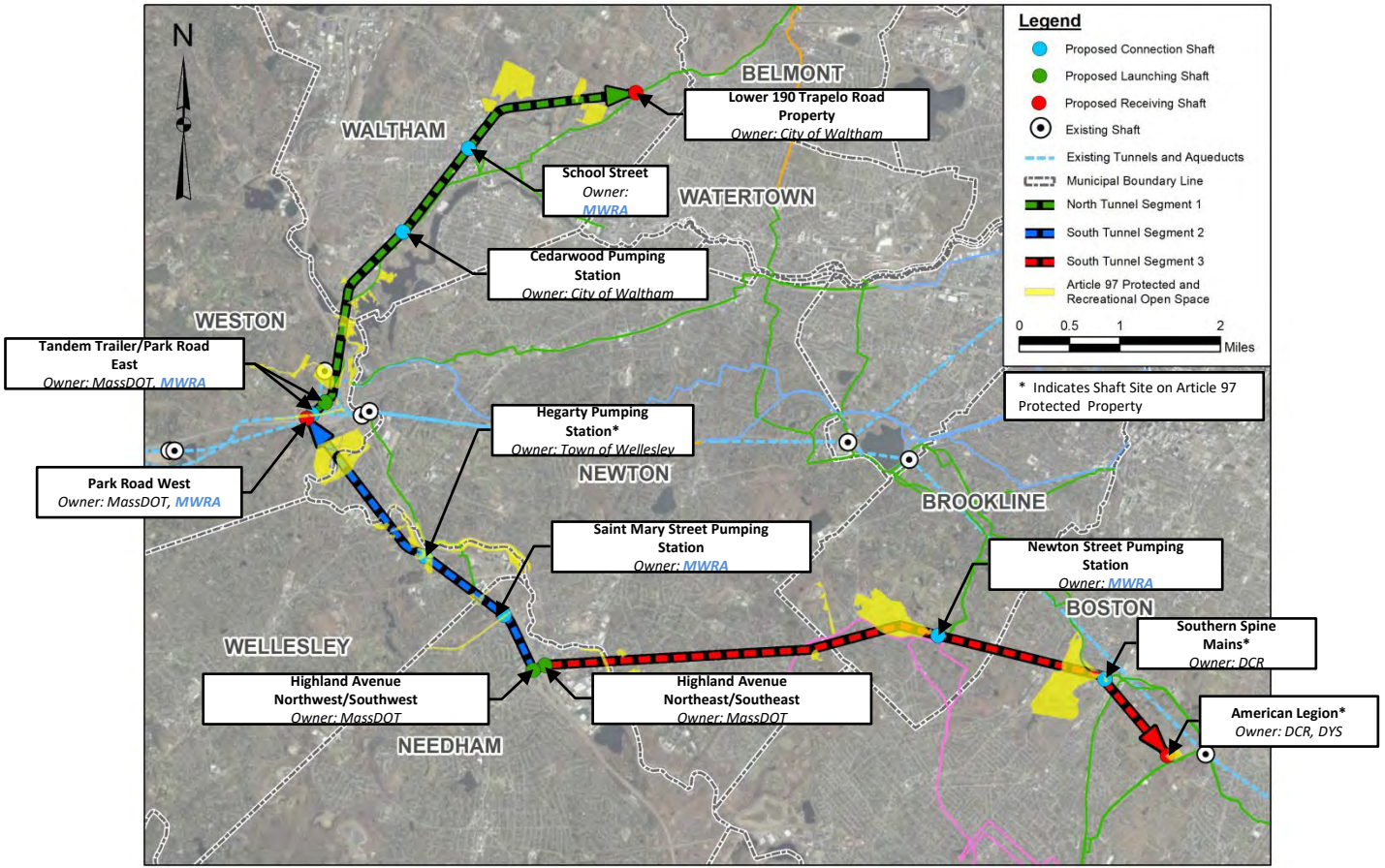
- More than ½ the Tunnel Program cost is associated with making a hole through the ground
- Crossing at least 4 major fault zones
- No previous deep borings along portions of both tunnel alignments
- TBM's will be built for the specific ground conditions
- Takes ~8 weeks to fully drill & test a deep rock boring
- Test boring locations will be increasingly difficult to access as design progresses
- Currently ~40% complete with planned deep test boring program
- Have encountered a few unexpected conditions:
  - Poor quality rock with thick overburden through portions of Waltham / North Tunnel
  - Small amount of naturally occurring asbestos has been found in 3 rock formations along South Tunnel
- Core Storage Facility in Needham allows for accelerated processing of data



Land Acquisitions

- 13 shaft sites -
  - Larger temporary staging area and smaller permanent facility footprint
  - MWRA owns 3 shaft sites & has partial control of 2 shaft sites already
- Pipeline easements - ~6,000 ft
- Permanent surface access easements - ~9 sites
- Subterranean easements - ~600 individual properties
- ~3.8 acres of land for permanent facilities will require Article 97 legislation
- Land purchases/easements will be based on appraised value and negotiations
- Own in fee (most sites) or permanent easement (MassDOT)
- Land acquisitions will require Board approval

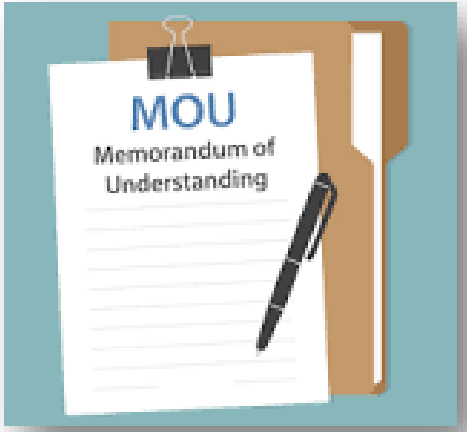
Land Acquisitions & Article 97 Properties



Community/Stakeholder Agreements (MOU's)

Topics may include:

- Land acquisitions
- Permitting and local regulations
- Public safety and emergency response
- Water supply contingency
- Work hours, hauling hours and routes, traffic management
- Dust and noise control, blasting and vibration control
- Connections to community water systems
- Mitigations and final site conditions (fencing, lighting, landscaping, etc.)



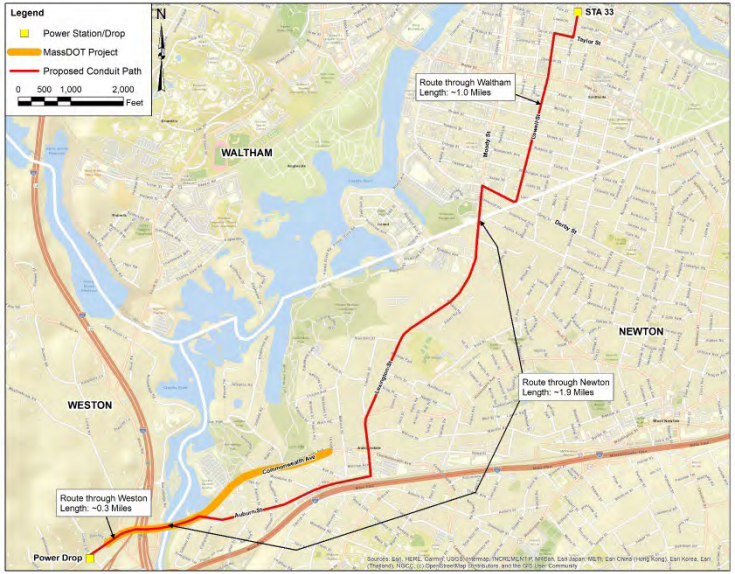
- Expect to execute MOU's with 7 communities (Waltham, Weston, Wellesley, Needham, Newton, Brookline & Boston)
- Expect to have agreements/MOU's (or similar) with DCR, MassDOT, and DYS related to land acquisitions
- All MOU's will be presented to the Board for approval

Emergency Response

- Shafts in six (6) communities, tunnel alignment beneath seven (7) communities
- Advance coordination to ensure coordinated emergency response during construction
- Staff have had three (3) meetings with community Emergency Responders:
  - Uniqueness of the underground construction environment and its hazards
  - Anticipated role and responsibilities of the MWRA tunnel contractors and community Emergency Responders
    - Tunnel Contractors to provide all OSHA required tunnel rescue resources (2 teams)
    - Community Emergency Responders assume incident commend on the surface and, if needed, support underground for extrication and medical care
  - Training and equipment needed by the community Emergency Responders throughout tunnel construction

- Emergency response coordination needs to be tailored to the supporting communities' capabilities and size
- MWRA resources will be needed to ready the community Emergency Responders
- MOU's between MWRA and each community will include emergency response support

TBM Power Supply

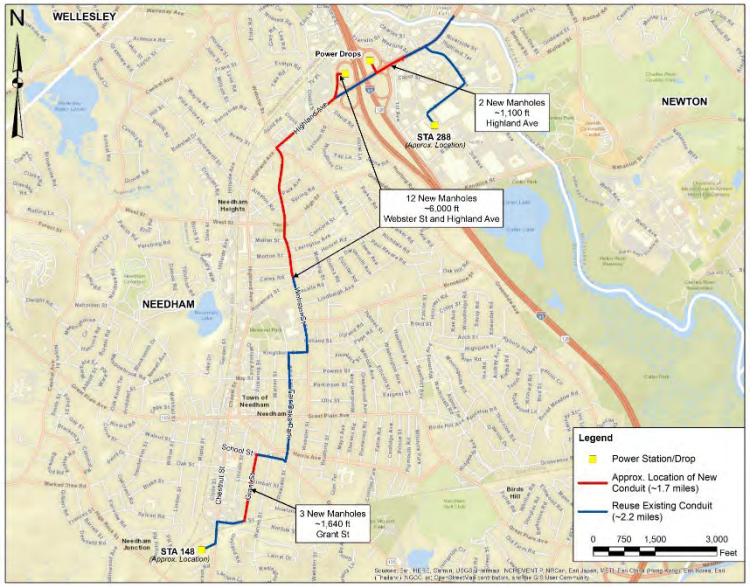


I90/I95 – Tandem Trailer Launching Shaft Site:

- ~3.2 miles of new duct bank & cable
- Coordinating with ongoing MassDOT project along Route 30
- Through Waltham, Newton & Weston

Highland Ave Launching Shaft Sites:

- ~1.7 miles of new duct bank & cable
- ~2.2 miles of reused duct bank & cable
- All within Needham

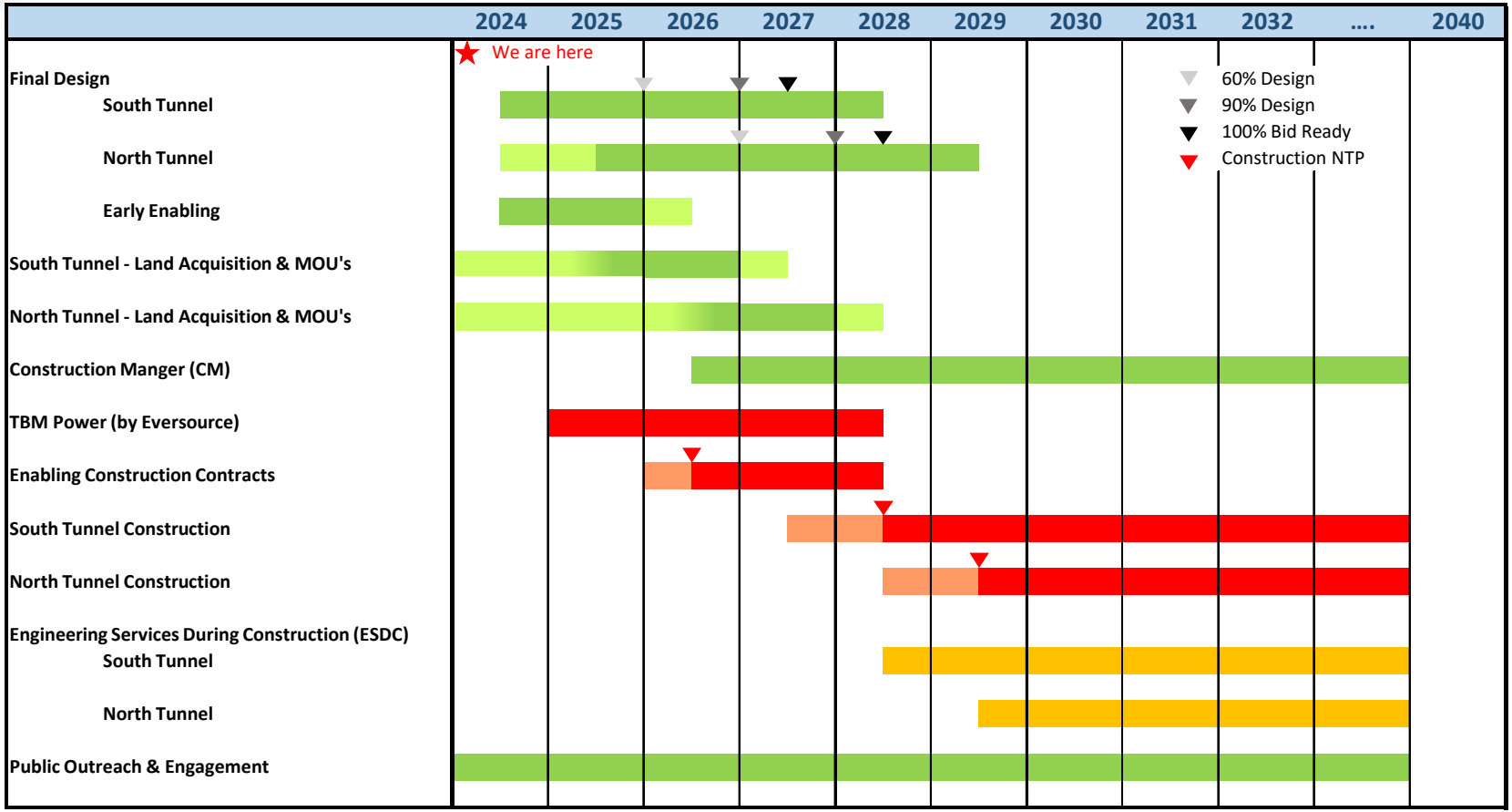


Eversource will design and install all new duct bank & cable

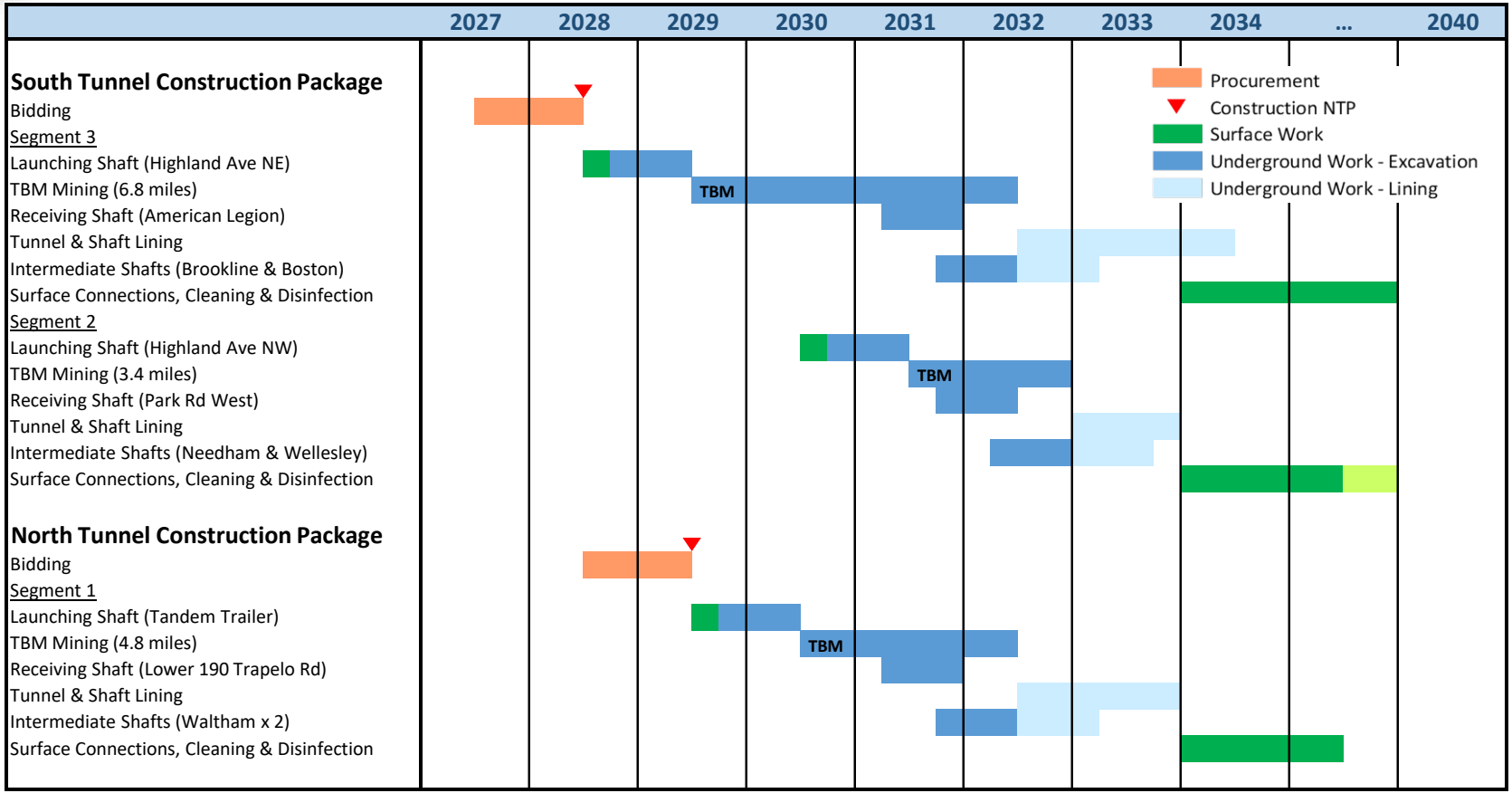
MWRA and Eversource will enter into an agreement addressing completion schedule and compensation, subject to Board approval

Power supply will remain and provide added resilience to the power grid

Tunnel Program - Critical Path Schedule



Tunnel System – Construction Schedule Look Ahead



W A.5
03/13/2024

Presentation to

MWRA Board of Directors

Metropolitan Water Tunnel Program FY25 CIP Updated Program Cost Estimate and Cost Controls

March 13, 2024

Tunnel Program CIP History (625 Metro Tunnel Redundancy)

	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25 Proposed
Other Projects	$191.4	$4.8[1]	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5	$3.5
Design/CM	$204.5	$216.8	$210.4	$240.3	$257.5	$256.4	$274.5	$310.4	$324.8
Construction	$919.4	$963.1	$997.6	$1,024.5	$1,046.7	$1,041.6	$1,083	$1,306.7	$1,636.8[2]
Adm/Legal/PR	$153.4	$160.7	$163.7	$140.3	$140.5	$140.1	$135.9	$157.3	$159.3
Future Projects	$5.9	$12.3	$12.8	$13.1	$14.6	$14.6	$15.1	$17.5	$18.0
Total FY CIP	**$1,474**	**$1,358**	**$1,388**	**$1,422**	**$1,507**	**$1,500**	**$1,558**	**$1,795**	**$2,142**
Annual Adjustment (Including Annual Inflation)[3]	N/A	$69.6	$30.2	$33.8	$85.2	($6.7)	$57.5	$237.6	$347.1

1. FY18 Other Projects item reflects ~$186M in costs moved out of 625 Metro Tunnel Redundancy and into other CIP items.
2. FY25 construction item includes $200M cost increase and $130M in annual inflation over FY24.
3. Annual Adjustment includes annual inflation and other revisions to reflect contract status. FY25 Annual Adjustment includes $200M construction cost increase. Amounts are included in the Total FY CIP amount for each FY.

Preliminary Design Construction Cost Estimates & Proposed FY25 CIP

- Based on 30% design / EIR configuration, anticipated construction methods, currently understood ground conditions, contract packaging/sequence/schedule & current market conditions
- Two bottom-up construction cost estimates (Jan 2023 value date)
- Include 25% design contingency, 4% contractor escalation
- First construction cost estimate since 2016
- As compared to FY24 CIP:
  - Added $200M to tunnel construction plus annual inflation ($130M)
  - No changes to Design/CM or Admin/Legal/PR beyond annual inflation ($17M)

- Construction contingency (15% tunnel/7% non tunnel) is included in the CIP separately

Future Cost Updates

- Updated cost estimates will be done at all design milestones for each construction package during Final Design:
  - 60%, 90%, 100%, Bid
  - 2 tunnel construction packages
  - 2 or 3 early enabling construction packages

- Design contingency will decrease as design stage increases

- Future cost updates will be incorporated into CIPs regularly

Key Cost Controls Principles

Implemented:

- Maintained schedule through preliminary design & environmental reviews
- Maintained focus on key Program goals, modified where long-term value is provided or schedule/risk is reduced
- Strategically located shafts, selected segment lengths & contract packaging

Ongoing & Future:

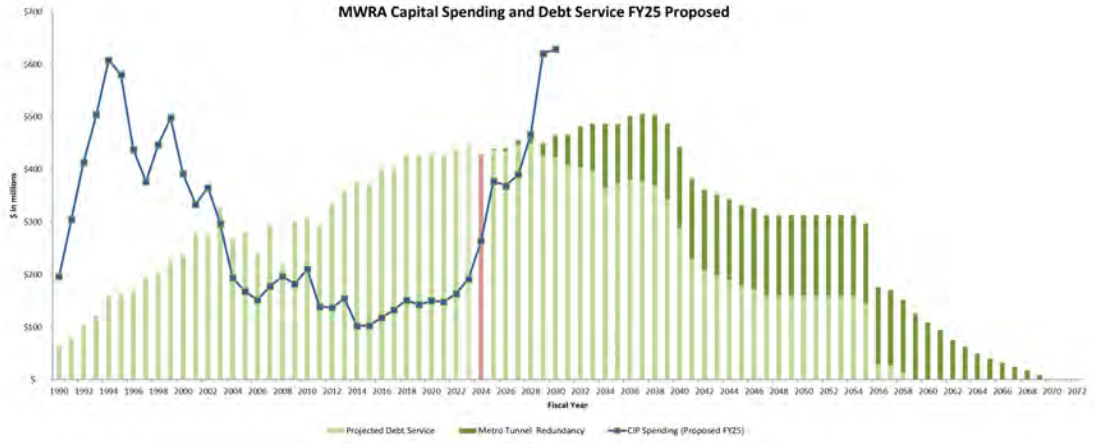
- Maintain schedule
- Select FDE and CM that are appropriately skilled, organized & resourced
- Identify/avoid/minimize/mitigate geo-hazards
- Avoid costly mitigations
- Execute early enabling construction works
- Promoting good competition
- Balance risks

Tunnel Program Financial Considerations

- Finance with long-term tax exempt bonds & Mass Clean Water Trust (SRF)
- Debt service is modeled on current CIP$, conservative interest rates, for 30 yrs
- Water Utility assessment in proposed FY25 CEB includes this debt
- Proposed FY25 CEB includes 3.9% increase to the Water Utility assessment

- Short-term borrowing for construction spending
- Structured long-term debt

} Mitigates impact on Water Utility assessment



W B.1
V A.1
03/13/24

Presentation to

MWRA Board of Directors

Metropolitan Water Tunnel Program
Final Design Engineering Services
Contract 7556
Recommended Contract Structure

March 13, 2024

Final Design Engineering Services Contract 7556

Advantages of one FDES contract

- Efficiency in executing the designs
- Consistency between construction packages
- Simplifies development of common specifications and standards
- Consistent application of risk management approach
- Provides for flexibility in construction procurement, if needed
- Requires less MWRA staff to support and manage
- Serves as the Engineer of Record for the Tunnel Program
- Will be precluded from any other future role on the Tunnel Program

Final Design Engineering Services Contract 7556

Procurement Process

- Two Phases:
  - Request for Qualification Statements (RFQ)
  - Request for Proposals (RFP)
- RFQ advertised in November 2023
- Statements of Qualifications received in December 2024
- RFP will be issued soon
- Anticipated award in September 2024

Scope of Work

Design Phase Services

- Basis of Design reports
- Final phase of subsurface investigations
- Design of two tunnel construction packages
- Risk management and quality management
- Cost estimating and construction scheduling
- Design and ESDC for two or three early enabling works construction packages

Scope of Work

Tunnel Construction Phase / ESDC

- Request for Information responses
- Review of contractors' submittals
- Review of contractor's value engineering proposals
- Onsite meetings and observations
- Change order and dispute assistance
- Structural geology mapping for final tunnel lining
- Development of record drawings
- Startup assistance
- Operations and maintenance training
- Certification reporting

ESDC Services

- Not the same as Construction Management or Resident Engineer/Resident Inspection
- Provided by the Engineer of Record during construction
- Necessary to maintain the integrity of the design
- Difficult/impossible to accurately scope and price ESDC services before the design is near complete for large complex projects
- Industry practices on large tunnel projects
  - Defer negotiations for ESDC until late in the final design

Recommended Contract Structure

- Proposals will include:
  - Labor rates, maximum overhead, percentage fee and level of effort for Final Design Phase services
  - Maximum overhead rate and percentage fee to be used for tunnel construction ESDC
- Evaluation of the proposals is based on multiple criteria which includes cost
- Contract will be awarded for the full duration of the contract including completion of tunnel construction
- Near end of tunnel design phase, tunnel construction ESDC scope of work will be determined by the Authority and negotiate level of effort and labor rates with Consultant
- Amend the FDE contract to include tunnel construction ESDC, which will required Board approval
  - Proposed FY25 CIP includes $77.8M for Final Design Engineering and $40M for ESDC

W D.1
V C.1
03/13/2024

Presentation to

MWRA Board of Directors

Contract 7457
Section 101 Pipeline Extension
Change Order 4

March 13, 2024

Section 101 Pipeline Extension: Supply Chain Delays for Pipe

Section 101 Pipeline Extension: Revised Work Hours

Section 101 Pipeline Extension: Ledge Removal

Section 101 Pipeline Extension: Laydown Area for Materials

WW B.1
V B.1
03/13/2024

Presentation to

MWRA Board of Directors

OP 464 – Thermal Plant, Hydro Power and Wind Turbine Maintenance

March 13, 2024

Deer Island Maintenance Contracts Background

- Have utilized contract services for certain maintenance for over 20 years
- Contracts range from $100k to $6M
- Complex machinery (cryo, high pressure boilers, steam, hydro and wind turbines) require specialized trades and expertise
- Contractors with skill and experience for this work limited
- Number of bidders has ranged from 1 to 4 for past solicitations

Procurement Challenges

- Have tried various contract packaging alternatives to improve outcomes
  - Combining assets and areas of work
  - Increasing length of contracts
  - Including capital work
- Market conditions adding additional pressures; more work than contractors can handle
- Contractors having difficulty retaining staff

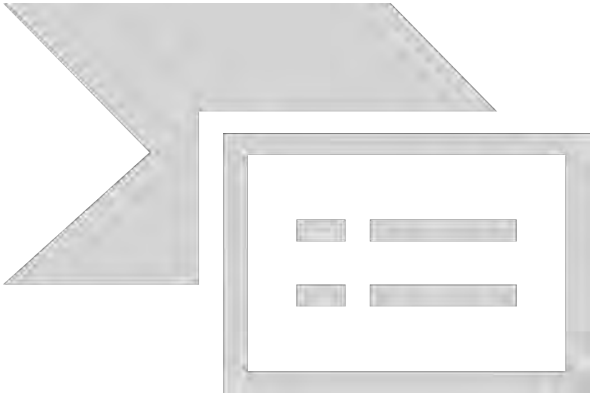
DITP Equipment in this Contract

High Pressure Boilers

Steam Turbine Generator

Back Pressure Steam Turbine Generator

Wind Turbine

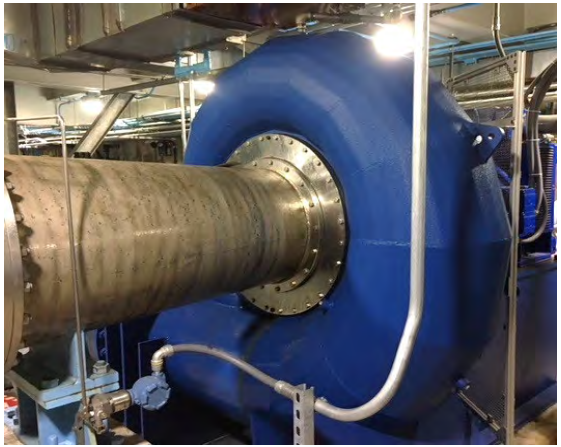


Hydro Turbine

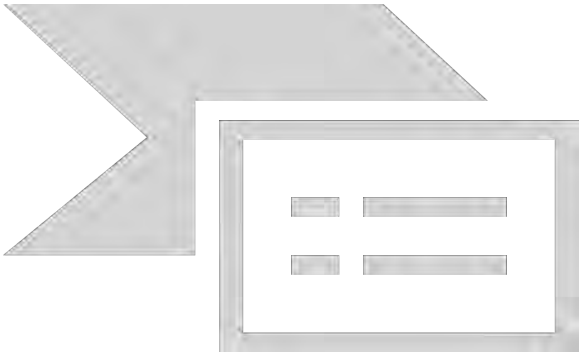
Other Facilities Equipment in this Contract

Oakdale Hydro

Cosgrove Hydro



Loring Road Hydro

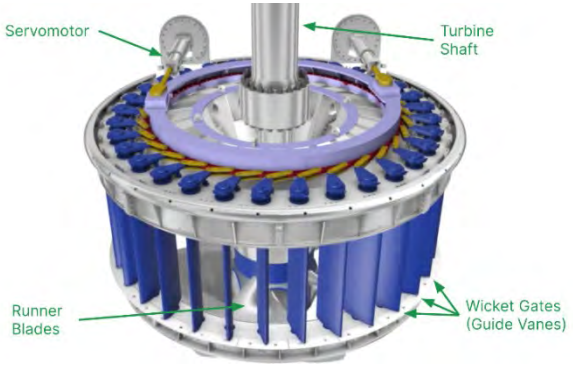


DeLauri Pump Station Wind Turbine

Contract OP 464

- Changes made to this Contract Procurement:
  - Rehabilitation of DITP hydro wicket gate assembly
  - Addition of wind turbine maintenance

- *Reasons for scope additions:*
  - Wicket gate assembly reliability issues over the last seven years.
  - Increased cost and frequency of repairs
  - Provide more mechanical maintenance capacity for wind turbines
  - Increased economy of scale



Deer Island Wicket Gates

Contract OP 464 Bid Evaluation

- One Bid Received:
  - O'Connor Corporation $13,590,197
  - *Engineer's Estimate* *$8,603,958*

- Main drivers of cost difference from Engineer's Estimate:
  - Wicket gate assembly work (including manufacturer rehab)
  - Overhead and profit
  - Project management costs
  - Labor costs

- Wind Turbine cost slightly lower than Engineer's Estimate

Staff Recommendation

- Staff considered alternatives for moving forward
- Repackaging and rebidding not likely to provide better result
- Continued maintenance
  - critical to plant operations
  - provides significant economic and green energy benefit
- Bid price reasonable and complete after staff review
- O'Connor references and past performance good
- Staff recommend award to O'Connor Corporation

Section 101 Pipeline Extension: Laydown Area for Soils

Quabbin Spilling

III
03/13/2024

BOARD INFO A
03/13/24

Presentation to

MWRA Board of Directors

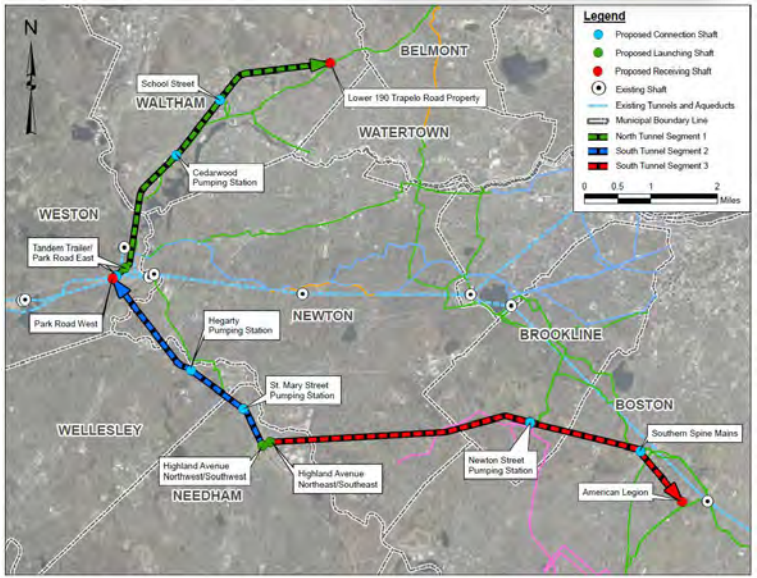
Metropolitan Water Tunnel Program
Tunnel Program Summary

March 13, 2024

Need and Progress

- The Program is necessary to create redundancy in the metro area and allow the existing, aging system to be completely taken offline for inspection, maintenance, and repair

- An incident similar to the May 2010 water main break would now result in an economic loss of over $360 million per day



- Interim Improvements projects are underway

- Recently completed Preliminary Design and submitted FEIR, which have refined two tunnel concept first presented in 2017

Next steps

- FY25 Proposed CIP includes $2,142 for the Program, future cost updates will be incorporated into CIPs regularly
- Short-term borrowing for construction spending and structured long-term debt will be used to mitigate impact on assessments
- Public outreach and engagement will continue through design and construction
- There are a several critical path items
- Final Design / Engineering Services

W C.1 (DEFERRED
TO BOARD INFO B)
03/13/24

Presentation to

MWRA Board of Directors

Local Water System Assistance Program Annual Update

March 13, 2024

MWRA Local Water System Assistance Program Funding Summary

MWRA LOCAL WATER SYSTEM ASSISTANCE PROGRAM
ALLOCATION AND FUND UTILIZATION BY COMMUNITY
THROUGH DECEMBER 2023

Community	Community Total Allocation Phases 2 and 3	Total Distributions Phases 2 and 3	Percent Distributed	Funds Remaining
Arlington	$14,912,000	$9,500,000	64%	$5,412,000
Ashland*	$519,400	$0	0%	$519,400
Bedford *	$6,067,000	$2,418,000	40%	$3,649,000
Belmont	$7,329,000	$6,977,000	95%	$352,000
Boston	$91,541,000	$69,021,364	75%	$22,519,636
Brookline	$8,011,000	$4,660,000	58%	$3,351,000
Burlington*	$827,400	$0	0%	$827,400
Canton *	$6,187,000	$5,716,000	92%	$471,000
Chelsea	$8,853,000	$6,325,700	71%	$2,527,300
Dedham/Westwood *	$1,352,000	$1,352,000	100%	$0
Everett	$10,970,000	$7,991,200	73%	$2,978,800
Framingham	$16,360,000	$10,057,900	61%	$6,302,100
Lexington	$6,801,000	$4,915,015	72%	$1,885,985
Lynnfield Water Dist.	$3,074,000	$2,926,800	95%	$147,200
Malden	$17,877,000	$14,695,500	82%	$3,181,500
Marblehead	$9,349,000	$5,259,400	56%	$4,089,600
Marlborough	$5,429,000	$1,283,800	24%	$4,145,200
Medford	$17,759,000	$11,097,000	62%	$6,662,000
Melrose	$10,853,000	$8,107,000	75%	$2,746,000
Milton	$10,090,000	$4,764,000	47%	$5,326,000
Nahant	$3,325,000	$2,235,550	67%	$1,089,450
Needham *	$2,688,000	$1,131,265	42%	$1,556,735
Newton	$34,439,000	$19,853,100	58%	$14,585,900
Northborough	$2,498,000	$986,053	39%	$1,511,947
Norwood	$10,691,000	$8,802,200	82%	$1,888,800
Peabody *	$3,845,000	$3,845,000	100%	$0
Quincy	$24,757,000	$23,331,800	94%	$1,425,200
Reading	$9,219,000	$7,189,800	78%	$2,029,200
Revere	$10,349,000	$7,160,000	69%	$3,189,000
Saugus	$16,309,000	$10,123,414	62%	$6,185,586
Somerville	$18,210,000	$13,008,234	71%	$5,201,766
Southborough	$3,432,000	$0	0%	$3,432,000
Stoneham	$5,081,000	$4,839,000	95%	$242,000
Stoughton*	$6,053,000	$4,128,000	68%	$1,925,000
Swampscott	$9,031,000	$6,049,468	67%	$2,981,532
Wakefield *	$5,681,000	$5,325,000	94%	$356,000
Waltham	$25,197,000	$5,520,201	22%	$19,676,799
Watertown	$6,723,000	$5,661,000	84%	$1,062,000
Wellesley *	$5,618,000	$1,813,569	32%	$3,804,431
Weston	$3,920,000	$3,392,997	87%	$527,003
Wilmington *	$1,917,000	$611,000	32%	$1,306,000
Winchester *	$2,276,000	$775,000	34%	$1,501,000
Winthrop	$7,431,000	$7,431,000	100%	$0
Woburn *	$6,496,000	$6,091,000	94%	$405,000
SUBTOTAL	**$479,346,800**	**$326,371,330**	**68%**	**$152,975,470**
Chicopee	$16,927,000	$12,339,400	73%	$4,587,600
South Hadley F.D. 1	$3,564,000	$2,038,000	57%	$1,526,000
Wilbraham	$3,509,000	$0	0%	$3,509,000
SUBTOTAL	**$24,000,000**	**$14,377,400**	**60%**	**$9,622,600**
TOTAL	**$503,346,800**	**$340,748,730**	**68%**	**$162,598,070**

* Partially Served Communities

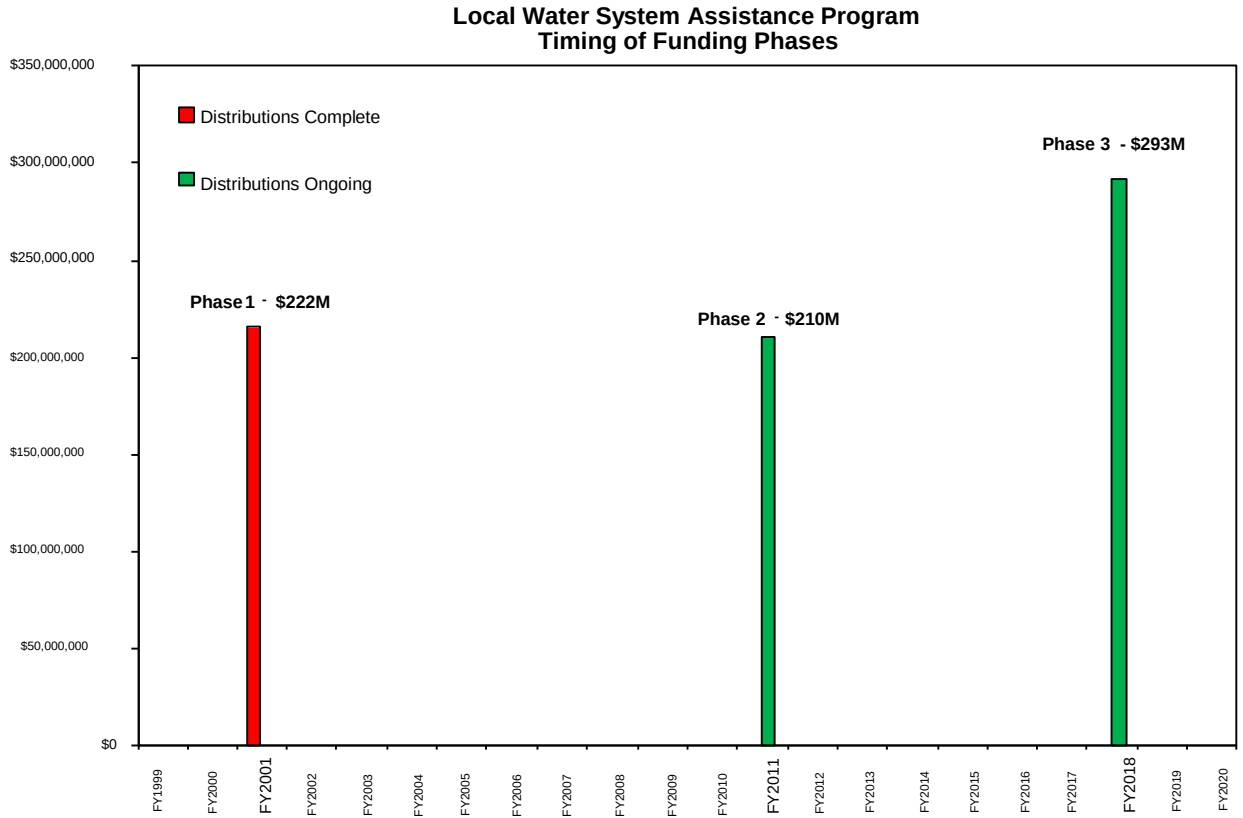
- $725M approved in three (3) phases
- $563M distributed (FY01 - December 2023)
- $384M loans repaid to MWRA

- 43 communities participating
- Community allocation based on % share water charge and % share unlined pipe

- 529 local projects funded
- 457 projects complete / 72 ongoing

- $50M distributed to 17 communities in CY23

MWRA's Long-Term Commitment to Fund Local Water System Rehabilitation

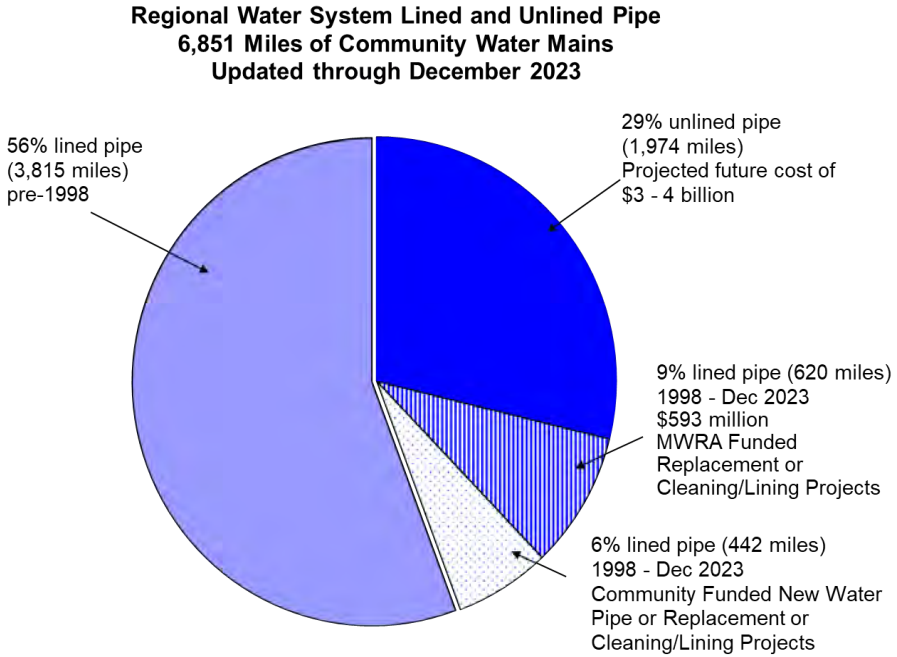


MWRA Funding for Local Water Projects

Water Main Replacement Construction

Water Storage Tank Rehabilitation

MWRA Funded an Eight (8) Percent Reduction in Unlined Cast Iron Mains



Remaining Unlined Pipe Represents a $3-4 Billion Future Cost

Lead Service Line Replacement Loan Program

- $100 Million in 10-Year Interest-Free Loans
- Fully Replace Lead Service Lines
- Distributed $42 Million to 17 Communities:
  - Newton $4.0 M
  - Marlborough $5.0 M
  - Everett $5.5 M
  - Winchester $2.8 M
  - Winthrop $4.7 M
  - Quincy $1.5 M
  - Needham $1.0 M
  - Somerville $2.5 M
  - Chelsea $1.8 M
  - Revere $1.5 M
  - Weston $160,000
  - BWSC $3.5 M
  - Watertown $1.5 M
  - Reading $1.5 M
  - Malden $500,000
  - Melrose $1.0 M
  - Lexington $3.9 M

$7.5 Million distributed to 6 communities in CY23

W C.1 (DEFERRED
TO BOARD INFO C)
03/13/24

Presentation to

MWRA Board of Directors

Infiltration/Inflow Local Financial Assistance Program Annual Update

March 13, 2024

MWRA I / I Local Financial Assistance Program

Program initiated in May 1993

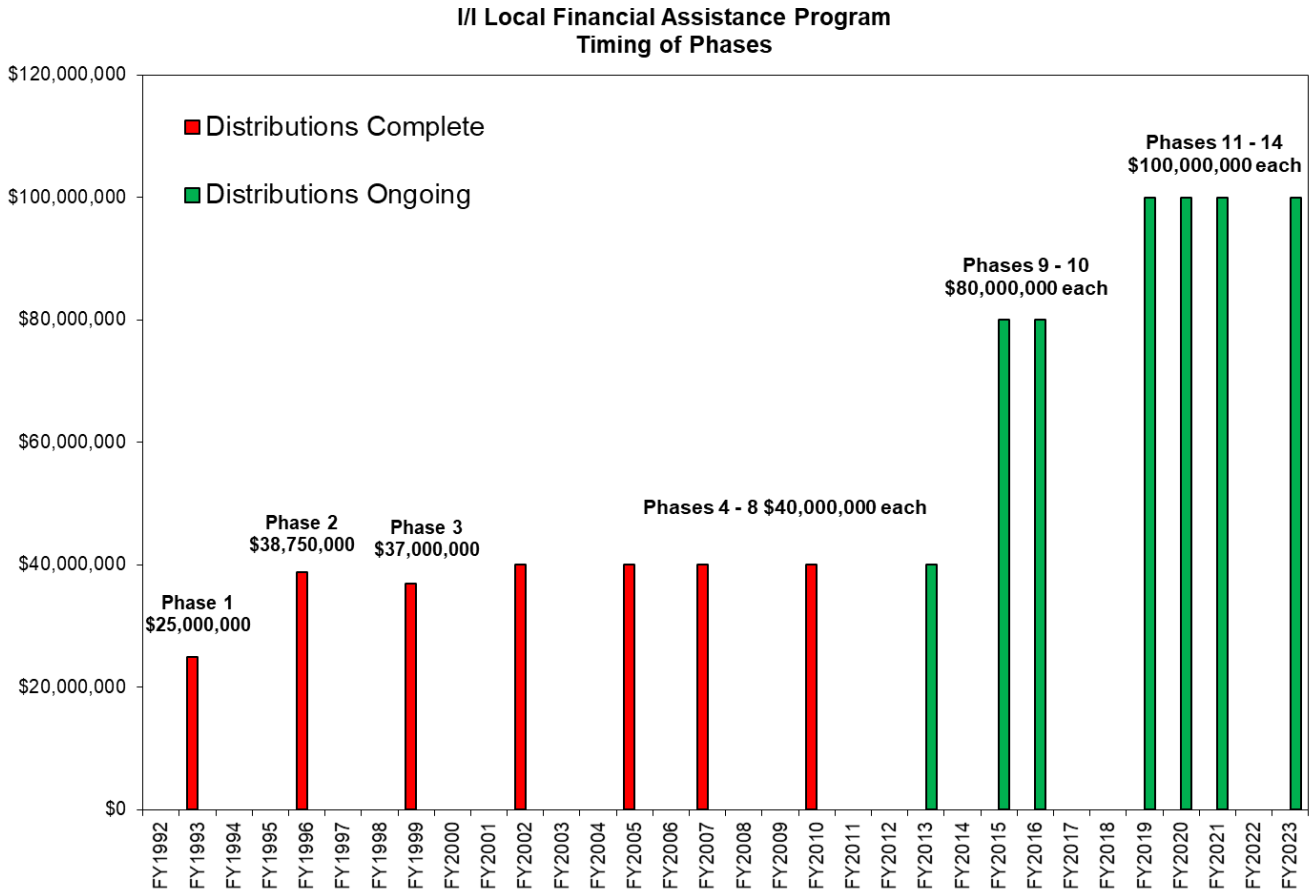
Goal: Rehabilitation of local sewer systems and long-term reduction of I/I.

Infiltration/Inflow (I/I)

Infiltration
(Groundwater via physical defects)

Inflow
(Stormwater via direct connections)

MWRA's Long-Term Commitment to Fund I / I Reduction



MWRA I / I Local Financial Assistance Program Funding Summary

MWRA I/I LOCAL FINANCIAL ASSISTANCE PROGRAM
COMMUNITY FUNDING SUMMARY THROUGH DECEMBER 2023

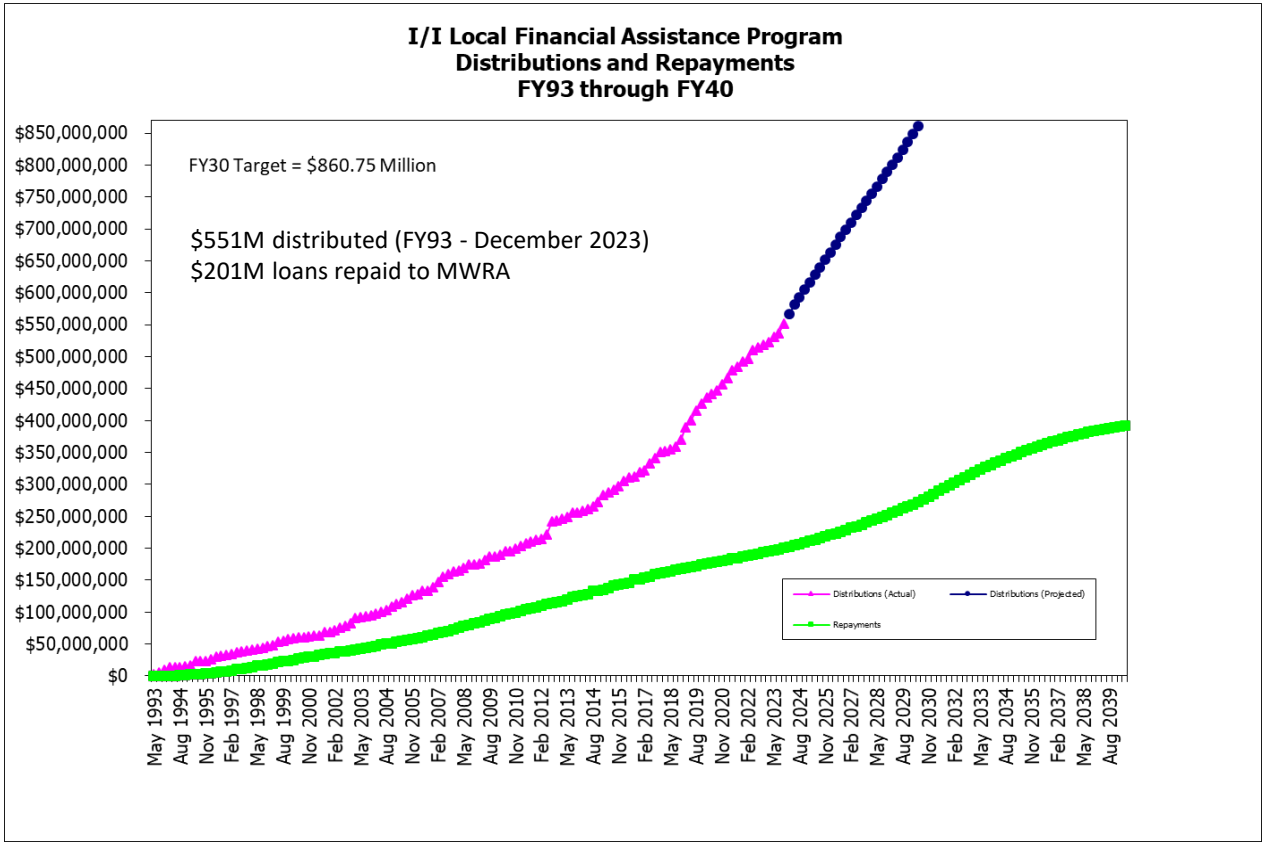
Community	Total Allocations (Phases 1 - 14)	Total Distributions (Phases 1 - 14)	Percent Distributed	Funds Remaining
Arlington	$15,473,000	$12,215,900	79%	$3,257,100
Ashland	$4,348,500	$2,020,060	46%	$2,328,440
Bedford	$6,354,600	$3,109,158	49%	$3,245,442
Belmont	$9,325,100	$5,135,100	55%	$4,190,000
Boston	$246,921,200	$122,868,059	50%	$124,053,141
Braintree	$16,449,000	$12,040,400	73%	$4,408,600
Brookline	$24,005,200	$19,666,200	82%	$4,339,000
Burlington	$9,632,800	$8,522,800	88%	$1,110,000
Cambridge	$44,640,100	$28,830,100	65%	$15,810,000
Canton	$7,565,900	$3,126,850	41%	$4,439,050
Chelsea	$13,510,100	$11,760,100	87%	$1,750,000
Dedham	$10,400,000	$9,240,000	89%	$1,160,000
Everett	$15,251,500	$11,611,500	76%	$3,640,000
Framingham	$23,045,000	$13,671,000	59%	$9,374,000
Hingham	$3,202,500	$2,593,670	81%	$608,830
Holbrook	$3,149,600	$1,349,600	43%	$1,800,000
Lexington	$13,715,300	$12,155,300	89%	$1,560,000
Malden	$23,373,900	$6,725,900	29%	$16,648,000
Medford	$22,077,600	$7,961,600	36%	$14,116,000
Melrose	$11,456,300	$10,106,300	88%	$1,350,000
Milton	$10,164,500	$10,164,500	100%	$0
Natick	$10,522,600	$6,832,600	65%	$3,690,000
Needham	$11,267,600	$4,018,600	36%	$7,249,000
Newton	$39,277,400	$39,277,400	100%	$0
Norwood	$13,239,400	$6,879,400	52%	$6,360,000
Quincy	$36,950,000	$32,325,000	87%	$4,625,000
Randolph	$11,400,800	$4,971,058	44%	$6,429,742
Reading	$8,789,100	$6,709,100	76%	$2,080,000
Revere	$19,090,900	$6,302,900	33%	$12,788,000
Somerville	$29,265,800	$18,995,800	65%	$10,270,000
Stoneham	$8,919,900	$7,829,900	88%	$1,090,000
Stoughton	$8,962,900	$7,902,900	88%	$1,060,000
Wakefield	$11,116,900	$9,836,900	88%	$1,280,000
Walpole	$6,940,000	$4,806,050	69%	$2,133,950
Waltham	$25,062,400	$19,214,560	77%	$5,847,840
Watertown	$11,475,800	$8,865,800	77%	$2,610,000
Wellesley	$10,429,700	$4,739,700	45%	$5,690,000
Westwood	$4,932,300	$3,091,300	63%	$1,841,000
Weymouth	$21,750,900	$13,949,584	64%	$7,801,316
Wilmington	$4,822,000	$2,462,000	51%	$2,360,000
Winchester	$7,673,000	$5,923,000	77%	$1,750,000
Winthrop	$6,293,400	$5,083,400	81%	$1,210,000
Woburn	$18,505,500	$16,515,500	89%	$1,990,000
Totals	$860,750,000	$551,406,549	64%	$309,343,451

- $860.75M approved (14 Phases)
- Community allocation based on percent share sewer charge

- All 43 communities participating
- 676 local projects funded
- 587 projects complete / 89 projects ongoing

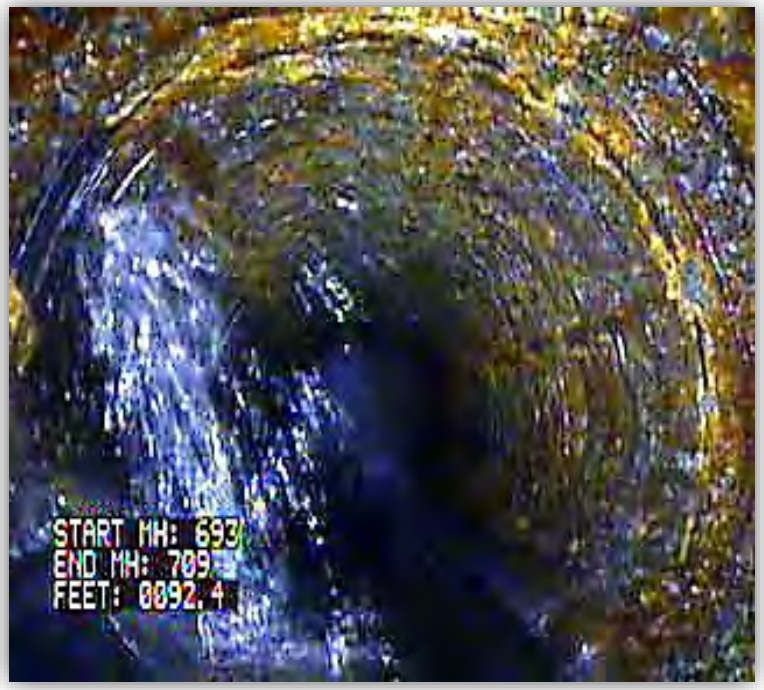
- $33M distributed to 20 communities in CY23

I / I Funding - Distributions and Repayments

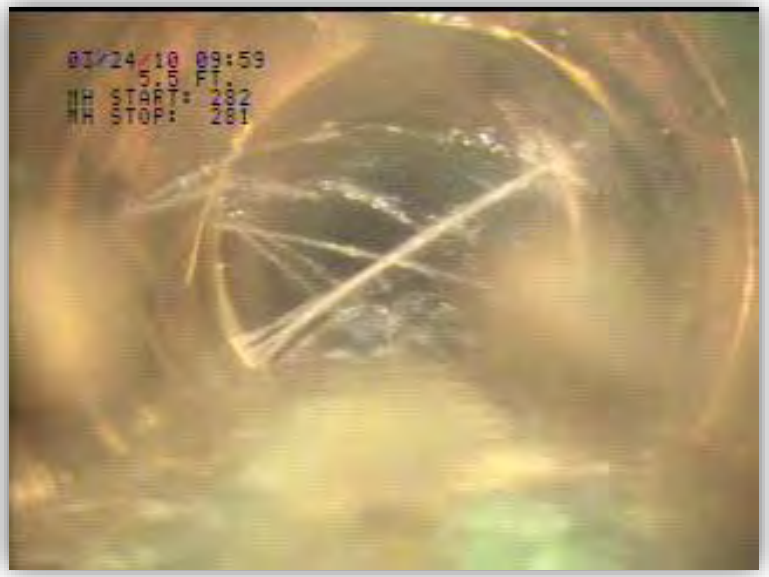


I / I Funding Results of Local Projects

CCTV Inspection of Sewers: 2,530 Miles



TV Inspection Location of Infiltration into Sewer Pipelines



I / I Funding for Rehabilitation of Local Sewers

357 Miles of Sewer Cured-In-Place Pipe (CIPP) Liner Installed and 3,388 Sewer Spot Repairs Performed

I / I Funding for Rehabilitation of Local Sewers

24,755 Manholes Rehabilitated / Sealed

I / I Funding for Rehabilitation of Local Sewers

1,489 Miles of Sewer Main Smoke Tested

1,208 Catch Basins Disconnected from Sewer System

MWRA Long-Term Regional Flow Data – Gradual Decrease in Flow