


## STAFF SUMMARY

**TO:** Board of Directors  
**FROM:** Frederick A. Laskey, Executive Director   
**DATE:** May 27, 2020  
**SUBJECT:** Metropolitan Tunnel Redundancy Program  
Preliminary Design, Geotechnical Investigation and Environmental Impact Report  
CDM Smith, Inc.  
Contract 7159

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**COMMITTEE:** Water Policy and Oversight

           INFORMATION

  X   VOTE

  
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Director of Administration

Beth Card, Director, Environmental and Regulatory Affairs  
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Preparer/Title

  
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Director, Tunnel Redundancy

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### RECOMMENDATION:

To approve the recommendation of the Consultant Selection Committee to award Contract 7159, Metropolitan Tunnel Redundancy Program Preliminary Design, Geotechnical Investigation and Environmental Impact Report to CDM Smith, Inc. and to authorize the Executive Director, on behalf of the Authority, to execute said Contract in an amount not to exceed \$15,692,527 for a contract term of 42 months from the Notice to Proceed.

### BACKGROUND:

In February 2017, the Board of Directors approved staff's preferred alternative to provide redundancy for the Metropolitan Tunnel System and directed staff to proceed with preliminary design, geotechnical investigation, and Massachusetts Environmental Policy Act (MEPA) review of the Project.

The preferred alternative generally consists of a northern tunnel and a southern tunnel (See Attachment A). Both tunnels are proposed to begin near the terminus of the Hultman Aqueduct and MetroWest Water Supply Tunnel. The northern tunnel is proposed to extend approximately 4.5 miles to the north, ending near the Waltham/Belmont line with a connection to the existing 60-inch diameter Weston Aqueduct Supply Main Number Three (WASM 3). The southern tunnel is proposed to extend approximately 10 miles to the south, ending in Mattapan with a connection to the Southern Spine distribution pipes near Shaft 7C of the Dorchester Tunnel.

In October 2018, given the size and complexity of the program, the Board approved the execution of two consultant contracts to perform necessary work over the next several years. The Preliminary

Design Engineering contract is the subject of this recommendation. An update on the Program Support Services contract, which was awarded in March 2019 and the status of program-wide activities to date is presented in Attachment B.

## **DISCUSSION:**

### **Preliminary Design Engineering Contract**

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.

The tasks included in this contract require substantial amounts of coordination with environmental regulatory agencies in order to ensure that the data and documentation generated result in a robust alternatives analysis in the MEPA process. In addition, early interaction with regulators will give MWRA staff the opportunity to address comments and concerns raised by agencies in the earlier MEPA phases.

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 Report
- Preliminary Design Report and Preliminary Design Drawings
- Draft and Final Environmental Impact Reports

While the Preliminary Design Engineering contract is underway, MWRA will simultaneously be implementing its communication plan to ensure that all stakeholders are informed as to the importance of this effort and what can be expected in the years ahead. This contract does not have a direct communication task; however, the work done under this contract will be utilized to support MWRA's communications efforts, which should in turn yield more informed comments during the MEPA process.

### **Procurement Process**

A two-step procurement process was utilized for this project. A Request for Qualifications (RFQ) was publicly advertised followed by a Request for Proposals (RFP) issued only to those firms that were short-listed after the RFQ phase.

A Selection Committee consisting of five voting members and seven non-voting members was formed to score and rank the proposals. Recognizing the importance of this project, the appointed voting members of the Selection Committee consisted of senior MWRA staff, who understand the critical needs of the water transmission system, the complexity of the permitting process, and the importance of the shaft site and alignment decisions that need to be made.

The RFQ, which was issued on October 2, 2019, required firms to submit information on: Qualifications/Key Personnel (45 points), Similar Experience/Past Performance (35 points) and Capacity (20 points). On November 1, 2019, Qualifications Statements were received from six respondents: AECOM Technical Services, Inc. (AECOM), Brierley Associates Corporation (Brierley), CDM Smith, Inc. (CDM Smith), McMillan Jacobs Associates, Inc. (McMillan Jacobs), Parsons Transportation Group, Inc. (Parsons), and Stantec, Inc. (Stantec). The Selection Committee evaluated the Qualifications Statements and voted to short-list the following three firms: AECOM, CDM Smith and McMillan Jacobs. Brierley was not shortlisted due to less large diameter pipeline design experience and less experience in program level tunnel alternatives evaluation than the shortlisted firms. Parsons was not shortlisted due to less relevant experience in water system hydraulics than the shortlisted firms. Stantec was not shortlisted due to less experience of some key personnel and less committed capacity of key personnel to this project.

The RFP was issued to AECOM, CDM Smith and McMillan Jacobs on December 2, 2019 and included the following criteria: Cost (20 points), Qualifications/Key Personnel (20 points), Technical Approach (20 points), Organization and Management Approach (20 points), Experience/Past Performance on similar Projects (15 points) and MBE/WBE Participation (5 points) for a total maximum score of 100 points.

On February 14, 2020, the three shortlisted firms submitted Proposals. The following is a summary of the costs and level of effort for each firm:

Proposer	Proposed Cost	Proposed Level of Effort (total hours)
CDM Smith	\$15,692,527	58,301
McMillan Jacobs	\$16,993,155	67,995
AECOM	\$19,241,231	79,416
<i>Staff Estimate</i>	<i>\$15,956,347</i>	<i>62,266</i>

The Selection Committee met to discuss and rank the Proposals. All of the scores from the Selection Committee members were totaled to determine the first-ranked team. The following is a summary of scores and rankings for each team:

Proposer	Total Final Score	Order of Preference Points*	Ranking
CDM Smith	439	5	1
McMillan Jacobs	402	10	2
AECOM	339	15	3

\*Order of Preference represents the sum of the individual Selection Committee members' rankings where the firm receiving the highest number of points is assigned a "1," the firm receiving the next highest number of points is assigned a "2," and so on.

The Selection Committee unanimously voted to recommend award of the contract to the first ranked firm, CDM Smith. The CDM Smith team includes the following firms: Jacobs Engineering Group (Jacobs), Vanasse Hangen Brustlin, Green International Affiliates, CDW Consultants, Inc. and New England Boring Contractors (NEBC). The Selection Committee members agreed that the CDM Smith team will provide well-qualified personnel who have extensive and relevant experience in the analysis of tunnel alignment alternatives, the operational requirements of MWRA's water transmission system, the planning and design of deep rock tunnels, and MEPA documentation and compliance. CDM Smith's proposed Technical Approach for this project was very thorough and well thought out. They identified critical success factors for the project including hydraulic flexibility and reliability, accurate/representative geotechnical data, and constructible/permitable infrastructure. Their proposed rock tunnel engineer has over 30 years of experience in the design of similar tunnels and is highly respected in the industry. Their proposed hydraulics engineer has over 35 years of experience and has worked extensively with the MWRA water system hydraulic model. CDM Smith's primary subconsultant, Jacobs, provided the permitting and engineering services for the MWRA MetroWest Water Supply Tunnel and many of the key staff from that project are assigned to this team. CDM Smith also has extensive experience in the design and hydraulic analysis of MWRA major water facilities.

CDM Smith's proposed cost is the lowest of the three proposers and is two percent lower than staff's estimate. The proposed level of effort (number of hours) is six percent lower than staff's estimate. The Selection Committee determined that CDM Smith's cost proposal provided the most appropriate distribution of hours among staff and tasks. The cost of the geotechnical drilling program is a significant portion of this contract (seven percent). CDM Smith's proposed driller (NEBC) is well qualified with large local crews and equipment, and proposed very competitive drilling costs compared to the other proposals.

The McMillan Jacobs proposal also included very qualified key personnel and demonstrated excellent experience. Their proposed cost was 6.5 percent higher than staff's estimate. McMillan Jacobs proposed ten subconsultants as part of their team, compared to five subconsultants proposed by CDM Smith, which the selection committee believed would require additional cost for coordination and oversight. In addition, McMillan Jacobs proposed to use an out-of-state drilling contractor with headquarters in Dayton, Ohio to conduct the boring program at a cost 46 percent higher than the CDM Smith proposal.

The AECOM proposal also included very qualified key personnel and demonstrated excellent experience. Their proposed cost was 21 percent higher than staff's estimate. AECOM proposed a higher level of effort than the other proposers for several tasks, which the Selection Committee determined as excessive. In addition, AECOM proposed to use two drilling contractors for the boring program, one in-state and one out-of-state. The combined cost of the boring program from these two drillers is 74 percent higher than the CDM Smith proposal.

Staff met with representatives of CDM Smith to confirm that they fully understand the scope of work and that they can complete the services for the proposed cost and schedule. Based on those discussions and for the reasons stated above, staff recommends that Contract 7159 be awarded to CDM Smith, Inc. Although the RFP targeted May 1, 2020 as the Notice to Proceed date for this contract, due to the ongoing uncertainty surrounding the coronavirus pandemic, staff expect to delay the Notice to Proceed until late June/early July 2020.

**BUDGET/FISCAL IMPACT:**

The FY20 CIP includes a budget of \$16,000,000 for Contract 7159. The recommended contract award amount is \$15,692,527.

**MBE/WBE PARTICIPATION:**

The MBE and WBE participation requirements for this contract were established at 7.18% and 5.77%, respectively. CDM Smith has committed to 9.87% MBE and 5.78% WBE participation.

**ATTACHMENTS:**

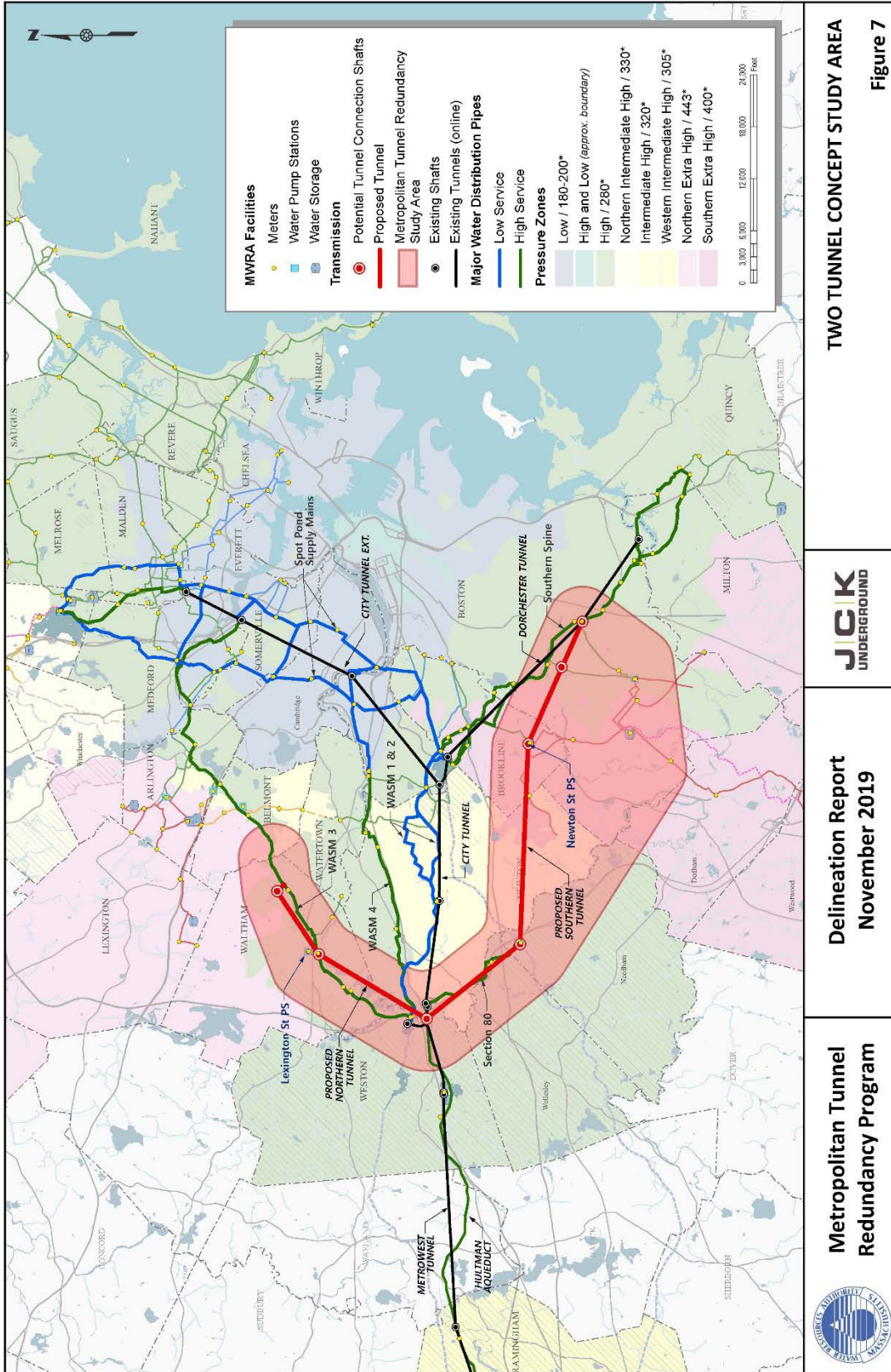
Attachment A: Preferred Alternative and Tunnel Alignment Study Area

Attachment B: Update on Program-Wide Activities

# Attachment A

## Metropolitan Tunnel Redundancy Program

### Preferred Alternative and Tunnel Alignment Study Area



**TWO TUNNEL CONCEPT STUDY AREA**  
**Figure 7**



**Delineation Report**  
**November 2019**

**Metropolitan Tunnel**  
**Redundancy Program**



## **Attachment B**

### **Update on Tunnel Redundancy Program 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 summary of completed and ongoing activities to support the management of the Tunnel Redundancy Program:

#### *Completed Program-Wide Guidelines and Standards*

Quality Management Plan. This document sets forth the minimum quality assurance and quality control procedures that the Program staff and consultants will implement in all areas of the work, including planning and design documents, internal and external communications, contract documents, technical reports, memoranda, and calculations.

Program Risk Management Plan. This document provides the approach to risk management for the Program. It describes the scope and objectives of the risk management effort, the methodologies and tools to be used, and the organizational structure to be followed throughout execution of the plan. The key aspects of the Risk Management Plan include:

- Risk management responsibilities of the various parties involved with the Program;
- Qualitative Risk Analysis and Risk Register Development;
- Risk Register Updating and Management; and
- Quantitative Analysis of Cost and Schedule Impacts of Risk Events.

Geotechnical Field Manual. This document provides program-wide standards, operational procedures and guidelines for geological and geotechnical investigations and related activities. It also establishes guidelines for quality and consistency of data collection and presentation among the multiple parties who will be involved in the geotechnical evaluation of the Program.

Program Delineation Report. This report was prepared for use by proposers responding to the Preliminary Design Request for Proposals. It describes the Program concept, the program goals, and delineates its anticipated scope. The content includes general summaries of the existing MWRA transmission system; the factors compelling the need to augment redundancy; and the concept to achieve these needs by constructing two new tunnels.

Existing Geotechnical Data Report. This is a 3000 page report that compiles existing MWRA project records, publicly available information, and references within and adjacent to the program study area. The existing geologic maps, geotechnical data reports, geotechnical engineering reports, technical papers and summary tables that are appended to or referenced in the report are provided to assist in developing an understanding of the areal and vertical extent of soil and rock types in the study area for use in Program planning.

### *Ongoing Program-Wide Activities*

In addition to preparing the above documents, staff are working on the following ongoing items:

Expert Review Panel. An Expert Review Panel has been formed to provide recommendations to the MWRA on key program elements such as risk mitigation, communication, program management and tunnel design and construction. In October 2019, staff provided a summary of the purpose and members of the Expert Review Panel. The first Expert Review Panel Workshop was held in November 2019. At that workshop staff presented the overall program and received constructive feedback from the panel. The next workshop is anticipated to be held in Summer/Fall 2020 to review initial work products of the Preliminary Design Engineer and discuss the Department's Risk Management Plan. The panel will continue to convene on a regular basis throughout the design phase of the Program.

Program Guide Specifications. Staff are 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.

Hydraulics. Staff have developed projected future high, medium and low water use projections using available population and employment projections. All three sets assume continued regional increases in population and employment. The low projections assume some continued improvements in water use efficiency; the medium assume no change in efficiency; and the high projects assume future development would be less efficient than current users. In October 2019, staff provided the Board with an update of these water use projections and the hydraulics of the proposed tunnel system. The current two-tunnel concept adequately meets projected needs and will accommodate the low projection of high day demand through 2040. Hydraulic analysis of the proposed tunnel system will continue through the preliminary design phase. Staff will continue to monitor system water use and continue to analyze the hydraulics of the new tunnel with respect to potential changes in population and employment projections or in water demand assumptions.

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

Project Controls. Staff are evaluating and 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.

Geotechnical Data Management Plan. An extensive geotechnical program will be implemented in multiple phases by various consulting firms over the course of preliminary and final design. A Geotechnical Data Management Plan is being developed to outline the organization and management of this comprehensive collection of data. Geotechnical data will be organized and stored in a computer database that can be accessed by various Program members.



Program Management Plan. A Program Management Plan is being developed to document processes and procedures for the Tunnel Redundancy Program. It will include the Program organization, roles and responsibilities, contract administration procedures, communications protocols, and will be the single repository for all of the program-wide guidelines and standards described above.

Contact 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, change order process, and payment provisions. Staff have convened an in-house working group with support from the Program Support Service consultant to review MWRA standard construction contract terms and conditions relative to current tunnel industry practices.



## Metropolitan Tunnel Redundancy

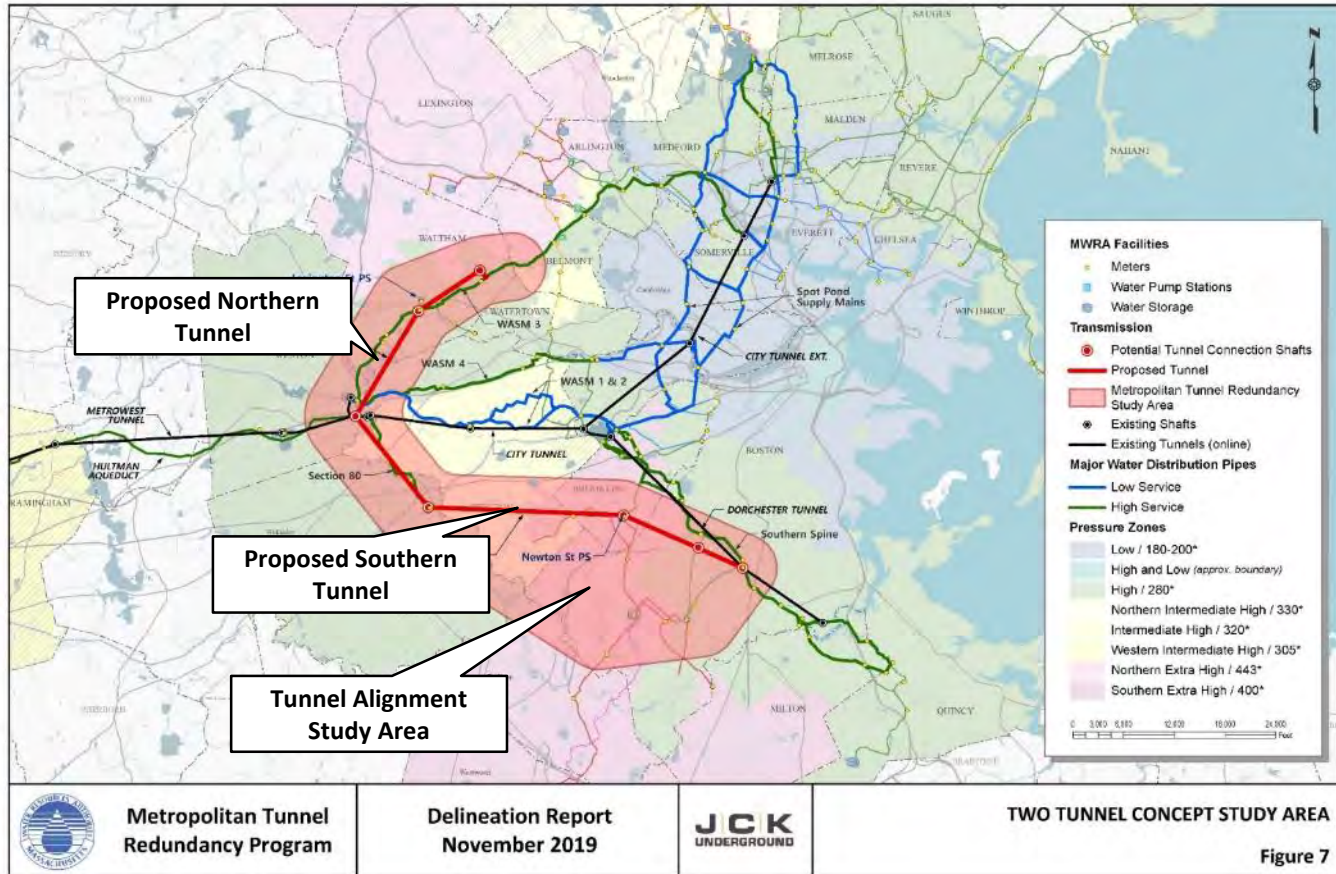
### Preliminary Design, Geotechnical Investigation and Environmental Impact Report

### Contract Award and Program Update

May 27, 2020



# Metropolitan Tunnel Redundancy Program





# Preliminary Design Scope of Services

- Project Management, Regulatory Agency, and Stakeholder Coordination
- Environmental Notification Form - MEPA
- Evaluation of Alternatives
- Environmental Impact Report - MEPA
- Geotechnical Subsurface Investigation and Evaluation
- Base Mapping and Survey
- Preliminary Design



# Procurement Process

- Two Step RFQ/RFP Process
- RFQ Publically Advertised
  - Qualifications/Key Personnel (45 points)
  - Experience/Past Performance (35 points)
  - Capacity (20 points)
- Received Six Qualifications Statements
- Selection Committee Shortlisted Three Firms to Submit Proposals
  - AECOM
  - CDM Smith
  - McMillen Jacobs Associates



## RFP Evaluation Criteria

- Cost (20 points)
- Qualifications/Key Personnel (20 points)
- Technical Approach (20 points)
- Organization and Management Approach (20 points)
- Experience/Past Performance (15 points)
- MBE/WBE Participation (5 points)



# Cost Proposal Summary

Proposer	Cost	Hours
CDM Smith	\$15,692,527	58,301
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# CDM Smith Proposed Team

- CDM Smith – Prime Consultant
- Jacobs Engineering Group
- VHB
- Green International Affiliates
- CDW
- New England Boring Contractors








- Extensive and relevant experience in
  - Evaluation of tunnel alignment alternatives
  - Hydraulics and design of the MWRA water system
  - Planning and design of deep rock tunnels
  - MEPA documentation and compliance



# Contract Schedule

Task Name	2020	2021	2022	2023
ENF				
Evaluation Of Alternatives				
Geotechnical Program				
EIR				
Preliminary Design				



# Update on Program Activities

- Completed Program-Wide Guidelines and Standards

- Program Quality Management Plan
- Program Risk Management Plan
- Geotechnical Field Manual
- Program Delineation Report
- Existing Geotechnical Data Report

- Ongoing Program-Wide Activities

- Expert Review Panel
- Program Guide Specifications
- Hydraulics
- Program Budget and Schedule Analysis
- Project Controls
- Geotechnical Data Management Plan
- Program Management Plan
- Contract Practices