


## STAFF SUMMARY

**TO:** Board of Directors  
**FROM:** Frederick A. Laskey, Executive Director   
**DATE:** March 20, 2019  
**SUBJECT:** Program Support Services for the Metropolitan Tunnel Redundancy Program  
JCK Underground, Inc.  
Contract 7655

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**COMMITTEE:** Water Policy and Oversight

           INFORMATION

  X   VOTE

  
Michele S. Gillen

Director of Administration

  
Kathleen M. Murtagh, P.E.

Director, Tunnel Redundancy

Frederick O. Brandon, P.E., Director, Design and Construction  
Preparer/Title

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### RECOMMENDATION:

To approve the recommendation of the Consultant Selection Committee to award Contract 7655, Program Support Services for the Metropolitan Tunnel Redundancy Program to JCK Underground, Inc. and to authorize the Executive Director, on behalf of the Authority, to execute said Contract in an amount not to exceed \$10,247,877 for a contract term of 60 months from the Notice to Proceed. In addition to the initial 60-month term, the Authority may elect to exercise options to renew the contract for two additional 24-month terms subject to further approval of the Board of Directors.

### BACKGROUND:

In October 2018, the Board of Directors approved staff's recommendation to issue an RFQ/P for Program Support Services for the Metropolitan Tunnel Redundancy Program.

The purpose of the Program Support Services contract is to assist Tunnel Redundancy staff with program-wide activities such as risk management planning, quality management, design criteria and standardization, document management and controls, design and construction package planning, independent technical reviews, field investigation procedures, rock core storage, critical path scheduling, and budget planning.

Engagement of a program-wide, independent consultant to support very large, long duration, complex projects is a common practice in the industry and generally consistent with past MWRA programs, such as the Lead Design Engineer and Program Manager/Construction Manager on the Boston Harbor Project, Design Management Support on the John J. Carroll Water Treatment Plant, and Owner's Representative on the Norumbega, Blue Hills and Spot Pond Covered Storage projects. In addition, most on-going, very large tunnel projects being conducted by other agencies and authorities across the country, include an independent consultant(s) in the form of an Owner's

projects. In addition, most on-going, very large tunnel projects being conducted by other agencies and authorities across the country, include an independent consultant(s) in the form of an Owner's Representative, Owner's Advisor, Program Manager, Geotechnical Consultant, Tunnel Consultant, or Program Support Services consultant.

The staff of the Tunnel Redundancy Department, with support from other MWRA departments as appropriate, will oversee the Tunnel Redundancy Program including all work of the Program Support Services consulting firm. The consultant organization chart, which was approved by the Board in October 2018, is attached. An update on overall progress to date is also attached.

## **DISCUSSION:**

The Program Support Services consultant team consists mostly of senior professionals with significant experience in tunneling and complex underground construction. Key personnel include technical experts in the areas of program management, rock tunneling, geotechnical engineering, structural engineering, and cost estimating/scheduling with experience in the planning, design, and construction of similar complex rock tunneling and underground projects including mega projects (greater than \$1.0 billion). A particular expertise that the consultant will provide is risk management/mitigation as well as an in-depth understanding of the state of the practice and current trends in the tunnel construction industry. These key personnel have the necessary skills in the area of tunneling and complex underground construction that is required to properly execute the Tunnel Redundancy Program but would be difficult for MWRA to hire as permanent staff.

The consultant will provide technical professional resources to the Tunnel Redundancy Department to support program-wide management, risk management, quality management, standardization, contract delivery, and contract packaging. The Consultant will include independent technical reviews, constructability reviews, critical path schedule evaluations, and cost estimating/opinions. The consultant will also provide advice on early engineering activities and will prepare early work products in advance of MWRA procuring the Preliminary Design Engineering Contract as the Tunnel Redundancy Department adds key permanent staff.

The consultant and its team members will be precluded from participating in either the preliminary or final design, or the construction phase of the project. Precluding the consultant from other phases of the project was intended to provide independence from the interests of other program participants, and encourage long-term commitment to the MWRA.

## **Procurement Process**

On January 2, 2019, MWRA issued a one-step Request for Qualifications Statements/Proposals that was publicly advertised in the Central Register, Boston Herald, Banner Publications and El Mundo. In addition, written notice was sent to over 35 engineering firms, most of which had expressed interest in the Metropolitan Tunnel Redundancy Program. Prior to advertising the RFQ/P, staff made an informational presentation on the Tunnel Redundancy Program to consulting firms at a meeting hosted by the American Council of Engineering Companies of

Massachusetts (ACEC). The meeting was attended by over 50 professionals representing over 25 firms.

The following evaluation criteria were included in the RFQ/P: Cost (20 points), Qualifications and Key Personnel (20 points), Experience/Past Performance on Similar Non-Authority projects and Past Performance on Authority Projects (20 points), Technical Approach (20 points), Capacity/Organization and Management Approach (17 points), and MBE/WBE Participation (3 points).

Forty-nine firms requested copies of the RFQ/P. On February 15, 2019, MWRA received one proposal from JCK Underground, Inc. Prior to opening the proposal, staff contacted multiple firms to determine the reason why more firms did not submit proposals. Twelve firms indicated that they are closely monitoring the Tunnel Redundancy Program and are forming teams to pursue future design and/or construction management contracts under this program. Other firms indicated that they were interested in this contract, but they did not have sufficient qualified personnel in the local area or their qualified personnel were already committed on other projects. Several of the other firms who requested copies of the RFQ/P are smaller firms that would not qualify as a prime consultant but remain interested in the program. Staff considered re-advertising this procurement to try to engender more competition. However, based on the feedback from the firms it was ultimately determined that re-procuring would not likely yield any additional competition. Therefore, the proposal was distributed to the Selection Committee for review.

The Selection Committee reviewed the proposal and determined that the JCK team meets, and in many instances exceeds, the qualifications required for this contract and has extensive experience with deep rock water/waste water tunnel projects similar in size and scope to the Tunnel Redundancy Program. The firm is providing similar program support services to several other agencies including DC Water, Alexandria VA, Allegheny County Sanitary Authority, and Silicon Valley Clean Water. All of the key personnel are committed and available to work on this project.

The proposed Project Manager is based in New England and has 30 years of experience with over 25 years specializing in tunnels and underground structures. He had significant roles in the design and construction of the MWRA Boston Harbor Project Tunnels, MetroWest Water Supply Tunnel, and the Braintree-Weymouth Tunnel. More recently he has been working on the DC Water Clean Rivers CSO Tunnel program and the Silicon Valley Water Sewer Tunnel project. In addition, many of the other key personnel have extensive experience working with the MWRA.

The proposed team includes individuals with national reputations as leaders in the area of risk management and project delivery for large complex tunnel programs. Most key personnel are locally based and all are well-known industry leaders in rock tunnel design, underground structural design, geotechnical engineering, and cost controls.

JCK's technical approach demonstrated an excellent understanding of the Tunnel Redundancy Program and the services that are required under the contract. The proposal suggested

thoughtful enhancements for consideration. Numerous references were provided for the firm's performance on similar projects and for all of the key personnel. All of the references were excellent and expressed strong satisfaction with JCK. All references also indicated that JCK was responsive and that they would rehire them.

JCK's proposed cost and level of effort in comparison to the Engineer's Estimate are presented below:

	JCK Underground, Inc.	Engineer's Estimate
Proposed Cost (initial 60-month term)	\$10,247,877.21	\$10,250,000
Level of Effort	34,743 hours	25,660 hours
Allowance for First Optional 24-Month Renewal	\$3,500,000 <sup>1</sup>	\$3,500,000
Allowance for Second Optional 24-Month Renewal	\$3,750,000 <sup>1</sup>	\$3,750,000
Total Potential Contract Including Two Optional 24-Month Renewals	\$17,497,877.21	\$17,500,000

1. An allowance for the cost of two optional 24-month renewal periods was set by MWRA staff. If MWRA staff recommend and the Board approves the renewal of the contract at the end of the initial 60-month term, the actual cost will be determined at that time.

The Selection Committee determined that JCK exceeded the minimum requirements of the RFQ/P and that its proposed cost and level of effort is favorable. JCK's proposed cost is within 1% of the Engineer's Estimate and its proposed level of effort is 35% higher than the Engineer's Estimate. This is attributed to a proposed higher level of effort for tasks such as developing a database for geotechnical information, detailed review of change orders and claims from previous projects to include lessoned learned into this project, developing a master program schedule, facilitating integrated project scheduling sessions, and quality control of geotechnical field work. Staff supports this increased level of effort for the proposed technical approach and staff mix.

The average direct labor rate of key personnel proposed by JCK is slightly below the average rate that was assumed in the Engineer's Estimate based on a recent assessment of current local rates for similarly experienced professionals. The proposed overhead and profit percentages are very competitive and result in a much lower fully burdened billable rate than anticipated. This lower hourly rate has allowed a higher level of effort to be available to MWRA for services under this contract.

Staff met with representatives of JCK in order to confirm that they fully understand the scope of work and that they can complete the services for the proposed cost. Based on those discussions and for the reasons stated above, staff recommends that Contract 7655 be awarded to JCK Underground, Inc.

**BUDGET/FISCAL IMPACTS:**

The FY19 CIP includes a budget of \$163,673,000 for Administration, Legal and Public Outreach, which was envisioned to include program-wide professional services such as Contract 7655 Program Support Services. Funds have been reallocated from this subphase to a separate contract in the Proposed FY20 CIP.

**MBE/WBE PARTICIPATION:**

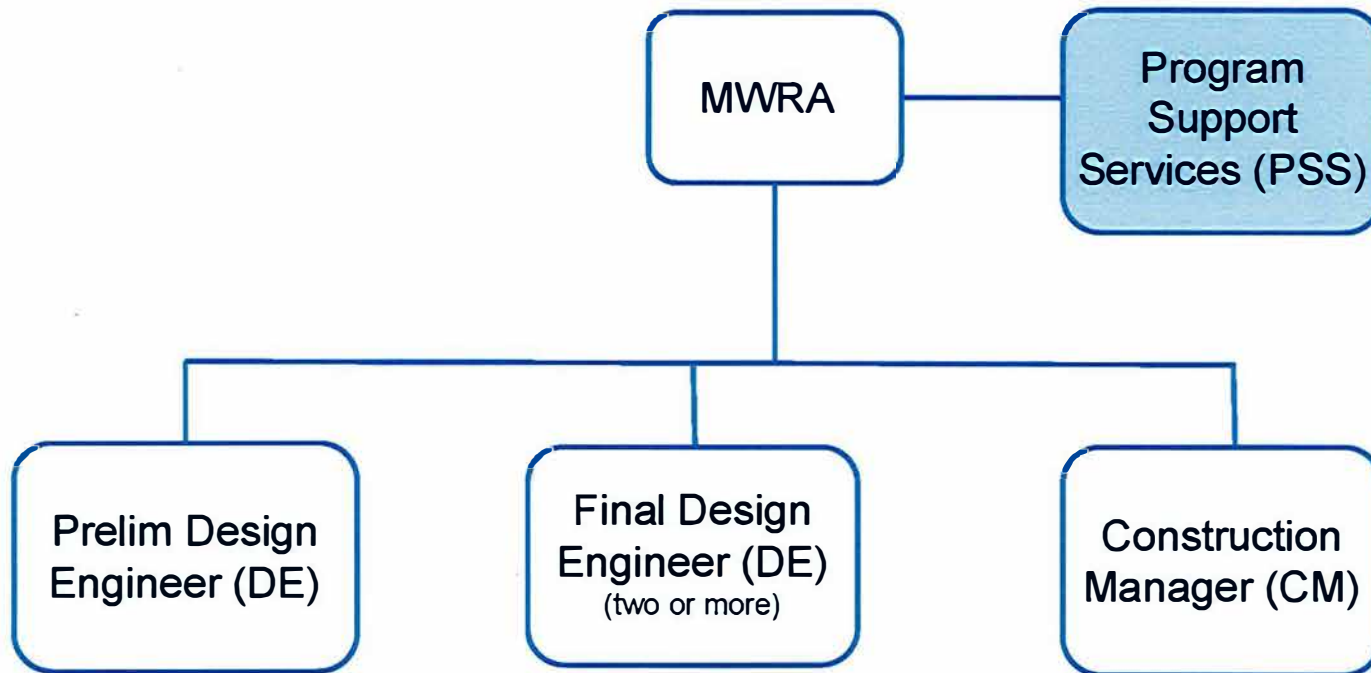
The Affirmative Action and Compliance Unit established a MBE/WBE participation requirement for this project of 0%. JCK Underground proposed 18% MBE and 3% WBE participation which becomes a requirement for this contract.

**ATTACHMENTS:**

Consultant Organization Chart  
Update on the Tunnel Redundancy Program



## Metropolitan Tunnel Redundancy Program – Consultant Organization



## **Update on the Tunnel Redundancy Program**

Since establishing the Tunnel Redundancy Department in June 2018, a number of activities have been initiated and are underway in addition to efforts to procure the Program Support Services consultant.

### ***Revised Tunnel Alignment***

Staff have evaluated a minor change to the alignment of the proposed tunnel to provide redundancy to MWRA's Section 80 pipeline, which is a single barrel pipeline that supplies Needham and Wellesley. The revised alignment would move a proposed tunnel shaft connection from the Commonwealth Avenue Pumping Station in Newton to the end of the Section 80 pipeline in Needham. The shaft connection at the Commonwealth Avenue Pumping Station is no longer needed because a new redundant pipe connection to the pumping station is under construction as part of the MWRA Interim Improvements Program. This new shaft connection would connect to the end of Section 80 and provide a second means of supply to Needham and Wellesley (see figure below).

### ***Preliminary Design Engineering Contract***

In addition to procurement of a Program Support Services consultant, staff are preparing a scope of services for preliminary design, geotechnical investigations, and MEPA review. It is anticipated that this contract will be procured under a two-step procurement process: an RFQ followed by an RFP issued to shortlisted firms. It is expected that the Preliminary Design Engineering contract will have a duration of approximately three years. At this time, the goal is to issue the Preliminary Design Engineering RFQ in the summer of 2019.

The Preliminary Design Engineering contract will include the preliminary geotechnical investigation (deep rock borings), preliminary route and shaft site alternative evaluations, preliminary design, preliminary contract packaging, and will establish a comprehensive list of the environmental permits needed, including preparation of the required MEPA filings for the project.

The Preliminary Design Engineering contract is anticipated to include several significant project documents including a Preliminary Geotechnical Data and Design Report, Alternatives Evaluation and Preliminary Design Report, Environmental Impact Report and preliminary design drawings. After the completion of the preliminary design, consultants will be needed to support both final design and construction management of the program. Future staff summaries will provide details on the structure of those contracts.

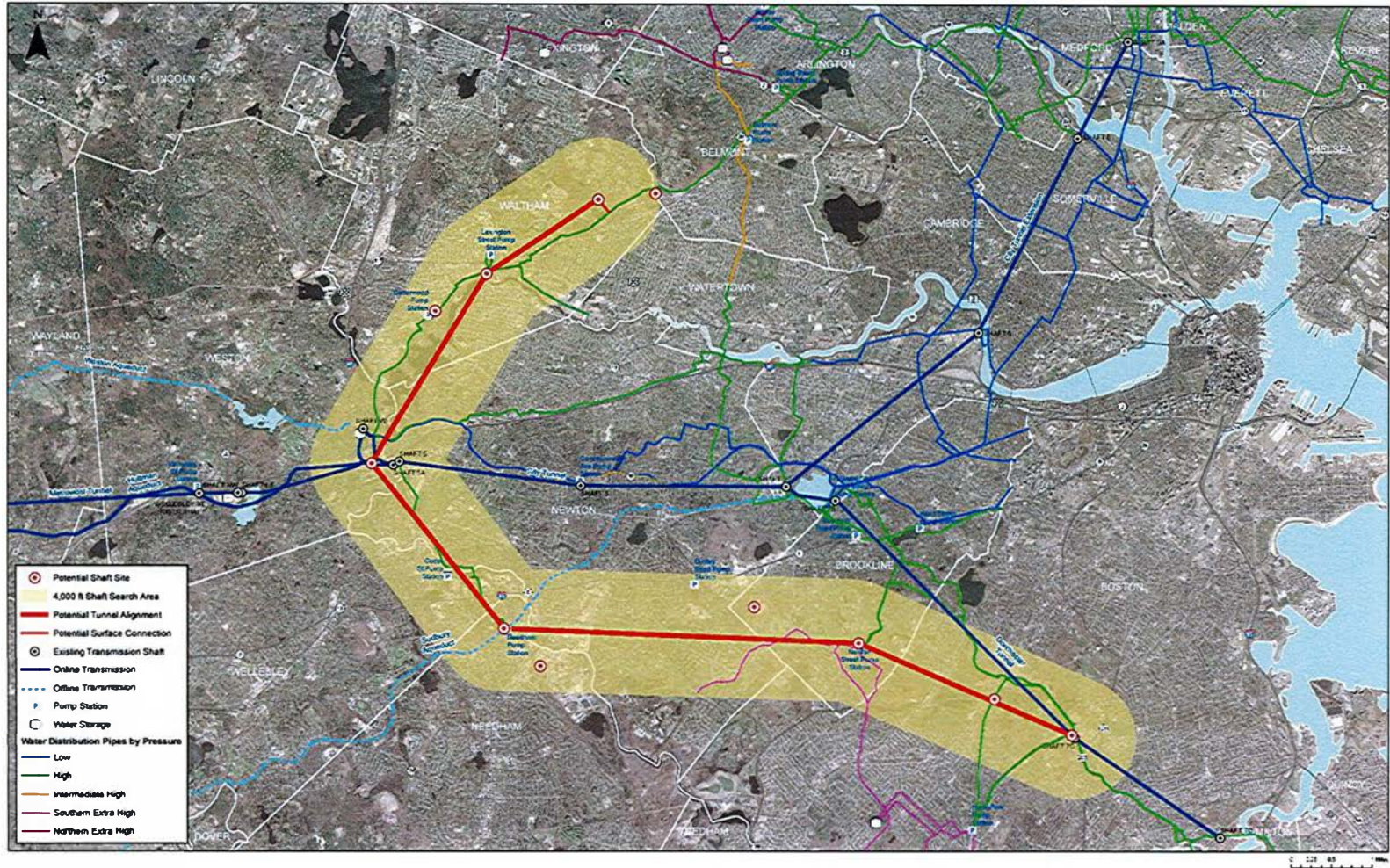
### ***Hydraulic Analysis***

Staff have begun to update the hydraulic model of the water system to include currently planned distribution system changes, and the latest population and employment projections for the service area through the year 2040, as well as available longer term projections. Staff also plan

to evaluate other longer term water use scenarios such as potential system expansion and the effect of drought or emergency conditions on local water supplies that are operated by MWRA partial users. While staff have found that recent increases in population and employment in the service area have not increased overall water use due to improved water use efficiency, the new tunnel will have a life span of over 100 years. The results of this evaluation will be used to confirm the size and configuration of the proposed redundant tunnel and ensure that the new tunnel is either designed to accommodate future potential demands or that a plan is in place to address potential future water use.



## Metropolitan Tunnel Redundancy Program Potential Tunnel Alignment and Shaft Locations



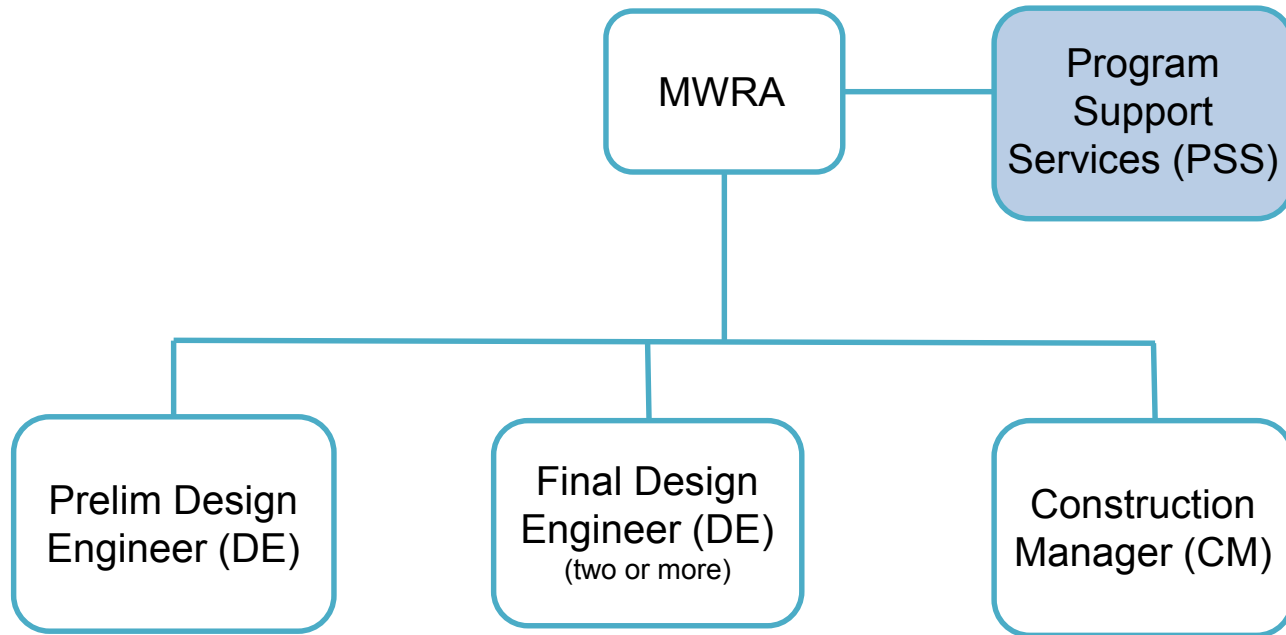


***Metropolitan Tunnel Redundancy  
Program Support Services Contract Award  
and  
Program Update***

March 20, 2019



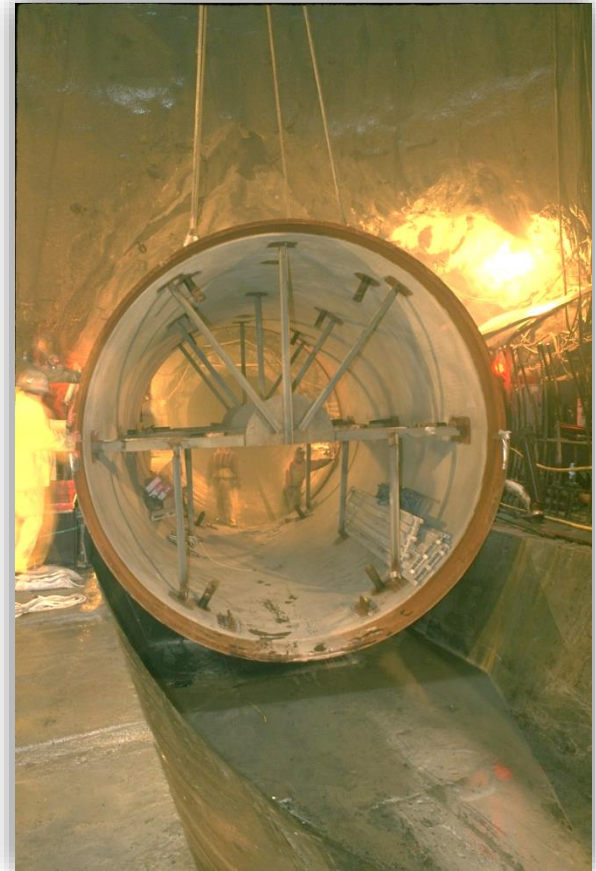
# Program Support Services Contract Award





# Program-Wide Support Services

- Program-wide planning
- Risk management planning
- Quality management
- Design criteria and standardization
- Independent design review
- Design and Construction package planning
- Critical path scheduling, and
- Budget planning and management





# Procurement Process

- Industry Outreach, pre-procurement:
  - American Council of Engineering Companies of Massachusetts (ACEC/MA)
  - George A. Fox Conference (annual national tunneling conference in NYC)
- RFQ/P Notice:
  - Central Register, Boston Herald, Banner Publications and El Mundo
  - Written notice was sent to over 35 engineering firms
  - 49 firms requested copies of the RFQ/P



## Evaluation Criteria

- Cost (20 points)
- Qualifications and Key Personnel (20 points)
- Experience/Past Performance on Similar Non-Authority projects and Past Performance on Authority Projects (20 points)
- Technical Approach (20 points)
- Capacity/Organization and Management Approach (17 points)
- MBE/WBE Participation (3 points)



## RFQ/P Response

- One proposal received
- Reasons for not submitting:
  - 12 firms to pursue future contracts
  - Other firms
    - Insufficient local personnel
    - Qualified personnel already committed
  - Small firms not qualified as a prime consultant
    - interested as subconsultants
- Re-procuring not likely to yield additional competition



# JCK Underground Proposal Review

- Exceeds minimum qualifications
- Extensive experience with deep rock water/waste water tunnel projects similar in size and scope
- Providing similar services for other agencies
  - DC Water
  - Alexandria VA
  - Allegheny County Sanitary Authority
  - Silicon Valley Clean Water





## Key Personnel

- Project Manager:
  - Locally based
  - 30 years of experience, with over 25 years specializing in tunnels and underground structures
  - Significant roles on the **MWRA** Boston Harbor Project Tunnels, MetroWest Water Supply Tunnel, and the Braintree Weymouth Tunnel



## Other Key Personnel

- Industry leaders in:
  - Risk management
  - Project delivery for large complex tunnel programs
- Locally based
- Past MWRA Tunnel experience includes:
  - Boston Harbor Project
  - MetroWest Water Supply Tunnel
  - Braintree-Weymouth Tunnel
- Added Key Personnel, beyond RFQ/P minimum requirements



## Technical Approach and References

- Excellent understanding of the Tunnel Redundancy Program and the services that are required
- Thoughtful enhancements for consideration
- Numerous references
  - All references were excellent
  - Strong satisfaction
  - Responsive and would rehire!



## Cost and Level of Effort

	JCK Underground, Inc.	Engineer's Estimate
Proposed Cost (initial 60-month term)	\$10,247,877.21	\$10,250,000
Level of Effort	34,743 hours	25,660 hours

- Allowances for two additional optional 2-year renewals with Board approval
- Total potential contract of \$17,497,877 over 9 years



# Cost Analysis

- Overhead and profit are very competitive
- Average direct labor rate is lower than estimated
  - Mix of senior and mid-level staff
- Result is a much lower fully burdened billable rate than estimated
- Value for the \$!



## Proposed Level of Effort

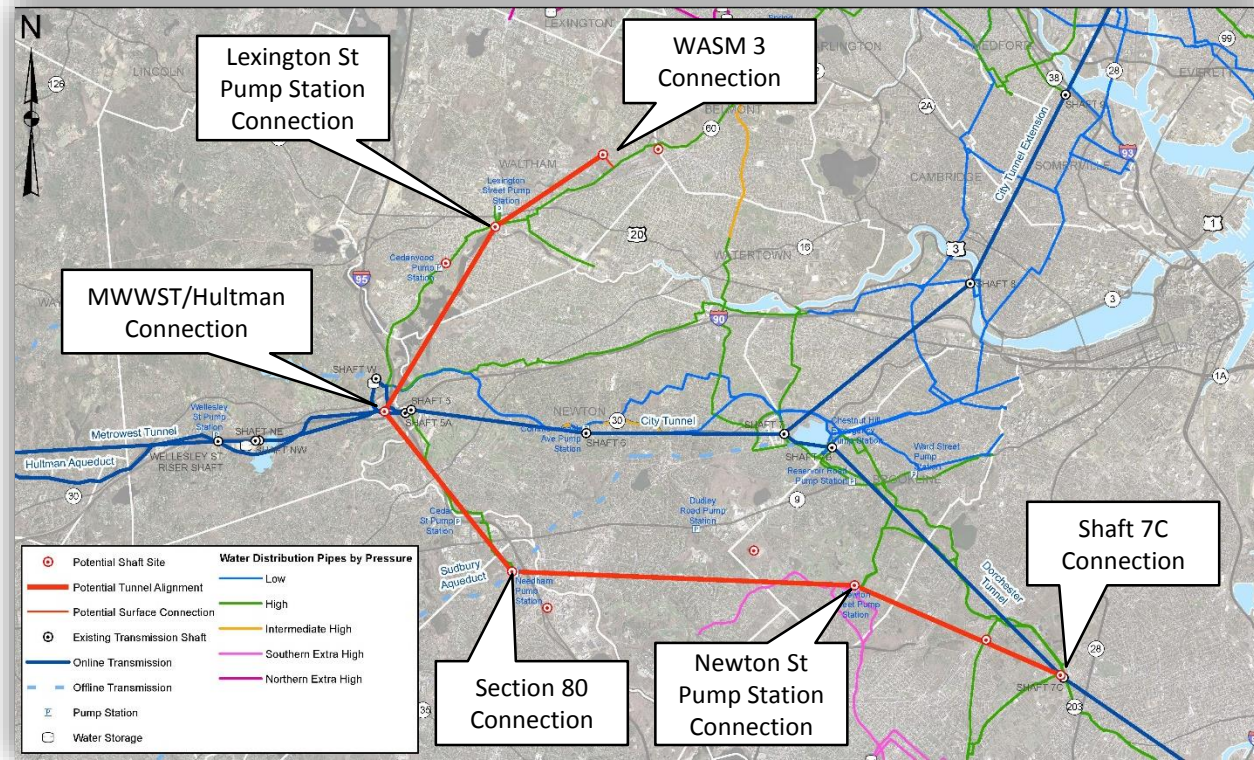
- JCK proposed a higher level of effort for certain tasks:
  - Project controls
  - Geotechnical database development
  - Incorporation of lessons learned into this project
  - Quality control of geotechnical field work
  - Independent review of design submittals
  - Risk management and mitigation planning
- Staff supports the increased level of effort for the proposed technical approach and staff mix



# Revised Tunnel Alignment

## The Tunnel Project Basics:

- 14 miles of deep rock tunnel
  - 4.5 mile to the north / WASM3
  - 9.5 miles to the south – Shaft 7C
- 10' finished diameter
- 200' – 500' below ground (well into bedrock)
- Revised shaft location provides redundancy to Section 80 (Needham and Wellesley)
- Shaft locations and alignment are preliminary and may change during Design





# Hydraulic Model Update

- Adding all proposed CIP Water Projects
  - New pipelines
  - Rehabilitated pipelines
- Population and Employment Projections
  - 2040 and beyond
- Potential System Expansion
- Temporary Loss of Local Sources (Drought/Emergency)
- Water age/quality





## Planned Schedule

- Program Support Services Consultant
  - Award - pending Board approval
  - Notice to Proceed: April 1, 2019
  
- Preliminary Design Engineering/MEPA Review
  - Issue RFQ: Mid 2019
  - Issue RFP: Late 2019
  - Notice to Proceed: Early 2020