



Board Report

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Agenda Number: 24.

CONSTRUCTION COMMITTEE MAY 21, 2020

SUBJECT: TUNNEL ADVISORY PANEL

ACTION: CONTRACT MODIFICATION

RECOMMENDATION

AUTHORIZE the Chief Executive Officer to:

- A. Execute Contract Modification No. 11 to Contract No. PS-2020-1055 with **Dr. Geoffrey R. Martin for the continuation of Tunnel Advisory Panel Services**, in an amount not-to-exceed \$910,475, increasing the total contract value from \$2,090,006 to \$3,000,481 and extend the contract from July 1, 2020 to June 30, 2023;
- B. Execute Contract Modification No. 6 to Contract No. PS-8510-2493 with **Dr. Edward J. Cording, for the continuation of Tunnel Advisory Panel Services**, in an amount not-to-exceed \$923,457, increasing the total contract value from \$2,075,778 to \$2,999,235 and extend the contract from July 1, 2020 to June 30, 2023; and
- C. Negotiate and Execute sole source Contract No. PS-1620-1000, with **Dr. Thomas O'Rourke**, for Tunnel Advisory Panel Services, in an amount not-to-exceed \$947,457, from June 1, 2020 to June 30, 2023.

ISSUE

LACMTA is currently planning, designing or constructing rail transit projects with extensive underground engineering and construction that involve complex geotechnical and tunneling issues. Some of the current active projects include the Westside Purple Line Extension Section 1, Section 2 and Section 3 Projects, Regional Connector Transit Corridor Project, Eastside Transit Corridor Phase 2 Project, Sepulveda Transit Corridor Project, West Santa Ana Branch Transit Corridor Project and Crenshaw Northern Extension Project. Los Angeles County has challenging geologic, seismic and tunneling conditions and deep underground station construction, with some through fault rupture zones, tar impregnated soil, toxic gasses, and high concentration of methane. While LACMTA has extensive experience from both staff and engineering consultants, there is the need for a Tunnel Advisory Panel (TAP) to provide expert advice and review of this engineering work. The Tunnel Advisory Panel comprised of Dr. Geoffrey Martin, Dr. Edward Cording and Dr. Thomas O'Rourke, are recognized in the industry and throughout the world as engineering/construction experts in the areas

of geotechnical analyses, tunneling, deep excavation, earthquake engineering and building settlements.

Board approval of the recommendations will allow the continuation of services of two of the current Tunnel Advisory Panel members and replacement for a recently deceased member, Dr. Harvey Parker, with Dr. Thomas O'Rourke to support LACMTA on the Westside Purple Line Extension Section 1, Section 2 and Section 3 Projects, Regional Connector Transit Corridor Project, Eastside Transit Corridor Phase 2 Project, Sepulveda Transit Corridor Project, West Santa Ana Branch Transit Corridor Project and Crenshaw Northern Extension Project. In addition, Board approval of the recommendations will also allow TAP to provide Ad-Hoc services to other projects as needed by Metro staff.

BACKGROUND

The TAP convened in August 1995 in response to questions posed by the Board regarding feasibility of tunneling in Los Angeles ground conditions. Metro contracted with Drs. Dan Eisenstein, Geoffrey Martin and Harvey Parker to determine the feasibility of tunneling in Los Angeles, to assess the effectiveness of Metro's construction program to date, and to recommend any modifications to the current construction program deemed appropriate.

In June 2001, the Board approved two five-year contracts to the members of the TAP in the amount not-to-exceed \$1,167,826 and directed staff to return each year for funding approval. Since that time, the Board has approved funding and extensions to the TAP contracts. Due to Dr. Eisenstein's untimely death in April 2009, Metro management staff decided to procure an additional member for the TAP, Dr. Edward Cording, to provide expert technical services. With Dr. Harvey Parker passing away on May 5, 2020, Metro management staff decided to procure an additional member for the TAP, Dr. Thomas O'Rourke, to provide expert technical services.

DISCUSSION

The TAP members, Drs. Martin and Cording, have been providing advice to all Metro project with underground construction elements. In addition, Dr. O'Rourke has provided Independent Review Services for the Westside Purple Line Extension Project (Contract No. PS85102798) to review and validate the technical approach and conclusions drawn by the Metro's Consultants regarding earthquake faults in the general vicinity of Century City and tunneling through Beverly Hills and Century City. The projects that TAP has been involved with, include extensive underground engineering and construction that involve complex geotechnical and tunneling issues for which the TAP members are uniquely qualified.

In particular, Drs. Martin and Cording have been involved with the Westside Purple Line Extension Section 1, Section 2 and Section 3 Projects and the Regional Connector Transit Corridor Project from planning studies, preliminary and advanced preliminary engineering and development of procurement documents for construction contracts. They will continue to support these projects during active underground excavation and tunneling. In addition, they are involved with the Eastside

Transit Corridor Phase 2 Project and Sepulveda Transit Corridor Project planning studies.

The status of each project is as follows:

Westside Purple Line Extension Project

The Westside Purple Line Extension Project was adopted by the Board and the Final Environmental Impact Report (EIR) was certified in 2012. The project is being designed and constructed in three sections as part of Metro's 30-Year Long Range Transportation Plan. The entire 9-mile project consists of twin-bored tunnels with 7 subway stations which are primarily under Wilshire Boulevard.

As part of the approval process for the project, Metro commissioned a Peer Review Panel by the American Public Transportation Association (APTA) in 2005 to assess the safety of tunneling under Wilshire Boulevard. The Peer Review Panel agreed that it was possible to safely tunnel and operate a subway along the Wilshire Boulevard corridor using current technologies of tunneling, station construction and operation. The Panel also assessed the specific risks associated with tunneling, and recommended a course of action that addressed the following elements of tunnel construction and operation:

- Gas detection
- Mitigation of hazards
- Tunnel boring and station construction
- Safe operation
- Long-term monitoring and verification
- Technical feasibility

As a follow-up to the APTA Peer Review Panel's recommendations, Metro has retained the services of the TAP to provide independent review and monitoring of the following work that is being performed by Metro's engineering consultants and contractors:

- Section 1 Wilshire/Western Station to Wilshire/La Cienega Station (3.92 miles of twin-bored tunnels, 3 subway stations) - The Design/Build Contract (Tunnels, Stations, Systems and Trackwork) Notice-To-Proceed (NTP) was issued in January 2015. The main station box for all 3 underground stations (Wilshire/La Brea Station, Wilshire/Fairfax Station, and Wilshire/La Cienega Station) and the excavation for the Wilshire/Western Shaft has been completed. The appendages for the underground stations have begun and is anticipated to continue through the 2nd Quarter of 2022. Tunneling is expected to be completed by the 4th Quarter of 2020. The TAP will be required to provide expert advice on the tunnel segment designs, geotechnical data which includes gassy ground and tar sands, the daily tunneling reports to monitor progress, potential ground movements and mitigations for gassy ground conditions. The construction of underground stations and tunnels is anticipated to continue till the 3rd Quarter of 2023. Tap services will only be required for the underground and tunnel portion of the project, which is expected to be complete in the 2nd Quarter of 2022.
- Section 2 - Wilshire/La Cienega to Century City Constellation Station (2.59 miles of twin-bored tunnels, 2 subway stations) - The Design/Build Contract (Tunnels, Stations, Systems and

Trackwork) Notice-To-Proceed (NTP) was issued on April 2017. Final Design is almost complete. Construction of the 2 Stations (Century City/Constellation Station and the Wilshire Rodeo Station) began in 3rd Quarter of 2018 and anticipated to be completed by 2nd Quarter of 2025. Tunnel construction is expected to begin 2nd Quarter of 2020 and is expected to be completed by 4th Quarter of 2022. The TAP will be required to continue providing expert advice on the tunnel and station construction, geotechnical conditions encountered, potential ground movements and mitigations for gassy ground conditions. The construction of underground stations and tunnels is anticipated to continue until 1st Quarter of 2024.

- Section 3 - Century City/Constellation Station to Westwood/VA Hospital Station (2.56 miles of twin-bored tunnels, 2 subway stations) - The Design/Build Contract (Tunnels, Stations, Systems and Trackwork) Notice-To-Proceed (NTP) for Tunnel was issued on January 2019 and for Station was issued on May 2019. Final Design is currently in progress. The Tunnel Construction is anticipated to begin in the 2nd Quarter of 2020 and anticipated to be completed by 1st Quarter of the 2022. Station Construction is expected to begin 4th Quarter of 2020 and expected to be completed by 1st Quarter of 2025. The TAP will be required to provide expert advice on the tunnel and station design and construction, especially in the potential fault rupture zones and gassy ground conditions, geotechnical conditions encountered, the daily tunneling reports to monitor progress, potential ground movements and mitigations for gassy ground conditions. The construction of underground stations and tunnels is anticipated to continue until 1st Quarter of 2024.

Regional Connector Transit Corridor Project

The Regional Connector Transit Corridor project was adopted by the Board and the Final EIR was certified in 2012. The project consists of 1.9 miles of twin bored tunnels with three underground stations. The Design/Build Contract NTP was issued in July 2014. Construction of the Tunnels and excavation of the underground stations are complete and station structure construction is in progress. TAP members will continue to provide expert advice for the Regional Connector Project construction quarterly until 2nd quarter of 2021.

Eastside Transit Corridor Project - Phase 2

Metro is preparing Supplemental Draft Environmental Impact Report (DEIR) for the Eastside Transit Corridor Phase 2 Project (Project) that would extend the existing Metro L (Gold) Line from the existing terminus station at Atlantic Boulevard and Pomona Boulevard in East Los Angeles eastern Los Angeles County. The Supplemental DEIR considers the Washington Alternative. The Washington Alternative is approximately 9 miles, of which roughly 3 miles is an underground configuration along Atlantic Boulevard in unincorporated East Los Angeles and then along Smithway Street in the City of Commerce. TAP will be providing expert advice for the Washington Alternative on the following topics amongst others:

- Tunnel alignment design
- Tunnel Portal Locations
- Feasibility of Metro's twin-bore tunnels vs single-bore tunnels

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- Ground movements and changes the groundwater table associated with proposed methods of excavation and support for cut and cover structures;
 - Ground movements and changes to the groundwater table associated with proposed tunneling methods

It is anticipated that draft environmental studies and advanced conceptual engineering will continue through 2023. The project is identified as one of the four pillar projects and if funding can be secured before the anticipated 2029 funding cycle, design and construction is anticipated to proceed from 2023 to 2028.

Sepulveda Transit Corridor Project

The Sepulveda Transit Corridor Project is included in Metro's 2009 Long-Range Transportation Plan (Metro, 2009), in the Measure R Expenditure Plan as the "San Fernando Valley I-405 Corridor Connection" (Metro, 2008) and in the Measure M Expenditure Plan as the "Sepulveda Pass Transit Corridor" (Metro, 2016a). After the passage of Measure R in 2008, Metro undertook the Sepulveda Pass Corridor Systems Planning Study (Metro, 2012), which evaluated both highway and transit improvements extending from the Valley to LAX. The Measure M Expenditure Plan provides for implementation of the Sepulveda Transit Corridor Project in two phases: the first segment between the San Fernando Valley and the Westside of Los Angeles (Valley-Westside) by 2033-2035 and an extension to LAX (Westside-LAX) by 2057-2059. Under Metro's 28 by 2028 initiative, the Valley-Westside portion of the project is identified for potential acceleration in time for the 2028 Olympic and Paralympic Games in Los Angeles (LA 2028).

The Sepulveda Transit Corridor Feasibility Study was completed and presented to the Board in November/December 2019, and contracts for the environmental phase, including up to two pre-development agreements (PDAs), are currently undergoing procurement. While project alternatives for environmental review have not yet been selected, they may require geotechnical considerations for design and construction of tunnels and underground stations as follows:

- Tunneling through hard rocks
- Tunneling through alluvial soils
- Tunneling through fault zones
- Tunneling with relatively high groundwater pressures
- Mixed-face tunneling with rocks with contrasting strengths (low to very high abrasive, weak to very strong rocks)

Environmental review is anticipated to be completed in 2024.

West Santa Ana Branch (WSAB) Transit Corridor Project

In Summary 2017, Metro formally initiated the environmental process through the original public scoping meetings held for the WSAB Project. In May 2018, the Metro Board selected two Northern Alignment options (Alameda Underground and Downtown Transit Core Underground) that include about 3 miles long tunnels and underground stations. It is anticipated that Draft EIS/EIR will be completed in Winter of 2021 and the Board will select LPA in Spring 2021 for Final EIR/EIS.

Concurrently, Metro is evaluating an early project delivery by 2028 through P3 delivery method.

TAP will be providing expert advice for the underground portions of the WSAB Project on the following topics amongst others:

- Tunnel alignment design
- Tunnel Portal Locations
- Ground movements and changes the groundwater table associated with proposed methods of excavation and support for cut and cover structures;
- Ground movements and changes to the groundwater table associated with proposed tunneling methods

Crenshaw Northern Extension Project

In February 2016, the Crenshaw North Extension project was included in the Chief Executive Officer's "Operation Shovel Ready Initiative" list of projects for advancement through early stages of project planning. The Crenshaw Northern Extension Feasibility Study was initiated in May 2016. Following the passage of Measure M in November 2016, it was further expanded to include Alternatives Analysis. The study analyzed four potential alignment alternatives that could extend the Crenshaw/LAX Line northward from the Metro Expo Line (Line E) to the Metro Purple Line (Line D) on Wilshire Boulevard and the Metro Red Line (Line B) in Hollywood, as well as one alignment alternative that would extend from the Expo Line to the Red/Purple Line Wilshire/Vermont Station, with a connection to Hollywood via transfer to the existing Metro Red Line, but would not serve West Hollywood.

In September 2018, the Metro Board authorized the preparation of an Advanced Alternatives Screening Study with further engineering design and public stakeholder outreach to narrow the range of alternatives to be carried forward in the environmental studies. That study was completed in 2019.

It is anticipated that EIR and Advanced Conceptual Engineering (ACE) will begin in the later part of 2020. TAP will be providing expert advice on the following topics amongst others for the ACE study:

- Tunnel alignment design
- Tunnel Portal Locations
- Tunneling through fault zones and gassy areas
- Ground movements and changes the groundwater table associated with proposed methods of excavation and support for cut and cover structures;
- Ground movements and changes to the groundwater table associated with proposed tunneling methods

In addition to the above Projects, TAP may be asked to provide Ad-Hoc services to other projects as needed by Metro Staff.

All the projects listed above are at critical stages in their respective planning, engineering and construction phases. Extension and additional funding for the TAP contracts are vital and essential to provide continuity that would otherwise be interrupted, should the Board decide to cancel and re-

procure the TAP contracts (a 6 to 9-month process). Furthermore, the history and knowledge of the current designs, geotechnical conditions and construction approaches will present a steep learning curve for a new team of TAP members, which could significantly delay the timely review and input necessary to provide this important layer of independent monitoring and oversight across these complex engineering and construction projects.

TAP members are involved with on-going support relating to third party and project stakeholders' issues, which will require continuation of their services for the future. They have unique knowledge and background on Los Angeles County's underground conditions and intimate knowledge of Metro's past and current engineering and construction projects. Board approval and execution of the Contract Modifications will allow continuation of these services.

DETERMINATION OF SAFETY IMPACT

The Board actions will not have an impact on established safety standards for Metro's engineering and construction projects.

FINANCIAL IMPACT

Funds are included in the FY21 budget for the actions under Regional Connector Transit Corridor Project 860228; Westside Purple Line Extension Section 1 Project 865518; Westside Purple Line Extension Section 2 Project 865522; Westside Purple Line Extension Section 3 Project 865523; Eastside Transit Corridor Phase 2 Project 460232; Sepulveda Transit Corridor Project 460305; West Santa Ana Branch Transit Corridor Project 460201; and Crenshaw Northern Extension Project 405558 under Account No. 50316 (Professional and Technical Services). Since this is a multi-year contract, the Executive Director of Engineering and Construction and the Project Managers will be responsible for cost budgeting in future years.

Impact to Budget

The source of funds for these actions are a combination of Measure R Transit 35%, Measure R Highway 20%, Measure R Admin 1.5%, Measure M Transit 35%, Lease Revenues, Federal Section 5309 New Starts, Transportation Infrastructure Finance and Innovation Act (TIFIA) Loan proceeds, Federal STP, CMAQ, State Proposition 1B, Local Partnership Program, Transit and Intercity Rail Capital Program, Proposition A 35%, Proposition A Admin 5%, Proposition C 25%, and Proposition C Admin 1.5%. These were approved in the capital projects funding plan.

IMPLEMENTATION OF STRATEGIC PLAN GOALS

This recommendation supports the Strategic Plan Goal # 5, *"Provide responsive, accountable, and trustworthy governance within the Metro organization."*

ALTERNATIVES CONSIDERED

Staff has considered the alternative of allowing the current contracts with Dr. Martin, and Dr. Cording to expire and open a procurement notice to solicit applications from potential new members, but

decided to execute the contract modification for the current TAP panel members and negotiate and execute sole source Contract with Dr. O'Rourke for the following reasons:

- Current TAP members Drs. Martin's and Cording's long history and institutional knowledge of Metro together with Drs. Martin's, Cording's and O'Rourke's knowledge of local soil conditions and technical understanding of specific tunnel related issues in general and those pertaining to local conditions in particular would require significant investment in time and resources to replicate even if other equally suitable candidates were found and used in this role,. This would not only incur cost but would significantly reduce the benefit and validity of their advice, while this knowledge and understanding were obtained. This is not recommended as it will leave Metro without the benefit of their extensive local experience, knowledge and expertise and create a void in the required tunneling expertise for a considerable period of time, thereby creating the potential for delays and additional costs to ongoing Metro projects.
- Metro baseline documents include Design Criteria, Standard Drawings, Directive Drawings and Baseline Specifications. These baseline documents were adapted and updated from documents previously utilized for prior projects and are being continuously updated to incorporate the Lessons Learned from the past and current projects or to account for evolving technologies. Current TAP members, Drs. Martin and Cording have observed developments and successes on Metro's current projects that need to be documented and be made available to both current and future Metro projects. Through their involvement with various Metro projects, TAP has also encountered technical and contractual issues that require improvements in Metro baseline documents. Currently, TAP is fully engaged in assisting Metro with this lessons-learned process and accordingly updating the Metro Baseline documents. Executing the contract modification with the current TAP members enable Metro to continue seeking this valuable input from them to update the baseline documents with the lessons learned from their engagements from all the current large projects. This will make the Metro Baseline a set of industry leading document and capture the issues from Metro's past and current Projects.

NEXT STEPS

After Board approval and execution of the Contract Modifications, staff will direct the Tunnel Advisory Panel to continue providing tunnel engineering advice to Metro including supporting the aforementioned projects.

ATTACHMENTS

Attachment A - Procurement Summary

Attachment B - Contract Modification Change Log

Attachment C - DEOD Summary

Prepared by:

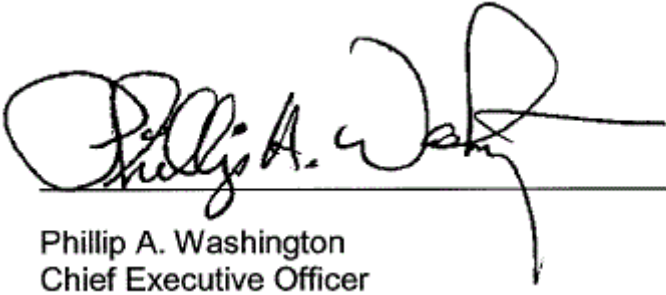
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