**Safety and Operations Committee**

**Board Information Item 3A**

**November 21, 2019**

# Silver Line Phase 2 Update

**Washington Metropolitan Area Transit Authority**

# Board Action/Information Summary

| ○ Action ◉ Information | MEAD Number: 202123 | Resolution: ○ Yes ◉ No |
|---|---|---|

**TITLE:**

Silver Line Phase 2 - Follow-Up

**PRESENTATION SUMMARY:**

Staff will present the Board with an update on Silver Line Phase 2 quality issues previously presented to the Safety and Operations Committee on September 12, 2019.

**PURPOSE:**

To inform the Safety and Operations Committee of the current status of construction quality issues that were previously presented on September 12, 2019.

**DESCRIPTION:**

**Capital Rail Constructors**, a joint venture of **Clark Construction Group, LLC**, and **Kiewit Infrastructure South Co.**, is the design-build contractor for Package A of the Silver Line Phase 2 (mainline and stations), and **Hensel Phelps Construction Company** is the design-build contractor for Package B (Dulles Rail Yard). Major subcontractors and consultants under these entities include **Mass. Electric Construction Company**, **Parsons Corporation**, **Dewberry**, **Systra**, and **M.C. Dean**.

Major consultants and contractors supporting Metro's efforts on the project include **Mott MacDonald**, **Gannett Fleming**, **HNTB**, and **Cubic Transportation Systems**.

**Key Highlights:**

- Metro, as intended future owner and operator, determines when all the conditions necessary for Metro acceptance have been satisfied, and whether Phase 2 of the project is accepted into the Adopted Regional System (ARS)

- Dynamic Testing for Phase 2 includes testing the tie-in of the Automatic Train Control (ATC) system to Phase 1. To support this ATC tie-in testing, 13 weekend outages of the Wiehle-Reston East Station will be scheduled between November 2019 and March 2020.

- The Airports Authority has identified problems with quality, and other issues, that will push back substantial completion of the project at least six months past its original August 2019 date. The Airports Authority believes that a Summer 2020 start of revenue service remains feasible, subject to resolution of these issues.

**Background and History:**

Phase 2 of the Silver Line will extend the Metrorail system into Loudoun County, Virginia, and provide 11.4 miles of new track from the interim terminus at Wiehle-Reston East Station, through the Washington Dulles International Airport, to a terminus in eastern Loudoun County. It includes six new Metrorail stations (Reston Town Center, Herndon, Innovation Center, Washington Dulles International Airport, Loudoun Gateway, and Ashburn), and a new service & inspection yard.

Metro's roles and responsibilities for the design-build phase of the Silver Line Phase 2 project are as defined in the Cooperative Agreement executed between the Airports Authority and Metro on August 7, 2013.

The Board of Directors amended the ARS to incorporate the Dulles Metrorail Extension (Silver Line) subject to the fulfillment of certain "ARS Contingencies" adopted in Resolution 2012-24. Additional conditions precedent for acceptance are established in Article 6 of the Cooperative Agreement.

**Discussion:**

Construction of the Silver Line Phase 2 is well advanced. Facility/civil construction is nearly complete, and systems installations and testing are under way. In the more advanced areas of the Phase 2 alignment, Dynamic Testing Readiness has been certified, and testing using Metro railcars is underway.

In addition to Dynamic Testing Readiness, the project will advance through several milestones moving towards the start of revenue service. These milestones are defined and summarized as follows:

Dynamic Testing Readiness – determination that the contractor has completed the work in accordance with the contract documents which renders the project safe and capable of supporting dynamic testing. This determination is supported by documentation of the following: final alignment and track configuration; operational traction and third rail power; completion of prerequisite automatic train control static testing; activation of contractor start-up railroad safety procedures; and verification of train, track and structure clearances.

System Performance Demonstration (SPD) – activities conducted by the contractor to demonstrate that the integrated subsystems of the project perform, both individually and collectively, in accordance with the contract requirements. The SPD testing addresses normal, abnormal, and simulated emergency operations, and includes both static and dynamic tests.

Substantial Completion (SC) – the work is substantially complete, all conditions of substantial completion have been met, and the project is ready for operational readiness testing. Conditions to substantial completion include performance of contractor inspections and tests, delivery of record documents and spare parts, completion of training and contractor safety certification, correction of all defects that materially adversely impact the operations of the Project, and provision of O & M manuals and punch list completion schedule.

Operational Readiness Date (ORD) – the date on which Metro determines that the Project is sufficiently complete for Metro to commence simulated rail service, and that the conditions to operational readiness have been met. A condition of operational readiness is the successful completion of operational readiness testing conducted by Metro.

Pre-Revenue Activities – between ORD and Acceptance, Metro has provisional care, custody and control of the project, and performs activities in preparation for revenue service. These activities include verification that conditions precedent for acceptance have been met; simulated service; emergency drills; safety certification; mobilization of stations and yard; re-keying all facilities; providing escorts to support contractor punch list completion; control right-of-way operations; and performance of preventive maintenance inspections.

Metro's acceptance determination is supported by the completion of certain ARS Acceptance Tasks, verification that all conditions precedent for acceptance have been met, and Metro's determination that Phase 2 is eligible and ready for Metro Acceptance.

The conditions precedent for acceptance of Phase 2 into the ARS as established in the Cooperative Agreement are summarized as follows:

Condition 1. Punch List – all punch list work completed to Metro's satisfaction. If not completed, Metro has the right to complete punch list items at the Airport Authority's expense.

Condition 2. Property Transfers – The Airports Authority shall have transferred to Metro the appropriate property interests as indicated in the approved Right-of-Ways plans.

Condition 3. Spare Parts and Training – Metro shall have received all spare parts, O&M manuals, and necessary training.

Condition 4. Record Deliverables – record deliverables

have been received by Metro.

Condition 5. Assignment of Warranties – all warranties have been assigned to Metro, and all documentation necessary to enforce the warranties has been provided to Metro.

Condition 6. Permits – The Airports Authority shall have obtained for Metro all land use and permitting approvals necessary for Metro's operations.

Condition 7. Payments – The Airports Authority shall have paid Metro all funds due and owing.

Condition 8. Safety and Security – project has achieved certification by Metro Chief Safety Officer.

Condition 9. Insurance – Metro shall have received all certificates of insurance.

Condition 10. Storm Water Management – The Airports Authority shall have obtained maintenance agreements as required.

A series of quality issues have been documented on the project, including the following:

Underway

- Track insulated joint (IJ) deficiencies at Dulles Yard
- Precast concrete wall panel cracks at Dulles Yard Buildings
- Tight gauge at switches in Dulles Yard
- Concrete tie deficiences

Unresolved

- Track plate deficiencies
- Cross level deficiencies at special track work
- Ballast deficiencies at Dulles Yard
- Precast concrete panel deficiences at stations

Updates on the status of these quality issues are discussed in the attached presentation.

**FUNDING IMPACT:**

| | |
|---|---|
| There is no impact on funding for presenting this update. However, should any Silver Line Phase 2 revenue service ramp up costs occur in FY2020, an amendment to the FY2020 Budget will be required. | |
| Project Manager: | John Thomas |
| Project Department/Office: | COO/DECO |

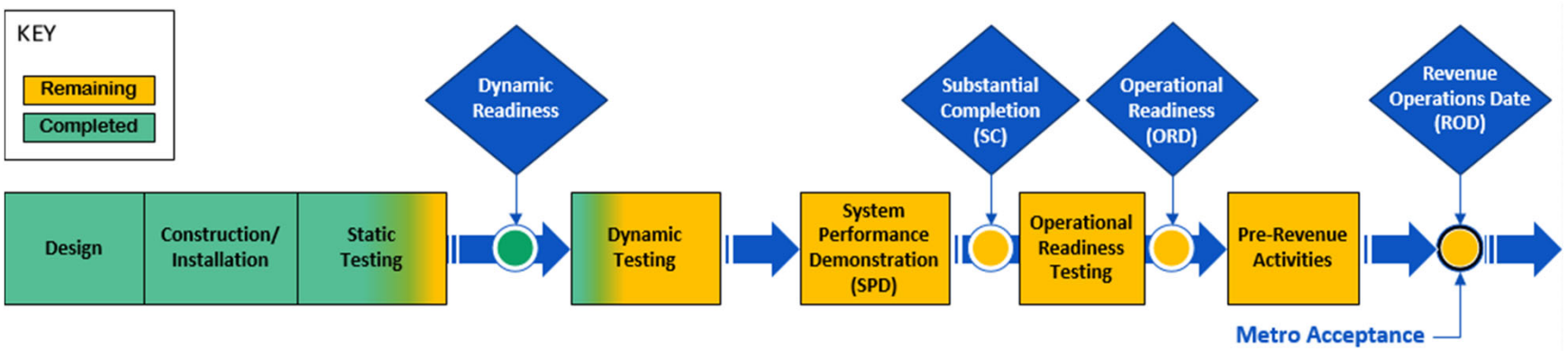
**TIMELINE:**

| | |
|---|---|
| **Previous Actions** | August 2013 – Metro and MWAA executed the negotiated Cooperative Agreement that provides for Metro support throughout the design-build phase of the Silver Line Phase 2 project. |
| **Anticipated actions after presentation** | **Month/year** – Acceptance of Silver Line Phase 2. |

# Silver Line Phase 2 Update

Safety and Operations Committee
November 21, 2019

# Silver Line Phase 2 Milestones/Sequence




- Phase 2 Tie-In Testing
  - Prior to completion of Dynamic Testing, and before beginning of SPD, testing of the Automatic Train Control (ATC) system tie-in to Phase 1 will be required
  - Outages at the Wiehle-Reston East Station needed to support ATC testing
  - 13 weekends scheduled between now and March 2020, supported by bus bridges

# Identified Quality Issues

- ✓ Aerial track girder cracking
- ✓ Pedestal deficiencies at Dulles Airport Station screen wall
- ✓ Roadway pavement failures at Dulles Yard
- ✓ Buy America issues with bridge cranes at Dulles Yard
- !! Track insulated joint (IJ) deficiencies at Dulles Yard
- !! Precast concrete wall panel cracks at Dulles Yard buildings
- !! Tight gauge at switches in Dulles Yard
- !! Concrete tie deficiencies
- ✗ Track plate deficiencies
- ✗ Cross-level deficiency at special track work
- ✗ Ballast Deficiencies at Dulles Yard
- ✗ Precast concrete panel deficiencies at stations

✓ Resolved !! Underway ✗ Unresolved

# !! Track insulated joint (IJ) deficiencies at Dulles Yard

- Mechanical deficiencies (misaligned/oversized holes)
- Contractor replaced selected field installed IJ's
- Failures of electrical isolation testing (rail to joint bar) continue, without identification of root cause
- Metro acceptance or rejection will be based on Metro's final review of the rework

# !! Precast concrete wall panel cracks at Dulles Yard buildings

- Cracks observed at the exterior surface of wall panels
- Airports Authority and contractor conducted testing and analyses to determine cause
- Airports Authority and contractor concluded that cracking is result of panel connections restraining the panel thermal and shrinkage movement
- Although cracks are narrow, potential exists for reduced durability
- Contractor has proposed application of a sealer, Metro reviewing sealer products and samples submitted by contractor
- Metro OIG is conducting a review of this issue; awaiting report
- Metro acceptance or rejection of the panels will be based on OIG findings

# !! Tight gauge at switches in Dulles Yard

- Condition exists at 39 switches in Dulles Yard
- Contractor working with manufacturer to achieve required tolerance – efforts still underway
- Contractor remediation includes use of alternate insulators to widen gauge
- Metro acceptance or rejection will be based on Metro's final review of the rework

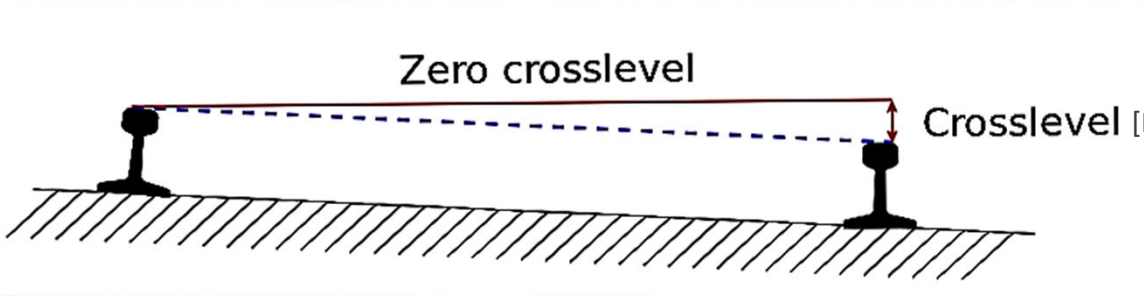
# !! Concrete tie deficiencies

- Some concrete switch ties exceed contractual design requirements for allowable camber
- Remediation or replacement of cambered ties continues to be reviewed in conjunction with resolution of cross-level deficiency

# Track plate deficiencies

- Track plates at special trackwork exhibit curvature in excess of contractual design requirements for flatness creating gap between plate and tie
- Metro ceased operation of test trains until it was determined that conditions at frog were safe
- After disassembly by contractor - determined that plate curvature caused by forces from fastener/frog configuration
- Plate fatigue concern remains
- Metro will require remedy to address gaps at track plates that could result in fatigue failure

# Cross-level deficiency at special track work




- Mainline turnouts throughout ballasted areas (29 turnouts)
- Inability to achieve compliance with the requirements for maximum allowed cross-level (1/8“ +/-)
- Deficiencies are not uniform - each turnout has unique conditions
- Remediation installed by contractor incorporates unique thicknesses for pads, custom guard rail plates, and ancillary hardware for each turnout

# Cross-level deficiency at special track work (cont.)

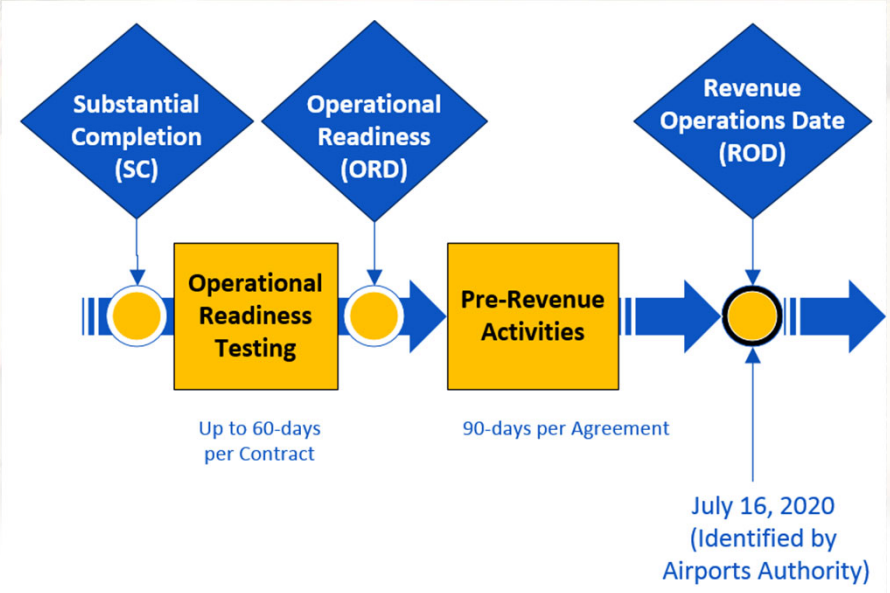
- Metro rejects the contractor remedy because it is not a safe and effective long-term solution
- Airports Authority continues to perform surveys of as-built conditions
- Airports Authority and contractor have not yet identified root cause

# Ballast deficiencies at Dulles Yard

- Ballast contaminated with materials of inappropriate size/consistency; condition can lead to drainage issues, affect ability to constrain tracks, and pose a potential safety risk
- Based on previous testing and field observations, fouled ballast pervasive throughout the Yard
- Metro OIG recommends complete survey and testing of ballast
- Metro's consultant has identified sampling locations and test methods – collection of samples and sieving underway
- Metro acceptance or rejection will be based on complete and thorough remediation of the fouled ballast in the Yard to meet required standards

# Precast concrete panel deficiencies at five at-grade stations

- Based on whistleblower complaint, federal investigation confirmed falsifying of test results at the concrete plant
- Deficiencies include high water/cement ratio; low air content; insufficient concrete cover of reinforcing; potential Alkali-Silica Reactivity (ASR)
- Airports Authority's contractor applied Silane sealer as a remedy; requires periodic reapplication
- Metro's OIG documented that Airports Authority's contractor tested 25 concrete cores for penetration depth of Silane solution application; 20% of 25 cores tested failed to achieve sufficient penetration
- Airports Authority's contractor applied additional sealer – Metro OIG awaiting documentation
- Metro rejects the remediation and the panels unless and until the Airports Authority proposes a safe and effective long term solution

# Summary

- Airports Authority has projected a revenue start date of July 2020
- Metro will not set a target service date until all identified deficiencies have been resolved to meet acceptance standards
- To complete automatic train control testing of tie-in to Phase 1 and achieve substantial completion 13 weekend shutdowns of Wiehle-Reston East required
- Once Metro has established a revenue start date, to begin start up the Metro Board will be requested to amend the FY 2020 budget in January
- Airports Authority's response to the unresolved deficiencies will determine path forward and timing for Metro acceptance or rejection of the project