



**Safety and Operations Committee**

**Board Information Item III-C**

**February 11, 2021**

**Silver Line Phase 2 Update**

Washington Metropolitan Area Transit Authority  
**Board Action/Information Summary**

☐ Action ☒ Information

MEAD Number:  
202245

Resolution:  
☐ Yes ☒ No

**TITLE:**

Silver Line Phase 2 Update

**PRESENTATION SUMMARY:**

Staff will present the Board with an update on the status of Silver Line Phase 2 open issues.

**PURPOSE:**

To inform the Safety and Operations Committee of the current status of open issues including updates to issues that were previously presented on December 10, 2020.

**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:**

- As part of Metro's ongoing review of the Silver Line Phase 2 project, at this time 18 identified and significant open issues are being tracked. One issue has been resolved (Cross Bond Spacing Deficiency); resolution is underway on eight issues (tentative agreement exists on a path forward and remediation is in progress); nine are Unresolved (lack of agreement on a path forward and/or lack of agreement on root cause analyses).
- Throughout the duration of this project, as with any other project, many quality issues were identified. These fall in several categories such as non-compliance with design and/or performance requirements, unapproved design modifications, premature component failures, or safety concerns. Over time, many of the issues have been resolved. However, as the project approaches Substantial Completion (SSCD now projected by MWAA to be in April 2021), many of the issues remain open. Depending on the specific issue, satisfactory resolution must occur prior to SSCD, Operational Testing, or at the very latest prior to acceptance/start of

revenue service. The current status of the 18 open items is included in the attached presentation.

- Metro will establish a revenue service date after all identified deficiencies have been resolved to meet acceptance standards.
- As the intended future owner and operator, Metro 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).

### **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 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 role 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 nearing completion. Facility construction is complete, and systems installations and testing are well advanced. The Dynamic Testing Readiness milestone has been achieved, and testing using Metrorail cars has been underway since February 2019.

In addition to Dynamic Testing Readiness, the project will advance through several milestones moving towards the start of revenue service. The 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.
- Substantial Completion (SC) – the work is substantially complete. System Performance Demonstration is 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. A key condition of operational readiness is the successful completion of operational readiness testing conducted by Metro.

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.

The status of the 18 issues that were brought to the Board's attention at the December 10, 2020 Safety & Operations Committee meeting are as follows:

#### Resolved

- Cross Bond Spacing

#### Underway

- Surge Arrestor Failures
- Non-Compliant Crib Heaters (Yard)
- Fuel Center Deficiencies at Dulles Yard
- Insufficient Line of Sight to Track Signals
- Rail Car Hoists
- Precast Panels at Dulles Yard
- Tight Gauge at Switches in the Yard
- Non-Compliant Snow Melter Calrods

#### Unresolved

- Cracked 3rd Rail Insulators
- Cracked Impedance Bonds
- Damaged Direct Fixation Track Fasteners
- Malfunctioning UPS Fans (Mainline and Yard)
- Incorrect Distance between Insulated Joints (IJ's) and Signals at Dulles Yard
- Station Platform Paver Installation
- Turntable Deficiencies at Service & Inspection Building at Dulles Yard
- Embedded Track Deficiencies at Maintenance Buildings at Dulles Yard
- Non-Compliant Clearance in Elevator Machine Room at Dulles Yard

In summary, of the 18 currently open issues:

- One is Resolved
- Eight are Underway (being resolved), and
- Nine are Unresolved

Updates on the status of all quality and open issues are discussed in the attached presentation.

## **FUNDING IMPACT:**

There is no direct impact on funding for presenting this update. However, based on future assessment of Silver Line Phase 2 revenue service ramp up in FY2021, the FY22 budget may need to be modified to reflect revised start of service. Changes for FY21 budget have already been incorporated.

Project Manager:	Neil Nott
Project Department/Office:	Capital Delivery/Project Implementation and Planning (CAPD/PICO)

#### **TIMELINE:**

<b>Previous Actions</b>	August 2013 – Metro and the Airports Authority executed the negotiated Cooperative Agreement that provides for Metro support throughout the design-build phase of the Silver Line Phase 2 project.
<b>Anticipated actions after presentation</b>	Board Action approving Service Plan and Title VI Equity Analysis Acceptance of Silver Line Phase 2

# Silver Line Phase 2 Update

Safety & Operations Committee  
February 11, 2021



# Purpose

- Provide an update on the status of significant Open Issues
- Review Schedule to Completion & Acceptance



# Open/Unresolved Issues Summary

- Currently, we are tracking the following significant open issues:
  - Nine are “Underway” – tentative agreement exists and resolution is in progress
  - Eight are “Unresolved” – lack agreement on path to resolution
  - One has progressed to “Resolved”, since December 10, 2020 briefing
  - No new issues to elevate to Board at this time
- While all issues must be resolved prior to Acceptance, some affect completion of testing and operational readiness, increasing urgency of resolution

# Open Issues by Status & Impact

*Impacts Operational Readiness  
(WMATA Project Acceptance)*

*Underway*

- Insufficient Line of Sight to Track Signals

- Rail Car Hoists
- Surge Arrestors
- Crib Heaters at Yard
- Precast Panels at Yard
- Fuel Center Slabs
- Tight Gauge at Switches in Yard
- **Non-Compliant Snow Melter/Calrods**

*Unresolved*

- Incorrect Distance Between Insulated Joints and Signals at Yard
- Malfunctioning UPS Fans (Mainline and Yard)

- Non-Compliant Clearance in Yard Elevator Machine Room
- Cracked Impedance Bonds
- **Damaged Direct Fixation Fasteners**
- **Station Platform Pavers**
- Turntable Deficiencies at Yard
- Embedded Track Deficiencies at Yard
- Cracked Third Rail Insulators

# Open Issues Progress Since December

- Cross Bond Spacing
  - Design submittals approved by WMATA
  - Contractor advancing field work and software modification efforts
  - Although work remains to implement and test, issue now considered to be resolved
- Non-Compliant Snow Melter/Calrods
  - Contractor acknowledged heater length not consistent with switch design
  - Proposal made by contractor to “use as is” is under consideration
- Cracked Third Rail Insulators
  - Root cause analysis submitted by contractor identifying cause of damage to be over-torqueing
  - Contractor checking torque on all insulators (+/- 40,000) and replacing any that are cracked
- Malfunctioning UPS Fans
  - Field verification of potential solution ongoing. Root cause still to be determined

# Damaged Direct Fixation Fasteners

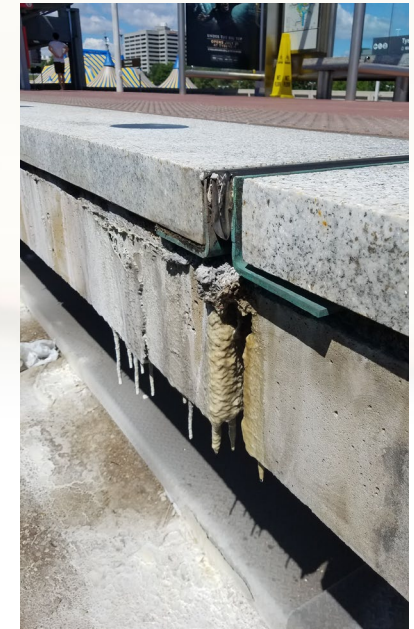
- Damaged Direct Fixation Fasteners (high pre-mature failure rate) is a significant unresolved issue
  - Several thousand damaged direct fixation track fasteners have required replacement
  - Forensic analysis remains underway but contractor suggests damage was result of installation process
  - WMATA and MWAA staff observed fasteners damage on both the side from which the clip is hammered in as well as the opposite side
  - Investigation by WMATA third-party consultant has been initiated





# Station Platform Pavers

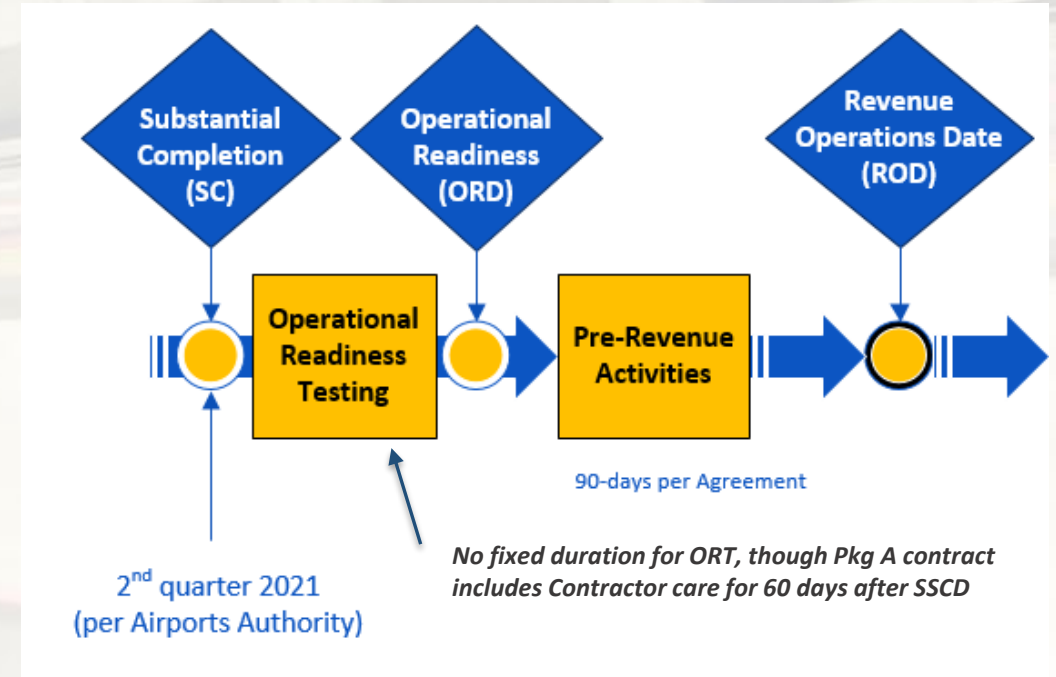
- Station Platform Pavers is another of the most concerning issues still unresolved due to impact on long term maintenance
  - September 2016 letter to MWAA identified systemic water infiltration to paver setting bed and efflorescence at Ph1 platforms causing edge light failures – requested MWAA ensure not repeated on Ph2
  - January 2018 letter provided MWAA with findings from 3rd-party investigation of Ph1 and identified issues not addressed in Ph2 design
  - Systemic joint failure/cracking, water infiltration and efflorescence formations of Ph1 are apparent on Ph2
  - WMATA concern is deficient paver system will result in significant additional maintenance and reduced life expectancy of platform



Tysons Corner Station

# Projected Completion

- Airports Authority currently projects Substantial Completion in second quarter 2021 (Package A)
- ATC testing can resume following implementation and regression testing of revised cross-bonding design
- Additional weekend shutdown required in 2021 to perform final cut-over



# Summary

- Several issues remain unresolved or open
  - Metro continues to work with the Airports Authority to mutually agree on a path forward to resolve open issues as required to achieve key milestones:
    - Start of Operational Readiness Testing
    - Pre-Revenue activities
    - Acceptance of the Project by WMATA for Revenue Operations
- Airports Authority's response to the unresolved issues will determine path forward and timing for Metro acceptance or rejection of the project



# Prior Slides on Key Issues now Resolved



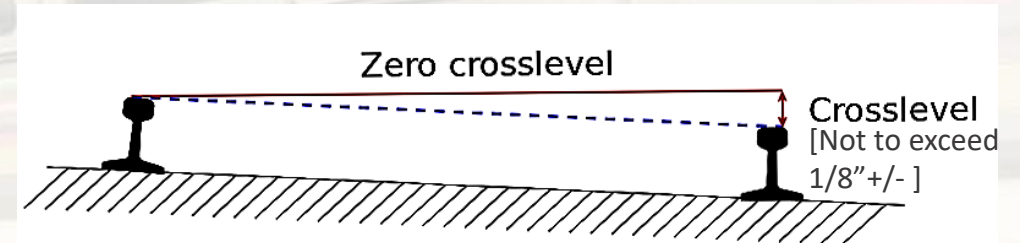
# Precast concrete panel deficiencies at five at-grade stations

- Deficiencies include high water content; low air content; insufficient cover of reinforcing; potential Alkali-Silica Reactivity (ASR)
- Airports Authority's contractor applied Silane sealer as remedy
- Metro OIG completed inspections of current panel conditions in Aug. 2020 - inspection reports identified 184 panels with cracks (342 cracks total)
- Metro concurs with OIG's 8 recommendations addressing panel documentation, crack repairs, future inspections, sealer re-application frequency, and escrow cost considerations



# Cross-level deficiencies at special trackwork

- Mainline turnouts throughout ballasted areas (29 turnouts/7 locations) - inability to achieve compliance with the requirements for maximum allowed cross-level ( $1/8''$  +/-)
- Original remedy of unique hardware rejected by Metro
- Airports Authority's contractor completed re-tamping effort at all locations
- Re-tamping results sufficient to allow Metro to accept 24 of the 29 non-compliant turnouts
- Metro to accept remaining 5 turnouts "as-is"; future costs to be determined



# Appendix: Full List of Unresolved Issues



# Open Issues: Component Failures

- Cracked 3<sup>rd</sup> Rail Insulators (April 2020)
  - Contractor has replaced 1500+ insulators that were exhibiting cracks - root cause has not been agreed upon
- Cracked Impedance Bonds (October 2019)
  - Seven bonds significantly cracked, requiring replacement bonds; others with potential hairline cracks being investigated
  - Root cause analysis by manufacturer identifies cause as damage during installation - Metro's assessment is root cause analysis does not definitively rule out systemic product defects
- Damaged Direct Fixation Track Fasteners (May 2020)
  - Several thousand damaged direct fixation track fasteners have required replacement - root cause of the damage has not been determined
- Malfunctioning UPS Fans (Yard and Mainline) (March 2018)
  - UPS exhaust fans continually running at high speed, burning out fan motors. Root cause preliminarily identified; solution has been implemented. Awaiting confirmation issue has been resolved
- Surge Arrestor Failures (March 2016)
  - Systemic positive surge arrestor failures experienced throughout project - surge arrestors replaced with product of different manufacturer with no further failures - awaiting further root cause analysis by Airports Authority

# Open Issues: Stations & Systems

- Incorrect Distance Between Insulated Joints (IJ) and Signals (Yard) (June 2019)
  - WMATA concern is insufficient distance between the signals and related IJ's to ensure safe train movement
  - Airports Authority challenges applicability of mainline specifications in the Yard and safety concerns
- Station Platform Paver Installation (November 2017)
  - Systemic joint failures at pavers, water penetrating setting bed, significant efflorescence deposits at the platform edges
  - Airports Authority has not identified comprehensive program to address the issues
- Non-Compliant Snow Melter/Calrods (Mainline) (September 2018)
  - The length of the respective heater elements does not comply with contract requirements. Proposal from Contractor to use 'as is' under consideration
- Insufficient Line of Sight to Track Signals (July 2018)
  - Multiple locations identified where there is insufficient line-of-sight to ATC signals. Field investigations continue

# Open Issues: Yard

- Railcar Hoists at Dulles Yard (April 2016/September 2020)
  - During performance testing issues were identified with the control systems, auto chock systems, and others
- Tight Gauge at Switches in Dulles Yard
  - Tight gauge identified at 39 switches in Dulles Yard
  - Acceptance of mitigation pending verification of gauge following completion of Dynamic testing
- Precast Concrete Wall panel Cracks at Dulles Yard Buildings
  - Airports Authority concluded cracking on surface of exterior wall panels due to panel connections restraining panel thermal and shrinkage movement, and have stabilized
  - Metro OIG Sept. 2020 report concluded that sealer application is acceptable remediation; however, costs for future re-application of sealer should be considered
- Turntable Deficiencies at Service & Inspection Building (October 2020)
  - Issues include excessive rocking, gaps and misalignment at flange way, undocumented modifications

## Open Issues: Yard (con't)

- Embedded Track Deficiencies at Maintenance Buildings (October 2018)
  - Embedded track in shop buildings and aprons - flange ways too wide, shop floor not flush with track
- Non-Compliant Clearance in Elevator Machine Room (May 2018)
  - Metro assesses that elevator machine room equipment clearances do not meet code requirements
- Fuel Center Deficiencies at Dulles Yard (July 2018)
  - Recommendation of Metro OIG March 2020 Interim Report was that contractor provide evidence that final construction complies with design requirements - acceptance request for nonconforming slab in progress
- Non-Compliant Crib Heaters (Yard) (September 2018/October 2019)
  - The length of the respective heater elements does not comply with contract requirements