



Safety and Operations Committee

Board Information Item IV-A

December 10, 2020

Silver Line Phase 2 Update

Washington Metropolitan Area Transit Authority
Board Action/Information Summary

Action Information

MEAD Number:
202231

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. The Board will also be briefed on the Safety and Security Certification process for this project.

PURPOSE:

To inform the Safety and Operations Committee of the current status of open issues including updates to issues that were previously presented on September 12, 2019, November 21, 2019, January 16, 2020, May 14, 2020 and October 8, 2020. Additionally, staff will provide an outline of the Safety and Security Certification Process for this project as required prior to acceptance and start of revenue service.

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, 14 major quality issues were identified and presented to the Safety and Operations Committee on October 8, 2020. Since then 10 of these quality issues have been resolved, pending negotiation of escrow account to cover increased maintenance costs. The remaining four issues are currently being remediated.
- 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 these issues have been resolved. However, as the project approaches Substantial Completion (SSCD now projected by MWAA to be in April 2021), many of these

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. As of now, fourteen issues fall in these categories. Four of these have a path forward and are expected to be resolved. The remaining ten issues are either unresolved and/or the proposed path forward for remediation is not acceptable because of the lack of an underlying root cause analysis. The current status of these fourteen 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.
- 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).
- The Safety Department will provide a briefing on the Safety and Security Certification process for this project as required prior to acceptance and start of revenue service.

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. 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.

- 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.

A series of quality issues have been documented on the project, including the following that have previously been presented to the Safety & Operations Committee. These fourteen issues have been categorized as follows to reflect their current status:

Resolved

- Aerial track girder cracking
- Pedestal deficiencies at Dulles Airport Station screen wall
- Roadway pavement failures at Dulles Yard building
- Buy America issues with bridge cranes at Dulles Yard
- Track insulated joint (IJ) deficiencies at Dulles Yard
- Track plate deficiencies
- Concrete tie deficiencies
- Ballast deficiencies at Dulles Yard
- Cross level deficiencies at special track work (pending escrow)
- Precast concrete panel deficiencies at stations (pending escrow)

Underway

- Precast concrete wall panel cracks at Dulles Yard Buildings
- Tight gauge at switches in Dulles Yard
- Rail Car Hoists at Dulles Yard
- Cross Bond Spacing Deficiencies

In addition, the fourteen outstanding open items that are being brought to the attention of the Board are as follows:

Underway

- Surge Arrestor Failures
- Non-Compliant Crib Heaters (Yard)

- Fuel Center Deficiencies at Dulles Yard
- Insufficient Line of Sight to Track Signals

Unresolved

- Cracked 3rd Rail Insulators
- Cracked Impedance Bonds
- Damaged Direct Fixation Track Fasteners
- Malfunctioning UPS Fans (Mainline and Dulles Yard)
- Incorrect Distance between Insulated Joints (IJ's) and Signals at Dulles Yard
- Station Platform Paver Installation
- Non-Compliant Snow Melter/Calrods (Mainline)
- 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 twenty-eight issues identified to date:

- Ten are Unresolved
- Eight are Underway (being resolved), and
- Ten are Resolved

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

The attached presentation also includes an outline of the process for Safety and Security Certification of this project that is required prior to acceptance and start of revenue service.

The goal of safety and security certification is to ensure that Metrorail extensions, new and rehabilitated facilities and vehicles, and new and rehabilitated Metrobus facilities and equipment are operationally safe and secure for customers, employees, and the general public. The process incorporates and builds on the processes detailed in FTA's Handbook for Transit Safety and Security Certification, while establishing WMATA's own certification procedures based on the Safety Risk Management (SRM) requirements of WMATA's Safety Management System (SMS). The Airports Authority contracted with two design build companies to complete the project. Metro's support for the Dulles Corridor Metrorail Project (DCMP) Phase 2 is defined within the Dulles Phase 2 Cooperative Agreement with the Airports Authority.

The Cooperative Agreement addresses many aspects of Metro's involvement with the DCMP Phase 2 project including overall technical oversight and specifies safety and security activities and responsibilities. Metro's Department of Safety & Environmental Management (SAFE) and Metro Transit Police Department (MTPD) are responsible for all activities associated with the oversight and verification of the Airport Authority's and their contractor's safety and security certification program. Metro has developed a DCMP Phase 2, Safety and Security Certification Oversight Plan to ensure that Metro's oversight/verification responsibilities and activities relating to the safety and security program, as defined in Section 7.1 of the Airport Authority's Safety and Security Management Plan (SSMP), are successfully fulfilled.

In addition to the oversight and verification responsibilities of the Airport Authority's safety and security program noted above, Metro also has the responsibility to provide the safety and security certification of Metro deliverables for the Dulles Phase 2 project. The Airport Authority's Safety Critical Items List (SCIL), which tracks any remaining certifiable items that, per the Cooperative Agreement, cannot be verified or closed before the planned start of revenue operations will also be presented to the Safety and Security Certification Review Committee (SCRC) for review and determination of mitigation. Once the project has entered the Pre-Revenue Operations Phase, SAFE and MTPD are responsible for all certification activities. SAFE, MTPD and the SCRC, with support from the Department of Capital Delivery (CAPD) project team and functional Metro departments, will review and certify that all programs, plans, and procedures have been modified as required; that all required training has been provided; and that all plans, programs, and procedures required to satisfy safety and security requirements are in place before entering revenue service. The successful completion of operational readiness verification will provide the documentation that the completed project will operate safely as a functionally integrated whole, and that safety and performance requirements have been achieved.

At the conclusion of the Pre-Revenue phase of the project, Metro will prepare a Safety and Security Certification Verification Report (SSCVR) that culminates the Airport Authority's and Metro's safety and security certification efforts. This report will be reviewed by the SCRC and presented to Metro's Chief Safety Officer for issuance of a Certificate of Compliance denoting that the project is safe for operational use. The SSCVR and Certificate of Compliance is then forwarded to the Washington Metrorail Safety Commission (WMSC) for recommendation that the DCMP Phase 2 be allowed to proceed with entry into revenue service.

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:

Previous Actions	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.
Anticipated actions after presentation	Board Action approving Service Plan and Title VI Equity Analysis Acceptance of Silver Line Phase 2

Silver Line Phase 2 Update

Safety & Operations Committee
December 10, 2020



Purpose

- Review list of Unresolved Open Issues
 - Status of 14 previously presented Quality Issues
 - Elevation of 14 unresolved issues for Board information

- Briefing on Safety and Security Certification (SSC) Process
 - Overview of SSC Process
 - Metropolitan Washington Airports Authority (MWAA) SSC Responsibilities

- Review Schedule to Completion & Acceptance

Previously Identified Quality Issues

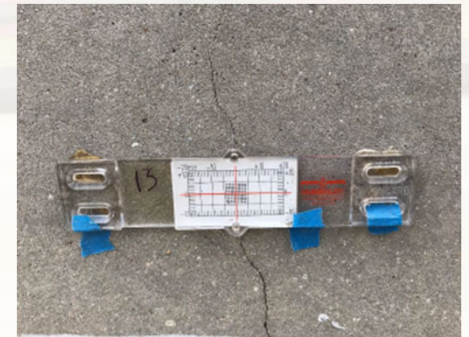
- ✓ Aerial track girder cracking
- ✓ Pedestal deficiencies at Dulles Airport Station screen wall
- ✓ Roadway pavement failures at Dulles Yard
- ✓ Buy America issues with bridge cranes at Dulles Yard
- ✓ Track insulated joint (IJ) deficiencies at Dulles Yard
- ✓ Track plate deficiencies
- ✓ Concrete tie deficiencies
- ✓ Ballast deficiencies at Dulles Yard ↑
- ✓ Cross-level deficiencies at special trackwork (pending escrow) ↑
- ✓ Precast concrete panel deficiencies at stations (pending escrow) ↑
- !! Precast concrete wall panel cracks at Dulles Yard buildings
- !! Tight gauge at switches in Dulles Yard
- !! Rail car hoist equipment
- !! Cross bond spacing deficiencies ↑



✓ Resolved !! Underway ✗ Unresolved

!! 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
- Cracks are narrow, though pose risk of potential reduced durability
- Contractor completed sealer application at all locations
- Metro OIG Sept. 2020 report concluded that sealer application is acceptable remediation; however, costs for future re-application of sealer should be considered
- **Metro working on quantification of additional inspection/maintenance costs**



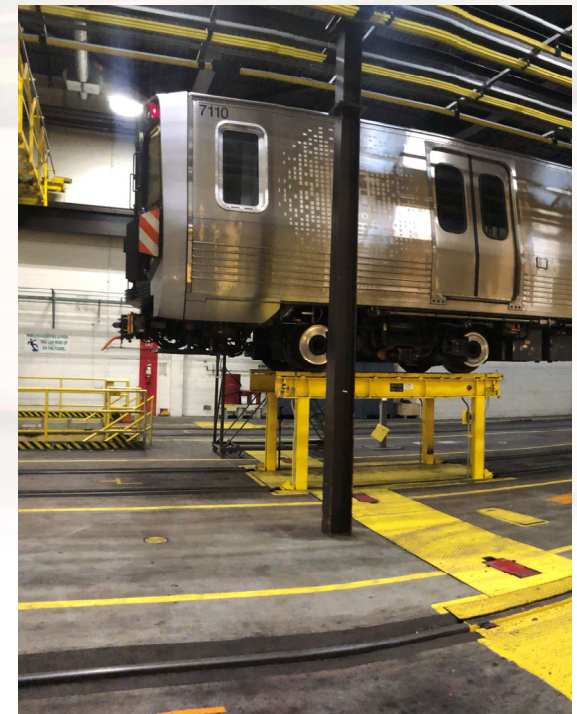
!! Tight gauge at switches in Dulles Yard

- Tight gauge identified at 39 switches in Dulles Yard
- With remedial work Contractor was able to achieve gauge within Metro maintenance tolerances
- Dynamic testing allowed to proceed conditioned on verification of construction gauge tolerances after test train activity – await completion of testing
- Metro acceptance or rejection will be based on Metro’s final review of the rework



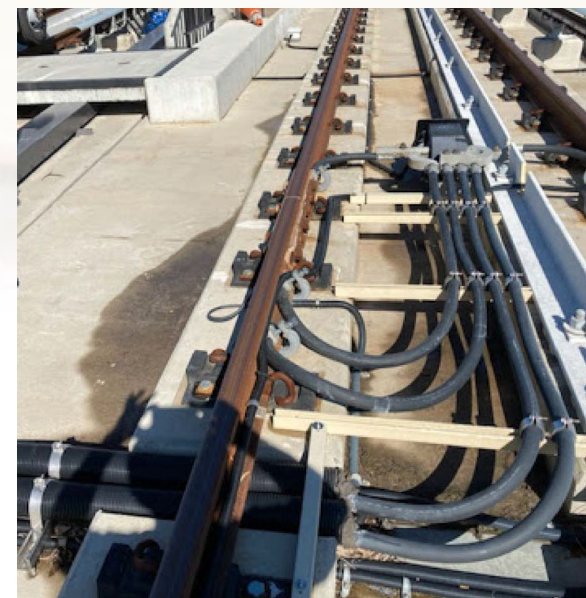
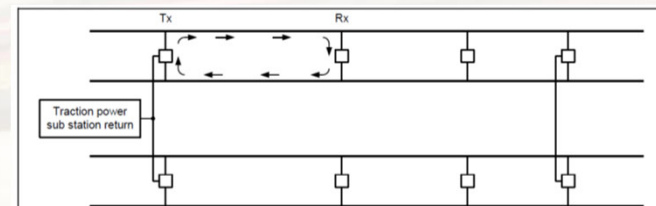
!! Railcar hoists at Dulles Yard

- November 2018, prior to delivery of all parts and completion of installation, equipment manufacturer went out of business
 - March 2019 assets acquired by successor manufacturer
- Installation completed, testing and inspection underway
 - Contractor achieved synchronization of jacks at all hoists
 - Functional performance testing of hoists using WMATA rail cars started September 2020
- Metro concerns remain:
 - Several issues identified during performance testing are being worked through by contractor
 - Metro reviewing warranty conditions submitted by general contractor



!! Cross bond spacing deficiencies

- Metro identified deviations from Design Criteria and industry practice for spacing of cross bonds
- Could result in broken rails not being detected; risk loss of train detection or derailment
- At 10% of approximately 200 locations spacing requirements are not met
- Contractor, in coordination with Metro and Airports Authority, developing modifications required to address each non-compliant location
- Continues to be a high-risk item with potential to impact project end date



Additional Unresolved Issues

- Most quality / non-compliance issues have been resolved at project level through project processes
 - To date, more than 1,800 non-compliance issues have been identified and 98% have been resolved
- Raising 14 open issues to Board's attention that are significant and unresolved
 - Each individual issue is not on the "critical path"
 - However, together they represent concerns of the acceptability of the project

Unresolved Open Issues: Component Failures

- ✘ Cracked 3rd Rail Insulators (April 2020)
 - Contractor has replaced 1500+ insulators that were exhibiting cracks
 - Root cause of the cracking has not been identified
- ✘ Cracked Impedance Bonds (October 2019)
 - Seven bonds significantly cracked, requiring replacement bonds; others with potential hairline cracks
 - 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 of the damage has not been determined

Unresolved Open Issues: Stations & Systems

- ✘ Incorrect Distance Between Insulated Joints (IJ) and Signals (Yard) (June 2019)
 - Insufficient distance between the signals and related IJ's to ensure safe movement
 - Airports Authority challenges applicability of mainline specifications in the Yard
- ✘ 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

Unresolved Open Issues: Yard Buildings

- ✘ Turntable Deficiencies at Service & Inspection Building (October 2020)
 - Issues include excessive rocking, non-compliant gaps and misalignment at flange way, and undocumented modifications
 - Physical modifications may be required to remedy
- ✘ Embedded Track Deficiencies at Maintenance Buildings (October 2018)
 - Embedded track in shop buildings and aprons not installed per requirements
 - Flange ways too wide, shop floor not flush with top of rail, observed degradation of asphalt
- ✘ Non-Compliant Clearance in Elevator Machine Room (May 2018)
 - Metro assesses that elevator machine room equipment clearances do not meet code requirements

Open Issues, Resolution Underway

!! 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

!! Non-Compliant Crib Heaters (Yard) (September 2018/October 2019)

- The length of the respective heater elements does not comply with contract 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
- Submission of final design details incomplete, acceptance request for nonconforming slab in progress

!! Insufficient Line of Sight to Track Signals (July 2018)

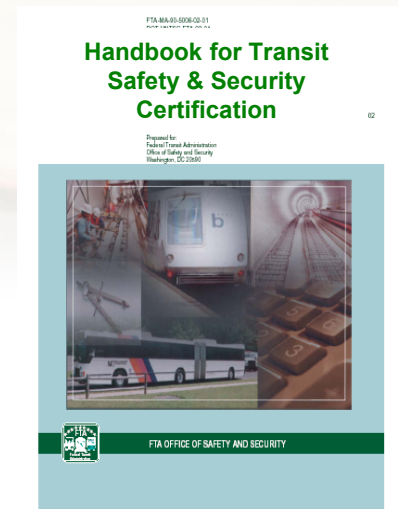
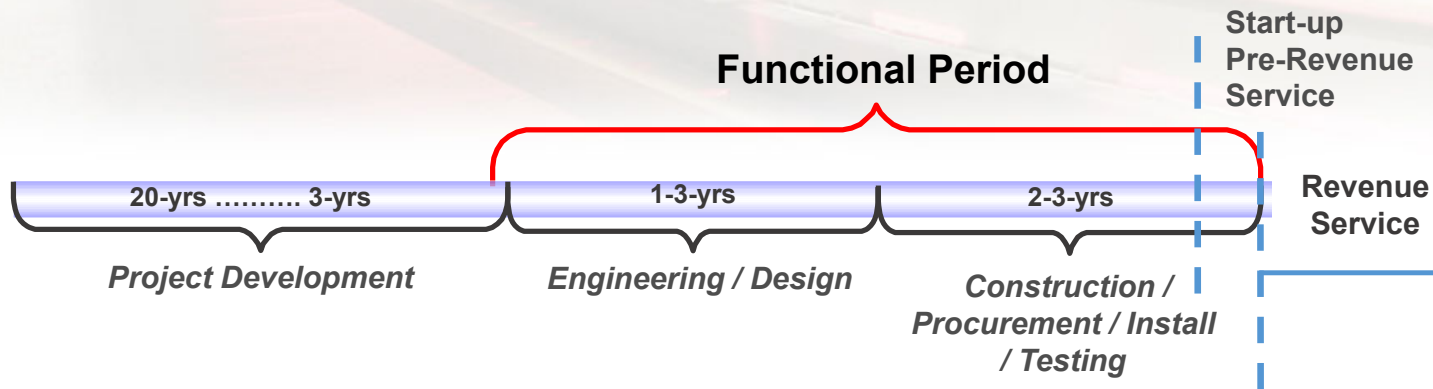
- Multiple locations identified where there is insufficient line-of-sight to ATC signals

Summary of Unresolved Open Issues

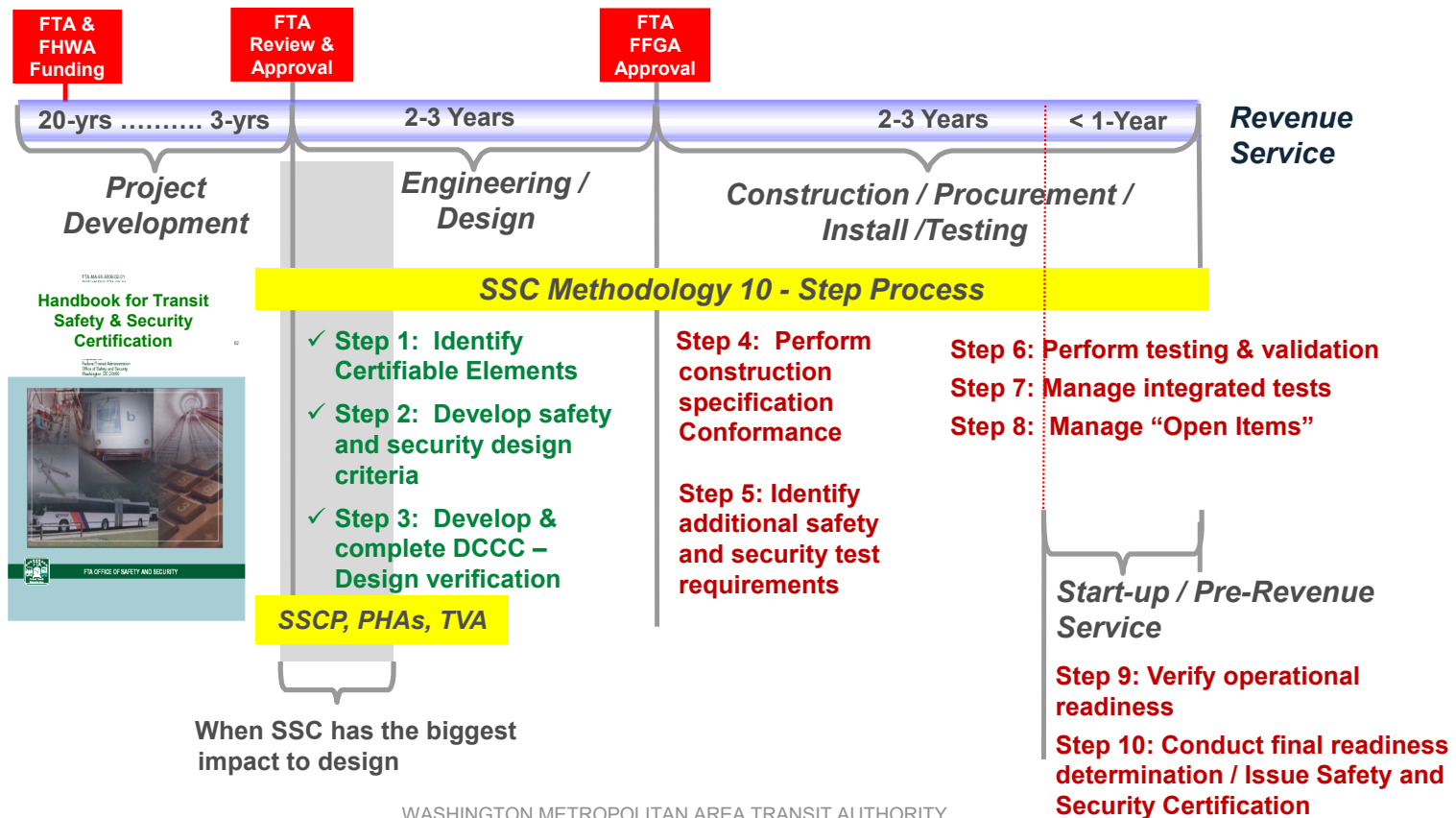
- Of 28 issues discussed today:
 - 10 are “Unresolved” – lack agreement on path to resolution
 - 8 are “Underway” – tentative agreement exists and resolution is in progress
 - 10 are “Resolved” – agreed remediation is complete, though some issues require negotiation of escrow amount to cover increased maintenance costs
- All issues must be resolved prior to project Acceptance
 - Some are required to support testing and operational readiness, as well as Safety & Security Certification

Safety and Security Certification (SSC)

A process applied to the functional period of a project that ensures all practical steps have been taken to integrate operational safety, security and emergency management requirements into a project and/or equipment/systems procurements



SSC Project Lifecycle



SSC Responsibilities

WMSC Oversight

Project Completion

MWAA

- Provide SSC final documentation for:
 - Metrorail Main Line
 - Stations
 - Dulles Yard
- Develop and Implement:
 - Safety & Security Management Plan (SSMP)
 - Safety & Security Certification Plan (SSCP)
 - Certifiable Elements Lists (CELs) and Certifiable Items Lists (CILs)
 - Preliminary Hazard Analyses

WMATA

- Technical oversight of MWAA's SSC activities
- Provide SSC final documentation:
 - Automatic Fare Collection
 - Tie-In Activities
 - Arts-In-Transit
 - Signage and Graphics
 - Non-revenue Vehicles, Equipment and Furniture

Operational Readiness

WMATA

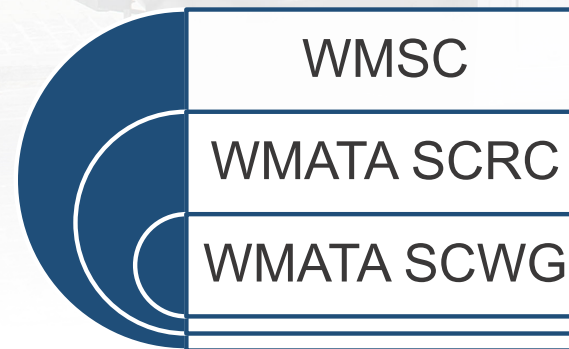
- Provide Operational Readiness verification:
 - Operational Hazard Analysis
 - Pre-Revenue SSC

Safety & Security Certification Working Group (SCWG)

- WMSC is the State Safety Oversight Agency (SSOA) and implements the requirements of its State Safety Oversight(SSO) program over the entire WMATA Metrorail System, whether operational or under construction.¹
- Committee Structures



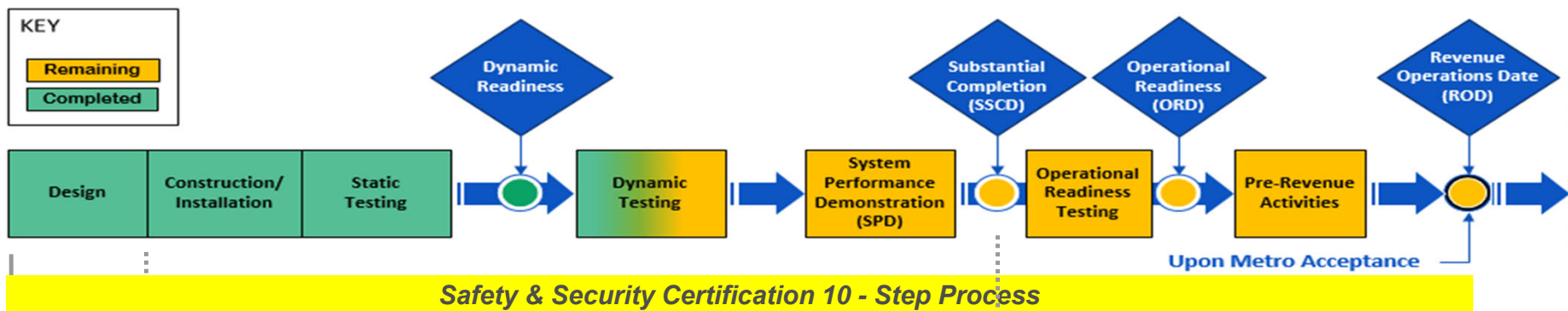
Project Safety & Security Certification Oversight



Agency Safety & Security Certification Oversight

¹ Washington Metrorail Safety Commission State Safety Oversight Program Standard, Revision 2, Washington, DC, 2020, p. 18

Silver Line Phase 2 Milestones/Sequence



Engineering / Design

- ✓ Step 1: Identify certifiable elements
- ✓ Step 2: Develop safety and security design criteria
- ✓ Step 3: Develop & complete DCCC – design verification

Construction / Procurement / Install / Testing

- Step 4: Perform construction specification conformance
- Step 5: Identify add'l safety and security test requirements
- Step 6: Perform testing & validation
- Step 7: Manage integrated tests
- Step 8: Manage “Open Items”

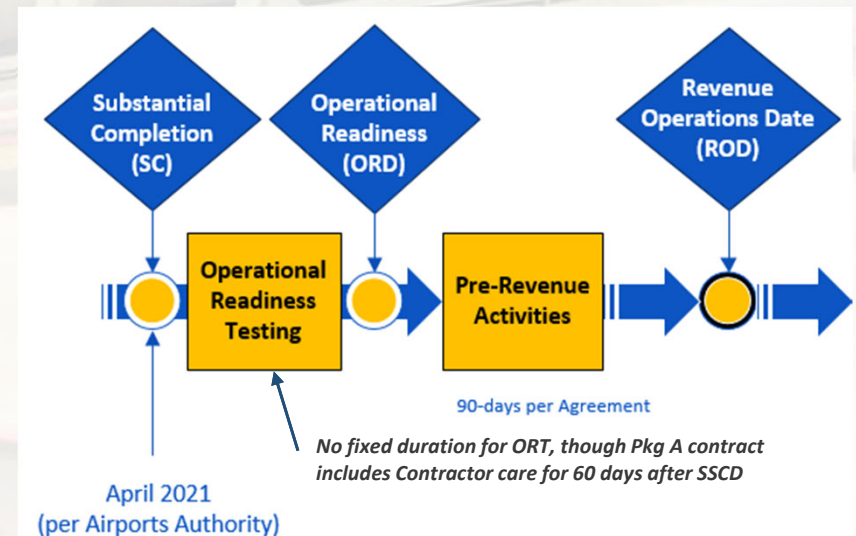
Start-up / Pre-Revenue Service

- Step 9: Verify operational readiness
- Step 10: Conduct final readiness determination

Issue Safety and Security Certification

Projected Completion

- Airports Authority currently projects Substantial Completion at end of April 2021 (Package A)
- Additional weekend shutdown required in 2021 to perform final cut-over
- Metro will not set a target service date until all identified issues have been resolved to meet acceptance standards
- Airports Authority's response to the unresolved issues will determine path forward and timing for Metro acceptance or rejection of the project



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 Testing
 - Acceptance of the Project by WMATA for Revenue Operations
- All safety certifications required prior to operational testing, acceptance and start of revenue service must be successfully completed