Baltimore Metro Retrofit – A Combined Train Control and Railcar Procurement

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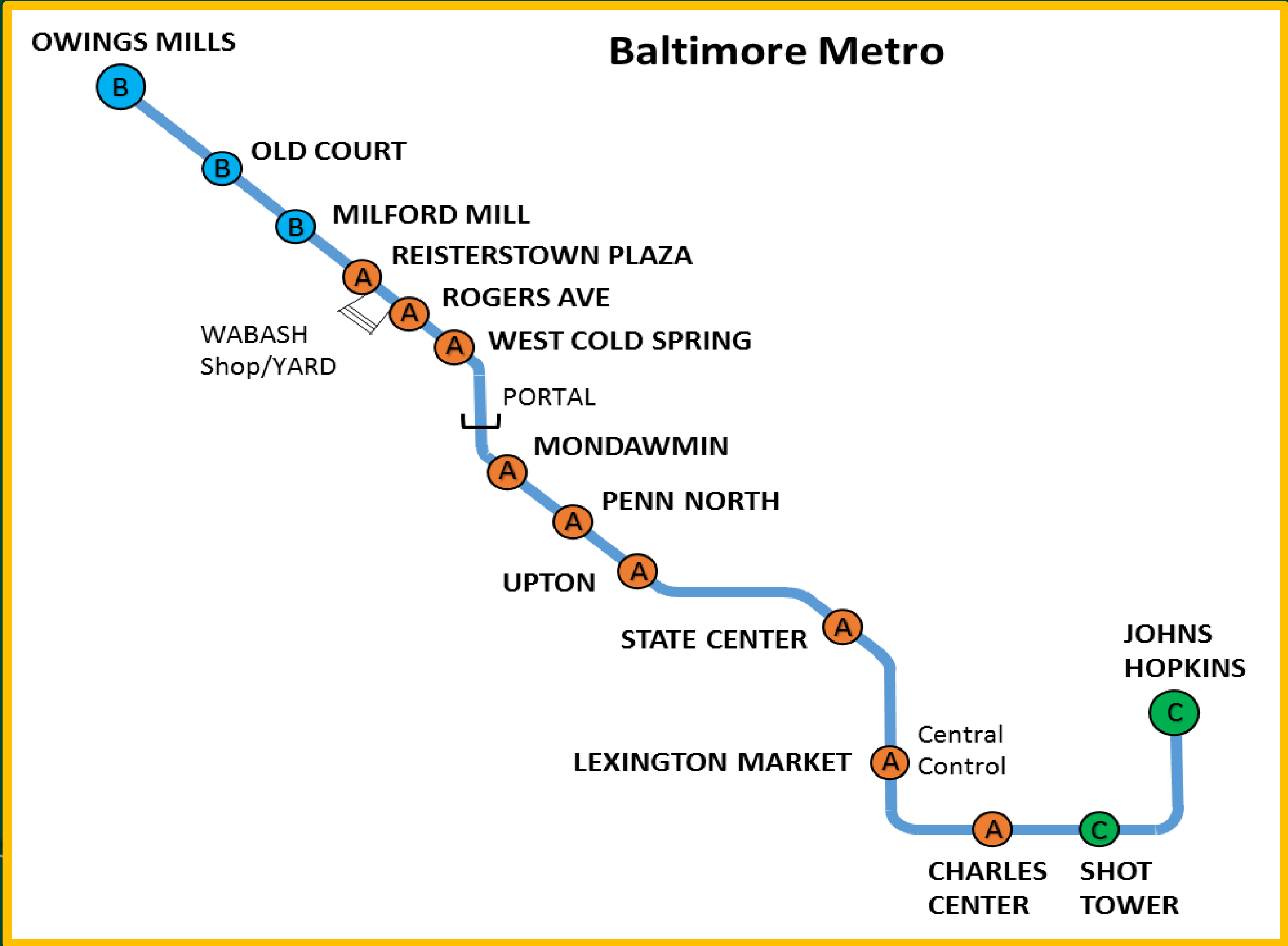
Metro History and Background

- 15 miles of double track mainline
  - Section A, 7.5 miles, in service November 1983
  - Section B, 6 miles, in service July 1987
  - Section C, 1.5 miles, in service June 1995
- 14 stations (8 below ground)
- 8 interlockings
- 100 railcars
- 1 Consolidated Central Control
- 1 Back-up Central Control
- 1 Yard


Baltimore Metro
OWINGS MILLS
B
OLD COURT
B
MILFORD MILL
B
REISTERSTOWN PLAZA
A
ROGERS AVE
A
WABASH
Shop/YARD
WEST COLD SPRING
A
PORTAL
MONDAWMIN
A
PENN NORTH
A
UPTON
A
STATE CENTER
A
LEXINGTON MARKET
A
Central
Control
CHARLES
CENTER
A
SHOT
TOWER
C
JOHNS
HOPKINS
C

Metro Operation

- 50,000 daily trips
- Operation 5 AM to 12 AM weekdays, 6 AM to 12 AM weekends
- Headways 8 min peak, 11 min off-peak
- Johns Hopkins to Owings Mills trip time 29 min
- 9 trains operating at peak
- 4-car train operation off-peak, 6-car trains peak
- 25 mph average speed
- 497 audio frequency (AF-400) track circuits with relay based train control system

Railcar and Train Control Project Goals

- Replace the near obsolete train control system with a CBTC system
- Replace the near obsolete railcars with new vehicles
- Improve reliability
- Reduce maintenance costs
- Reduce risk with a combined Railcar and train control system procurement
- Control risk by using only proven technologies
- Implement the new system with minimal disruptions to revenue service
- Realize the best value for the State of Maryland

Joint Railcar and ATC Procurement

- Eliminates the interface risk to the MTA
  - Between the Railcar and the train control system
- Eliminates the schedule coordination risk to the MTA
- Single contract focused on a performance based outcome
- Single point of contact for contract management

Railcar and Train Control Replacement Project Scope

- New railcars compatible only with CBTC
- CBTC system complete with Solid State Interlockings (SSI)
- The CBTC overlay enables both train types to operate prior to cutover
  - Existing trains with the AF-400 system
  - New trains with CBTC
- New automatic train supervision (ATS) with interface to Customer Information
- New Data Communications System with ring backbone
- Installation of temporary and permanent facilities for equipment

Railcar and Train Control Replacement Project Scope

- Design, construction, and installation of conduit, duct, and raceways
- Replace all system cables in interlockings, including signals, switches, snow melters, and track circuits
- Cutover from existing train control to CBTC
- Removal of railcars and removal of obsolete train control equipment
- Commissioning and Safety & Security Certification
- Training (including maintenance and operations)
- Spares and special tools
- Site support and warranty

Metro Existing Relay Based Control

Railcar Project Summary

- Three alternatives for consideration
  - Married Pairs
  - Triplet w/ Gangway
  - Triplet w/ Free axle
- Maintain 75 ft length w/ 3 doors per side
- 6-car train length
- Stainless Steel with Crash Energy Management
- No backward compatibility

Why CBTC

- The ability to Overlay and operate simultaneously with the existing ATC
- Realize the life-cycle cost benefits of solid state microprocessor controls
- Reduced maintenance costs due to the elimination of track circuits
- Enable precise control of train movement in a work zone

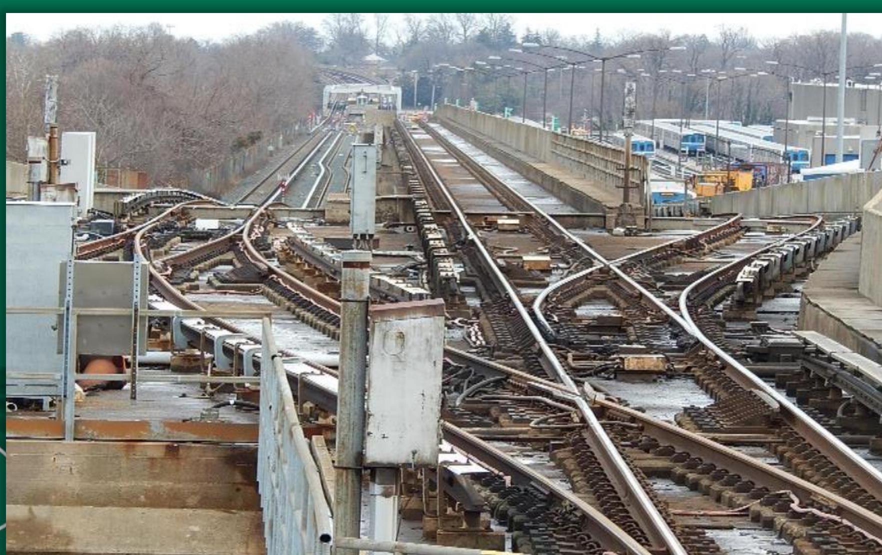
Railcar and Train Control Replacement Constraints

- Maintain Metro system revenue service
- Minimize the number of service disruptions
- Access the system job site after evening peak service
- Integrate the new railcar into the Metro physical environment
- Integrate the ATC into the Metro physical and functional environment
- Provide the same ATS interface to the Central Controllers
- Limited space in the train control rooms
- Cabling installation using existing and new conduits or ducts

Integrated ATS Interface

Replacement Challenges

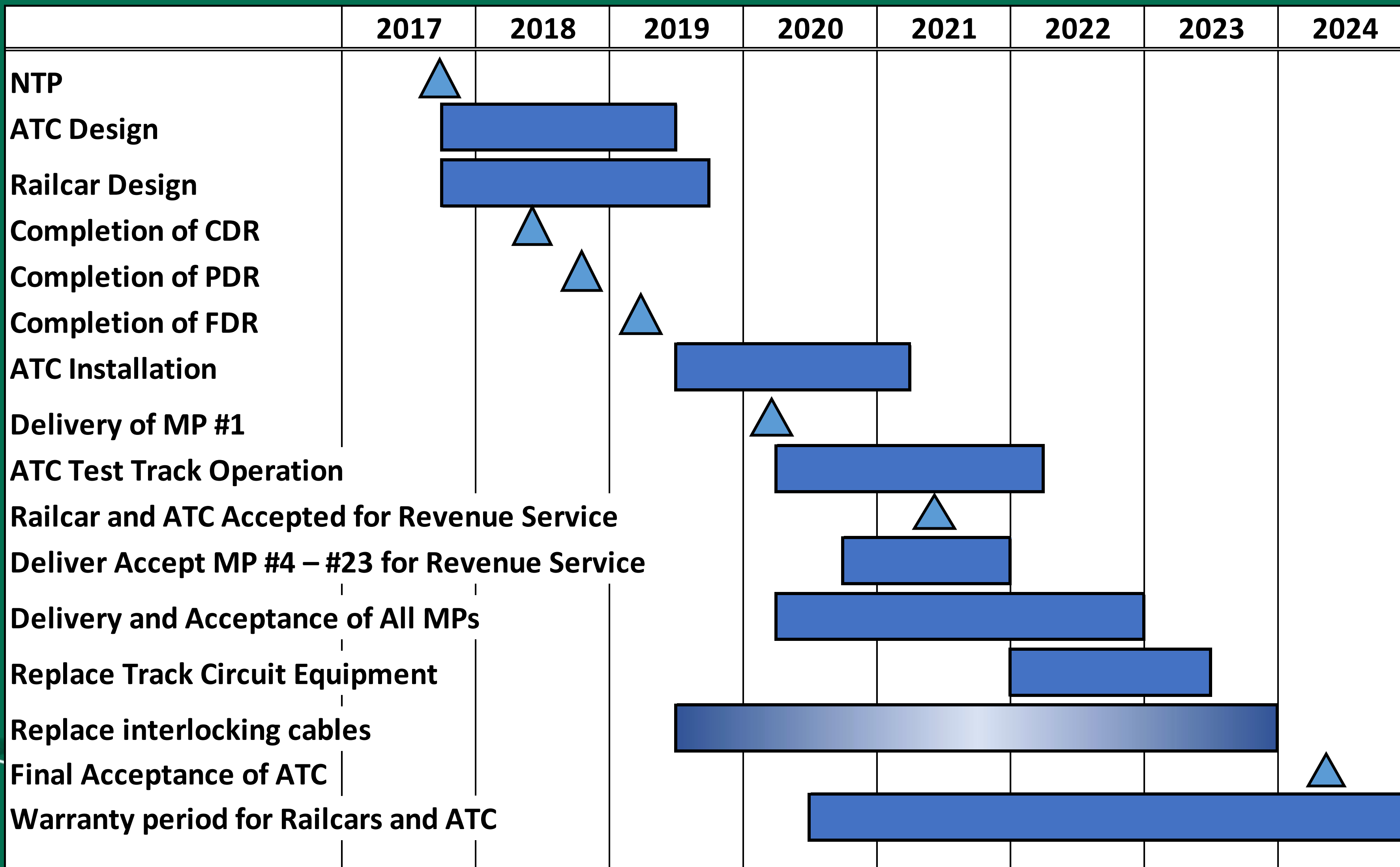
- The active system will limit unencumbered access
- The cut-over of the system will occur over many phases
- The occurrence of unforeseen/undocumented conditions
- Varying interfacing conditions; tunnel, elevated, ballasted
- Schedule



Contractor Qualifications

- System Integration experience with Brownfield within 10 years.
- Railcar experience with 7 years experience manufacturing in the US.
- Train Control System Supplier experience with 10 years
- Compliant with the standards cited in the RFP
- Implemented SSI similar to project scope
- Installer experienced with railway environment and project scope

Project Schedule



Thank You

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