Communications-Based Train Control Update

Project Update & Staff Recommendation to Award / Authorize

July 9, 2026 | BART Board of Directors Meeting

Agenda

- Project Overview
- Schedule
- Automatic Train Supervision - Integrated Computer System (ATS-ICS) Demo
- Updates – Vehicle, Design & Deployment
- Contract Changes
- Recommendation to the Board

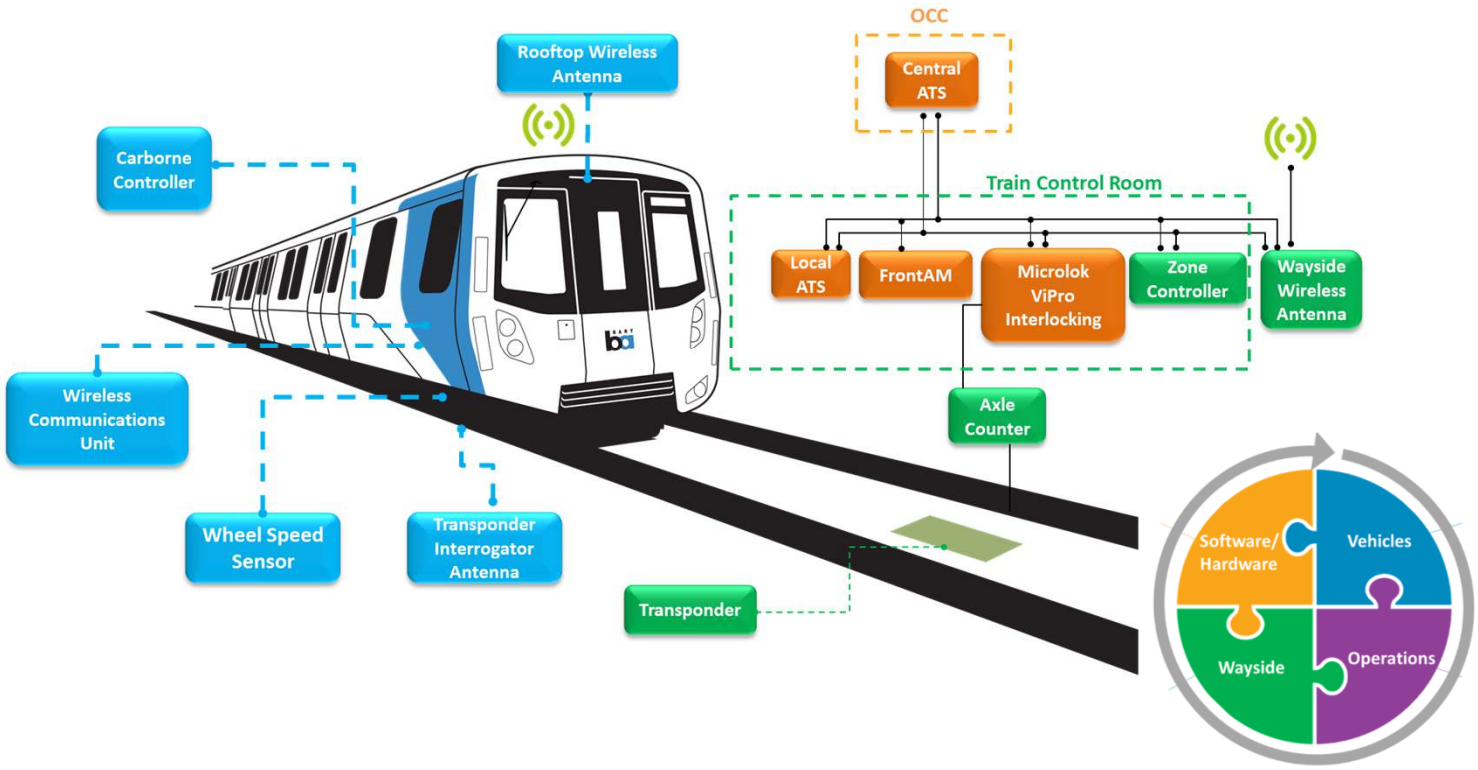
Transbay Corridor Core Capacity Program: CBTC Elements

Software/Hardware

Wayside

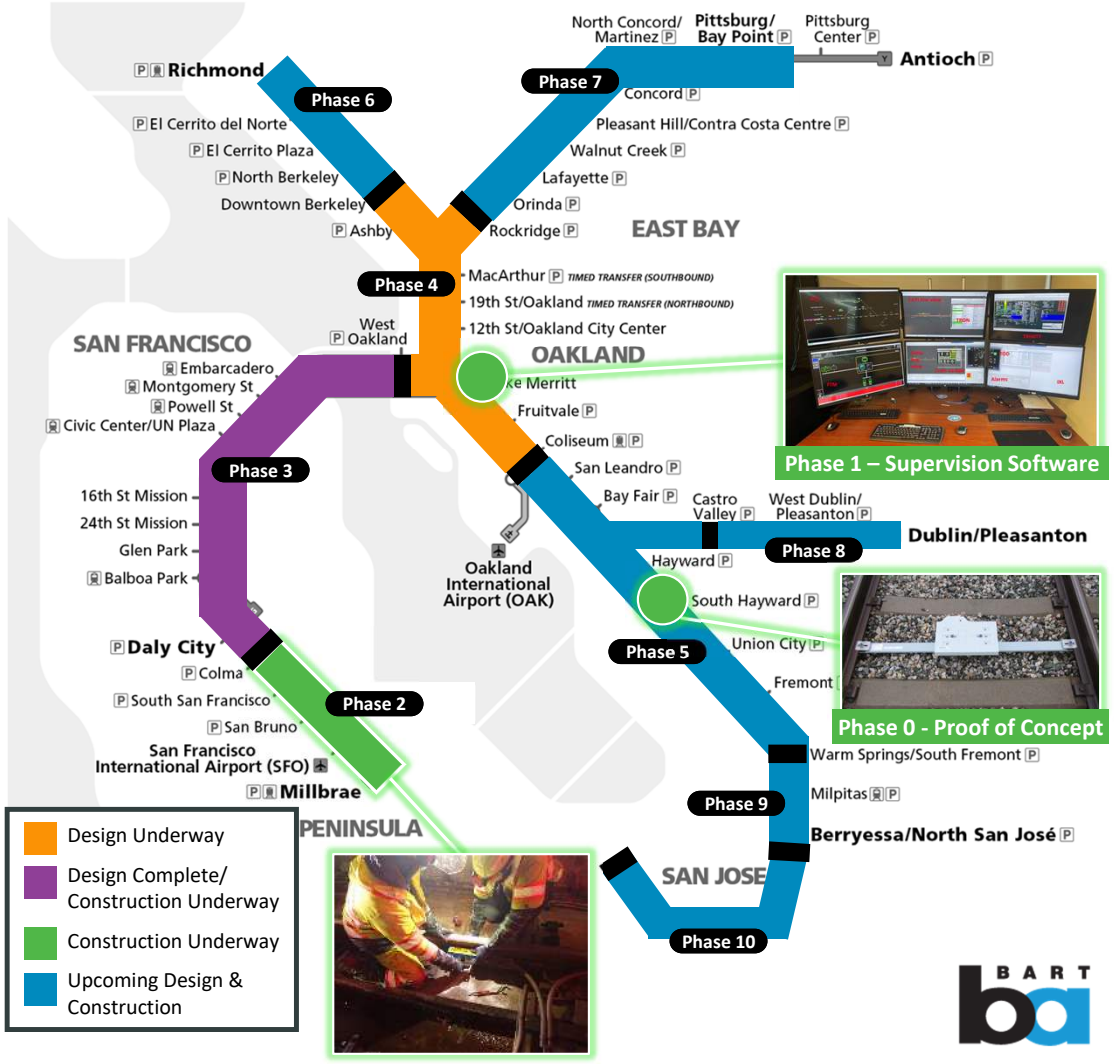
Vehicle Systems

Vehicles include 13 Sub Systems, 8 require modification to interface with CBTC.

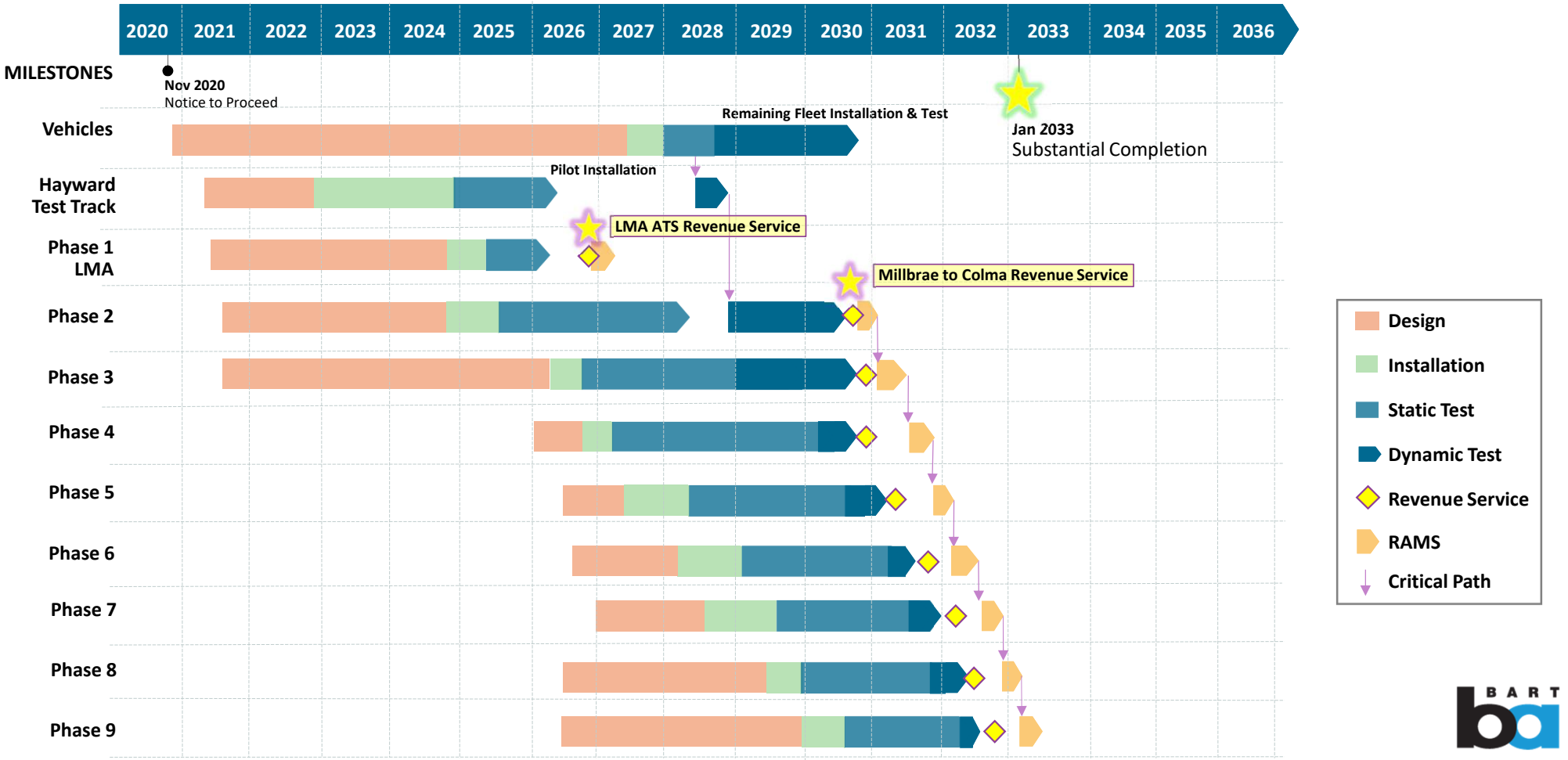


Project Sequencing

- **Proof of Concept (Phase 0)**
  - Installation/Testing at Hayward Test Track – Complete
- **Supervision Software (Phase 1)**
  - Automatic Train Supervision (ATS) - Complete
- **Millbrae/SFO to Colma (Phase 2)**
  - Ongoing Construction
- **Colma to West Oakland (Phase 3)**
  - Ongoing Construction
- **Rest of the System (Phases 4 – 10)**
  - Ongoing Design

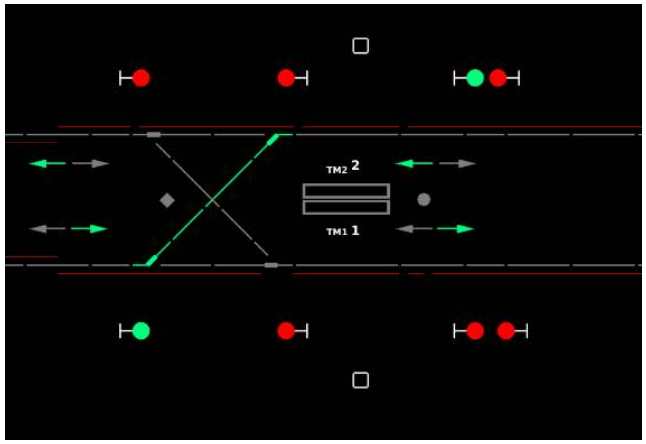


Schedule

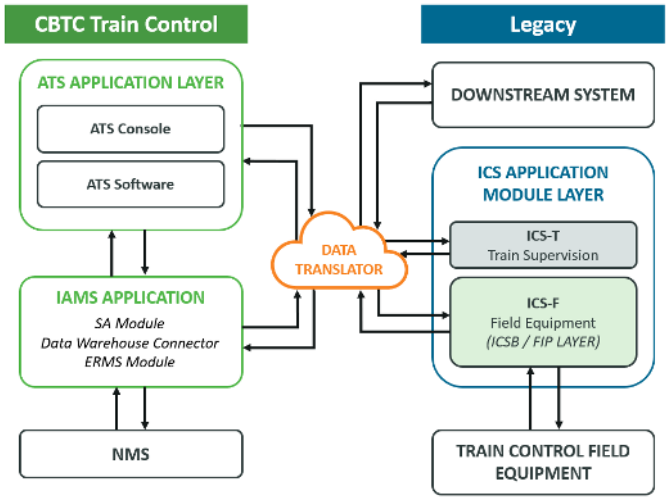

2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
MILESTONES
Nov 2020
Notice to Proceed
Jan 2033
Substantial Completion
Vehicles
Remaining Fleet Installation & Test
Hayward Test Track
Pilot Installation
Phase 1 LMA
LMA ATS Revenue Service
Phase 2
Millbrae to Colma Revenue Service
Phase 3
Phase 4
Phase 5
Phase 6
Phase 7
Phase 8
Phase 9
Design
Installation
Static Test
Dynamic Test
Revenue Service
RAMS
Critical Path

Phase 1 ATS-First (Automatic Train Supervision)

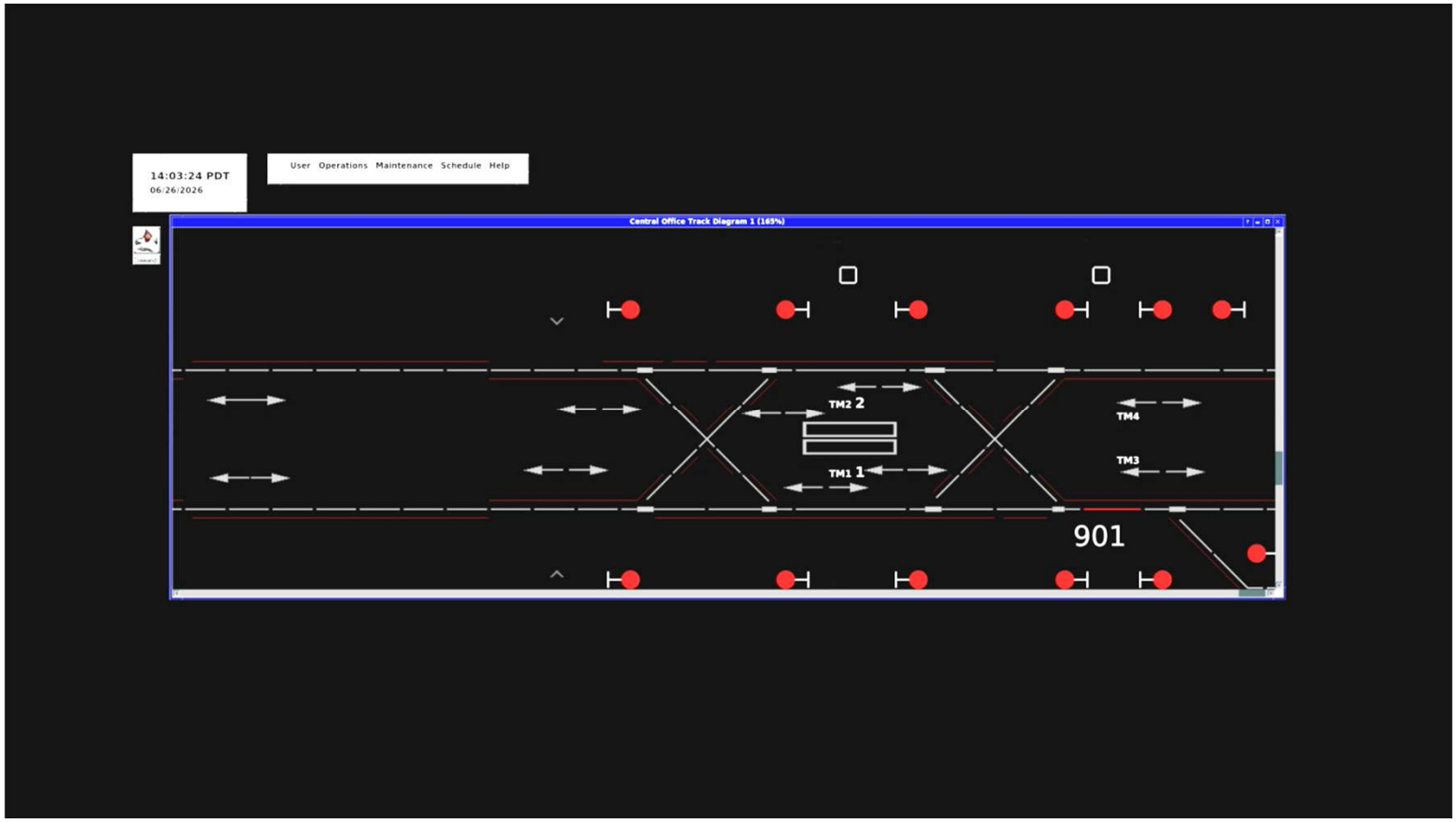
- CBTC Project **(ATS-First)** is the migration strategy that introduces the new CBTC compatible ATS software.
  - **This software will become the new user environment for the Operation Control Center (OCC)**
- The new automatic train supervision functions **interface** with the existing legacy Integrated Computer System (ICS). This strategy was adopted as the First Migration Phase specifically to support BART Central



Definitions	
ATS	Automatic Train Supervision Hitachi/CBTC automatic train supervision software
IAMS	Intelligent Asset Management Software
NMS	Network Management Software
ICS	Integrated Computer System BART developed legacy train control system software
Data Translator	Converts real-time data back and forth and provides both systems diagnostic systems and maintenance tools



Automatic Train Supervision (ATS) First Video



May 31st System Wide Test Completion

Dynamic Systemwide testing of the Phase 1 ATS-First System with real Test Trains was completed on May 31, 2026. This test represented running the ATS on all of BART's service lines

- **One Train** traveled on the Yellow Line from Pittsburg / Bay Point to San Francisco International Airport (SFO) and back.
- **Two Trains** traveled from Richmond Yard. One followed the Red Line to Millbrae to SFO, and the other train followed the Orange Line to Berryessa/North San Jose and back.
- **One Train** traveled on the Green Line from Hayward Yard to Daly City and back.

- **The Operations Control Center (OCC) was under Automatic Train Supervision (ATS) Control using ATS Workstations.**

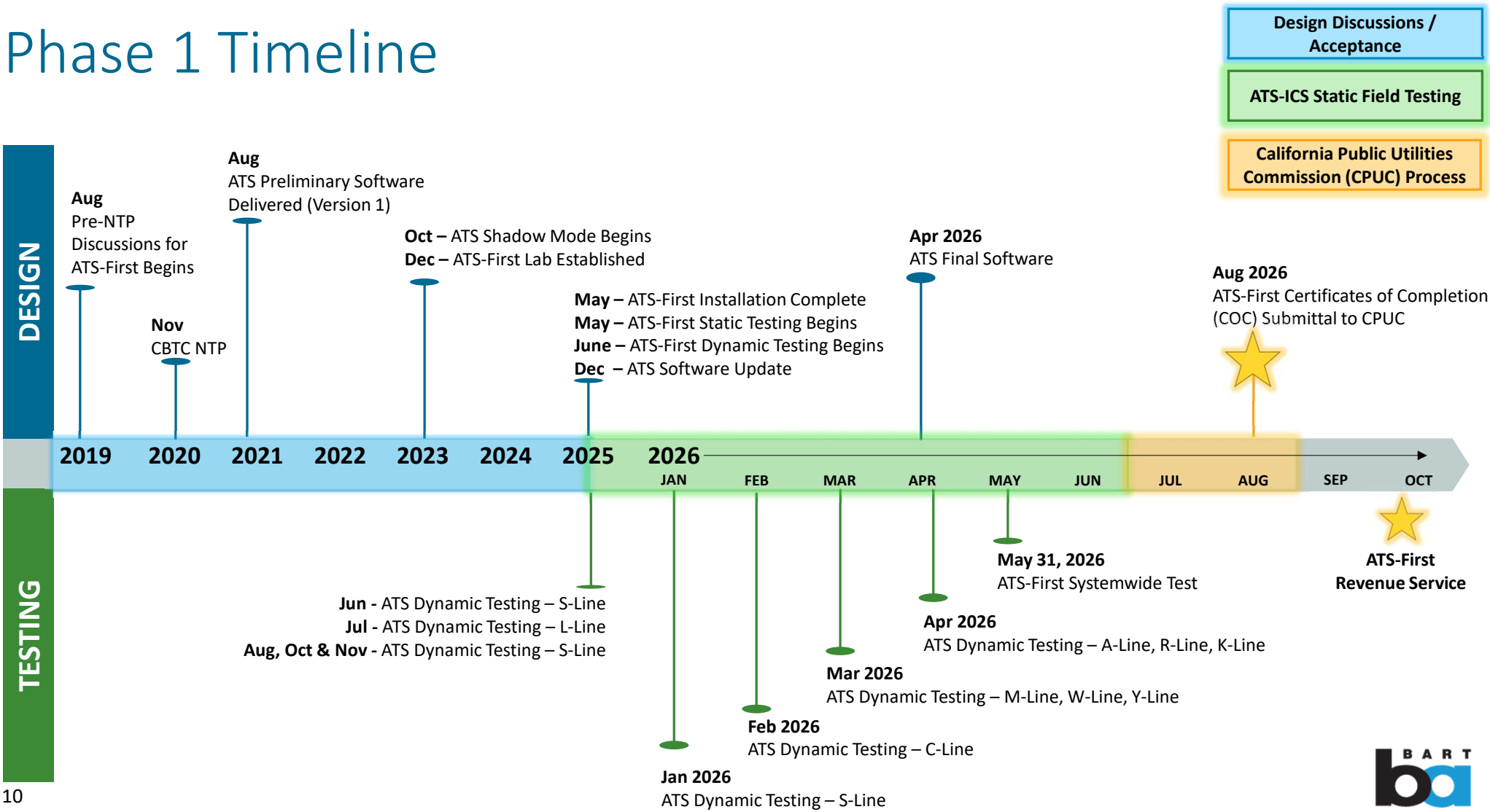
- **Automatic Train Supervision (ATS) / Integrated Computer System (ICS) is fully tested.**

Training Accomplishments Phase 1

- Contractor has delivered 100% of the required training to Maintenance and Engineering to be ready and prepared to operate and maintain the new Software and Hardware.
- **ATS-First Training completed on 6/11/2026.**
- 229 class certifications / 3,816 hours of training were all completed for Phase 1 revenue service (combination of Computer Techs, Communications Techs, and Engineers)
- BART Trainers have delivered training to the Rail Operation Controllers.

Subsystem	Class		
	Maintenance	System Administrator	Operations (OCC)
Automatic Train Supervision (ATS)	496	264	256
Cybersecurity	160	192	N/A
Data Communication System (DCS)	960	288	N/A
Intelligent Asset Management System (IAMS)	400	288	N/A
Total Hours (ACTUAL)	**3816**		

Phase 1 Timeline

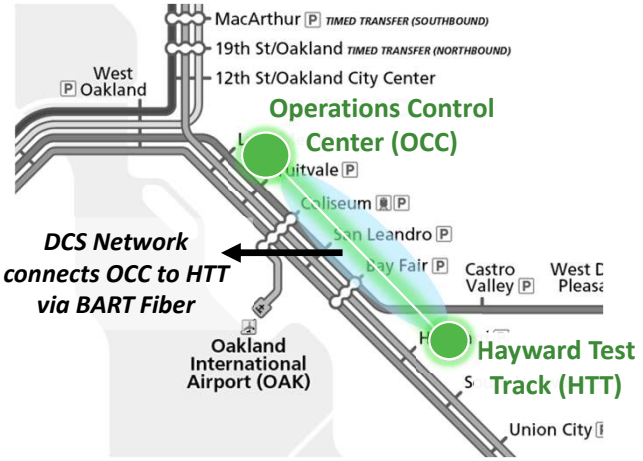


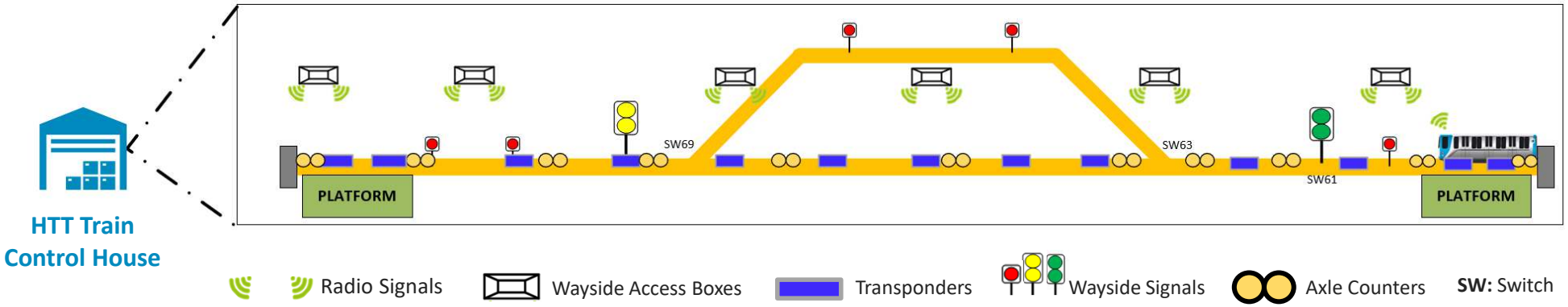
DCS Accomplishments: Phase 0 – Hayward Test Track

Data Communications System (DCS): CBTC network connecting all CBTC Equipment.

Hayward Test Track (HTT) DCS: Complete independent CBTC network with a central network core, Train Control Room (TRC) network and 10 Wayside Radios.

New Operations Control Center (OCC) Connection: Created new OCC to HTT link for OCC control of HTT during testing.





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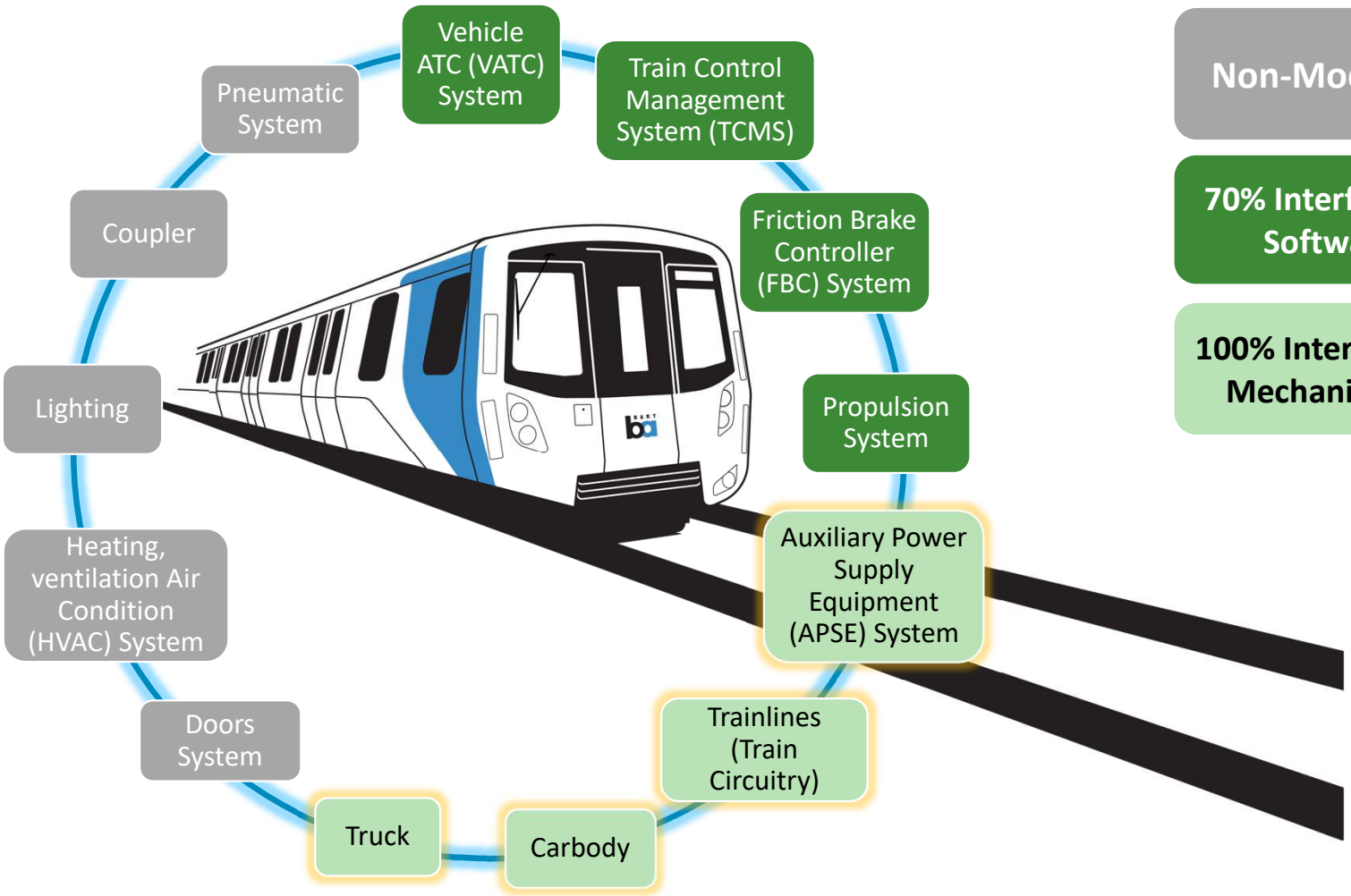
Vehicle Sub Systems Interface



Non-Modified Systems

70% Interface Final Design Software/Systems

100% Interface Final Design Mechanical & Electrical

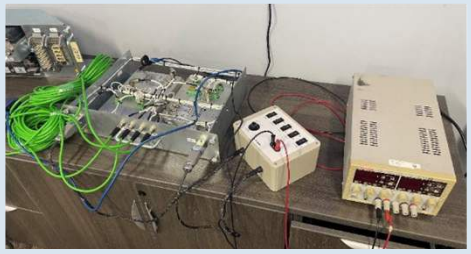
Vehicle Updates

Existing Train Lines
Modification for CBTC Train Lines

Project Achievements

- Design for Speed Sensor completed. All testing passed.
- Carborne Controller being assembled for Pilot Cars
- TIA and Antenna procured. Final design ongoing for connection to Vehicle.
- Carborne Controller Rack Subassemblies passed Factory Acceptance Testing.
- Installation of trainlines ahead of schedule

Speed Sensor Testing



Rack Subassemblies
Factory Acceptance Testing

Assembly of Carborne Controller –South Carolina

CBTC Design Update

Design Documents

Phase	% Complete
Phase 0	100%
Phase 1	100%
Phase 2	100%
Phase 3	100%
Phase 4	75%

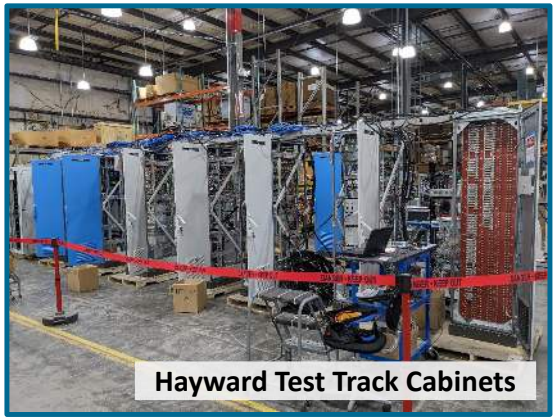
Assembled & Tested

Train Control Room Cabinets Factory Acceptance Testing

Phase	% Complete
Phase 0	100%
Phase 1	100%
Phase 2	100%
Phase 3	83%
Phase 4	8%

Factory Test Setup

Factory Test Underway



Hayward Test Track Cabinets

Phase 2 & 3 Installation Progress

Phase 2

Location	Progress
Millbrae	90%
SFO	50%
W34 (in-between SFO & San Bruno)	50%
San Bruno	50%
South San Francisco	100%
Colma	50%

Colma Train Control Room Testing

Power Panel installation at Colma

Axle Counter Sensor

Phase 3

Location	Progress
Daly City	20%
Balboa Park	15%
Glen Park	0%
24th Street	0%
Montgomery	0%
SF Vent Structure	0%
Oakland Vent Structure	0%
West Oakland	0%

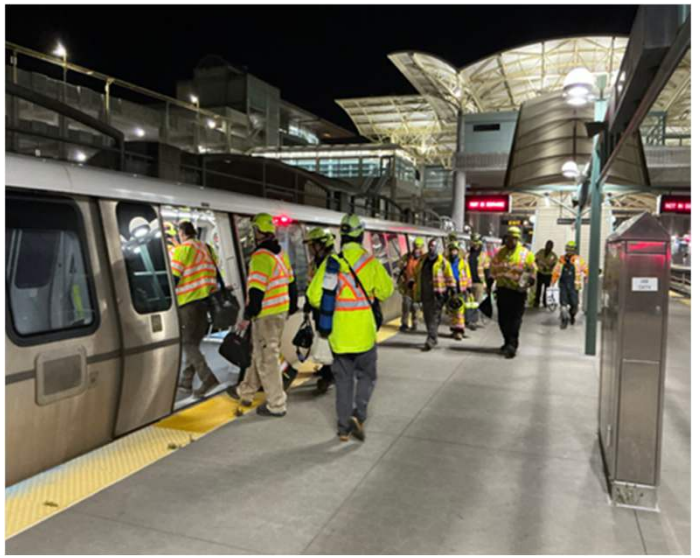
Site Survey for installing under Daly City Guideway

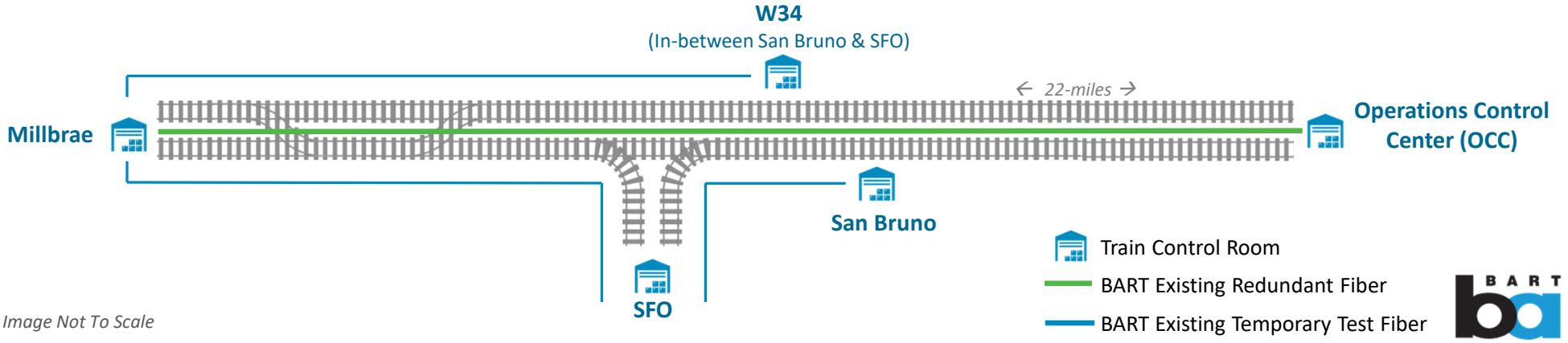
Continued installation of new conduit in the Daily City Train Control Room

Began installation of 6"x4" cable tray on the girder adjacent to M2 track

Installation Optimizations

- Utilize extended work windows to optimize deployment and installation
  - Special Revenue Schedules developed to facilitate early access to Main Line Tracks
  - Extended work windows provide additional four (4) hours for installation activities
  - Daily notifications to patrons regarding schedule changes due to extended work window provided
- First time use of work trains to transport up to 100 construction personnel to work sites
- Utilize District spare communication capacity to conduct wayside equipment testing early to identify and mitigate issues early.





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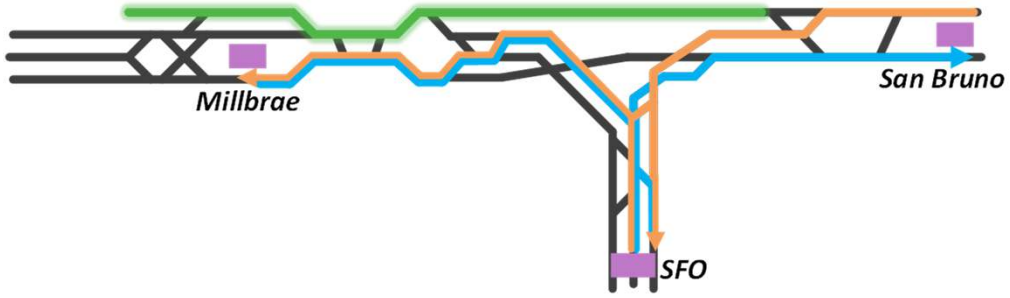
Extended 55-Hour Weekend

July 31st through August 3rd

- Extended 55-hour weekend window with single tracking
- Beginning Friday at 9:00PM to Monday at 4:00AM
- CBTC requires continuous cable installation of up to 5000 linear feet (LF)
- Total of 9 miles of cable to be installed
- These cable installations cannot be performed under normal extended work windows

Extended 55-Hour Weekend

Shift 1



Cable Installation Scope:

Microduct: 1700LF

Signal: 12500LF

Power: 4000LF

Shift 2

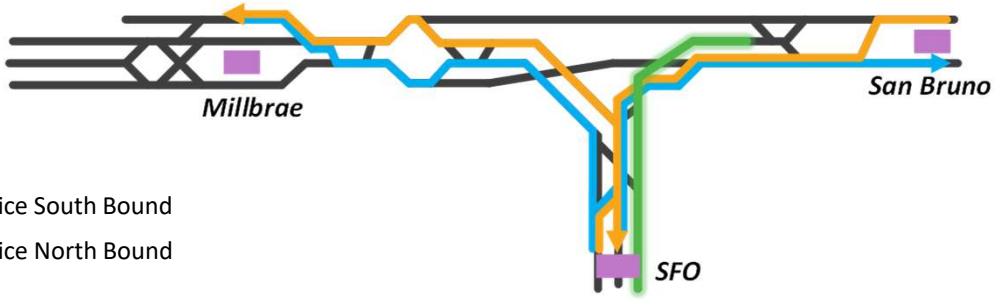
Microduct: 3000LF

Signal: 5400LF

Power: 5400LF

Fiber: 805LF

Shift 3



Microduct: 2800LF

Signal: 6000LF

Power: 2200LF

Fiber: 2000LF

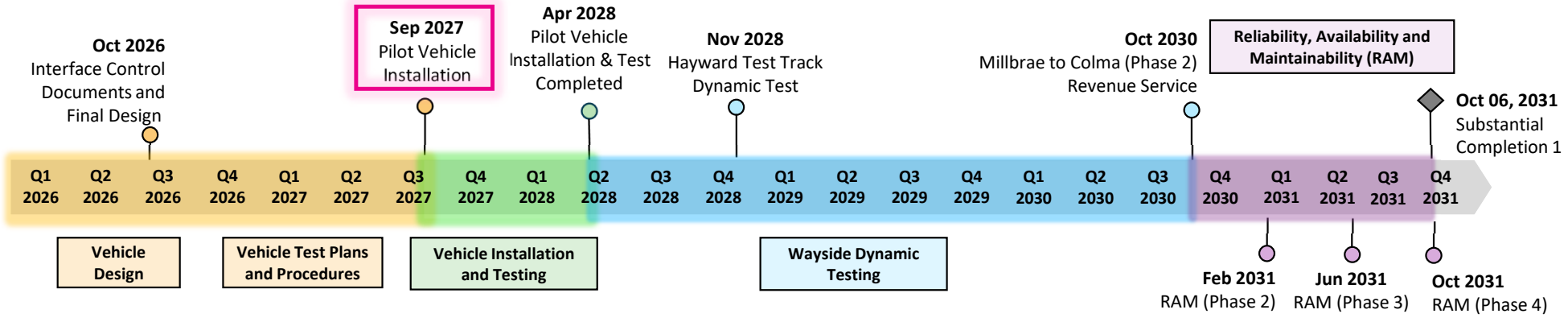
Work Area

Revenue Service South Bound

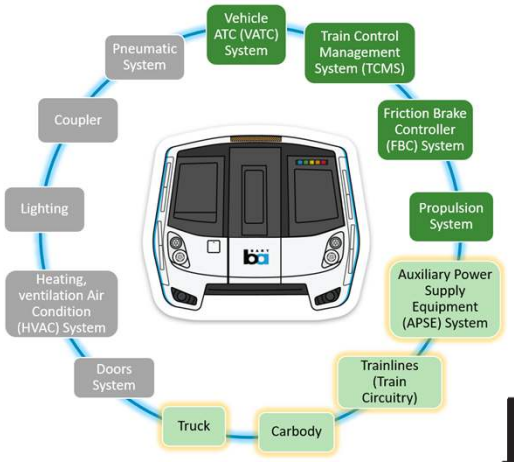
Revenue Service North Bound

BART Station

CBTC Critical Path (Driven by Vehicle)



Requirements Traceability Matrix (RTM)	Total Requirements	Open Under Contract Amdt.	Current Contract Amendment
Vehicle ATC (VATC) System	334	65	15
Train Control Management System (TCMS)	668	130	30
Friction Brake Controller (FBC) System	200	39	9
Propulsion	134	26	6
Truck	445	62	7
Carbody	411	57	6
Train lines	258	63	16
Auxiliary Power Supply Equipment System	315	76	19
Total	**2765**	**518**	**108**



Contract Operations Reliability Modifications

Additional Overnight Train Storage Feature

Bi-Directional Train Movement at Transition Platforms

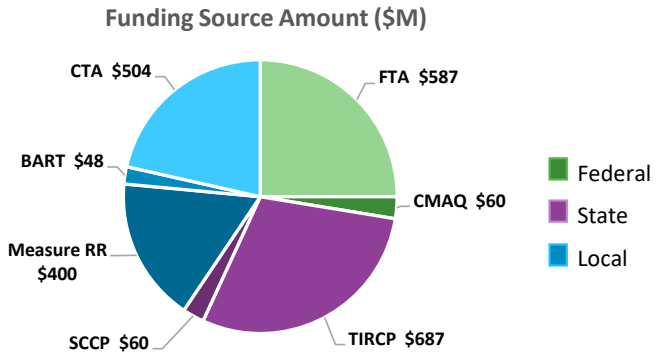
Yard Interface at Daly City

CBTC Project Budget & Systems Integration Cost

CBTC Project Budget (July 2026)	Amount
CBTC Contractor Contract	$789,301,920
Executed/Planned/Potential Scope Additions*	$444,434,354
CBTC Systems Integration Amendment	*$383,400,000*
VTA Option 3	$119,119,848
Enabling Works Budget	$113,802,763
BART Labor/DSDC/CM	$448,143,586
Other - Materials/Equipment	$20,023,415
Contingency	$411,290,096
TOTAL PROJECT BUDGET (Fully Funded)	**$2,346,115,982**

**Includes July 9, 2026, Recommendation to the Board*

CBTC Project Budget (June 2025)	Amount
CBTC Contractor Contract	$789,301,920
Executed/Planned/Potential Scope Additions	$61,520,571
VTA Option 3	$119,119,848
Enabling Works Budget	$114,796,455
BART Labor/DSDC/CM	$469,223,196
CBTC Systems Integration Amendment	***$433,000,000***
Other - Materials/Equipment	$14,481,793
Contingency	$344,672,199
Total Project Budget:	***$2,346,115,982***



Recommendation to the Board

Authorize the General Manager to execute Change Orders to Communications-Based Train Control Contract No. 49GH-110 for system design related to additional overnight train storage features, bidirectional operations at transition platforms, a wired interface at Daly City Yard, and completion of the remaining vehicle design and CBTC integration work, in an amount not to exceed $25,833,741.

Thank You