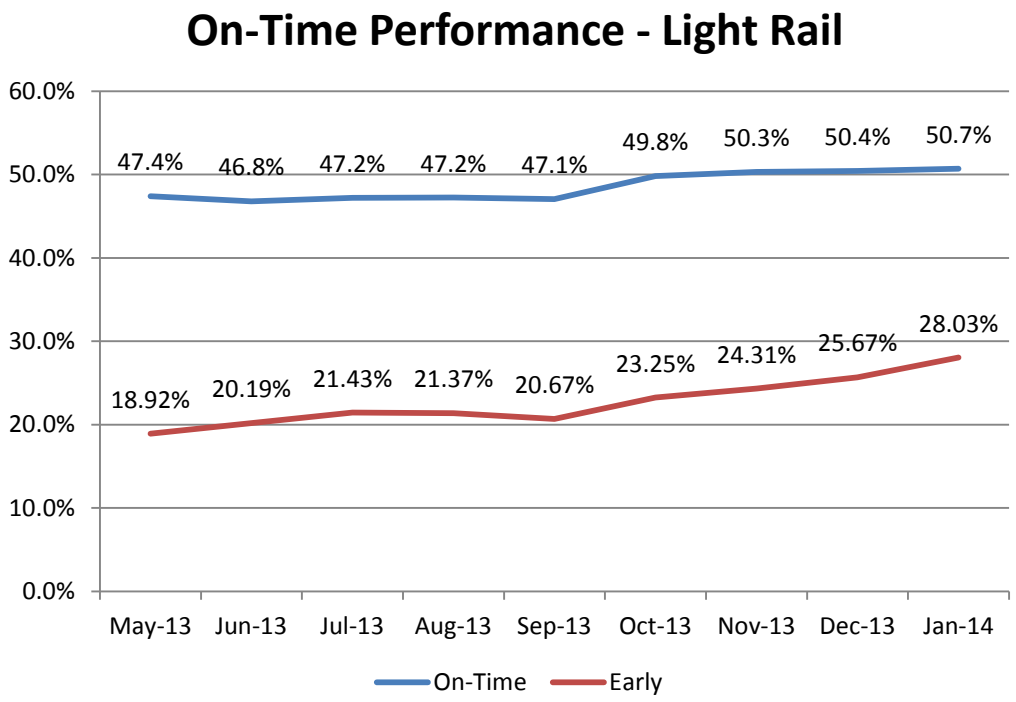
SFMTA
Municipal
Transportation
Agency

Light Rail Performance Initiatives Update

February 4, 2014

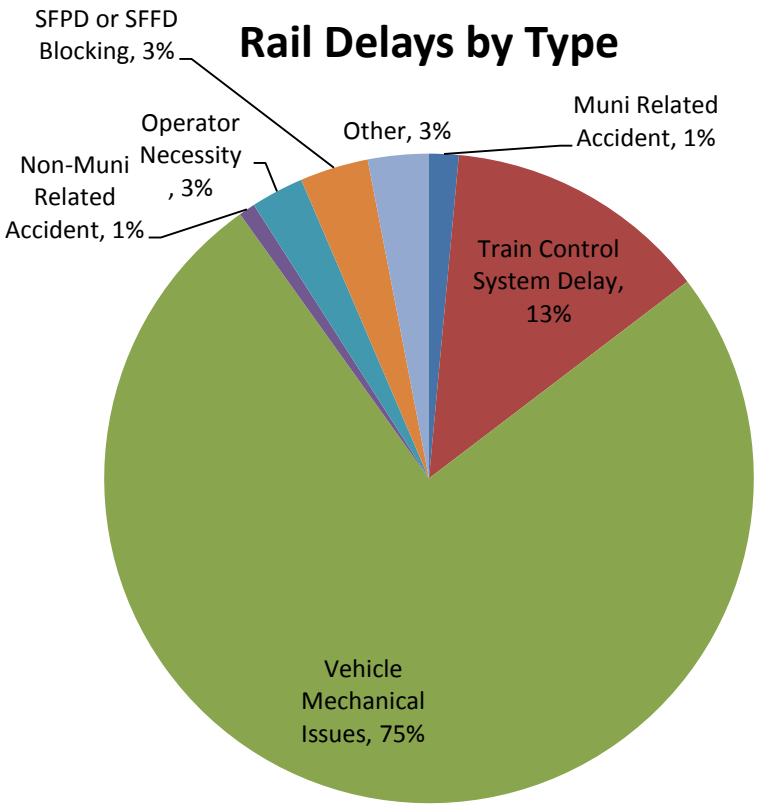
Performance

- On June 4, 2013, initiatives to improve light rail performance were outlined
- On-Time Performance up from 47% in May to 51% in January, driven mostly by an increase in early arrivals and decline in late arrivals



Light Rail Delays

- Hours of delay down from 452 hours of vehicle delay in May to 414 hours of vehicle delay in December (8% decline)
- Delays continue to be concentrated with vehicle issues
- One delay in the subway majorly impacts all lines



Major Issues to Address to Improve Service

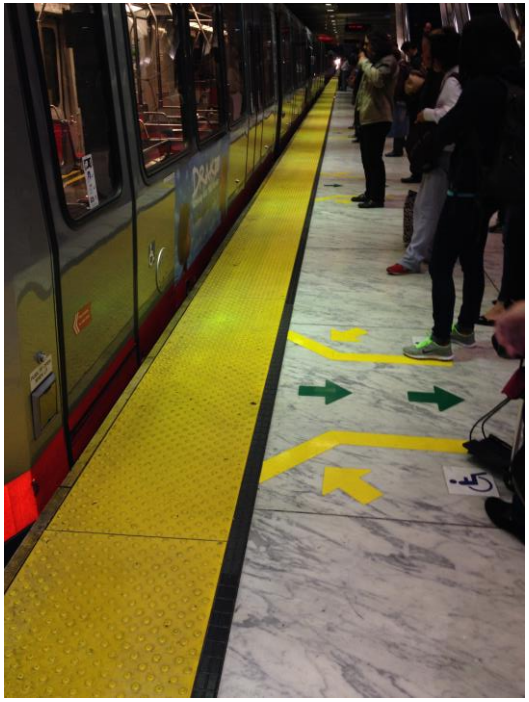
1. Operations
2. Light rail vehicle maintenance
3. Infrastructure maintenance
4. Technology & Communications

Initiatives already underway and completed!

Operations Improvements

Operations: Embarcadero Improvements

- Increased supervision and focus on turnarounds
- Improved turnaround time from 7.1 minutes to 5.3 minutes
- Results:
  - Improved train turnaround capacity (17 trains to 23 trains!)
  - Increase in early departures from Embarcadero
- Adjusting schedules for Spring 2014
- Installed queue markings at Embarcadero



Almost two minutes in savings!

Operations: Shuttles

- Launched three car shuttle train in October
  - Operates during the morning and evening weekday commutes from West Portal to Embarcadero
  - Popular with customers in the subway
  - Customers like getting a seat through the congested subway
- Tested concept of an N-Judah Shuttle to Hillway where trains are often crowded
  - One car shuttle during morning commute worked
  - Planning on starting regular pilot in Spring 2014

Operations: Supervision and Training

- Rail supervisors trained by rail maintenance on troubleshooting to help expedite delays – Reduction in delay length
- Finalizing troubleshooting card and training program for operators to reduce delays
- Repositioning rail supervision staff to better address system needs

Operations: Reduce Slow Zones

- Increased the travel speed between Castro and West Portal Stations from 35 MPH to 45 MPH after extensive safety testing
- Reviewed and reassessed mandatory stop locations on the rail lines
  - Removed over half of locations (73 total)
- **Overall gain in 2-4 minutes on travel time!**

Operations: Focus on Portal Entries

- Each time a train does not attain automatic control at the entrance to the subway, the train is delayed and could lead to reduce speed in the subway
- Focusing on operator, vehicle, and infrastructure issues related to failed entries
  - Retraining of operators with multiple failed entries
  - Inspecting vehicles after failed entries
- Failed entries down 50%

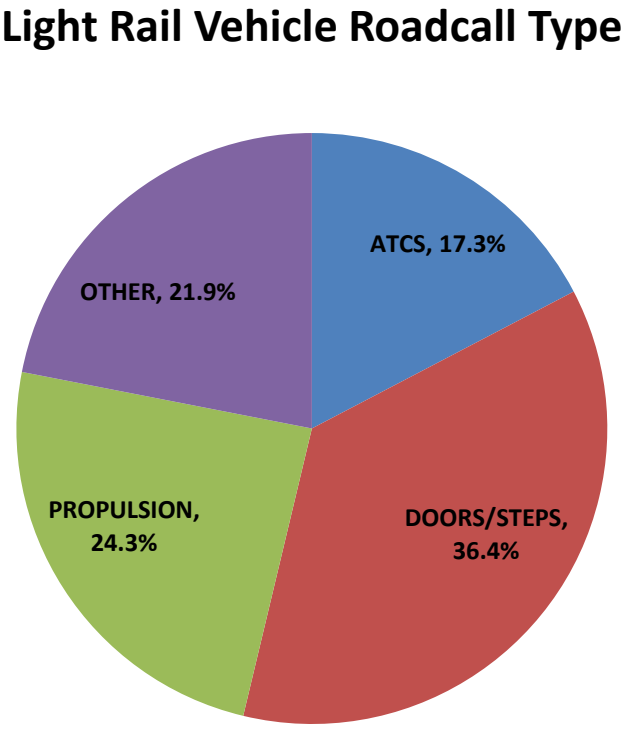
Operations: Switchbacks

- Implemented stricter switchback guidelines in Spring 2013
- Using alternative techniques to rebalance service and minimize switchbacks
- Down from over 700 incidents in Spring to 300 at the end of 2013
- Focus on customer communications via social media and electronic signage
- Implemented Nextbus update to update predictions when switchback implemented

Vehicle Improvements

Vehicles: Light Rail Fleet

- Door problems continue to be largest failure type
- Vehicle performance is flat
- Must continue to invest in fleet in order to last for 10 more years



Vehicles: Rehabilitation Program

- 74 cars completed to date
  - Replaced the communications link between the LRV, ATCS and the wayside equipment
  - Redesigned and replaced articulation wiring harnesses and yoke pins to allow for significant reductions in troubleshooting, repairs, and cost
  - Replaced traction motor bearings in the LRVs to extend the useful life of the equipment
- Following rehabilitation, the door performance was unchanged on rehabilitated cars, as a result the scope of the existing contract was modified to:
  - Remove rehabilitation of doors/steps from contract
  - Substitute rehabilitation of trucks for same price as doors/steps
  - Remove partial rehabilitation of air supply units
  - Include propulsion rehabilitation items that were not included in the existing contract

Vehicles: Propulsion

- Current propulsion equipment has exceeded is useful life, resulting in an unacceptable level of failures.
- Campaigns for targeted components of the propulsion system were instituted to improve propulsion performance, such as:
  - Rebuilding line breakers
  - Replacing starter relays
  - Replacing capacitors
- Finalizing capital program to complete other major subsystems in propulsion

Vehicles: Campaigns

- Completed 13 focused campaigns to improve reliability, MDBF and safety, such as:
  - Door overhaul – 28 cars completed
  - ATCS card rehabilitation – all cars
  - Replaced Knorr brake communication boards – all cars
  - Replaced tachometers – all cars
- Completed 97% of PM inspections on time

Next Generation Light Rail Vehicles

- Procurement of 175 cars
- Bids due in February 2014
- Award expected in Summer 2014
- Cars expected to start arriving at the end of 2016

Infrastructure Improvements

Infrastructure: Signal Improvements

- Signal priority up and running on Third Street and regularly monitored
- Fiber optic communications work underway to improve benefits
- Signal preemption (change lights to green) installed at six intersections on Third Street
- Fourth and King Intersection improved to reduce T-Third delays and more signal improvements coming

Infrastructure: Signal Standardization

- Coordinating maintenance schedules between SFMTA Signal Shops to increase preventative maintenance on signals
- Replaced 29 outdated signals with larger four aspect heads
- Signal Priority System upgraded to latest generation of controllers along T Third

Infrastructure: Double Berthing

- Double Berthing: Allows two trains to stop and load/unload passengers at the platforms together in the subway
- Upgrade status:
  - Programming updated and testing completed
  - Awaiting State certification for installation
  - Implementation in early Spring

Infrastructure: Train Control

- Old relay system controlling switch operations in subway in conjunction with train control system
- Old relay system not supported and parts hard to procure
- Upgrading train control system to eliminate need for relay system and fully realize benefits of train control system installed in the 1990s
- Phase I underway with final cutover planned for late 2014
- Result will be improved reliability through use of fully modern, supported train control system

Infrastructure: Rail Projects

- Rail replacement completed in the Embarcadero
- Rail replacement scheduled for Sunset Tunnel and Twin Peaks Tunnel over next year
- Other Rail Projects:
  - Replacement of powered track switches with next generation equipment
  - Replacement of analog axle counters with digital counters

Infrastructure: Projects Needed to Prevent Crippling Subway Delays

- Replace Train Control and Signal Wiring
- Replace switch machines which control routing
- Replace train control circuit cards
- Back-up power source for train control system
- Replace subway crossovers
- Divide power circuits on J and N lines

Technology and Communications Improvements

Technology & Communications Improvements

- Communications staffing for Line Management Center from 5am to 8pm
- Regular real time social media and on-street signage updates of incidents
- Prediction system upgrade to communicate when a switchback is occurring
- New subway platform signage and audio system to be installed starting in Summer
- Installation of new cameras in subway with thermal imaging capabilities to improve safety and security this summer

Safety Initiatives

Safety Focused Actions

- Signal standardization completed
- Worker protection completed
- Between car barrier testing underway on 13 cars
- Vehicle camera installation underway in driver cab and additional cameras in passenger area
- Beginning in 2014, ultrasonic testing will identify potential defects in the rail and rail grinding will bring the rail back to original configuration to lower derailment potential
- Replacement of ATCS components in relay rooms and wayside units to improve the reliability of automatic train movement in the subway

On-Going Challenges

Challenges

- Operators not fully staffed
  - Many shifts over 11 hours per day
  - Heavy reliance on overtime (25% of all operator overtime)
  - Staffing up training and dedicating two cars to Training to improve
- Subway infrastructure aging and in need of rehabilitation
  - Need to prioritize programs to rehabilitate key systems that could cripple subway
- Vehicles continue to have reliability issues
- Security issues: subway trespassers, autos on the trackway, vandalism, on-vehicle altercations
- Successful integration of new Control Center

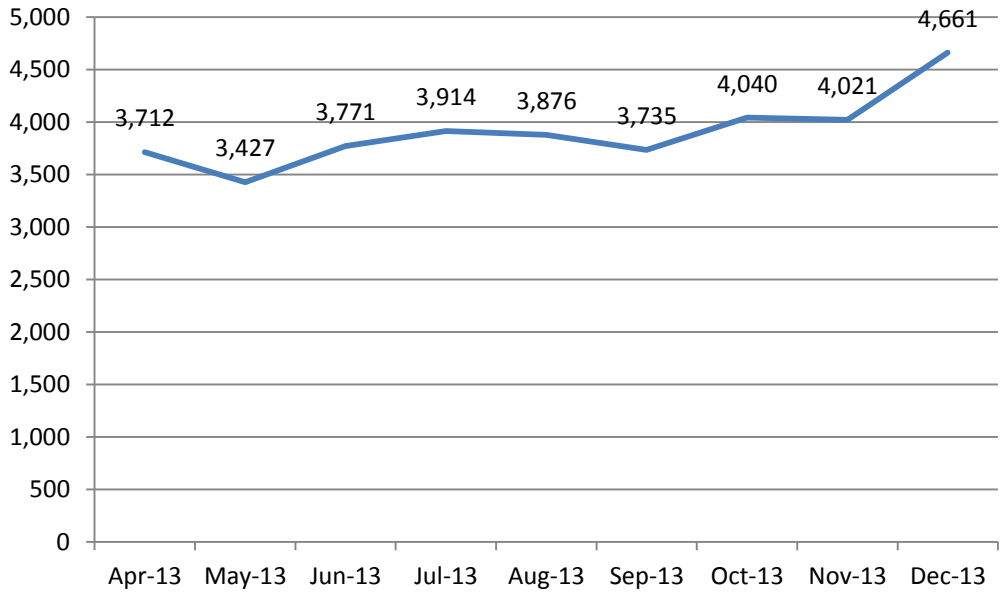
Next Steps to Improving Service

- Provide update in Summer 2014
- Vehicles: Three pronged approach to improvements
  - Improve rehabilitation program
  - Continue in-house targeted campaigns
  - Advance LRV 4 procurement
- Operational Assessments:
  - Review operations of rail lines and reassess service concepts with a focus on improving subway capacity
- Infrastructure Projects:
  - Move forward on improving subway infrastructure vulnerabilities
  - Track replacement projects: Twin Peaks and Sunset Tunnel
  - Signalization of Church and Duboce
  - Irving/Judah Street signal priority
  - Focused mid-life overhauls of track and infrastructure
- Adjust baseball game service management plan to improve N Judah and T Third service

Bus Fleet Improvements

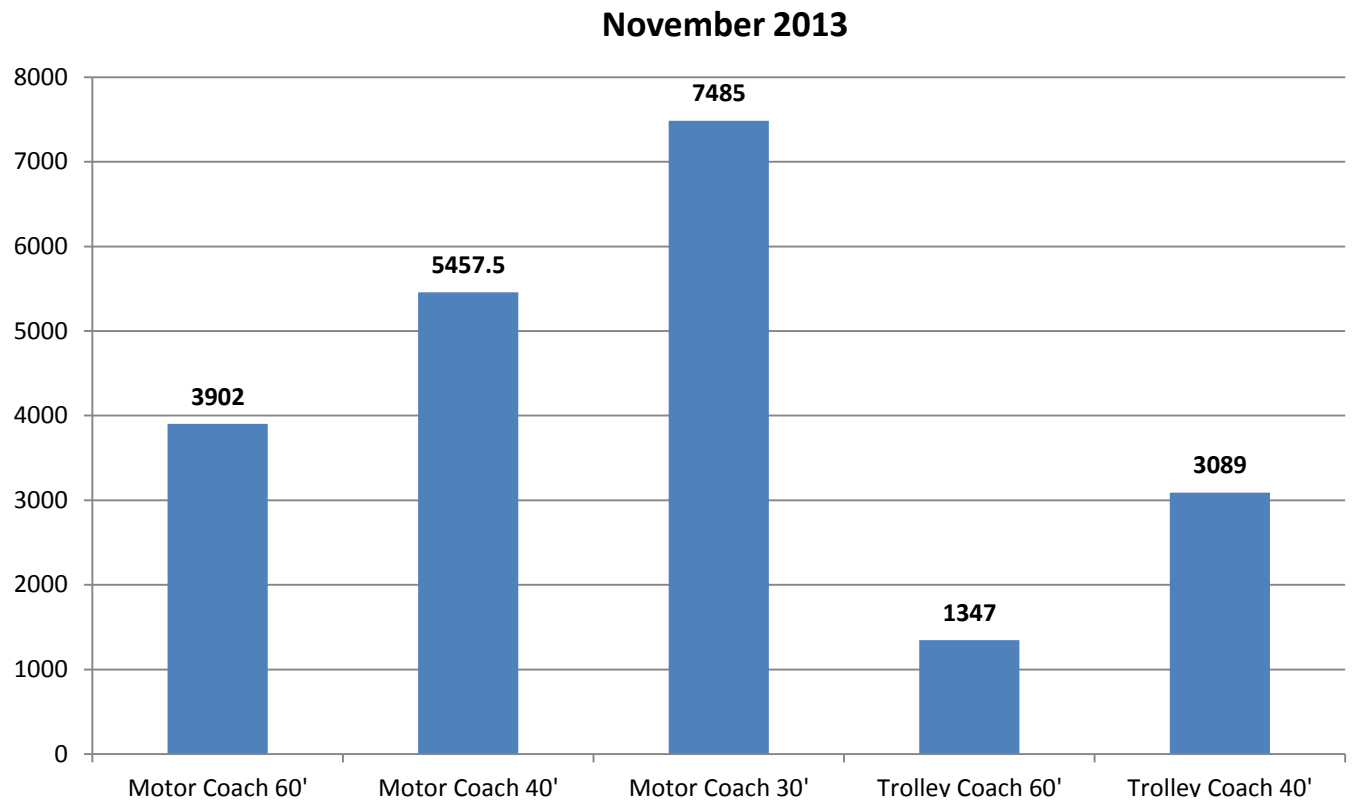
Bus Fleet Performance Improving!

- Bus performance increasing!
- Mean distance between failure up 25%
- New maintenance procedures introduced
- Focused campaigns paying off



MDBF By Fleet

Mean Distance Between Failures (MDBF) is the average number of miles a coach travels before breaking down and causing a delay. The higher the MDBF, the more reliable the equipment and the service.



Bus Campaigns and Rehabilitation

- Rehabilitating 80 Neoplan buses to improve reliability – Completion in June
- Trolley coach air compressor campaign completed – Major contributor to improved performance
- Articulated diesel coach differential replacement – 80 completed, 0 failures compared to approximately 3 per month prior

New Buses are Here!

- 112 New Flyer buses are here and are in service!
- MDBF of over 12,000 miles!
- Entire fleet will be replaced within five years

Fleet Appearance

- Interior repainting campaign to clean the fleet!
  - 59 out of 83 40’ trolley coaches completed
  - 58 out of 61 60’ trolley coaches completed
- Mobile cleaning crew started in Fall
  - 116 graffiti calls per week
  - Cleaning vehicles at the terminals
  - Responding to ~30 calls per week for dirty coaches

Bus Safety Initiatives

- Installation of new cameras completed on over 300 buses!
  - Cameras will be installed fleetwide by June
- Safety scaffolding – In use at all divisions
- Installation of 23 new in-ground hoists underway to replace 30+ year old equipment
- Rear door modification on fleet to improve customer safety – Completion in February

Cable Car Improvements

Successful Delivery of Key Cable Car Reliability Projects

- Over 5000 cable pulleys replaced, improving cable position and height to reduce wear and tear
- Rebuilt seven track switches completely including one that had been out of service for many years
- Installed camera on cable to catch damage faster than the visual inspections
- Retrained operators on where and how to best pick up the cable
- Performed analysis of gearboxes and developed scope schedule and budget for rehabilitation of the Cable Car propulsion system
- Began capital program to rewire the traffic controls for Cable Cars.

Cable Car Safety Initiatives

- Installation of a left turn signal for automobiles at Hyde and California
- Upgraded control tower signal wiring at California and Powell to reduce potential cable car crossing conflicts
- Turntable latch assembly redesigned, built and installed at Powell and Market
- Replaced turntable position light to make it more visible to operators at Powell and Market
- Safety netting installed in Cable Car shop areas
- Fall protection installed in Cable Car machinery areas
- Guard railings installed around motors and gearboxes in the Cable Car facility
- Confined space training completed, including:
  - Calibrating and replacing as necessary gas testing equipment
  - Fire protection system inspection and repair at the Cable Car facility

Historic Streetcar Improvements

Rehabilitation Programs Underway

- Rehabilitation of 15 SEPTA cars completed
- Bids received for rehabilitation of next 13 cars
- Success delivery of program will support F-Market/Wharves reliability and ability to launch the E-Embarcadero line

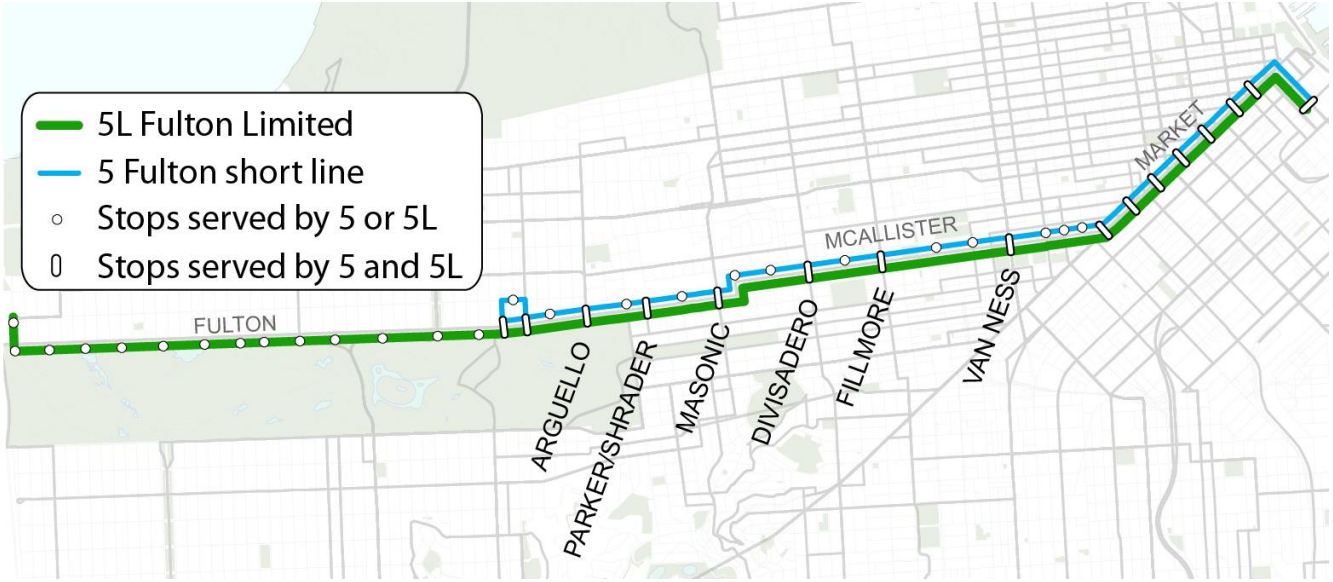
Service Initiatives & TEP

Major Initiatives

- Two pilots launched for Transit Effectiveness Project (TEP)
- Church Street Red Lane pilot launched in March 2013
- Lane from Duboce to 16th Street
- Travel time improved by 10% on segment (6-7 min before, 5-6 min after)

5L Fulton Limited

- Launched in late October – 12 month pilot
- Expanded service by 30% on the Fulton corridor
- Very popular with customers!



Transit Effectiveness Project (TEP)

- TEP progress moving *rapidly*
- Public outreach across the City beginning in February
- Planning Commission for Environmental Impact Review (EIR) certification in March
- Public hearing with MTAB in March to:
  - Adopt EIR Project Description
  - Legislate travel time reduction proposals ready for bid
  - Legislate service changes

Route & Frequency Changes Proposed

- 10% increase in service hours recommended for FY15/16 two year budget
- Final plan will be determined after February outreach