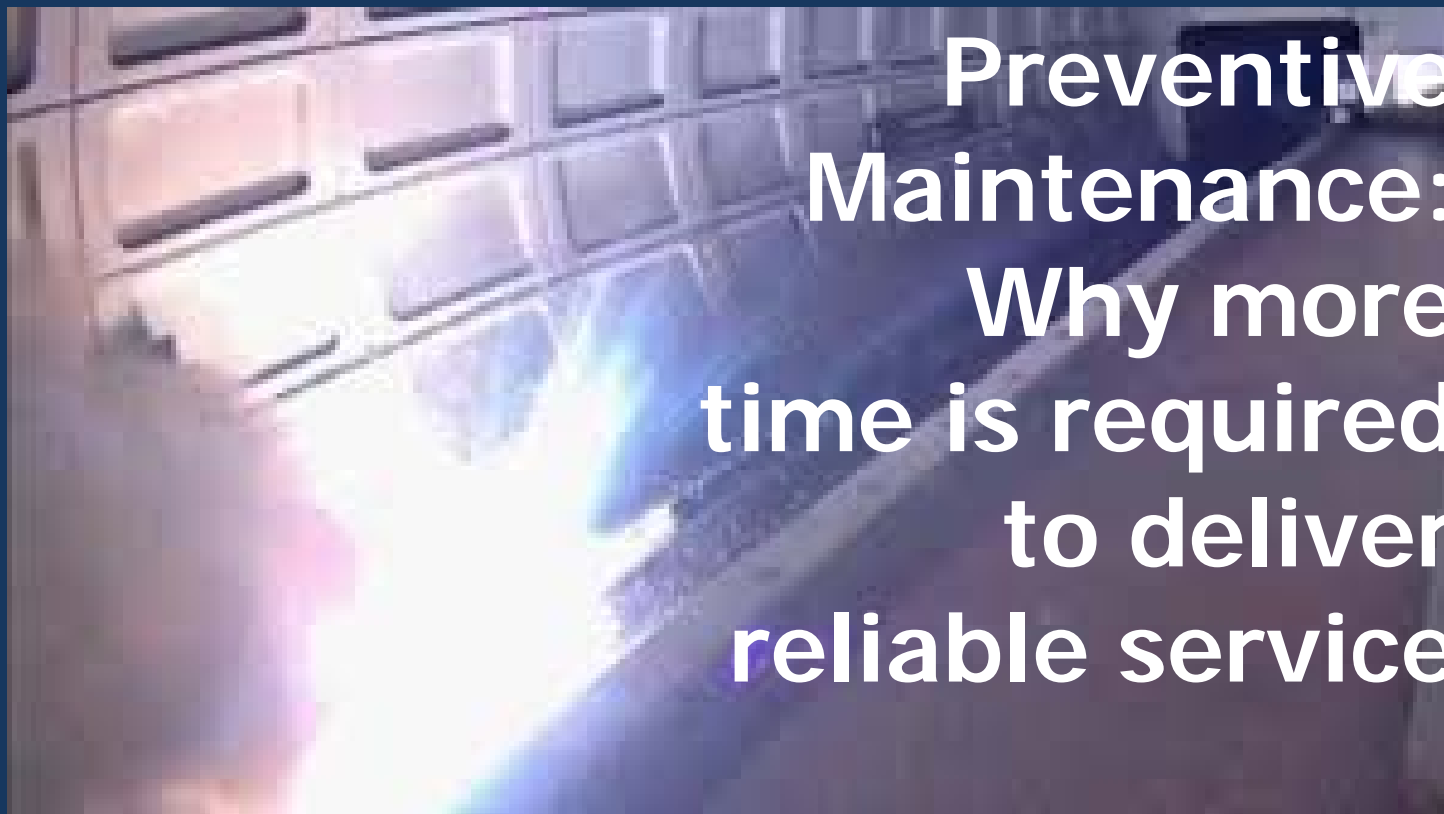




# Washington Metropolitan Area Transit Authority

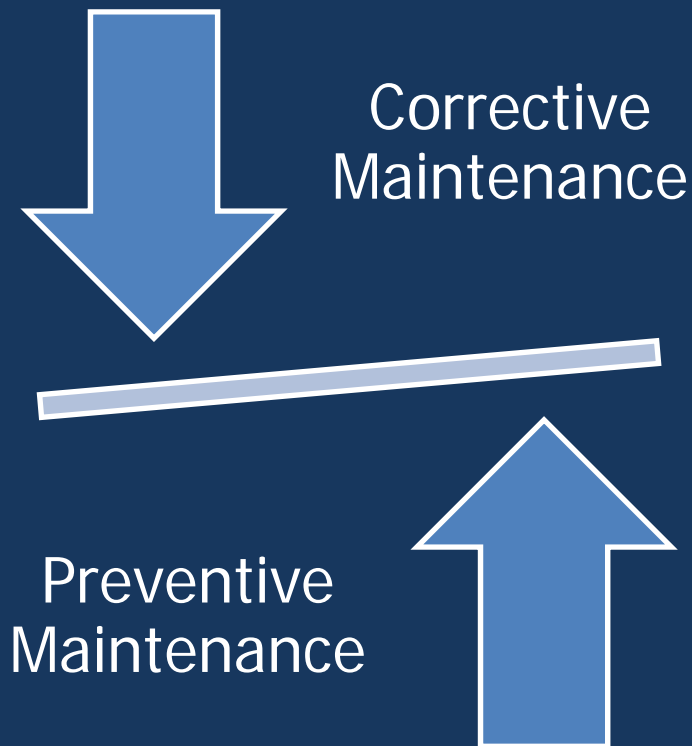


**Preventive  
Maintenance:  
Why more  
time is required  
to deliver  
reliable service**

Customer Service, Operations and Security Committee  
November 3, 2016



# Why is more time needed?



- To avoid SafeTrack 2.0
- Shift balance from reactive to proactive
  - Corrective vs Preventive
- Multiple programs to target specific safety & reliability issues

**Preventive Maintenance is the Anti-SafeTrack**



# How will the time be used?

- New Programs targeting specific safety & reliability issues
  1. Traction Power Cable Meggering
  2. Stray Current Testing
  3. Tamping & Surfacing
  4. Interlocking Component Maintenance
  5. Mechanical Joint Maintenance
- Inspections, Testing & Maintenance highlighted by:
  - WMATA Engineering Standards
  - NTSB Recommendations (4)
  - FTA Corrective Action Plans (8)
  - 2016 APTA Peer Reviews (3)
  - Network Rail Track Time Study



# 1) Cable Meggering

- **Benefits**

- Prevent fire or smoke incidents (L'Enfant Plaza, McPherson Square, & Metro Center)

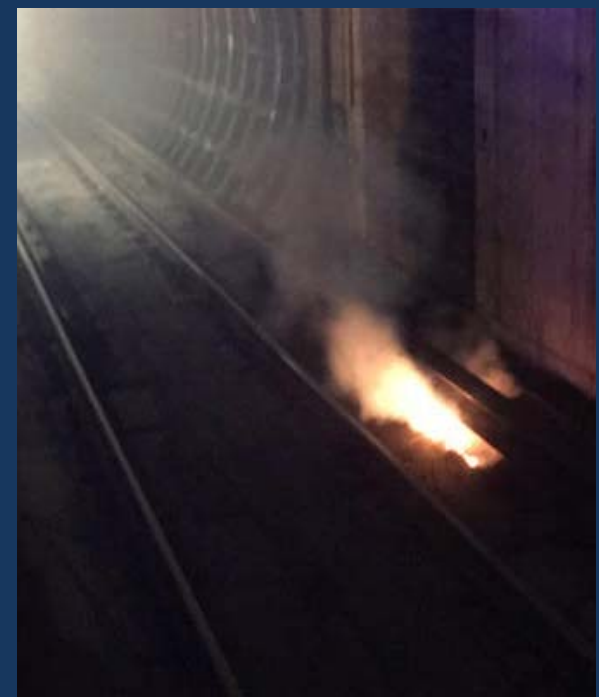
- **Program Description**

- Long duration, systemic program to test cables that can't be visually inspected
- Test the insulation of high voltage cables to monitor & trend condition of cable and replace cables with poor insulation (FTA SMI R-5-35-d)
- 13,529 cables to be tested every four years

- **Requirements**

- Two crews to disconnect every cable from the breaker to megger individually
- Requires 19 work hours per week

5 related incidents  
2016 year to date





## 2) Stray Current Testing

- **Benefits**

- Prolong life expectancy of rail, track and structures
- Reduce risk of fires
- Improves track circuit stability (smoother and faster ride)

- **Program Description**

- Shut down all power and send a test voltage into the tracks to find where there are weaknesses in the electrical insulation
- Test every 4-5 years

- **Requirements**

- Four 3+ hour work windows per area to set-up, test and investigate results

83 related incidents  
2016 year to date





## 3) Tamping & Surfacing

- **Benefits**

- Improves ride quality, minimizing bumps
- Preserves the track by eliminating excessive strain on the rails & ties and stability of track circuits

117 related incidents  
2016 year to date

- **Program Description**

- Maintenance program to correct the alignment of rails and improve track stability
- Mainline biannually; switches annually

- **Requirements**

- Computerized track equipment that lifts track & vibrates ballast to ensure adequate tie support and add ballast where needed
- Requires 20 work hours per week

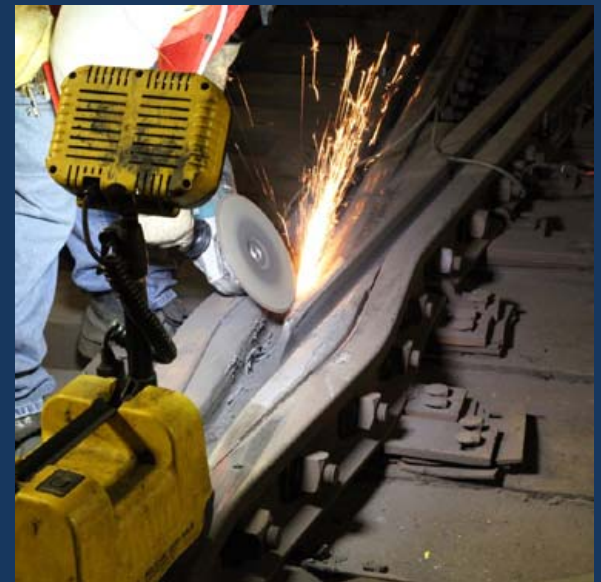




## 4) Switch Welding & Grinding

- **Benefits**
  - Reduce noise and vibration
  - Improve service by keeping all interlocking operable to mitigate other delays
  - Reduce length of single-tracking events
- **Program Description**
  - Switch point grinding and frog grinding & welding to ensure proper wheel/rail interface
  - ATC Component cleaning
- **Requirements**
  - Longer windows (4+ hours)

80 related incidents  
2016 year to date





## 5) Mech. Joint Maintenance

- **Benefits**

- Reduces excessive dynamic loading at joint which accelerate deterioration of track & structure
- Reduce speed restrictions

28 related incidents  
2016 year to date

- **Program Description**

- Inspect, tighten mechanical joints and spot-tie replacements to ensure alignment



- **Requirements**

- Requires 18 work hours per week





## 6) Other Preventive Maintenance

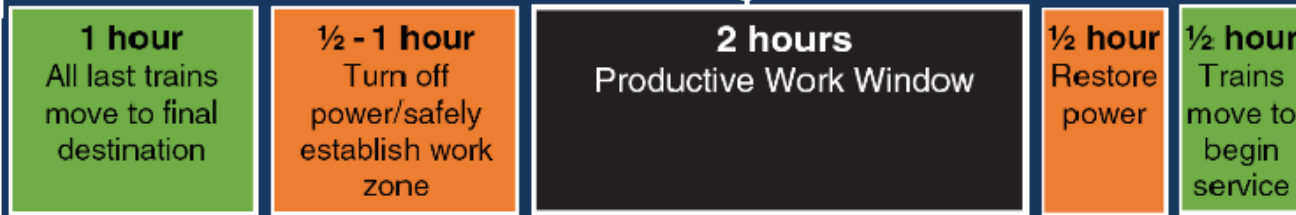
1. Inspection, maintenance and repair of Emergency Trip Stations (ETS)
2. Tunnel lighting replacement
3. Tunnel drains
4. Removal of mud, debris and water
5. Fire extinguishers compliance checks and repair
6. Maintaining emergency egress routes.
7. Torquing
8. Ultrasonic testing of running rails

FTA CAP R-3-23a: Insufficient time for maintenance



# How do we use the time we have?

5 hour window is really 2 hour work window



**Today's Maintenance Window**  
*Sunday-Thursday*

4 hour window is really 1 hour work window



**Pre-SafeTrack Maintenance Window**  
*Friday & Saturday*

*Could not be used for preventative maintenance*

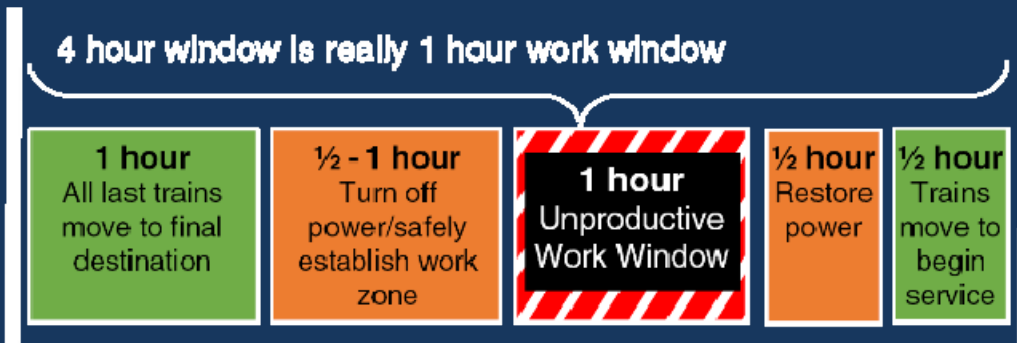


# Efficiency Is Not Enough

- Parallel initiatives
  - Reduce train moves → Max gain 15 min
  - Reduce work area set-up → Max gain 15 min
- Safety trumps Service
  - Current rules are direct result of past experience
  - Changes will take 2-3 years to ensure we stay safe
    - Technology investments
    - Time to implement procedural changes



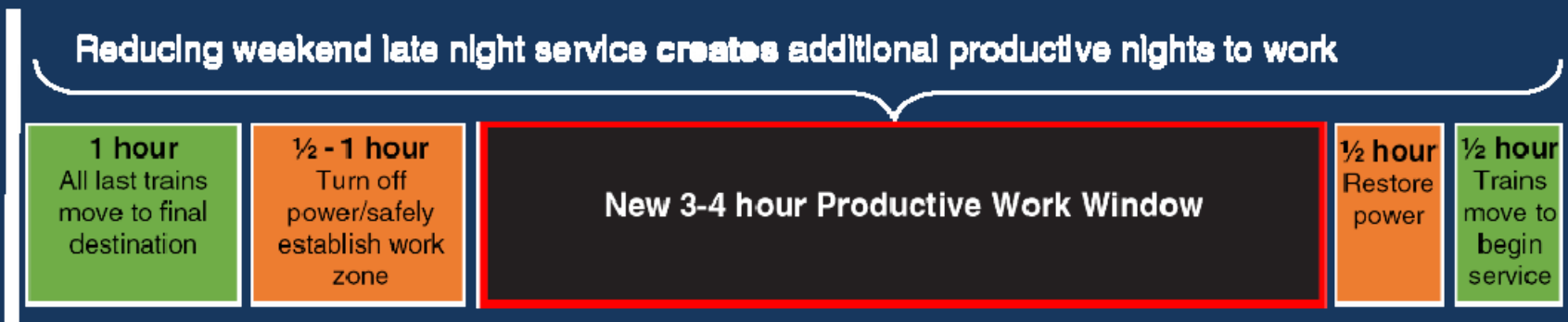
# How do we get the time needed?



**Pre-SafeTrack Maintenance Window**  
Friday & Saturday

*Could not be used for preventative maintenance*

**Adjusted Maintenance Window/Current SafeTrack Maintenance Window**  
Closing Metrolink 3 hours earlier

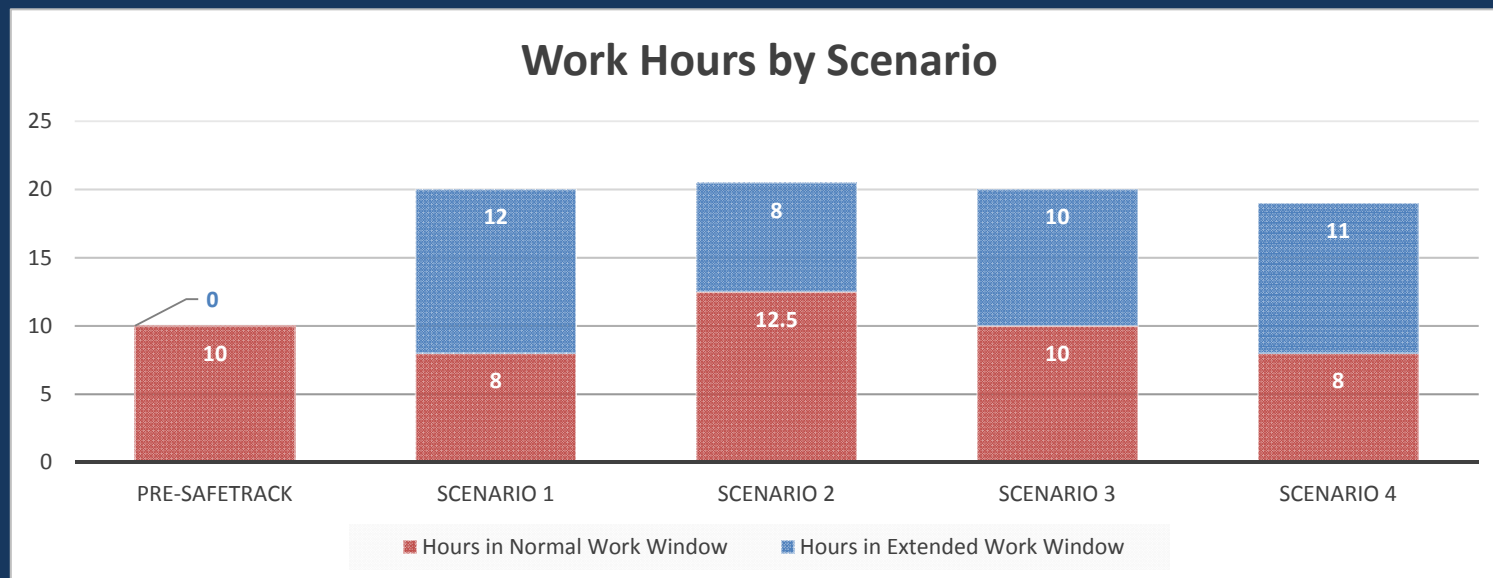


Weekends need to be part of the solution



# What are the options?

- Four scenarios have been proposed that:
  - Decrease passenger service by 8 hours (5%)
  - Impacts <1% of ridership
  - Double productive work time, from 10 hours to 20 hours per week
  - Create expanded work windows (>3 hours) for time-intensive work





# What does everyone else do?

- Different properties are different
  - Type of components
  - How they are used
  - Environmental conditions
- Atlanta >> Concrete ties vs wood
- Chicago >> Rebuild vs Maintenance
  - Dan Ryan Line Rebuild closed 10 miles for 5 months
    - Similar to closing Vienna to Clarendon
    - Four miles of 10mph speed restriction prior to closure

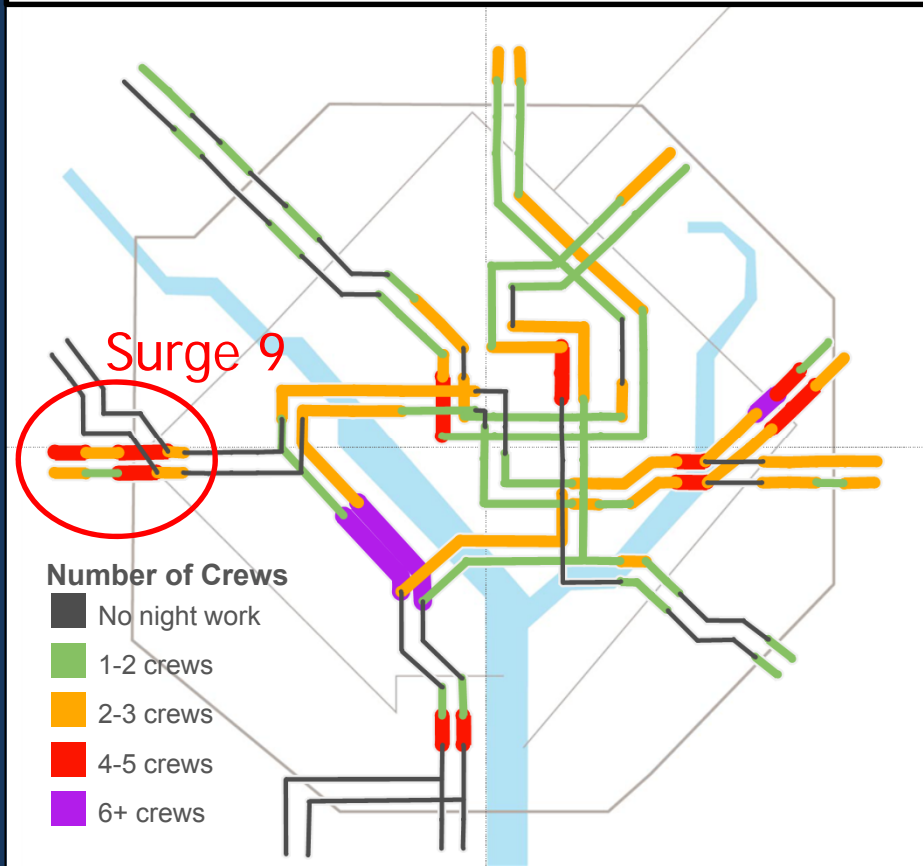


# Why can't we surge instead?

- Volume of work overnight exceeds a surge
  - Avg. night → 57 work crews
  - Surge + Early Outs → 15
- Different needs for access, power and frequency of work

## Night of Sept 7, 2016

- Work on 164 of 234 track miles
- Most outside Surge, after hours

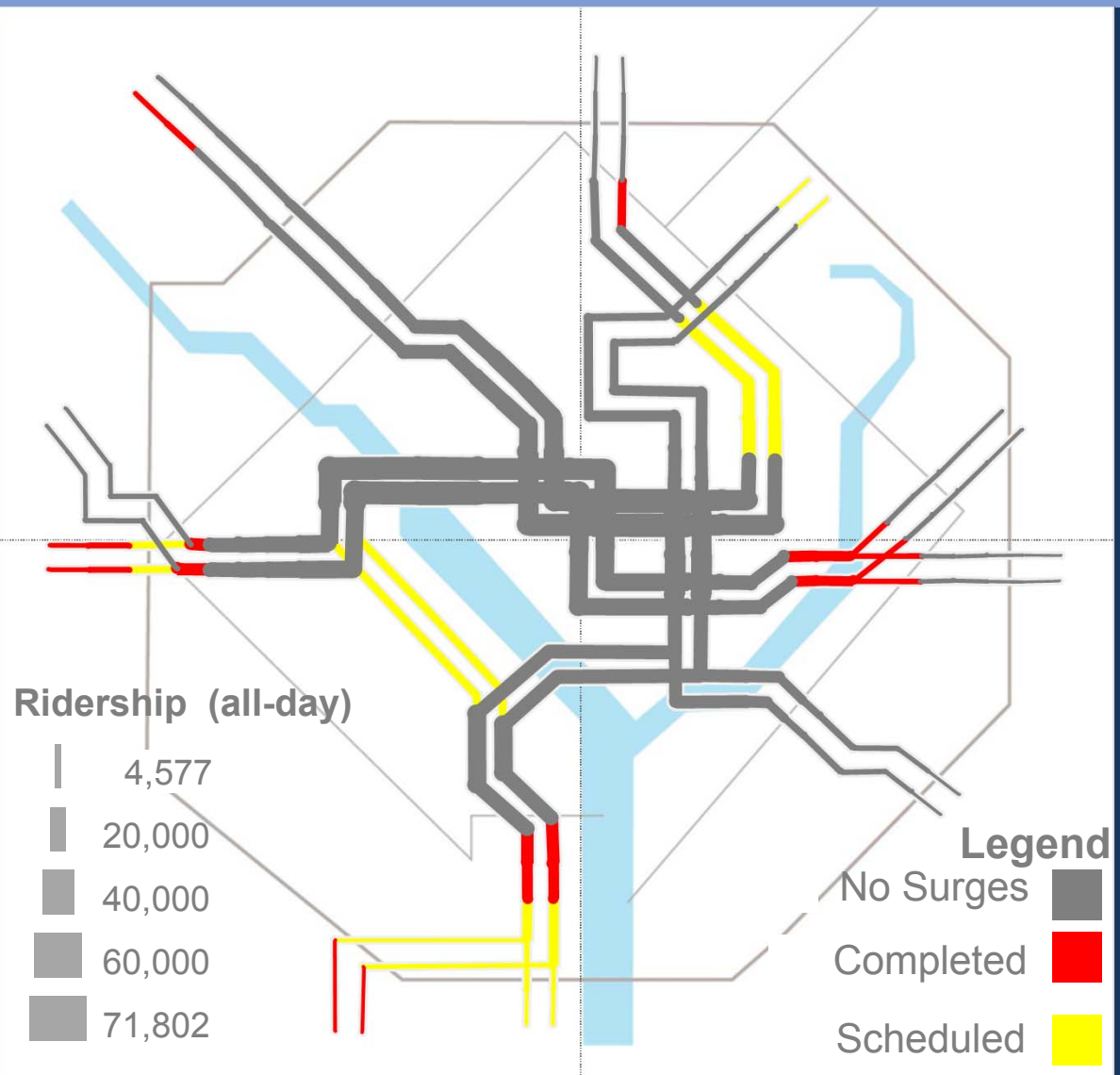




# SafeTrack has not touched Core

Surges in the core would have a much greater impact on the system:

- 20+ min headways
- 85% reduction in service through core







# What would PM surging be like?

- 55 surges, two years, to complete one pass
  - 415 days of surging
  - \$42m of additional support costs
  - Plus additional weekend and late-night single tracking for higher frequency programs
- Ineffective for work crews
- Inefficient for riders
  - Surges reduce capacity beyond the work area
  - Surges in core would dramatically impact the whole system



# How will we know it is working?

- New metric: Infrastructure Availability
  - Miles of track impacted
  - Severity of impact
  - Root cause of delay
  - Trends by location
  - Supplements current OTP metric in Vital Signs
- Riders will experience more reliable service
- Measureable immediately; re-evaluate in two years



# And what if we don't?

- SafeTrack 2.0 will be a matter of time
- Reliability degrades:
  - Significant unplanned service disruptions
- Other urgent safety programs suffer in competition for track time
  - Tunnel Lighting
  - Radio Project



# Pivotal Decision for WMATA

- “Safety trumps Service” led to SafeTrack
- The question now is Service vs. Reliability:
  - Reduce infrastructure-related delays by HALF (10% overall)
  - Impact <1% of trips

Preventive Maintenance, and the time to execute it, is the only way to deliver safe & reliable service and every peer and regulatory review has come to the same conclusion.