Making the Best of it: Maintenance Productivity During the Pandemic

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Agenda

- System Overview
- Revenue Service Reduction
- Rail Relay
- Direct Fixation Fastener Replacement
- Rail Re-profiling
- Accelerated Capital Projects
- A65 Interlocking Replacement
- A75 Interlocking Replacement
- Q/A

System Overview

- 126 Route Miles
- 430,000 daily riders (Pre-covid)
- 80mph Max Speed
- Automatic Train Operation
- 66 in. Track Gauge
- 23% Aerial DF, 24% Subway DF
- 53% at Grade Ballasted Concrete Tie

Revenue Service Reduction

Service Reduction between Mar 21st 2020 and Aug 2nd 2021)

	Pre-Covid-19	During Service Reduction
Daily Ridership	430,000	11% of normal
Weekday service	5am – 1 am	5am – 9pm
Weekend service	6am – 1am	8am – 9pm
Headway	15 mins	30 mins
Maint. Work Window	4 hr	8 hr

Rail Relay

- 50-year-old legacy rail nearing end of useful life
- Predominant wear on high rail
- Short term goal to replace 50 miles

Pre-Covid-19

- 7.1 linear miles (two-year average)

During Service Reduction

- 13.3 linear miles (15 months)
- 51% increase

DF Fastener Replacement

- 50-year-old fasteners nearing end of life
- Replaced legacy threaded fasteners with elastic fasteners
- Replaced 120k out of 345k fasteners

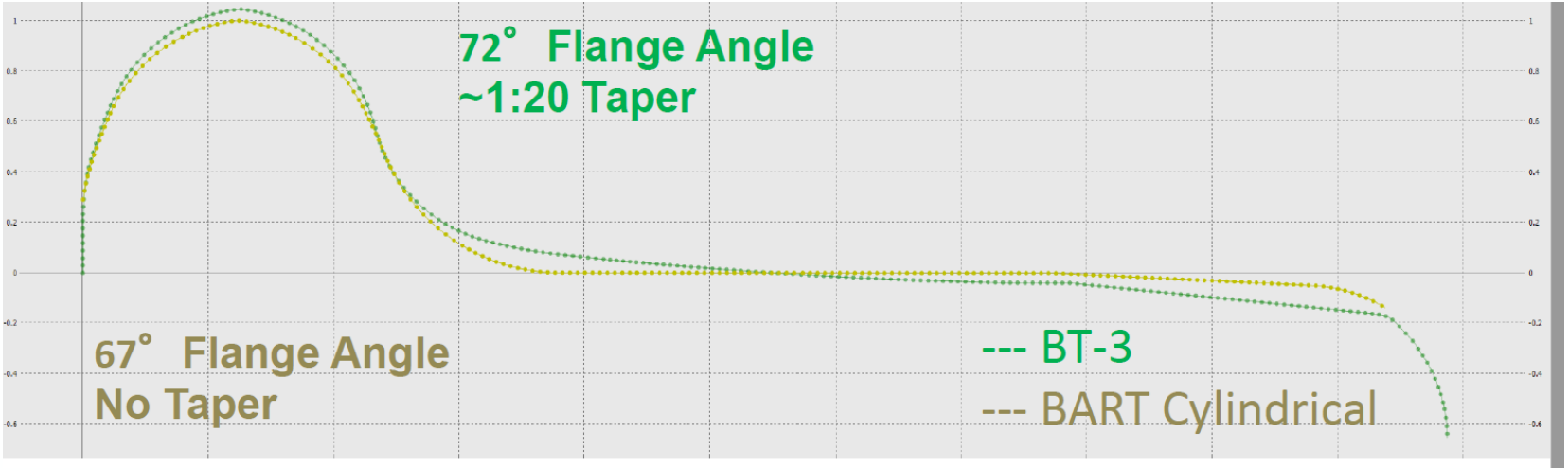
Pre-Covid-19

- 12,672 EA (two-year average)

During Service Reduction

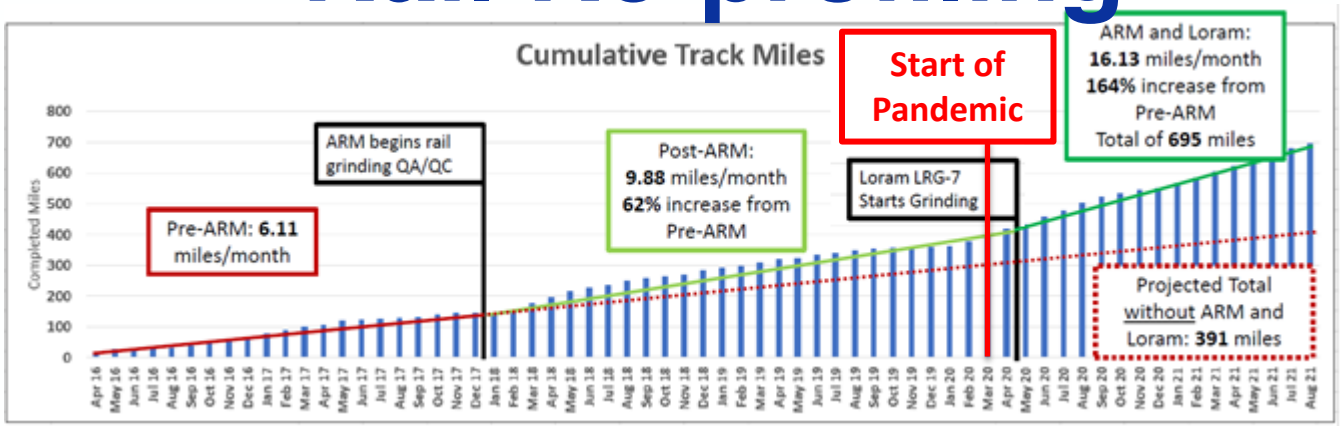
- 20,236 EA (15 months)
- 60% increase

Rail Re-profiling



- Transition from cylindrical to conical wheel (BT-3 wheel)
- ARM/NRC designed matching rail templates

Rail Re-profiling

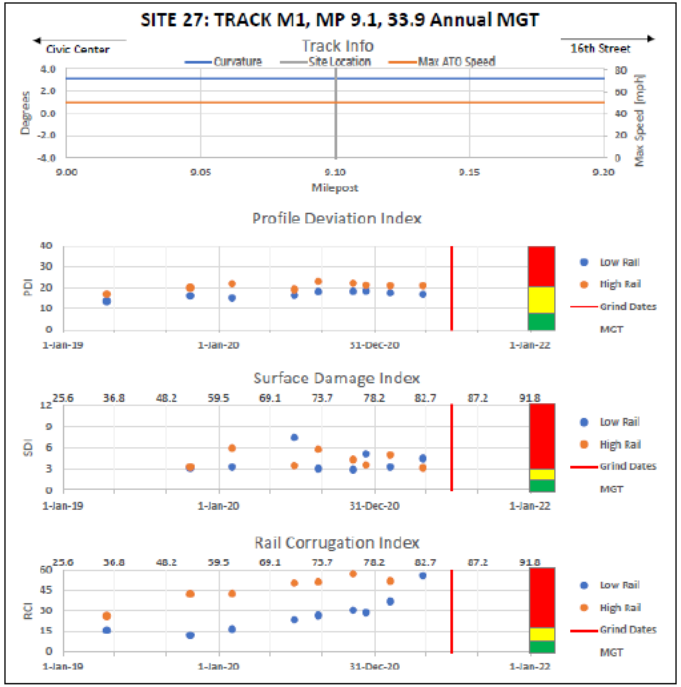


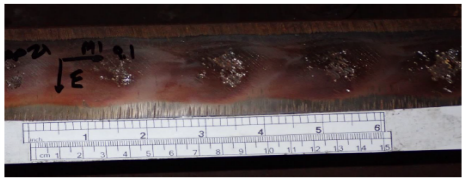
- BT-3 wheel implementation began Jul 2017
- Two-phase rail profile implementation began Jan 2018
- Loram grinder production began Apr 2020
- % complete for phase 1 (93%) and phase 2 (76%)

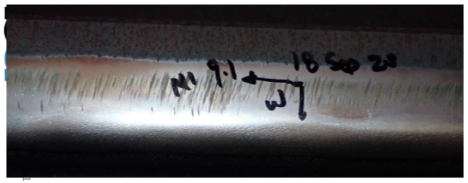
Rail Re-profiling

50 locations for rail conditions trending

- **Based on curvature, speed, traffic volume, grade, etc**
- **Performed by ARM**
- **Profile Deviation Index**
- **Surface Damage Index**
- **Rail Corrugation Index**



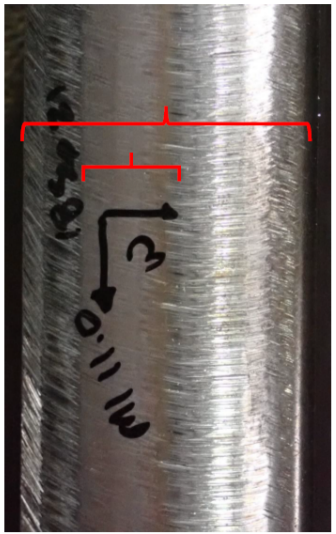




Rail Re-profiling

Site 23: M1 11.0, 3.6° curve

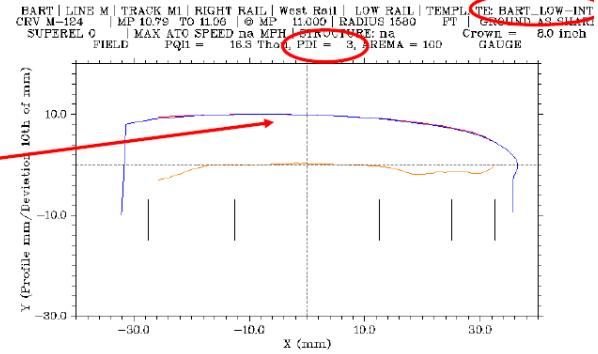
Running band looks very good



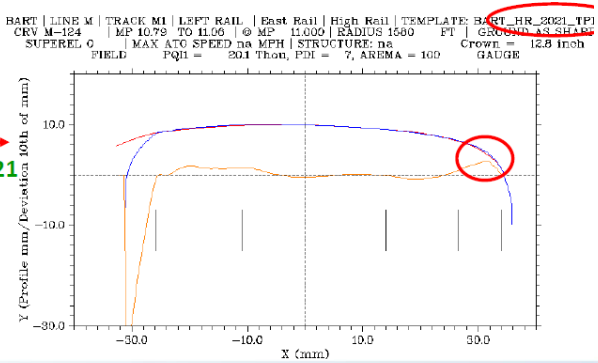
Low-int

Ground 23JUN21
Passes: 4W, 5E

Light GCC

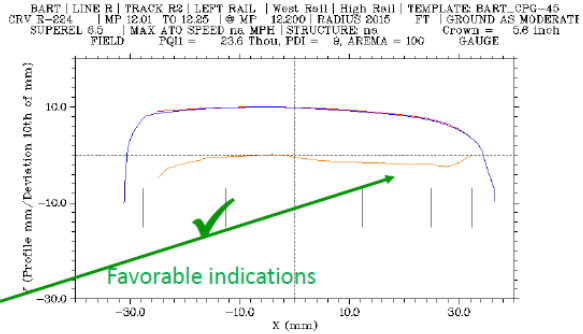


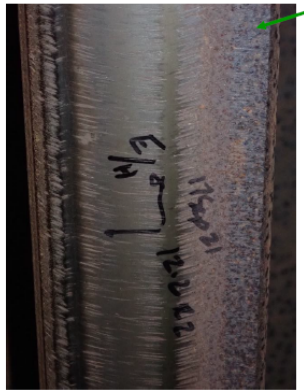
HR-2021

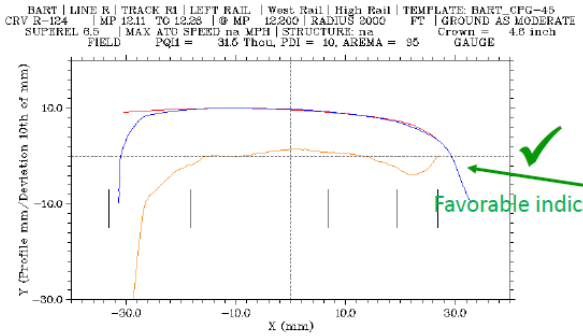


Rail Re-profiling

Site 38: R2 12.2, CPG as high rail





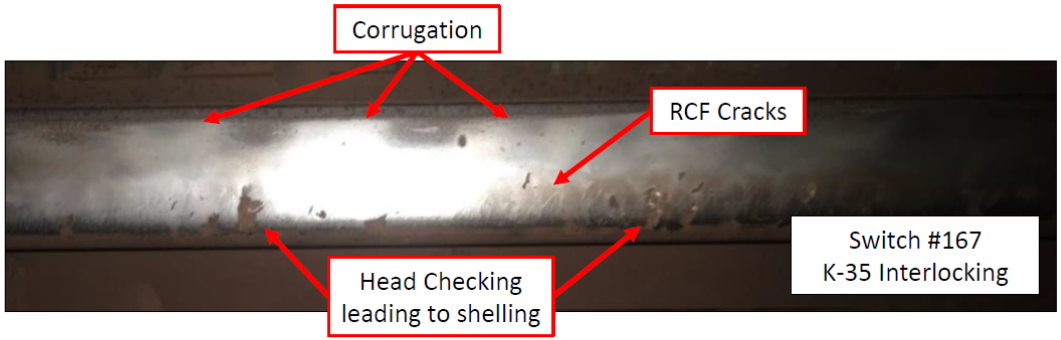


R1 12.2, CPG as high rail

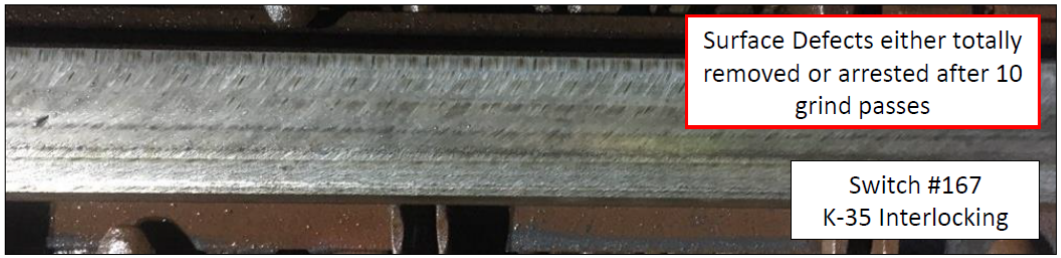
Rail Re-profiling

- **Defect Removal in Switch**

Pre-Grind



Post-Grind



Accelerated Capital Projects

- Contractor accelerated production rates due to longer maintenance windows
- Reduced agency support costs
- Reduced Planned weekend outages bus bridge cost

Photo credit: Martin Chandrawinata, Prescience

A65 Interlocking Replacement

- Hayward Station
- Two No. 10 Concrete Tie Crossovers
- New Traction Power Contact Rail, Coverboard, and Cables

Photo credit: Martin Chandrawinata, Prescience

A75 Interlocking Replacement

- North Hayward Yard
- One No. 15 Concrete Tie Crossover and Two No. 15 Concrete Tie Turnouts
- New Traction Power Contact Rail, Coverboard, and Cables

Photo credit: Martin Chandrawinata, Prescience

Q/A

Photo credit: Martin Chandrawinata, Prescience