Maintaining a Legacy Transit Railroad

Port Authority

John W. Binsse, E.I.T.

Port Authority of Allegheny County, Manager – Way Department

Pittsburgh, PA
Agenda

• System Information
• Strap Guard
• Embedded Switch
• Vegetation Management
• Station Design
System Information
Track

• 26 miles of mainline double track
• 40.4 ballast
• 20.4 embedded or direct fix
• 251 switches
• 317 frogs
• 115 lb and 100 lb rail
System Information
Geometry

- 62 ½” gauge
- 36’ loops
- 82’ radius curves
- Grades up to 9.25%
System Information
Stations and LRV’s

• 65 high and low platform stations
• Wheels
  – Unique flange design
  – Tire Resilient wheel
Strap Guard

- Shallow flangeway
  - Excessive wear
  - Flange bearing
- Width is 1.375"
  - 1.55” is appropriate
Wheel Lateral Forces

Optimal Width = 1.55
Wheel Wear Index

![Graph showing the relationship between Flangeway Width (inch) and Wheel Wear Index (lb-in/in). The graph indicates that the optimal Flangeway Width is 1.55 inches. The legend includes Guard Rail, High-Rail Wheel Flange, Low-Rail Wheel Tread, and High-Rail Wheel Tread.]
Bending Strap
Current Guarding Criteria
Primary

• Inside rail
  – <500’ ballast
  – <750’ Embedded

• Both rails
  – <125’
Current Guarding Criteria
Secondary

• Inside rail
  – <300’ speed <15mph
  – <750’ Embedded

• Both rails
  – <100’ speed <15 mph
Proposed Guarding Criteria
Primary

• Inside rail
  – <500’ Ballasted
  – <750’ Embedded

• Both rails
  – Eliminate use of double guarding
Proposed Guarding Criteria
Secondary

• Inside rail
  – <300’ speed <15mph

• Both rails
  – Eliminate use of double guarding
Strap Guard Failures
Key Take Aways

• Wheel loading
• PCC
  – early form of resilient wheel
  – More tolerant of back of wheel flange loading
• LRV’s resilient wheel
  – Rubber blocks absorb forces solely through shear resistance. Not designed for this.
Solutions

Vertically Mounted Restraining Rails

Strap Guard Rail

Horizontally Mounted Restraining Rail

33C1 Restraining Rail
Reccomendations

• Discontinue use of double strap guard criteria
• Replace with restraining rail alternatives
• Remove strap on high side and replace low side as time permits
Embedded Switch

- Originally installed during Stage 2
- Replaced
- Previous design
  - Unservicable
- New Design
  - Modular
  - Incorporated restraining rail
Embedded Switch
Embedded Switch
Embedded Switch
Vegetation Management

• Preventative Pruning
  – Mechanical
    • Mowing, Brush Hogging, Trimming, Winter/Growing Season
  – Chemical
    • Ballast, Brush, Turf, Ornamentals/Beds
    • Bare Ground, Contact, Systemic, Brush Control, Turf Management
Vegetation Management
Vegetation Management
Vegetation Management

• Emergency
  – Mechanical
• Year Round
Station Design
Station Design
Closing

- Unique system
- Strap - Restraining rail
- Embedded switch - Serviceable
- Vegetation Management - Preventative
- Station Design - Sustainable maintenance
Credits

• Eric S. Doyle Supervisor – Way Department
  Port Authority of Allegheny County
• Mott MacDonald Task 5 Report –
  Assessment of Strap Guard Fitment 2016
• TCRP 82 2007
Questions?