

11/26 Link Incident: Audit Overview and Agency Response

Rider Experience and Operations Committee

2/9/22

Why are we here?

- Review internal audit findings
- Review agency response
- Describe key areas for improvement

Internal Audit Overview

1 Line service and background

- Sound Transit owns 1 Line service and is responsible for rider information, security, and incident communication.
- King County Metro is under contract for operations, maintenance, safety, and incident/emergency response.
- Responsibility for emergency actions divided between the two agencies.
- Incident occurred Nov. 26, on a section of track that had opened eight weeks prior on Oct. 2.



Why was the Audit Division involved?

- Broad investigation requested by CEO Rogoff.
- To inform improvements in communications, operating practices, safety and security.
- To identify gaps and prevent similar incidents.

Incident Overview

Incident overview

8:19pm – Full train leaves UW Station for U District Station

- Day after Thanksgiving, immediately following Apple Cup.
- 46% more trains in service for event (13 regular, 6 special).
- Crush-loaded trains immediately after the game.



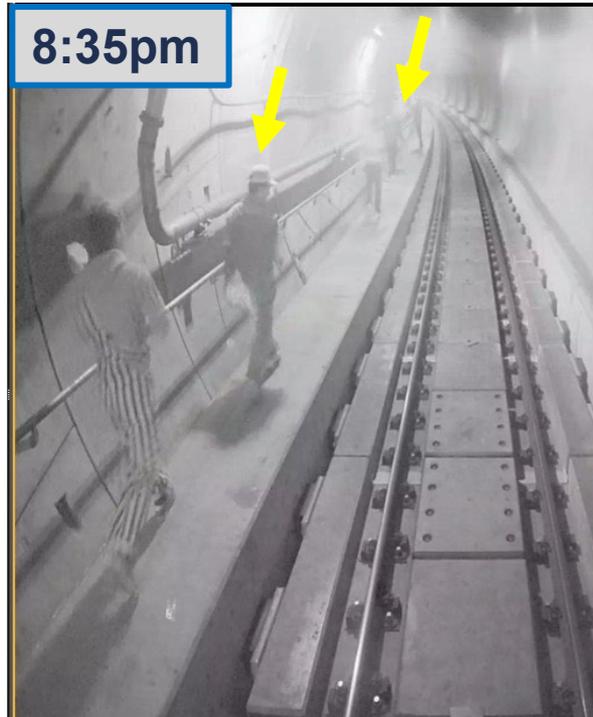
Incident overview (cont.)

8:20pm (+1 minute) – 1,000 feet north of UW Station, the train loses power and comes to an abrupt stop



Incident overview (cont.)

8:24 (+4 mins): passengers begin self-evacuating the train



Incident overview

Event Timeline

8:32pm (+12 mins)

- Operator makes first announcement to passengers.
- King County Metro Link Control Center (LCC) implements a full system stop, requiring all trains to hold in position.
- The LCC dispatches a rescue train.

8:36pm (+16 mins)

- LCC clears rescue train to proceed slowly southbound from U District Station to the nearest cross passage.
- King County Metro Rail Supervisors walk the tunnel to assist getting passengers off the disabled train.

Incident overview (cont.)

Event Timeline

- ***8:41pm (+21 mins)***
 - ST Operations duty officer sends "Command Post" message.
- ***8:46pm (+26 mins)***
 - King County Metro Rail Supervisors begin loading passengers onto the rescue train.
 - The rescue train's departure is then delayed.
- ***9:15pm (+55 mins)***
 - All remaining passengers from the disabled train are aboard the rescue train and it proceeds to U District Station.
- ***9:19pm (+59 mins)***
 - Trains continue shuttling some passengers to/from the platforms using single tracking.

Incident overview (cont.)

Event Timeline

- ***9:19pm (+59 minutes)***
 - Bus bridge communications issues.
- ***9:35pm (+1 hour, 15 mins)***
 - Three calls to ST Communications Duty Officer go unanswered.
- ***9:53pm (+1 hour, 33 mins)***
 - Sound Transit CEO Peter Rogoff notified.
- ***9:57pm (+1 hour, 37 mins)***
 - Communications hears of the incident from external media outlet.

Incident overview (cont.)

Event Timeline

- ***10:00pm (+1 hour, 40 mins)***
 - Passenger Experience staff hears of the incident and sends first “Rider Alert” message two minutes later.
- ***10:20pm (+2 hours)***
 - WSDOT and FTA reporting deadline passes, without reporting.
- ***10:58pm (+2 hours, 38 mins)***
 - King County Metro tows disabled train back to the Operations and Maintenance Facility (OMF).
 - Single tracking ends and normal 1 Line service resumes.
- ***11:57pm (+3 hours, 37 mins)***
 - Communications sends out a blog post about the event.

Summary of Findings

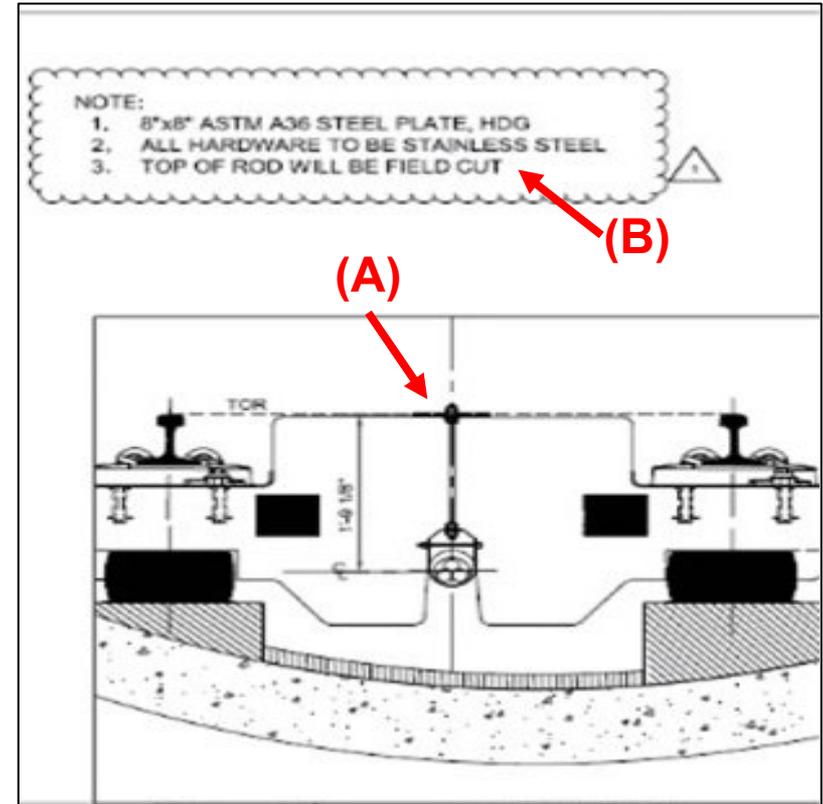
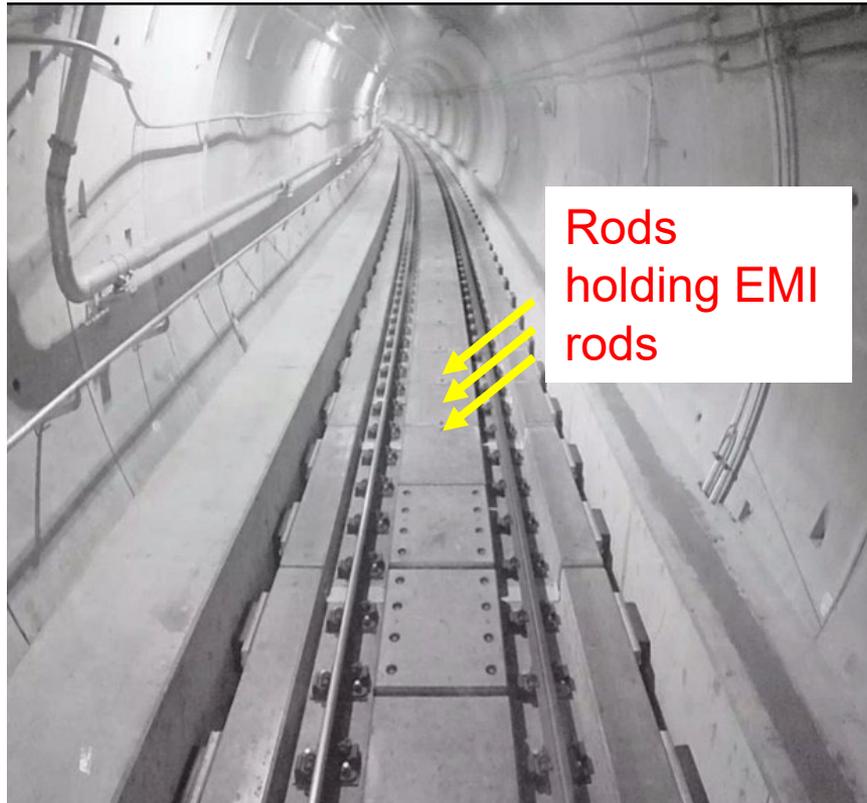
Audit findings categories

1. Causes of train damage and stoppage.
2. Effectiveness of communications.

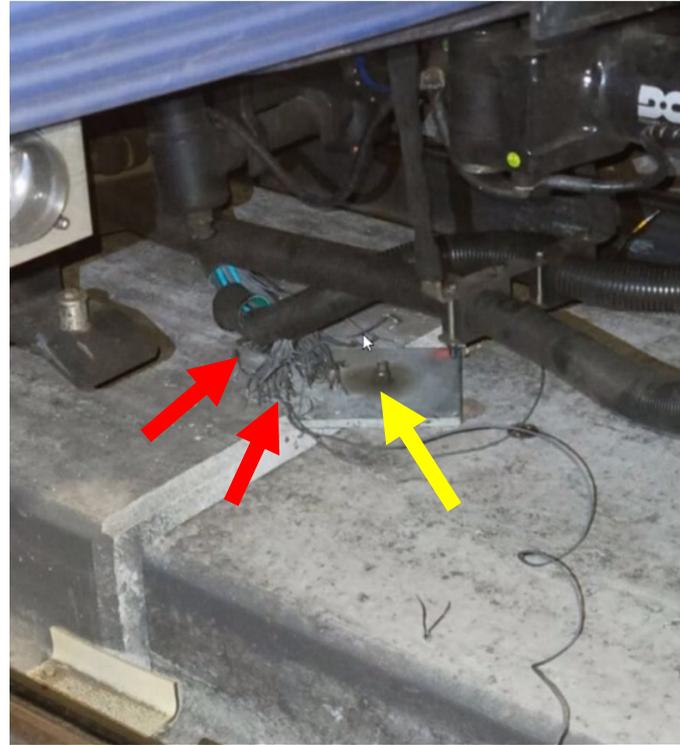
Summary of what damaged the train

1. Series 2 train vehicle struck a protruding EMI rod between the rails which severed cables beneath the vehicle.
2. Pre-revenue testing processes had not fully considered clearance differences between Series 1 and Series 2 vehicles under all possible operating conditions.
3. Previous rod strikes and non-disabling vehicle damage were being reported by maintenance staff but were not properly escalated.

Electromagnetic interference (EMI) rods

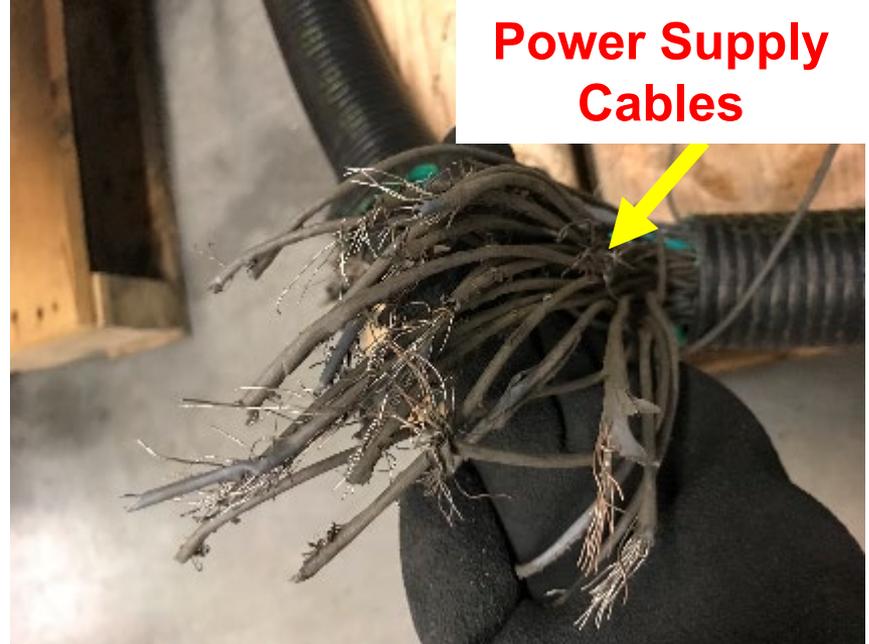
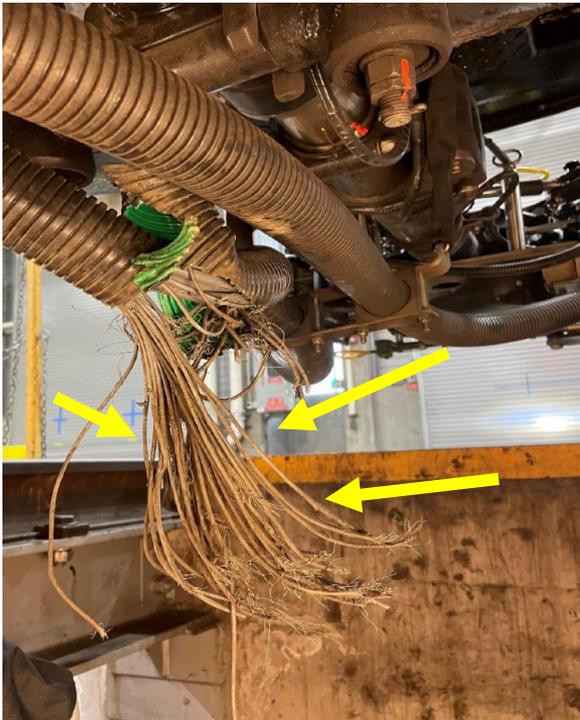


Previously damaged EMI rod (left) and damaged vehicle (right)



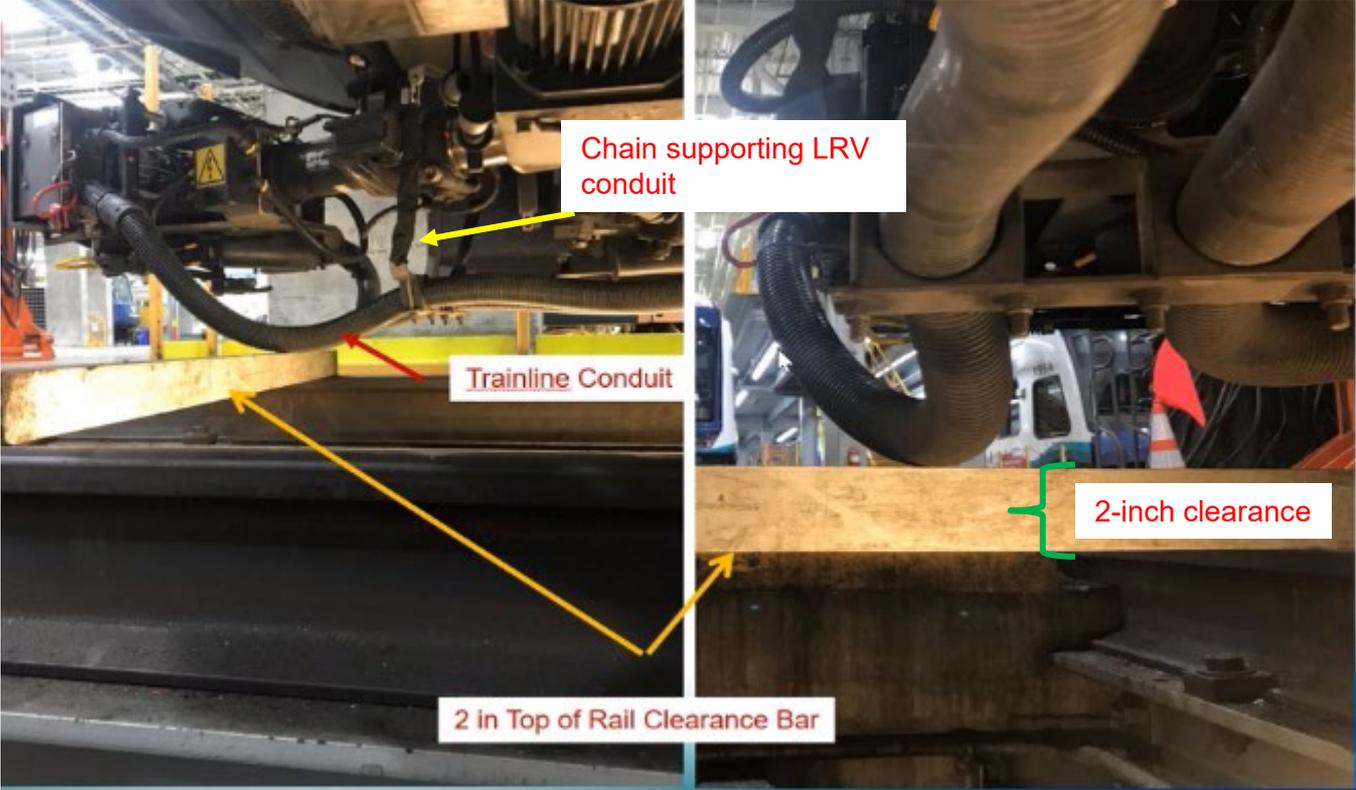
Damage caused by EMI rod

Conduit damage to light rail vehicle

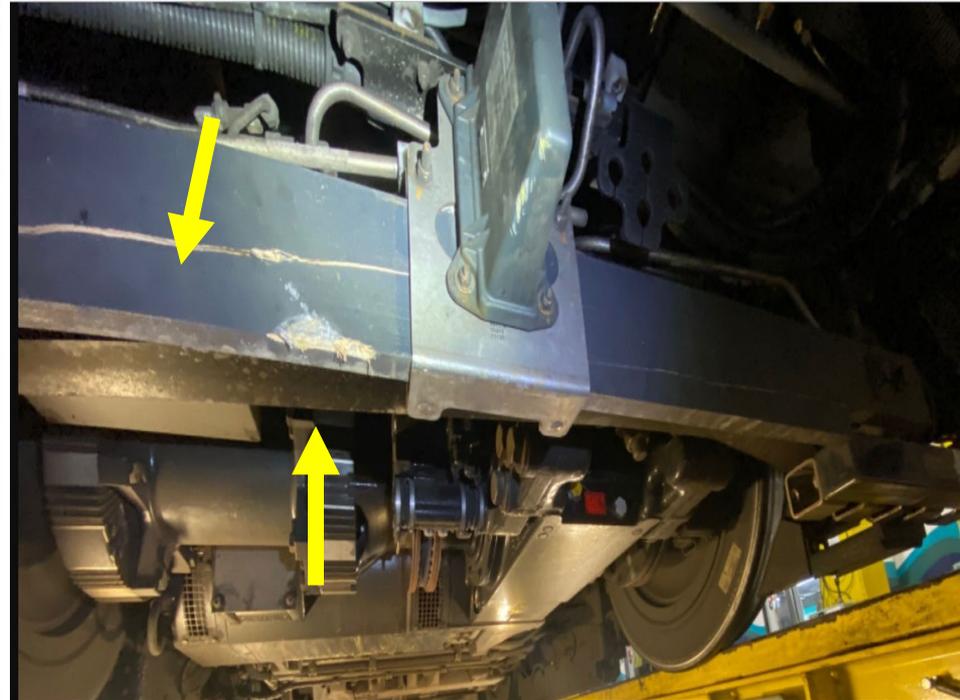


Post-incident vehicle clearance checks

Configuration differences



Damage occurring prior to incident



Damage occurring prior to incident (cont.)

- Audit team reviewed 2,800 work orders, finding 16 relating to EMI rods or related damage.
 - 5 work orders for damage to Series 1 vehicles.
 - 3 work orders for damage to Series 2 vehicles.
 - 8 work orders for rods.
- King County Metro was looking into the issue and notified Sound Transit Engineering.
- King County Metro Safety, Sound Transit Operations, and Sound Transit Safety were not notified, as established by procedures.

Communications breakdowns

- Passengers on the affected train did not receive prompt communications about the incident and impact to service.
- Duty officer communications information didn't reach the right channels, preventing prompt staff and passenger communications (rider alerts).
- Some functions (tunnel cameras, station PA systems) inoperable on night of event.

***Agency Response to
Incident and Audit***

Key improvement areas

- ***Strengthen operations procedures***
 - Emphasis on clarity around Sound Transit's overarching accountability for service.
 - All Sound Transit and King County Metro operations staff must be fully aware of their respective roles and responsibilities. We must work to eliminate any ambiguity or confusion.
- ***Improve agency emergency communication processes***

Agency Response to Incident and Audit

- ***Action plan to address the findings***
 - Initial overview of action plan and responses presented today
- ***Establish Executive Oversight Team with King County Metro and begin quarterly reporting on findings action on incident action plan***
- ***Improve communications processes and procedures***

***Preventing track
clearance issues***

Issue: track clearance

Errors leading up to 11/26

- Checkpoints in design, construction and testing for Northgate Link Extension should have ensured proper clearance on the new alignment.
- Checkpoints in testing and acceptance for the Series 2 vehicles should have ensured proper clearance at the highest passenger load limits.
- Checkpoints in the Activation process should have ensured the rods be cut to complete Safety Certification
- Once in Operations, known incidents of protruding EMI rods should have been escalated via Safety Incident Reporting Tool.

Issue: track clearance

Actions since 11/26:

- Field cut all protruding rods per approved design.
- Raised the trainline cables on Series 2 vehicles.
- Adjusted vehicle clearance requirements in our design verification testing.
- Applied these requirements to East Link testing.
- Refined special event procedures to ensure adequate staffing and passenger communications

Issue: track clearance

Additional next steps:

- Improve quality assurance processes prior to live power testing on the new alignment.
- Improve verification processes prior to testing and operations (design, construction, safety certification).
- Review high-risk and non-standard design elements throughout the operating system.

Effective communications

Issue: onboard communications

What should have happened during incident?

- Prompt communication to passengers of the mechanical problem and instructing them to remain onboard for rescue train.
- Passenger communication should have occurred simultaneously with attempts to troubleshoot or restart the disabled train.

Issue: onboard communications

Actions since 11/26:

- Revised protocols and training for train operator communications with passengers of disabled trains.
- Reinforced existing protocols for expedited staff dispatch and prompt staging of rescue trains.

Issue: onboard communications

Additional next steps:

- Review and reinforce protocols for no train deployment, if intercom system is disabled.
- Analyze potential technical solutions to show the operator whether intercom is working, independent of main panel.
- Add train signage promoting rider alerts (website and text/email subscriptions).

Issue: station and system communications

What should have happened?

- Prompt communication of system stoppage on all station platforms, including notification of alternate bus bridge.
- Ensured that staff was trained and prepared to use individual station intercoms.
- Issued sufficiently detailed rider alerts (email, SMS, Twitter) within minutes of the start of the incident.
- Contingency plans in place for staff absences in Link Control Center during evenings, weekends and holidays.

Issue: station and system communications

Actions since 11/26:

- Ensured that LCC staff have working remote access station intercoms and conducting extra testing prior to large events to ensure they are working as expected.
- Trained staff to use on-site intercom.
- Clarified bus bridge implementation protocols.
- Temporary dedicated staffing commitments at LCC during high-ridership events.

Issue: station and system communications

Additional next steps:

- Co-locate Sound Transit passenger communications staff and King County Metro Rail staff in a new Link Control Center (begins 2023).
- New Passenger Information Management System (PIMS) and increased control center staffing will enable more rapid intercom and electronic signage communications.

Ongoing Safety Oversight

Additional next steps:

- Safety Department tracking each corrective action and finding to closure.
- Improve and expand our tabletop exercises to better incorporate passenger communications elements.
- Procure technology and develop protocols for rapid, reliable staff notifications and positive verification that staff are responding.

Thank you.



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