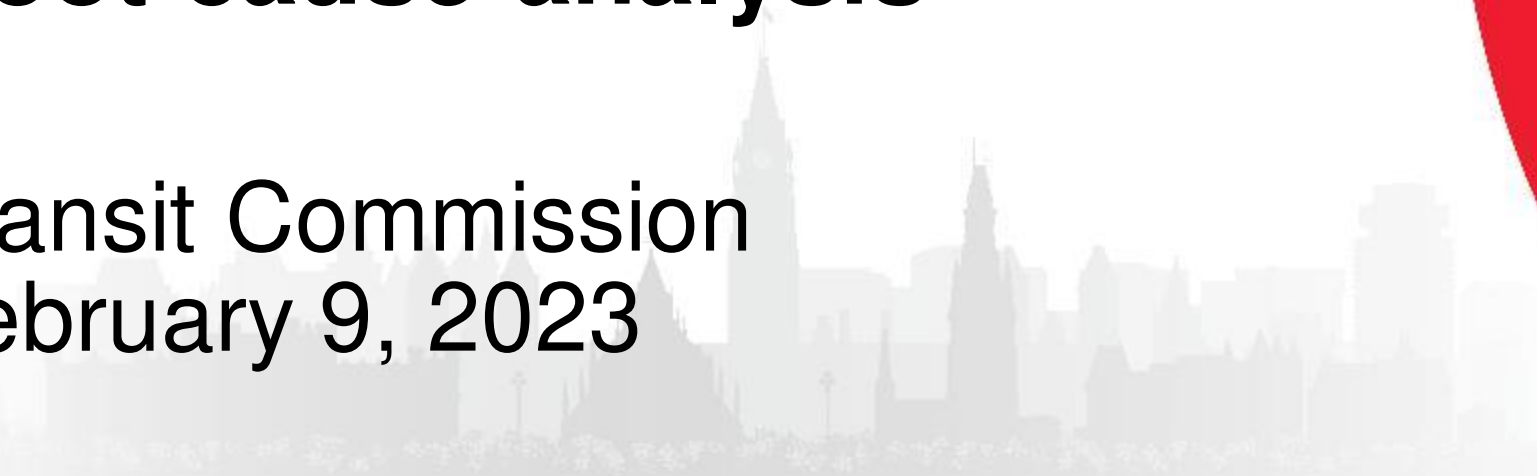




# **January 4 Line 1 service disruption Root cause analysis**

Transit Commission  
February 9, 2023



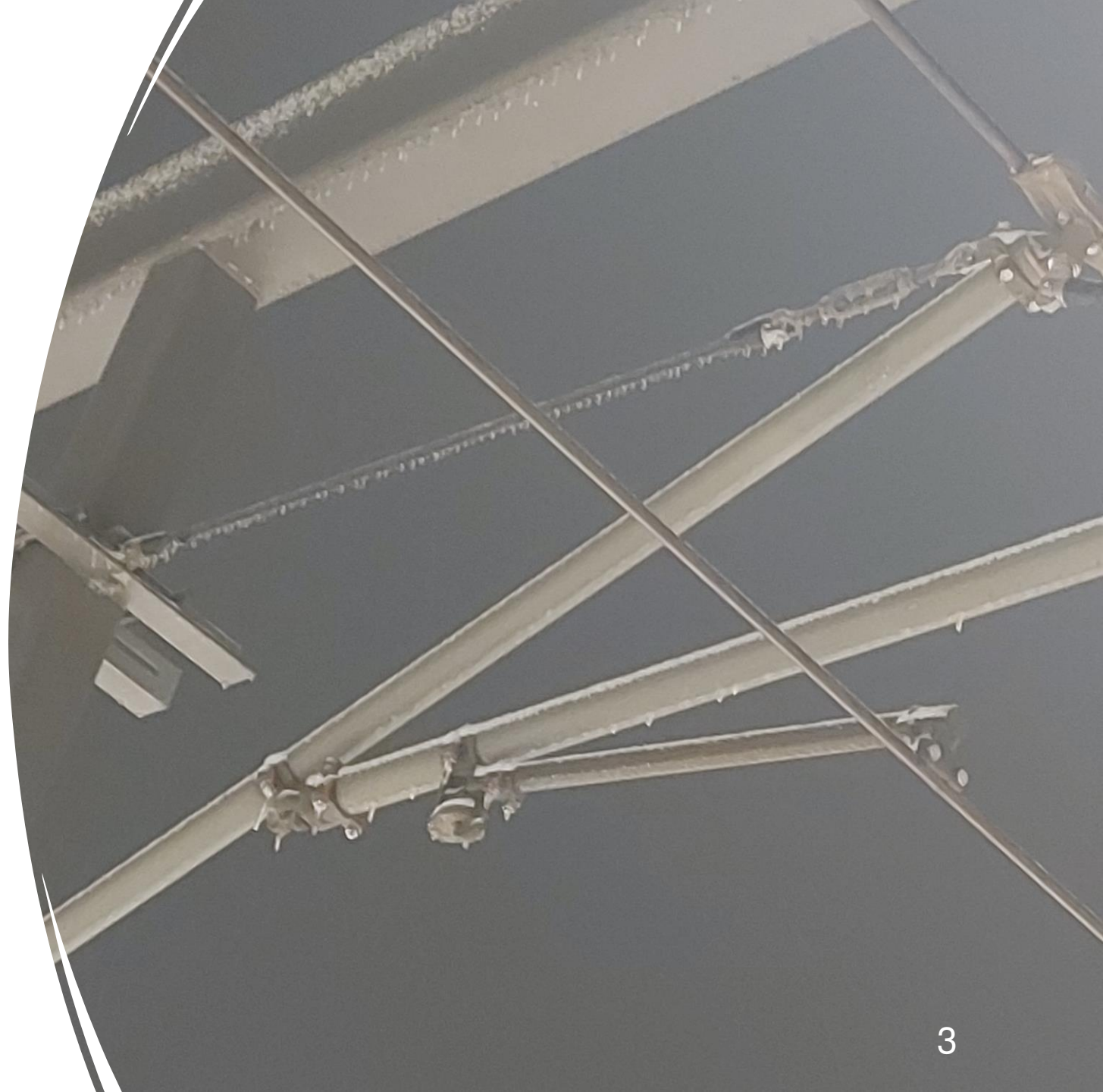
# Line 1 winter storm readiness

- City/RTM implement winter operating plan
- Specialized equipment and extra staff
- Trains run through the night
- Snow fencing
- Proactive snow clearing resources



# System design

- Project Agreement:
  - Vehicles built to withstand up to 5mm/hour and 30mm/day of freezing rain
  - OCS designed for 12.5mm of ice accumulation
- 2019 to 2022:
  - 50+ days of freezing rain events
  - Zero ice-related OCS issues



# Jan. 4: unique environmental conditions

- January 4, between 10 and 11 p.m., Environment Canada reported up to 4.3mm of freezing rain per hour
- Temperatures were much higher than the historical average for January in Ottawa:  $-5$  to  $-14$  degrees Celsius
- Trains were immobilized just east of Rideau River where high moisture content was observed
- Sections of open water on the river combined with colder air to create fog
- Moist fog condensed and froze on the cold metal of the OCS
- Unique combination of factors caused greater ice buildup in this area than elsewhere on the system



# Overhead catenary system event

- Passenger service continued in the east and west sections
- Two trains were immobilized between Lees and Hurdman stations due to accumulated ice on the OCS contact wire
- Stopped trains blocked eastbound and westbound tracks allowing ice to accumulate
- Recovery trains dispatched and cautiously approached stopped LRVs
- The slow speed combined with ice accumulation caused severe arcing
- The contact wire failed from overheating due to the surge of high energy

# Repairs and restoring service

Due to the failure of the contact wire, the removal of the ice had to be completed manually

- **January 4 – 6:** Recovery attempted using LRVs
- **January 6 – 10:** Approx. 5,600 metres of iced OCS cleared by hand
- **January 6 – 10:** Repair of the overhead wires
- **January 10:** Recovery of four immobilized trains
- **January 7 - 10:** Full inspection of the OCS; Tremblay to uOttawa
- **January 10:** Testing repaired sections of contact wire
- **January 10 (8 p.m.):** safe re-opening of full Line 1 service

# Next steps

City and RTM have established an OCS working group

- Includes experts in power supply and distribution
- Preliminary root cause investigation is completed, and final report is being finalized

Recommended mitigations:

## Immediately Implemented

- Increase installation of winter carbons on LRVs in service
- Strategically place staff on the line to monitor ice buildup and arcing
- Monitor train diagnostic computer systems in real-time

## Short- and Long-Term Mitigation (Q4 2023)

- Investigate use of anti-icing treatments on the contact wire in advance of freezing rain
- Install LRV mounted OCS monitoring system
- Procure non-electric recovery vehicle

## Other Mitigations Being Explored (2024)

- Maintenance equipment outfitted with ice breaking pantograph
- Exploring feasibility of heat tracing contact wire at vulnerable locations



# Questions?