

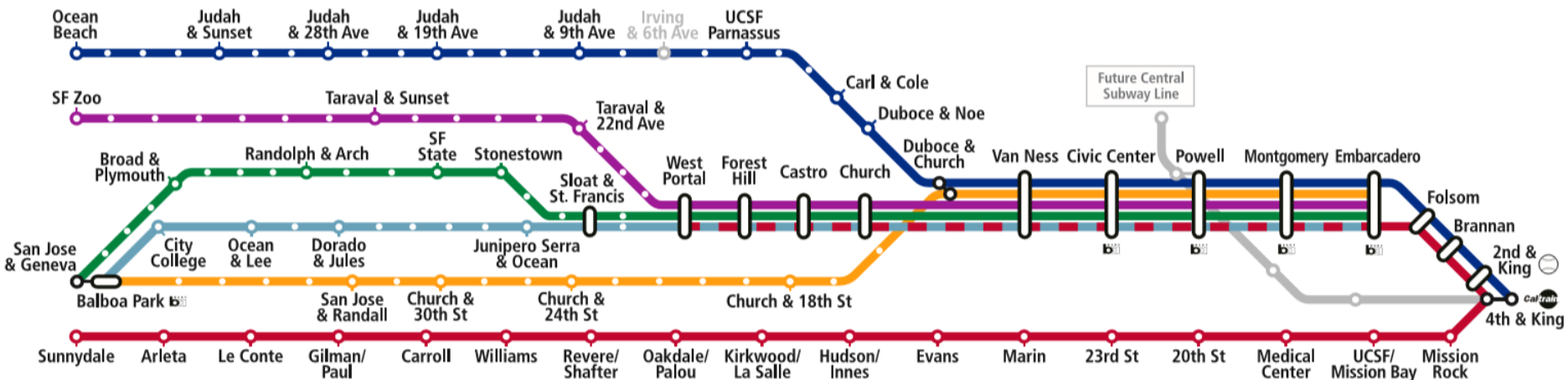
# Importance of Improving Subway Performance

- Backbone of the LRV System serving over 160,000 daily customers
- Key to Meeting Service Goals and Delivering Special Events



# Subway Design Constraints

- Five routes sharing a single trunk with three (J, L, M) of those line terminating at Embarcadero Station
- Subway is a relatively short segment of protected right-of-way combined with mixed traffic operations
- Three entry points (Ferry Portal, West Portal, and Church & Duboce)
- Very frequency service (1-2 min in commute times)
- Aging Train Control System (over 20 years old)





# Sources of Subway Incidents

**49%**

## Infrastructure Delays

- ATCS issues accounted for 19% of total subway delay (113 hours in 2018)
- Vehicles losing automatic train control and failed portal entries are the largest source of infrastructure delays

**31%**

## Vehicle Breakdowns

- Mechanical issues made up 52% of the total subway delay (305 hour in 2018).
- Problems with doors particularly on the Breda fleet accounted for nearly a third of vehicle related delays
- Brakes and Propulsion were the second highest source of vehicle related delays

**4%**

## Passenger-Related Delays

- Passenger-related incidents accounted for 4% of total subway delay (25 hours in 2018)
- Causes include people sleeping on the trains, intruders, passenger altercations and medical emergencies

**4%**

## Operator-Related

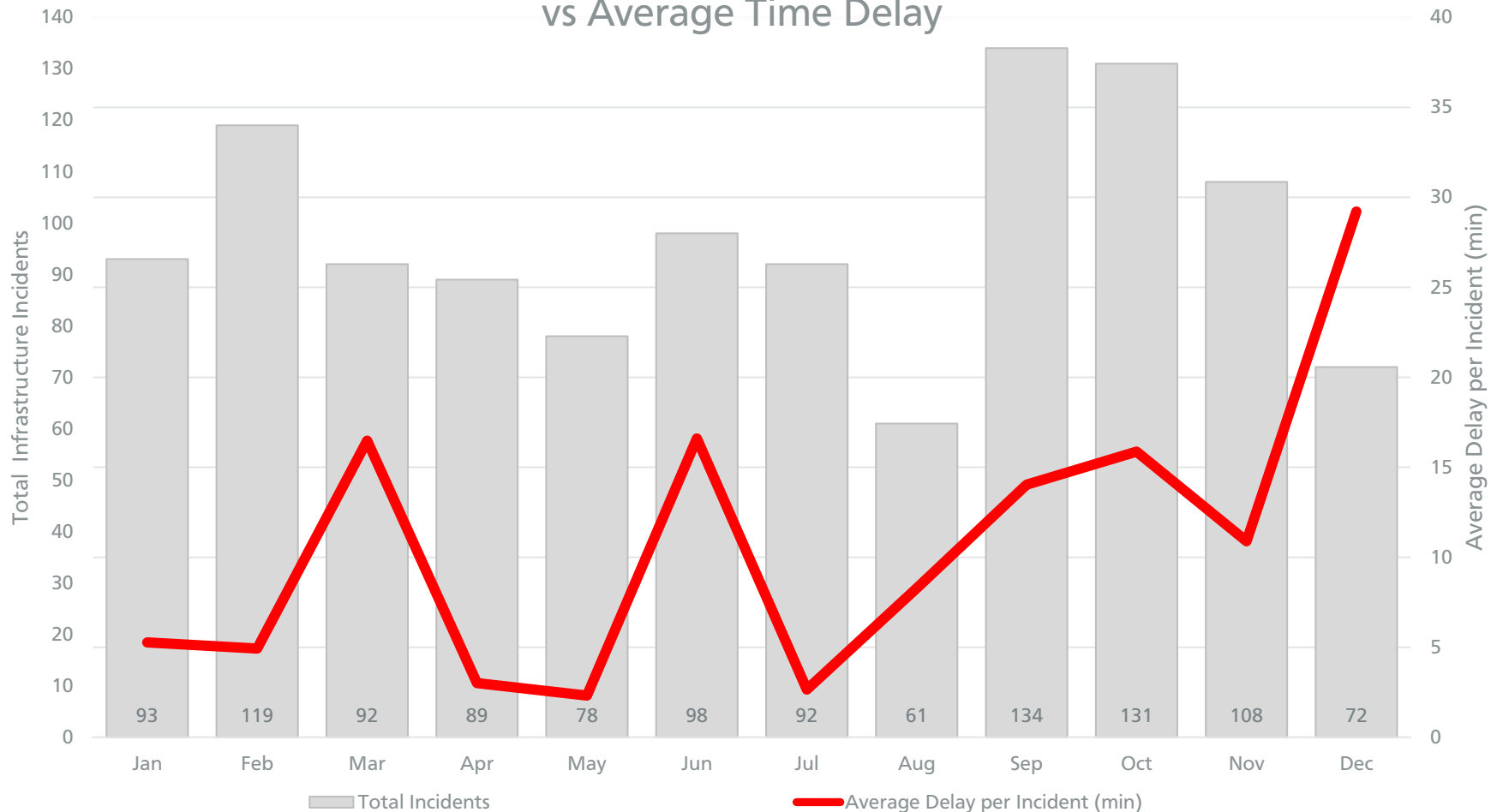
- Approximately 4% of delay was operator-related in (25 hours in 2018)
- Of issues reported, nearly 18 hours of missed service was due to personal necessity reasons.

Congestion and slow moving trains due to train control issues also create slow downs and delays



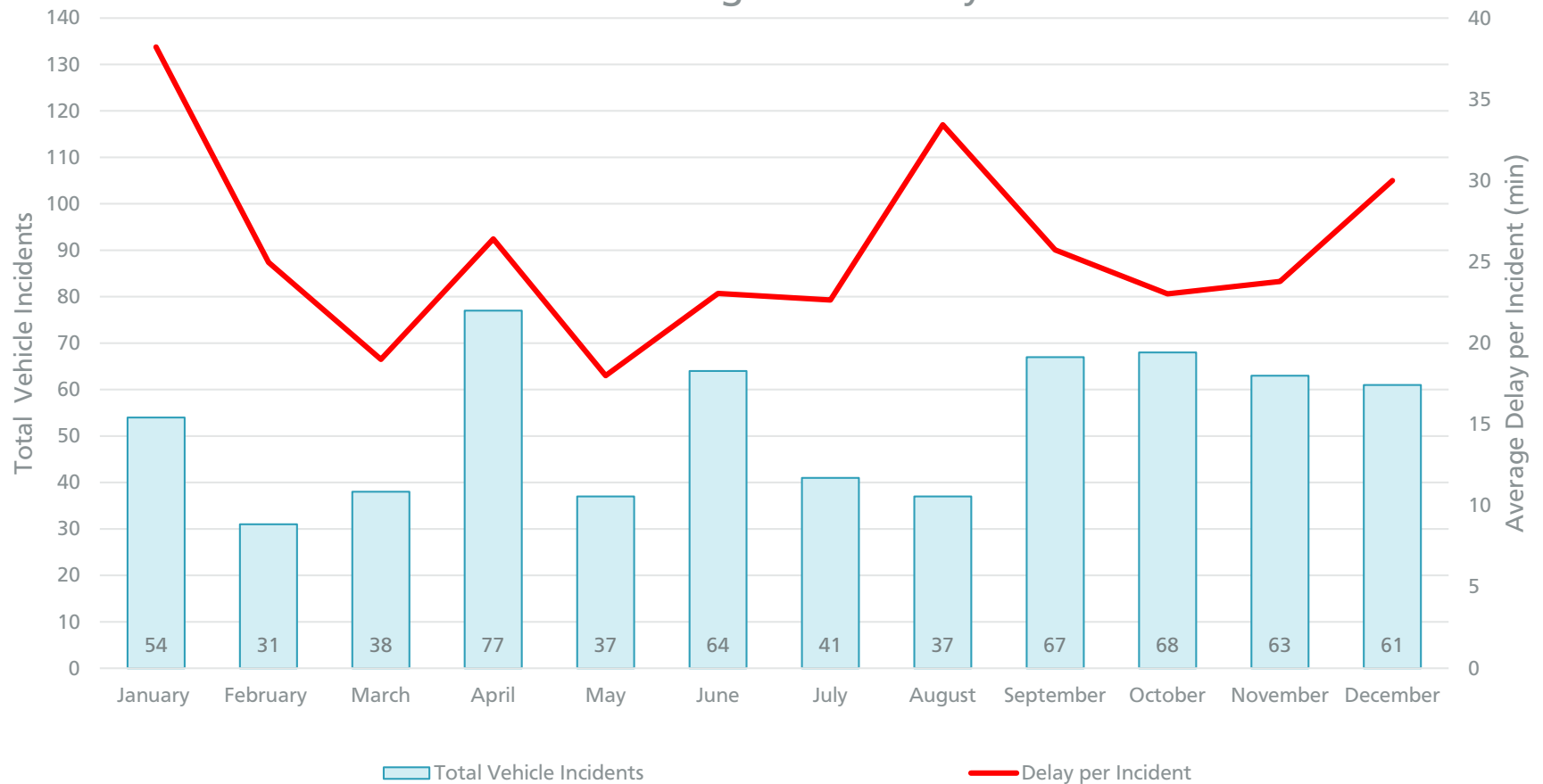
# Total infrastructure incidents declined, but average delay time increased in December for infrastructure related problems

## 2018 Number of Subway Infrastructure Incidents vs Average Time Delay



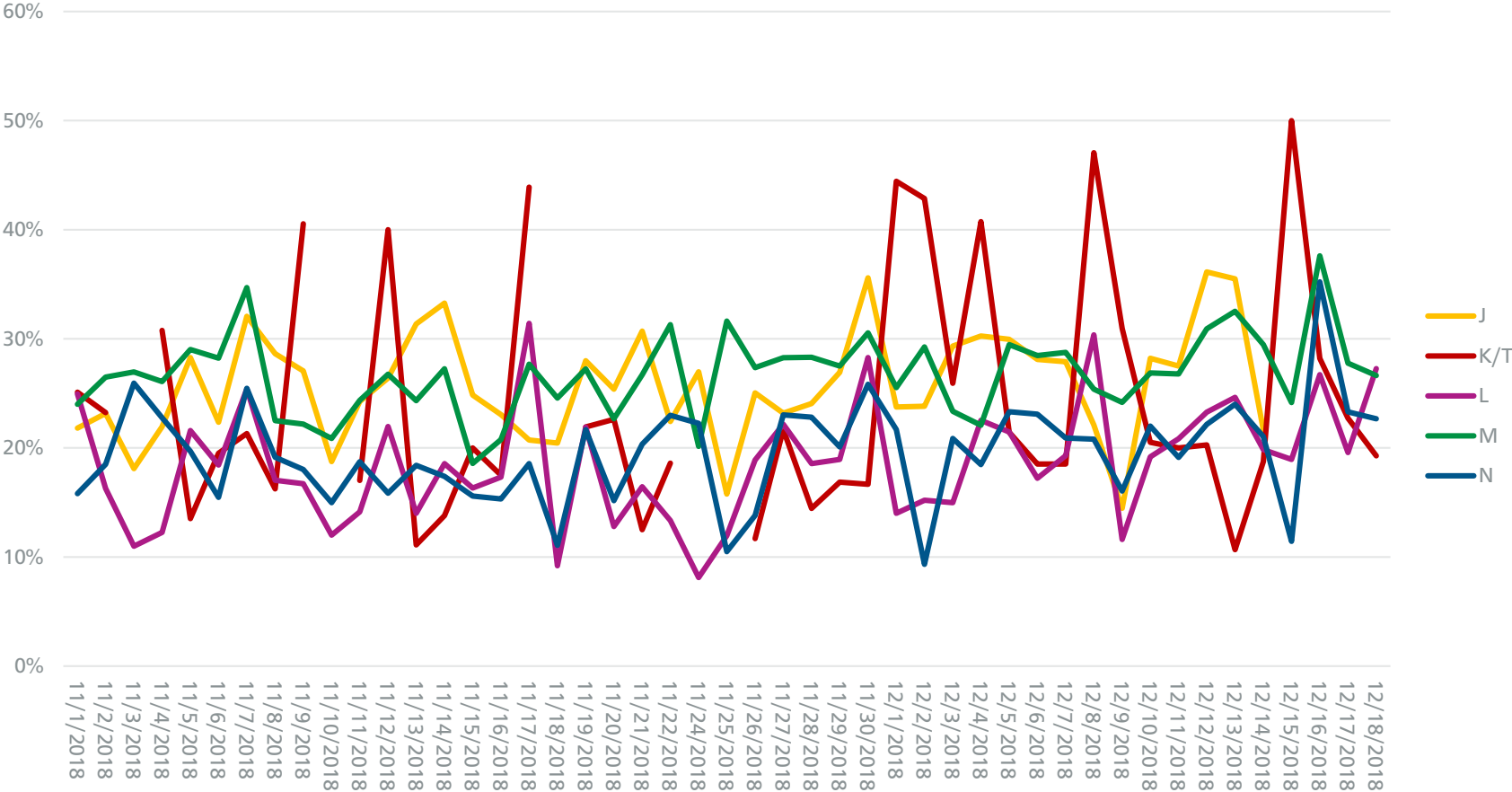
# Vehicle breakdowns in the subway higher than average September through December

## 2018 Number of Subway Vehicle Incidents vs Average Time Delay



# LRV service gaps highly variable in November and December, especially on KT line. Contributed to an increase in Twitter complaints

Muni Metro Daily Average Gaps





# Improving Subway Performance

- **Construction Management:** Advanced planning for Muni Metro East maintenance facility closure and T line bus substitution during Mission Bay platform construction
- **Terminal Management:** Reduce turnaround time at Embarcadero and focus on timely departures at outer terminals (AM and PM shifts)
- **West Portal:** Upgrade train signal software and manually expedite congested trains in/out of subway
- **Closing Gaps:** Introduce use of gap train to cut long headways, especially after major delays

# Improving Subway Performance

- **Vehicle Maintenance:** Use data from vehicles with repeat failures in service to identify patterns among defective parts and/or areas to improve maintenance practices
- **Customer Information:** Refine use of new Platform Audio-Visual (PAV) Signs and announcements to provide better customer information particularly during service disruptions
- **Quicker Response to Breakdowns:** Position maintenance staff at additional strategic locations in the subway during AM/PM peak to reduce response time
- **Preventative Maintenance:** Increase maintenance window at the Mun Metro Turnback (MMT) for personnel to conduct inspections; proactively replace switch motors