LIGHT RAIL VEHICLE
PROCUREMENT PHASE 2
Replacement Fleet Upgrades, February 2019
Background

Summer 2014  SFMTA awarded a contract to Siemens
January 2017  First vehicle delivered to SFMTA property
Fall 2017    First vehicle in revenue service
Fall 2018    Operator familiarization complete, systemwide deployment of LRVs
Spring 2019  Initiate replacement phase (Phase II)
Summer 2019  Complete expansion phase (Phase I)
Fall 2025    Complete procurement of replacement phase (Phase II)
Project status

All 68 expansion vehicles will be delivered and in service this summer
Key design features

The new trains feature updates from lessons learned on past procurements:

• **Lighter vehicle**—quieter ride for passengers and neighbors

• **Improved interior design:**
  - **Facilitates flow of people**—less blocking the doors
  - **Increased potential standing capacity**—more comfortable ride during peak hours

• **Upgraded passenger information**—know where you are and where you’re going

• **Easier to maintain door and step units**—less time spent fixing critical systems
Performance and reliability

Reliability Demonstration Program launched August 2018, runs for 2 years
Program validates progress to reliability standard of 25k miles between failure
Fleet currently performing at 6,600, on track to meet target
New Flyer Procurement Reliability

Reliability ramp up and performance fluctuations during wear-in are common in any custom fleet procurement.

![New Flyer Hybrid 60’ Mean Distance Between Failure](chart)

- **Mean Distance Between Failures (MDBF)**
- **Fleet performance**
- **MDBF Trendline**
Calgary Siemens LRV procurement

Calgary Transit procured similar Siemens vehicles and also underwent a reliability demonstration during the first two years of regular operation.
Planning for LRV4 Phase 2

Replace 151 Bredas on expedited schedule
Incorporate design enhancements based on:

• System Performance
• Operator and Mechanic Feedback
• Customer Feedback Sources
  — 311, Twitter, Letters, etc.
  — Intercept survey
  — Focus groups
Operations and maintenance enhancements

We’ve been collecting feedback from operators, maintenance, engineering and the public about all aspects of these vehicles since they first arrived.

**Operations:** 20 enhancements

- Improved sunshades for enhanced Operator visibility
- Updated operator panel switches to more easily distinguish functionality (e.g., front door versus all door button)
- Updates to passenger information system to clarify messaging

**Maintenance:** 22 enhancements

- Updates to wheel design to make wheel-truing easier
- Modify brakes to better distribute force during quick stops
- Changes to panel securements for easier access
Customer Feedback for Phase 2 Survey Results

Riders are overwhelmingly satisfied with the new vehicles

Majority of those surveyed are regular riders, all had first hand experience onboard the new Siemens trains

In all categories we surveyed, people are more satisfied than dissatisfied

Are you satisfied with the new LRV4s?

- Very satisfied: 40%
- Somewhat satisfied: 25%
- Neutral: 12%
- Somewhat dissatisfied: 13%
- Very dissatisfied: 10%

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Where we’ve got it right

- **There is plenty of space to stand**: 87% Agree, 6% Disagree
- **The trains look attractive**: 85% Agree, 6% Disagree
- **The trains are easy to enter and exit**: 83% Agree, 9% Disagree
- **There are plenty of places to hold on when I am standing**: 71% Agree, 17% Disagree
- **The trains are quiet**: 70% Agree, 15% Disagree

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What we heard: Room for improvement

I feel comfortable sitting on the bench seats because I find the height just right

I feel comfortable sitting on the bench seats

There are plenty of spaces to sit

I feel comfortable sitting on the bench seats when the train accelerates and stops

<table>
<thead>
<tr>
<th>Agree</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>57%</td>
<td>27%</td>
</tr>
<tr>
<td>53%</td>
<td>34%</td>
</tr>
<tr>
<td>52%</td>
<td>33%</td>
</tr>
<tr>
<td>50%</td>
<td>33%</td>
</tr>
</tbody>
</table>

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Focus group feedback

• The seats are very uncomfortable, they are slippery and need seat definition.

• Most participants like the handholds and want one to three more of them per vertical pole; also received requests for hand straps that accommodate different rider heights.

• Participants liked the wider aisle created by the sideways-facing seats for people to travel through more easily.
Focus Groups Special considerations

Customers with disabilities
- Similar overall satisfaction levels as all respondents
- High levels of approval for ease of access and egress
- Much higher levels of dissatisfaction with the seats

Shorter riders: 5’4” or less
- Similar overall satisfaction levels as all respondents
- Lower levels of satisfaction with the height of seats
PASSENGER ENHANCEMENTS
Passenger comfort updates

Options for changes were developed to address customer feedback in the following categories:

• Additional handholds
• Seating type
• Interior seating layout
Additional Handholds

Archways
Provide handholds in center of aisle

Hand Straps
Provide multi-length hand straps
Seating type

Seat type can be updated to provide more definition of seats and to increase passenger comfort

Seat Options B & C reduce seating capacity

Option A : No change
Option B: Freedman
Option C: SMC
# Seating layout

<table>
<thead>
<tr>
<th>Base Change</th>
<th>Modest alteration</th>
<th>Lower bench seating 2 inches, except where train control equipment box is stored (applies to all options)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1</td>
<td>Modest alteration</td>
<td>Convert area across from leaning bar to single transverse seats</td>
</tr>
<tr>
<td>Option 2</td>
<td>Intermediate alteration</td>
<td>Convert most longitudinal seats to single transverse seats</td>
</tr>
<tr>
<td>Option 3</td>
<td>Significant alteration</td>
<td>Convert one side of seating to double transverse seats</td>
</tr>
</tbody>
</table>
Base Change: Lower bench seating

All seats would be lowered 2 inches except over the train control equipment box.
Base Change: Lower bench seating

- Retains aisle width
- Provides more seating variety
- Preserves current number of seats
- Meets accelerated schedule
- Increases hand holds
Option 1: Convert area across from leaning bar to single transverse seats
Option 1: Convert area across from leaning bar to single transverse seats

- Retains aisle width
- Provides more seating variety
- Preserves current number of seats (4 seats fewer)
- Meets accelerated schedule
- Increases hand holds
Option 2: Convert most longitudinal seats to single transverse seats
Option 2: Convert most longitudinal seats to single transverse seats

- Retains aisle width
- Provides more seating variety
- Preserves current number of seats (12 seats fewer)
- Meets accelerated schedule
- Increases hand holds
Option 3: Convert one side of seating to double transverse seats
Option 3: Convert one side of seating to double transverse seats

- Retains aisle width
- Provides more seating variety
- Preserves current number of seats
- Meets accelerated schedule
- Increases hand holds
## Seat Layout Summary

<table>
<thead>
<tr>
<th>Base Change: All Bench Seating but Lowered</th>
<th>Option 1: Convert area across from leaning bar to single transverse seats</th>
<th>Option 2: Convert One Side to Single Transverse Seats</th>
<th>Option 3: Convert One Side to Double Transverse Seats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retains Aisle Width</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Provides More Seating Variety</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Preserves Number of Seats</td>
<td>✓</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Meets Accelerated Schedule</td>
<td>✓</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>Increases Hand Holds</td>
<td>X</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
NEXT STEPS
How do we take feedback and turn them into improvements?

- There are no easy choices - even survey responses from the same participants appear to conflict (see below)
- Timeline matters: quick decisions help preserve schedule
- Some changes could impact popular features

- **Being able to fit more people standing in each train is more important than seating**
  - Agree: 50%
  - Neutral: 21%
  - Disagree: 29%

- **Seating is more important than the train’s overall capacity**
  - Agree: 48%
  - Neutral: 23%
  - Disagree: 29%

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Timeline

March 2019  Present Options to CAC and Board for Feedback
March - April 2019  Negotiate change order and pricing with Siemens
May 2019  SFMTA Board reviews/approves change order
Summer 2019  Final expansion vehicle in service
December 2020  First replacement LRV delivered
October 2025  Last replacement LRV delivered