DEDICATION

John W. “Jack” Boorse, PE, PLS
(1933 - 2012)
Trackway Guidelines for Streetcar and Light Rail Circulator Systems Infrastructure

Authored by:
• Jack Boorse, Parsons Brinckerhoff
• Russ Jackson, STV (retired)
• Larry Lovejoy, Parsons Brinckerhoff

Technical assistance
• Jim Graebner, Lomando Group
Light Rail Circulator Systems

• Typically provide transit service within a single municipal jurisdiction

• Need to “fit” the scale of peripheral residential areas that may be contiguous with the urban center.

• Do not function solely to transport passengers from outlying areas to the city center

• Typically do not require the speed, capacity and multiple-unit capability of line-haul LRT
Light Rail Circulator Systems

- Must be able to negotiate street patterns in the urban center, often in mixed traffic
- The overall system utilizes embedded track in city streets for all or the majority of its operations
- Often require rolling stock which can negotiate smaller radius curves than customary light rail standards
# Vehicle Size and Curving Considerations

**De facto US Light Rail Transit Standards:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Curve Radius</td>
<td>82 feet / 25 m</td>
</tr>
<tr>
<td>Vehicle Width</td>
<td>2650 mm / 8.7 feet</td>
</tr>
<tr>
<td>Track Gauge</td>
<td>56 ½ inches / 1435 mm</td>
</tr>
</tbody>
</table>

**Typical European Tramway Characteristics:**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Curve Radius</td>
<td>15 to 18 m (49 to 59 ft)</td>
</tr>
<tr>
<td>Vehicle Width</td>
<td>2200 mm to 2650 mm (7.2 to 8.7 ft)</td>
</tr>
<tr>
<td>Track Gauge</td>
<td>1000 to 1435 mm</td>
</tr>
</tbody>
</table>
GUIDELINE #4:

A key word in the title “Light Rail Circulator System” is the word “system”.

✓ Preliminary engineering and meetings with vehicle suppliers should take place simultaneously.
✓ Sharp curves and steep grades will limit the universe of available “off-the-shelf” LRVs.
✓ Vehicle suppliers can sometimes be more accommodating for larger vehicle orders.
✓ Optimizing the trackway infrastructure/vehicle relationship will often be an iterative process.
GUIDELINE #5:

✓ In optimizing the trackway/vehicle relationship ensure that the chosen vehicle’s curving capabilities do not excessively constrain site selection for the yard and shop.

✓ Evaluate trade-offs of fewer vehicle suppliers and possibly higher vehicle prices versus greater costs for the fixed facilities if the yard location is constrained by the vehicle capabilities.
GUIDELINE #6:

✓ Ensure that those parties responsible for wheels and rails are working in concert to produce optimum compatibility between the two subsystems.

✓ Wheel gauge, track gauge, check gauge, and all new and worn dimensions should all be mutually agreed to and initial drawings documenting all parameters should be developed before any serious design work takes place.
GUIDEINE #7:

✓ The track designer needs to have a demonstrable knowledge of streetcar track and successful design experience.

✓ Many track designers have primarily a railroad background, which by itself is not qualification for design of Light Rail Circulator System track with small radius curves and possibly complex and compact shop and yard layout.
Rails and Wheels

- They are a system - not every wheel contour will perform satisfactorily on every rail section or on any track alignment.

- The AAR freight wheel contour (or any wheel which resembles it) is very likely not the best choice for any LRT operation with tight curvature in embedded track situations.
Track Design Considerations

Wheel Tread and Flange Contours

Typical Light Rail Circulator Wheel

AAR 1B Narrow Flange Railroad Wheel
Rails and Wheels

The wheel / rail interface surfaces should be close to identical regardless of whether the track is embedded in the street or open ballasted track.

Achieving the above with a mixture of North American tee rail and girder/groove rails of European design is difficult at best.
GUIDELINE #8: Part 1

✓ If grooved / girder rail is used, then a wheel flange profile optimized for the girder rail should be adopted.

✓ Both the gauge and guard side flange angles from vertical and the tip radii on both the running rail and guard side of the flange should be analyzed for use on curve radii below 15 meters (49 feet) and adjusted for perfect compatibility if found necessary.
GUIDELINE #8: Part 2

✔ Consider adopting wheel flange profile and matching rail section standards already in successful use on a property which has similar curve radii to those to be used on the Circulator System.

✔ The flange should include the typical flat tip that works best with flange-bearing frogs, crossings, and mates.
Track Design Considerations

GUIDELINE #10

To avoid potential problems due to gauge inaccuracies, all specialwork containing turnouts and small radius curves should be designed, fabricated and constructed with a positive means of maintaining the gauge.
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Track Design Considerations

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GUIDELINE #12

✓ Coordinate with roadway pavement design to minimize cross slope in the track.

✓ It is not essential to eliminate cross slope.

✓ Negative superelevation is acceptable provided that speeds are limited to control the overall unbalance to acceptable levels.

✓ The rate of track twist must be carefully controlled.
GUIDELINE #13

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