Streetcar and Light Rail Design Differences

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How Are Streetcar and Light Rail Different?

The design differences between streetcar and light rail are tied to the distinctions in the markets served by each technology.

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What Markets Are Best Served by Each Technology?

- Streetcar
  - Intended for short connections within a compact urban setting
  - Focus is on local access and circulation – a “walk extender”

MARKETS SERVED

- Light Rail
  - Intended for longer-distance trips across a city or from suburbs into city
  - Focus is on regional mobility

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How Do Markets Affect the Design Differences?

Markets Served

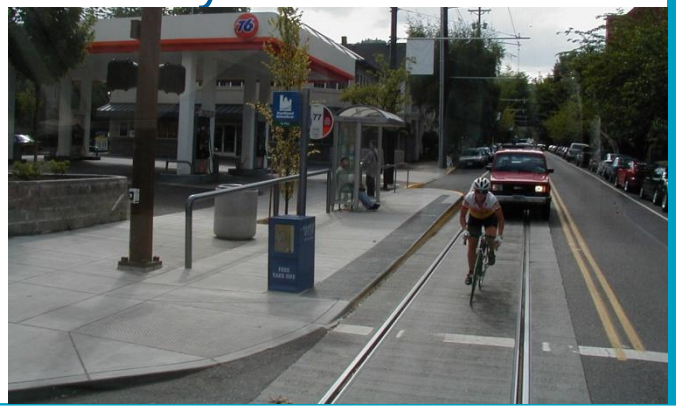
- Long or short-distance trips?
- Circulation within a “place”, or moving between “places”?
- Quick walk-up access or large capture area?

Design Differences

- Type of right-of-way
- Station spacing and design
- Type of vehicle
- Track design
- Power source
- Signals and control

Key Design Differences

- Streetcar
  - Does not require its own right-of-way
  - Typically shares lanes with autos in mixed traffic (like a bus)
  - Must avoid in-street utility conflicts



RIGHT OF WAY

STATION SPACING AND DESIGN

TYPE OF VEHICLE

TRACK DESIGN

POWER SOURCE

SIGNALS AND CONTROL

- Light Rail
  - Typically has own right-of-way, with limited interaction with autos and fewer utility conflicts
  - Can operate in its own corridor or in-street (separated from autos)

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Key Design Differences

- Streetcar
  - Stations (stops) every 2-3 blocks
  - Simple platforms at a lower height blend into urban streetscape
  - Intended for walk-up access

RIGHT OF WAY

STATION SPACING AND DESIGN

TYPE OF VEHICLE

TRACK DESIGN

POWER SOURCE

SIGNALS AND CONTROL

- Light Rail
  - Stations every 1-2 miles
  - Larger stations to serve longer trains
  - Some stations have park-and-ride access
  - Higher platforms enable level boarding

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Key Design Differences

RIGHT OF WAY

STATION SPACING AND DESIGN

TYPE OF VEHICLE

TRACK DESIGN

POWER SOURCE

SIGNALS AND CONTROL

- Streetcar
  - Smaller and more nimble than light rail
  - Operates as single car
  - Typical length = 60’-70’
  - Speed = up to 40 mph
  - Capacity = 120-150 (seated + standing)

- Light Rail
  - Larger vehicles (for higher capacities)
  - Can connect 2-4 cars
  - Typical length = 90’-100’
  - Speed = up to 60 mph
  - Capacity = 170-200 (seated + standing)

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Key Design Differences

- Streetcar
  - Shallow (12” deep) concrete track slab
  - Can make tighter turns than light rail
  - Lots of interaction with peds and bicycles

RIGHT OF WAY

STATION SPACING AND DESIGN

TYPE OF VEHICLE

TRACK DESIGN

POWER SOURCE

SIGNALS AND CONTROL

- Light Rail
  - Ballasted track or slab
  - Larger vehicles require wider turns
  - Focus on limiting interaction with autos / peds / bicycles

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Key Design Differences

- Streetcar
  - Single contact wire over each track
  - Emerging “off-wire” technology
  - Smaller substations

RIGHT OF WAY

STATION SPACING AND DESIGN

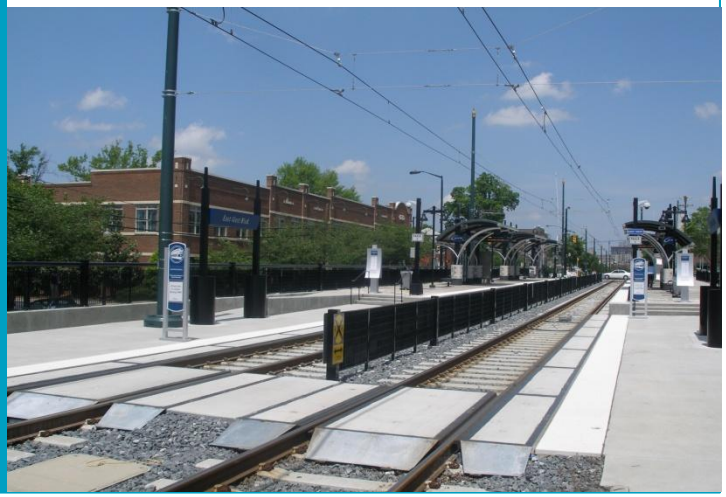
TYPE OF VEHICLE

TRACK DESIGN

POWER SOURCE

SIGNALS AND CONTROL

- Light Rail
  - Double-wire overhead contact system
  - Limited “off-wire” options
  - Larger substations



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Key Design Differences

- Streetcar
  - Obeys existing traffic signals; no special signalization
  - No special train controls required due to slow speeds

RIGHT OF WAY

STATION SPACING AND DESIGN

TYPE OF VEHICLE

TRACK DESIGN

POWER SOURCE

SIGNALS AND CONTROL

- Light Rail
  - Typically has own signalization system for safety at grade crossings
  - Separation between trains maintained by control system

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It Doesn't Have to be "Either / Or"

- The same line may have varying design features on different segments
  - Example: Street-running segments with closer station spacing in downtown (like streetcar) and dedicated ROW in suburbs (like light rail)
- Some design elements of a line may be more like light rail, while others are more like streetcar
  - Example: Norfolk light rail operates in single-car trains with limited train controls (like streetcar), but operates in dedicated ROW with wider station spacing (like light rail).

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The Streetcar / Light Rail Design Continuum

Portland, OR

Streetcar

- In-street running
- Shared lanes with auto traffic
- Simple platform stops
- Single vehicles
- Obeys regular traffic signals
- Blends in with existing neighborhoods

Level of Infrastructure

Less substantive / less complex

More substantive / More complex

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The Streetcar / Light Rail Design Continuum

Norfolk, VA

Street-Running Light Rail

- Operates in street ROW, but typically in own dedicated lane
- Stations blend into streetscape
- Single or multiple vehicles
- Interaction with traffic at intersections

Level of Infrastructure

Less substantive / less complex

More substantive / More complex

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The Streetcar / Light Rail Design Continuum

Light Rail in Exclusive ROW

- Operates in own dedicated lane
- Significant stations
- Single or multiple vehicles
- Limited interaction with autos (grade separations or at-grade crossings)

Minneapolis, MN

Level of Infrastructure

Less substantive / less complex

More substantive / More complex

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How to Know Which Rail Technology is Appropriate?

- What markets are you trying to serve?
  - Length of trips
  - Regional mobility vs. local access
  - Potential customers
- What types of ROW are available?
  - Dedicated corridors
  - In-street options

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