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Transit Mode Choice – Vehicle Options



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RailVolution Conference, Los Angeles
October 16, 2012*

Agenda

Review vehicle choices by mode:

- Definition/ examples
- Key capabilities
- Pros and Cons

I want to build a transit system – what are my vehicle options?

- Bus/ Bus Rapid Transit
- Streetcar/ Trolley/ Circulator
- Light Rail
- Commuter Rail
- Rapid Transit/ Subway



*Increasing
capacity*

Bus and Bus Rapid Transit Vehicles – Options



< **Circulator type service**



Standard Heavy Duty Bus >



< **Bus Rapid Transit/ Articulated**



Electric Trolley Bus >

Bus and Bus Rapid Transit Vehicles – key parameters

Type	Length	Capacity (Passengers)	Approx. Cost Range
Circulator	30ft	25 seated, 25 standing	\$400 - \$450k
Standard Heavy Duty	40 ft	42 seated, 43 standing	\$425 - \$520k (+ \$150k for hybrid)
“Bus Rapid Transit”	60 ft	59 seated, 57 standing	\$740 - \$850k (+ \$50k for hybrid)
Electric Trolley bus	40 ft 60 ft	42 seated, 43 standing 59 seated, 57 standing	\$1.1m \$1.3m

Bus and Bus Rapid Transit Vehicles – power options

- Conventional engine
 - Diesel/ Bio diesel
 - CNG/ LNG
- Hybrid
 - Electric – series/ parallel
 - Hydraulic
- Electric
 - External power
 - Battery



Bus and Bus Rapid Transit Vehicles – Pros and Cons

Pros	Cons
Lowest cost vehicle	Emissions/ noise
Flexible to deploy quickly and to adjust routes	Perception
Well proven, low risk	BRT and Electric versions can be costly
Ideal for lower capacity routes/ startups	Special infrastructure needed for electric buses and CNG/LNG fueled
	Can get stuck in traffic unless costly segregation provided

Streetcar options



< “Historic”/ Replica



Modern >

Streetcars— key parameters

Type	Length	Capacity (Passengers)	Approx. Cost Range
Historic (PCC type)	~47ft	Typ. 46 seats, 88 standing	Depends on condition
Modern (low floor)	~66 ft	30 seated, 80 standing	\$4 - \$4.7m

Modern Streetcar suppliers:

- Brookville Equipment
- CAF
- Siemens
- Skoda
- United Streetcar



Streetcars – Pros and Cons

Pros	Cons
Fits better in urban environment than LRV	Cost
Image of permanence/ durability	Historic type not suitable for very heavy duty use
Very accessible (modern type)	Infrastructure needs
Styling (historic or modern) can attract riders	Can still get stuck in traffic

Light Rail Vehicle options

< High Floor, 2 section

**Partial or 70% Low Floor
v 3 section v**



< 100% Low Floor, 5+ section



Light Rail Vehicles – key parameters

Type	Length	Typ. Capacity (Passengers)	Approx. Cost Range
High Floor	75-95 ft	76 seats, 140 standing	\$3.5 - \$4 m
Partial Low Floor	75-95 ft	68 seated, 130 standing	\$3.5 - \$4.5 m
100% Low Floor	100 ft +	70 seated, 180 standing	\$4 - \$5m

LRV suppliers:

- Alstom
- AnsaldoBreda
- Bombardier
- CAF
- Kinkisharyo
- Siemens
- Stadler

Light Rail Vehicles – Pros and Cons

Pros	Cons
High Capacity	Cost
Image of permanence/ durability	High floor requires steps, or high platform
Can be very accessible (with level boarding)	Maintenance skills needed
Faster than bus or streetcar	Infrastructure needs

Commuter Rail Vehicle options

Loco/ Coaches – Push Pull



Electric Multiple Unit (EMU)



Diesel Multiple Unit (DMU)



Commuter Rail Vehicles – key parameters

Type	Length	Typ. Capacity (Passengers)	Approx. Cost Range
Loco/ Coaches	85 ft/ coach	110 seats single level 135 Seats bi level/ gallery	\$1.5 - 2 m single level ~ \$2.5 - \$3m bi level/ gallery (+ loco @ \$4.5 - \$5.5m)
EMU	85 ft/ car	110 seats/ car	\$3.5 - \$4 m/ car
“Light DMU”	134 ft / unit	104 seats/ unit	\$7 - \$7.5 m/ unit
“Heavy” DMU	85 ft/ car	78 seats/ car	\$3 - 3.5 m/ car

Commuter Rail Vehicles – Pros and Cons

Pros	Cons
High Capacity	Generally have to comply with FRA regulations
Higher speed	Accessibility (if not high platform)
Positive image	Infrastructure (EMU)
	Loco/ coach sets inflexible and can carry wasted capacity off-peak






Subway Vehicles



Subway Vehicles – key parameters

Type	Length	Capacity (Passengers)	Cost Range
Subway car	50-75 ft/ car	Typ. 42 Seated, 200 standing	\$2 - \$2.5m/ car

Summary – vehicle decision is driven by capacity and constrained by budget

Mode	Capacity/ car (Passengers)	Approx. Cost Range
Bus 	50 – 116	\$400 – \$1,300k
Streetcar 	110	\$4 - \$4.7m
Light Rail Vehicle 	198-256	\$3.5 - \$5m
Commuter Rail Vehicle 	78 – 135 (+ standees)	\$1.5 - \$3m (car only)
Subway Car 	242	\$2 - \$2.5m