

## Passenger Rail and Transit Comparison

### **RAIL TRANSIT TECHNOLOGIES**

**Funded by Federal Transit Administration and local communities**

**BUS RAPID TRANSIT (BRT)** – Rubber tire transit bus vehicles used in "train-like" services, either in a dedicated busway or in mixed traffic with signal preemption and other traffic flow improvements to create fast, limited-stop service.



Cost/mile (for dedicated busway): \$2-\$60 million/mile  
 Average cost/mile: \$5.3 million/mile  
 Example: Cleveland Euclid BRT, Houston Metro Regional Bus Plan, Boston South Piers Transitway

**STREETCARS and TROLLEYS** – Lightweight, single vehicle that runs on rails through surface streets. Powered by electric catenary. Often vintage or restored railcars.



Cost/mile: \$20-60 million/mile  
 Average cost/mile: \$35 million/mile  
 Example: New Orleans Canal Street, Portland Streetcar

**LIGHT RAIL** – Constructed rail system, either separated from car traffic or on surface streets. Powered by electric catenary. Lightweight cars operating singly or in pairs, typically on routes of 5-20 miles, in downtown metropolitan areas.



Cost/mile: \$20- >\$200 million/mile (if tunnels)  
 Average cost/mile: \$100 million/mile  
 Passenger capacity: 6,000-15,000 passengers/peak hour  
 Example: Dallas Area Rapid Transit (DART), Salt Lake City TRAX (Utah Transit Authority)

**COMMUTER RAIL** – Often uses existing rail infrastructure or right-of-way. Electric or diesel-powered trains, either pulled by a single locomotive or in a "push-pull" arrangement with a locomotive on each end. Diesel Multiple Unit trains (DMUs) provide own power source and do not require separate locomotive. Provides rush hour based service, typically on routes of 20-80 miles, for suburban areas connecting to city centers.



Cost/mile: \$5-20 million/mile  
 Average cost/mile: \$20 million/mile  
 Passenger capacity: 3,000-20,000 passengers/peak hour  
 Example: Tri-Rail, Long Island Rail Road, Virginia Railway Express.

**HEAVY RAIL (Metro, Subway, or Rapid Rail)** – Electric railway with capacity for a heavy volume of traffic. Operates in separate rights-of-way, either at grade, through tunnels or on elevated track. Operates in four to eight-car trainsets, typically on routes of 2-20 miles only in large cities and densely populated suburbs.



Cost/mile: elevated track \$50-140 million/mile  
 Subway \$200 million-\$2 billion/mile  
 Passenger capacity: 20,000-75,000 passengers/peak hour  
 Example: Washington Metro, New York Subway, Chicago "L" (Chicago Transit Authority).


**MONORAIL** – Rail system based on a single rail; also describes the single support beam or track used in the system, often elevated, but not always. Monorail vehicles are wider than the beam that supports them. Most often used in airport transfer and some medium-capacity metro systems.




Cost/mile: \$138.2 million (urban areas)  
 Passenger capacity: between 1,960-6,400 passengers/peak hour (not including theme parks)  
 Example: Las Vegas Monorail, Disneyworld, Seattle Center Monorail

**INTERCITY PASSENGER RAIL TECHNOLOGIES**  
**Funded by Federal Railroad Administration, Amtrak**

**DIESEL LOCOMOTIVE PASSENGER RAIL** – Intercity and long-distance service using single and bi-level rail cars, pulled by diesel locomotives. Speed limited to 79 mph on most routes. Except in Northeast Corridor, operates over more than 21,000 miles of track owned by the nation’s freight railroads.


	<p>Examples: All Amtrak services except <i>Acela</i> on Northeast Corridor</p>
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**AMTRAK ACELA** – Intercity service between Washington, DC, New York, and Boston, using trainsets powered by electric catenary. While the technology is capable of reaching a top speed of 150 mph, limitations and poor design result in an average speed of 83 mph between Washington and New York, and 66 mph between New York and Boston. Amtrak owns most of the Northeast Corridor right-of-way and operates both Acela and electric locomotives pulling standard rail cars on the corridor.


	<p>Examples: <i>Acela</i> service is unique – faster than diesel, slower than world-standard high-speed rail</p>
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International High-Speed Rail Systems

**HIGH-SPEED ELECTRIC PASSENGER RAIL** – High-speed intercity service between major cities, using trainsets powered by electric catenary. Average speeds range from 110 mph to 160 mph, and top speeds up to 220 mph. Services provided by a variety of operators, including private companies.

	<p>Examples: France TGV, Spain AVE, Germany ICE, Japan Shinkansen</p> <p>Est. cost/mi = \$50-80 million</p>
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**MAGNETIC LEVITATION (MAGLEV)** – Very high-speed service (250 mph+) without wheels or rails but instead an elevated guideway on which the vehicle is lifted, guided and propelled by magnetic energy.

	<p>Examples: Only system currently in service is in Shanghai, China.</p> <p>Est. cost/mi = \$60-100 million</p>
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Notes on High-Speed Rail

- Federal Law defines High-Speed Rail as passenger service with an average speed of 110 miles per hour
- International Standard for High-Speed Rail is 120 mph average
- In Europe & Asia, high-speed lines operate at an average speed of 150 mph, some as high as 180 mph
- A train that only reaches 150 mph at some point is not a high-speed train
- Amtrak’s Acela, traveling at an average speed of 65 mph from NYC to Boston and 83 mph from NYC to DC, is not high-speed
- The U.S. has no high-speed rail line