Rail Transit Systems – Alternate Modes: INNOVIA Monorail 300 System

Urban Mobility India
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Game Changing Urban Transit Solution

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Optimised System for Mass Transit Applications

The *INNOVIA* Monorail 300 system incorporates the design and operational features required for rigorous urban line-haul service

- Fully automated driverless mass transit solution with minimised headways for highest frequency of service
- Broad range of applications – from mass transit solution to feeder service
- Seamless integration into urban environment and route flexibility
- Fast and easy implementation
- Low system and fleet costs

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CITYFLO 650 Technology for Fully Automated Operation

- **Proven technology**
- **Reduces cost of operation**
- **Reduces system maintenance costs**
- **Minimises energy consumption**
- **Allows for very short headways, which enable:**
  - Maximum train speed
  - Minimum train lengths
  - Minimum platform length and civil station costs
  - Optimum fleet size
  - Minimum wait times (higher frequency of service)
  - High ridership levels

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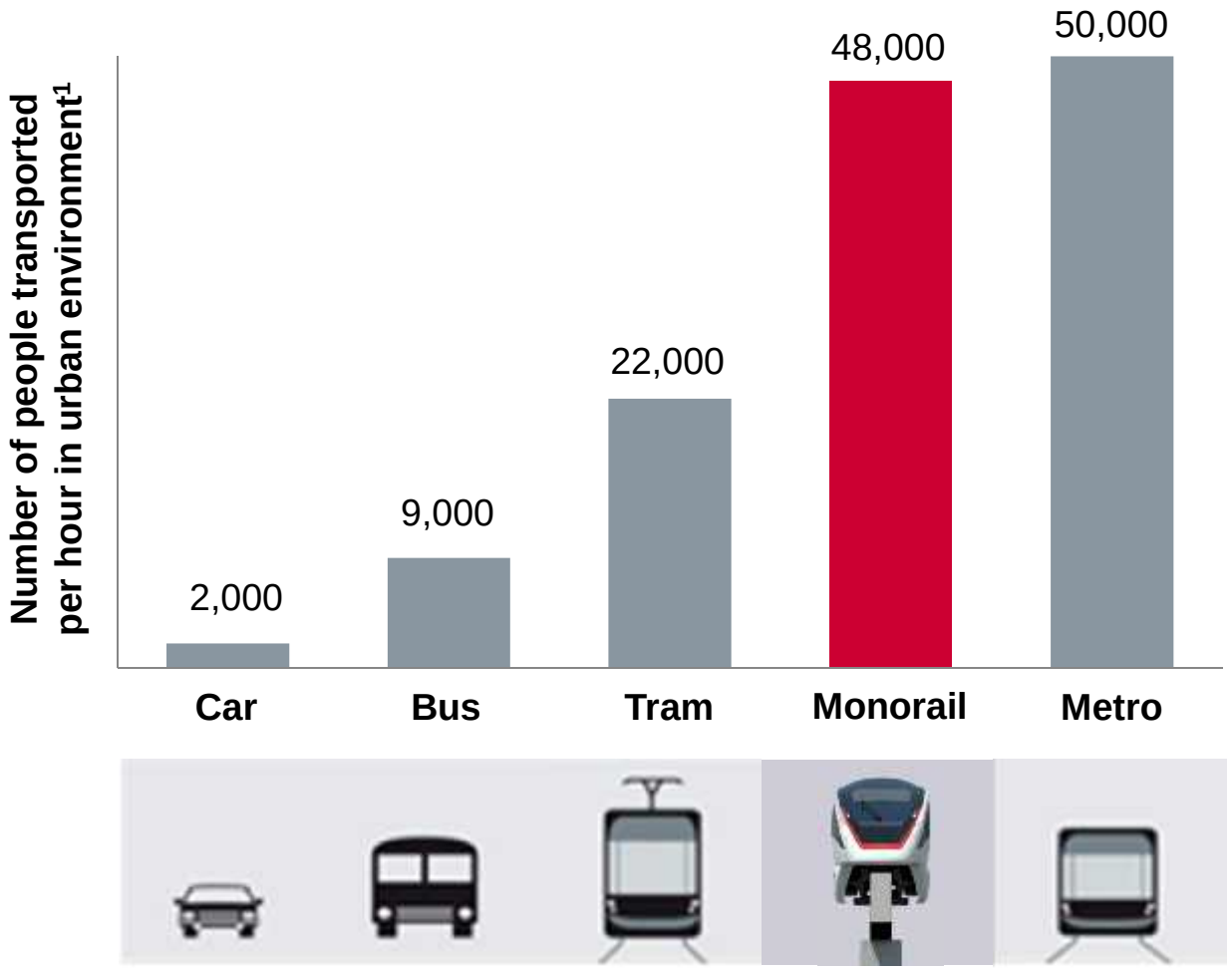
Mass Transit Capacity – A Competitive Solution



[1] International Association of Public Transport (UITP); Institute for Sustainability and Technology Policy, Murdoch University. Number of people crossing a 3 to 5 metre-wide space in an hour in an urban environment (Monorail added by Bombardier Transportation)

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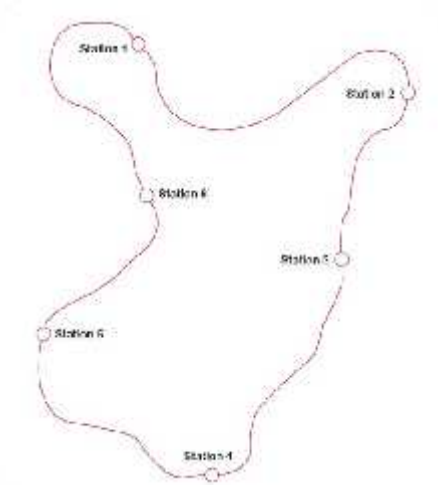
Excellent Fit for a Range of Applications

Line haul (medium to high capacity)

- 5,000 to 48,000 pphpd[1]
- Frequent and reliable passenger service
- Dedicated right-of-way provides unrestricted operation
- Example: *INNOVIA* Monorail 300 system for São Paulo, Brazil

Collector distributor

- 2,000 to 10,000 pphpd
- Feeder system to mass transit network
- Seamless integration into urban environment (including through buildings and structures)
- Example: *INNOVIA* Monorail 300 system for Riyadh, Saudi Arabia



[1] pphpd: passengers per hour per direction

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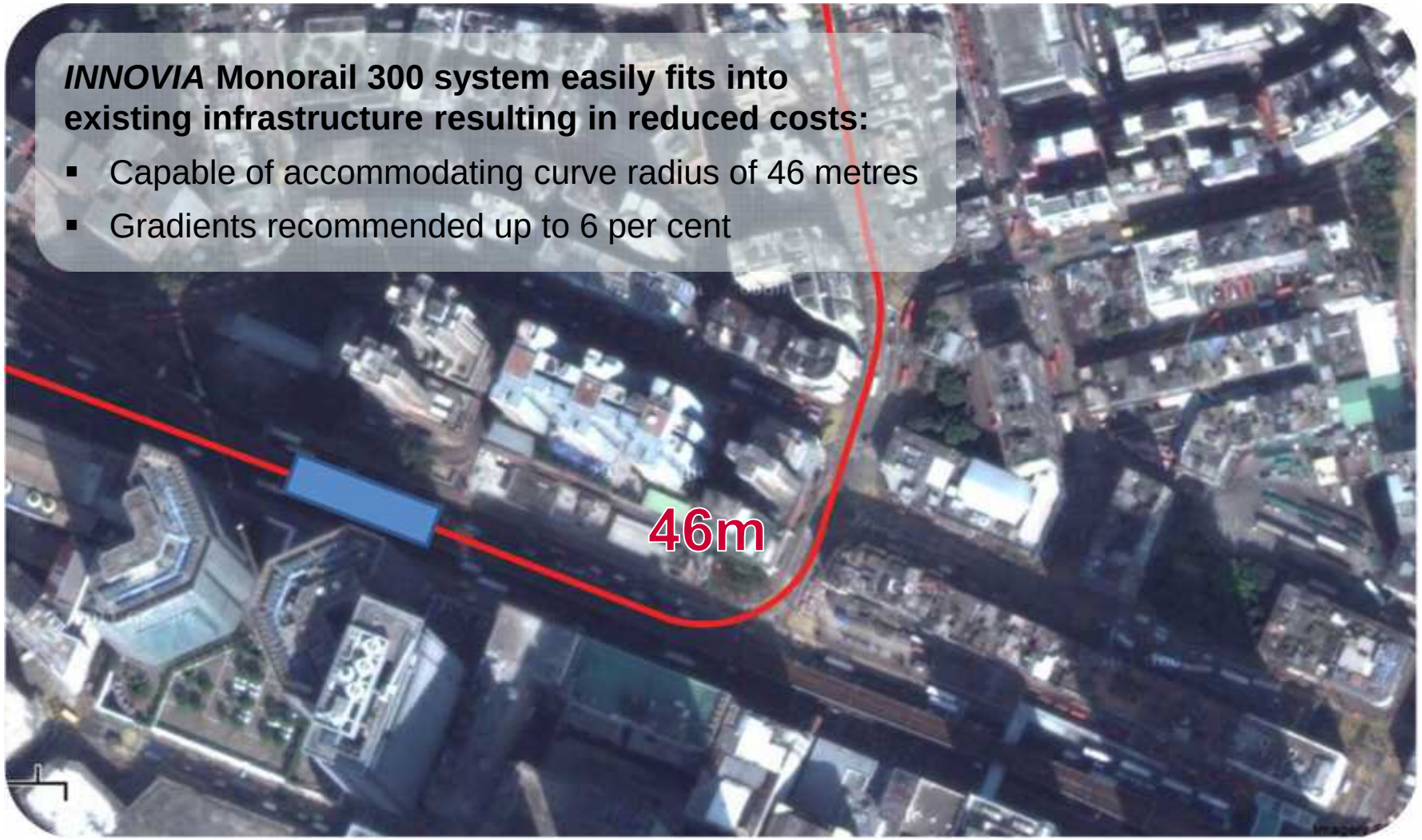
Seamless Integration and Route Flexibility

- Slender guideways are easily integrated into different environments
- Low profile sleek vehicles
- Infrastructure requires minimal land expropriation
- Flexible route alignment
- Sharp curve radii and steep grades
- Designed for seamless integration with buildings and structures
- Unobtrusive stations
- Quiet vehicle operation

Outstanding Urban Integration



Satellite picture © Google 2012

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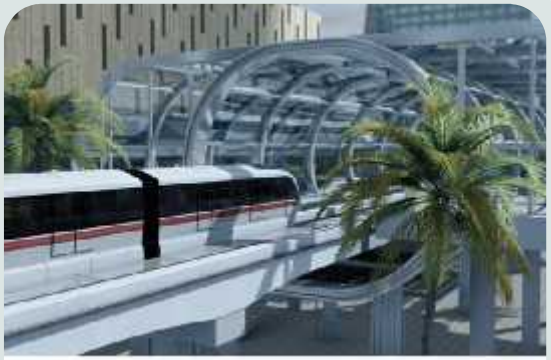
Guidebeam Design for Minimum Visual Impact



Concrete structures provide elegant strength and durability as well as:

- **Fast and efficient construction**
- **Affordability**
- **Fire-resistance**
- **Low maintenance**
- **Full compliance to all norms and standards**

Exclusive guidebeams ensure:

- **Dedicated right-of-way unrestricted operation**
- **Accidents with surface traffic are impossible**
- **Derailment virtually impossible**

Unobtrusive evacuation walkway, always recommended for safe egress, allow for:

- **Passenger safety**
- **Easy access for system maintenance**
- **No need for active intervention in an emergency**

Cost Effective and Easy Installation

- **Infrastructure developed to minimise the cost and disruption of civil construction**
- **Pre-cast lightweight guideway structures built off-site allow rapid assembly on site**
- **Low land intake / low expropriation costs reduce delays and allow for quick progress**
- **Elevated guideway eliminates the need for expensive and time-consuming tunnelling**
- **Easy implementation into different environments (suitable for both greenfield and brownfield)**

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Low System and Fleet Costs

- **Lightweight aluminium vehicles reduce energy consumption costs**
- **Standardised for optimised operation and maintenance costs**
- **Driverless operation requires less staff and reduces overhead costs**
- ***CITYFLO* 650 automated train control also reduces the costs of service interruptions and corrective maintenance**

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Predictive Maintenance for Increased System Health

Increase availability

- **Minimise service affecting failures**
- **Track failure trends and mitigate**

Improve customer service

- **Perform maintenance optimally**
  - Extends the operating life of the system
  - Extends life of equipment

Reduce the total cost of ownership

- **Extends maintenance intervals**
- **Potential elimination of daily/monthly tasks**
- **Automated vehicle inspections**
- **Reduce planned maintenance activities**
- **Reduce spares holdings**

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INNOVIA Monorail 300 System – Summary of Benefits

Technology	▪ **Sleek and attractive vehicles** ▪ **Slender contemporary guidebeams have a subtle presence** ▪ **Unique emergency walkway allows for safe passenger egress** ▪ **Modern solution to transportation needs**
Operation	▪ **Driverless system enhances overall efficiency** ▪ **Frequent, safe and reliable service** ▪ **High service capacity** ▪ **Cost effective transit solution**
Passenger	▪ **Modern visual appeal** ▪ **Spacious vehicle interior** ▪ **Easy access for passengers** ▪ **Comfortable rides**
Environment	▪ **Low visual impact** ▪ **Low noise** ▪ **Zero emissions** ▪ **Energy saving equipment**

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INNOVIA Monorail 300 System – Technical Overview

Train configuration	2- to 8- car trains
Car empty weight	14,000 kg
Maximum gradient	6 %
Minimum horizontal curve radius	46 m
Maximum speed	80 km/h
Power distribution	750 Vdc
Propulsion system	Permanent Magnet Motor
Design capacity	
▪ 2-car trains	9,680 pphpd
▪ 4-car trains	20,400 pphpd
▪ 8-car trains	41,840 pphpd

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Twenty Years of Urban Mobility Evolution

São Paulo, Brazil
INNOVIA Monorail 300 System
2015

Riyadh, Saudi Arabia
INNOVIA Monorail 300 System
2014

Las Vegas, USA
INNOVIA Monorail 200 System
2004

Jacksonville, USA
INNOVIA Monorail 100 System
1998

Newark, USA
INNOVIA Monorail 100 System
1996

Tampa, USA
INNOVIA Monorail 100 System
1991

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Q&A

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