

MicroRail Alternate to Light Rail



Practical & affordable solutions are now available!

- Low Cost
- Low Tech
- Low Risk

MegaRail® Transportation Systems, Inc.
Fort Worth, Texas

U.S. PATS. 6,039,135, 6,401,625, 6,435,100, 6,615,740, 6,742,458, 6,834,595 & 6,837,167
OTHER U.S. & INTERNATIONAL PATENTS PENDING

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LRT has Serious Guideway Problems

Not light weight – Must support 149,000-lb cars

- Heavy-duty bridge structures needed

Guideway – Railroad-type grade, ballast, rails & cross-ties

Right of way – Dedicated ROW needed – 44-ft for dual track

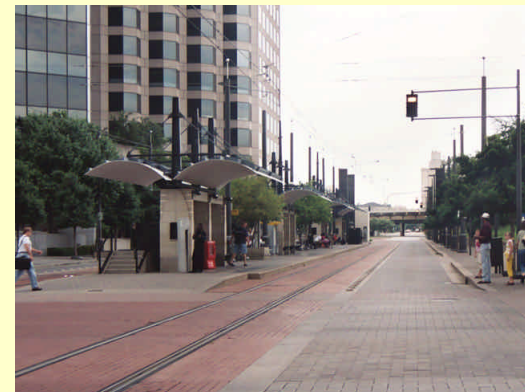
- 25-ft on city streets (Typical) **Plus side trolley wire posts**
- On-street lines **often take two traffic lanes**



Heavy-duty & costly structures



Massive support columns



Multiple traffic lanes lost

LRT has Major Station Problems

Typical characteristics

- **200-ft platforms** (Handle 2-car, 200-ft trains)
- **Open platforms** (No passenger protection from trains & guideway)
- **Need additional right of way**

Elevated stations – Often large and expensive

Street stations – Take away two to three traffic lanes



Large & costly structures



Open Passenger Platforms



Stations can block traffic lanes

LRT has Critical Cost & Time Problems

High initial cost – \$30 to \$60 M / mile – Avg. \$45 M / mile

(US) Now typically 50% Federal – 50% local funds

High O&M costs – 15 - 25% from fare box - Balance from taxes

Large & costly maintenance facility

Long wait time – Often 6 to 12 years

- Years of lobbying congress (US) – **Often greatest time hurdle**
- **Long ROW acquisition process**
 - Long construction time
 - Major traffic disruptions

LRT has Installation & Traffic Impacts

Major light rail system problems

Street light rail – Serious traffic disruption

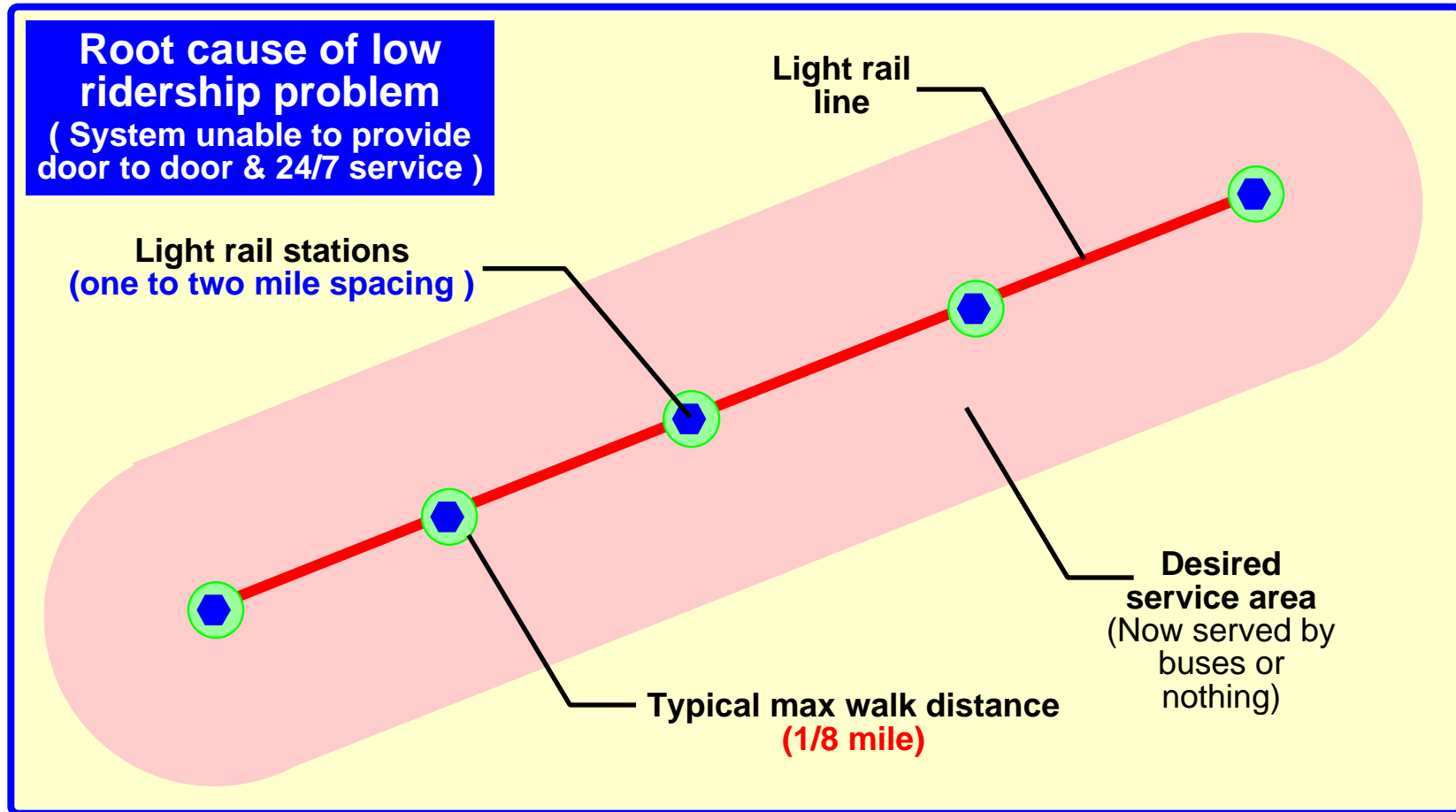
- Streets torn up for months
 - Traffic rerouted
 - **Business failures** during construction – Street blockage impact
- **Long-term traffic disruption** – Traffic flow impeded by trains
- Frequent **grade crossing accidents** – cars & pedestrians

Dedicated right right-of-way

- Tearing down homes and businesses
- Extensive grading & utility relocations
- Environment damage – Noise, visual & drainage impacts

Light Rail has “Last Mile” Problem

Service does not appeal to most people



Only carless people and limited others ride system

MicroRail Offers
Affordable, Low-risk & **NOW**
Alternate to LRT

Better mass transport in less time and at less cost!

- Low Cost
- Low Tech
- Low Risk

Superior *MicroRail SkyCoach*[™] Performance

Performance

- High-speed – **65-mph** – Short trip times!
- **High** passenger capacity
 - **26,000 pphpd** (Typical light rail **200-ft** station length) (36,047 with 300-ft stations)
(Typical max **at-grade** light rail capacity = **5,220 pphpd**)
- Short wait times – As short as **30 seconds**
(Typical time for conventional, at-grade light rail is **6-min**)

Grade-separated – Small, factory-built stainless-steel guideways

- No crossing accidents or street traffic delays
- No pedestrian accidents

Go-anywhere (Including up hills) – Cars use **rubber tires**

Plus – Offers “Last Mile” problem solutions!

***MicroRail* Transport is Available NOW!**

Guideway installation

- Guideway engineering – Immediate start
- First production guideway sections deliver in 12 months

Train production

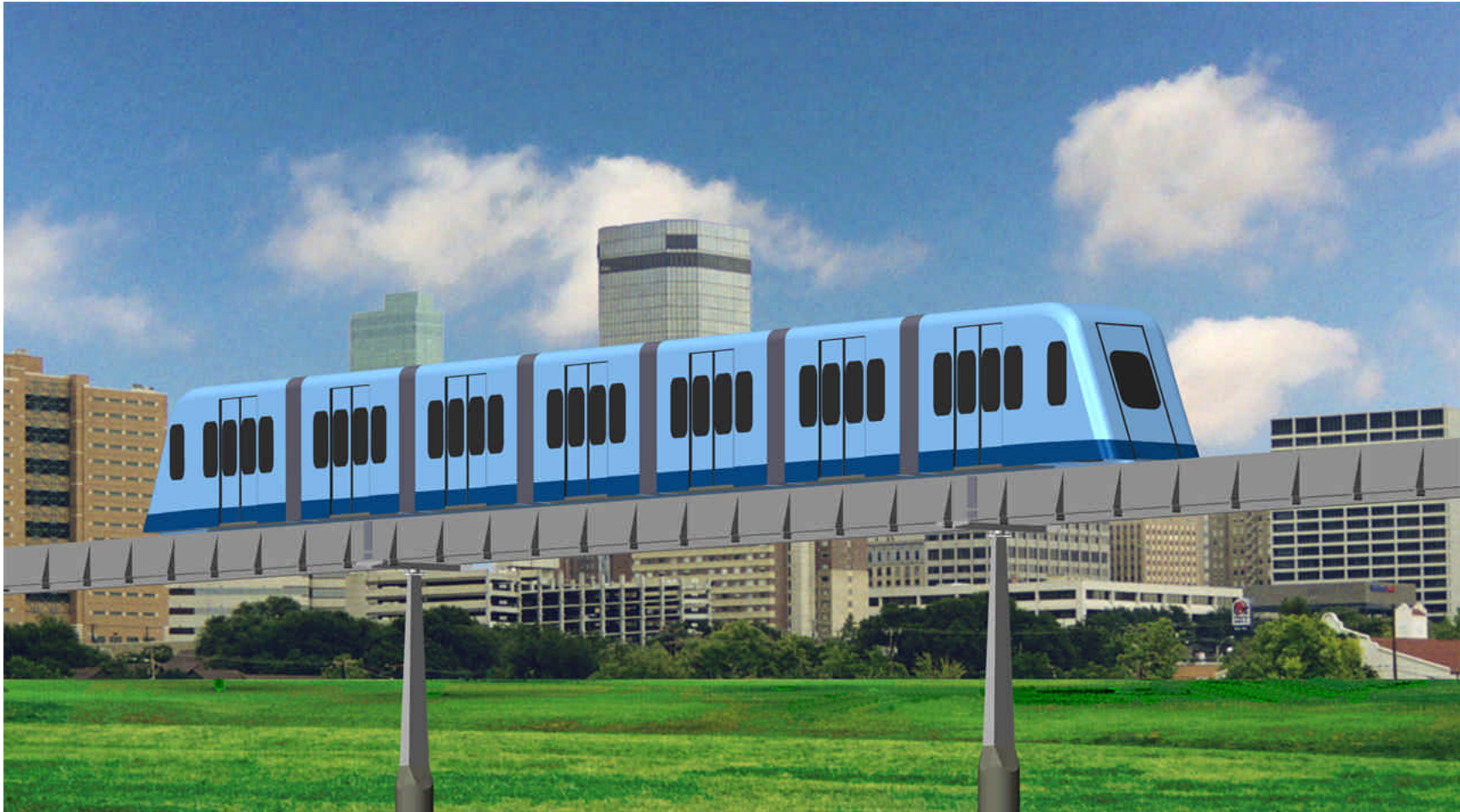
- Start within 12 months
- Deliveries within 18 months

First service within 30 months – (Manual control)

No waiting for extensive new development!

MicroRail[™] **SkyCoach**[™] Urban Transport

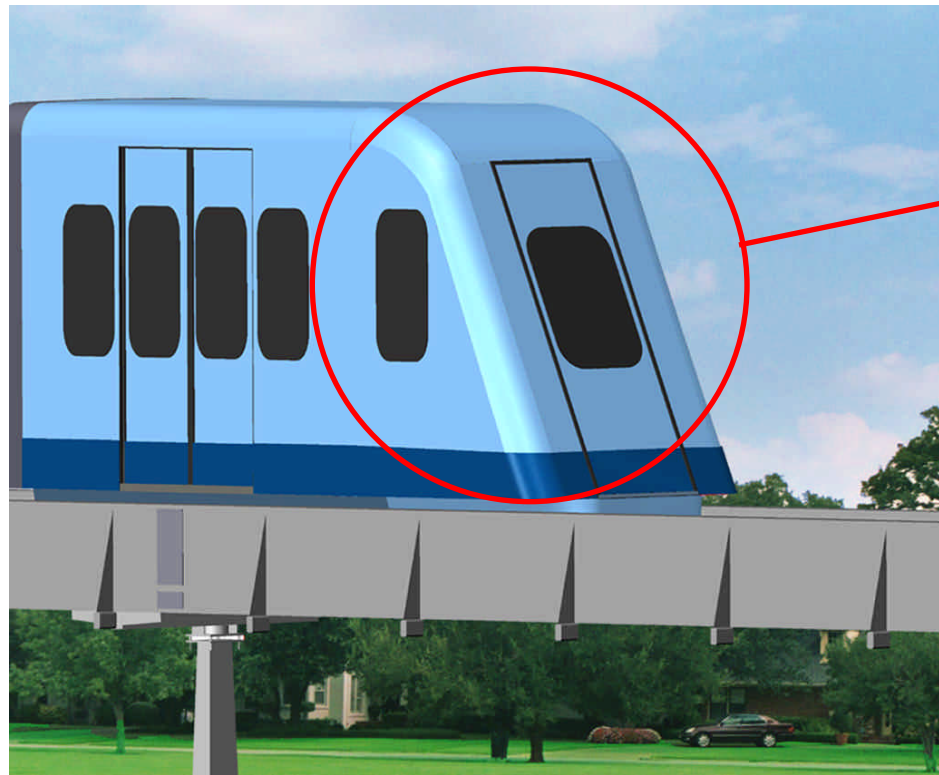
Superior performance to light rail & monorail in **small space** & **at low cost**



Ultralight **MicroRail SkyCoach** urban transport train on elevated guideway
(Mechanically-coupled train operated by on-board motorman)

Conventional off-the-shelf Train Control *MicroRail*

Used on light rail systems for over a century



Motorman
in
lead car

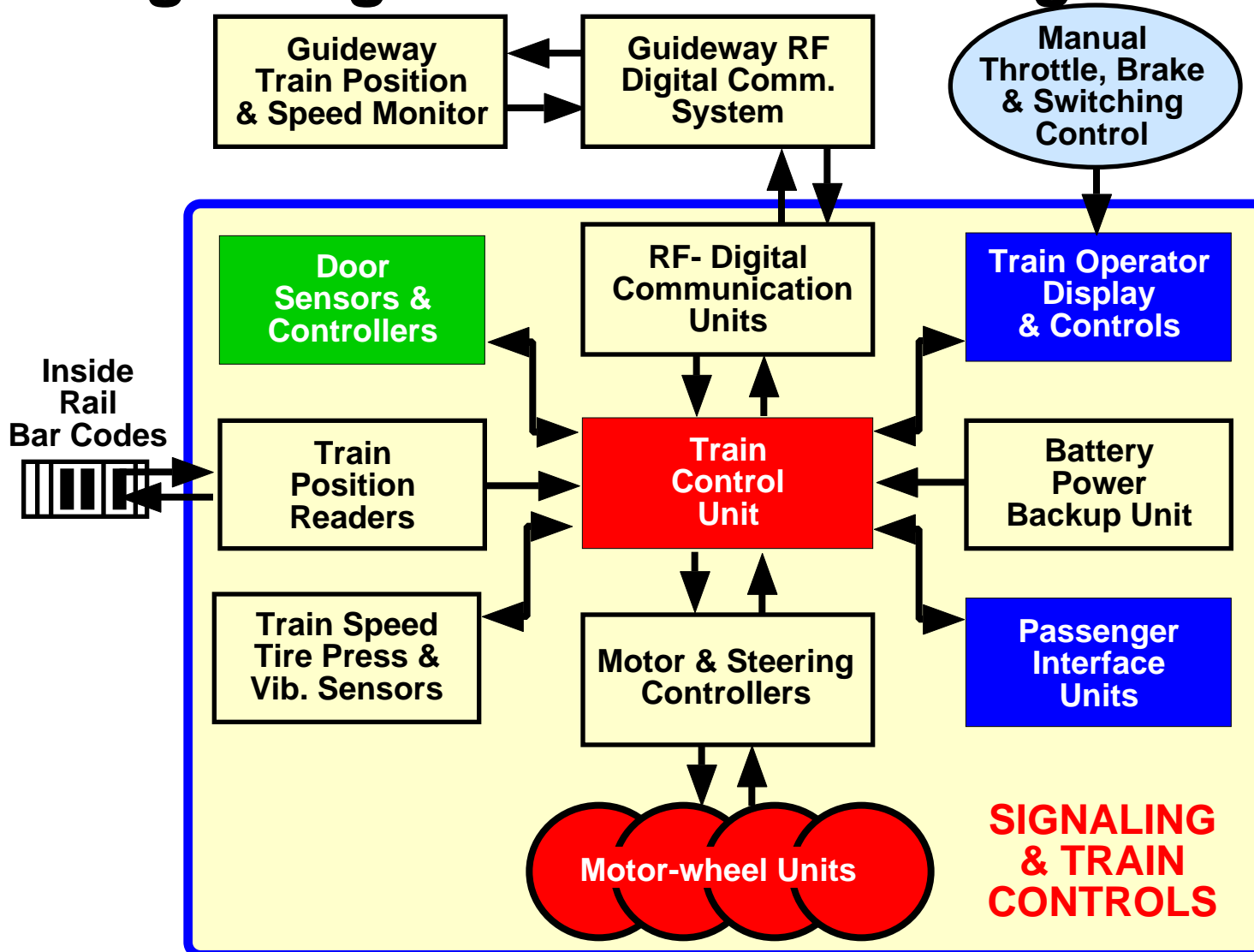
- Manual speed and brake controls
- Precise in-cab signaling for close train spacing

Signaling & Train Control Systems

- **Signaling system** – **Position & speed read by each train**
 - Two-way RF - digital data transfer links in guideway
 - Train position & speed data from each train - Rapid updates
 - Distances to next station & next train sent to each train
- **Train control system** – **Operator in each train**
 - Graphical & numeric train **operator displays in cab**
 - Train Speed & Distances to next train & station
 - Required braking zones – Amber bars & max speed
 - Prohibited entry zones – Displayed as red bars
- **Train operator controls** – **Simple & easy-to-use**
 - Throttle – Brakes – Left/right Switch Select – Doors

Integrated part of system – Not a separate system

Signaling & Train Control Diagram



Attractive & **Low Profile** Stainless Guideway



Ultralight, stainless-steel structure

Long-life, no rusting

Guideways elevated above street & pedestrian traffic - *MicroRail* guideway photo

Minimum sky blockage – No wide elevated LRT shadows



View looking upward through guideway

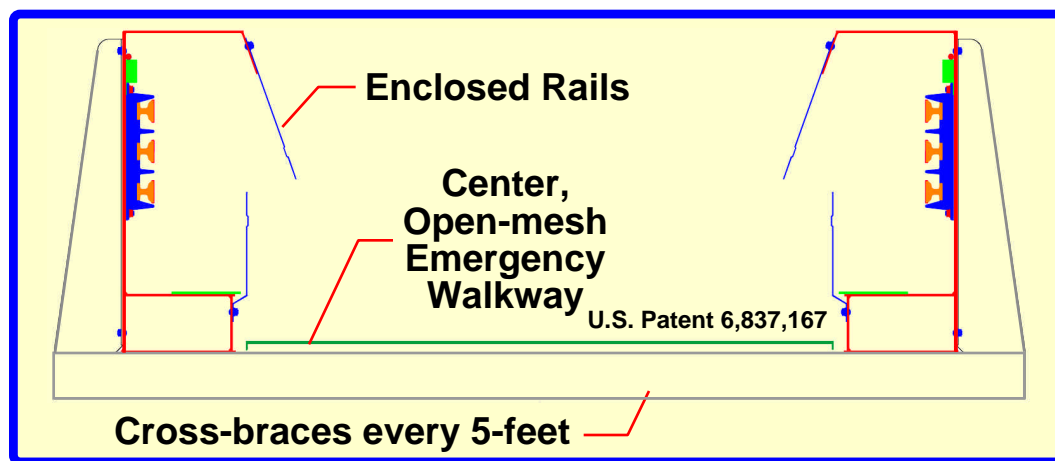
U.S. Patent 6,837,167

Small, 6.4-ft wide by 34-inch high *MicroRail* guideway

Small, **low cost**, factory-built guideway

Fast, bolt in place installation

6.4-ft
wide by
34-inch
high
MicroRail
guideway

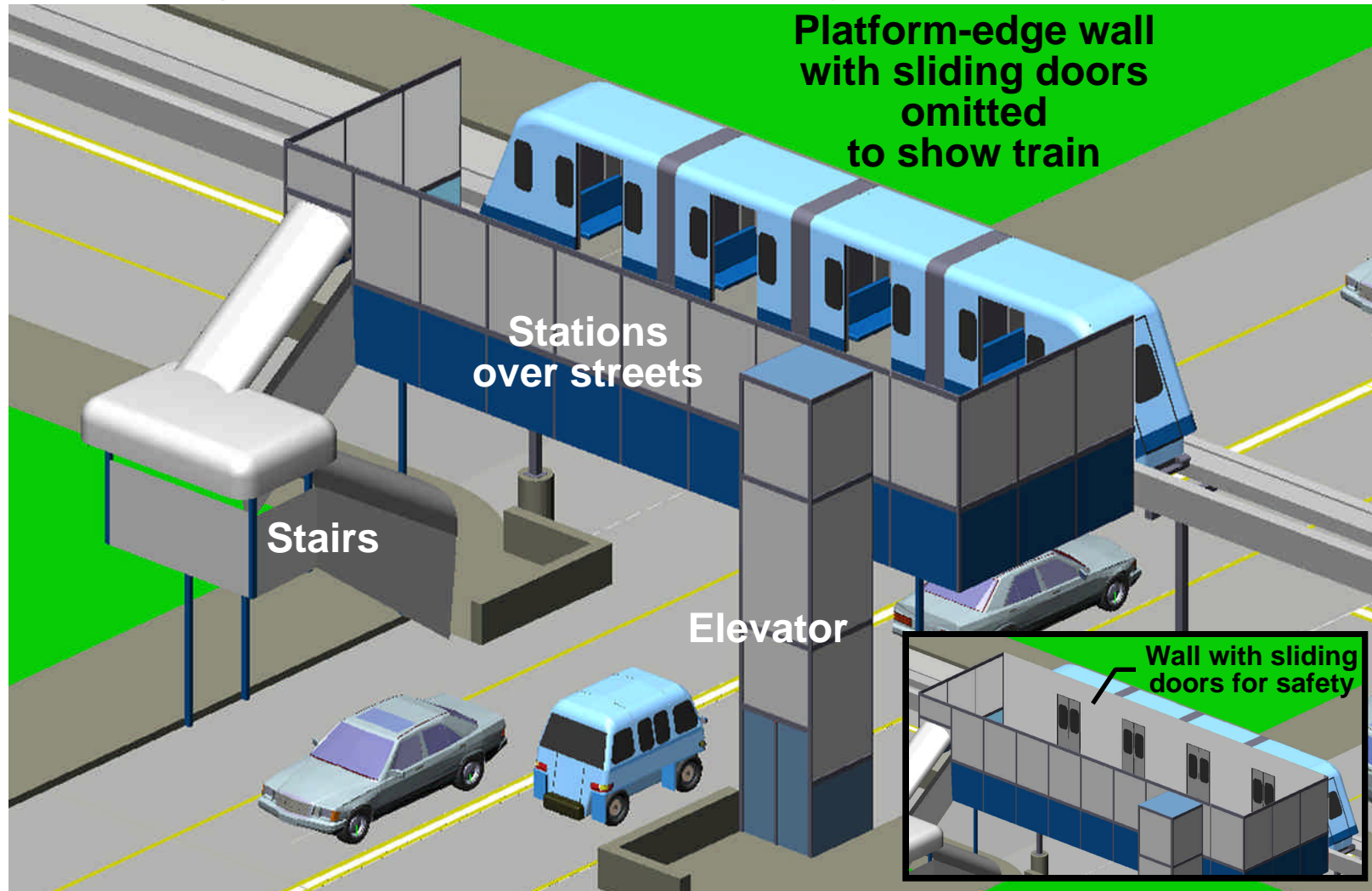


Guideway cross-section

System cost – *20% of typical LRT system cost*

- Over street rights-of-way – No more land or earth moving projects
- Mass-produced, factory-built sections – **fast on-site assembly**

Factory-built, Modular **SkyCoach**[™] Stations

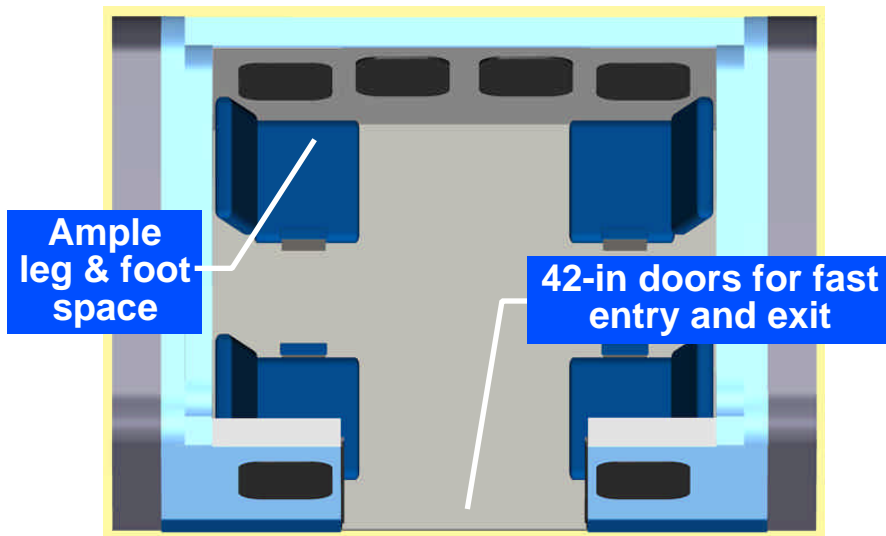


MicroRail[™] mass transit train at four-car elevated, over-street **SkyCoach**[™] station

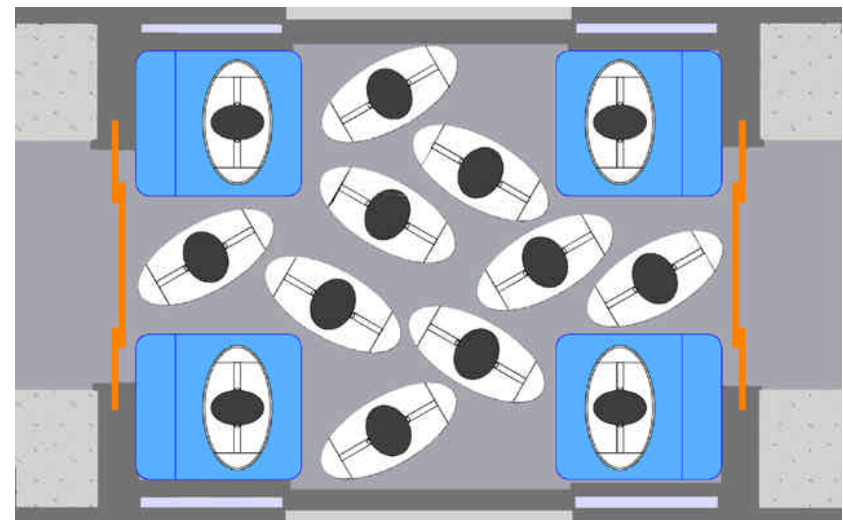
- Low-maintenance stainless-steel
- Low cost
- Minimum street impact

MicroRail SkyCoach™ Train Design

Trains of small & light-weight, mechanically-coupled cars



MicroRail Skycoach interior
Four seat configuration



MicroRail coaches carry up to 13 and seat from four to six passengers

- **8-ft long cars**
- **2-ft car spacing**
- **20 to 30-car trains** – Up to 260 to 390 passengers per train

SkyCoach™ Step in and Sit Entry & Exit

- **No center aisles!**
 - Fast entry & exit
 - Short station dwell times
- **Ample leg room**



Photos are of larger, but similar, MegaRail cabin

All cars are wheelchair-compatible

SkyCoach™ Offers Safe Escape

Unaided escape for all (including wheelchairs) without rescue personnel

U.S. Patent 6,837,167



- Full-height escape doors in ends of cars
- Open-mesh escape walkway between rails
- Covered electric rails



Upward view through walkway

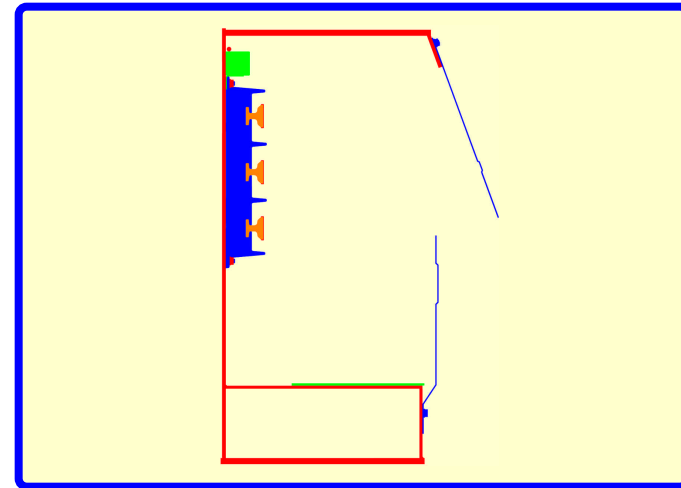
Low Energy Use

- **Electric power to trains**
 - 3 phase, 240V, 50 or 60 Hz
 - Four power rails – Located inside rail tubes
- **Power to system**
 - 3 phase, 13,000V, 50 or 60 Hz – Substations at each 4 miles
 - Distributed internally by system cables inside rail tubes
 - Step-down transformers on guideway support columns
- **Emergency power** – Generators spaced along guideway
- **Energy use** – For 10-car train - Stations at 0.5-mi.
 - Peak energy (during acceleration) – 0.68 Mw *
 - Average energy use per hour – 138 kw - (20% of LRT power)

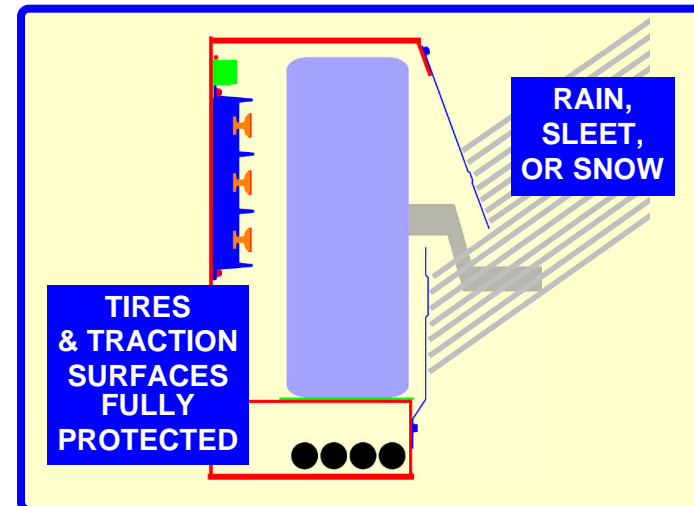
* Loads would be balanced by time-matching accelerating & decelerating trains to reduce total system peak power to approach 160-kw x number of trains.

Low-cost, All-weather, Enclosed Rails

- **Low-cost guideway rails**
 - Formed from flat stainless-steel
 - Machine-welded construction
 - Low material & labor costs
 - Bolt-in electric power rails
 - Trucked to installation site
- **All-weather, enclosed rails**
 - Wheels & power collectors inside
 - Protected electric power rails
 - Dry & ice-free traction surfaces
 - **Safe operation in any weather**



Single guideway rail cross-sections



Technical Summary

Unique **new** combination of **off-the-shelf, proven technology**

Enclosed stainless-steel guideway rails - US Pat. 6,039,135

- Simple welded steel factory fabrication
- Standard electrical power rails

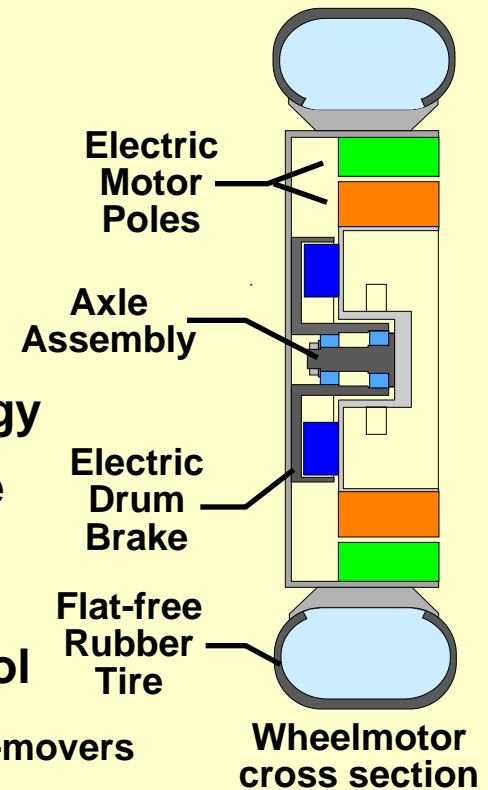
Flat-free tires – Current car tire technology

Permanent-magnet electric motors

- Current commercial brushless-motor technology
- Electric motor wheels – current electric car use

Car-based steering & switching

- Automobile-type steering with electronic control
- Switching – **No moving rails** – Used in other people-movers



Only the combination & guideway are new!

***SkyCoach* Maintenance**

- **Daily** – Cleaning & equipment inspections
 - Accomplished at stations during nightly shutdown times
- **Routine Periodic** – Actuators, tires, brakes, electronics
 - Accomplished at on line service station on storage rail
- **Car Installation & Removal**
 - Accomplished at on line service station on storage rail
 - Lifts move cars between guideway and trucks on street
- **Major Maintenance** – HVAC service, interiors, doors
 - Accomplished at ground level service center
 - Service center similar to an automobile repair facility

No costly guideway to a costly repair center!

MicroRail™ – “Last Mile” Problem Solutions

Driver-controlled, hybrid-electric **Skytram**™ service

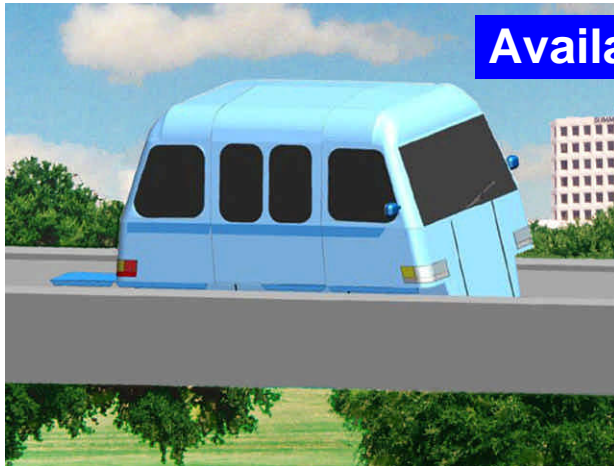
Available - 36 months



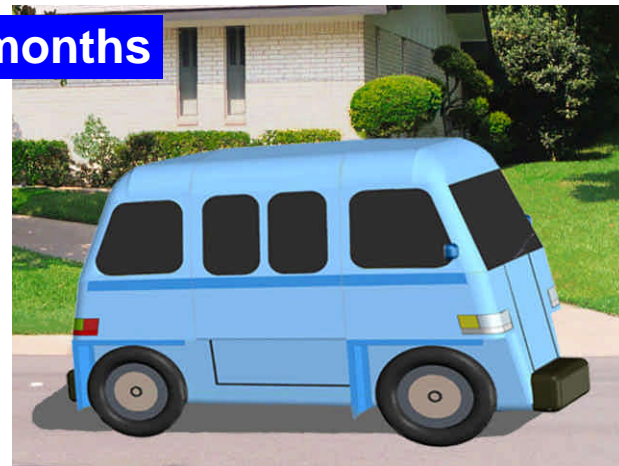
Dualmode, 52-passenger, 25-mph **SkyTram**™ service areas beyond easy walking range

Future dualmode electric & hybrid-electric automobiles

Available - 48 months



Automated personal dualmode automobile service on guideways



Dualmode personal automobile service on ordinary streets

Factory-built, Modular **SkyTram**[™] Stations



Dualmode *MicroRail*[™] **SkyTram**[™] at station on parking lot

- Low-maintenance stainless-steel
- Low cost
- Minimum ground space

Future Growth Summary

Improved service – More frequent & personal service

- On-demand, 24-hour, seven-day service
- Personal automated transport (PAT) service
- Short wait time for group automated transport (GAT) service

Time to initial automated service – 42 months!

- Only 12 months after start of manual-control train service

Added future features – Improve “Last Mile” solution

- Personal automobile service – Electric dualmode car capability
- Automated cargo container car service

MicroRail – Available NOW + Exciting Future Growth Options

***MicroRail* - Low-risk Solution**

Revolutionary, but entirely upon off-the-shelf, proven technology

- **First systems use manual train control**
Control **proven** in transit and railroad systems
- **No exotic new technology**
All technology **proven** in transit and auto systems*
- **Guideway is only really new element!**
(And it is a simple welded steel structure)

* Future automated systems also employ proven aircraft technology

MicroRail Transport Summary

Performance – Beats LRT – and solves “Last Mile” problem

- **26,000 pphpd** (200-ft LRT-size stations) – Up to 36,947 pphpd with 300-ft stations
At-grade LRT capacity = 5,220 pphpd
- Shorter trip times • **Bus-type** hill capability • **Dualmode serves more**

Early service – Within 30 months! – (LRT-type manual control)

- Much less than typical LRT systems - No funding delays

Total system cost – 20% to 22% of typical LRT system cost

- Local funding and control • **No on-going operation subsidies**

Environment friendly – Noise free operation

- No construction or operating impacts to business or street traffic
- No earth moving • No added right-of-way • **Zero emissions**

MicroRail – Available NOW

**• Low Cost
• Low Tech
• Low Risk**



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