Global Trends in Bus Rapid Transit

United Nations
Centre for Regional Development

5th Regional EST Forum in Asia

Bangkok, Thailand, 24 August 2010

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Viva
cities for people

BRT in Asia


Ahmedabad
ITDP


Guangzhou
Lloyd Wright


Bangkok
GTZ


Seoul
City of Seoul


Jakarta
Lloyd Wright

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BRT systems worldwide

Latin America
Bogotá
Curitiba
Goiânia
Guadalajara
Guatemala City
Guayaquil
León
Mexico City
Pereira
Porto Alegre
Quito
São Paulo
Santiago

North America
Boston
Cleveland
Eugene
Los Angeles
Miami
Ottawa
Orlando
Pittsburgh
York

Asia
Ahmedabad
Bangkok
Beijing
Changzhou
Chongqing
Delhi
Guangzhou
Hangzhou
Jakarta
Jinan
Kunming
Nagoya
Pune
Seoul
Taipei
Xiamen
Xian

Oceania
Auckland
Adelaide
Brisbane
Sydney

Europe
Amsterdam
Bradford
Cambridge
Claremont Ferrand
Crawley
Eindhoven
Edinburgh
Essen
Istanbul
Leeds
Lille
Lyon
Nantes
Nice
Paris
Rouen
Toulouse
Utrecht

Africa
Cape Town
Johannesburg
Port Elizabeth
Lagos

Volvo


Part I. Project Costing
GTZ

Summary of typical planning costs

Plan	Estimated cost
Feasibility study	US$ 0.5 – 1 million
Project Management	US$ 1 – 2 million
Operations Plan	US$ 3 – 4 million
Business Plan	US$ 3 – 5 million
Marketing & Communications Plan	US$ 2 – 4 million
Total	US$ 9.5 – 16 million

Plan	Estimated cost
Preliminary & detailed infrastructure design	10% of construction costs

Typical capital costs

Implementation	Estimated cost
Civil works	US$ 4.5 – 7.5 million per km
Trunk stations	US$ 0.5 – US$ 1 million per station
Depots	US$ 15 – US$ 25 million per depot
Trunk vehicles	US$ 0.2 – 0.4 million per vehicle
ITS and fare equipment	R 0.07 – 0.15 million per station
Control centre	US$ 20 – US$ 30 million
Land acquisition	Variable
Industry compensation	Variable

Four systems at approximately the same cost

France

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China

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South Africa

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Colombia

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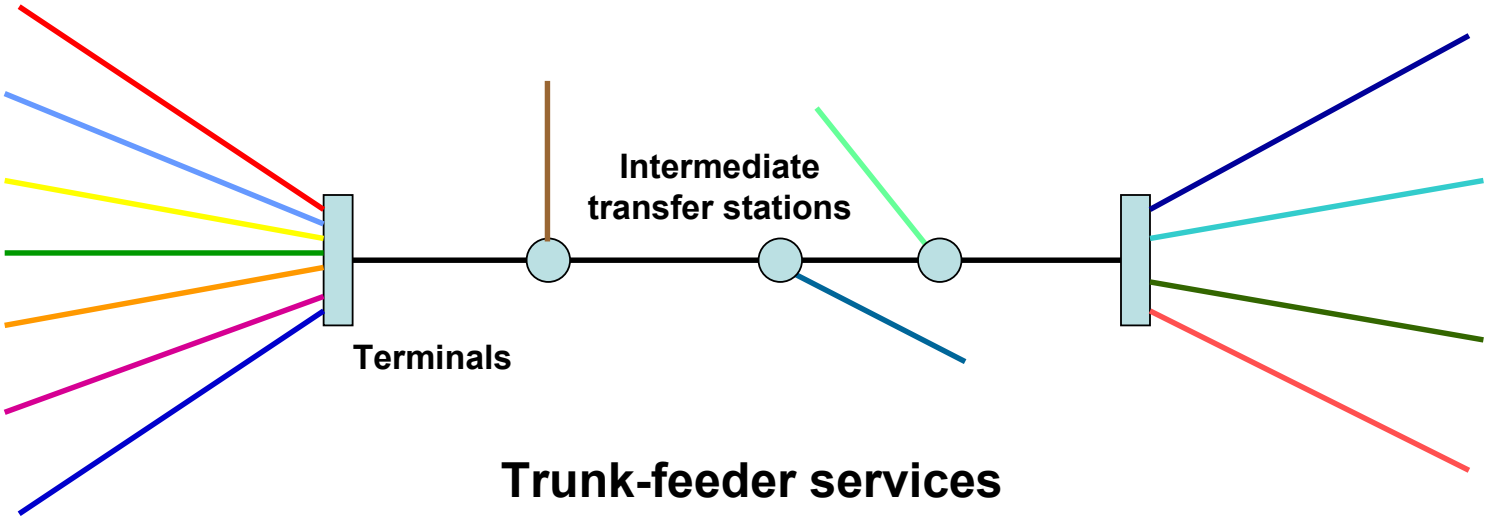
Sao Paulo Expresso Tiradentes

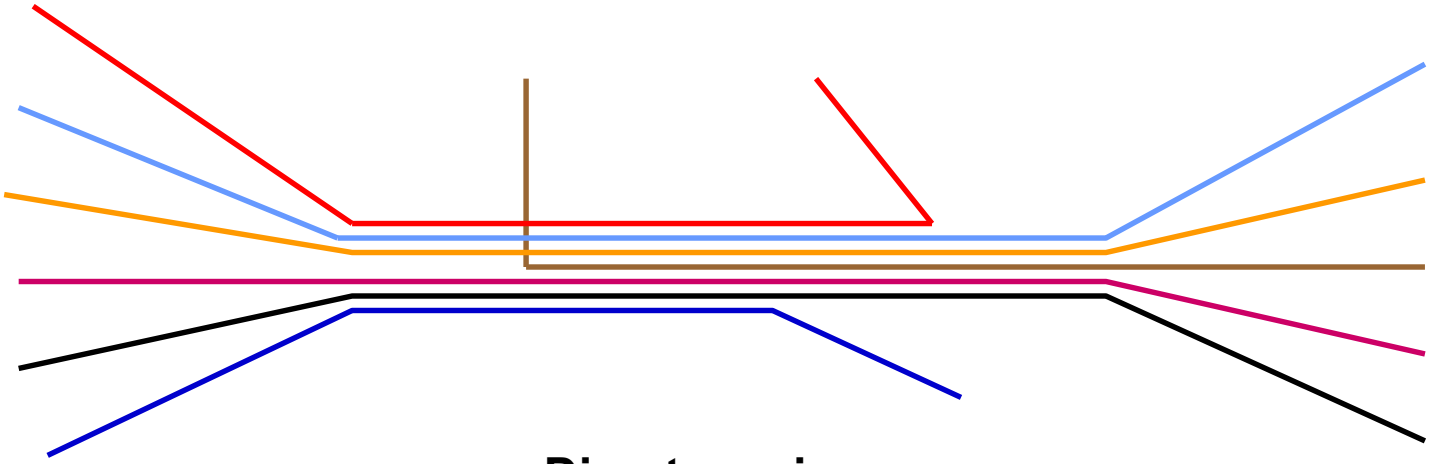
Lagos BRT Lite

Part II. Operations and Infrastructure

System design



Trunk-feeder services



Direct services

Central median stations vs. split stations

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Reasons for central median stations

1. Ease of transfers
2. Travel time / commercial speed advantages
3. Capital cost reductions
4. Operating cost reductions
5. Legibility / marketing
6. Self-enforcing
7. Improves pedestrian safety
8. Saves road space

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Lane enforcement techniques

- Lane colourisation
- Number plate recognition cameras
- Road signs and markings
- Fines and penalties
- System branding
- Delineators

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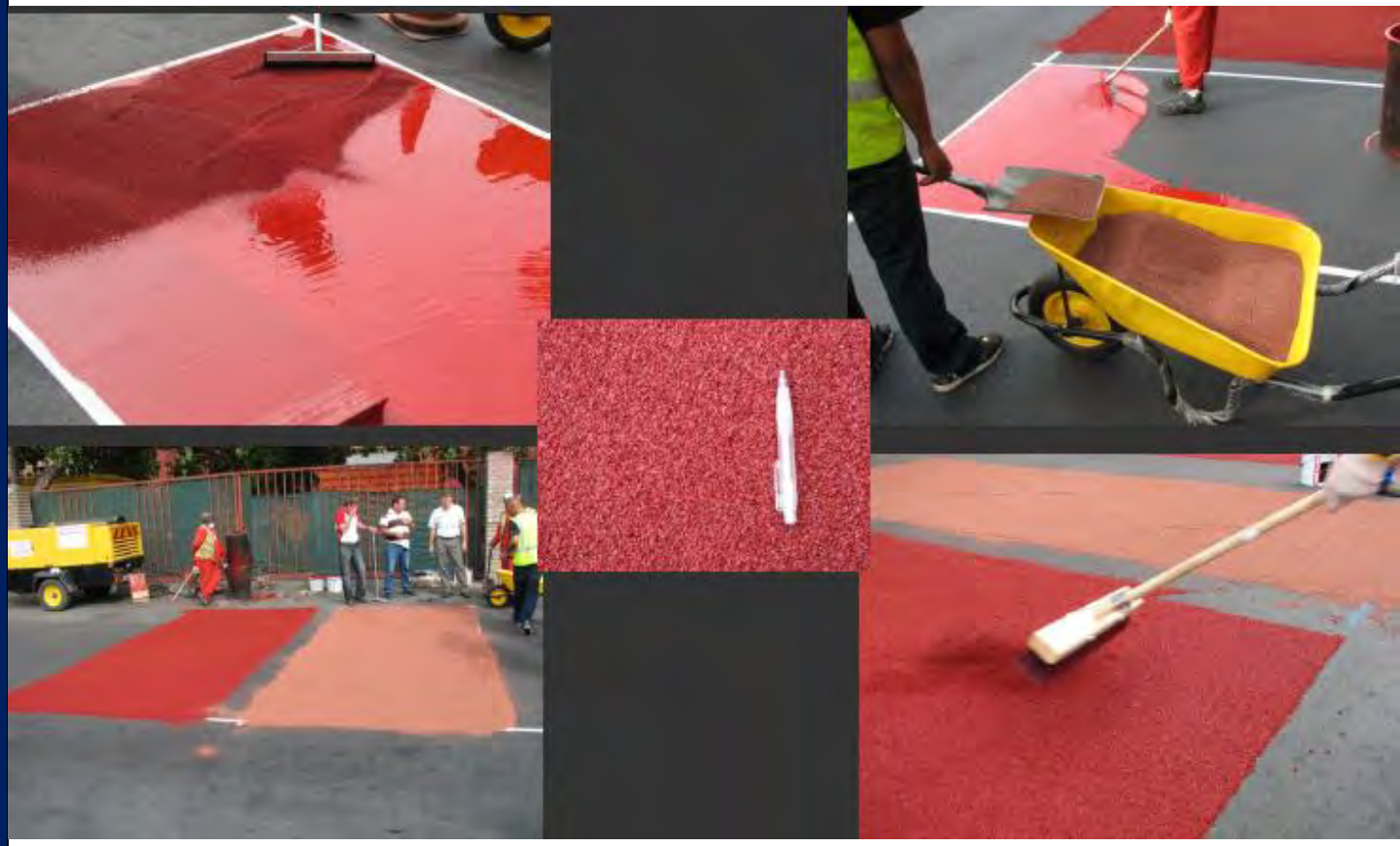
Lane colourisation

Thin film problems

- ❑ **Expensive**
- ❑ **Poor durability**
- ❑ **Dulling of colour**



Lane colourisation

Before

After

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Low-cost colourisation in Cape Town

HHO

Continuously Re-inforced Concrete (CRC)

- Concrete designed for flexural strength of 3.5 MPa
- Concrete thickness varies from 190 to 260 mm
- Optimum colour enhancement at 5% of mix

HHO

Vehicle-platform interface

Connecting the customer to the system

Why worry about large gaps?

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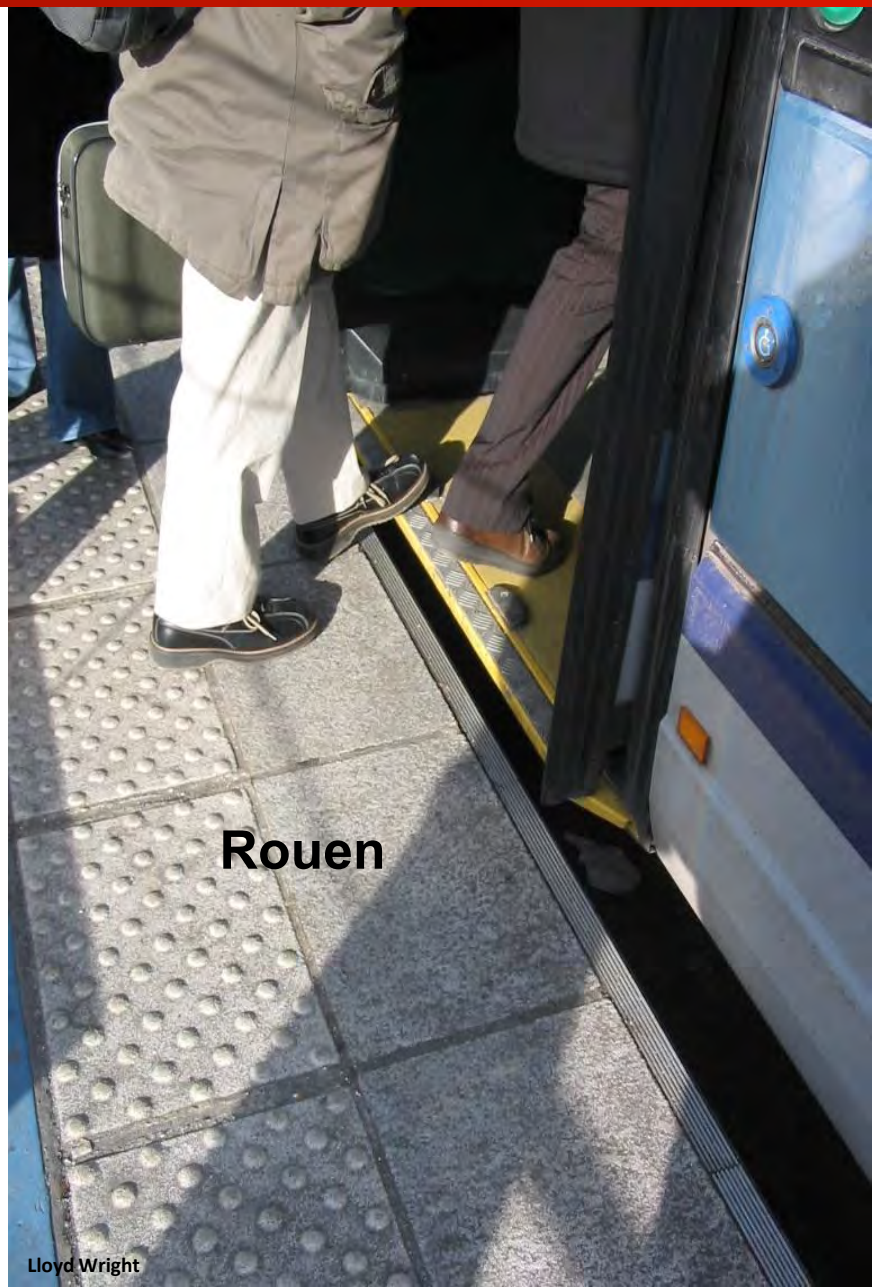
Optical alignment to platform

Las Vegas



Rouen

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Window marker aligned to street marking

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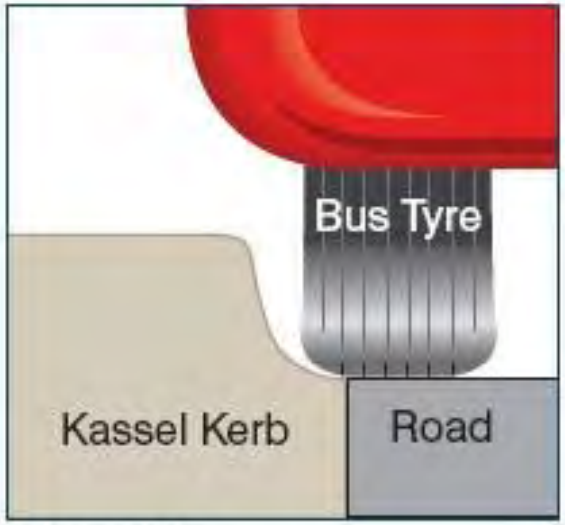
Kassel kerbs

Smooth contact face



Boot shaped profile

HHO

Kassel kerbs in Cape Town

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Kassel kerb in Amsterdam

Boarding bridges

- Eliminates many of the platform interface problems
- Provides greater customer ease in boarding, especially for the physically disabled, the elderly, and children

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CD-style boarding bridge

BRT and the FIFA World Cup

Station design and artwork

Johannesburg

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Cape Town

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Part III. Vehicles

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High floor vs. Low floor vehicles

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High floor

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Low entry

Low-entry vehicles

Advantages

- Reduces station costs
- Reduces station visual impact
- Reduces overall length of stations
- Allows easier integration of trunk and feeder services

Disadvantages

- Slightly more costly vehicles
- Some loss of seating
- Maximum vehicle speed of 70 kph (compared to 100 kph for high-floor)

12-meter vehicles

Advantages

- Lower vehicle cost per passenger carried
- Improved fuel economy
- Increased ease in vehicle docking
- Superior ride comfort
- Improved acceleration and deceleration

City of Brisbane

Modern vehicles

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Vehicle interior

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APTS

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Feeder vehicles and feeder stations

Universal access with all feeder vehicles

Real-time information displays at feeder stations

Part IV. Communications & Marketing

Duan Xiaomei, GMTDC

Branding

Karl Fjellstrom, itdp-china.org

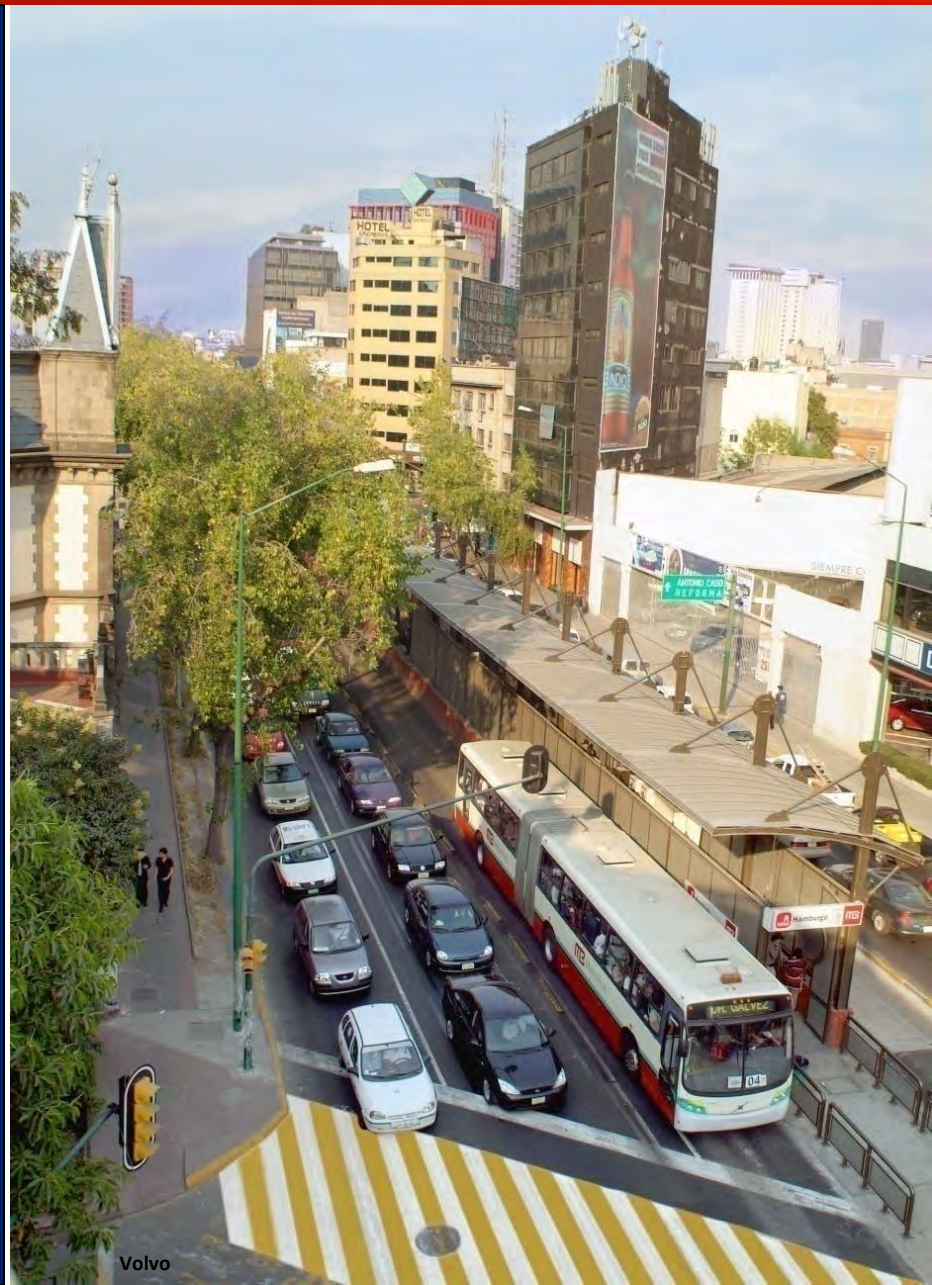
System branding in Los Angeles

Celebrity endorsements

System merchandising

Trends defining BRT success

- ✓ Median dedicated lanes and central median stations
- ✓ Low-entry vehicles
- ✓ Quality feeder vehicles and stations
- ✓ Kassel kerbs and boarding bridges to ease boarding and alighting
- ✓ Lane colourisation
- ✓ Legible signage
- ✓ High-quality pedestrian and bicycle infrastructure integrated into design
- ✓ System is fully wheelchair accessible



Part V. Resources

Bus Rapid Transit Planning Guide

3rd Edition:

www.itdp.org/index.php/microsite/brt_planning_guide

Collaborations invited for upcoming 4th edition

Bus Rapid Transit
Planning Guide
June 2007

Partners

ITDP
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Thank you

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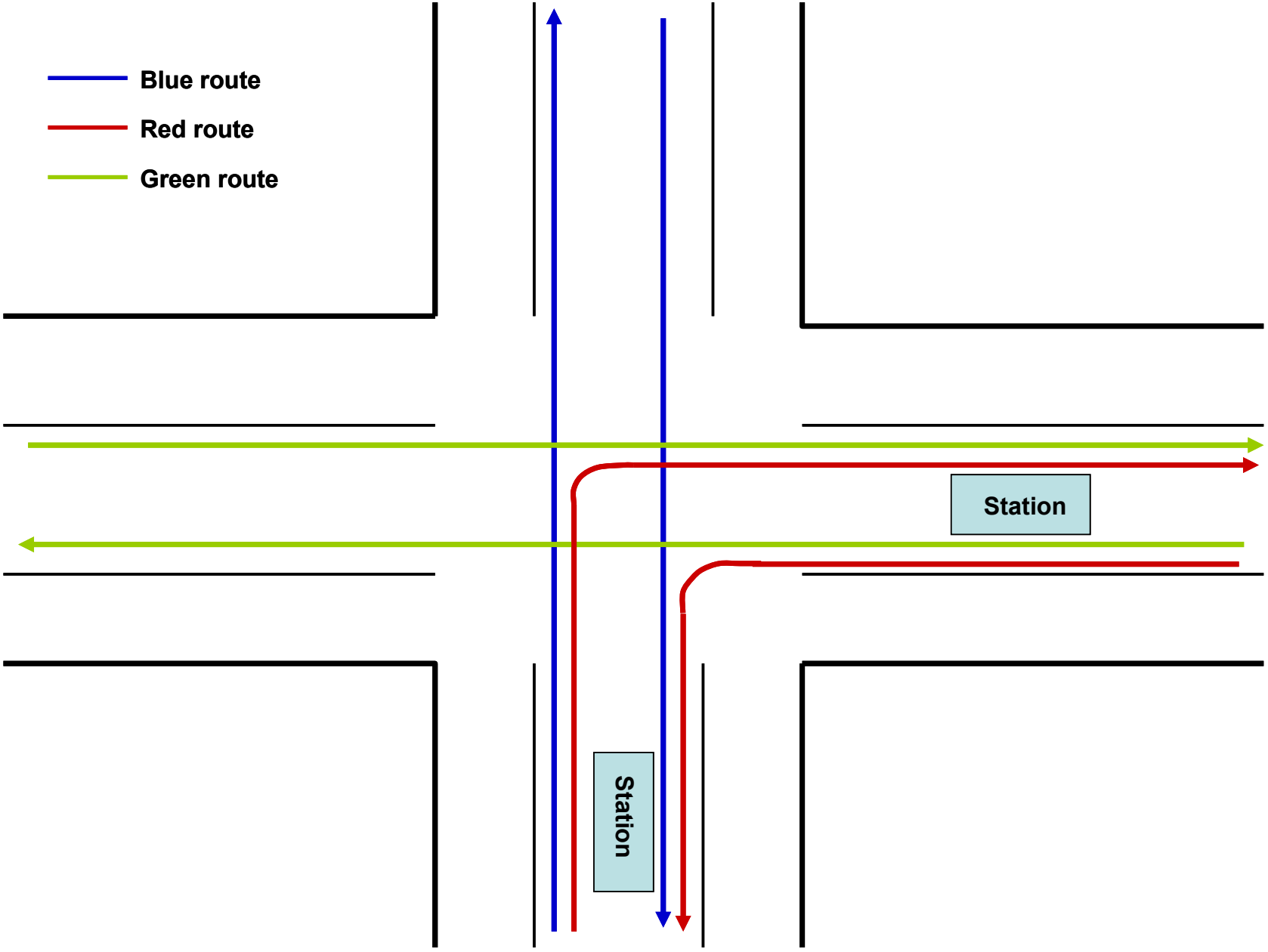
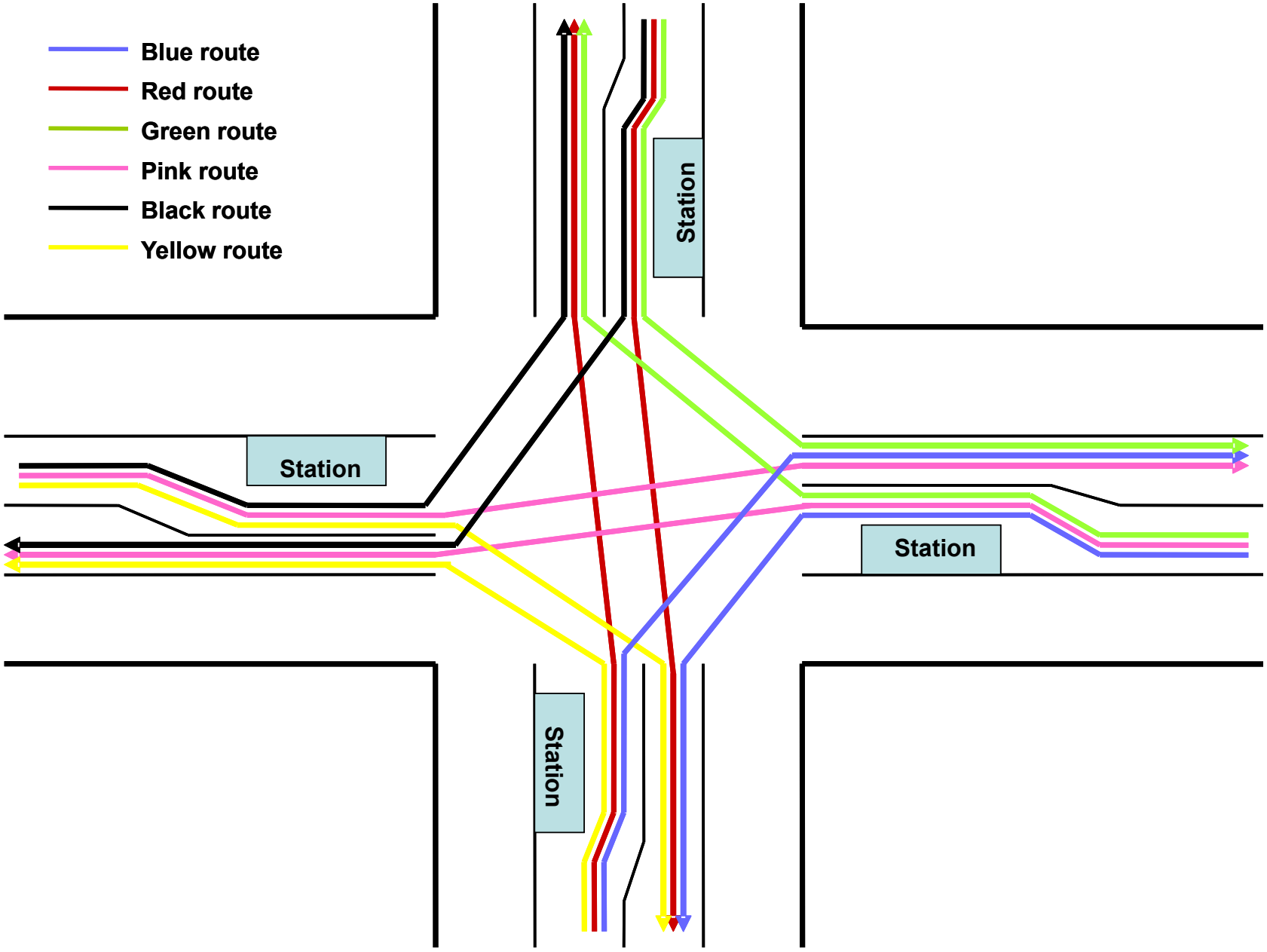
Median stations with route permutations



Split stations with route permutations



Mechanical guidance systems

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Station design

Karl Fjellstrom

Feeder vehicles