Introduction

Part I Project Preparation

Part II Operational Design

Part III Physical Design

Part IV Integration

Part V Business Plan

Part VI Evaluation and Implementation

Resources, Annexes, and References

Bus Rapid Transit
Planning Guide

June 2007

Resources

"You see things as they are and you ask why. But I dream of things that never were and I ask why not."

—George Bernard Shaw, 1856–1950

Cities embarking upon improvements to their public transport system are not alone in this endeavour. Many organisations and resources are available to cities seeking to upgrade the quality of public transport. This section notes some of the key organisations that provide either technical assistance or distribute technical information. Also, this section presents some of the key resource materials and websites on BRT. The full content of this section is:

Support organisations

1. *Access Exchange International*

Access Exchange International (AEI) is a non-governmental organisation promoting accessible public transport for persons with disabilities and seniors in Latin America, Africa, Asia, and eastern Europe. The organisation's web site provides resources on good design practices that improve quality access for those with physical disabilities.

http://globalride-sf.org

2. *American Public Transportation Association (APTA)*

APTA is a national trade association representing public transport agencies and operators in the United States. The APTA website includes useful background documentation on BRT concepts.

http://www.apta.com

3. *Associação Nacional de Transportes Públicos (ANTP)*

The Brazilian National Association for Public Transport provides information on a range of sustainable transport topics, including BRT. The Portuguese web site includes access to a range of publications.

http://portal.antp.org.br/default.aspx

4. *Bus Rapid Transit China*

BRT China is a Mandarin language web site devoted to providing BRT information and updates on projects in China.

http://www.brtchina.org

5. *Bus Rapid Transit Central*

This site holds articles on BRT and links to technical information on various BRT systems.

http://www.busrapidtransit.net

6. *Bus Rapid Transit Policy Center*

The Bus Rapid Transit Policy Center has been developed by the Breakthrough Technologies Institute is a US-based organisation that seeks to provide key background information on the BRT option. The web site provides news on BRT developments, links to key BRT reports, and information on different vehicle technologies. Also, the Breakthrough Technologies Institute publishes a journal called *Transport Innovator* that provides analysis of BRT issues as well as updates on projects around the world.

http://www.gobrt.org

7. *Bus Rapid Transit UK (BRT-UK)*

BRT-UK is an association dedicated to the sharing of information about evolving bus based rubber tyred rapid transit technology. BRT-UK is a particuliarly key resource for news and publications related to BRT in the United Kingdom.

http://www.brtuk.org

8. *Clean Air Initiative*

The Clean Air Initiative (CAI) advances innovative ways to improve air quality in cities by sharing knowledge and experiences through partnerships in selected regions of the world. The CAI website as well as its training initiatives provides knowledge and information on

mechanisms to improve public transport.
http://www.cleanairnet.org

9. The Commons

The Commons is an "Open Society Sustainability Initiative" developed by Eric Britton and EcoPlan International. The site provides information and offers the opportunity for cities and individuals to exchange experiences. The site also hosts a wide selection of BRT related videos (see the "World Outreach" and "Video Libraries" headings).
http://www.ecoplan.org

10. Energy Foundation

The China Sustainable Energy Program of the Energy Foundation has done much to spread awareness of BRT in the context of Chinese cities. Of particular note is the development of the China Sustainable Transportation Centre which provides training and resources on BRT.
http://www.efchina.org/FProgram.do?act=list&type=Programs&subType=2

11. GTZ Sustainable Urban Transport Programme (SUTP)

The German Overseas Technical Assistance Agency (GTZ) has developed an information source on a wide range of sustainable transport topics. The SUTP web site hosts this BRT module and other documents on sustainable transport. GTZ also supports sustainable transport projects in a variety of developing-nation cities.
http://www.sutp.org, http://www.sutp.cn

12. Institute for Transportation & Development Policy (ITDP)

ITDP is an international non-governmental organisation that provides supports to BRT initiatives and other sustainable transport projects in Africa, Asia, and Latin America. ITDP has assisted BRT projects in such countries as Brazil, China, Colombia, Ghana, Senegal, South Africa, Tanzania, Bangladesh, India, and Indonesia. ITDP also publishes a regular newsletter, *e-Sustainable Transport*, which features frequent articles on BRT projects worldwide.
http://www.itdp.org

13. International Association of Public Transport (UITP)

UITP is a worldwide network of public transport professionals that acts as a point of reference for sharing information across the public transport sector. UITP publications and conferences provide a key international perspective on best practice in the field.
http://www.uitp.com

14. International Energy Agency (IEA)

The IEA has compared the environmental performance of different fuel and propulsion options for buses in its publication entitled *Bus Systems for the Future: Achieving Sustainable Transport Worldwide*. This research has also compared the emission impacts of tailpipe technologies to the benefits of mode-shifting strategies.
http://www.iea.org

15. Metro Magazine

Metro Magazine's website hosts a BRT home page that provides a range of information including updates on recent BRT news stories.
http://www.metro-magazine.com/t_brt_home.cfm

16. National Bus Rapid Transit Institute

Based at the University of South Florida (US), the National BRT Institute is an information clearinghouse on BRT. The site includes BRT publications, presentations, video, and images from both US and international projects.
http://www.nbrti.org

17. Transit Cooperative Research Program (TCRP)

TCRP is a component of the US Transportation Research Board (TRB). TCRP has produced several key studies on topics related to BRT, including a compendium of BRT case studies and planning guidances.
http://www4.trb.org/trb/crp.nsf

18. Transportation Research Board (TRB)

TRB is a division of the US National Research Council which acts as an independent advisor to the US government. TRB seeks to promote innovation and progress in transport through research. Each year in January, TRB hosts its annual review conference which includes many useful sessions on BRT related themes.
http://gulliver.trb.org

19. Transport Roundtable Australia

This site provides useful information and articles both on general BRT issues as well as specific links to Australian systems in cities such as Brisbane and Adelaide. The site also provides information on the "Smart Urban Transport" conferences which cover a range of sustainable transport topics, including BRT.
http://www.transportroundtable.com.au

20. US Federal Transit Administration (USFTA)

This site provides an overview of the USFTA's national BRT programme as well as information on the activities underway in each of the participating cities. The site also provides a number of useful links to technical documents.
http://www.fta.dot.gov/assistance/technology/research_4234.html

21. Victoria Transport Policy Institute (VTPI)

The Victoria Transport Policy Institute (VTPI) has produced the on-line TDM Encyclopaedia, which is one of the most complete and expansive works to date on sustainable transport topics. Amongst the topics covered by the On-line TDM Encyclopaedia are: BRT, Non-Motorised Planning, Park & Ride, Transit Improvements, Transit Examples, Transit-Oriented Development (TOD), and Evaluation.
http://www.vtpi.org

22. Weststart-CALSTART

WestStart-CALSTART is an advanced transportation technologies consortium, dedicated to creating and expanding a global advanced transportation technologies industry and its markets through technology development, analysis, and implementation. Weststart-CALSTART particularly provides much information on different BRT vehicle types. Weststart-CALSTART also regularly publishes the BRT Newslane which provides project updates and information on BRT vehicle options.
http://www.calstart.org/programs/brt/new/newbrtinfo.php

23. Wikipedia

Wikipedia, the free on-line encyclopedia, provides an overview article on the BRT concept.
http://en.wikipedia.org/wiki/Bus_rapid_transit

24. World Bank

The World Bank, along with the Global Environment Facility (GEF), has supported many BRT initiatives world wide. The World Bank also publishes a range of useful background topics, including reference guides on access for the physically disabled and data sets on existing systems.
http://www.worldbank.com/transport

25. World Resources Institute - Embarq

Established in 2002, *EMBARQ* - The World Resources Institute Center for Sustainable Transport - acts as a catalyst for socially, financially, and environmentally sound solutions to the problems of urban mobility. The Embarq website includes information on specific projects as well as information resources.
http://embarq.wri.org

Technical resources

This document has sought to provide an overview of the BRT concept as well as provide insights into the BRT planning process. However, there are several other publications that also provide additional perspectives and information on the topic of BRT. This section lists some of these documents.

Public transport technology options

Allsop, R. (2000), *Mass rapid transit in developing countries*. London: Halcrow Fox.

Flyvbjerg, B., Bruzelius, N., and Rothengatter, W. (2003), *Megaprojects and risk: An anatomy of ambition*. Cambridge: Cambridge University Press.

Fouracre, P., Dunkerley, C., and Gardner, G. (2003), Mass rapid transit systems for cities in the developing world. *Transport Reviews*, 23(3): 299-310.

Hass-Klau, C., Crampton, G., Weidauer, M., and Deutsch, V. (2003), *Bus or light rail: Making the right choice*. Brighton: Environmental & Transportation Planning.

Hidalgo, D. (2006), Comparing transit alternatives after recent developments in BRT in Latin America. Paper presented at the *85th Annual Meeting of the Transportation Research Board*, Washington, US, January 2006.

US GAO (United States General Accounting Office) (2001), *Bus rapid transit shows promise*. Washington: US GAO.

Vuchic, V. (2007), *Urban transit systems and technology*. Hoboken: John Wiley & Sons.

Vuchic, V. (2005), *Urban transit operations, planning, and economics*. Hoboken: John Wiley & Sons.

Wright, L. and Fjellstrom, K. (2003), *Mass transit options*. Germany: GTZ.

General BRT guidance

CALTRANS (2007), *Bus rapid transit: A handbook for partners*. Sacramento: California Department of Transport (CALTRANS).

Diaz, R. (ed.) (2004), *Characteristics of bus rapid transit for decision-making*, Project number FTA-VA-26-7222. Washington: US FTA.

Diaz, R. and Schnek, D. (2000), Innovative service design among bus rapid transit systems in the America. Paper presented at the APTA 2000 *Bus and Paratransit Conference*, (http://www.apta.com/research/info/briefings/briefing_2.cfm).

Kang, A. and Diaz, R. (2000), Bus rapid transit: An integrated and flexible package of service. Paper presented at the *APTA 2000 Rail Transit Conference*, (http://www.apta.com/research/info/briefings/briefing_2.cfm).

Levinson, H., Zimmerman, S., Clinger, J., Rutherford, S., Smith, R., Cracknell, J., and Soberman, R. (2003a), *Bus rapid transit, Volume 1: Case studies in bus rapid transit*, TCRP Report 90. Washington: US TCRP.

Levinson, H., Zimmerman, S., Clinger, J., Gast, J., Rutherford, S., and Bruhn, E. (2003b), *Bus rapid transit, Volume 1: Implementation guidelines*, TCRP Report 90. Washington: US TCRP.

Shen, L. Elbadrawi, H., Zhao, F., and Ospina, D. (1998), *At-grade busway planning guide*. Florida: National Urban Transit Institute.

Transportation Research Laboratory (TRL) (1993), *Design guidelines for busway transit*, Overseas Road note 12. Workingham (UK): TRL.

US FTA (2004), *Bus rapid transit characteristics for decision-making*. Washington: USFTA.

Specific bus system issues

Gwilliam, K., Meakin, R. and Kumar, A. (2000), *Designing competition in urban bus passenger transport: Lessons from Uzbekistan*, World Bank Discussion Paper TWU-41. Washington: World Bank.

Hidalgo, D. and Yepes, T. (2005), Are bus rapid transit systems effective in poverty reduction? Experience of Bogotá's TransMilenio and lessons for other cities. Paper presented at the 2005 *Annual Meeting of the Transportation Research Board (TRB),* Washington, DC, US, January 2005.

Kittelson & Associates, Inc. assisted by KFH Group, Inc., Parsons Brinckerhoff Quade & Douglas, Inc., and Hunter-Zaworski, K (2003), *Transit capacity and quality of service manual*, TCRP report number 100. Washington: Transportation Research Board.

Lusk, A. (2001), Bus and bus stop designs related to perceptions of crime. Report number FTA MI-26-7004-2001.8, Washington: US FTA.

Menckhoff, G. and Zegras, C. (1999), *Experiences and issues in urban transport infrastructure*. Presented at the International Road Federation Symposium, Hanoi, Vietnam, (http://www.worldbank.org/transport/publicat/twu-38/twu-38.pdf)

Pardo, C. (2006), *Raising public awareness about sustainable urban transport*. Eschborn: GTZ, (http://www.sutp.org).

TAS Partnership Ltd. (2000), *Quality bus infrastructure: A manual and guide*. London: Landor Publishing.

Transportation Research Laboratory (TRL) (2004), *The demand for public transit: A practical guide*, Report TRL 593. Wokingham (UK): TRL.

US TCRP (1999), *The role of transit amenities and vehicle characteristics in building transit ridership*, TCRP Report 46. Washington: National Academy Press.

Modelling

Abdelghany, K., Abdelghany, A., Mahmassani, H., and Abdelfatah, A. (2006), Modeling bus priority using intermodal dynamic network assignment-simulation metholdogy. *Journal of Public Transportation*, vol. 9, no. 5.

Ortúzar, J. and Willumsen, L. (2002), *Modelling transport*. Chichester (UK): John Wiley & Sons Ltd.

BRT vehicles

Arrillaga, B., Wnuk, L. and Silver, F. (2004), *Bus rapid transit vehicle demand analysis update*, Report number FTA-CA-26-7044-2003.2. Washington: US FTA.

Hardy, M., Stevens, W., and Roberts, D. (2001), *Bus rapid transit vehicle characteristics*, USFTA report number FTA-DC-26-7075-2001.1. Washington: US FTA.

King, R. (1998), *New designs and operating experiences with low-floor Buses*. TCRP Report 41, Columbus.

US FTA (2006), *Vehicle catalog: A compendium of vehicles and powertrain systems for bus rapid transit service, 2006 update*. Washington: US FTA.

US FTA (2001), *Proceedings of the bus rapid transit vehicle design meeting*. Washington: Federal Transit Administration.

Zimmerman, S. and Levinson, H. (2004), Vehicle selection for BRT: Issues and options. *Journal of Public Transportation*, vol. 7, no. 1.

BRT – Regional

Baltes, M. and Hinbaugh, D. (2003), *Lynx LYMMO bus rapid transit evaluation*, Report number NCTR-392-15, RPWO-BC 137-17. Washington: US FTA.

Baltes, M., Perk, V., Perone, J., and Thole, C. (2003), *South Miami Dade busway system summary*. Tampa: National Bus Rapid Transit Institute, (http://www.nbrti.org).

Cain, A., Darido, G., Baltes, M., Rodriguez, P., and Barrios, J. (2006), *Applicability of Bogotá's TransMilenio BRT system to the United States*. Tampa: National Bus Rapid Transit Institute (NBRTI), (http://www.nbrti.org).

Currie, G. (2006), Bus rapid transit in Australasia: Performance, lessons learned and futures. *Journal of Public Transportation*, vol. 9, no. 3.

Darido, G. (2006), *Bus rapid transit developments in China*, Report number FTA-FL-26-7104.02, Washington: US FTA.

Friberg, L. (2000), Innovative solutions for public transport: Curitiba. *Sustainable Development International*, 3: 153-157.

Gardner, G., Cornwell, P., and Cracknell, J. (1991), *The performance of busway transit in developing cities*, research report no. RR329. Crowthorne: TRL.

Golub, A. (2003), Brazil's buses: Simply successful. *Access*, Spring 2004, no. 24, pp. 2-9.

Hidalgo, D., Custodio, P., and Graftieaux, P. (2007), Planning, implementation and operation or BRT systems: The cases of Quito, Bogotá, León, México City, Jakarta, and Beijing. Paper presented at the 2007 *Annual Meeting of the Transportation Research Board (TRB),* Washington, US, January 2007.

Hidalgo, D. and Hermann, G. (2004), *The Bogotá model for sustainable transportation: Inspiring developing cities throughout the world*. Trialog, Germany, August 2004.

Hidalgo, D. (2003), TransMilenio: A high capacity - low cost bus rapid transit system developed for Bogotá, Colombia. Presented at *55th UITP World Congress*, Madrid, 4-9 May 2003.

Hidalgo, D. (2002), Bogotá and Its transportation characteristics. Paper presented at the *Second International Conference on Urban Transportation Systems: Ensuring Sustainability through Mass Transit*, 14-18 April, 2002, Alexandria, VA, US.

Hidalgo, D. (2002), A high capacity – low cost bus rapid transit system developed for Bogotá, Colombia. Paper presented at the *CODATU X Conference*, 12-15 November, 2002, Rotterdam, The Netherlands.

ITDP (Institute for Transportation and Development Policy) (2005), *Making Transjakarta a world class BRT system: Final recommendations*. New York: ITDP.

Kenworthy, J. and Laube, F. (2000), *Millennium cities database for sustainable transport*. Brussels: UITP.

Kim, E., Darido, G., and Schneck, D. (2005), Las Vegas Metropolitan Area Express (MAX) BRT demonstration project evaluation, Report number FTA VA-26-7222-2005.1.

Lobo, A. (2006), *BRT options and results after six months: Applicability anywhere else in Mexico*. Mexico City: Centro de Transporte Sustentable.

Major, M. (1997), Brazil's busways. *Journal of Mass Transit*, Vol. 23, no. 3, pp. 26-34.

Meirelles, A. (2000), *A review of bus priority systems in Brazil: From bus lanes to busway transit*. Presented at the Smart Urban Transport Conference, 17-20 October, 2000, Brisbane, Australia.

Menckhoff, G. (2005), Latin American experience with bus rapid transit. Paper presented at the *2005 Annual Meeting of the Institute of Traffic Engineers*, Melbourne, Victoria, Australia, 7-10 August, 2005.

Robelo, J. (2003), *Basic busway data in Latin America*, Washington: World Bank. (http://www.worldbank.org/transport/urbtrans/pubtrans.htm).

Schimek, P., Darido, G., and Schneck, D. (2005), *Boston silver line Washington Street BRT demonstration project evaluation*, project number FTA-VA-26-7222-2005.2. Washington: US FTA, (http://www.nbrti.org).

Seoul Development Institute (SDI) (2005), *Toward better public transport: Experiences and achievements of Seoul*. Seoul: SDI.

Smith, N. and Hensher, D. (1998), The future of exclusive busways: The Brazilian experience. *Transport Reviews*, 18: 131-152.

Steer Davies Gleave (SDG) (2000), *Diseño operacional del sistema TransMilenio: Proyecto de transporte urbano para Santa Fe de Bogotá*, BIRF 4021-FONDATT-10. SDG: Bogotá.

TransMilenio (2003), *TransMilenio: La joya de Bogotá*. Bogotá: Alcaldía Mayor de Bogotá.

TransMilenio (2003), *Plan marco sistema: TransMilenio*. Bogotá: TransMilenio SA.

Wright, L. (2001), Latin American busways: Moving people rather than cars. *Natural Resources Forum*, May 2001.

BRT – Business and institutional model

Ardila-Gomez, A. (2004), *Transit planning in Bogota and Curitiba: Roles in interaction, risk, and change*. PhD thesis in Urban and Transportation Planning at the Massachusetts Institute of Technology (MIT). Boston: MIT.

Meakin, R. (2002a), *Bus regulation and planning*. Eschborn: GTZ.

Meakin, R. (2002b), *Urban transport institutions*. Eschborn: GTZ.

Meakin, R. (2001), *Technical guidelines on bus route tendering*. Eschborn: GTZ.

Fare systems and ITS

Lobron, R. (2003), *Developing a recommended standard for automated fare collection for transit*, TCRP Research Results Digest 57. Washington: US TCRP.

Multisystems, Inc. in association with Mundle & Associates, Inc. and Simon & Simon Research and Associates, Inc. (2003), *Fare policies, structures, and technologies update*, TCRP Report 94. Washingto: Transportation Research Board.

Smith, H., Hemily, B., and Ivanovic, M. (2005), *Transit signal priority: A planning and implementation handbook*. Washington: ITS America.

Stern, R. (1997), *Bus transit fare collection practices*, TCRP Synthesis of Transit Practice 26. Washington: Transportation Research Board.

Robelo, J. (1999), *Automated ticketing systems: The state of the art and case studies*. Washington: World Bank. (http://www.worldbank.org/transport/urbtrans/pubtrans.htm)

Schweiger, C. (2003), *Real time bus arrival information systems*, TCRP Synthesis 48. Washington: US TCRP.

UITP (International Association of Public Transport) (2005), *Towards an integrated travel information system*. Brussels: UITP.

US FTA (2001), *Proceedings of the FTA / PRHTA bus rapid transit fare collection workshop*. Washington: Federal Transit Administration.

US TCRP (2002), *A toolkit for self-service, barrier-free fare collection*, TCRP Report 80. Washington: National Academy Press.

Transit-Oriented Development

CALTRANS, *California transit-oriented development (TOD) searchable database* (2004), Sacramento: California Department of Transportation. (http://transitorienteddevelopment.dot.ca.gov).

Cervero, R., Murphy, S., Ferrell, C., Goguts, C., Tsai, Y., Arrington, G., Boroski, J., Smith-Heimer, J., Golem, R., Peninger, P., Nakajima, E., Chui, E., Dunphy, R., Myers, M., McKay, S., and Witeenstein, N. (2004), *Transit-oriented development in the United States: Experiences, challenges, and prospects*, TCRP report number 102. Washington: US TCRP.

Currie, G. (2006), Bus transit oriented development: Strengths and challenges relative to rail. *Journal of Public Transportation*, Vol. 9, No. 4.

Dittmar, H. and Ohland, G. (2004), *The new transit town: Best practices in transit-oriented development*. Washington: Island Press.

Marya Morris (ed) (1996), *Creating transit-supportive land-use regulations*, Planning Advisory Service Report No. 468, Washington: American Planning Association.

Munoz-Raskin, R. (2006), *Walking accessibility to Bus Rapid Transit: Does it affect property prices, The case of Bogotá, Colombia*. A Master's thesis presented to the Faculty of Architecture and Planning, Columbia University, New York.

Rodriguez, D. and Targa, F., 2004, The value of accessibility to Bogotá's bus rapid transit system. *Transport Reviews*, 24(5).

Smith, J. and Gihring, T. (2004), *Financing transit systems through value capture: An annotated bibliography*. Victoria: Victoria Transport Policy Institute.

US TCRP (1997), *The role of transit in creating livable metropolitan communities*, TCRP Report 22. Washington: National Academy Press.

Pedestrian and bicycle access

Gehl, J. and Gemzøe, L. (1996), *Public spaces—public life*. Copenhagen: The Danish Architectural Press.

Gehl, J. (1987), *Life between buildings: Using public space*. New York: Van Nostrand Reinhold.

Hook, W. (2005), *Non-motorised transport*. Eschborn: GTZ, (http://www.sutp.org).

Hook, W. (2004), *Preserving and expanding the role of NMT*. Eschborn: GTZ, http://www.sutp.org.

King, M. and Wright, L. (2005), Safe routes to transit in developing cities. Paper presented at the *Walk21 Conference*, Zurich, Switzerland, September 2005.

Rickert, T. (2006), *BRT accessibility guidelines*. Washington: World Bank, (http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTDISABILITY/0,,contentMDK:20192134~menuPK:414202~pagePK:148956~piPK:216618~theSitePK:282699,00.html).

Schneider, R. (2005), *Integration of bicycles and transit*, TCRP synthesis report number 62. Washington: US TCRP.

Environment and energy

EA/SMP (International Energy Agency / Sustainable Mobility Programme of the World Business Council for Sustainable Development) (2004), *The IEA/SMP transportation model*, (http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=MTE0Njc)

International Energy Agency (IEA) (2002), *Bus systems for the future: Achieving sustainable transport worldwide*. Paris: IEA.

Schipper, L. (2006), Transforming transportation: Cleaning up the buses in Mexico City. Paper presented in *2006 TRB Annual Meeting*, Washington DC, January 2006.

Shapiro, H. (2002), *Conserving Energy and Preserving the Environment: The Role of Public Transportation*. Washington: APTA.

Vasconcellos, E. (2001), *Urban transport, environment and equity: The case for developing countries*. London: Earthscan.

Whitelegg, J. (1997), *Critical mass: Transport, environment and society in the twenty-first century*. London: Pluto Press.

Wright, L. and Fulton, L. (2005), *Climate change mitigation and transport in developing nations*, Transport Reviews, vol. 25, no. 6, pp. 691-717.

Evaluation

Litman, T. (2004), *Evaluating public transit benefits and costs*. Victoria: Victoria Transport Policy Institute.

Ryus, P., Connor, M., Corbett, S., Rodenstein, A., Wargelin, L., Ferreira, L., Nakanishi, Y., and Blume, K. (2003), *A guidebook for developing a transit performance-measurement system*, TCRP Report 88. Washington: Transportation Research Board.

Schwenk, J (2002), *Evaluation guidelines for bus rapid transit demonstration projects*, report number DOT-VNTSC-FTA-02-02, DOT-MA-26-7033-02.1. Cambridge: Volpe National Transportation Systems Center.

US TCRP (2002), *Estimating the benefits and costs of public transit projects: A guidebook for practitioners*, TCRP Report 78. Washington: National Academy Press.

BRT city websites

Adelaide, Australia
http://www.adelaidemetro.com.au/guides/obahn.htm

Alameda and Contra Counties (AC Transit), US
http://www.actransit.org/planning_focus/planning_focus.wu?category_id=1

http://www.actransit.org/planning_focus/details.wu?item_id=30

Amsterdam, Netherlands
http://www.roa.nl/live/index.jsp?nav=423&loc=7502&det=4055

Auckland, New Zealand
http://www.busway.co.nz

Bogotá, Colombia
http://www.transmilenio.gov.co

Boston, US
http://www.mbta.com/about_the_mbta/t_projects/?id=1072

Bradford, UK
http://www.firstgroup.com/ukbus/yorkhumber/bradford/guidedbusway/index.php

Brisbane, Australia
http://www.translink.com.au/qt/translin.nsf/index/busway_main

Caen, France
http://www.twisto.fr

Calgary, Canada
http://www.calgarytransit.com/BRT/brt.html

Cali, Colombia
http://www.metrocali.gov.co/mio_index.htm

Cartagena, Colombia
http://www.transcaribe.gov.co/transcaribe_interfaz/menu.asp

Charlotte, US
http://www.charmeck.org/Departments/CATS/Rapid+Transit+Planning/Home.htm

Cleveland, US
http://euclidtransit.org/home.asp

Crawley, UK
http://www.westsussex.gov.uk/ccm/navigation/roads-and-transport/public-transport/fastway/

Curitiba, Brazil
http://www.curitiba.pr.gov.br

Douai, France
http://www.transportsdudouaisis.fr

Eugene, US
http://www.ltd.org

Evry, France
http://www.bus-tice.com

Guangzhou, China
http://www.gzbrt.org

Guatemala City, Guatemala
http://transmetro.muniguate.com

Guayaquil, Ecuador
http://www.metrovia-gye.com/start.htm

Hartford, US
http://www.ctbusway.com

Honolulu, US
http://www.oahutrans2k.com/corridor/corridor.htm#

Jakarta, Indonesia
http://www.jakarta.go.id/transjakarta/home/index.php

Kent, UK
http://www.go-fastrack.co.uk

Leeds, UK
http://www.leeds.gov.uk/Transport_and_streets/Public_transport/page.aspx?pageID=B87A58A52B06F5EE80256E1400521B09

León, Mexico
http://correo.leon.gob.mx/admon03_06/transporte/sitioweb/

Long Island, US (New York)
http://www.litp2000.com

Los Angeles, US
http://www.metro.net/projects_programs/orangeline/images/ol_interactive.htm

Mexico City, Mexico
http://www.metrobus.df.gob.mx/

Miami, US
http://www.co.miami-dade.fl.us/transit/metrobus.asp

Nancy, France
http://www.reseau-stan.com

Nantes, France
http://www.tan.fr

New York City, US
http://www.mta.info/mta/planning/brt

Nice, France
http://www.lignedazur.com

Orlando, US
http://www.golynx.com

Ottawa, Canada
http://www.octranspo.com/Main_MenuE.asp

Paris, France
http://www.v2asp.paris.fr/v2/Deplacements/mobilien/default.asp

Pereira
http://www.megabus.gov.co/megabus.html

Phoenix, US
http://www.ci.phoenix.az.us/PUBLICTRANSIT/rapid.html

Pittsburgh, US
http://www.portauthority.org/PAAC/CustomerInfo/BuswaysandT/tabid/111/Default.aspx

Quito, Ecuador
http://www.quito.gov.ec/DMT/dmt_inicio.htm

Rouen, France
http://www.tcar.fr/presentation/index.asp?rub_code=52

San Francisco, US
http://www.sfcta.org/geary.htm
http://www.sfcta.org/vanness

Santa Clara, US
http://www.vta.org/projects/line22brt.html

Santiago, Chile
http://www.transantiagoinforma.cl

São Paulo, Brazil
http://www.prefeitura.sp.gov.br/servicos/cidadaos/transito_e_transporte/onibus/index.php

Sydney, Australia
http://www.t-way.nsw.gov.au

Vancouver, Canada
http://www.translink.bc.ca

West Sussex, UK
http://www.fastway.info/home.htm

York, Canada
http://www.vivayork.com

Annex 1
BRT system comparisons

The information provided in this comparison matrix of different BRT systems has been collected from a variety of sources, including the transport authorities of the particular cities. The authors of this Planning Guide thus cannot ascertain the veracity of the information provided. System characteristics also change with time as cities extend and improve services. The data presented here is based on information received in early 2007. A copy of the most recently updated comparison matrix can be found at: http://www.itdp.org/programs/BRT.

Qualitative comparisons

Colombia

✓ – Yes   x – No   P – Partial   I – Insufficient network to make a conclusion   NA – Not applicable

BRT Feature	Bogotá (TransMilenio)	Pereira (Megabus)
Segregated busways or bus-only roadways	✓	✓
Existence of an integrated “network” of routes and corridors	✓	I
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	✓
Special stations and terminals to facilitate transfers	✓	✓
Overtaking lanes at stations / Provision of express services	✓	x
Improvements to nearby public space	✓	✓
High average commercial speeds (> 20 km/h)	✓	✓
Actual peak ridership over 8,000 passengers per hour per direction	✓	x
Pre-board fare collection and fare verification	✓	✓
At-level boarding and alighting	✓	✓
Fare- and physical-integration between routes and feeder services	✓	✓
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓
Competitively-bid and transparent contracts and concessions	✓	✓
No need for operational subsidies	✓	✓
Independently operated and managed fare collection system	✓	✓
Quality control oversight from an independent entity / agency	✓	✓
Low-emission vehicle technology (Euro III or higher)	P	x
Automated fare collection and fare verification system	✓	✓
System management through centralised control centre, utilising automatic vehicle location system	✓	✓
Signal priority or grade separation at intersections	P	x
Distinctive marketing identity for system	✓	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	x
Supporting car-restriction measures (*e.g.,* road pricing)	✓	x

1. Bogotá data courtesy of TransMilenio SA
2. Pereira data from Monica Venegas, Megabus System Manger, 2nd TransMilenio International Conference, 8 Nov 2006

Qualitative comparisons

Brazil

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Curitiba (Rede Integrada)	Goiânia (METROBUS)	Porto Alegre (EPTC)	São Paulo (Inteligado)
Segregated busways or bus-only roadways	✓	✓	P	P
Existence of an integrated “network” of routes and corridors	✓	✓	x	✓
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	✓	P	P
Special stations and terminals to facilitate transfers	✓	✓	x	P
Overtaking lanes at stations / Provision of express services	x	x	x	P
Improvements to nearby public space	P	x	x	x
High average commercial speeds (> 20 km/h)	✓	x	x	P
Actual peak ridership over 8,000 passengers per hour per direction	✓	✓	✓	✓
Pre-board fare collection and fare verification	✓	✓	x	x
At-level boarding and alighting	✓	✓	P	x
Fare- and physical-integration between routes and feeder services	✓	✓	✓	✓
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓	✓
Competitively-bid and transparent contracts and concessions	x	P	x	✓
No need for operational subsidies	✓	P	✓	x
Independently operated and managed fare collection system	✓	✓	✓	✓
Quality control oversight from an independent entity / agency	✓	P	✓	x
Low-emission vehicle technology (Euro III or higher)	x	x	P	P
Automated fare collection and fare verification system	P	✓	x	✓
System management through centralised control centre, utilising automatic vehicle location system	x	x	x	P
Signal priority or grade separation at intersections	x	x	x	x
Distinctive marketing identity for system	✓	✓	x	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	x	P
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	x	x	x
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x	✓

1. Brazil data courtesy of Eric Ferreira (ITDP) and Wagner Colombini (Logit)

Qualitative comparisons

Ecuador

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Guayaquil (Metrovía)	Quito (Trolé)	Quito (Ecovía)	Quito (Central Norte)
Segregated busways or bus-only roadways	✓	✓	✓	P
Existence of an integrated "network" of routes and corridors	I	P	P	X
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	✓	✓	✓
Special stations and terminals to facilitate transfers	✓	✓	✓	✓
Overtaking lanes at stations / Provision of express services	x	x	x	P
Improvements to nearby public space	✓	✓	x	X
High average commercial speeds (> 20 km/h)	✓	x	✓	✓
Actual peak ridership over 8,000 passengers per hour per direction	✓	✓	✓	✓
Pre-board fare collection and fare verification	✓	✓	✓	✓
At-level boarding and alighting	✓	✓	✓	✓
Fare- and physical-integration between routes and feeder services	✓	✓	✓	P
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓	✓
Competitively-bid and transparent contracts and concessions	✓	x	x	P
No need for operational subsidies	✓	P	✓	✓
Independently operated and managed fare collection system	✓	x	x	X
Quality control oversight from an independent entity / agency	✓	P	P	P
Low-emission vehicle technology (Euro III or higher)	✓	✓	x	P
Automated fare collection and fare verification system	✓	✓	✓	X
System management through centralised control centre, utilising automatic vehicle location system	✓	x	x	X
Signal priority or grade separation at intersections	x	P	x	✓
Distinctive marketing identity for system	✓	✓	✓	P
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	✓	P
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	x	x	x	X
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x	X

1. Guayaquil data courtesy of César Arias.
2. Quito data courtesy of the Metropolitan Municipality of Quito and Hidalgo et al., 2007

Qualitative comparisons

Chile and Mexico

✓ – Yes   x – No   P – Partial   I – Insufficient network to make a conclusion   NA – Not applicable

BRT Feature	Santiago (Transantiago)	León (Optibus SIT)	Mexico City (Metrobús)
Segregated busways or bus-only roadways	P	✓	✓
Existence of an integrated "network" of routes and corridors	✓	✓	x
Enhanced station environment (*i.e.,* not just a bus shelter)	P	✓	✓
Special stations and terminals to facilitate transfers	✓	✓	x
Overtaking lanes at stations / Provision of express services	P	x	x
Improvements to nearby public space	P	x	x
High average commercial speeds (> 20 km/h)	P	✓	x
Actual peak ridership over 8,000 passengers per hour per direction	P	✓	x
Pre-board fare collection and fare verification	X	✓	✓
At-level boarding and alighting	x	✓	✓
Fare- and physical-integration between routes and feeder services	✓	P	x
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓
Competitively-bid and transparent contracts and concessions	✓	x	x
No need for operational subsidies	✓	✓	P
Independently operated and managed fare collection system	✓	✓	✓
Quality control oversight from an independent entity / agency	x	P	✓
Low-emission vehicle technology (Euro III or higher)	✓	✓	✓
Automated fare collection and fare verification system	✓	✓	✓
System management through centralised control centre, utilising automatic vehicle location system	x	P	✓
Signal priority or grade separation at intersections	x	x	x
Distinctive marketing identity for system	✓	✓	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	✓
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	x	x	x
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x

1. Santiago data courtesy of Eduardo Giesen.
2. León and Mexico City data courtesy of Bernardo Baranda (ITDP)

Qualitative comparisons

China

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Beijing	Hangzhou	Kunming
Segregated busways or bus-only roadways	P	P	✓
Existence of an integrated "network" of routes and corridors	I	I	✓
Enhanced station environment (*i.e.,* not just a bus shelter)	P	✓	P
Special stations and terminals to facilitate transfers	x	x	NA
Overtaking lanes at stations / Provision of express services	P	x	x
Improvements to nearby public space	✓	✓	x
High average commercial speeds (> 20 km/h)	✓	✓	x
Actual peak ridership over 8,000 passengers per hour per direction	x	x	✓
Pre-board fare collection and fare verification	✓	✓	x
At-level boarding and alighting	P	P	x
Fare- and physical-integration between routes and feeder services	x	P	NA
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	P	x	x
Competitively-bid and transparent contracts and concessions	x	x	P
No need for operational subsidies	x	x	✓
Independently operated and managed fare collection system	✓	x	x
Quality control oversight from an independent entity / agency	P	P	P
Low-emission vehicle technology (Euro III or higher)	✓	✓	x
Automated fare collection and fare verification system	✓	✓	x
System management through centralised control centre, utilising automatic vehicle location system	✓	x	P
Signal priority or grade separation at intersections	x	x	P
Distinctive marketing identity for system	x	✓	x
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	x
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	P	P
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	P

1. Beijing data courtesy of Kangming Xu
2. Kunming data courtesy of Lin Wei (Municipality of Kunming)

Qualitative comparisons

Indonesia, Japan, South Korea, and Taiwan

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Jakarta (TransJakarta)	Nagoya (Yurikamome line)	Taipei	Seoul
Segregated busways or bus-only roadways	✓	✓	✓	P
Existence of an integrated "network" of routes and corridors	x	P	✓	✓
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	✓	P	x
Special stations and terminals to facilitate transfers	x	P	x	x
Overtaking lanes at stations / Provision of express services	x	x	P	x
Improvements to nearby public space	x	x	x	✓
High average commercial speeds (> 20 km/h)	✓	✓	✓	x
Actual peak ridership over 8,000 passengers per hour per direction	✓	x	✓	✓
Pre-board fare collection and fare verification	✓	x	x	x
At-level boarding and alighting	✓	x	x	x
Fare- and physical-integration between routes and feeder services	I	x	✓	✓
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	x	P
Competitively-bid and transparent contracts and concessions	x	x	x	
No need for operational subsidies	x	x	✓	x
Independently operated and managed fare collection system	✓	x	x	✓
Quality control oversight from an independent entity / agency	P	x	P	✓
Low-emission vehicle technology (Euro III or higher)	x	x	✓	✓
Automated fare collection and fare verification system	✓	x	✓	✓
System management through centralised control centre, utilising automatic vehicle location system	x	x	✓	✓
Signal priority or grade separation at intersections	x	✓	x	x
Distinctive marketing identity for system	✓	x	x	x
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	P	P
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	x	✓	P	P
Supporting car-restriction measures (*e.g.,* road pricing)	P	x	x	x

1. Jakarta data courtesy of ITDP
2. Nagoya data courtesy of Hiroyuki Takeshita (Nagoya University)
3. Seoul data courtesy of the Municipality of Seoul
4. Taipei data courtesy of Dr. Jason Chang (Taiwan National University)

Qualitative comparisons

Australia

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Adelaide (O-Bahn)	Brisbane (SE Busway)	Sydney (Liverpool - Parmatta)
Segregated busways or bus-only roadways	✓	✓	✓
Existence of an integrated “network” of routes and corridors	✓	✓	x
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	✓	✓
Special stations and terminals to facilitate transfers	✓	✓	✓
Overtaking lanes at stations / Provision of express services	✓	P	✓
Improvements to nearby public space	✓	✓	P
High average commercial speeds (> 20 km/h)	✓	✓	✓
Actual peak ridership over 8,000 passengers per hour per direction	x	✓	x
Pre-board fare collection and fare verification	x	P	x
At-level boarding and alighting	x	x	x
Fare- and physical-integration between routes and feeder services	✓	✓	P
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓
Competitively-bid and transparent contracts and concessions	P	P	P
No need for operational subsidies	x	x	x
Independently operated and managed fare collection system	x	x	x
Quality control oversight from an independent entity / agency	✓	✓	✓
Low-emission vehicle technology (Euro III or higher)	P	P	P
Automated fare collection and fare verification system	P	x	P
System management through centralised control centre, utilising automatic vehicle location system	P	P	✓
Signal priority or grade separation at intersections	✓	✓	✓
Distinctive marketing identity for system	✓	✓	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	✓
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	✓	✓	✓
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x

1. Australia data courtesy of Richard Filewood (McCormick Rankin Cagney)

Qualitative comparisons

France

✓ – Yes   x – No   P – Partial   I – Insufficient network to make a conclusion   NA – Not applicable

BRT Feature	Caen (Twisto TVR)	Lyon (C-lines)	Nantes (Busway -Line 4)
Segregated busways or bus-only roadways	✓	P	✓
Existence of an integrated “network” of routes and corridors	x	x	x
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	P	✓
Special stations and terminals to facilitate transfers	✓	✓	✓
Overtaking lanes at stations / Provision of express services	x	x	x
Improvements to nearby public space	✓	x	✓
High average commercial speeds (> 20 km/h)	x	x	x
Actual peak ridership over 8,000 passengers per hour per direction	x	x	x
Pre-board fare collection and fare verification	✓	x	✓
At-level boarding and alighting	✓	x	✓
Fare- and physical-integration between routes and feeder services	✓	✓	✓
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓
Competitively-bid and transparent contracts and concessions	✓	✓	x
No need for operational subsidies	x	x	x
Independently operated and managed fare collection system	x	x	x
Quality control oversight from an independent entity / agency	✓	✓	✓
Low-emission vehicle technology (Euro III or higher)	✓	✓	✓
Automated fare collection and fare verification system	✓	✓	x
System management through centralised control centre, utilising automatic vehicle location system	✓	✓	✓
Signal priority or grade separation at intersections	✓	✓	✓
Distinctive marketing identity for system	✓	✓	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	✓
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	P	✓
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x

1. Caen, Lyon, and Nantes data courtesy of François Rambaud (CERTU)

Qualitative comparisons

France continued

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Paris (RN305, Mobilien, Val de Marne)	Rouen (TEOR)	Toulouse
Segregated busways or bus-only roadways	✓	✓	P
Existence of an integrated "network" of routes and corridors	x	x	x
Enhanced station environment (*i.e.,* not just a bus shelter)	P	P	P
Special stations and terminals to facilitate transfers	P	✓	P
Overtaking lanes at stations / Provision of express services	x	x	x
Improvements to nearby public space	x	✓	P
High average commercial speeds (> 20 km/h)	✓	✓	x
Actual peak ridership over 8,000 passengers per hour per direction	x	x	x
Pre-board fare collection and fare verification	P	P	x
At-level boarding and alighting	x	✓	x
Fare- and physical-integration between routes and feeder services	✓	✓	✓
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓
Competitively-bid and transparent contracts and concessions	x	✓	✓
No need for operational subsidies	x	x	x
Independently operated and managed fare collection system	x	x	x
Quality control oversight from an independent entity / agency	✓	✓	✓
Low-emission vehicle technology (Euro III or higher)	✓	P	✓
Automated fare collection and fare verification system	x	x	x
System management through centralised control centre, utilising automatic vehicle location system	✓	✓	✓
Signal priority or grade separation at intersections	✓	✓	✓
Distinctive marketing identity for system	P	✓	x
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	P	✓	P
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	P	P
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x

1. Rouen data courtesy of Werner Kutil (Veolia Transport)
2, Paris and Toulouse data courtesy of François Rambaud (CERTU)

Qualitative comparisons

Netherlands

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Amsterdam (Zuidtangent)	Eindhoven
Segregated busways or bus-only roadways	✓	✓
Existence of an integrated "network" of routes and corridors	x	P
Enhanced station environment (*i.e.,* not just a bus shelter)	✓	✓
Special stations and terminals to facilitate transfers	x	✓
Overtaking lanes at stations / Provision of express services	x	x
Improvements to nearby public space	x	✓
High average commercial speeds (> 20 km/h)	✓	✓
Actual peak ridership over 8,000 passengers per hour per direction	x	x
Pre-board fare collection and fare verification	x	P
At-level boarding and alighting	✓	✓
Fare- and physical-integration between routes and feeder services	✓	x
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓
Competitively-bid and transparent contracts and concessions	✓	x
No need for operational subsidies	x	x
Independently operated and managed fare collection system	x	✓
Quality control oversight from an independent entity / agency	✓	
Low-emission vehicle technology (Euro III or higher)	✓	✓
Automated fare collection and fare verification system	✓ (from 1-1-2008)	x
System management through centralised control centre, utilising automatic vehicle location system	✓	✓
Signal priority or grade separation at intersections	✓	✓
Distinctive marketing identity for system	✓	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	✓	✓
Supporting car-restriction measures (*e.g.,* road pricing)	x	x

1. Amsterdam data courtesy of Ruud van der Ploeg (Stadsregio Amsterdam)
2. Eindhoven data courtesy of Jacques Splint (Municipality of Eindhoven)

Qualitative comparisons

United Kingdom

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Bradford (Quality Bus)	Crawley (Fastway)	Edinburgh (Fastlink)	Leeds (Superbus, Elite)
Segregated busways or bus-only roadways	P	✓	✓	P
Existence of an integrated "network" of routes and corridors	P	✓	P	P
Enhanced station environment (*i.e.,* not just a bus shelter)	P	✓	P	P
Special stations and terminals to facilitate transfers	I	P	P	I
Overtaking lanes at stations / Provision of express services	x	x	x	x
Improvements to nearby public space	x	P	P	x
High average commercial speeds (> 20 km/h)	x	P	P	x
Actual peak ridership over 8,000 passengers per hour per direction	x	x	x	x
Pre-board fare collection and fare verification	x	x	x	x
At-level boarding and alighting	P	P	P	P
Fare- and physical-integration between routes and feeder services	P	✓	P	P
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	I	✓	I	I
Competitively-bid and transparent contracts and concessions	x	✓	I	x
No need for operational subsidies	P	✓	✓	P
Independently operated and managed fare collection system	x	x	x	x
Quality control oversight from an independent entity / agency	x	x	x	x
Low-emission vehicle technology (Euro III or higher)	I	✓	✓	I
Automated fare collection and fare verification system	x	x	x	x
System management through centralised control centre, utilising automatic vehicle location system	x	✓	P	x
Signal priority or grade separation at intersections	P	✓	P	P
Distinctive marketing identity for system	x	✓	P	x
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	P	✓	P	P
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	I	✓	P	I
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x	x

1. UK data courtesy of Dr. Alan Brett (BRT-UK)

Qualitative comparisons

Canada and United States

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Ottawa (Transitway)	Boston (Silver Line Waterfront)	Eugene (EmX)	Los Angeles (Orange line)
Segregated busways or bus-only roadways	✓	✓	✓	P
Existence of an integrated “network” of routes and corridors	✓	✓	✓	✓
Enhanced station environment (*i.e.,* not just a bus shelter)	x	P	✓	P
Special stations and terminals to facilitate transfers	x	✓	✓	P
Overtaking lanes at stations / Provision of express services	x	x	x	x
Improvements to nearby public space	x	✓	✓	✓
High average commercial speeds (> 20 km/h)	✓	✓	✓	✓
Actual peak ridership over 8,000 passengers per hour per direction	x	x	x	x
Pre-board fare collection and fare verification	x	x	NA (free fare)	x
At-level boarding and alighting	x	x	✓	x
Fare- and physical-integration between routes and feeder services	P	x	✓	✓
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	✓	✓	x
Competitively-bid and transparent contracts and concessions	✓	x	x	x
No need for operational subsidies	x	x	x	x
Independently operated and managed fare collection system	x	x	NA (free fare)	x
Quality control oversight from an independent entity / agency	✓	✓	x	x
Low-emission vehicle technology (Euro III or higher)	x	✓	✓	✓
Automated fare collection and fare verification system	P	P	NA (free fare)	✓
System management through centralised control centre, utilising automatic vehicle location system	x	✓	✓	✓
Signal priority or grade separation at intersections	x	✓	✓	✓
Distinctive marketing identity for system	✓	✓	✓	✓
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	✓	✓	✓	✓
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	x	✓	x
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x	x

1. Ottawa data based on Metro Magazine (2006) and OCTransit website
2. Eugene data courtesy of Graham Carey, Lane Transit District
3. Boston data based on Schimek et al. (2005) and MBTA website
4. Los Angeles data courtesy of Gary Spivack, Los Angeles County Metropolitan Transportation Authority

Qualitative comparisons

Canada and United States

✓ – Yes x – No P – Partial I – Insufficient network to make a conclusion NA – Not applicable

BRT Feature	Miami (South Miami-Dade Buswway)	Orlando (LYNX Lymmo)	Pittsburgh (South Busway)	Pittsburgh (MLK East Busway)	Pittsburgh (West Busway)
Segregated busways or bus-only roadways	✓	✓	✓	✓	✓
Existence of an integrated "network" of routes and corridors	x	x	✓	✓	✓
Enhanced station environment (*i.e.,* not just a bus shelter)	P	✓	P	✓	✓
Special stations and terminals to facilitate transfers	✓	x	P	✓	✓
Overtaking lanes at stations / Provision of express services	x	x	P	✓	✓
Improvements to nearby public space	x	✓	x	✓	P
High average commercial speeds (> 20 km/h)	✓	x	✓	✓	✓
Actual peak ridership over 8,000 passengers per hour per direction	x	x	x	x	x
Pre-board fare collection and fare verification	x	NA (free fare)	x	x	x
At-level boarding and alighting	x	x	x	P	P
Fare- and physical-integration between routes and feeder services	✓	x	P	P	P
Entry to system restricted to prescribed operators under a reformed business and administrative structure (closed system)	✓	P	✓	✓	✓
Competitively-bid and transparent contracts and concessions	✓	✓	P	P	P
No need for operational subsidies	x	x	x	x	x
Independently operated and managed fare collection system	x	NA (free fare)	x	x	x
Quality control oversight from an independent entity / agency	✓	✓	P	P	P
Low-emission vehicle technology (Euro III or higher)	x	✓	x	P	x
Automated fare collection and fare verification system	x	NA (free fare)	x	x	x
System management through centralised control centre, utilising automatic vehicle location system	x	x	x	x	x
Signal priority or grade separation at intersections	✓	✓	✓	✓	✓
Distinctive marketing identity for system	P	✓	x	P	P
High-quality customer information (*e.g.,* clear maps, signage, real-time information displays)	P	✓	P	P	P
Modal integration at stations (*e.g.,* bicycle parking, taxi stations, easy transfers between public transport systems)	P	x	P	✓	✓
Supporting car-restriction measures (*e.g.,* road pricing)	x	x	x	x	x

1. Miami data courtesy of the Miami Dade Bus Transit Services
2. Orlando data courtesy of Doug Jamison (Lynx Lymmo)
3. Pittsburgh data courtesy of David Wohlwill (Port Authority of Pittsburgh)

Quantitative comparisons

Colombia

BRT Feature	Bogotá (TransMilenio)	Pereira (Megabus)
Year system commenced	2000	2006
Number of existing trunk corridors	6	2
Total length of existing trunk corridors (km)	84 km	15 km
Number of trunk routes	84	3
Location of busway lanes	Centre lanes	Centre lanes
Location of doorways	Median side (left)	Median side (left)
Type of surface material on runways	Concrete	Concrete
Type of surface material on runways at stations	Concrete	Concrete
Total length of existing feeder routes (km)	212 km	Not available
Projected length of total future trunk corridors (km)	388 km	16.7 km
Number of stations	107	38
Average distance between stations (m)	500 m	395 m
Number of stations with passing lanes	Not available	0
Number of terminals	7	2
Number of depots	7	1
Number of total system passenger-trips per day	1,450,000	100,000
Actual peak ridership (passengers per hour per direction)	45,000	6,900
Actual non-peak ridership (passengers per hour per direction)	28,000	Not available
Average commercial speed (km/h)	27 km/h	20 km/h
Average peak headway (seconds or minutes)	3 min	3-5 min
Average non-peak headway (seconds or minutes)	5 min	5 min
Average dwell time at stations (seconds)	25 seconds	20 seconds
Number of trunk vehicles	1,013	51
Trunk vehicle type	Articulated	Articulated
Fuel type used in trunk vehicles	Diesel Euro II/III	Diesel Euro II
Trunk vehicle capacity	160	160
Trunk vehicle length (m)	18.5 m	18.5 m
Number of feeder vehicles	407	85
Type of guidance system, if applicable	None	None
Type of fare collection / verification technology	Smart card	Smart card
Number of intersections with priority signal control	0	0
Number of grade-separated intersections	3	0
Fare (US$)	US$0.58	US$0.48
Total planning costs (US$)	US$5.3 million	Not available
Average trunk vehicle costs (US$)	US$200,000	US$200,000
Total infrastructure costs (US$per km)	$5.3 mill/km (ph. I) $13.3 mill/km (ph. II)	US$1.7 million/km

1. Bogotá data courtesy of TransMilenio SA
2. Pereira data from Monica Venegas, Megabus System Manger, 2nd TransMilenio International Conference, 8 Nov 2006

Brazil

BRT Feature	Curitiba	Goiânia	São Paulo (Interligado)	Porto Alegre
Year system commenced	1972	1976	2003	1977
Number of existing trunk corridors	6	2	9	8
Total length of existing trunk corridors (km)	64.6 km	35 km	129.5 km	45.6 km
Number of trunk routes	12	1	> 40	> 40
Location of busway lanes	Curbside & centre	Centre lanes	Centre lanes	Centre lanes
Location of doorways	Curbside (right)	Median side (left)	Median & curbside	Curbside (right)
Type of surface material on runways	Asphalt	Asphalt	Asphalt	Asphalt
Type of surface material on runways at stations	Concrete	Concrete	Concrete	Asphalt
Total length of existing feeder routes (km)	Not available	Not available	Not applicable	Note applicable
Projected length of total future trunk corridors (km)	Not available	Not available	Not available	Not available
Number of stations	123	23	235	128
Average distance between stations (m)	540 m	560 m	500 m	550 m
Number of stations with passing lanes	0	0	43	0
Number of terminals	16	5	27	1
Number of depots	12	Not available	Not available	Not available
Number of total system passenger-trips per day	562,000	140,000	2,780,000	900,750
Actual peak ridership (passengers per hour per direction)	20,000	11,500	34,900	28,000
Actual non-peak ridership (passengers per hour per direction)	Not available	Not available	Not available	Not available
Average commercial speed (km/h)	19 km/h	18 km/h	22 km/h	15 km/h
Average peak headway (seconds or minutes)	2 minutes	40 seconds	30 seconds	30 seconds
Average non-peak headway (seconds or minutes)	6 minutes	2 minutes	45 seconds	2 minutes
Average dwell time at stations (seconds)	22 seconds	20 seconds	30 seconds	30 seconds
Number of trunk vehicles	232	87 articul./5 bi-artiuculat.	Not available	Not available
Trunk vehicle type	Bi-articulated	Articul./Bi-articulated	Articulated / Standard	Standard
Fuel type used in trunk vehicles	Euro III Diesel	Euro II/III Diesel	Diesel	Diesel
Trunk vehicle capacity	270	160 & 270	100	100
Trunk vehicle length (m)	24 m	18.5 m & 25 m	18.5 m	12 m
Number of feeder vehicles	Not available	Not available	Not applicable	Note applicable
Type of guidance system, if applicable	None	None	None	None
Type of fare collection / verification technology	Smart card	Smart C. & Magnetic Strip	Smart card	Smart card
Number of intersections with priority signal control	0	0	0	0
Number of grade-separated intersections	0	0	0	1
Fare (US$)	US$0.74	US$0.59	US$1.00	US$0.68
Total planning costs (US$)	US$380,000	Not available	Not available	Not available
Average trunk vehicle costs (US$)	US$395,000	US$220,000	Not available	Not available
Total infrastructure costs (US$per km)	US$1.1 – US$6 mill/km	US$1.3 mill/km	US$2 – US$22 mill/km	US$1.2 mill/km

1. Curitiba data courtesy of URBS
2. São Paulo data courtesy of SPTrans

Quantitative comparisons

Ecuador

BRT Feature	Guayaquil (Metrovía)	Quito (Trolé)	Quito (Ecovía)	Quito (Central Norte)
Year system commenced	2006	1995	2001	2004
Number of existing trunk corridors	1	2	1	1
Total length of existing trunk corridors (km)	15.5 km	16.2 km	9.4 km	12.8 km
Number of trunk routes	1	5	1	2
Location of busway lanes	Centre lanes	Centre lanes	Centre lanes	Centre lanes
Location of doorways	Median side (left)	Curbside (right)	Median side (left)	Curbside (right)
Type of surface material on runways	Concrete	Asphalt	Asphalt	Concrete
Type of surface material on runways at stations	Concrete	Concrete	Concrete	Concrete
Total length of existing feeder routes (km)	24 km	Not available	Not available	Not available
Projected length of total future trunk corridors (km)	44.1 km	Not available	Not available	Not available
Number of stations	34	34	19	16
Average distance between stations (m)	62 m	476 m	494 m	800 m
Number of stations with passing lanes	0	0	0	0
Number of terminals	2	2	2	1
Number of depots	2	1	1	1
Number of total system passenger-trips per day	100,000	246,000	81,000	120,000
Actual peak ridership (passengers per hour per direction)	5,400	9,600	6,400	6,400
Actual non-peak ridership (passengers per hour per direction)	3,700	2,900	1,680	1,680
Average commercial speed (km/h)	22 km/h	15 km/h	18 km/h	23 km/h
Average peak headway (seconds or minutes)	2.5 minutes	1 minute	2 min	2 min
Average non-peak headway (seconds or minutes)	5 minutes	3 minutes	5 min – 10 min	5 min
Average dwell time at stations (seconds)	20 seconds	20 seconds	20 seconds	30 seconds
Number of trunk vehicles	40 artic./10 stand.	113	42	74
Trunk vehicle type	Articulated/stand.	Electric trolley	Articulated	Articulated
Fuel type used in trunk vehicles	Diesel Euro III	Electricity	Diesel Euro II	Diesel Euro II / III
Trunk vehicle capacity	160	160	160	160
Trunk vehicle length (m)	18.5 m	18.5 m	18.5 m	18.5 m
Number of feeder vehicles	30	90	36	135
Type of guidance system, if applicable	None	None	None	None
Type of fare collection / verification technology	Smart cards	Coins / mag. Strip	Coins / mag. strip	Paper
Number of intersections with priority signal control	0	0	0	0
Number of grade-separated intersections	0	1	0	4
Fare (US$)	US$0.25	US$0.25	US$0.25	US$0.25
Total planning costs (US$)	US$1,300,000	US$400,000	US$500,000	Not available
Average trunk vehicle costs (US$)	US$240,000	US$650,000	US$167,000	US$180,000
Total infrastructure costs (US$per km)	US$1.4 million	US$5.1 million	US$585,000	US$1.4 million

1. Guayaquil data courtesy of César Arias.
2. Quito data courtesy of the Metropolitan Municipality of Quito and Hidalgo et al., 2007

Chile and Mexico

BRT Feature	Santiago (Transantiago)	León (Optibus)	Mexico City (Metrobús)
Year system commenced	2005-2007	2003	2005
Number of existing trunk corridors	2	3	1
Total length of existing trunk corridors (km)	Not available	26 (15 km exclusive)	20 km
Number of trunk routes	Various	3	3
Location of busway lanes	Centre lanes and curbside	Centre lanes	Centre lanes
Location of doorways	Curbside (right)	Median side (left)	Median side (left)
Type of surface material on runways	Asphalt	Concrete: 99% Asphalt: 1%	Asphalt
Type of surface material on runways at stations	Asphalt	Concrete: 92% Asphalt: 8%	Concrete
Total length of existing feeder routes (km)	Not applicable	140 km	0
Projected length of total future trunk corridors (km)	Not available	34 km	Not available
Number of stations	Not available	51	34
Average distance between stations (m)	Not available	400 m	450 m
Number of stations with passing lanes	Not available	0	0
Number of terminals	0	3	2
Number of depots	Not available	2	Not available
Number of total system passenger-trips per day	Not available	220,000	260,000
Actual peak ridership (passengers per hour per direction)	Not available	2,900	8,500
Actual non-peak ridership (passengers per hour per direction)	Not available	900	Not available
Average commercial speed (km/h)	20 km/h	18 km/h	19 km/h
Average peak headway (seconds or minutes)	3 minutes	T1: 2.5 min, T2/T3: 7 min	63 seconds
Average non-peak headway (seconds or minutes)	7 minutes	T1: 7 min, T2/T3: 12 min	Not available
Average dwell time at stations (seconds)	1 – 3 minutes	7 seconds	Not available
Number of trunk vehicles	Not available	55	97
Trunk vehicle type	Articulated & standard	Articulated	Articulated
Fuel type used in trunk vehicles	Diesel Euro II/III	Diesel	Diesel Euro III
Trunk vehicle capacity (passengers)	160	160	160
Trunk vehicle length (m)	18 m & 12 m	18.5 m	18.5 m
Number of feeder vehicles	Not applicable	Feeder serv: 350 Auxiliar serv: 150	0
Type of guidance system, if applicable	None	None	None
Type of fare collection / verification technology	Smart card	Smart card	Smart card
Number of intersections with priority signal control	0	0	0
Number of grade-separated intersections	0	0	0
Fare (US$)	US$0.70	US$0.50	US$0.35
Total planning costs (US$)	Not available	US$1.5 million	Not available
Average trunk vehicle costs (US$)	US$240,000	US$260,000	US$243,000
Total infrastructure costs (US$million per km)	Not available	US$1.0 mill. / km	US$1.5 mill. / km

1. Santiago data courtesy of Eduardo Giesen, 2. León data courtesy of Dr. Dario Hidalgo, Booz Allen Hamilton, 3. Mexico City data courtesy of Bernardo Baranda (ITDP) and Gerhard Menckhoff (World Bank consultant)

Quantitative comparisons

China

BRT Feature	Beijing	Hangzhou	Kunming
Year system commenced	2004	2006	1999
Number of existing trunk corridors	1	1	4
Total length of existing trunk corridors (km)	16 km (14 exclusive)	27.2 km	32.2 km
Number of trunk routes	1	2	Not available
Location of busway lanes	Centre lanes	Curb lanes	Centre lanes
Location of doorways	Median side (left)	Curbside (right)	Curbside (right)
Type of surface material on runways	Asphalt	Asphalt	Asphalt
Type of surface material on runways at stations	Asphalt	Asphalt	Asphalt
Total length of existing feeder routes (km)	0	0	Not applicable
Projected length of total future trunk corridors (km)	100 km	180 km	179 km
Number of stations	18	16	53
Average distance between stations (m)	940 m	1,800 m	500 m
Number of stations with passing lanes	7	0	4
Number of terminals	1	3	8
Number of depots	1	1	5
Number of total system passenger-trips per day	120,000	40,000	156,000
Actual peak ridership (passengers per hour per direction)	8,000	1,500	6,300
Actual non-peak ridership (passengers per hour per direction)	1,500	500	1,000
Average commercial speed (km/h)	22 km/h	24 km/h	18 km/h
Average peak headway (seconds or minutes)	1 minute	2 minutes	40 seconds
Average non-peak headway (seconds or minutes)	4 - 8 minutes	5 minutes	3 minutes
Average dwell time at stations (seconds)	20 seconds	18 seconds	34 seconds
Number of trunk vehicles	87	48	Not available
Trunk vehicle type	Articulated	Articulated	Standard
Fuel type used in trunk vehicles	Diesel Euro III, CNG	Diesel Euro III	Diesel Euro II
Trunk vehicle capacity	160	160	80
Trunk vehicle length (m)	18 m	18 m	12 m
Number of feeder vehicles	0	0	Not applicable
Type of guidance system, if utilised	None	None	None
Type of fare collection / verification technology	Smart card	Smart card	Smart card & coin
Number of intersections with priority signal control	3	3	0
Number of grade-separated intersections	3	0	5
Fare (US$)	US$0.26	US$0.40	US$0.12 – US$0.26
Total planning costs (US$)	US$765,000	US$255,000	US$60,000
Average trunk vehicle costs (US$)	US$250,000	US$250,000	US$250,000
Total infrastructure costs (US$per km)	US$4.68 million/km	US$450,000 / km	US$750,000 / km

1. Beijing data courtesy of Kangming Xu
2. Kunming data courtesy of Lin Wei (Municipality of Kunming)

Indonesia, Japan, South Korea, and Taiwan

BRT Feature	Jakarta (TransJakarta)	Nagoya	Seoul	Taipei
Year system commenced	2004	2001	2002	1998
Number of existing trunk corridors	3	1	6	11
Total length of existing trunk corridors (km)	46.9 km	6.8 km	86 km	60 km
Number of trunk routes	3	1	Various	Not available
Location of busway lanes	Centre lanes	Separated ROW	Centre & curbside	Centre lanes
Location of doorways	Median side (right)	Curbside (left)	Curbside (right)	Curside (right)
Type of surface material on runways	Asphalt	Concrete	Asphalt	Asphalt
Type of surface material on runways at stations	Concrete	Concrete	Asphalt	Concrete
Total length of existing feeder routes (km)	0	None	9,000	0
Projected length of total future trunk corridors (km)	97 km (2008)	11.9 km	192 km	90 km
Number of stations	54	9	73	150
Average distance between stations (m)	860 m	720 m	750 m	380 m
Number of stations with passing lanes	1	0	0	4
Number of terminals	4	5	Not available	Not available
Number of depots	3	3	40	10
Number of total system passenger-trips per day	140,000	9,000		1,200,000
Actual peak ridership (passengers per hour per direction)	3,600	Not available	12,000	9,500
Actual non-peak ridership (passengers per hour per direction)	1,000	Not available	5,000	3,500
Average commercial speed (km/h)	17 km/h	30 km/h	17 km/h	17 km/h (peak hour), 22 km/h (non-peak)
Average peak headway (seconds or minutes)	1.5 minutes	3-4 minutes	4-5 buses / minute	15–30 seconds
Average non-peak headway (seconds or minutes)	Not Available	10 minutes	3-4 buses / minute	1-2 minutes
Average dwell time at stations (seconds)	Not Available	Not available	10 sec – 20 sec	7-25 seconds
Number of trunk vehicles	Not Available	25	Not available	Not available
Trunk vehicle type	Standard	Standard	Standard	Standard
Fuel type used in trunk vehicles	I: Euro I diesel II&III: Euro III CNG	Diesel	CNG	Diesel
Trunk vehicle capacity	75	75	75	69
Trunk vehicle length (m)	12 m	12 m	10 m & 12 m	10 m & 12 m
Number of feeder vehicles	0	0	Not applicable	Not applicable
Type of guidance system, if applicable	None	Mechanical	None	None
Type of fare collection / verification technology	Smart Card	Coins/magnetic card	Smart cards	Smart cards & coins
Number of intersections with priority signal control	None	Not applicable	0	0
Number of grade-separated intersections	None	All (elevated)	0	0
Fare (US$)	US$0.30	US$2.00	US$1.00	US$0.45
Total planning costs (US$)	US$2 million	Not available	US$1 million	Not available
Average trunk vehicle costs (US$)	Not Available	Not available	US$150,000	US$125,000
Total infrastructure costs (US$per km))	US$1 million/km	US$46.5 mill./km	US$1.2 million/km	US$350,000 / km

1. Jakarta data courtesy of ITDP, 2. Nagoya data courtesy of Hiroyuki Takeshita (Nagoya University), 3. Seoul data courtesy of the Seoul Development Institute, 4. Taipei data courtesy of Dr. Jason Chang (Taiwan National University)

Quantitative comparisons

Australia

BRT Feature	Adelaide (O-bahn)	Brisbane (SE Busway)	Sydney (Liverpool-Par.)
Year system commenced	1986	2001	2003
Number of existing trunk corridors	2	1	1
Total length of existing trunk corridors (km)	12 km	16.5 km	10 exclusive + 20
Number of trunk routes	18	117	1
Location of busway lanes	Centre lanes	Separated ROW	Curbside lanes
Location of doorways	Curbside (left)	Curbside (left)	Curbside (left)
Type of surface material on runways	Concrete	Concrete	Asphalt
Type of surface material on runways at stations	Concrete	Concrete	Asphalt
Total length of existing feeder routes (km)	Not applicable	Not applicable	None
Projected length of total future trunk corridors (km)	0	Not available	Not available
Number of stations	3 stations	10 stations	36 stations
Average distance between stations (m)	5,000 m	1,650 m	861 m
Number of stations with passing lanes	0	Not available	0
Number of terminals	Not available	0	Not available
Number of depots	Not available	Not available	Not available
Number of total system passenger-trips per day	25,000	93,000	6,800
Actual peak ridership (passengers per hour per direction)	4,500	10,000	Not available
Actual non-peak ridership (passengers per hour per direction)	Not available	Not available	Not available
Average commercial speed (km/h)	80 km/h	55 – 58 km/h	29 – 34 km/h
Average peak headway (seconds or minutes)	50 seconds	23 seconds	10 minutes
Average non-peak headway (seconds or minutes)	5 min – 15 min	27 seconds	20 minutes
Average dwell time at stations (seconds)	Not available	Not available	Not available
Number of trunk vehicles	118	475	15
Trunk vehicle type	Articulated / Standard	Standard	Standard
Fuel type used in trunk vehicles	Diesel	Diesel & CNG	Diesel
Trunk vehicle capacity	Not available	Not available	Not available
Trunk vehicle length (m)	18.5 m / 12 m	12 m	12 m
Number of feeder vehicles	Not applicable	Not applicable	0
Type of guidance system, if applicable	Mechanical	None	None
Type of fare collection / verification technology	Magnetic strip	Smart card and paper	Not available
Number of intersections with priority signal control	None	Not available	None
Number of grade-separated intersections	25	8	None
Fare (US$)	US$1.92 – US$3.17	US$1.83 – US$14.50	US$1.42 – US$4.67
Total planning costs (US$)	Not available	Not available	Not available
Average trunk vehicle costs (US$)	Not available	Not available	Not available
Total infrastructure costs (US$per km)	US$7.2 / km	US$20.2/km – US$33.3/km	US$23.9 / km

1. Source: Currie (2006)

France

BRT Feature	Caen	Lyon	Nantes
Year system commenced	2002	2006	2006
Number of existing trunk corridors	2	1	1
Total length of existing trunk corridors (km)	15.7 km	4 km	7 km
Number of trunk routes	2	1	1
Location of busway lanes	Centre lanes	Curbside lanes	Centre lanes
Location of doorways	Curbside (right)	Curside (right)	Curbside (right)
Type of surface material on runways	Asphalt	Asphalt	Asphalt
Type of surface material on runways at stations	Asphalt / concrete	Asphalt	Asphalt “percolés”
Total length of existing feeder routes (km)	Not applicable	Not applicable	Not applicable
Projected length of total future trunk corridors (km)	Not available	26	Not available
Number of stations	34	10	15
Average distance between stations (m)	500 m	430 m	500 m
Number of stations with passing lanes	0	0	0
Number of terminals	4	2	2
Number of depots	1	1	1
Number of total system passenger-trips per day	45,000	Not available	25,000
Actual peak ridership (passengers per hour per direction)	Not available	Not available	Not available
Actual non-peak ridership (passengers per hour per direction)	Not available	Not available	Not available
Average commercial speed (km/h)	20	17	20
Average peak headway (seconds or minutes)	6min	10 min	4 to 5 min
Average non-peak headway (seconds or minutes)	10 to 15min	10 min	6 to 7 min
Average dwell time at stations (seconds)	Not available	Not available	Not available
Number of trunk vehicles	24	Not available	20
Trunk vehicle type	Bi-articulated	Articulated	Articulated
Fuel type used in trunk vehicles	trolley	trolleybus	CNG
Trunk vehicle capacity	150	110	110
Trunk vehicle length (m)	24.5	18	18
Number of feeder vehicles	Not applicable	Not applicable	Not applicable
Type of guidance system, if applicable	Central rail	None	None
Type of fare collection / verification technology	Not available	Not available	Not available
Number of intersections with priority signal control	49	All	All
Number of grade-separated intersections	0	0	0
Fare (US$)	US$1.5	US$1.5	US$1.5
Total planning costs (US$)	US$190 million	US$29 million	US$75 million
Average trunk vehicle costs (US$)	US$2 million	US$800,000	US$600,000
Total infrastructure costs (US$per km)	Not available	Not available	Not available

1. Caen, Lyon, and Nantes data courtesy of François Rambaud (CERTU)

France (continued)

BRT Feature	Paris (Val de Marne)	Rouen
Year system commenced	1993	2001
Number of existing trunk corridors	1	3
Total length of existing trunk corridors (km)	12.5 km	26 km (12 exclusive)
Number of trunk routes	1	3
Location of busway lanes	Centre lanes	Centre & curbside
Location of doorways	Curbside (right)	Curbside (right)
Type of surface material on runways	Asphalt	Asphalt
Type of surface material on runways at stations	Asphalt	Asphalt
Total length of existing feeder routes (km)	Not available	Not available
Projected length of total future trunk corridors (km)	20.2 km	38 km
Number of stations	22	41
Average distance between stations (m)	600 m	535 m
Number of stations with passing lanes	0	0
Number of terminals	2	1
Number of depots	1	1
Number of total system passenger-trips per day	45 000	32,000
Actual peak ridership (passengers per hour per direction)	Not available	1,770
Actual non-peak ridership (passengers per hour per direction)	Not available	640
Average commercial speed (km/h)	23 km/h	16.6 km/h
Average peak headway (seconds or minutes)	4 minutes	3 minutes
Average non-peak headway (seconds or minutes)	8 minutes	4 minutes
Average dwell time at stations (seconds)	Not available	6.3
Number of trunk vehicles	19	38
Trunk vehicle type	Articulated	Articulated
Fuel type used in trunk vehicles	Diesel	Diesel Euro II & III
Trunk vehicle capacity (passengers)	110	110
Trunk vehicle length (m)	18 m	17.9 m
Number of feeder vehicles	Not available	Not available
Type of guidance system, if applicable	None	Optical
Type of fare collection / verification technology	Not available	Magnetic strip
Number of intersections with priority signal control	All	15 (out of 25)
Number of grade-separated intersections	2	1
Fare (US$)	US$1.5	US$0.90
Total planning costs (US$)	US$9 million	Not available
Average trunk vehicle costs (US$)	Not available	US$390,000
Total infrastructure costs (US$per km)	Not available	US$8.3 million/km

1. Rouen data courtesy of Werner Kutil (Veolia Transport)
2. Paris data courtesy of François Rambaud (CERTU)

Netherlands and United Kingdom

BRT Feature	Amsterdam (Zuidtangent)	Eindhoven	Crawley (Fastway)
Year system commenced	2002	2003	2003
Number of existing trunk corridors	1 (2^{nd} opens , 1-1-2008)	2	2
Total length of existing trunk corridors (km)	30 km (2nd: 8 km)	12 km exclusive	24 km
Number of trunk routes	1	2	2
Location of busway lanes	Separated ROW and curbside	Centre lanes	Curbside lanes
Location of doorways	Curbside (right)	Curbside (right)	Curbside (left)
Type of surface material on runways	Concrete	Concrete	Concrete/asphalt
Type of surface material on runways at stations	Concrete	Concrete	Concrete/asphalt
Total length of existing feeder routes (km)	1 km	0	None
Projected length of total future trunk corridors (km)	50 km	50 km	Not available
Number of stations	22	32	62
Average distance between stations (m)	1500 m	550 m	400 m
Number of stations with passing lanes	0	0	0
Number of terminals	5	3	3
Number of depots	2	1	1
Number of total system passenger-trips per day	28,500	12,000	6,000
Actual peak ridership (passengers per hour per direction)	Not available	Not available	Not available
Actual non-peak ridership (passengers per hour per direction)	Not available	Not available	Not available
Average commercial speed (km/h)	38 km/h	21 km/h	20 km/h
Average peak headway (seconds or minutes)	7.5 minutes	7.5 minutes	10 minutes
Average non-peak headway (seconds or minutes)	10 minutes	10 minutes	10 minutes
Average dwell time at stations (seconds)	10-15 seconds	10 seconds	Not available
Number of trunk vehicles	33	11	Not available
Trunk vehicle type	Articulated	Articulated	Single deck rigid
Fuel type used in trunk vehicles	Diesel Euro III	LPG	Diesel Euro IV
Trunk vehicle capacity	130	120	60
Trunk vehicle length (m)	18 m	18 m	11 m
Number of feeder vehicles	0	0	0
Type of guidance system, if applicable	None	Magnetic	Mechanical
Type of fare collection / verification technology	Paper (strippenkaart)	Paper (strippenkaart)	Cash, smart card
Number of intersections with priority signal control	45 (all)	20 (all)	None
Number of grade-separated intersections	11	0	None
Fare (US$)	US$1.00- $4.00	US$2.27	Not available
Total planning costs (US$)	US$350 million	US$143 million	Not available
Average trunk vehicle costs (US$)	Not available	Not available	US$250,000
Total infrastructure costs (US$per km)	US$11 million / km	US$10 million / km	US$2 million

1. Amsterdam data courtesy of Ruud van der Ploeg (Stadsregio Amsterdam)
2. Eindhoven data courtesy of Jacques Splint (Municipality of Eindhoven)

Canada and United States

BRT Feature	Ottawa (Transitway)	Boston (Silver Line Waterfront)	Eugene (ExM)	Los Angeles (Orange Line)
Year system commenced	1983	2004	2007	2005
Number of existing trunk corridors	3	1	1	1
Total length of existing trunk corridors (km)	30 km	11.3 km	6.44 km	22.7 km
Number of trunk routes	Various	4	1	1
Location of busway lanes	Curbside and separated ROW	Curbside and separated ROW	Centre lanes and curbside	Centre, curbside, separated ROW
Location of doorways	Curbside (right)	Curbside (right)	Double-sided (3 right / 2 left)	Curbside (right)
Type of surface material on runways	Asphalt	Asphalt	Concrete	Asphalt
Type of surface material on runways at stations	Asphalt	Asphalt	Concrete	Concrete
Total length of existing feeder routes (km)	Not applicable	Not available	Various	Various
Projected length of total future trunk corridors (km)	Not available	Not available	145 km	14.2 km
Number of current stations	37	11	8	14
Average distance between stations (m)	810 m	1,130 m	530 m	1,610 m
Number of stations with passing lanes	Not available	0	None	14
Number of terminals	4	1	2	2
Number of depots	Not available	Not available	1	1
Number of total system passenger-trips per day	200,000	9,300	3,500	22,000
Actual peak ridership (passengers per hour per direction)	10,000	Not available	500	Not available
Actual non-peak ridership (passengers per hour per direction)	Not available	Not available	Not available	Not available
Average commercial speed (km/h)	Not available	Not available	24 km/h	34 km/h
Average peak headway (seconds or minutes)	2 minutes	3 minutes	10 minutes	5 minutes
Average non-peak headway (seconds or minutes)	15 minutes	12 minutes	10 - 20 minutes	20 minutes
Average dwell time at stations (seconds)	10-20 seconds	24 seconds	10 seconds	10-20 seconds
Number of trunk vehicles	Not available	Not available	4	30
Trunk vehicle type	Standard	Articulated & standard	Articulated	Standard
Fuel type used in trunk vehicles	Diesel	Dual mode (electric-diesel)	Hybrid-electric	CNG
Trunk vehicle capacity (passengers)	50	104	120	120
Trunk vehicle length (m)	12 m	18 m & 12 m	18 m	18 m
Number of feeder vehicles	Not applicable	Not available	Various	Not available
Type of guidance system, if applicable	None	None	None	None
Type of fare collection / verification technology	Cash, paper, pass	Cash, paper, magnetic strip	Free (no fare)	Cash, paper
Number of intersections with priority signal control	0	None	24	35
Number of grade-separated intersections	0	Bay tunnel	0	0
Fare (US$)	US$0.85	US$1.70 – US$2.00	Free	US$1.25
Total planning costs (US$)	Not available	Not available	US$1.5 million	US$1.8 million
Average trunk vehicle costs (US$)	Not available	US$640,000	US$966,000	US$663,000
Total infrastructure costs (US$per km)	US$8.3 mill/km	US$53.2 mill/km	US$2.8 mill/km	US$14.9 mill/km

1. Ottawa data based on Metro Magazine (2006) and OCTransit website, 2. Eugene data courtesy of Graham Carey, Lane Transit District, 3.Boston data based on Schimek et al. (2005) and MBTA website
4. Los Angeles data courtesy of Gary Spivack, Los Angeles County Metropolitan Transportation Authority

Canada and United States

BRT Feature	Miami (Busway)	Orlando (Lynx LYMMO)	Pittsburgh (South Busway)	Pittsburgh (MLK East Busway)	Pittsburgh (West Busway)
Year system commenced	1997	1997	1977	1983 & 2003	2000
Number of existing trunk corridors	1	1	1	1	1
Total length of existing trunk corridors (km)	21.9	4.8 km	6.9 km	14.7 km	8.1 km
Number of trunk routes	6	1	15	38	10
Location of busway lanes	Separated ROW	Curbside, septd. ROW	Separated ROW	Separated ROW	Separated ROW
Location of doorways	Curbside (right)	Right Side	Curbside (right)	Curbside (right)	Curbside (right)
Type of surface material on runways	Asphalt	Concrete	Concrete	Concrete	Concrete
Type of surface material on runways at stations	Asphalt	Concrete	Concrete	Concrete	Concrete
Total length of existing feeder routes (km)	Not applicable	0	Not applicable	Not applicable	Not applicable
Projected length of total future trunk corridors (km)	Not available	30.42 km	6.9 km	25.7 km	9.3 km
Number of stations	21	13 (plus 7 stops)	2 (plus 8 stops)	9	6
Average distance between stations (m)	920 m	300 m	627 m	1,633 m	1,350 m
Number of stations with passing lanes	0	10	2	9	6
Number of terminals	3	2	2	3	1
Number of depots	1	1	5	5	5
Number of total system passenger-trips per day	22,500	3,000	11,000	26,000	9,100
Actual peak ridership (passengers per hour per direction)	Not available	Not available	1,650	5,000	1,365
Actual non-peak ridership (passengers per hour per direction)	Not available	Not available	Not available	Not available	Not available
Average commercial speed (km/h)	45 km/h	Not available	34.5 km/h	40.1 km/h	40.5 km/h
Average peak headway (seconds or minutes)	10 minutes	4 minutes	2 minutes	4 minutes	5 minutes
Average non-peak headway (seconds or minutes)	20 minutes	10 minutes	8.6 minutes	8.6 minutes	20 minutes
Average dwell time at stations (seconds)	Not available	Not available	Not available	Not available	Not available
Number of trunk vehicles	62	9 (plus 1 spare)	68	162	50
Trunk vehicle type	Low Floor	Low Floor	Standard	Articulated	Standard
Fuel type used in trunk vehicles	Diesel	CNG	Diesel	Diesel + Hybrid-Electric	Diesel
Trunk vehicle capacity (passengers)	52	30	50	80	50 & 57
Trunk vehicle length (m)	12 m	10.7 m	12.2 m	18.3 m	12.2 m & 13.7 m
Number of feeder vehicles	Not applicable	None	Not applicable	Not applicable	Not applicable
Type of guidance system, if applicable	None	None	None	None	None
Type of fare collection / verification technology	Cash, paper, mag. strip	Free Fare	Cash, paper	Cash, paper	Cash, Paper
Number of intersections with priority signal control	All	10	None	1	1
Number of grade-separated intersections	0	None	None	None	None
Fare (US$)	US$1.50		US$1.75	US$1.75	US$1.75
Total planning costs (US$)	Not available	Not available	Not available	Not available	Not available
Average trunk vehicle costs (US$)	Not available	Not available	US$357,000	US$477,000	US$357,000 & US$395,000
Total infrastructure costs (US$per km)	US$21 mill/km	US$4.3 mill/km	US$3.9 mill/km	US$12.5 mill/km	US$31.9 mill/km

1. Miami data courtesy of Miami Dade Transit Bus Services
2. Orlando data courtesy of Doug Jamison (Lynx Lymmo)
3. Pittsburgh data courtesy of David Wohlwill (Port Authority of Pittsburgh)

Annex 2
BRT consultant directory

The information provided in this BRT Consultant Directory has been provided by the consultants themselves. The authors of this Planning Guide thus cannot ascertain the veracity of the information provided in this directory. The appearance of a particular consultant in this directory is not indicative of any sort of endorsement by the authors of this Planning Guide. Likewise, if a particular consultant does not appear in this directory, it is not indicative of any sort of disapproval. A copy of the most recently updated BRT Consultant Directory can be found at: http://www.itdp.org/programs/BRT.

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Andrade, Luis Fernando	McKinsey & Company	Carrera 7 No. 71-21, Torre B, Of. 802 Bogota Colombia Tel. +57 1 313 7000 Fax +57 1 313 7079 luis_andrade@mckinsey.com	Bogotá						X		
Ardila, Arturo	Universidad de los Andes	Calle 78 No. 12 – 29 Int. 4, Apt. 901 Bogotá Colombia Tel. + 57 311 230 4553 aardila@alum.mit.edu	Bogotá, Medellín, Bucaramanga, Barranquilla, Panama, Guatemala, Managua, Tegucigalpa, San Salvador, San José				X		X		X
Arias, César	A & Y Consultores Cia. Ltda.	Calle El Comercio 402 y Shyris Quito Ecuador Tel. +593 2 2251 906 Fax +593 2 2251 907 Cel. +593 9 9781 494 fraarias@uio.satnet.net cesarh_arias@yahoo.com	Gold Coast, Guayaquil, Hanoi, Ho Chi Minh City, Quito, Cuenca Lima, Arequipa Querétaro, Tecamac	X		X			X		
Ayles, Chris	MVA Asia Limited	Bangkok Thailand chrisa@mva.co.th	Hanoi, Ho Chi Minh City, Bangkok	X	X		X				
Berczuk, Phil	Steer Davies Gleave	28-32 Upper Ground, London, SE1 9PD, UK Tel: +44 20 7919 8500 David.Bosers@sdgworld.net	Bogotá, Santiago, Concepción							X	
Bowers, David	Steer Davies Gleave	28-32 Upper Ground, London, SE1 9PD, UK Tel: +44 20 7919 8500 David.Bosers@sdgworld.net	Lagos	X	X	X	X	X		X	X
Burley, Chris	MVA Asia Limited	Hong Kong Tel. +852 2864 6417 cjb@mva.com.hk	Hanoi, Ho Chi Minh City	X	X		X				X

				Specialities (indicated by an "X")							
Consultant	**Firm name or independent**	**Contact details**	**BRT project experience (list cities)**	**BRT Project management**	**Demand modelling**	**Operational planning**	**Infrastructure planning**	**Technology (fare systems, vehicles, ITS)**	**Strategic, legal, business plan**	**Marketing, communications**	**Evaluation**
Cagney, Neil	McCormick Rankin Cagney	50 Park Road Milton QLD 4064 Australia Tel. +61 7 3320 3600 Fax +61 7 3320 3636 ncagney@mrcagney.com	Brisbane, Auckland	X		X	X	X	X		X
Cal y Mayor, Patricio	Cal y Mayor & Associates	Dr. Pallares y Portillo 174, 1er piso México DF 04040 México Tel. +52 55 44 37 18 Fax +52 55 44 64 63 pcalymayor@calymayor.com.mx	Lima, Mexico	X		X	X				
Carey, Graham	Independent and Lane Transit District	3500 East 17th Avenue Eugene, OR 97403 USA Tel. +1 541 682 6100 Fax +1 541 682 6111 graham.carey@ltd.org	Eugene, Houston, Monterey, Honolulu, Johannesburg	X		X	X	X		X	
Castro, Angélica	TransMilenio SA	Avenida Eldorado #66 – 63 Bogota, Colombia Tel. +57 1 275 7000 angelica.castro@transmilenio.gov.co mariav.miranda@transmilenio.gov.co	Bogotá	X		X	X	X	X		
Ceneviva, Carlos	Instituto Jaime Lerner	Rua Bom Jesus , 76 Curitiba - Paraná - Brasil CEP 80.035-010 Tel. 55 41 2141 0700 Fax 55 41 2141 0718 ceneviva@jaimelerner.com	Curitiba, State of Mexico, Mexico, Rio de Janeiro, State of Oaxaca	X		X	X			X	X
Chang, Jason	Independent	National Taiwan University Department of Civil Engineering Taipei 10617, Taiwan Tel. +886 935178543 Fax +886 223639990 skchang@ntu.edu.tw	Taipei, Beijing	X	X	X		X	X		X

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Chiu, Michael	MVA Asia Limited	Hong Kong mkc@mva.com.hk	Hanoi, Beijing			X	X				
Colombini Martins, Wagner	Logit Consultoria	Avenida Eng.Luis Carlos Berrini,1700 São Paulo, SP CEP 04571-000 Brazil Tel. +55 11 5505 8800 wagner@logitconsultoria.com.br	Bogotá, Dar es Salaam	X	X	X	X	X	X		
Correa, Germán	Independent	Santiago Chile Tel. +56 2 285 2985 vgermancorrea@hotmail.com	Santiago						X		
Custodio, Paulo	Independent	São Paulo Brazil Tel. +55 11 8245 1478 custodiops@uol.com.br custodio.ps@gmail.com	Bogotá, Cartagena, Cali, Pereira, La Paz, Mexico City, State of Mexico, Dar Es Salaam, Jakarta, Jinan, Xian, Chengdu	X	X	X	X				X
de Bruyn, Johan	Arcus Gibb	Block A, 1st Floor, East Wing Lynwood Corporate Park 36 Alkantrant Road Lynwood Manor, Pretoria 0081 South Africa Tel. +27 12 348 5880 Fax +27 12 348 5878 jdebruyn@gibb.co.za	Johannesburg	X		X	X	X			
de Guzman, Ignacio	Akiris	Calle 86 Bogotá, Colombia Tel. +57 310 327 8343 Fax +57 1 317 3161 ignaciodeguzman@akiris.net	Bogotá, Mexico City	X					X		

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
de la Barra, Tomas	Modelistica	Qta. Morichalito Calle San Antonio Bello Monte Caracas, Venezuela tomas@modelistica.com	Bogotá, Mexico City, Sao Paulo, Panamá, Maracaibo, Mérida (Ven), Barcelona (Ven)		X	X	X		X		X
de Pommerol, Alexis	SYSTRA	5, avenue du Coq Paris 9 Tel. +33 1 40166100 Fax +33 1 40166104 systra@systra.com	La Paz, Pereira	X		X	X	X			
Diaz, Juan Carlos	Akiris	Carrera 7 No. 71-21 Torre A, Oficina 601 Bogotá, Colombia Tel. +57 1 317 3337 Fax +57 1 317 3161 juancdiaz@akiris.net	Bogotá, Lima	X		X		X			
Ernst, John	ITDP	127 W. 26th St., suite 1002 New York, NY 10001 johnernst@itdp.org	Jakarta, Hyderabad	X							X
Escallon Morales, Fernando	Escallon Morales & Asociados	Carrera 4A, No. 73-71 Bogotá Colombia escallonmorales@yahoo.com	Bogota, Dar es Salaam						X		
Ferreira, Eric Amaral	IMAE	Rua Harmonia 755 / 142 São Paulo Brazil Tel. +55 83814933 abcderic@gmail.com	Leon, México, Curitiba	X	X	X					
Fialho, Andre	AGKF Servicios de Ingeniería SS	Rua Nilo Peçanha 3.555 Curitiba/ Paraná / Brasil codigo postal CEP 82.120.440 telefonos; 00.55.41. 3252.9823 celular; 00.55.41. 9977.8704 agkf@uol.com.br	Curitiba, Arequipa, Posadas, Quito, Guayaquil	X		X					

				Specialities (indicated by an "X")							
Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Filewood, Richard	McCormick Rankin Cagney	50 Park Road Milton QLD 4064 Australia Tel. +61 7 3320 3600 Fax +61 7 3320 3636 rfilewood@mrcagney.com	Brisbane, Auckland			X	X		X		X
Fjellstrom, Karl	ITDP	127 W. 26th St., Suite 1002 New York, NY 10001 kfjellstrom@itdp.org	Guangzhou, Ahmedabad, Dar es Salaam	X		X					X
Forshaw, Pauline	Namela Projects	PO Box 73267 Lynnwood Ridge South Africa, 0040 Tel: +27 12 349 1887 Fax: +27 12 349 1515 Mobile: +27 83 274 7886 pauline@namela.co.za	Johannesburg, Pretoria	X		X			X		
Frazier, Charles	ALG	Comte d'Urgell, 240 3 C 08036 Barcelona Spain Tel. +34 93 430 40 16 Fax +34 93 419 5524 cfrazier@alg-global.com	Guatemala City, Lima	X		X	X				
Frieslaar, André	HHO Africa	Cape Town South Africa Tel. +27 21 425 2870 Fax +27 21 419 4689 Email andre@hho.co.za	Cape Town	X		X	X				
Fuller, Charles	Axios Consulting	PO Box 7121 Roggebaai 8012 South Africa Tel. +27 21 419 2115 Fax +27 21 425 2544 crfuller@mweb.co.za	Cape Town	X		X					

				Specialities (indicated by an "X")							
Consultant	**Firm name or independent**	**Contact details**	**BRT project experience (list cities)**	**BRT Project management**	**Demand modelling**	**Operational planning**	**Infrastructure planning**	**Technology (fare systems, vehicles, ITS)**	**Strategic, legal, business plan**	**Marketing, communications**	**Evaluation**
Gómez, Pedro	Getinsa	Calle Raimundo Fernandez Villaverde, 59 Madrid Spain Tel. +34 91 533 3551 pdgomez@getinsa.es	Lima	X							
Gordillo, Fabio	Independent	Calle 80 N 7 49 Ap. 202 Bogota, Colombia Tel. +57 1 321 0416 fgr@alum.mit.edu	Bogotá, Jakarta, Dar es Salaam, Mexico City, London					X			
Gosselin, Ken	McCormick Rankin International	2655 North Sheridan Way Mississauga, Ontario Canada L5K 2P8 Tel. +1 905 823 8500 Fax +1 905 823 8503 kgosselin@mrc.ca	Brisbane, Ottawa, Pittsburgh	X							
Hidalgo, Dario	Booz Allen Hamilton and independent	Carrera 12 79-43 P4 Bogotá, Colombia Tel. +57 1 628 5050 Fax +57 1 313 0093 hidalgo_dario@ne.bah.com	Bogotá, Lagos, São Paulo	X		X			X		X
Hoffman, Alan	The Mission Group	World Trade Center Building 1250 Sixth Avenue, Suite 214 San Diego, CA 92101 USA Tel. +1 619 232 1776 Fax +1 619 374 2785 alan@missiongrouponline.com	Brisbane, Las Vegas, Sarasota, San Diego, Atlanta			X	X		X	X	X
Jeanneret, Remi	Independent	Rio de Janeiro Brazil Tel. +55 21 3970 3188 remijeanneret@uol.com.br	Ahmedabad, Bogotá, Cali, Dar es Salaam, Jakarta, Jinan		X	X					

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Johnstone, Len	Pacific Consultants International (PCI)	518/3 Maneeya Centre North 4th Floor, Ploenchit Road, Lumpini, Pathumwan Bangkok 10330 Thailand Tel. +66 2 2556813 Fax +66 2 2537369 lenj@loxinfo.co.th	Bangkok	X	X						X
Joos, Ernst	Independent	Lahnstrasse 81 8200 Schaffhausen Switzerland Tel. +41 52 624 8870 ernst.joos@spectraweb.ch	Kunming	X				X			
Kijmanawat, Kerati	Pacific Consultants International (PCI)	518/3 Maneeya Centre North 4th Floor, Ploenchit Road, Lumpini, Pathumwan Bangkok 10330 Thailand Tel. +66 2 2556813 Fax +66 2 2537369 kijmanawatk@pcitokyo.co.jp	Bangkok, Chiang Mai	X		X	X	X			X
Kuranami, Chiaki	PADECO	Izumikan Sanbancho Building 3-8 Sanbancho, Chiyoda-Ku Tokyo 102-0075 kuranami@padeco.co.jp	Cuenca, Hanoi	X							X
Lerner, Jaime	Instituto Jaime Lerner	Rua Bom Jesus , 76 Curitiba - Paraná - Brasil CEP 80.035-010 Tel. 55 41 2141 0700 Fax 55 41 2141 0718 contato@jaimelerner.com	Curitiba, State of Mexico	X						X	X
Levinson, Herbert S.	Independent	40 Hemlock Road New Haven, Ct 06515 USA Tel. +1 203 389 2092 hslevinson @aol.com	Albany, New York	X		X	X				X

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Lillo, Enrique	diaDro Consulting España	Goya, 51-5º3, 28001 Madrid Spain Tel. +34 91 576 26 37 enrique.lillo@diadro.com www.diadro.com	Bogotá, Cape Town	X	X	X					
Lleras, Germán	Steer Davies Gleave	Carrera 7, No 21-71, Torre A Oficina 604 Edificio Avenida Chile, Bogotá, Colombia g.lleras@sdgworld.net	Bogotá, Pereira, Medellín	X		X	X	X			
Lobo, Adriana	Centro de Transporte Sustentable (CTS)	Colonia Villa Coyacán C.P. 04000 Mexico City Mexico Tel. +52 55 3096 5742 director@cts-ceiba.org	Mexico City	X							X
Marchezetti, Antonio	Logitrans	Rua México, 320 Bacacheri CEP 82510-060 Curitiba PR Brazil Tel/Fax +55 41 3357 2142 marchezetti@logitran.com.br	Curitiba, Bogotá	X	X	X	X	X			X
McCaul, Colleen	Colleen McCaul Associates	40 Avalanche Street Westdene Johannesburg 2092 South Africa Tel. +27 11 482 6038 Fax +27 11 482 7680 mccaul@pixie.co.za	Johannesburg		X	X			X		
Menckhoff, Gerhard	Independent	3110 Cathedral Avenue, NW Washington, DC 20008 USA Tel. +1 202 473 1868 gmenckhoff@worldbank.org	Bogotá, Lima, Hanoi	X					X		X

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Motta, Paulo	Independent	Porto Alegre Brazil Tel. +55 51 3332 8598 motta.paulo@gmail.com	Lima, Monterrey, León, Barquisimeto, Porto Alegre	X		X	X				
Navarro, Ulises	Modelistica	Qta. Morichalito Calle San Antonio Bello Monte Caracas, Venezuela ulises@modelistica.com	Mexico City Dar es Salaam, Jakarta	X	X	X	X				
Olyslagers, Frits	TransTech Engineering Pty Ltd	PO Box 795 Bulimba 4171, Queensland Australia Tel. +61 (0)418 875 740 olyslagers@optusnet.com.au	Adelaide, Bangkok, Chiang Mai, Johannesburg, Karachi	X		X			X		X
Perera, Fernando	Grupo BMCP Consultores C.A / Independent	Av. Terepaima. Multicentro Empresarial Cristal Plaza. Of 3-E. Urb el Piñal. Barquisimeto. Venezuela perera_fernando@yahoo.com	Barquisimeto, Lima, Santo Domingo	X		X	X	X	X	X	
Pérez, José Enrique	ALG	Comte d'Urgell, 240 3 C 08036 Barcelona Spain Tel. +34 93 430 40 16 Fax +34 93 419 5524 jeperez@alg-global.com	Guatemala City, Lima, Caracas, Santiago, Arequipa, Montevideo, Panamá City, Toluca	X	X	X	X	X	X		
Reck, Garrone	Logitrans	Rua México, 320 Bacacheri CEP 82510-060 Curitiba PR Brazil Tel/Fax +55 41 3357 2142 garrone@logitran.com.br	Bogotá, Curitiba, Pereira	X	X	X	X				X
Sandoval, Edgar Enrique	Independent	Transversal 18 No. 127-43 Torre 5, Apt. 702 Bogotá, Colombia eesandoval@cable.net.co	Bogotá, Dar es Salaam	X					X		

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Sayeg, Philip	Independent	Policy Appraisal Services Pty Ltd PO Box 139, Paddington, Brisbane Australia 4064 Tel. +61 7 3102 3007 Fax +61 7 3369 7185 p.sayeg@uq.net.au	Brisbane, Bangkok	X							X
Scatena, J. Carlos	Independent	Rua Dr. Paulo Vieira, 258 São Paulo – SP Cep: 01257-000 Tel. +5511 3872 4118 Fax +5511 9656-2152 jcscatena@gmail.com jcscatena@terra.com.br	Jakarta, Jinan, São Paulo, Ciudad Guayana, Xi'an Porto Alegre, Goiania	X	X	X					X
Shibata, Junji	Pacific Consultants International (PCI)	1-7-5, Sekido, Tamashi Tokyo 206-8550 Japan Tel. +81 42 372 6201 Fax +81 42 372 6353 shibataj@pcitokyo.co.jp	Bangkok, Chiang Mai, Doha	X	X	X	X				
Silva, Germán	Silva Carreño y Asociados SA	Carrera 7 No. 74-21, Of. 301 Bogotá Colombia Tel. +57 210 5510664 gsilva42@etb.net.co	Bogotá, Pereira, Lima				X				
Siriwarapitak, Somchai	PlanPro Corp., Ltd.	335 Moo 3 Bangkruay-Sanoi Rd Bangrakpattana, Bangbuathong, Nonthaburi 11110 Thailand Tel. +66 2571 2741 somchai@planpro.co.th	Bangkok	X	X	X	X	X			
Stanbury, Jim	Arcus Gibb	Cape Town South Africa jstanbury@gibb.co.za	Cape Town	X	X	X	X				

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Su, Allen Chih-Che	THI Shanghai Consultants Inc.	R 706, No. 65, Chifeng Road, Shanghai 200092, China Tel. +86-21-65975023 Fax +86-21-65975023 thi_shanghai@163.com www.thiconsultants.com	Shenzhen, Jinan, Shanghai, Huaian	X		X	X	X	X		
Sun, John	THI Consultants Inc.	THI Consultants Inc. 5F, No. 130, Sungshan Road Taipei, Taiwan 110 Tel. +886 2 2748 8822 Fax +886 2 2748 6600 jsun@ms1.thi.com.tw www.thi.com.tw	Taipei, Shenzhen, Jinan, Shanghai, Huaian, Taichung, Kaohsiung, Chiayi	X	X	X	X	X	X		X
Szasz, Pedro	Independent	São Paulo Brazil szasz@terra.com.br	Bogotá, Guangzhou, São Paulo, Jakarta, Ahmedabad	X	X	X	X				
Tapia, Juan	CIDATT	Av. Javier Prado Este 1104 – Oficina 402 San Isidro Lima Peru Telefono +51 1 2249800 Fax +51 1 2251677 jtapia@cidatt.com.pe	Lima, Monterrey, Chihuahua						X		X
Tewari, Geetam	IIT-Delhi	Indian Institute of Tech. – Delhi TRIPP Room MS 808 (Main Building Hauz Khas New Delhi - 110 016 India Tel. 91-11-26596361 Fax 91-11-26858703 geetamt@gmail.com	Delhi, Pune	X		X					
Thompson, John	Pacific Consultants International (PCI)	1-7-5, Sekido, Tamashi Tokyo 206-8550 Japan Tel. +81 42 372 6201 Fax +81 42 372 6353 johnjanete@aol.com	Bangkok, Chiang Mai, Doha	X		X	X				

				Specialities (indicated by an “X”)							
Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Tofie, Zaida	Pendulum Consulting	Cape Town South Africa Tel. +27 21 447 8904 Fax +27 21 448 6499 ztofie@pendulumsa.co.za	Cape Town	X		X				X	
Tsuzuki, Koichi	Yachiyo Engineering Co., Ltd.	2-18-12 Nischiochiai Shinjuku-ku Tokyo 161-8575 Japan Tel. +81 3 5906 0363 tsuzuki@yachiyo-eng.co.jp	Lima	X			X				
Utria, Antonio	Independent	Bogota Colombia Tel. +57 1 218 2600 autria@etb.net.co					X				
Vlasak, Jarko	Independent	Bogota Colombia Mf_jarko@hotmail.com	Bogotá, Lima, Cape Town	X					X		
Wartel, Alain	Veolia Transport (Connex)	15, rue de la Petite Chartreuse B.P. 99 76002 Rouen Cedex 1 France Tel. +33 (0)2 35 52 52 12 Fax +33 (0)2 35 52 52 38 alain.wartel@veolia-transport.fr werner.kutil@veolia-transport.fr www.veolia-transport.com	Bogotá, Las Vegas, Rouen, York	X	X	X		X	X	X	X
Williams, Paul	MVA Asia Limited	Bangkok Thailand paulw@mva.co.th	Hanoi, Ho Chi Minh City, Bangkok	X	X		X	X	X		X
Willumsen, Luis	Steer Davies Gleave	28-32 Upper Ground London SE1 9PD UK Tel. +44 71 919 8500 Fax +44 71 827 9850 l.willumsen@sdgworld.net	Bogotá, Cape Town	X	X	X	X				

Consultant	Firm name or independent	Contact details	BRT project experience (list cities)	Specialities (indicated by an "X")							
				BRT Project management	Demand modelling	Operational planning	Infrastructure planning	Technology (fare systems, vehicles, ITS)	Strategic, legal, business plan	Marketing, communications	Evaluation
Xu, Kangming	3E Transportation System	1564 NW 183rd Avenue Pembroke Pines, Florida USA Tel: +1 954 663 1683 Tel. +86 139 1092 3155 Fax. +1 954 538 1492 kangmingxu@gmail.com	Beijing Kunming Hangzhou Shenzhen Changzhou Xian Shanghai Miami	X		X	X	X			X

Annex 3
Templates for consultant solicitation

A3.1 Template: "Expression of Interest" (EOI) document for planning consultant

Request for Expression of Interest

Project title:
Project number: (if applicable)
Date of EOI announcement:
Contracting agency:

Brief project description:

- Project goals and objectives
- History of project to date
- Type of system envisioned for city (size, level of quality, etc.)
- Estimated project timeline (estimated date of project commencement, estimated date of project completion)

Expected consultant outputs for project:

- Type of plan to be developed (pre-feasibility, feasibility, demand analysis, conceptual plan, detailed engineering design, communcations and marketing, business and regulatory, financing, or impact evaluation)
- Output types (report, models, video, drawings, etc.)

Requested inputs in reply to Expression of Interest:

- Name of lead firm/individual
- Name of any associate firms/individuals
- Experience to date with similar types of projects (name of client, dates of execution, name of lead and associate firms, project results, financing sources)
- Available project staff (name, title, specialties, and years of experience)

Submission deadline:

Date and time (specify time zone)

Decision date:

Date and method of contact for decision on short-listed firms

Submission details:

- Formatting standards
- Maximum word length
- Submission delivery options (post, email, etc.)
- Signature of firm representative

Submission contact details:

- Contact details for any questions (telephone, email, etc.)
- Postal address for submission

A3.2 Template: "Terms of Reference" (TOR) document for planning consultant

Terms of Reference

Project title:
Project number: (if applicable)
Date of TOR announcement:
Contracting agency:

Project background:

- Summary of economic, environmental, and social conditions of city
- Transport sector background (mode shares, travel patterns, congestion levels, road network, etc.)
- Summary of existing plans (e.g., Master Transport Plan)

Project description:

- Project goals and objectives
- History of project to date
- Type of system envisioned for city (size, level of quality, etc.)
- Expected contents of plan
- Methodology for execution of plan
- Expected project outcomes

Expected consultant outputs for project:

- Intermediate plans and final plan
- Additional materials (models, videos, drawings, etc.)
- Estimated project timeline (estimated date of project commencement, estimated date of delivery of intermediate outputs, estimated date of project completion)

Requested inputs in reply to TOR:

- Name of lead firm/individual
- Name of any associate firms/individuals
- Bid price
- Proposed delivery dates of project outputs
- Experience to date with similar types of projects (name of client, dates of execution, name of lead and associate firms, project results, financing sources)
- Available project staff (curriculum vitaes with name, title, specialties, and years of experience)

Legal requirements: (if applicable)

- Anticorruption agreement
- Equal opportunity employment agreement
- Local and national tax provisions

Decision process:

- Expected date of decision
- Evaluation committee
- Proposal evaluation criteria and weightings (*e.g.,* bid price, experience, staff qualifications, proposed delivery date, etc.)
- Method of contact for decision on short-listed firms
- Declaration of no chosen winner (if applicable)

Submission deadline:

Date and time (specify time zone)

Submission details:

- Formatting standards
- Maximum word length
- Submission delivery options (post, email, etc.)
- Signature of firm representative

Submission contact details:

- Contact details for any questions (telephone, email, etc.)
- Postal address for submission

Annex 4
List of financing organisations

A4.1 Foundations

Alternative Gifts International
http://www.altgifts.org

Blue Moon Foundation
http://www.bluemoonfund.org

Charles Stewart Mott Foundation
http://www.mott.org

Codespa Foundation
http://www.codespa-asia.org

David and Lucile Packard Foundation
http://www.packard.org

Earth Share
http://www.earthshare.org

Ford Foundation
http://www.fordfound.org

Global Greengrants Fund
http://www.greengrants.org

MacArthur Foundation
http://www.macfound.org

New Land Foundation
http://www.gm-unccd.org/FIELD/Foundations/NewLand/FR_Gr.htm

Rockefeller Foundation
http://www.rockfound.org

Rockefeller Brothers Foundation
http://www.rfb.org

Rockwood Foundation
http://www.rockwoodfund.org

Rose Foundation
http://www.rosefdn.org

Roy A. Hunt Foundation
http://www.rahuntfdn.org

Shell Foundation
http://www.shellfoundation.org

Soros Foundation
http://www.soros.org

Surdna Foundation
http://www.surdna.org

Tides Foundation
http://www.tides.org

Toyota Foundation
http://www.toyotafound.or.jp/etop.htm

Wallace Global Fund
http://www.wgf.org

William and Flora Hewlett Foundation
http://www.hewlett.org

William J. Clinton Foundation
http://www.clintonfoundation.org

W.K. Kellogg Foundation
http://www.wkkf.org

Working Assets
http://www.workingassets.com/recipients.cfm

A4.2 International organisations

African Development Bank (AfDB)
http://www.afdb.org

Asian Development Bank (ADB)
http://www.adb.org/Vehicle-Emissions/default.asp

Clean Air Initiative – Asia (CAI-Asia)
http://www.cleanairnet.org/caiasia

Clean Air Initiative – Latin America (CAI-LAC)
http://www.cleanairnet.org/cailac

Clean Air Initiative – Sub-Saharan Africa (CAI-SSA)
http://www.cleanairnet.org/caissa

Development Bank of Southern Africa (DBSA)
http://www.dbsa.org

East African Development Bank (EADB)
http://www.eadb.org

European Bank for Reconstruction and Development (EBRD)
http://www.ebrd.com

European Union
Directorate General VIII, Development
http://europa.eu.int/comm/development/index_en.htm

European Union
Directorate General XI, Environment
http://europa.eu.int/comm/environment/funding/intro_en.htm

European Union
Directorate General XVII, Energy and Transport
http://europa.eu.int/comm/energy_transport/en/prog_cut_en.html

Global Environment Facility (GEF)
http://www.gefweb.org

Inter-American Development Bank (IDB)
http://www.iadb.org

International Finance Corporation (IFC)
http://www.ifc.org

Pan American Health Organisation (PAHO)
http://www.paho.org

United Nations Centre for Regional Development (UNCRD)
http://www.uncrd.or.jp/env/est

United Nations Development Programme (UNDP)
http://www.undp.org

United Nations Environment Programme (UNEP)
http://www.unep.org

United Nations Human Settlement Programme (UN-Habitat)
http://www.unchs.org/programmes/sustainablecities

World Bank
http://www.worldbank.org/transport

World Health Organization
http://www.euro.who.int/healthy-cities

A4.3 Bi-lateral agencies

Australian Agency for International Development (AusAID)
http://www.ausaid.gov.au

Austrian Development Agency (ADA)
http://www.ada.gv.at/view.php3?r_id=3042&LNG=de&version=

Belgium Development Cooperation (DGCD)
http://www.dgcd.be/en/index.html

Belgium Technical Cooperation (BTC)
http://www.btcctb.org/showpage.asp?iPageID=2&sLangCode=EN

Canadian International Cooperation Agency (CIDA)
http://www.acdi-cida.gc.ca

Danish Cooperation for Environment and Development (DANCED)
http://www.mst.dk/homepage

Danish International Development Agency (DANIDA)
http://www.danida.dk

Danish Ministry of Foreign Affairs
http://www.um.dk/en/menu/DevelopmentPolicy/DanishDevelopmentPolicy

Development Cooperation Ireland (DCI)
http://www.dci.gov.ie

Dutch Ministry for Development Cooperation (DGIS)
http://www.minbuza.nl/default.asp?CMS_ITEM=MBZ257572

Finnish Ministry of Foreign Affairs, Development Cooperation (Global.Finland)
http://global.finland.fi/index.php?kieli=3

French Development Agency (AfD)
http://www.afd.fr/jahia/Jahia/lang/en/pid/1

French Ministry of Foreign Affairs
http://www.diplomatie.gouv.fr/thema/dossier.gb.asp?DOS=SOLIDARITYDEVEL

German Agency for Technical Cooperation (GTZ)
http://www.gtz.de/en

German Ministry of Foreign Affairs (BMZ)
http://www.bmz.de/de/english.html

Italian Ministry of Foreign Affairs
http://www.esteri.it/eng/index.asp?

Japanese International Cooperation Agency (JICA)
http://www.jica.go.jp/english

Japanese Bank for International Cooperation (JBIC)
http://www.jbic.go.jp/english/index.php

KfW Entwicklungsbank
(German Development Bank)
http://www.kfw.de/EN

Lux Development (Luxembourg)
http://www.lux-development.lu/e/home.htm

New Zealand International Aid and Development Agency (NZAID)
http://www.nzaid.govt.nz

Norwegian Agency for Development Cooperation (NORAD)
http://www.norad.no/default.asp?V_ITEM_ID=1139&V_LANG_ID=0

Portuguese Institute for Development Support (IPAD)
http://www.ipad.mne.gov.pt

Spanish Agency for International Cooperation (AECI)
http://www.aeci.es/Default.htm

Swedish International Cooperation Agency (Sida)
http://www.sida.se/Sida/jsp/polopoly.jsp?d=107

Swiss Agency for Development and Cooperation (SDC)
http://www.sdc.admin.ch

UK Department for International Development (DFID)
http://www.dfid.gov.uk

US Agency for International Development (USAID)
http://www.usaid.gov/our_work/environment

Annex 5
Template for concession contract

Basis of template

This operational contract template is based upon the Phase II contract for trunk services in the Bogotá TransMilenio system. The original contract is 183 pages in length with significant technical detail. The template merely provides the outline of the original contract. For a reading of the complete contract, please visit the website of the Institute for Transportation & Development Policy (ITDP), http://www.itdp.org/programs/BRT.html.

Concession title

Provide official title of document. For example, in Bogotá the contract title was: "Concession Contract for Passenger Land Public Transport Service in the Urban Area".

Initial context (2 pages)

The initial section provides the legal context of the project, describes the background to the project's development, and outlines the basic objectives.

Definitions (10 pages)

Clear and precise definitions are provided for key terms that will be used in the document. These definitions include both technical and legal terms. For example, each physical component, such as stations, vehicles, terminals, etc., should be defined. Also, key operational terms such as technical and user tariffs, express services, etc. should be explained. Finally, legal terms, such as "penalty clauses", "civil liability", "risks", and "proceedings", should be defined as well.

Part I: Description of system (14 pages)

In order to properly bid on becoming a trunk operator, the various companies must gain a very detailed description of the proposed system.

1. Introduction

This section provides background on the project's history.

2. Principles and objectives of the new system

This section details the overall principles and objectives the City wishes to achieve in implementing the new public transport system.

3. Regulation and control mechanisms

The appropriate regulatory bodies that oversee the project should be clearly noted along with their exact roles.

4. Components of the TransMilenio system

The physical and operational components of the proposed system must be clearly defined. These details will include the corridors and routes of operation and the number and location of stations, terminals, and depots.

5. Operation of vehicles

This section refers to the exclusivity of the use of the vehicles to the system.

6. Fare system

This section provides an overview of how the fare collection system will function.

7. Trunk service operators

This section gives a definition of the role of the trunk service operators.

8. Feeder service operators

This section gives a definition of the role of the feeder service operators.

9. Related services

This section refers to the other key services involved in the system, such as cleaning and maintenance services.

10. System operation

This section describes the operational characteristics of the trunk and feeder services, as well as the planning, management, and control of those services.

Part II: Concessional contract (148 pages)

1. Object and nature of contract (1 page)

This section provides a basic framework of the contract.

2. Rights and duties of the concession holder (11 pages)

This section details the responsibilities of the concession holder (*e.g.,* performance of services) and also notes the rights or aspects provided to the concession holder (*e.g.,* access to use terminal facilities). This section also touches upon specific topics such as restrictions on advertising, payments to the public transport authority, etc.

3. Rights and duties of the public transport authority (4 pages)

This section details the rights of the public transport authority (*e.g.,* ownership of system, right to inspect operator performance) and the obligations of the authority (*e.g.,* availability of maintenance depot to operators).

4. Economic aspects of concession (28 pages)

This section details how revenues will be collected and distributed. Specifically, this section defines the "user" and "technical" tariffs that will be the basis for revenue distribution. It also discusses the circumstances and methodologies utilised to make adjustments in the tariffs. Operators must become familiar with the calculations presented in this section in order to assess their bid relative to the expected profitability. The public transport authority is essentially presenting their expectations of the operating costs to be incurred by the operators.

This section also outlines how the fare revenues will be handled and distributed from a procedural standpoint. This description includes an overview of how the "contingency" and "trust" funds will function.

5. Revenues of the concession holder (3 pages)

This section explains the share value of the particular concession holder relative to the other concession holders within the system. Formulas are presented on calculating the concession holder's participation value.

6. Revenues to the public transport authority (1 page)

Likewise, the distribution and use of part of the revenues to the public transport authority is explained.

7. Infrastructure (3 pages)

This section denotes the infrastructure that will be provided to the concession holder and the related responsibilities between the different parties in terms of maintaining and operating the infrastructure.

8. Vehicles (31 pages)

The role of the operators in providing the vehicles is explained. Additionally, the exact details of the vehicle specification are given here. These detailed specifications include precise definitions on all internal, external, instrumentation, and mechanical aspects of the vehicles. This section also discusses the expected fleet size and any requirements for a reserve fleet. Maintenance and performance requirements (*e.g.,* environmental performance) are also noted.

9. Trunk route operation (14 pages)

This section discusses the operational regime, including start and termination times, scheduling, and performance indicators.

10. Supervision and control (3 pages)

This section outlines how the performance of the concession holder will be monitored and controlled. The application of both external and internal audits is discussed. These inspections include both operational performance as well as financial and accounting oversight.

11. Implementation (1 page)

This section discusses the steps that will take place upon execution of this contract. It stipulates the testing and operational periods that will govern the start-up responsibilities of the concession holder.

12. Allocation of contract risks (3 pages)

This section notes the contractual risks of each party.

13. Fines (11 pages)

BRT systems of the type operated in Bogotá make payments to concession holders based on the vehicle-kilometres served (instead of based on the number of passengers). Thus, any fines for poor performance result in a reduction in vehicle-kilometres. This section specifies the type of activities and performance errors that will result in fines as well as the number of vehicle-kilometres deducted.

14. Guarantees and insurance (11 pages)

The contract agreement stipulates that the operator must deposit a monetary guarantee once the contract is signed. The details of the guarantee requirement are noted in this section. The guarantee is held to assure that the operator is always able to comply with obligations, such as salaries and social benefits to employees. Likewise, the operators must hold certain types of insurance to operate within the system.

15. Takeover of concession (3 pages)

This section outlines the steps taken if the concession holder fails to abide by the stipulated agreements in the contract. In such cases, the public transport authority will take the concession away from the contracted party.

16. Abuse of a dominant position and unfair competition (3 pages)

This section outlines prohibited practices in which a concession holder may attempt to restrict competition. The specific acts which constitute an abuse of a dominant position are discussed.

17. Duration of contract (1 page)

In the case of Bogotá, the length of the contract is determined by the earlier of 15 years or an average fleet operation of 850,000 vehicle-kilometres. This formula for the duration is explained in this section.

18. Termination of contract (5 pages)

This section notes the points at which the contract is terminated. The reasons for termination can conclusion of the stipulated contract duration or an early termination due to a list of reasons.

19. Reversion phase (2 pages)

This section discusses the manner in which certain assets (*e.g.,* property, equipment) are returned to the public transport authority at the conclusion of the contract.

20. Liquidation of assets (1 page)

In the event that actions by the concession holder results in a required liquidation of assets, this section sets out the process.

21. Unilateral decisions (1 page)

This section notes the conditions in which the public transport authority would take unilateral decisions in the disposition of assets or termination of activities.

22. Settlement of conflicts (4 pages)

In the event that the parties disagree over a particular issue, this section sets forth the procedures for resolving such disagreements. The options for resolving disputes include direct settlement, conciliation, and arbitration.

23. Final aspects (3 pages)

This final section covers an assortment of legal issues penalty clauses, subjection to national law, relationship of the parties, and the defined domicile of the contract.

Signature

Finally, both the public transport authority and the concession holder must sign and date the document.

References

Access Board (2005), *Guidelines*, (**http://www.access-board.gov**).

Agran P., Castillo D., and Winn D. (1990), Limitations of data compiled from police reports on pediatric pedestrian and bicycle motor vehicle events. *Accident Analysis and Prevention*, vol. 22, no. 4, pp. 361–370.

Allen, H. (2005), Successful examples of sustainable public transport. Presentation at the *Getting Around Cities Workshop*, Bangkok, Thailand, 25–26 October 2005.

Allport, R. (2000), *Urban mass transit in developing countries*. London: Halcrow Fox.

Alvarez, E. And Camisão, V. (2005), *Guía operativa de accesibilidad para proyectos de desarrollo urbano, con criterios de diseño universal*. Washington: Inter-American Development Bank (IADB), (**http://www.iadb.org/sds/SOC/publication/gen_6191_4180_e.htm**).

Ardila-Gomez, A. (2004), *Transit planning in Bogota and Curitiba: Roles in Interaction, Risk, and Change*. PhD thesis in Urban and Transportation Planning at the Massachusetts Institute of Technology (MIT). Boston: MIT.

Aunurrohman, C. (2005), *Problems in reforming transportation and parking: A case study in Yogyakarta*. New York: ITDP.
Avendaño, C. (2003), Congress asked to probe LRT cost overrun. *Inquiry News Service*, (**http://www.inq7.net/brk/2003/jun/06/brkoth_1-1.htm**).

Bautista, K. (2005), MRT-7 project gets clearance from Transportation Department. *Business World*, 15 October 2005.

Benjamin, J. and Sirmans, S. (1996), Mass transportation, apartment rent and property values. *Journal of Real Estate Research*, vol. 12, no. 1, pp. 1–8.

Brown, L. (2006), Supermarkets and service stations now competing for grain. *Eco–Economy Update*, 2006 number 5.

Bruton, M. (1985), *Introduction to Transportation Planning*. London: Hutchinson.

Cervero, R. and Duncan, M. (2002a), *Land value impacts of rail transit services in San Diego County*. Report to the National Association of Realtors & Urban Land Institute.

Cervero, R. and Duncan, M. (2002b), *Land value impacts of rail transit services in Los Angeles County*. Report to the National Association of Realtors & Urban Land Institute.

Chambers, B. (2006), Octopus electronic fare management of the future. Presentation at the *Second International Mass Transport Fair 2006*, Bogotá, 9 November 2006.

Chin Hoong, C. (2004), Transportation planning: Singapore style. Presentation at *Cities and Changes in Mobility seminar*, GTZ, Berlin, 29 October 2004.

CITEPA (Centre Interprofessionel Technique d'Etudes de la Pollution Atmosphérique) (2005), *Road transport-passenger cars, light duty vehicles, heavy duty vehicles*. Synopsis Sheet.

City of Stockholm (2004), *City to introduce congestion charges on a trial basis*, (**http://www.stockholm.se/files/63600-63699/file_63617.pdf**).

Como Vamos Bogotá (2005), *Ficha técnica*. Bogotá: Como Vamos Bogotá.

Como Vamos Bogotá (2001), *Boletín números 6 y 7*, Bogotá: Como Vamos Bogotá.

Cracknell, J. (2000). *Experience in urban traffic management and demand management in developing countries*, Background paper for World Bank Urban Transport Strategy Review. London: UK Department for International Development (UK DFID).

Custodio, P. (2005), BRT planning and operation. Presentation at the *International Forum on Bus Rapid Transit Development and Implementation*, Beijing, China, 19 October 2005.

CVTF (Cleaner Vehicles Task Force) (2000), *The report of the alternative fuels group of the cleaner vehicles task force: An assessment of the emissions performance of alternative and conventional fuels*. London: UK Department of Trade and Industry.

Dabinett, G. (1998), Realising regeneration benefits from urban infrastructure investment: Lessons from Sheffield in the 1990s. *Town Planning Review*, vol. 69, no. 2, pp. 171–189.

Dargay, J. and Gately, D. (1999), Income's effect on car and vehicle ownership, worldwide: 1960–2015. *Transportation Research Part A*, vol. 33, pp. 101–138.

de Guzmán, I. (2005), Personal communication with Ignacio de Guzmán, former Project Director for TransMilenio.

Deluchi, M. (2003), *A lifecycle emissions model (LEM): Lifecycle emissions from transportation fuels, motor vehicles, transportation modes, electricity use, heating and cooking fuels, and materials*, report number UCD-ITS-RR-03-17. Davis: University of California at Davis.

Doganis, R. (2001), *The airline business in the 21st century*. New York: Routledge.

Dueker, K. and Bianco, M. (1999), Light rail transit impacts in Portland: The first ten years. *Transportation Research Record,* vol. 1685, pp. 171–180.

Economist (2007), Transport heaven and hell: First commandeer your bus. *Economist*, 15 Febr. 2007.

Economist (2006a), Making the trains run on time. *Economist*, 16 February 2006, (http://www.economist.com/business/displaystory.cfm?story_id=5519214).

Economist (2006b), The Brazilian Amazon: How green was my valley. *Economist*, 27 April 2006, (http://www.economist.com/world/la/displaystory.cfm?story_id=6859779).

eMarketer (2007), Auto industry pouring money into digital. *eMarketer*, 15 March 2007, (http://www.marketingvox.com/archives/2007/03/15/emarketer-auto-industry-pouring-money-into-digital).

Engwicht, D. (1999), *Street reclaiming: Creating livable streets and vibrant communities*. Gabriola Island, BC, Canada: New Society Publishers.

Engwicht, D. (1993), *Reclaiming our cities & towns: Better living with less traffic*. Philadelphia: New Society Publishers.

Enoch, M. and Ison, S. (2006), Levying charges on private parking: Lessons from existing practices. *World Transport Policy & Practice*, vol. 12, no. 1, pp. 5–14.

Enoch, M. (2001), Workplace parking charges down under. *Traffic Engineering and Control*, November 2001, pp. 357–360, (http://eeru.open.ac.uk/staff/marcus/Workplace%20parking.PDF).

European Mobility Week (2005), *Participating and supporting cities and towns,* (http://www.22september.org/part/en/day04.html).

Ewing, R., Pendall, R., and Chen, D. (2002), *Measuring sprawl and its impacts*. Washington: Smart Growth America.

Fenhann, J. (2005), *UNEP Risoe pipeline*, Report of the UNEP Risoe Laboratory, 14 March 2007, (CDM pipeline: http://www.cd4cdm.org/Publications/CDMpipeline.xls), (JI pipeline: http://www.cd4cdm.org/Publications/JIpipeline.xls).

Flyvbjerg, B., Bruzelius, N., and Rothengatter, W. (2003), *Megaprojects and risk: An anatomy of ambition*. Cambridge: Cambridge University Press.

Frommer, G. (2006), Personal communication on 24 January 2006 with Glenn Frommer, Director of Sustainable Development, Hong Kong MRT Corporation.

Frommer, G. (2005), Hong Kong – transport and the MRT. Presentation at the *Getting Around Cities Workshop*, Bangkok, 25 October 2005.

Gandhi, S. (2002), Bus shelter as integral part of the urban transport system in low income countries. *CODATU X Conference Proceedings*, Lome, Togo.

Garb, Y. (2003), Transit terror: The view from Jerusalem. *Sustainable Transport*, Fall 2003, vol. 15, pp. 12–13, 17.

Gehl, J. (1971), *Life between buildings: Using public space*. Copenhagen: Danish Architectural Press.

Gilbert, R. (2000), Sustainable mobility in the city. Proceedings from *URBAN21, Global Conference on the Urban Future*, Berlin, Germany, 4–6 July, 2000.

Goodwin, P., Hass-Klau, C., and Cairns, S. (1998), Evidence on the effects of road capacity reduction on traffic levels. *Traffic Engineering and Control*, June, pp. 348–354.

Hadley, J. (2004) Hybrid buses' fuel economy promises don't materialize: Older models have gotten better mpg. *Seattle Post-Intelligencer*, 12 December 2004.

Hass-Klau, C. (1993), Impact of pedestrianization and traffic calming on retailing: A review of the evidence from Germany and the UK. *Transport Policy*, vol. 1, no. 1, pp. 21–31.

Hau, T. (1992), *Congestion charging mechanisms for roads: An evaluation of current practice*. Washington: World Bank.

Hautzinger, H., Dürholt, H., Hörnstein, E., Tassaux-Becker, B. (1993), *Dunkelziffer bei Unfällen mit Personenschaden* (Unreported Proportion of Personal-Injury Accidents), Report M13. Bergisch Gladbach (Germany): Bundesanstalt für Straßenwesen (Federal Highway Research Institute).

Hazel, G. and Parry, R. (2003), *Making cities work*. London: Academy Editions.

Hidalgo, D. (2003), The backbone of the mobility strategy of Bogotá: TransMilenio. *Public Transport International*, vol. 51, pp. 28–31.

Hidalgo, D. (2003), TransMilenio: A high capacity – low cost bus rapid transit system developed for Bogotá, Colombia. Presented at the *55th World Congress of the International Public Transport Union (UITP)*, May 2003, Madrid, Spain.

Hindu Business Line (2006), Volvo mulls launching BRT systems in India. *Hindu Business Line*, 16 January 2006, (http://www.thehindubusinessline.com/bline/2006/01/17/stories/2006011702460300.htm).

Homburger, W., Hall, J., Loutzenheiser, R., and Reilly, W. (1996), *Fundamentals of traffic engineering*, 14th edition. Berkeley: Institute of Transportation Studies.

Hook, W. (2005), *Non–motorised transport*. Eschborn: GTZ, (http://www.sutp.org).

Hook, W. (2004), *Preserving and expanding the role of NMT*. Eschborn: GTZ, (http://www.sutp.org).

Hook, W. (2000), *Improving conditions for non motorized transport in Surabya, Indonesia: A pilot project in two neighbourhoods*. Eschborn: GTZ.

Husler, W. (2005), The Zürich tram system. Presentation at the *Walk 21 Conference*, Zürich, September 2005.

Institute of Transportation Engineers (2005), *Traffic calming for communities*, (web document accessed on 3 May 2005, http://www.ite.org/traffic/tcdevices.htm).

IEA (International Energy Agency) (2004), *Biofuels for transport – An international perspective.* Paris: IEA.

IEA (International Energy Agency) (2002a), *World energy outlook – 2002.* Paris: IEA.

IEA (International Energy Agency) (2002b), *Bus systems for the future: Achieving sustainable transport worldwide.* Paris: IEA.

IEA/OECD (International Energy Agency / Organisation for Economic Co-operation and Development) (2003), *CO_2 emissions from fuel combustion 1970–2001.* Paris: IEA.

IEA/SMP (International Energy Agency / Sustainable Mobility Programme of the World Business Council for Sustainable Development) (2004), *The IEA/SMP transportation model*. (http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=MTE0Njc).

IplanRio (Prefeitura da Cidade do Rio de Janeiro) (1996), *Transportes urbanos: Perfil do usuáio na área metropolitana, Rio de Janeiro*. Rio de Janeiro: IplanRio.

Jacobs, J. (1961), The *death and life of great American cities*. New York: Vintage.

James, H. (1991), Under-reporting of road traffic accidents. *Traffic Engineering and Control*, December 1991, pp. 574–583.

JIQ (2002), AIJ pilot projects. *Joint Implementation Quarterly*, vol. 8, no. 4, pp. 14.

Kenworthy, J. and Laube, F. (1999), *Millennium cities database for sustainable transport*. Brussels: International Union of Public Transport (UITP).

Kim, G. (2005), *Toward better public transport: Experiences and achievement of Seoul*. Seoul: Seoul Development Institute.

Levinson, H., Zimmerman, S., Clinger, J., Rutherford, S., Smith, R., Cracknell, J., and Soberman, R. (2003a), *Bus rapid transit, volume 1: Case studies in bus rapid transit*, TCRP Report 90. Washington: US TCRP (US Transit Cooperative Research Program).

Levinson, H., Zimmerman, S., Clinger, J., Gast, J., Rutherford, S., and Bruhn, E. (2003b), *Bus rapid transit, volume 1: Implementation guidelines*, TCRP Report 90. Washington: US TCRP (US Transit Cooperative Research Program).

Lewis-Workman, S. and Brod, D. (1997), Measuring the neighborhood benefits of rail transit accessibility. *Transportation Research Record,* vol. 1576, pp. 147–153.

Litman, T. (2006), *Parking management best practices*. Washington: Planners Press.

Litman, T. (2006a), *Parking taxes: Evaluating options and impacts,* (http://www.vtpi.org/parking_tax.pdf).

Litman, T. (2005a), *Transportation costs and benefits*, (http://www.vtpi.org/tdm/tdm66.htm).

Litman, T. (2005b), *Road space allocation*, (web document accessed on 7 February 2006, http://www.vtpi.org/tdm/tdm56.htm).

Litman, T. (2005c), *Transportation elasticities*, (web document accessed on 4 April 2006, http://www.vtpi.org/tdm/tdm11.htm).

Litman, T. (2004a), *Parking management,* (http://www.vtpi.org/tdm/tdm28.htm).

Litman, T. (2004b), *Land use impacts on transport*, (http://www.vtpi.org/tdm/tdm20.htm).

McLaughlin, E. (2005), Atlanta subways to get TV, radio feeds. *Environmental News Network*, (http://www.enn.com/biz_PF.html?id=309).

Meakin, R. (2003), Institutional framework for bus regulation and planning. Presentation at the *Sustainable Urban Transport Development Conference*, Bucharest, Romania, 19 Nov. 2003.

Meakin, R. (2002a), *Bus regulation and planning*, Eschborn: GTZ, (http://www.sutp.org).

Meakin, R. (2002b), *Urban transport institutions*, Eschborn: GTZ, (http://www.sutp.org).

Meirelles, A. (2000), A review of bus priority systems in Brazil: From bus lanes to busway transit. Presented at the *Smart Urban Transport Conference*, 17–20 October, 2000, Brisbane, Australia.

Menckhoff, G. (2002), Summary presentation of World Bank transport projects in Latin America. Presented at *World Bank Seminar*, 16 January 2002, Washington.

Metschies, G., Friedrich, A., Heinen, F., Peters, J., and Thielmann, S. (2007), *International fuel prices 2007*. Eschborn: GTZ, (http://www.sutp.org).

Millard-Ball, A. (2005), *Bus Rapid Transit for Dar es Salaam: Parking management report*. New York: ITDP.

Mindali, O., Raveh, A., and Salomon, I. (2004), Urban density and energy consumption: a new look at old statistics. *Transportation Research Part A: Policy and Practice*, vol. 38, no. 2, February 2004, pp. 143–162(20).

Moore, R. and Older, S. (1965), Pedestrians and motor vehicles are compatible in today's world. *Traffic Engineering*, vol. 35, no. 12.

Munoz-Raskin, R. (2006), *Walking accessibility to Bus Rapid Transit: Does it affect property prices, The case of Bogotá, Colombia*. A Master's thesis presented to the Faculty of Architecture and Planning, Columbia University, New York.

Ortúzar, J. and Willumsen, L. (2002), *Modelling transport*. Chichester (UK): John Wiley & Sons Ltd.

Pardo, C. (2006), *Raising public awareness about sustainable urban transport*. Eschborn: GTZ, (http://www.sutp.org).

Planet Ark (2006), Ethanol, biodiesel eats into US corn stockpiles, *Planet Ark*, (http://www.planetark.com/dailynewsstory.cfm/newsid/36348/story.htm).

Pollard, N. (2006), Stockholm residents choke on new congestion charge. *Reuters News Service*, (http://www.planetark.com/dailynewsstory.cfm/newsid/34307/story.htm).

Poulsen, E. and Mozer, D. (2005), *Rainbow of free bikes*. International Bicycle Fund (IBF),(web document accessed on 3 September 2005, http://www.ibike.org/encouragement/freebike-details.htm).

Public CIO (2006), Congestion pricing system trial reduces Stockholm traffic 25 percent in one month. *Public CIO*, (http://www.public-cio.com/newsStory.php?id=2006.03.06-98651).

Rickert, T. (2006), *BRT accessibility guidelines*. Washington: World Bank, (http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALPROTECTION/EXTDISABILITY/0,,contentMDK:20192134~menuPK:414202~pagePK:148956~piPK:216618~theSitePK:282699,00.html).

Rickert, T. (2003), *Making access happen: Promoting and planning transport for all*. San Francisco: Access Exchange International (AEI), (http://www.independentliving.org).

Rodriguez, D. and Targa, F. (2004), The value of accessibility to Bogotá's bus rapid transit system. *Transport Reviews*, vol. 24, no. 5.

Sandvik, E. (2005), Clean development mechanism as a vehicle for funding transport systems in developing countries. Proceedings from the *Annual Meeting of the Transportation Research Board*, Washington, January 2005.

Schipper, L. (2003). Personal communication with Dr. Lee Schipper of the World Resources Institute, Embarq Programme.

Science (2004), The hydrogen backlash. *Science*, vol. 305, 13 August 2004, pp. 958–961.

Shoup, D. (2005), *The high cost of free parking*. Washington: The American Planning Association.

Smith, J. and Gihring, T. (2004), *Financing transit systems through value capture: An annotated bibliography*. Victoria: Victoria Transport Policy Institute.

Sofradzija, O. (2005), Monorail to up visitor fare, locals to pay less. *Las Vegas Review-Journal*, 15 December 2005, (http://www.reviewjournal.com/lvrj_home/2005/Dec-15-Thu-2005/news/4800435.html).

Steer Davies Gleave (2003), *Estimation of private vehicle trips replaced by TransMilenio: Phase II report*. SDG: Bogotá.

Thomas, E. (2001), Bus rapid transit. Presentation at the *Institute of Transportation Engineers Annual Meeting*, Chicago, August 2001.

Thomson, I. (2001), The Impact of Social, Economic and Environmental Factors on Public Transport in Latin American Cities, *International Seminar on Urban Transport*, November 2001, Bogotá, Colombia.

Tinker, I. (1997), *Street foods: Urban food and employment in developing countries*. New York: Oxford University Press.

Tiwari, G. (2000), Encroachers or service providers? *Seminar*, vol. 491, pp. 26–31, (http://www.india-seminar.com/2000/491/491%20geetam%20tiwari.htm).

TCRP (2003), *TCRP synthesis report 48: Real-time bus arrival information systems*. Washington: US TCRP.

TfL (2006), *Impacts monitoring: Fourth annual report, June 2006*. London: Transport for London (TfL).

TfL (2003), *Summary of the main benefits of the Jubilee Line*. London: Transport for London (TfL).

TRB (Transportation Research Board) (2000), *Highway capacity manual*. Washington: TRB.

UITP (International Association of Public Transport) (2005), *Towards an integrated travel information system*. Brussels: UITP.

UNCFD (United Nations Car Free Days) (2005), *Why use car free days?*, (http://www.uncfd.org/index2.php?menu=1&id=1&pid=0&tl=0&page=About.php).

US GAO (United States General Accounting Office) (2001), *Bus rapid transit shows promise*. Washington: US GAO.

Vasconcellos, E. (2001), *Urban transport, environment and equity: The case for developing countries*. London: Earthscan.

Venter, C., Sentinella, J., Rickert, T., Maunder, D. and Venkatesh, A. (2004), *Enhancing the mobility of disabled people: Guidelines for practitioners*. TRL Overseas Road Note 21, Wokingham (UK): TRL.

VTPI (Victoria Transport Policy Institute) (2006), *On-line TDM encyclopaedia*, (http://www.vtpi.org/tdm/index.php).

Wangwongwatana, S. (2003), Use of appropriate technology for air quality solutions. Presentation at the *Air and Waste Management Association national conference*, San Diego, US.

Webster, B. (2006), Congestion charge chiefs may profit from a Swedish lesson. *The Times Online*, (http://www.timesonline.co.uk/article/0,,2-2120871,00.html).

Wetzel, D. (2006), Innovative ways of financing public transport. *World Transport Policy & Practice*, vol. 12, no. 1, pp. 40–46.

Wetzel, D. (2005a), Communication on the New Mobility Cafe group (http://groups.yahoo.com/group/NewMobilityCafe). Dave Wetzel, Vice Chair, Transport for London (TfL), 24 October 2005.

Wetzel, D. (2005b), A smart tax. *Estates Gazette*, 12 March, pp. 54–57.

Whitelegg, J. (1997), *Critical mass: Transport, environment and society in the twenty-first century*. London: Pluto Press.

WBCSD (World Business Council for Sustainable Development) (2001), *Mobility 2001*. Switzerland: Atar Roto Presse.

Wright, L. (2003), *Bus rapid transit*. First edition. Eschborn: GTZ.

Wright, L. and Fulton, L. (2005), Climate change mitigation and transport in developing nations. *Transport Reviews*, vol. 25, no. 6, pp. 691–717.

Wright, L. and Fjellstrom, K. (2003), *Mass transit options*. Eschborn: GTZ, (http://www.sutp.org).

Xinhuanet (2005), Shenzhen drivers walk to work on 'car-free day'. *Xinhuanet News Service*, (http://news.xinhuanet.com/english/2004-06/11/content_1521766.htm, 11 June 2005).

Institute for Transportation & Development Policy (ITDP)
127 West 26th Street
Suite 1002
New York, NY 10001
USA

mobility@itdp.org
http://www.itdp.org