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Easter Seals DISABILITY SERVICES

Bus Rapid Transit (BRT) and Accessibility in the U.S.

Bus rapid transit, or "BRT," is a relatively new form of public transportation in the U.S. that is attracting increased attention as an alternative to traditional urban bus and rail services.

In some cities BRT operates more like a bus while in others it is more like a train. Consequently, the design and operation of each local BRT program will determine the application of the appropriate transportation regulations of the Americans with Disabilities Act since provisions exist for both bus and rail operations. Easter Seals Project ACTION is working with the Federal Transit Administration to identify factors related to effectively serving people with disabilities on BRT. To discuss these concerns, develop consensus about issues that need to be addressed, identify solutions, and make recommendations to the transit industry, ESPA and the FTA convened members from the disability, transit operating, and vehicle manufacturing communities at a consensus conference in Washington, D.C., in April 2005. Consensus conference participants included representatives from the disability communities and public transit agencies in Boston, Dallas, Eugene, Ore., Las Vegas, and Pittsburgh; BRT vehicle and accessibility equipment manufacturers; American Society of Civil Engineers; Institute of Transportation Engineers; The Access Board; National Council on Disability; National Organization on Disability; U.S. Department of Transportation Office of the Assistant General Counsel for Regulation and Enforcement; FTA; and ESPA.

As one of the outcomes of this consensus conference, ESPA has compiled the following question-and-answer brief to provide communities with more information and best practices on accessibility and BRT.

What is Bus Rapid Transit?

BRT has characteristics of both fixed-route bus and rail operations, and can be described as a hybrid service that can be more like either bus or rail depending on locally-determined variables. BRT is operated using buses that resemble rail cars, with service characteristics that resemble rail service.

In August 2004, the FTA published *Characteristics of Bus Rapid Transit for Decision-Making* (CBRT), a document that defines the major elements of BRT.[1] The CBRT cites Bus Rapid Transit - Implementation Guidelines, TCRP Report 90-Volume II to define BRT as "A flexible, high performance rapid transit mode that combines a variety of physical, operating and system elements into a permanently integrated system with a quality image and unique identity." The following six key characteristics, summarized below, are described in detail in the CBRT.

1. Use of "**running ways**" (or roadways) that are often segregated from the travel lanes other vehicles use, such as a dedicated bus lane. This allows BRT to operate in a more express manner than if operating in mixed traffic. However, segregated running ways are not a requirement for a service to be considered BRT. As an element of the running way characteristic, some systems use a technology called "precision docking" to aid the vehicle in aligning with the roadway and curb, resulting in a smoother ride and more reliable alignment with passenger boarding platforms.

2. As with rail service, passengers board and disembark from BRT vehicles at **stations**. BRT stations are characterized by a number of variables, including station type, platform height, platform layout, vehicle passing capability, and station access by pedestrians and drivers.

[1] An update of this document incorporating the accessibility issues identified at the April 2005 consensus conference is planned for 2006. The current edition is available at http://www.fta.dot.gov/7639_16085_ENG_HTML.htm.

3. BRT **vehicles** can create a strong visual identity that is distinctive from more traditional bus service. While they are still rubber-tired buses, they are often designed to appear sleek and futuristic. Their height, door widths, circulation areas, seating configurations, and securement areas can be designed to maximize accessibility. Like rail cars, multiple passenger doors may open to station platforms on both sides of the vehicle, allowing passengers to board and exit relatively quickly.

4. The **fare collection systems** used for BRT are designed to facilitate express service operations. Some BRT systems collect fares upon boarding, as is done on a traditional bus, while others use a form of pre-payment as is typically used for in rail service. Some pre-payment fare collection systems use gates to enforce payment, while others have no gates and require each passenger to carry a ticket or other proof of payment.

5. BRT operations are enhanced by the use of **Intelligent Transportation Systems (ITS)**. The CBRT report documents 21 ITS applications categorized into seven groups: vehicle prioritization (affecting the control of traffic signal timing), vehicle assist and automation technology (including precision docking), electronic fare collection, operations management (including scheduling, dispatching, and vehicle monitoring), passenger information (including traveler information at stations and personal trip planning), safety and security, and support technologies such as advanced communication systems, data archiving, and passenger counting.

6. BRT **service and operating plans** include routes that are designed to minimize the need for passengers to transfer between routes to reach their destination. Planners also design a high frequency of service (so customers experience no more than a brief wait at the station for the next bus) and they position stations spaced farther apart on the route than stops for traditional local bus service. In terms of operating characteristics, BRT service is more akin to rail than traditional bus service.

Locally-determined variations within each of the BRT characteristics determine whether BRT operates more like a bus or more like rail.

Why is BRT service becoming popular in the U.S.?

- BRT is an economical and efficient alternative to traditional bus and rail service, offering the convenience and express travel of rail service without requiring the major capital investment required for rail.

- BRT offers a reduction in travel time over traditional bus service. Where segregated travel lanes, signal priority and other features are used, BRT can even offer reduced travel time over personal automobiles.

- The sleeker identity and more express nature of BRT over traditional bus attracts more “choice” riders (those who have the option of driving themselves, but choose to use transit instead), resulting in fewer cars on the road.

- Unlike rail service, BRT has the flexibility to adapt to physical surroundings specific to a community, and respond to changes in these surroundings. Because BRT can operate on travel lanes with mixed traffic, new routes and changes to existing routes can be implemented with relative ease compared to rail.

- BRT has met with success in Europe and South America. Early service in the U.S. appears promising. Current and planned BRT services in the U.S. are listed in Appendix A of this document.

How does the ADA apply to BRT?

The April 2005 consensus conference participants agreed that regulatory needs for BRT can be largely met by drawing from existing bus and/or rail regulations. Additional federal guidance was discussed to clarify which elements of the bus and rail regulations apply to BRT systems, and how locally-determined variations within the BRT characteristics affect whether a community’s BRT service operates more like a bus or more like rail. Until such guidance is published, communities planning BRT services should consult with their FTA regional office for guidance on applying the ADA regulations to their specific BRT services.

What accessibility issues have been identified?

The consensus conference identified the following issues related to BRT accessibility:

- **Ramp Design and Deployment**: The use of low-floor vehicles aligned with the height of station platforms and rapidly deployable ramps will help ensure accessibility of BRT services. Other factors that affect accessibility include side barriers on the ramp, operator training, and slope of the ramp (related to platform design).

- **Platform Design**: Platform design is integral to the issue of ramp design. A difference in heights of the vehicle floor and platform creates a "vertical gap" or level change that passengers experience when moving between the platform and the vehicle. Distance between the vehicle and the platform is called the "horizontal gap." Ideally, these gaps are minimal so that all passengers can walk or wheel across the vehicle threshold without a noticeable change in level or surface continuity. If the vertical gap exceeds 5/8 of an inch or the horizontal gap exceeds 3 inches, a ramp or "bridge plate" that spans these gaps and meets the requirements of the ADA Accessibility Guidelines (ADAAG) for Transportation Vehicles must be used. Use of precision docking technology (described below) can help minimize gaps.

- **Wheelchair Securement**: Accessibility for the variety of mobility devices and their securement is an issue for all transit modes, including BRT. Because BRT vehicles may have multiple doors, including doors on both sides of the vehicle, and greater passenger capacity than traditional buses, they have passenger circulation issues more like rail than bus service. The number, location and design of securement positions are interrelated with vehicle size and passenger circulation. Rear-facing securement, stability of securement, support structures surrounding each securement position (such as handrails, walls and partial walls) and the additional use of lap belts and shoulder harnesses are important to consider in designing BRT vehicles.

- **Interior Configuration and Circulation**: Integral to the issue of wheelchair securement locations, described above, is the overall interior configuration of vehicles and the resulting circulation patterns of passengers entering and exiting vehicles. Vehicle configuration design presents challenges for meeting multiple and changing needs. Circulation through a BRT vehicle, which uses doors on both right and left sides depending on the position of the platform in relation to the running way, is different from traditional bus service which uses single-side boarding. Accessibility issues to be considered in designing BRT vehicles include interior surfaces, traction needs, traversable areas for people with disabilities including those who use wheelchairs, and marking transition through floor texture and color were included in discussions. The fare collection location also affects circulation. Interior configuration profoundly affects the speed of passenger boarding and egress for all passengers.

- **Running Way Treatment and Markings**: BRT stations may be located in the middle of the roadway, requiring customers to cross running ways to get to and from the station. Running ways, safe crossing locations, platform edges, and other potentially hazardous features need to be conveyed to customers in accessible formats. Tactile warnings and visual warnings using color and contrast strips are potential solutions for some issues.

- **Precision Docking**: This technology can minimize the horizontal gap between the vehicle and platform and therefore maximize the accessibility and safety of the threshold between vehicle and platform. Consistency in controlling the vertical and horizontal gap at each station is important for ensuring accessibility, and precision docking is a means of achieving this consistency, though extreme temperatures and weather conditions may affect its effectiveness. Vehicle manufacturers in the U.S. are beginning to understand the value in adding this technology to BRT vehicles as the number of BRT systems in the U.S continues to grow.

- **Passenger Information – Signage and Displays**: As with traditional bus and rail services, BRT accessibility is affected by the accessibility of the information provided to passengers. Traveler information (such as vehicle arrival time, next-stop

information, and way-finding directions to guide passengers in and around the station) needs to be accessible to everyone, including passengers with vision and hearing disabilities. Information should be provided in visual, tactile and audible formats. This information needs to be easy to access throughout the station and vehicle. For example, LED displays on a vehicle should be visible to both forward and rear-facing passengers. Audible announcements need to be understandable and at a volume that does not interfere with other audible cues.

- **Signal Priority**: Transit signal priority is a technology that facilitates express bus operations, putting the "rapid" in Bus Rapid Transit by recognizing the location of a transit bus and changing the traffic signal timing of the upcoming intersection to minimize the amount of time the bus is stopped in traffic. As previously noted, the use of this technology can reduce the amount of time pedestrians have to complete street crossings. While buses may operate more quickly, people with disabilities and slower moving people generally may not have adequate time to safely cross the street. The use of transit signal priority timing needs be balanced with the needs and safety of all pedestrians.

- **Access to Stations**: Station placement in relation to intersections, pedestrian crossing locations and timing, and overall pedestrian facilities surrounding stations are key accessibility issues for BRT. Walkways and pathways for passengers with and without disabilities should be the same, so that this distinction between the two customer groups would be eliminated. Since the ADAAG requirement already says that the two paths should coincide to the maximum extent feasible, that requirement would also apply to BRT. BRT stations placed in the center median will have different pedestrian access issues from stations placed to the bus-traditional right side of traffic lanes, particularly with regard to street crossings.[2]

[2] The Access Board is currently developing standards regarding pedestrian street crossings in the context of public rights-of-way rulemaking. More information on this is available at http://www.access-board.gov/prowac/index.htm.

What can communities and transit providers do to address accessibility in developing BRT services?

- **Involving community members with disabilities in all aspects of planning and designing the services, equipment, and facilities can help ensure system and vehicle accessibility**. For example, Lane Transit District involved a group of local disability advocates in using a mock-up version of the vehicle being designed for BRT service in Eugene, Ore. The April 2005 event engaged local residents with disabilities in problem-solving the challenges of boarding and securing mobility devices in a low-floor vehicle with both left and right side boarding. People with different styles and sizes of mobility devices participated in the test, trying out different seating configurations and securement positions, and maneuvering through the vehicle using both doors. The three-dimensional and the experiential nature of the demonstration enabled participants and planners to discover unanticipated barriers which will be redesigned before vehicle specifications are finalized.

- **Ensuring that, in planning each aspect of the BRT system, all interrelated aspects are designed in coordination with each other**. The system should be planned holistically. The entire system can be compared to a puzzle composed of interlocking pieces, or perhaps a scale with multiple weights to balance. For example, station platform height, vehicle design, and the use of precision docking can be designed to fit together to ensure accessibility at the threshold from station to vehicle. Vehicle interior configuration and circulation are strongly related to the design of wheelchair securement areas. Running way treatments, signal priority, and station access are also interconnected.

- **Improving the accessibility of the larger pedestrian environment in communities surrounding BRT stations. Passengers need to be able to easily and** safely travel between the station, residences, shopping, employment sites, and other destinations in the surrounding community in order for BRT to be truly accessible. Such improvements will also benefit the community beyond use of the BRT system.

What research efforts are under way?

- FTA is evaluating BRT demonstration projects in Boston, Charlotte, Cleveland, Eugene, Hartford, Honolulu, Las Vegas, Miami, San Juan, and Santa Clara. Information about each project is online through: http://www.fta.dot.gov/initiatives_tech_assistance/technology/brt/projects/2401_ENG_HTML.htm.

- Transit Cooperative Research Program (TCRP) Project A-16A: Improved Traffic Signal Priority for Transit, being conducted by Gardener Transportation Systems, Inc., with completion planned in 2005. This project completes the work begun under project A-16 with the University of Arizona. More information is available through the Transportation Research Board (TRB) Web site at: http://www4.trb.org/trb/crp.nsf/63b33593db2829ee8525672f0062cef3/422df59057b3fd988525678a004dc2e5?OpenDocument.

- TCRP Project A-23A: Cost and Effectiveness of Selected Bus Rapid Transit Components, being conducted by Kittleson & Associates, Inc., with a completion date of October 2005. The objective of this project is to determine the costs, impacts, and effectiveness of implementing selected BRT components. More information is available through the TRB Web site at: http://www4.trb.org/trb/crp.nsf/63b33593db2829ee8525672f0062cef3/a93f955364d1d11185256c6e0060f179?OpenDocument.

- Project B-12A, Phase II: Update the "Traveler Response to Transportation System Changes" Handbook (DOT-FH-11-9579), being conducted by Richard H. Pratt, Consultant, Inc. This research effort is being published in chapters as TCRP report R-95: *Traveler Response to Transportation System Changes*. Chapter 4 of this report will be titled "Busways, BRT and Express Bus." The full project is planned for completion in December 2005. More information is available through the TRB Web site at: http://www4.trb.org/trb/crp.nsf/63b33593db2829ee8525672f0062cef3/5ea0f7710f14445385256784006e9bd8?OpenDocument.

- TCRP Project D-11: Design, Operation, and Safety of At-Grade Crossings of Exclusive Busways, being conducted by BMI-SG Associates. More information is available through the TRB Web site at: http://www4.trb.org/trb/crp.nsf/63b33593db2829ee8525672f0062cef3/08112f2402caf8b785256dfa0073e33d?OpenDocument.

- TRB Transit IDEA Project 34: Mechanical Precision Docking for Bus Rapid Transit, being conducted by Greater Cleveland Regional Transit Authority. More information is available in the following PDF file on the TRB Web site: http://trb.org/publications/sp/transit-idea_report_jan2005.pdf.

Where can I get more information?

- FTA's *Characteristics of Bus Rapid Transit for Decision-Making*, R. Diaz, editor, August 2004, available as a PDF file on the FTA Web site through the following page: http://www.fta.dot.gov/7639_16085_ENG_HTML.htm. An update of this document is planned for 2006.

- The FTA Web site includes many pages and documents on BRT available through the following page: http://www.fta.dot.gov/initiatives_tech_assistance/technology/2381_ENG_HTML.htm.

- FTA's Office of Research, Demonstration and Innovation, Karen Facen, email Karen.Facen@fta.dot.gov.

- TCRP Report 90: *Bus Rapid Transit, Volume 1: Case studies in Bus Rapid Transit* and *Volume 2: Implementation Guidelines*. These 2003 documents are available through www.tcrponline.org.

- WestStart-CALSTART web page: http://www.calstart.org/programs/brt/ and electronic newsletter funded by FTA called *BRT newsLane*: http://www.calstart.org/programs/brt/brt_newslaneform.php.

- APTA's online Bus Rapid Transit Resource Guide: http://www.apta.com/research/info/briefings/briefing_2.cfm.

- The Access Board, http://www.access-board.gov/, for existing vehicle and facility standards in the ADAAG: http://www.access-board.gov/transit/

- TCRP Synthesis 50: *Use of Rear-facing Positions for Common Wheelchairs on Transit Buses*. This 2003 document is available through www.tcrponline.org.

ESPA offers a number of related resources on creating an accessible pedestrian environment. These include:

- "Accessible Pedestrian Signals: Making Your Community Safer and More Accessible for Everyone," a fact sheet available online through the ESPA Clearinghouse at: http://projectaction.easterseals.com/site/PageServer?pagename=ESPA_fact_sheets

- ESPA sponsored development of an Accessible Transportation Signals course offered by the National Transit Institute: http://www.ntionline.com/CourseInfo.asp?CourseNumber=ID011

- ESPA sponsored development of an online Pedestrian Accessibility course offered by the Institute of Transportation Engineers: http://www.ite.org/education/webinars_pa.asp

A note about Web site links: Precise URL links are included in this document for your convenience. All links were tested prior to publication. Because organizations that maintain Web sites sometimes change and discontinue pages, please contact the sponsoring organization (generally indicated near the beginning of the URL) if the page you seek is not available.

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Appendix A: Current and planned BRT services in the US

BRT services are operational or planned in at least the following communities:[3]

- Alameda County, Calif.: Alameda Contra Costa Transit District -- http://www.actransit.org/riderinfo/sanpablo.wu http://www.actransit.org/planning_focus/mis.wu
- Albany, N.Y.: Capital District Transportation Authority – http://www.ny5.org
- Atlanta, Ga.: Georgia Regional Transit Authority -- http://www.nwhovbrt.com/
- Boston, Mass.: Massachusetts Bay Transportation Authority -- http://www.allaboutsilverline.com/
- Charlotte, N.C.: Charlotte Area Transit System (CATS) -- http://www.fta.dot.gov/2400_7270_ENG_HTML.htm
- Chicago, Ill.: Chicago Transit Authority -- http://www.fta.dot.gov/2396_7271_ENG_HTML.htm
- Cleveland, Ohio: Greater Cleveland Regional Transit Authority -- http://euclidtransit.org/
- Denver, Colo.: Regional Transportation District -- http://www.rtd-denver.com/SpecialRides/MallShuttles/
- Eugene, Ore.: Lane Transit District -- http://www.ltd.org/about/projects.html
- Fairfax County, Va.: http://www.co.fairfax.va.us/news/2004/04226.htm and http://www.fta.dot.gov/library/policy/ns/ns2004/pe_DullesBRT.htm
- Hartford, CT: Connecticut Department of Transportation -- http://www.ctbusway.com/
- Honolulu, Hawaii: City and County of Honolulu Department of Transportation Services -- http://www.oahutrans2k.com/
- Kansas City, Miss.: Kansas City Area Transportation Authority -- http://www.kcata.org/media/MAXFacts.htm
- Las Vegas, Nev.: Regional Transportation Commission of Southern Nevada -- http://www.rtcsouthernnevada.com/max/
- Los Angeles, Calif.: Los Angeles County Metropolitan Transportation Authority and Los Angeles DOT -- http://mta.net/projects_programs/rapid/rapid.htm
- Louisville, Ky.: Transit Authority of River City -- http://www.fta.dot.gov/2396_7280_ENG_HTML.htm
- Miami, Fla.: Miami-Dade Transit Agency -- http://www.co.miami-dade.fl.us/transit/south_miamidade_busway.asp
- Minneapolis, Minn.: Metro Transit -- http://www.metrotransit.org/improvingTransit/northwestCorridorWhat.asp
- Montgomery County, Md.: Montgomery County Department of Public Works and Transportation -- http://www.fta.dot.gov/2396_7282_ENG_HTML.htm
- Orlando, Fla.: Central Florida Regional Transportation Authority, Lynx -- http://www.golynx.com/?pid=1155575

[3] URLs are included for systems with specific BRT services/planned projects. FTA project pages are provided for FTA demonstration projects without a local Web page on BRT.

- Phoenix, Ariz.: Valley Metro/Regional Public Transit Authority -- http://phoenix.gov/PUBLICTRANSIT/rapid.html

- Pittsburg, Pa.: Port Authority of Allegheny County -- http://www.ridegold.com/ride/pgBusways.asp

- San Diego, Calif.: Regional Planning Agency and Caltrans - http://www.sandag.org/index.asp?newsid=213&fuseaction=news.detail

- San Francisco, Calif.: MUNI -- http://www.sfcta.org/geary.htm

- San Juan, P.R.: Puerto Rico Highway and Transportation Authority -- http://www.fta.dot.gov/2400_7284_ENG_HTML.htm

- Santa Clara, Calif.: Santa Clara Valley Transportation Authority -- http://www.vta.org/projects/line22brt.html

- Seattle, Wash.: King County Metro Transit -- http://www.metrokc.gov/kcdot/tp/transit/six-year.stm