



Expanding the use of BRT

Bus rapid transit accelerates to maturity as cities add lines, regional spines and plan for adaptable local service.

WHITE PAPER | 2018

Affordable, fast to implement and flexible, bus rapid transit has matured over the past 20 years and has become a common element of transit networks in both large and small markets. This white paper explores BRT's rise and how cities continue to expand its use.

In this white paper:

- BRT takes its place as part of an overall system
- Cities tee up BRT for the future by planning smaller areas, frequent service
- Why cities are attracted to BRT
- Aggressive tactics to keep BRT competitive

BRT takes its place as part of the overall transit system

Realizing bus rapid transit's effectiveness at moving people, cities are expanding its role. In fact, 15 years ago, there were only a few BRT lines in a small number of systems in the United States. Today, most bus systems have at least one BRT line, and many operators are adding on:

- **Kansas City, Missouri**, will open its third MAX BRT – Prospect in 2019.
- **Eugene, Oregon**, opened its third Emerald Express BRT line in 2017.
- **Grand Rapids, Michigan**, is opening its second BRT line.
- **Chicago's** Pace Pulse is adding two lines, one opening in 2018 and the second opening in 2020.
- **San Antonio** has one VIA Primo BRT line in operation and two more lines under construction. The city is developing a system plan with up to seven high-capacity transit corridors, including BRT.

Other cities, including Omaha, Indianapolis, Tulsa and San Francisco, are preparing to open their first BRT lines.

"If a transit operator has a high-volume BRT program carrying 40 to 60 people in every vehicle, four to six times an hour, that's dozens of cars removed from congested corridors," said Mark Huffer, HNTB project director and BRT practice leader. "City leaders understand BRT is an opportunity to greatly enhance citizens' mobility options in a cost-effective manner."

As transit systems evolve, many operators are opening multiple BRT corridors as "spines" of regional transit networks. Thus, BRT no longer is a single line but part of an overall integrated transit system.

"A strong transit spine consisting of BRT or other modes – with fast, frequent service and additional branch line services – creates a strong system," said Kyle Keahey, AICP, HNTB Central Division transit market leader.

Cities tee up BRT for the future

Two more trends indicate the U.S. may see more BRT in the future:

- **Smaller areas, frequent service.** One of the newest trends in bus service planning is to have smaller service areas with high-quality, high-frequency service as opposed to larger service areas with infrequent service. And that trend is positioning key corridors well for BRT development.

Capital Metro in Austin, Texas, recently completed its five-year service plan update, Connections 2025, which focuses on providing higher frequency service on its core routes rather than more costly coverage in suburban areas. The plan intends to boost ridership and move these

corridors toward a robust arterial BRT operation, like the two MetroRapid BRT routes already in operation.

- **Pairing BRT with managed lanes.** Miami, Tampa, Austin, Boulder and others are considering how to integrate transit express bus services into managed lane facilities, creating a BRT-type operation where travel times can be reliable. Granting transit access to managed lane facilities helps address the equity issue and gives commuters options.

Austin, for example, is exploring a managed lane component with the future reconstruction of I-35. Capital Metro is evaluating how it might integrate transit service and in-line stations into the managed lane as well as ingress/egress ramps into downtown.

Another Austin managed lane along Loop 1 (MOPAC) won't have in-line stations but will integrate express bus service in its operation. The new managed lanes will offer significant travel-time savings for transit customers traveling to and from Austin's congested downtown core.

Under Tampa Bay's NEXT program, where managed lanes are an appropriate solution and being proposed for implementation, the Florida Department of Transportation is considering how to add express bus or bus rapid transit service.

The Miami-Dade Expressway's proposed SR 836-MDX Transit Program will deploy an Express Rapid Transit Service pilot program along SR 836 that includes private ride-sharing providers (e.g., uberPOOL and Lyft Line).

The SR 836-MDX Express Rapid Transit Service will incorporate express technology (XT) lanes. XT lanes are dedicated platforms for private and public transit and ride-share vehicles linked to intermodal hubs. MDX is widening and hardening its inside shoulders to provide a 12-foot uninterrupted XT lane along SR 836. The agency will be operating a peak-hour express transit service along these lanes. As technology allows, the XT lanes are envisioned to accommodate autonomous vehicles as well. This service will provide reliable, multimodal options to MDX customers while increasing capacity and increasing the level of service along SR 836. These services should be available in the second half of 2018.

The U.S. 36 Managed Lanes/Bus Rapid Transit Project between Denver and Boulder, Colorado, includes 15 miles of improvements in the corridor. The multimodal U.S. 36 Express Lanes Project is led by the Colorado Department of Transportation and the Regional Transportation District. The effort to reconstruct a section of U.S. 36 includes an express lane in both directions and two general-purpose lanes. The express lanes accommodate

tolled vehicles, high-occupancy vehicles and BRT, which began running in January 2016.

What's the attraction?

Bus rapid transit combines the flexibility and cost savings of buses with the efficiency, speed, reliability and amenities of a rail system – often without the expense of adding significant infrastructure.

- **Scalable.** BRT is whatever a city needs it to be. Systems vary from basic enhanced stations and service in mixed traffic to center-running dedicated lanes and full transit-signal priority.

“Alignments can be lanes on arterials, adjacent to highly traveled highways, such as the Minneapolis Orange Line, or in non-urban areas with significant traffic demand, as illustrated by the Aspen-Glenwood Springs VelociRFTA BRT project in Colorado,” Keahey said.

Further, BRT can accommodate specific roadway configurations and community design standards. Systems routinely run in mixed traffic and dedicated lanes in the same alignment.

Austin has two BRT routes, the 801 and the 803, both of which run through downtown along a common alignment. There is a dedicated lane for transit and right-turn lanes for autos in the downtown area, but the remainder of the routes are in mixed traffic.

- **Affordable.** BRT capital costs can range from \$5 million to \$20 million per mile, depending on the type of system and the length of the corridor.

“Rail projects, in general, cost up to \$100 million per mile and more,” Huffer said. “For less than the cost of a single rail line, a city can implement an extensive bus rapid transit system. Delivery time from planning to operations can be five years or less.”

- **Favorable.** BRT has been viewed favorably by both Congress, which has been supportive of Small Starts funding, and the Federal Transit Administration because of the mode's ability to deliver significant transit improvements in a cost-effective and relatively quick manner.

BRT also is viewed favorably among riders. Most BRT projects result in significant ridership gains. These riders enjoy predictability, travel time savings and next-level amenities. Residents living in private developments near BRT lines often see BRT positively impact property values and adjacent land use.

Aggressive tactics keep BRT competitive

Pressured by cheaper fuel prices and the popularity of ride-sharing services, cities are keeping BRT competitive by accelerating bus movement throughout arterial traffic, increasing passenger communication and improving access.

HNTB has seen widespread efforts by transit agencies to offer bus-on-shoulder routes, off-board fare payment, next-bus arrival technology, level boarding, queue jumps at key intersections and sophisticated traffic signal prioritization to give buses an advantage in congested corridors. Real-world examples of innovations in BRT include:

- **Jacksonville's First Coast Flyer Southwest BRT**, which is a 13-mile corridor from the Orange Park Mall to downtown Jacksonville, Florida. The project includes 16 stand-alone BRT stations, four queue-jump lanes, transit signal priority at 23 intersections, ITS improvements, 3 miles of sidewalk improvements and a multiuse path.
- **San Diego's SuperLoop Rapid**, which operates both clockwise and counterclockwise to better serve customers, and includes signal priority and synchronization for the entire route. The first two phases of the project are operating. The nine-mile circulator system has 26 stations and keeps University of California, San Diego students moving while reducing vehicle load.

Incorporating technology, such as traffic signal prioritization, could help transit operators compete for federal funding of dedicated guideway projects. According to FTA requirements, at least 50 percent of the guideway needs to be dedicated to BRT – but it doesn't have to be dedicated 24 hours a day. Cities can signalize an existing traffic lane for peak periods of the day and still be eligible for federal dollars.

Moving people differently

Communities across the United States are increasingly turning to bus rapid transit to address traffic congestion, support economic mobility and satisfy the demand for multimodal transportation options. BRT provides an affordable means for addressing those issues, and providing increased capacity and reliability in areas where feasible.

Resources

For more information, please contact one of HNTB's BRT experts:

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BRT activity across the country

HNTB delivers professional services to support all stages of BRT development. Following is a list of the firm's current BRT projects, scheduled to open within the next four years:

- **MAX BRT Network, Kansas City, Missouri**

The Kansas City Area Transportation Authority launched its planned BRT network with the opening of Main Street MAX in 2005 and Troost MAX in 2011. Prospect MAX, its third line, will open in 2019.

- **Minneapolis Orange Line, Minnesota**

The Metro Transit Orange Line is a 17-mile planned Highway BRT line along the I-35 west corridor from downtown Minneapolis through Richfield, Bloomington and Burnsville. Stations will be in the median of the highway with special flyover ramps and park-and-ride lots. The Orange Line will be the first Highway BRT in the Metro system. The project has a projected 2020 opening.

- **IndyGo Red Line BRT, Indianapolis**

At complete buildout, this 35-mile BRT route will connect northern and southern Indianapolis suburbs with the urban core and central business district of Marion County. Ultimately, the Red Line will be a single north-south line, built in segments. Sixty percent of the initial route will be dedicated lanes with a combination of median and curbside stations. It will be one of the nation's first all-electric vehicle BRT lines. Construction is scheduled to begin in 2018 on the first phase, and revenue service is scheduled to begin in 2019.

- **Pace Pulse, Chicago**

Pace's new rapid transit network is delivering enhanced express bus service to suburban commuters using the latest technology and streamlined route design. The first line on Milwaukee Avenue is scheduled to launch in late 2017, and the second line, along Dempster Street, is planned to open in 2020.

- **Peoria Avenue and Route 66 BRT lines, Tulsa, Oklahoma**

Designed to transform the perception and reliability of BRT service, stations and buses will feature elements that create a unique Tulsa-centric brand. The first line, opening in 2018, will run north-south through the city on Peoria Avenue and will include 39 stations along a 9-mile corridor. The second line, planned for 2021, will run east-west along the historic Route 66.

- **San Francisco Van Ness Avenue BRT, California**

The city's first BRT system on Van Ness Avenue in downtown San Francisco is being constructed under the CM/GC project delivery method and is expected to carry 45,000 passengers per day when it opens in 2019.

- **San Antonio VIA Metro Transit**

In 2016, VIA Metropolitan Transit updated its long-range plan. As part of the update, the agency identified seven corridors in which to study the feasibility of high-capacity transit. VIA is completing a Rapid Transit Corridor Study exploring an alternatives analysis and a mode analysis for each corridor, and developing a system network of high-capacity transit, including both BRT and light rail transit.

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