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Bus Rapid Transit Working Group

BRT Vehicles: Characteristics and Selection Considerations

Abstract: This document reviews the current state of vehicles for bus rapid transit (BRT) in North America, including information on size, design elements, propulsion system, intelligent transportation system technologies, and branding. The document discusses how these characteristics impact the BRT service and provides guidance on selecting the right BRT vehicle and characteristics to meet the needs of an agency's BRT system.

Keywords: automated bus rapid transit (ABRT), automatic vehicle location (AVL), bus rapid transit (BRT), bus, driver assist, intelligent transportation systems (ITS), transit signal priority (TSP), vehicle

Summary: Vehicle design plays a critical role in BRT system performance, cost and user experience. Transit agencies must consider carefully when selecting the vehicles for their BRT. Key design factors to consider include vehicle size, aisle width, number and configuration of doors, and seating arrangements—all of which directly impact system capacity and service efficiency. The propulsion system is another important vehicle element to consider in terms of cost, ability to meet the BRT's operational demands, and community benefits. Intelligent transportation system (ITS) elements are critical for both the passenger experience and for service speed and efficiency. Finally, the internal and external appearance of the vehicles contribute significantly to a system's image and identity in the transportation market. This document reviews the key characteristics of BRT vehicles and their impact on BRT service, providing guidance to transit agencies as they select vehicles for their BRT systems.

Foreword

The American Public Transportation Association is a standards development organization in North America. The process of developing standards is managed by the APTA Standards Program's Standards Development Oversight Council (SDOC). These activities are carried out through several standards policy and planning committees that have been established to address specific transportation modes, safety and security requirements, interoperability, and other topics.

APTA used a consensus-based process to develop this document and its continued maintenance, which is detailed in the manual for the APTA Standards Program. This document was drafted in accordance with the approval criteria and editorial policy as described. Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

This document was prepared by the Bus Rapid Transit Vehicle Sub-Working Group of the Bus Rapid Transit Working Group as directed by the Bus Systems Standards Policy and Planning Committee. The sub-working group utilized a paper developed by the APTA BRT Committee to create this document for the APTA Standards Program.

This document represents a common viewpoint of those parties concerned with its provisions, namely transit operating/planning agencies, manufacturers, consultants, engineers and general interest groups. The application of any recommended practices or guidelines contained herein is voluntary. APTA standards are mandatory to the extent incorporated by an applicable statute or regulation. In some cases, federal and/or state regulations govern portions of a transit agency's operations. In cases where there is a conflict or contradiction between an applicable law or regulation and this document, consult with a legal adviser to determine which document takes precedence.

This is a new document.

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Introduction

This introduction is not part of APTA BTS-BRT-GL-008-25, "BRT Vehicles: Characteristics and Selection Considerations."

APTA recommends the use of this document by:

- individuals or organizations that operate or plan to operate bus rapid transit;
- individuals or organizations that contract with others for the operation of bus rapid transit; and
- individuals or organizations that influence how bus rapid transit systems are operated (including but not limited to consultants, designers and contractors).

Scope and purpose

For transit agencies implementing bus rapid transit (BRT), it is important to understand the role that the vehicle plays in system performance, customer experience, and branding that differentiates the BRT from other bus service.

The document reviews the current state of vehicles that can be used for BRT operations in North America, including information on size, design elements, propulsion system, intelligent transportation system technologies, and branding, and how these characteristics impact the BRT service. The goal is to help transit select BRT vehicles with the right characteristics to meet the needs of their BRT systems.

BRT Vehicles: Characteristics and Selection Considerations

1. The role of the vehicle in bus rapid transit

The U.S. Federal Transit Administration defines BRT as a high-quality bus-based transit system that delivers fast and efficient service that may include dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms and enhanced stations. These BRT elements, which may be implemented incrementally, can increase the efficiency and effectiveness of bus service, increase ridership, improve the rider experience and provide air quality benefits.

Vehicles are an important component of a BRT system. They not only contribute significantly to BRT's image and identity, but they also play an important role in achieving measurable performance success. Vehicle size and layout are critical for increased ridership capacity. Physical elements such as doors, cameras and ramps, must be considered with regard to their impact on boarding efficiency, dwell times, passenger experience, and accessibility. Intelligent transportation system (ITS) technologies such as driver assist and transit signal priority can improve service speed and efficiency. The different propulsion systems offer varying pros and cons with regard to cost, operational ease, and community air quality benefits. And identifiable branding is an important factor in distinguishing BRT in the transit landscape.

This document reviews these key elements and what to consider when selecting a bus for BRT service.

2. Vehicle size and considerations for BRT

A key consideration for the BRT vehicle is size. Most BRT systems in North America use the standard 40-foot, non-articulated transit bus (or the slightly smaller non-articulated 30-foot or 35-foot sizes) or a 60-foot articulated bus.

2.1 30/35/40-foot non-articulated bus

The 30/35/40-foot non-articulated bus is the most standard of the two bus sizes. These buses are better suited for high-service-frequency routes and less dense corridors, as well as routes with smaller load factors, where riders are traveling short distances and off-boarding and onboarding frequently. Because this type is the primary bus of traditional transit service, use of these vehicles for BRT service has operational advantages, such as staff familiarity, obviating the need for new training; and providing inventory commonalities. However, because of its commonality with the rest of the fleet, its external appearance may not offer as much differentiation for the BRT service as a 60-ft bus does. In addition, agencies must avoid the temptation to deploy these standard size BRT vehicles on other routes and vice versa, thereby undermining the BRT service's brand identity and ridership gains.

2.2 60-foot articulated bus

The 60-foot articulated bus (or "artic"), while less widespread than the 40-foot non-articulated bus, has some distinct advantages for certain situations. These buses provide more passenger capacity and can be more cost-effective in high-demand corridors by enabling fewer buses, and related operating costs, to meet demand.

Artics also provide the opportunity for left-side doors that may be required for center-platform stations. Agencies should check local or state laws regarding size regulations, since buses may exceed the length allowed, especially after the addition of certain features, such as bike racks.

Artics also have a distinctive look and, if they are used only on the BRT line, can help define the BRT service brand, which is an essential and federally required characteristic of BRT. On the other hand, deployment of artics as the vehicle for agencies' BRT networks often results in creation of a single-purpose sub-fleet, which can result in higher capital and operating costs, as well as higher costs for parts inventory and field service support that such specialized vehicles require.

2.3 Dimensions and capacity

The vehicle's size and internal layout determine how many passengers can be carried and how comfortably. **Table 1** provides standard dimensions and capacities of typical BRT vehicles in North America and Canada, assuming a standee density of three per square meter.

TABLE 1
BRT Vehicle Dimensions and Capacity

Length (ft [m])	Width (in.)	Floor Height (in.)	Door Channels	Seats	Max. Capacity
40 (12.2)	96–102	13–36	2–5	35–44	50–60
45 (13.8)	96–102	13–36	2–5	35–52	60–70
60 (18)	98–102	13–36	4–7	31–65	80–90

2.4 Boarding efficiency and accessibility

Minimizing the step down and gap from the bus floor to the platform is essential for reducing dwell times and improving accessibility for passengers with disabilities, strollers or packages. Guided vehicles used with level platform boarding can match the efficiency of light or heavy rail systems—boarding times of two to three seconds per person per channel represent a 25% to 35% time savings over conventional bus service. Wide aisles and well-placed doors further reduce service times and improve passenger distribution.

3. Propulsion type and considerations for BRT

The five main energy source types for transit buses in North America are: diesel fuel in a conventional internal combustion (IC) drivetrain; compressed natural gas (CNG) in a conventional IC drivetrain;; diesel-hybrid electric which combines an electric motor and battery with a diesel engine; battery electric, which uses an electric drivetrain and onboard battery; and fuel cell electric, which uses an electric drivetrain, a fuel cell, onboard compressed hydrogen storage, and typically a battery as well. Battery-electric and fuel cell electric propulsions systems are both considered zero emission bus technologies.

In North America, battery electric and hybrid-electric are the two most commonly used energy source types for BRT. Battery electric buses (BEB) have unique benefits in dense urban environments where noise and local emissions are of concern, since they are far quieter and, in most cases, do not release any exhaust. In most situations, however, they cannot run an entire service day for a BRT bus and require either on-route charging or a duplicate fleet to swap out midday. Project sponsors should build in those costs to their BRT project if planning to proceed with electric buses. While fuel cell electric buses are not yet as widely deployed in North America as BEBs, they offer similar benefits in terms of reduced noise and zero tailpipe emissions (except for water) and have longer range than BEBs. They require building out new infrastructure, and this cost also should be built into a BRT project plan. More guidance on zero emission buses can be found in the Transit Cooperative Research Program publication "Guidebook for Deploying Zero-Emission Transit Buses".

For more on bus manufacturers' specific BRT vehicle offerings, see Appendix A.

4. BRT-specific procurement specifications

In addition to the vehicle size, interior layout and propulsion system, there are several BRT-specific specifications that are critical to consider when procuring a fleet.

4.1 Doors

1. **Number/configuration:** If using single center-platform stations, doors will be required on both sides of the bus. This has historically been an option only on 60-foot buses (five-door configuration) but has recently been offered on some 40-foot variants.
2. **Size:** By the nature of BRT, passengers will be exiting and entering the same doors, often at the same time. To speed up the boarding process, it is advantageous to make the doors as wide as possible.
3. **Mechanism design:** There are three primary styles of door mechanisms:
    a. **Swing-out doors** should be avoided in most BRT applications because they create conflict points with passengers waiting outside the station and can create issues with level boarding. Platform heights need to be considered so that doors do not hit the platform, or at least the doors are able to clear the platform when opening and closing.
    b. **Swing-in doors** are the most common type used and work well in most situations. However, if heavy volumes of standees are expected, they can create problems because the doors swing into passengers. They also constrict the aisle, making it more difficult to navigate bicycles and mobility devices into securement areas.
    c. **Sliding plug doors** operate most like train doors, where the door pops out slightly and then slides along the face of the bus. This style of door offers a premium train-like feel and the most advantages in quick boarding and maximum load capacity. However, they are considerably more expensive and require much more routine maintenance and calibration.
4. **Door actuation:** In some climates, it may be desirable to place actuation buttons on the doors to enable passengers to open only the doors that are necessary, in order to maintain better temperature control. If these are used, they should be placed on the door itself (rather than to the side of the door) and be mounted both on the inside and outside of the door.
5. **Lockout:** If using doors on both sides, the bus will need a lockout system to prevent an operator from accidentally opening doors into active traffic. This has been done either by using GPS trigger points or an RFID tag/reader on the bus and station that interact with the door multiplex system. In either case, it is important that the system does not open/close the doors itself, but only provide a layer of protection to the operator. It will also be important to provide the ability to temporarily override the lockout if it malfunctions.

4.2 Ramps

Buses should have a standard ramp at the front door to be used in off-route applications. However, if using level boarding at BRT stations, that front ramp will be too long and will not function at stations. For level and near-level applications, a shorter ramp, called a bridge plate, should be used at other doors. These bridge plates come in two styles: one that folds out much like regular ramps and another "cassette" style that extends out a ramp from beneath the floor. Cassette style ramps are prone to freezing up in icy conditions, so they are not recommended for areas that experience cold temperatures.

4.3 Mobility device securement

Using a rear-facing automated mobility device securement system can considerably expedite the boarding process and is often well-received by passengers due to the independence it provides. However, these are costly and require routine maintenance.

4.4 Bicycle storage

When using 60-foot buses and level or near-level boarding, providing bicycle storage inside the bus can enable quicker boarding times, reduce risk of falls from stepping down off a high curb, and provide an overall better experience. However, it can consume valuable real estate inside the bus. Bicycle storage generally comes in three types:

1. **"Toaster"-style racks** are very simple, inexpensive, maximize storage and allow standees to use the space while no bikes are there. These simply use a few vertical bars to stabilize the front tire, with Velcro straps mounted along the wall to provide additional securement. However, this securement is fairly loose and allows multiple bikes to rattle on one another, which may cause concerns for people with higher-end bikes.
2. **"Spinlock" or other similar devices** firmly secure the front wheel of the bike, providing a stable and secure hold. However, they require more space, hold fewer bikes, and limit the area from being used for other purposes when bikes are not there.
3. **Vertical racks** that hold the front tire with the bike stood up along the wall of the bus are common in rail but generally discouraged in bus applications. Because buses lack very controlled rates of acceleration and braking, this can create a hazard if the bus moves forward before a bike is fully secure.

4.5 Boarding gap control

There are several bus features that are important to consider in controlling the gap between the bus and the station in level and near-level boarding situations:

1. Most systems use a plastic "rub rail" along the platform edge to allow the bus tires to slide along the station without damage. However, for this to function most effectively, each axle on the bus must be the same width so the outer face of all tires are on roughly the same plane. Some manufacturers have varying axle widths, which could result in uneven gaps from the front to back of the bus.
2. Many buses use rubber seals that protrude from wheel wells and doors, as well as indicator lights that protrude from the bus body. It is important to minimize those protrusions below the level of the platform height to avoid damage.

4.6 Mirrors/cameras

- Because passengers at BRT stations are generally slightly elevated and somewhat protected from adjacent traffic, they tend to stand closer to the edge of the platform. External mirrors have the potential to impact those passengers. Mirrors should be as low-profile as safely feasible. Newer camera-based mirrors reduce the footprint even further but are not allowable in all states.
- Because passengers are likely to board at rear doors, in 60-foot buses mirrors do not always allow operators to see passengers waiting to board from outside the bus. It may be helpful to provide a camera view of the rear door area that the operator can monitor while the bus is stopped and doors are open.

5. Procurement best practices

While not specific to only BRT vehicles, agencies should consider the following procurement practices that have been identified by the APTA Bus Manufacturing Task Force as potentially helping strengthen the transit bus manufacturing sector when procuring their BRT vehicles:

- more frequent use of advance/progress payments
- allowing price escalation provisions in contracts

Procurement language for these contract provisions can be found in APTA's Standard Bus Procurement Guidelines document. It is also recommended that agencies stay informed on any evolving APTA procurement standards.

6. ITS technologies

There are ITS technologies that are already well-integrated elements of North American BRT applications and others that are relatively new to the North American bus market, but that are gradually being implemented into and improving BRT systems. These include three technologies of note:

- **Computer-aided dispatch (CAD) and automatic vehicle location (AVL),** important for real-time passenger information and advanced scheduling.
- **Transit signal priority (TSP),** which is important for both bus and rail services operating in mixed traffic to achieve travel time savings competitive with automobile travel.
- **Driver-assist technologies** for vehicle guidance, vehicle platooning and precision docking applications.

In addition, the development of **automated bus rapid transit**, which combines previous innovations in a next-generation synthesis, has the potential to significantly improve efficiency and decrease costs when it reaches full technical maturity.

Each technology is discussed below.

6.1 Computer-aided dispatch/Automatic vehicle location (CAD/AVL)

CAD/AVL systems are becoming ubiquitous with transit agencies throughout North America, and for BRT systems, this technology takes on a higher level of importance. CAD/AVL systems consist of the standard components of GPS systems: location transmitters and tracking software. Each bus has an onboard GPS tracker that sends its vehicle location to a satellite, which transmits the coordinates to tracking software on the ground. This tracking software can display the live location on phone apps, browser pages, street signs and other devices.

CAD/AVL technology is critical to BRT for the following reasons:

- CAD/AVL systems are closely linked to providing real-time arrival data, which is a core tenet of most BRT systems.
- Many TSP systems (referenced in the next section) rely on AVL schedule data to determine the amount of priority to provide.
- Many BRT systems operate by managing headways (or gaps between vehicles) rather than a schedule of arrival times, which is enabled by most AVL systems.

6.2 Transit signal priority

TSP works to decrease the length of time transit vehicles wait at stoplights. TSP reduces delays via changing the timing of the red light and green light cycles depending on the bus's location. Given that signals are often a major source of delay for transit service, TSP can greatly reduce that delay.

These are some of the specific actions a TSP system can perform:

- Shortening the red light length and decreasing wait times.
- Extending the green duration, allowing a bus to continue through without stopping.
- Timing the transition to green to match the arrival of an approaching bus.
- Controlling red light timing for upstream traffic, allowing a bus to safely pull out of a stop or reenter traffic lanes.
- Creating special signal phases, such as a "transit-only" phase or a queue-jump around stopped traffic.

Intersections with long signal cycles or those that have long distances between signals are especially good options for TSP application. Intersections with far-side stops or no stops are the most effective types for TSP, as a bus can get through the intersection without having to stop at the signal. There are also secondary benefits to existing traffic along a bus route corridor.

While signal preemption is also possible with TSP technologies, most jurisdictions do not allow preemption for buses; it is primarily used in rail transit or for emergency vehicles and first responders.

Decentralized TSP solutions require both onboard equipment as well as field equipment. Newer centralized systems do not require field equipment; they work on direct communication and integration between the transit CAD/AVL servers (not in the field or onboard) and the traffic agency's Advanced Traffic Management System (ATMS) servers (also not in the field). Newer cloud-based solutions achieve similar integrations. In each case (centralized, cloud-based), the objective behind each system architecture is to reduce or eliminate onboard and wayside equipment, reducing capital costs and easing deployability of TSP across a region.

Implementing TSP for BRT requires coordination with the jurisdiction that controls the signal equipment and traffic management systems. BRT practitioners will need to closely coordinate their TSP operating plans with local jurisdictions, bus manufacturers and TSP equipment providers to ensure proper systems integration.

6.3 Driver-assist technologies

For transit agencies planning a BRT system, integrating emerging technologies can significantly enhance efficiency and safety. There are several emerging technologies that assist BRT operators, some classified within the broader intelligent transportation systems (ITS) technologies category.

6.3.1 Precision docking

Precision docking refers to technologies that assist the bus driver in exactly aligning the bus with the platform when parking, helping to ensure safety and speed for passengers while boarding and off-boarding. ITS precision docking's effectiveness can be maximized when paired with other improved bus designs, such as low-floor bus models and large doors.

These systems have historically taken two forms:

- **Optical guidance,** in which a front-placed optical sensor reads the trip path marked out on the roadway, along with magnetic sensors, where some sort of permanent magnetic guidance or wiring is placed in the roadway along which the bus travels, allowing it to sense the correct path on the roadway, and with which it can smoothly dock with a parking platform.
- **Mechanical guidance systems,** which have a guidance arm attached to the steering axle with a wheel on the end of the arm, which is then connected to a narrow preformed concrete slot built into the running way. Buses that use this technology will also be able to function outside the guided corridor as well, simply requiring manual control or electronic guidance while parking.

6.3.2 Lane detection, collision avoidance and other technologies

Companies like Hayden AI and Safety Fleet, which have conducted pilots with transit agencies, offer systems that help ensure that privately owned vehicles do not encroach the buses' dedicated lanes. Collision avoidance systems, including automatic braking features offered by providers like Rosco Mobileye, can play a crucial role in preventing accidents.

Additionally, technologies like precision docking for pantograph charging (which enables rapid electric bus recharging at stops) and automated wheelchair securement contribute to a more accessible and efficient passenger experience. Connected vehicle technologies, such as platooning or advanced headway management, present opportunities to optimize bus flow and minimize congestion.

These technologies should be carefully evaluated to determine their suitability within the agency's strategic plan, considering factors like cost, infrastructure requirements and compatibility with existing systems.

6.4 Automated BRT

Automated BRT (ABRT) describes what could be considered a next-generation synthesis of the other previous innovations. As the name suggests, ABRT would take currently existing BRT systems and incorporate autonomous technology with the aim of improving efficiency and decreasing costs. ABRT functions best by combining the automated bus systems with dedicated lanes and automatic traffic controls.

ABRT does not use fully autonomous vehicles but is closer to such than a normal BRT vehicle. ABRT vehicles still require an operator to drive them, but they have many advanced automated features, such as sensors to detect people and objects around the bus, lane departure warnings, collision detection, warnings for overpasses, and pairing and docking assistance, among other possible options. The following technologies are required for implementing ABRT:

- imaging sensors
- drive-by-wire systems
- GPS and other types of location systems
- databases to store information
- computing systems to capture new data
- communications systems to distribute information to various platforms

The first case of ABRT in the U.S. is being tested by the Connecticut Department of Transportation, with three electric automated buses being placed on a route between New Britain and Hartford. It is a combined effort between CTDOT, New Flyer, Robotic Research, the University of Connecticut, and the Center for Transportation and the Environment. Anticipated benefits from this pilot program include improved rider comfort from more reliable headways; more consistent acceleration, deceleration and approaches at transit stops; and possibly operating efficiencies through platooning and reduced maintenance costs. In June 2023

CTDOT was awarded $2 million to expand the program along the corridor, incorporating collision avoidance and precision docking assist. If successful, this program can provide an example for other communities and transit agencies to emulate.

7. BRT vehicle branding

Branding and styling on vehicles and infrastructure for BRT lines is both useful and a necessary eligibility criterion for U.S. federal capital Small Starts grants.

An attractive and unique vehicle branding scheme, coordinated with stations, marketing materials and other features, distinguishes BRT lines from regular bus and shuttle service. Vehicles can function like traveling advertisements for the service moving throughout the community.

7.1 Naming rights for BRT services

Branding is not just a great idea for BRT services; it is a factor that could determine the success of the project. Developing and delivering a well-designed brand for BRT services may also lead to the execution of a naming rights sponsorship. Naming rights sponsorships are commonly associated with high-profile projects such as sports arenas, and this same approach could be effectively applied to major public transit initiatives.

An example is Cleveland's HealthLine BRT's naming rights sponsorship with the Cleveland Clinic and University Hospital, the two largest employers in the region, with both having major establishments on the corridor. This was then followed by a naming rights sponsorship for the Cleveland State Line BRT. Such a sponsorship can bring in new long-term revenue to a BRT project and can also form a strong strategic partnership with the contracting party, further enhancing the image of the service and the agency.

7.2 Developing and deploying the branding strategy

APTA BTS-BRT-RP-001-10, "BRT Branding, Imaging and Marketing," addresses branding development and deployment and provides guidance on the process, as well as examples of how it's been done effectively.

Key elements highlighted in that document include the following:

- Identifying the audience.
- Determining the brand promise to engage public support.
- Understanding touch points that will capture community interest.
- Identifying the elements of the brand, including naming and visuals.
- Tactics and implementation.
- Branding of vehicles, including differentiating coach exterior and interior styling from standard service vehicles.
- Branding of infrastructure, including station architecture, ticketing, advertising and transit system information displays.
- Information displays, which can include frequency and span of service, reliability of service via updates regarding delays and detours, and travel time.

The point is to create a continuum of image and perception that instills comfort and confidence in the riders, to sustain and grow ridership by delivering on the promise of safe, efficient and cost-effective passenger service.

8. Conclusion: Guidelines for BRT vehicle selection

Successful BRT systems align vehicle design with service type, market needs and system goals. As reviewed in this document, the key guidelines that an agency should consider are:

- **Service and market match:** Vehicle design should reflect the service type (local, express, trunk) and average trip length.
- **Capacity requirements:** Choose vehicles that meet anticipated ridership with comfortable loading (three per square meter).
- **Vehicle sizes:** Options range from 40- to 45-foot standard buses to 82-foot double-articulated units.
- **Passenger appeal:** Comfort features like A/C, panoramic windows, lighting and real-time information improve attractiveness.
- **Boarding design:** Low floors (under 15 in.) are ideal; otherwise, deploy ramps or docking mechanisms for level boarding.
- **Door configuration:** Wide, numerous doors reduce dwell time. Aim for one door channel per 10 ft of vehicle length.
- **Seating vs. standing mix:** Short urban routes may prioritize standing space; longer routes emphasize seating.
- **Proven designs:** Select vehicles with a track record in revenue service to reduce operational risks.
- **Branding and identity:** Standard buses can be used with unique livery and interior layouts to distinguish BRT service.
- **Life cycle costs:** Consider long-term value. Investments in guidance systems, hybrid drives or composite materials may reduce maintenance costs and extend vehicle life.
- **System integration:** Vehicle design must align with BRT infrastructure, including running ways, stations, fare collection and service plans.

Related APTA standards

APTA BTS-BRT-RP-001-10, "BRT Branding, Imaging and Marketing"
APTA BTS-BRT-RP-002-10, "Bus Rapid Transit Stations and Stops"
APTA BTS-BRT-RP-003-10, "Designing Bus Rapid Transit Running Ways"
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Abbreviations and acronyms

A/C	air conditioning
ABRT	automated bus rapid transit
AVL	automatic vehicle location
BEB	Battery electric bus
BRT	bus rapid transit
CTDOT	Connecticut Department of Transportation
IC	internal combustion
ITS	intelligent transportation systems
GPS	Global Positioning System
RFID	radio-frequency identification
TSP	transit signal priority

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Appendix A: BRT vehicles by manufacturer as of May 2025

The section provides a short overview of bus models available in the North American market, by manufacturer. It is important to note that the heavy-duty bus industry has undergone significant changes in recent years, and continued changes are expected. This section provides a snapshot of the bus manufacturers as of this writing, but agencies are encouraged to confirm up-to-date information as they proceed with their vehicle orders.

Table 2 provides examples of agencies who are deploying these manufacturers' vehicles in their BRT systems.

TABLE 2
Bus Rapid Transit Vehicles In Use

NTD-ID	Agency	Bus Manufacturer				
		GILLIG	New Flyer	Nova Bus	Proterra/ PhoenixEV	RIDE/BYD
90014	AC Transit		27			
60019	City of Albuquerque		30			
80011	City of Fort Collins	6				
10048	Connecticut DOT		18*	12		
50015	Greater Cleveland RTA		40			
30006	Greater Richmond Transit Company	4				
50050	IndyGo					31
70005	KCATA	40				
00007	Lane Transit District		21			
90154	LA Metro		40			
40035	LYNX (Central Florida RTA)	5			8	
10003	MBTA		27			
60008	METRO (Harris County)		14			
20008	MTA New York City Transit		120	41		
50033	The Rapid (Interurban Transit Partnership)	10				

Source: Federal Transit Administration (FTA) National Transit Database (NTD), 2022
NTD data downloaded October 2024 from https://www.transit.dot.gov/ntd/data-product/2022-annual-database-revenue-vehicle-inventory

Gillig

Gillig is an American bus manufacturer headquartered in Livermore, California. Gillig offers a variety of propulsion systems -- diesel, CNG, hybrid electric, and battery electric -- and styling options for its buses.

Available models:

Low Floor/Low Floor Plus: Gillig's Low Floor model is the foundational model for all other variations. It comes in 30-foot, 35-foot and 40-foot lengths, with clean diesel, hybrid-electric or CNG propulsion power systems. Gillig's Low Floor Plus model is similar to the Low Floor model but has a smooth roof and improved light styling. It comes in 30-foot, 35-foot and 40-foot lengths, with clean diesel, CNG, hybrid-electric or battery-electric propulsion power systems.

BRT/BRT Plus: Gillig's BRT model is similar to the Low Floor and Low Floor Plus models but is more aesthetically modern. It comes in 30-foot, 35-foot and 40-foot lengths, with clean diesel, hybrid-electric or CNG propulsion power systems. Gillig's BRT Plus Model is similar to the BRT model but has a raised and raked-back front cap, which blends into a contoured roofline. It comes in 30-foot, 35-foot and 40-foot lengths, with clean diesel, hybrid-electric or CNG propulsion power systems.

More information can be found here: https://www.gillig.com/buses/

FIGURE 1
Gillig Buses

New Flyer

Canadian-based New Flyer is a subsidiary of NFI Group Inc., one of the world's largest bus and coach manufacturers. The company is headquartered in Winnipeg, Manitoba and also has production facilities in Anniston, Alabama; Crookston, Minnesota; Jamestown, New York; and St. Cloud, Minnesota. New Flyer offers a wide range of bus styles, sizes and propulsion systems for the U.S. and Canadian markets.

Available models:

Xcelsior: New Flyer buses currently in production all fall under the Xcelsior line. There is a wide array of options for Xcelsior buses' energy source, including battery-electric, clean diesel, CNG, fuel cell-electric, and trolley-electric models. They are produced in 35-foot, 40-foot and 60-foot lengths. The heights of the buses vary slightly depending on what the energy source is. There are customization options for door placement, door size, seating layout and other aspects. More information can be found here: https://www.newflyer.com/new-flyer-buses-meet-the-xcelsior-family/

FIGURE 2
New Flyer Buses

Nova Bus

Nova Bus is a Canadian bus manufacturer headquartered in Saint-Eustache, Quebec. It is a subsidiary of Volvo and provides a wide range of bus sizes and propulsion types. In June 2023, Nova Bus announced that it would stop manufacturing buses in the U.S. in 2025 in order to focus on serving the Canadian market. The closure of its New York manufacturing facility means that the company's buses are no longer compliant with FTA Buy America requirements and thus cannot be purchased by U.S. agencies using FTA funds.

Available models:

LFS: Nova Bus buses currently in production all fall under the LFS line. There is a wide array of options for LFS buses' energy source, including diesel, hybrid, natural gas and electric. Most of the bus models are produced in 40-foot lengths, although there is one 60-foot length model. Heights vary slightly depending on the energy source. More information can be found here: https://novabus.com/ (French), https://us.novabus.com/ (English).

FIGURE 3
Nova Bus buses

PhoenixEV/Proterra

Proterra Transit was an American electric vehicle technology company founded in 2004 and headquartered in Burlingame, California. It exclusively manufactured electric vehicles in a range of vehicle sizes and sold around 1,200 electric buses to a number of transit agencies throughout the U.S. and Canada. In 2023, Proterra filed for bankruptcy and,iIn January 2024, PhoenixEV acquired the assets of Proterra's transit bus division. PhoenixEV is an electric vehicle company headquartered in Anaheim, California. Prior to acquiring Proterra's transit assets, PhoenixEV, then known as Phoenix Motorcars, manufactured primarily for commercial EV applications.

Available models:

ZX5: PhoenixEV buses currently in production all fall under the ZX5 line. The ZX5 buses are all battery electric and are available with either a 492 kWh battery or a 738 kWh battery. They are sold in 35-foot and 40-foot models with a composite body. More information is available here: https://phoenixmotorca.wpenginepowered.com/products/

FIGURE 4
PhoenixEV/Proterra Buses

RIDE Mobility/BYD

BYD is a manufacturing company founded in 1995 in China that has produced a wide variety of automotive products since 2003 and has delivered more electric vehicles than any other company worldwide. BYD opened a U.S. battery electric bus manufacturing facility in 2013 in order to serve the U.S. market. In 2023, BYD spun off its transit bus business as RIDE Mobility with a focus on reorganizing under U.S. majority ownership in order to comply with new Chinese ownership rules passed by Congress. BYD exclusively offers battery electric buses although, in May 2025, RIDE announced a partnership with US Hybrid to develop a fuel cell electric bus.

Available models:

K-series: RIDE buses currently in production all fall under the K-series line. The K-series buses are battery-electric. There are several 35-foot, 40-foot and 60-foot options, and they offer a range of battery pack sizes to accommodate varying range needs. More information is available here: https://ride.co/transit-buses/

FIGURE 5
BYD Buses

ElDorado National–California (ENC)

ENC is an American bus manufacturing company headquartered with a production facility in Riverside, California. In January 2024, ENC parent company REV Group announced it was closing the ENC transit business, but then subsequently sold ENC to Rivaz, a U.S. green energy vehicle manufacturer launched in 2023. In May 2025, Rivaz has announced that it had resumed production at the ENC Riverside facility.

Available models:

ENC buses fall under the Axess line of low-floor bus that comes in 32-foot, 35-foot and 40-foot varieties. It also comes in a variety of different engine types, including diesel, CNG, LNG, hybrid, and battery electric. The company plans to introduce a fuel cell bus in 2027. More information is available here: https://eldorado-ca.com/

FIGURE 6
ENC Bus