Recapturing Global Leadership in Bus Rapid Transit

A Survey of Select U.S. Cities

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Cover: A sleek and modern-looking BRT vehicle pulls into a station in Las Vegas. Photo: Annie Weinstock, ITDP

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Foreword

The transportation system in the United States has often been dominated by a particular mode. A century ago it was rail; in the last several decades it has been the automobile. Over time we have come to learn that while various modes have a tremendous impact on the shape of our communities, the movement of goods, and the health of our environment, each also serves different needs. One approach does not fit all.

Congress took an important step in 1991 to create a balance between different modes with the Intermodal Surface Transportation Efficiency Act; subsequent transportation authorization bills have continued that trend. During my fifteen years in Congress, I have fought for a transportation framework that includes light rail, streetcars, and facilities that provide safe and convenient access for bicyclists and pedestrians as well as cars, buses, and railroads. Bus rapid transit (BRT) is an important part of an extensive tool kit that can strengthen both our transportation system and our communities.

This report takes a close look at the value of bus rapid transit, highlighting best practices from systems in the United States as well as abroad. BRT projects can be put in place quickly, provide a high level of flexibility, and integrate well with other transportation modes, from subways to cycling and walking, while fitting today's often constrained budgets.

While bus rapid transit has worked well in large and medium-sized cities from Bogotá, Colombia to Curitiba, Brazil to Guangzhou, China, it is less well known in the United States. BRT is sometimes met with skepticism and resistance from transportation planners and engineers who are unfamiliar with how to build high-quality BRT systems, since we have limited examples here at home. Citizens too are often concerned about dedicating the requisite street space to buses.

This report outlines what it would take to build high-quality, or "gold-standard," BRT in the United States. If American communities are to become more livable, we need all transportation options on the table for consideration. Now more than ever it is important to find creative solutions to provide affordable transportation options that meet the needs of our communities and residents and keep our economy moving forward.

Congressman Earl Blumenauer
Third Congressional District, Oregon

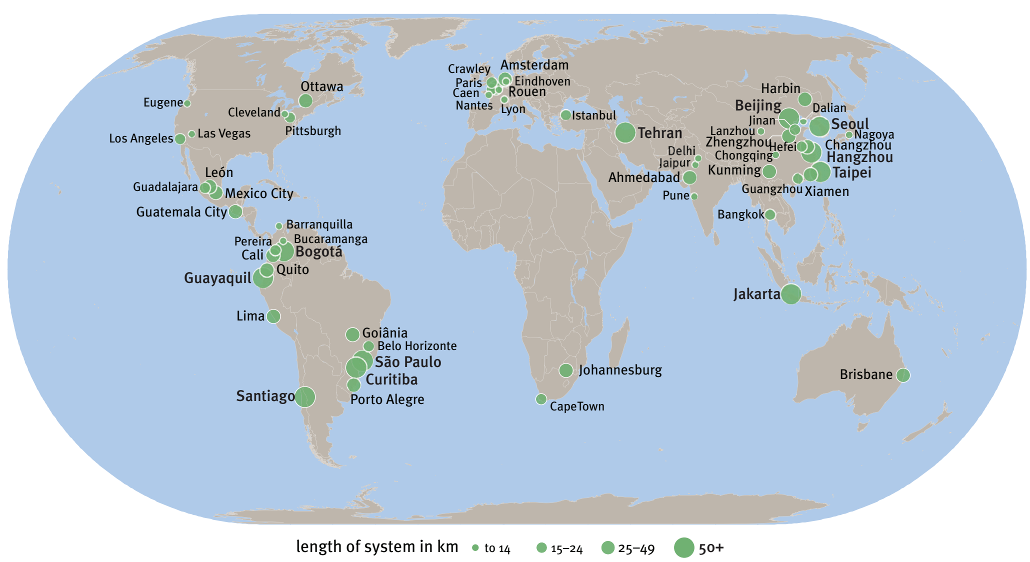
Introduction

Bus Rapid Transit was first implemented in Curitiba, Brazil in 1974, and has become a global phenomenon in the twenty-first century. Major new BRT projects have opened since the turn of the century in Africa, Australia, China, India, Indonesia, Iran, Mexico, Turkey, several cities in Europe, and dozens of cities in Latin America.

BRT holds great promise for the United States. In 2008, transit ridership in the United States reached its highest level since the mid-1950s and ridership grew faster than population and vehicle miles travelled between 1995 and 2008 [APTA 2010 Fact Book]. The flexibility and cost effectiveness of Bus Rapid Transit make it an excellent choice for cities and transit agencies facing both increasing demand for transit and increasingly constrained budgets.

Though it is still in its infancy in the United States, several good BRT systems have opened in the country over the last decade, and perhaps a dozen new projects are in the pipeline in cities from San Francisco to Chicago. In many ways, the spread of BRT in the twenty-first century mimics the worldwide spread of the streetcar a century earlier.

Bus Rapid Transit Around the World



Today, cities are beginning to realize that a good mass transit system helps attract an educated workforce that forms the backbone of the modern economy. A mass transit network is a powerful tool in the fight against traffic congestion, air pollution, rising road construction and maintenance costs, and the economic hazards of growing dependence on insecure and volatile oil imports. Cities that have already made the decision to invest in mass transit find BRT systems attractive for the following reasons:

a. **Speed of Implementation:** the time from planning to opening tends to be far shorter for BRT than for rail-based alternatives—a benefit very attractive to politicians facing short election cycles.

b. **Cost:** capital costs tend to be considerably lower than those for rail-based mass transit alternatives; operating costs are also lower in some contexts.

c. **Network Connectivity:** because parts of the network can operate on normal streets, it is much cheaper and faster to establish a full network using bus-based mass transit. In this way, modern BRT can offer more one-seat rides than the typical trunk-and-feeder systems offered by older BRT and most light rail, metro, or commuter rail systems.

Rail-based mass transit technologies have certain common characteristics dictated by the need for rail infrastructure and the specialized vehicles needed to operate on it. This is less true for BRT systems, where there is no rigid definition of precisely what constitutes a BRT system. The lack of a common definition of BRT has caused confusion in discussions of the technology since its inception.

Lack of a common understanding of what constitutes a BRT system has led to branding problems. The lack of any sort of quality control on bus-based mass transit interventions has made it possible for marginal bus system improvements to be branded as BRT, leading to some community backlash against the concept of BRT. Modest incremental improvements, while beneficial to bus riders, are often not the most cost-effective solution. They certainly do not add up to the fundamental change needed to shift the travel paradigm in ways that make alternatives to driving cars attractive at a national scale.

This problem is by no means unique to the United States. After Curitiba opened the first BRT system, other cities in Brazil opened systems with some of the same characteristics as Curitiba, but with much lower speeds, capacities, and customer comforts. These light BRT systems—São Paulo's *passa rápido* corridors, for example—also brought some real benefits to passengers, but were far less appreciated by the general public. As a result of this backlash, Brazil, once the leader in BRT system development, lags behind Colombia and other countries in BRT development. Instances of this same problem have occurred across the globe. After Indonesia opened TransJakarta—a system with significant problems of its own—other cities across Indonesia began opening copycat systems, the best of which brought about only marginal improvements, and the worst of which made conditions worse. Chinese and Indian cities, after gaining some limited familiarity with Bogotá's TransMilenio, also made a number of sub-optimal bus system improvements, which were branded as BRT, but which could not be judged as cost effective.

The United States has followed a similar trend. Having gained some familiarity with BRT from visits to Curitiba or Bogotá, a number of American cities began developing BRT-type systems. Some of these systems have brought significant benefits and won public approval. However, even the best U.S. systems lack some key characteristics of the world's best BRT systems, and none of them have fully captured the imagination of American motorists and voters.

Ultimately, the only true test of a high-quality mass transit intervention is an assessment of "cost effectiveness," indicating:

- A substantial reduction in total travel time and/or travel cost for the population of transit riders in the project's impact area;
- Evidence that the system has attracted new riders from other modes; and
- Effectiveness in achieving other public transportation objectives, such as serving as a framework for sustainable development. However, this indicator is heavily dependent on the first two.

Project proponents are required to collect some of this information if applying to the U.S. FTA for funding. However, insufficient information is available to the general public about how this cost effectiveness determination has been made to independently verify its legitimacy.

For this reason, this paper follows the approach taken by the LEED certification process (Leadership in Energy and Environmental Design) pioneered by the Green Buildings Council, creating a scoring system based on readily observable system characteristics associated with best practice. Existing and potential future projects were evaluated based on the resulting *BRT Standard* which classified them as gold, silver, bronze or not BRT. The scoring system is still a work in progress and a technical committee should be convened to examine and further refine it.

Chapter I reviews the history of BRT in the United States in the larger context of mass transit history. It argues that streetcars died out in the United States in part because of suburbanization and growing private car use, but also in part because of the specific technical limitations of rail-based transit systems in increasingly car-oriented cities. It reviews efforts to implement BRT-like systems in the United States as early as the 1950s, and again in the 1970s, none of which survived in the face of the car-oriented planning of the period, but which nevertheless showed an alternative transit development path.

Chapter II reviews the suitability of key international BRT best practices to specific U.S. conditions. It then proposes a scoring system, called the *BRT Standard*, based on those BRT system characteristics that most impact bus speed, passenger travel times, customer comfort, and ridership. Depending on the number of BRT best practice elements, a project can receive a gold, silver, or bronze ranking.

Good service planning is one of the most critical elements of a gold-standard BRT. As U.S. BRT systems aim to simultaneously serve transit-dependent populations and capture new "choice" riders, the highest quality of service must cater to both populations. But because bus frequencies are generally low, potential passengers lose a lot of time waiting for the next bus to come and the result is that choice riders may not use the system. Services in the United States need to be designed to maximize bus frequency within any specialized BRT infrastructure, while minimizing transfers. The best way to achieve this is to upgrade as many existing bus routes and service types as possible to BRT-grade buses and allow all of them to use any BRT system infrastructure like exclusive running ways. Currently, the trend in the United States is that a single existing bus route is upgraded to BRT grade buses, and any other bus routes that were previously using that corridor are either re-routed or are allowed to use only a limited part of the specialized BRT infrastructure.

Infrastructure design should therefore accommodate the addition of new limited and express bus services. In order to provide fast services to far-flung suburban areas, it is critical to design trunk infrastructure that also accommodates express bus routes, which may also employ high-occupancy vehicle (HOV), high-occupancy toll (HOT), or other forms of managed lanes on limited-access freeways for part of their route.

Chapter II also describes the infrastructural elements that are critical to gold-standard BRT. These include physically segregated central median alignment, stations set back from intersections, passing lanes at stations, camera enforcement of dedicated lanes, turning restrictions across busways, station platforms level with bus floors, uniquely branded BRT buses, off-board fare collection, and operational control systems.

Chapter III suggests a ranking system, called the *BRT Standard*, and uses it to score several of the best BRT systems currently operating in the United States, and compares these systems to international best practice. It concludes that several of the systems include many crucial BRT characteristics, and many have brought about significant improvements in the quality of transit services, and therefore deserve a bronze ranking, but none of them ranks among the world's leading BRT systems. These are, however, important precursors to gold-standard BRT in the United States. Some American systems reviewed had so few essential characteristics that calling them a BRT system at all does a disservice to efforts to gain broader adoption of BRT in the United States. The rankings are as follows:

Cleveland	Eugene	Los Angeles	Pittsburgh
63	61	61	57
Bronze	Bronze	Bronze	Bronze

Las Vegas	Boston	New York City
50	37	35
Bronze	Not BRT	Not BRT

This is as compared to four international best practice systems:

Bogotá	Guangzhou	Johannesburg	Ahmedabad
93	89	79	76
Gold	Gold	Silver	Silver

Chapter IV reviews the main reasons why American BRT systems have fallen short of global best practice.

By far the most important reason for this failure is that U.S. cities have far fewer transit riders and far more private car owners than most of the cities where gold-standard BRT systems have been implemented. As a result, it is difficult to make a direct comparison between some of the global best practices and the U.S. cases. However, that does not change the fact that gold-standard BRT system elements still represent the most cost-effective design and operational practices, and that these standards can work as well in the United States as they do abroad.

The chapter reviews political obstacles to the development of BRT in the United States, including lack of awareness of BRT in political circles, politicians' lack of control over transit systems, a small, less politically-powerful transit-riding constituency, and lack of a clear corporate lobby in support of BRT. Organized labor has the potential to be a strong proponent of BRT, and presents no real obstacle to gold-standard BRT, but thus far has played a minor role. Local citizens' groups, businesses, motorists, and concerned individuals are also more empowered in the United States than in other countries to oppose changes proposed by the government, and this provides another obstacle to BRT development.

Next, the chapter examines administrative and institutional barriers to BRT development including traffic engineers who feel constrained by national- and state-level traffic design guidelines that were written before BRT entered the American planner's lexicon. These guidelines are mainly concerned with vehicular speed and level of service and many contain standards that are incompatible with gold-standard BRT requirements. In most countries with gold-standard BRT, traffic engineers were initially resistant to change. But powerful politicians, backed by leading international engineers, managed to overrule the civil engineers' resistance.

Chapter V examines how federal policy and funding has affected BRT system development in the United States. In general, federal policy has been supportive of BRT in the United States, and the Federal Transit Administration (FTA) is one of the main proponents of BRT. Federal policy does not present an obstacle to gold-standard BRT system development. In fact, FTA alternatives analysis and cost effectiveness requirements have helped stimulate BRT system development in the United States.

However, the fact that the federal government and states generally pay the majority of funds for any major investment makes cost-effectiveness less of an incentive at the local level. Additionally, buy-American provisions create rigidity and delay in the procurement of specialized BRT buses. The FTA also faces the challenge of upholding policy in what is very often a politically-charged environment. The result is that the FTA frequently provides grants to local governments whose applications contain dubious analyses recommending rail projects over other forms of fixed guideway transit, such as BRT. While the current fiscal crisis affecting all levels of government in the United States should be grounds for increasing the importance of cost-effectiveness criteria, early efforts by the Obama Administration have been in the direction of weakening these criteria and the alternatives analysis process which produces them.

Chapter V recommends that the FTA create a special grants program, called BRT Starts, to stimulate the creation of gold-standard BRT in the United States. It also recommends that the alternatives analysis process be carried out by a more independent body so that it may be kept separate from political motives.

Chapter VI assesses the role of the public and media's perception of BRT in the United States. Reviewing press reaction to the Los Angeles, Las Vegas, and San Francisco/East Bay BRT projects, we came to the following conclusions: first, once implemented, the quality of the BRT is crucial for winning media support. If the system quality is poor, this—rather than the overall project benefits—will tend to dominate the media's (and the public's) perception. Second, while it seems inevitable that BRT will be compared to light rail—especially in terms of cost—stressing the operational advantages, as was done in Las Vegas, can help increase political success. The cities that never related the new system to traditional buses, like Las Vegas, did better politically than cities, like Los Angeles and San Francisco/East Bay, that referred to the system as a "busway." In general, cities whose systems had more BRT characteristics tended to be a greater public success. The cities that also had higher concept designs for both their stations and their buses experienced greater public success than those whose systems included normal buses and stations.

Chapter VI also summarizes interviews with several leading journalists on the topic of public and media perceptions of BRT. Everyone we spoke with emphasized that none of the BRT systems in the United States today are sufficiently high profile or high quality to capture the public imagination in the way that TransMilenio caught the imagination of the rest of Latin America. Until the United States has a world-class system, most Americans are not going to know what BRT is or understand its potential. The journalists all emphasized that the system will need to have high-concept stations and photogenic buses. They said that most journalists are aware of handsome light-rail lines in Portland and Charlotte, and that these systems were an inspiration to other cities. They pointed out that BRT has no equivalent inspiring model in the United States. They all stressed that BRT should not sell itself on its relative thrift, but on the operational benefits that it has over light rail. But these benefits need to in fact be real. Several journalists mentioned that BRT in the United States needs an individual champion—some charismatic mayor or other political leader, like Colombia's Enrique Peñalosa—who could become the U.S. face for BRT, as this would make BRT a more compelling news story. They also emphasized the lack of a significant national non-governmental organization (NGO) pushing for BRT in the United States.

BRT is in many ways optimal for American transit needs. Ultimately, to convince the American public that BRT could be something exceptional and desirable, the United States needs a world-class system that not only improves conditions for bus passengers but also inspires the rest of the country and the rest of the world to do better, and puts the United States back at the forefront of transportation innovation.

Given the fiscal crisis facing most city and local governments, the growing traffic congestion, and the increasing importance of weaning the United States off of oil, BRT needs to become a cornerstone of American mass transit system development, instead of a consolation prize for cities unwilling or unable to implement light rail. If not, the United States is likely to further cede its competitive advantage to cities elsewhere in the world.

Chapter I:

History of BRT in the United States

Beginning in the late nineteenth century, many cities around the world developed networks of streetcar lines. The streetcar replaced cable cars, which had replaced horse cars (horse-drawn carriages on rails), which had replaced omnibuses (horse-drawn carriages). The streetcar carried more passengers more efficiently than cable cars because cable cars expended ninety percent of their energy dragging the cable. Cable cars were more cost-effective and reliable than horse cars because horses littered the streets with manure, the teams sometimes got sick, and sick horses would be shot on the spot, with the carcass left to rot in the street. From the turn of the century until the 1940s, streetcars were the predominant mode of transport for most urban residents. They were initially owned and operated by a variety of small private companies that were then consolidated into huge, profitable monopolies. In some cities, these companies made much of their profits from land development in new streetcar suburbs, amusement parks, and shopping facilities near the terminals. With a transit-dependent population clustered into dense cities and into streetcar-oriented suburbs, these monopolies were generally profitable, but also frequently hated by the public. Conditions on the streetcars were grim. They were overcrowded, which was particularly unpleasant in those days, because people did not bathe regularly, and vagrants were a constant problem.[1]

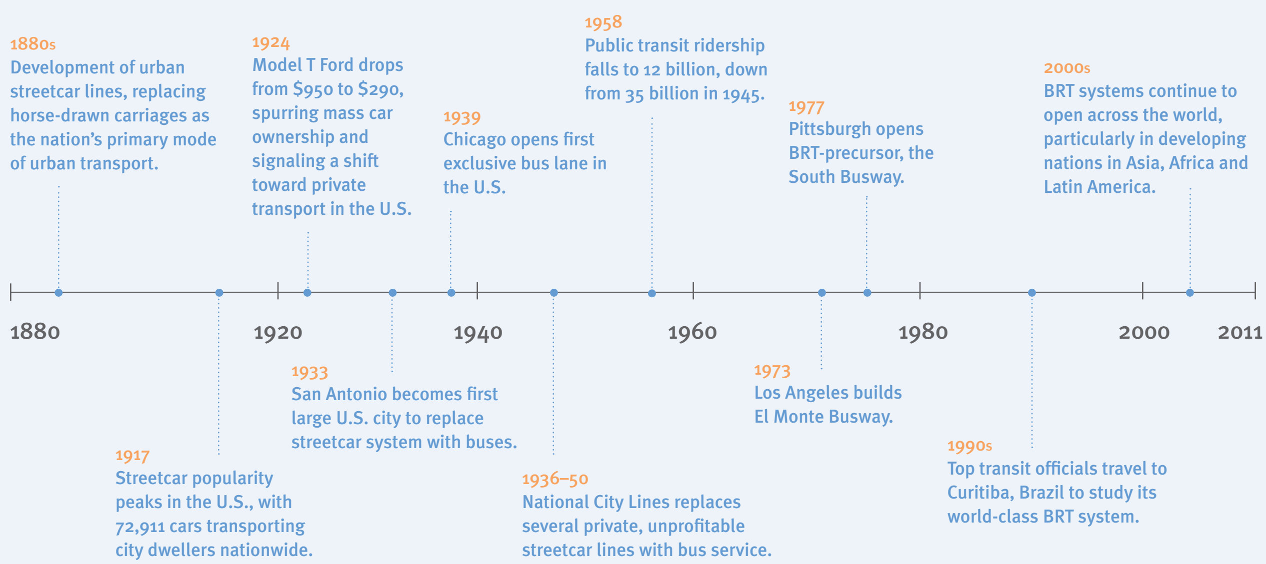
Starting in the 1920s, these streetcar companies became less profitable. They became the target of Progressive Era reforms, where they were brought under the control of state-level public utility commissions and tighter city-level franchise agreements. During World War I wartime inflation drove up operating costs, but municipal authorities refused to allow fare increases for fear of political backlash, and many of these companies suffered financially. So, the companies began disinvesting in the systems, leading to serious repair and maintenance issues, and eventually, a decline in service. The total number of streetcars peaked nationally in 1917 at 72,911 and by 1949 had dropped to 17,911.[2]

In the 1920s, smaller cities began to replace streetcars with buses.

In 1933, San Antonio, Texas became the first large U.S. city to replace its streetcar system with buses. By the 1920s, General Motors started buying up financially troubled streetcar companies and converting them to bus operations. In New York City in 1926, GM joined forces with the Omnibus Corporation to buy out the largest streetcar company and convert it to a bus company. They cut the total miles of trolley tracks in New York from 1,344 to 337 between 1919 and 1939.[3] From 1936 until about 1950, a consortium named National City Lines—comprised of General Motors, Firestone, Mack, and Standard Oil of California—purchased many of the private American streetcar lines in order to dismantle them and replace them with bus services, using their own vehicles. In order to keep their transit systems running, many cities began to turn them into public authorities. New York City took over its private streetcar system in 1940. Cleveland followed suit in 1942, and Chicago did the same in 1947. While General Motors' actions hastened the dissolution of remaining private U.S. streetcar networks, these systems were also gradually dismantled in cities where GM did not intervene, and fiscal problems continued even after they became public entities. From 1945 to 1949, New York City cut its trolley fleet from 1,228 to 606, while adding more than 1,700 new buses. Chicago, also a public system, had abolished all of its streetcars by 1958, and Detroit accomplished the same feat by 1956.[4]

The problems with the streetcar were partly technological, and partly related to a more general trend towards automobile-oriented suburbanization. Automobile production became cheaper with the application of mass production techniques by Henry Ford, and in turn, the private automobile became more affordable. The cost of a Model T Ford dropped from $950 in 1910 to $290 in 1924,[5] and simultaneously, car-oriented suburbs began to grow. Faced with declining profits, the streetcar networks were unable to keep up with the growth of auto-oriented suburbs, and larger areas of the city became disconnected from the streetcar network.[6] Suburbanization was held in check somewhat by the Great Depression and World War II, but took off after the war.

Public Transit Milestones in the United States



Buses replaced streetcar lines at a time when annual nationwide public transit ridership fell from thirty-five billion to twelve billion between 1945 and 1958.[7]

Particularly in downtown areas, streetcars tended to operate in the median of the roadway in mixed traffic, in order to maintain curbside access. The right-of-way was somewhat protected, however, by station platforms that were located in the middle of the road. These median platforms took up a lane of traffic and created the need for additional safe pedestrian crossings. Pro-car interests wanted these platforms removed, and ultimately helped them get dismantled.

However, streetcars had some distinct disadvantages for transit passengers, too, and these problems grew more acute with growing car use and suburbanization. Both experts and citizen groups complained that streetcars could not navigate around even minor obstructions in the road. If a single delivery truck blocked the lane, the entire streetcar line came to a stop. This problem got worse as traffic congestion worsened. Similarly, if one streetcar broke down, the entire line came to a stop for long periods of time, until repairs could be made. These problems occurred more frequently as maintenance declined. People also complained about the noise. Streetcars were extremely noisy compared to rubber tire vehicles, particularly when they were not in good condition. There was also a great deal of complaint about unsightly overhead wires, though these could be replaced at a price with underground conduit.[8] Finally, it was very expensive to maintain the special tracks and catenary (overhead wires) or conduit required to operate the streetcar systems. Disrepair caused by disinvestment only made this worse. Streetcar lines were extremely cumbersome and expensive to repair because if only a single piece of the line needed to be fixed, whole sections of the system needed to be shut down, with resulting revenue and service losses. Also, if the tracks were worn, they damaged the wheels on the vehicles, and if old vehicles had worn wheels they damaged the tracks. So for any significant maintenance both tracks and rolling stock had to be replaced at once, making piecemeal maintenance impractical. The old private streetcar companies were also some of the most ruthless monopoly capitalists in the business, and therefore enjoyed little love from the general public. For these reasons, by the time the streetcars began to be replaced by buses, relatively few people mourned their passing.

Buses had a lot of advantages in the increasingly low-density, auto-oriented U.S. cities. As buses operate on normal streets, they could take advantage of all the new roads being built and serve the sprawling suburban areas without the expensive investment needed to extend streetcar services. Buses could easily pull around obstructions. The rubber-tired vehicles made less noise and did not require unsightly overhead wires. Unfortunately, those few elements of streetcar design that helped to increase their speeds were also removed: namely, their location in the central verge of the roadway (which allowed them to avoid many of the turning conflicts and double parking obstacles), the station platforms which helped to keep other vehicles out of the right of way, and those areas where the streetcars had exclusive rights of way.

A model 718 bus for forty-one passengers, New York City, c. 1936. General Motors and Omnibus Corporation bought out the largest streetcar company and converted it to a bus company. Photo: G.M. Coach Company and New York Public Library

Curiously, however, already in the 1930s many traffic experts were advocating for measures that are now considered elements of Bus Rapid Transit. A few cities realized that giving buses exclusive lanes would allow them to bypass traffic congestion, and they planned networks of bus lanes as an alternative to resurrecting the declining streetcar systems. The first exclusive bus lane in the United States, and perhaps in the world, opened in downtown Chicago in 1939. Chicago also had ambitious plans to convert some inner city rail lines to busways, but the plan was never implemented. Similarly, Milwaukee and Washington, D.C. had ambitious, but unfulfilled, plans to build networks of exclusive bus lanes.[9] The car-oriented and anti-bus planning of the mid-twentieth century killed not only the streetcar, but also these early BRT plans.

Standard bus systems, without exclusive lanes, central median platforms, or other BRT features, began to suffer from the same negative cycle of disinvestment and service decline that killed streetcars in earlier decades, prompting their public takeover from the 1950s into the 1970s.

In the 1970s, a few prescient traffic engineers, aware of developments in South American cities like Curitiba, Brazil, began some early prototypes of BRT-like systems in the United States. In 1977, Pittsburgh, Pennsylvania opened its South Busway. Hoping to address the adverse impact of growing traffic congestion on bus operating costs and speed, and lacking the funds to modernize the city's one-hundred-year-old streetcar lines, community leaders and elected officials decided to implement the South Busway instead.[10] Designed to transport travelers from the western suburbs of the city to downtown, it featured 4.3 miles of exclusive bus lanes.[11] The busway has been a success; not only does it still exist, it accounts for the continuing popularity of BRT-type infrastructure in Pittsburgh, including recent developments such as the East Busway, which opened in 1983 and was expanded in 2003, the West Busway, which opened in 2000, and recent plans to integrate BRT into downtown Pittsburgh.

Another BRT prototype was built in Los Angeles in the early 1970s. The 11-mile El Monte Busway opened in 1973 to ease transit connections to downtown Los Angeles, at first accommodating only bus traffic, then opening up to carpools in 1976.[12] The success of the El Monte Busway encouraged, in part, future transit investments

The El Monte Busway in Los Angeles, California, built in the early 1970s, was an early forerunner of BRT. Photo: Dorothy Peyton Gray Transportation Library — Los Angeles Country Metropolitan Transportation Authority

in Los Angeles, including the Silver Streak BRT link to El Monte Station in the 2000s and plans to build and anchor the mixed-use community of El Monte Transit Village to El Monte Station. Though the Silver Streak only incorporates some elements of BRT, the El Monte Transit Village, if constructed, will be one of the first mixed-use transit-oriented developments built around a bus station in the country.[13]

Other examples of early BRT-type infrastructure include a busway constructed in the 1970s just south of Washington, D.C. on Virginia's Shirley Highway (since converted into the I-395 HOV lanes, which convey higher passenger volumes in buses than a parallel metro line), the I-495 connection between New Jersey and the New York Port Authority Bus Terminal through the Lincoln Tunnel, and bus lanes on California Highway 101 around the San Francisco metropolitan area. At the same time several cities, including New York, Seattle, and Honolulu, were also opening HOV lanes to buses, vanpools, and carpools.[14]

None of these were full-featured BRT systems, however, and none of them ever really caught the public imagination. Public awareness of these modest improvements was largely eclipsed by other contemporary mass transit developments like the flashy new Washington, D.C. Metro and San Francisco's BART system. With far more state and federal funds available for mass transit infrastructure, new metro systems and the expansion and rehabilitation of older subway systems received the lion's share of public sector largesse.

In a few cases, these new metro systems were controversial to those on the left and among minorities because the primary beneficiaries were suburban white communities. Sometimes, these benefits came at the expense of bus services in minority communities, many of which were rerouted or cancelled. This further reinforced the notion that buses were only used by the transit-dependent: low-income, elderly, disabled, and minorities. The expensive rail projects were more controversial, however, among conservatives who saw them as examples of government extravagance.

In the new millennium, decades of efforts to reverse urban decline have begun to succeed, and a growing number of civic leaders have started to focus on revitalizing downtowns and the transit- and pedestrian-oriented streets that serve them. As part of these urban revitalization efforts, many cities have begun to consider new investments in urban mass transit again.

Looking for models of how to do this, many U.S. transit advocates looked to America's own past—the time of our bustling, streetcar-dominated cities. Other Americans turned to Europe, where higher population density and far more generous tax revenues made the survival and renewal of extensive networks of underground and surface railways viable. As a result, many progressive transit advocates, and the general public in the U.S. tend to equate public transit with rail, and maintain an aversion to buses. By the twenty-first century, few people recalled the earlier shortcomings of the streetcar systems that led to their ultimate demise.

Unfortunately, it is much more difficult to build up a financially feasible rail-based surface transit network in U.S. cities now than it was in the early decades of the twentieth century. Tram systems were successful in the early years of the twentieth century because the vast majority of the population still lived in dense urban areas and did not own private vehicles. Also, streetcar companies operated as private monopolies, and subsidized operations with real estate investments. In these conditions, municipalities were able to build up vast networks of streetcars. With this network dismantled, and people dispersed into car-oriented suburbs, however, reestablishing any degree of comprehensive network connectivity is fiscally impossible using rail technology.

While some progressive municipalities have recently turned to light rail systems, similar in their operating characteristics to the streetcars that were abandoned more than half a century ago, few of these systems have led to any fundamental change in travel behavior. This is despite often massive capital investments and levels of operating subsidies that would have been unimaginable in the past. Given the state- and city-level fiscal problems that are endemic across the United States today, most American cities can only hope to build one or two new rail lines over the next decade. These systems will be unable to serve the increasingly dispersed population of our massive metropolitan regions, despite their enormous price tags.

In the 1990s, a second wave of BRT began to appear in the United States. In part, it was stimulated by new U.S. FTA funding. The W. Alton Jones Foundation (now Blue Moon) also played a key role, actively pushing BRT as an alternative, more cost-effective solution to mass transit problems. Headed by Pat Edgerton, the foundation provided funding to take top officials from several American cities on study tours to Curitiba, Brazil. As a result of these visits, a number of American planners started to look to BRT as a viable and attractive mass transit option with significantly lower construction and operational costs than light rail.

In the last fifteen years, new world class BRT systems in Latin America, Asia, and Africa have emerged, which have demonstrated that BRT can provide levels of speed and capacity comparable to metro systems. As BRT has become a worldwide phenomenon, American cities have started considering BRT as a viable alternative option in their transit plans. Unfortunately, there is no consensus as to what constitutes a full-fledged or gold-standard BRT system yet. Awareness of BRT's full potential is limited in the United States, and several cities have made modest bus system enhancements and labeled them BRT, tarnishing the BRT brand. As a result, at the start of the second decade of the twenty-first century, the public in most U.S. cities remains unaware or apathetic about BRT's potential.

Chapter II:

BRT Global Best Practice

While there are some internationally agreed-upon concepts of what BRT is, definitions are somewhat variable. In the United States, the term BRT is essentially a marketing term promoted by the U.S. FTA for a set of common system characteristics that tend to increase the speed and capacity of standard bus services. There is no technical body with the authority to determine what constitutes BRT and what does not. As a result, both in the United States and internationally, many marginal bus system improvements have been billed as BRT.

Ultimately, there are two ways to determine if a BRT project, or any mass transit intervention, is successful. First, whether or not the project reduces the door-to-door travel time and travel cost of all existing public transit passengers in the impact area, and second, whether or not it attracts new passengers from other modes. Transit projects that fail to meet these criteria cannot be considered worthwhile. Because it is difficult to fully analyze these factors without a sophisticated traffic model (a simple transit model is not enough to capture door-to-door travel times or make robust predictions about modal shift), technical experts tend to rely on rules of thumb for determining what constitutes best practice in most conditions.

The United States has a few characteristics that are unlike those in any of the cities where gold-standard BRT systems have been implemented. Very high levels of private car use and very low levels of bus ridership have profound ramifications for potential American BRT system design. Yet it is still possible, within the context of these conditions, to implement the gold-standard.

While transit needs vary from city to city, there are certain criteria that are necessary in most conditions to create a system that serves the highest possible passenger demand at high speeds while reducing operating costs. ITDP has thus developed a tiered scoring system to rank BRT systems. This scoring system, called the *BRT Standard*, allows BRT systems to be ranked as gold, silver, or bronze. The weightings in the scoring system roughly reflect the impact of specific criteria on passenger travel time and the quality of the service, which takes speed and capacity into account, along with other indicators. For a more thorough review of BRT features and best practices, see ITDP's *The Bus Rapid Transit Planning Guide* (currently being updated).[1]

This score system fills a void in the field to better measure the robustness of BRT systems, but it is still very much a work in progress. The authors of this paper suggest that a technical committee be convened to review and refine the *BRT Standard* and develop an official certification system for BRT.

This section explores each of these characteristics in detail, grouped into several general categories: service planning, infrastructure, station design and station-bus interface, and quality of service and passenger information systems. A gold-standard BRT system in the United States would be planned with most if not all of the features below.

Defining the *BRT Standard*

This table shows the criteria and weightings that make up the *BRT Standard*. A total score of 85 or above classifies a BRT system as gold; 70 to 84 as silver; and 50 to 69 as bronze. For more information, see corresponding sections in this chapter.

SERVICE PLANNING	Max Score
Off-vehicle fare collection	7
Multiple routes use same BRT infrastructure	4
Peak period frequency	4
Routes in top 10 demand corridors	4
Integrated fare collection with other public transport	3
Limited and local stop services	3
Off-peak frequency	3
Part of (planned) multi-corridor BRT network	3
Performance-based contracting for operators	3
Enforcement of right-of-way	2
Operates late nights and weekends	2
Operational control system to reduce bus bunching	2
Peak-period pricing	2
INFRASTRUCTURE	
Bus lanes in central verge of the road	7
Physically-separated right-of-way	7
Intersection treatments (elimination of turns across the busway and signal priority)	4
Physically-separated passing lanes at station stops	4
Stations occupy former road/median space (not sidewalk space)	3
Stations set back from intersections (100 feet min)	3
Stations are in center and shared by both directions of service	2
STATION DESIGN AND STATION-BUS INTERFACE	
Platform-level boarding	5
Buses have 3+ doors on articulated buses or 2+ very wide doors on standard buses	4
Multiple docking bays and sub-stops (separated by at least half a bus length)	3
QUALITY OF SERVICE AND PASSENGER INFORMATION SYSTEMS	
Branding of vehicles and system	3
Safe, wide, weather-protected stations with artwork (>/=8 feet wide)	3
Passenger information at stops and on vehicles	2
INTEGRATION AND ACCESS	
Bicycle lanes in corridor	2
Bicycle sharing systems at BRT stations	2
Improved safe and attractive pedestrian access system and corridor environment	2
Secure bicycle parking at station stops	2
Total Possible Points	**100**

Defining BRT

There is currently no official definition of what constitutes Bus Rapid Transit. Here is how a few leading authorities define it:

1.

"A high-quality bus-based transit system that delivers fast, comfortable, and cost-effective urban mobility through the provision of segregated right-of-way infrastructure, rapid and frequent operations, and excellence in marketing and customer service."

—Institute for Transportation and Development Policy

2.

A "flexible, rubber-tired rapid transit mode that combines stations, vehicles, services, running ways, and Intelligent Transportation System (ITS) elements into an integrated system with a strong positive identity and unique image."

—The U.S. Transit Cooperative Research Program (Levinson, 2003, p.12)

3.

"An enhanced bus system that operates on bus lanes or other transitways in order to combine the flexibility of buses with the efficiency of rail....It also utilizes a combination of advanced technologies, infrastructure, and operational investments that provide significantly better service than traditional bus service."

—USDOT, FTA

SERVICE PLANNING

One of the main goals of BRT systems should be to reduce the door-to-door travel time for passengers and improve the quality of their trip as compared to traditional bus service. Transit planners should always begin with service planning to understand which transit services are needed and before making infrastructure decisions.

Multiple routes use same BRT infrastructure

In developing countries, where most of the gold-standard BRT systems are located, passenger demand is high and, as a result, bus frequencies are high. With large volumes of buses using the same bus stop, and many passengers simultaneously boarding and alighting, stop delays are long. Under these conditions it is sometimes necessary to minimize bus volumes on high-demand corridors to avoid buses backing up at station stops and causing delay. The solution is often to create services in which large articulated BRT vehicles travel along these corridors only, and passengers wishing to travel beyond these corridors transfer to another, smaller bus at a transfer terminal. In Curitiba and Bogotá, when the BRT systems were created, some former bus routes were removed from the main arterials and passengers were forced to transfer onto fewer, larger buses with higher load factors. These types of systems are typically known as "trunk and feeder" systems.

In the United States, existing transit demand is generally lower than in developing countries. This is because U.S. cities are much more car-dependent and bus demand is often limited to the small population of "transit dependents" and an even smaller population of "choice riders." As U.S. BRT systems aim to simultaneously serve transit-dependent populations and capture new choice riders, the highest quality of service is necessary for accommodating both populations.

Because existing demand is low, bus frequencies along one given corridor are generally low as well. Thus, potential passengers lose more time waiting for a bus to arrive. It is rare that buses will congest the bus stops, so this is less of a concern. At low bus frequencies, bus lanes appear empty to drivers in adjacent lanes, increasing public irritation if drivers are stuck in traffic. Services in the U.S. therefore need to be designed to maximize bus frequency within any specialized BRT infrastructure. Transfers also need to be minimized, because low frequency increases the time penalty of each transfer.

Normal bus systems typically have multiple bus routes that tend to converge on a few major arterials and then diverge to reach different destinations. These bus routes can be matched closely to transit demand in the city, as buses can operate on any road, reducing door-to-door travel times, and maximizing ridership. In some cities, the existing bus networks have been well thought-out and are close to optimal. In others, BRT creates an opportunity to modify route structures.

In every BRT system design, the first questions the service planner needs to answer are which of the existing bus routes using the BRT corridor should be modified, which ones should be included in the new BRT operations, and which ones should be excluded. Because of the low bus frequencies in the United States, it is generally optimal to incorporate as many existing and new bus routes as possible into the new BRT system.

Thus, when designing a BRT system, it is generally sensible to upgrade as many of the bus routes and service types as possible using the corridor with BRT-grade buses so they can all take advantage of the new BRT system infrastructure, such as exclusive running ways. Off of the BRT infrastructure, these buses will continue to travel along their existing routes. In this way, many routes are using the same running way, producing higher frequencies. The result is a better-used BRT lane and fewer transfers for passengers since buses travel full routes and not just along singular corridors.

Currently, the trend in the U.S. is that when planning for BRT, a single existing bus route is upgraded to BRT-grade buses, and any other bus routes that were previously using that corridor are either re-routed or are allowed to use only a limited part of the specialized BRT infrastructure. This manner of service planning likens BRT planning to rail planning in which rail vehicles can only travel back and forth along a single corridor. It does not take advantage of the flexibility of buses. The problem that the trunk-and-feeder systems were set up to address—bus congestion on the trunk arterials—simply does not exist here. A shift in service planning methodology, to more of a "direct service" model, will be necessary to capture the maximum number of riders.

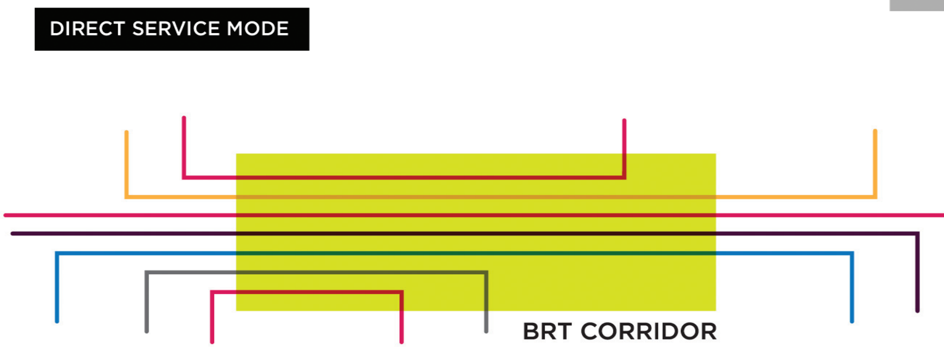
Today, even outside the U.S., many gold-standard BRT systems are emerging, created on more of a direct service model. Recently three new systems—Johannesburg, South Africa; Guangzhou, China; and Cali, Colombia—have opened, offering direct service operations, eliminating the need for transfers that trunk-and-feeder systems often create, while avoiding station saturation problems.

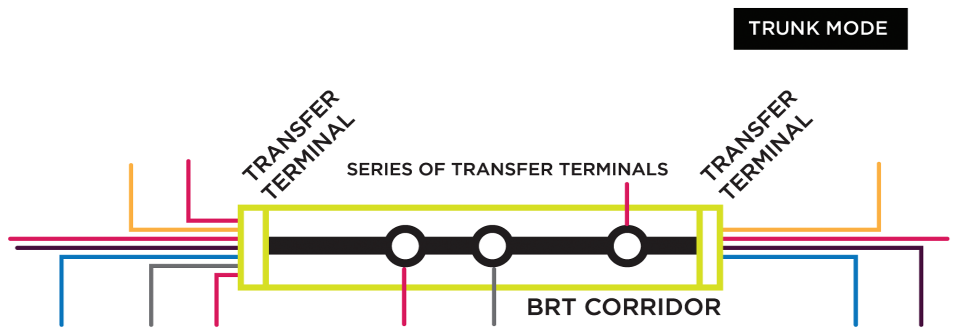
Accommodating express bus services into BRT trunk infrastructure is also particularly important in the United States. Express buses that serve far-flung suburban areas could utilize high occupancy vehicle lanes on freeways and BRT trunk infrastructure on city streets, in order to become competitive with driving, particularly in parking-constrained urban locations.

The *BRT Standard* awards up to four points for systems that include multiple services that use the same infrastructure in the densest corridor segments. Fewer points should be awarded for fewer routes or less optimal service.

Some American cities do have multiple services using the same bus lanes but lack many other gold-standard BRT system characteristics. The elements of gold-standard BRT typically incorporated into "trunk" infrastructure are a key part of what is typically considered BRT and often include physically separated rights-of-way, pre-boarding fare collection and other elements (as will be discussed in later sections). These are the elements which produce a faster, higher-quality passenger experience.

The MIO—Cali, Colombia's BRT—opened in 2008 and offers direct service operations. Photo: Carlos Felipe Pardo





Direct service mode allows the same buses to serve the BRT corridor and regular routes, without requiring passengers to transfer. The trunk mode requires transfers from outside the BRT corridor in order to travel inside the corridor. Source: Streetfilms

Limited and local stop services

The Bus Rapid Transit Planning Guide explains that:

"Single lane BRT systems with only local services have significant disadvantages. Most importantly, at high passenger volumes, they have much lower capacity and speed. Typically, the vast majority of passengers will get on and off at a few major stations… For many passengers, stopping at each intermediate station adds significantly to the overall travel time with relatively little commercial benefit to the system operators. Thus, both passengers and operators can benefit from the provision of services that skip intermediate stops. BRT's relative flexibility means that 'limited-stop services' … can be accommodated."

It is thus generally recommended to have both types of services. The *BRT Standard* scoring system gives a maximum of three points to systems that include both limited and local services in the densest corridor segments. A system that has optimized its limited and local stop services, based on passenger demand profile, should receive all three points, while systems that attempt to meet passenger demand through such services but fail to meet demand optimally, should receive fewer points.

Frequency of service

One barrier to getting people out of their cars and onto public transportation is the human desire to travel flexibly, and on a whim. People do not want to have to wait to travel, especially when they can get in their car and go—even if, in fact, once in their car they will be stuck in traffic. The best way to overcome this barrier is to provide frequent service, with service gaps of no more than five minutes.

There is a false notion that BRT generally requires articulated buses. Articulated buses were introduced in the Latin American systems because the busways and bus stations were saturated, and using fewer, larger vehicles in those conditions was a way of reducing station saturation and increasing bus speeds. But in the United States, where demand is lower, smaller buses can provide higher frequency service, instead of running bigger buses less frequently. Because labor costs are higher in the United States than in developing countries, increasing service frequency has operational cost ramifications, but a high-quality transit service needs to be frequent.

Peak period frequency

During the peak period, the *BRT Standard* awards up to four points for frequency of service in the highest-demand segments as follows:

Service Frequency (minutes)	Points
< 3	4
3–5	3
5–7	2
7–10	1

Off-peak frequency

During the off-peak period, the *BRT Standard* awards up to three points for frequency of service. Off-peak frequency receives one less point than peak period frequency because demand is higher during the peak period and thus, more people are affected by frequency of service. Points for off-peak frequency are awarded as follows:

Service Frequency (minutes)	Points
< 7	3
8–15	2
> 15	1

Late night and weekend operations

In order to reasonably expect people to put aside their cars and take transit, they need to be guaranteed that if they make a trip, they will also be able to make the return trip. Thus, service needs to be offered throughout the day and well into the night. This seems to be understood in the United States, as most services that call themselves BRT operate at least until midnight. Weekend service is important as well if the system is to be seen as a viable alternative to owning a car. Late night and weekend service is awarded a maximum of two points under the *BRT Standard*, with one point awarded for late night service and the other point for weekend.

Off-vehicle fare collection

Except on highly-congested corridors, boarding delay is by far the most significant form of delay in most bus systems. Off-vehicle fare collection is thus the most important element in any BRT system. As such, the *BRT Standard* awards up to seven points for off-vehicle fare collection in the highest-demand segments.

Conventional bus systems require passengers to pay their fare on-board, before the bus departs. This slows the process significantly, particularly when there are large numbers of passengers boarding at a station. Boarding times per passenger under such conditions are upwards of five seconds per passenger, and in a standard BRT system, boarding times per passenger can be brought down to as little as one-third of a second.

Collection of fares off-board, before buses arrive, significantly increases operational efficiency. There are two methods of doing this:

1. Proof-of-payment: passengers pay their fare at a ticketing machine and enforcement agents do random checks to ensure that all have paid. This is somewhat labor intensive and can be uncomfortable for passengers who get caught because they did not understand the system.

2. Barrier-controlled stations: passengers pay their fare before passing through a turnstile to enter the station. No enforcement agents are necessary, as passengers cannot enter the station without paying. This is more capital intensive than proof-of-payment but minimal on labor costs. Additionally, it requires that stations are large enough to hold all waiting passengers who have paid.

A growing number of BRT-type systems in the United States include off-board fare collection, and are showing impressive time savings benefits. To date, all of them have used a proof-of-payment method, more typical of European bus and tram systems.

The operational costs, capital costs, and the revenue implications of both types of off-board fare collection warrant more thorough study. The benefits of off-board fare collection are higher at stations with high passenger volumes, and lower at stations with lower passenger volumes.

The main reason U.S. systems are using proof-of-payment systems is that they do not require special stations, so the capital costs are lower and the administrative headaches associated with public works are reduced. Many of the systems

Off-vehicle fare collection machine in Las Vegas, Nevada.
Photo: Annie Weinstock, ITDP

with proof-of-payment are curb-aligned busways, with stations located on the sidewalk, where a physically-enclosed station with a platform would obstruct the sidewalk.

However, systems with gold-standard characteristics require the construction of special platform-level stations in the central verge of the roadway. In this situation the advantages of proof-of-payment systems are fewer, since station costs will be almost the same, and stations in the central median will not obstruct the sidewalk. In the rest of the world, and on all of the gold-standard BRT systems to date, barrier-controlled stations are used almost exclusively.

Barrier-controlled stations can provide important operational advantages for the United States. In direct-service BRT systems, bus drivers can collect fares aboard the bus at stations with low ridership, and fares can be collected at barrier-controlled turnstiles at stations with high passenger volumes. These stations may or may not be on the trunk BRT corridor. With gate-controlled stations, multiple bus routes can use the same BRT infrastructure and the same payment format. Stations can either be manned or unmanned depending on whether or not the passenger volumes justify a heightened level of customer service.

Proof-of-payment systems discourage the use of BRT infrastructure by multiple services and routes because for each new route that is added, off-board ticketing machines and enforcement personnel need to be added to the entire length of the route where off-board payment is accepted.

All of these factors should be weighed in the U.S. context where labor costs tend to be higher. Barrier-controlled stations may also reduce fare evasion. In some circumstances, passengers prefer a station environment more protected from both weather and security concerns. Barrier-controlled stations may provide a stronger sense of permanence and likeness to metro stations in anchoring transit-oriented development.

The determining factor should not be whether the capital cost of one system or the other is higher; rather the question should be which one reduces the most travel time for the most passengers, and which one best reduces operating costs in the long term.

Enforcement of right-of-way

Keeping unauthorized vehicles out of bus lanes is a challenge, even for the most robustly separated lanes. Bus lanes with very high volumes of buses need fairly minimal enforcement. Mixed traffic invasions of bus lanes are also predictable: they tend to happen at locations that congest and at intersections. In most of the developing world, where labor costs are lower, this problem is handled by adding traffic police to locations along the BRT corridor where invasions are most likely to occur. However, in developed countries where labor costs are high, camera enforcement is more cost-effective. Technological advancements have made it possible to police bus lanes with cameras. These should ideally be installed on buses in order to ensure constant moving enforcement of bus lanes. A less effective, but still useful measure is to install stationary cameras along the corridor.

Legislation in the United States has been slow to allow for camera enforcement in bus lanes. It took ten years for the New York City MTA to receive approval to enforce their new bus lanes with cameras. However, the need seems to be understood and most American transit agencies are eager to move towards the latest technologies. The *BRT Standard* awards two points for on-board camera enforcement or one point for stationary camera enforcement.

Performance-based contracting for operators

Performance-based contracts provide competition and incentives for good performance (and penalties for poor performance) to multiple private and/or public operators. To the customer, services provided by multiple operators all look the same; but in actuality, service is generally superior than it might have been under a single operator.[2] For example, with TransMilenio in Bogotá, when a bus operator performs poorly, e.g., the buses are not clean, or drivers have demonstrated poor behavior or poor on-time performance, the company is fined. The fines are put into an escrow account, and then ninety percent of the fines and penalties are distributed to the highest-performing operator. The scheme thereby provides a double incentive to avoid poor performance by first penalizing poor-quality service, and then rewarding excellence. The result is better quality service for a lower price. Furthermore, TransMilenio has operating contracts written to incentivize bus operators to cut costs and for TransMilenio itself to optimize operations in a way that cuts costs, helping to make the system financially self-sufficient. For more details, see the *BRT Planning Guide*.

Internationally, quality-of-service contracting is increasingly accepted as the gold-standard in bus operations. In the United States, municipal buses are still predominantly operated by monopoly public transit authorities. Transit authorities have relatively weak incentives to optimize the efficiency of operations, and these authorities have to be responsive to both political and community involvement in their operations.

The current fiscal crisis in the United States creates a political opportunity to demand better transit system performance for less taxpayer funds. While most U.S. transit agencies choose to operate new BRT systems in-house, as it is simpler, a few cities are looking into public-private partnerships. Las Vegas has contracted out their BRT operations to Veolia Transportation, a private entity that "operates and maintains the service, and manages the highly technical and customized maintenance the vehicles require."[3] Nevertheless, awareness of the possibilities of performance-based contracting is quite limited in the United States, and the institutional obstacles are significant. The *BRT Standard* awards up to three points for performance-based contracting. One to two points may be awarded for competitive tendering of operations without performance incentives, depending on the strength of the contract.

Operational control system to reduce bus bunching

Even a BRT system in which buses are given their own right-of-way encounters delays due to irregular numbers of boarding and disembarking passengers. Sometimes, the result is that a group of buses scheduled at fixed intervals become bunched together in close proximity. The result is a lapse in the schedule, extended waiting times, and sometimes a significant reduction in system capacity. Both electronic and manual operational control systems exist to regulate bus positions to reduce bus bunching. GPS or cell-phone technology is used to map bus locations relative to the schedule, and show where buses are beginning to bunch. Such systems can send messages to drivers to either increase or decrease speeds and to make minor schedule adjustments. These systems are already being employed throughout transit systems in the United States and need only be updated to the state-of-the-art when a new BRT system is implemented. The *BRT Standard* awards up to two points for operational control systems.

Integrated fare collection with other public transport

In most cities, BRT is one mode that complements a network of other transit modes—usually bus, light rail, and/or heavy rail. It is helpful to consumers if the fare system for the new BRT is integrated with fare systems already in place for other modes so that discounts can be offered to transferring passengers, and to simplify the ticketing process. Fare integration with modern ticketing systems does not generally require that the funds for different transit modes be pooled.

American transit agencies generally recognize the need for fare integration and already possess the capabilities through their other already-integrated modes. The *BRT Standard* awards up to three points for integrated fare collection.

Peak-period pricing

In order to help spread demand more evenly across the day, and to avoid the sharp spikes in ridership that often occur during the peak period,

Physically-separated right-of-way in Eugene, Oregon. Photo: Annie Weinstock, ITDP

An example of Johannesburg's Rea Vaya BRT lane in the central verge of the road. Photo: ITDP

a top-quality BRT system should employ peak-period pricing. Fares are increased during the peak periods so that passengers with some flexibility will have the incentive to travel off peak. This lowers costs for transit agencies, which typically need to deploy more vehicles to serve high demand during peak periods.

Peak-period pricing has yet to be employed in American BRT systems, though it has been embraced by other transit systems, like the Washington, D.C. Metrorail. The *BRT Standard* awards up to two points for peak-period pricing.

Routes in top 10 demand corridors

BRT corridors should be implemented where passenger demand is highest. Often, a BRT corridor is chosen where passenger demand is low, simply because there is excess roadway capacity. The *BRT Standard* awards four points for systems in which the BRT corridors are on the highest demand corridors and fewer points when the BRT corridors are on lower-demand corridors.

Part of (planned) network

Too often in the United States, BRT is looked at as a one-off corridor, similar to rail. But one of BRT's biggest advantages is that it can be turned into a network relatively easily. In Montgomery County, Maryland, the current plan is to build a full network within a short time frame rather than apply for federal funding for one corridor at a time and wait until that corridor is constructed. In this way, a BRT network can cover an entire metropolitan area making it significantly more attractive to potential users who will experience increased access to their desired origins and destinations.

The *BRT Standard* awards up to three points for the existence of, or plans for, a full BRT network.

INFRASTRUCTURE

Infrastructure decisions should follow the operational design; what is needed and makes sense for a trunk-and-feeder system may not make sense for a direct service BRT. However, some generalizations can be made.

Physically-separated right-of-way

Providing buses with exclusive right-of-way in busways allows them to travel at free-flow speeds and avoid mixed traffic congestion. During periods of congestion, dedicated rights-of-way allow bus speeds between station stops to surpass vehicle speeds in the remaining mixed traffic lanes.

In the best systems, enforcement of a dedicated right-of-way is assisted by a physical barrier to protect the lane from encroaching vehicles. In technical terms, the physical separation is only necessary where there is traffic congestion and a risk that vehicles will encroach on the dedicated right-of-way. However, because congested conditions change over time, and because the physical separation makes the system feel more official, physical separation is generally recommended throughout the entire length of the trunk corridors. This physical separation is ideally something that is not so rigid and impermeable that a bus cannot get out of the lane without damaging the vehicle or the barrier. As a rule of thumb, physical separation is most important in downtown areas and on the major trunk arterials that tend to experience traffic congestion.

Dedicating one or more mixed traffic lanes only to buses is more politically challenging in the United States than in cities with higher ridership and bus frequencies. In most of the Phase I BRT corridors in the developing world, bus volumes are sufficiently high and boarding and disembarking sufficiently chaotic that relocating a large share of bus traffic to a segregated bus lane actually *improves* the level of service in the mixed traffic lanes. Such win-win conditions are comparatively common in the developing world, and quite rare in the United States. BRT corridors in the United States, where a dedicated bus lane would improve levels of service for mixed traffic, are very few, and the number of lanes that would actually carry more passengers if turned into a dedicated bus lane is also relatively low. Regulations in many states make it difficult to significantly adversely impact the mixed traffic level of service. Politically, it is also difficult to physically segregate a bus lane when bus frequencies are low because at frequencies longer than two minutes, the bus lane looks empty to the casual observer. BRT lanes in the most popular developing-country systems have bus frequencies as low as ten or fifteen seconds. At these frequencies, busways hardly even need physical segregation, as their exclusive right-of-way tends to be self-enforcing.

Many BRT systems in the United States, particularly those operating on congested downtown streets or on densely-developed urban arterials, struggle with dedicating a lane to BRT. However, to implement a full-fledged, cost-effective BRT the lane ought to be physically segregated. For these reasons, in the United States, some of the better systems have been built on decommissioned railway lines, but these have the disadvantage that there are rarely concentrations of trip origins or destinations along decommissioned railways. In this context, it is imperative that the highest transit-demand corridors be selected for lane segregation, and that as much existing bus traffic as possible be captured by the new facility.

As dedicated right-of-way is one of the most important features of gold-standard BRT the *BRT Standard* awards up to seven points for physically separated right-of-way as follows:

Location of dedicated right-of-way	Points
In highest-demand segments	7
In low-demand segments only	3
Nowhere in network	0

Bus lanes in central verge of road

The placement of the dedicated lane is perhaps the next most important design decision. All of the world's best BRT systems have their dedicated rights-of-way in the center of the road. This is true for streetcars and light-rail systems, and for the same reasons.

Placing a dedicated lane in the center of the road tends to increase bus speeds because it minimizes conflicts with right-turning vehicles, parking and standing vehicles, bicyclists, pedestrians spilling into the roadway, and other forms of traffic impedance.

There are three circumstances where central median alignment's superiority is more debatable:

The first is along a major body of water like a river, lake, ocean, or any large zone that is not penetrated by streets, like a college campus, park, or industrial park. In such locations it is sometimes better to put both directions of the BRT system directly adjacent to the water body, as it rarely needs to be crossed.

The second is on one-way streets. The optimal configuration for a dedicated BRT lane on a one-way arterial is still open for debate. Some cities, such as Johannesburg, South Africa and Guayaquil, Ecuador, have placed a dedicated one-directional BRT lane in the middle of a one-way street with semi-permeable barriers. (And also on a parallel street in the opposite direction.) This seems to be working well, but these one-way pairs create connectivity problems in the network. A passenger wishing to transfer to another line going the opposite direction has to leave the system and walk a block to the nearest station. In Mexico City and León, Mexico, there are two-way BRT systems in the middle of one-way arterials. This works fine from the point-of-view of vehicular flow and speed, but has led to increases in both vehicular and pedestrian accidents. The advantages of a central-median alignment on a one-way street grid are debatable. Curb-aligned parking-protected bus lanes—similar to many of New York City's new bicycle lanes—have been discussed in a few cities but have not been tested. Physically-segregated curb-lane alignment with banned parking and turning restrictions across the busway may be just as effective. Converting the road back into a two-way street and turning one arterial into a two-way BRT-, bicycle- and pedestrian-only street should also be considered.

The third circumstance is on suburban arterials. Many major arterials in the United States are signalized highways surrounded by surface parking lots and strip malls set back far from the road. With ample surface parking inside the strip mall, there is little incentive for people to park along the roadway itself—one of the major impediments to curbside BRT lanes. With delivery bays set back far from the road reserve, delivery vehicles do not need to stop in the curb lane. Taxis would also tend not to stop directly along the road, instead dropping passengers closer to the shops. Many of the risks of various forms of traffic impedance typical in downtowns and in developing countries are diminished on strip-mall-centric arterials more typical in the United States.

Meanwhile, in this third case, the disadvantages of median-aligned BRT are marginally more pronounced. On a typical strip-mall arterial, there tend to be frequent left turns with turning bays to allow direct access into shopping areas without slowing through traffic. Left turns can cause conflicts on any median BRT system as the buses are generally through traffic. If it is a free left turn, the car may get stuck perpendicularly across the busway and block it. This may not be a major problem, but traffic engineers are not particularly comfortable with it. If it is a signalized left turn, then this new signal will introduce a signal delay to the busway that does not affect the rest of traffic. If it is a short signal phase it may not be a significant delay. Preferable is to ban the left turn and force the traffic to either go around the block and make three right turns, or make a U-turn, either mid-block or at the next signalized intersection where left turns are allowed. As this imposes a minor inconvenience to left-turning motorists for the benefit of bus passengers, this change is harder to justify in cost-effectiveness terms where there are more turning vehicles and fewer bus passengers.

Because placing the lanes on the median of any street (two-way or one-way) requires building stations in the middle of the road, rather than on sidewalks, another lane often needs to be taken for the station as well as the dedicated bus lanes. The standard solution to this is to remove parking where the stations are built. Another part of

A dedicated one-directional BRT lane in the middle of a one-way street in Guayaquil, Ecuador. Photo: ITDP

the solution is to have a single bus station that is used by buses in both directions. The other option is to offset the bus station stops.

As central verge bus lanes are also highly important in a gold-standard BRT, the *BRT Standard* awards up to seven points for this metric, where all seven points are given to systems that include central verge lanes in the highest-demand segments.

Stations are in center and shared by both directions of service

In general it is better if there is one bus station in the central median shared by buses traveling in both directions, rather than having split stations. While this requires the procurement of buses with doors on the left side, it reduces the amount of space needed for bus platforms. As the corridor grows into a network, passengers will transfer between bus lines more frequently. This is more convenient when one can simply cross the platform, than if one has to exit the station and enter another one.

The *BRT Standard* awards up to four points for shared stations in the center of the road in the highest-demand segments (see page 27).

Intersection treatments

It is important to reduce the time buses and other traffic spend at traffic lights in a BRT corridor. In the United States, much of the focus has been on measures that extend a green signal by up to about five seconds if a sensor detects that a bus is approaching. This measure is somewhat important in low-frequency BRT systems. Additionally, it is not a measure biased against mixed traffic; rather, it privileges the traffic on the BRT corridor at the expense of traffic on perpendicular roads.

Significantly more time can be saved by eliminating left turns across a central median-aligned BRT system altogether. This is in part due to delays caused by left turns as described above and due to additional right-of-ways required at the intersection to keep it from saturating.

As a rule of thumb, on a BRT corridor the majority of traffic signals should be two-phased, and only a few key intersections with high turning volumes should be three-phased, but never more than three phases. The classic object lesson here is the Delhi BRT, which retained all turning movements for both mixed traffic and buses, leading to a six-phase traffic signal, which created a severe bottleneck for both the buses and the mixed traffic that badly damaged the credibility of BRT in India.

One of the main reasons that gold-standard BRT includes central median placement is because it is easier to eliminate left turns across a median-aligned BRT system than it is to eliminate right-hand turns across a curb-aligned BRT system.

There remains debate about the specific conditions when it makes sense to ban left turns and add U-turns, and when it makes sense to retain them. In general, the traffic engineering traditions in Latin America tend to favor removing more turns, while in the Anglo-American tradition there is a greater reluctance to remove turns.

In general, however, a gold-standard BRT requires that city officials favor both the buses and mixed traffic on the BRT corridor, if necessary, at the expense of traffic on perpendicular streets. The *BRT Standard* awards up to four points for well-executed intersection treatments that favor both buses and mixed traffic on BRT corridors over cross-street traffic.

Stations set back from intersections

One of the most common misconceptions about BRT system planning is the belief that stations should be located adjacent to intersections so that pedestrians crossing to the middle of the road can simply cross with the traffic light. This is a holdover from the days of the streetcar.

Ideally, BRT stations should be set back from intersections for two critical reasons. First, when finished loading and unloading, buses should be able to pull out of the station immediately,

Place stations in center of the roadway.

CENTRAL ALIGNMENT (ONE STATION)

- **Saves money with fewer stations.**
- **Simple, free transfer possible.**
- **Requires special buses.**

CURBSIDE ALIGNMENT (TWO STATIONS)

- **Difficult to transfer.**
- **Costs more.**
- **Takes more right-of-way or needs to be offset.**

Quito BRT Line #2

Quito BRT Line #1

allowing a bus behind to immediately begin its boarding and alighting process. If the station is close to an intersection on the near side (just before the intersection), a bus stopped at a red traffic signal will block all buses behind it from accessing the station, delaying the boarding and alighting process of the rear bus. If the station is close to an intersection on the far side (just after the intersection), a bus stopped at a station with passengers boarding and alighting will prevent a bus behind it from clearing the intersection. Separating the traffic signal from the boarding and alighting process is critical to avoiding station saturation and minimizing signal delay. The minimum distance needed between the station and the intersection will vary depending on the bus frequency.

The other key reason to set stations back from intersections is that station platforms occupy critical road space. It is generally easier to take space away from mixed traffic lanes mid-block than it is to take the space at an intersection where one frequently needs dedicated turning lanes to maximize throughput.

Constructing stations mid-block, or at least set back from intersections to avoid boarding/alighting and signal system conflicts, is not a common practice in the United States. This may be due to the low frequency of service, leading to an insignificant amount of bus queuing. At the same time, bus bunching almost always occurs at some point during the day, and this should be mitigated to the highest degree possible.

Another obstacle to implementing this measure in American downtowns is the length of city blocks. Stations need to be long enough to accommodate the bus volumes, and in many U.S. cities the blocks are simply too close together to achieve the suggested setback distances.

Traffic engineers worldwide are often hesitant to create designs which require pedestrian crossings to central median stations set back from intersections, though there exist solutions which can help mitigate these concerns. Pedestrian crosswalks can be placed mid-block with a signal if the location warrants it, and the signal can be timed to coincide with the nearest intersection to minimize any signal delay. Another common solu-

BRT station in Cleveland, Ohio, appropriately set back from the intersection. Photo: ITDP tion calls for median platforms that extend from the station to the intersection, thereby allowing pedestrians to cross at the intersection.

The *BRT Standard* awards up to three points for stations that are set back from the intersection, with a preferred one-hundred feet minimum.

Physically-separated passing lanes at station stops

As was discussed above, a primary difference between first- and second-generation BRT systems in Latin America is the way in which they deal with local, limited, and express services. Curitiba has only a single dedicated lane at station stops, and therefore only has one type of service that stops at every stop. Curitiba introduced express buses on the same corridors, but until 2010 they operated in the mixed traffic lanes.

Bogotá's TransMilenio, Johannesburg's Rea Vaya, Guayaquil's Metrovia, Curitiba's new Linea Verde line, and most newer BRT systems in Latin America include local and express services within the new BRT infrastructure. From a design perspective, local, limited, and express services can only coexist inside BRT infrastructure when there is a way for the limited and express services to pass the local. This only requires a passing lane at the station stops, instead of all along the corridor.

With U.S. transit demand far lower than in many developing countries, it is harder to take an additional mixed traffic lane and dedicate it to exclusive BRT infrastructure. While the adverse impact of this can be mitigated by placing stations away from the intersections, so that mixed traffic lanes can be maximized at traffic lights, it is often hard to take so much road space in the United States with such low bus frequencies.

One design alternative is installing a pull-by in front of the BRT station where a local bus can move out of the way of an express bus if the driver sees one coming. This option works well up to frequencies of about one bus every four or five minutes; at higher frequencies, the busway gets congested. This pull-by design is being considered on San Francisco's Van Ness Avenue corridor.

This TransJakarta line (Jakarta, Indonesia) includes a physically-separated passing lane at the station stop. Photo: ITDP

Another option is to simply include a break in the physical lane separation at the station stops.

The inclusion of physically-separated passing lanes at station stops incurs up to four points, particularly where the demand exists, and dependent on robustness of design, under the *BRT Standard*.

Stations occupy former road/median space (not sidewalk space)

As roadway capacity is often considered a valuable commodity, transit agencies are sometimes more willing to construct stations on sidewalks rather than in a general traffic or parking lane. But the result is that in a new transit-friendly environment, pedestrians are being restricted and must squeeze around the station. Further, stations usually end up being narrower so as not to block the entire sidewalk.

STATION DESIGN AND STATION-BUS INTERFACE

Multiple docking bays and sub-stops

On routes where ridership is high enough, multiple docking bays and sub-stops at stations become important for minimizing delay at the stations. The photo above shows three sub-stops, each with two docking bays. The difference between a docking bay and a sub-stop is that

Including more than two doors, like this vehicle in Nantes, France, allows for faster boarding and alighting (above). Photo: Luc Nadal, ITDP

Multiple docking bays and sub-stops at a BRT station in Guangzhou, China (left). Photo: Luc Nadal, ITDP

sub-stops are far enough apart that one bus can pull around another bus stopped in front of it. A second docking bay allows one bus to pull up behind another bus, but there is not generally enough length for a bus to pass the bus in front of it. BRT systems are ideally designed to keep bus station saturation levels below 0.4—meaning the bus stop is occupied no more than 40 percent of the time—to avoid situations in which buses get backed up at the station. As bus frequencies and passenger numbers increase, stations quickly saturate. This can only be avoided by adding additional sub-stops. The additional docking bay saves a few seconds but is not as critical to reducing station saturation. Multiple stopping bays also require a passing lane at each station.

The speed benefits of multiple sub-stops and docking bays increase in direct proportion with ridership numbers. As a rule of thumb, a separate sub-stop becomes critical at over 6,000 passengers per direction per hour, though of course it depends on station-specific boarding and alighting numbers. No BRT system yet built in the United States has reached anywhere near this level of demand, but a few corridors in New York, Chicago, and other major cities have the potential to reach those levels.

The *BRT Standard* awards up to three points for systems that include stations with multiple docking bays and sub-stops in the highest-demand segments.

Buses with three plus doors

In most conventional bus systems, buses have two doors—the door in front is for boarding, where passengers pay the driver, and the rear door is for exiting. This cumbersome process is the single largest cause of delay in a normal bus system.

Full-featured BRT systems typically employ three or more doors on each bus through which passengers may board or alight simultaneously. The benefits of multiple wide doors can only be realized with a pre-paid boarding process. Where demand is lower, buses may have two doors, provided they are wide enough to accommodate swift boarding.

While buses with three-plus door configurations are widely available internationally, transit authorities in the United States have historically faced special difficulties in procuring non-standard buses. This has been largely due to Buy American laws and an absence of American bus manufacturing companies that make such specialized buses. Currently, such transit agencies wishing to procure specialized buses not manufactured in the United States must obtain a Buy American waiver. This incurs additional delays and costs. Orders for specialized buses have become more commonplace; however, as American bus manufacturers have begun making such vehicles. Additionally, some cities have been

Passengers on Janmarg—Ahmedabad, India's new BRT—step directly from the platform onto the bus. Photo: ITDP

partnering to procure vehicles jointly in order to secure a lower price; Cleveland and Eugene teamed up when ordering buses for their respective BRT systems.

The *BRT Standard* awards up to four points for this measure.

Platform-level boarding

To further reduce boarding and alighting times, most gold-standard BRT systems have introduced platform-level boarding. The docking bay platform is designed to be the same height as the vehicle floor, and the vehicle floor is flat. This allows for fast boarding and alighting, and also allows easier access for persons in wheelchairs, parents with strollers, young children, and the elderly.[4] The standard high-floor, step-up buses seen throughout much of the United States have historically had two major problems. First, the step significantly increases standing time at stops, as passengers must climb up to board. Second, they are mandated to include wheelchair lifts "which have been one of the biggest sources of maintenance-related road calls."[5]

From a time-efficiency point of view, it does not really matter what height the bus floor is as long as the bus floor is level with the bus station platform and no step up or down is necessary. In the United States, few systems have achieved this. Frequently-cited reasons for not having platform-level boarding include fears by maintenance operators that the buses will be damaged by hitting the platform, fears that the additional construction will kick off a more rigorous environmental review process, and fears that a curbside platform will obstruct a sidewalk. However, there are no conditions unique to the United States that would justify not having a platform level with the bus floor.

There is also undue concern in the United States about the ability of drivers to pull up to the station platform in order to minimize the gap. Platform-level boarding does not require any special optical guidance systems, which are unheard of in most of the highest-ranked BRT systems.

Platform-level boarding is faster for all passengers, and easier for people in wheelchairs, parents with strollers, young children and the elderly.

But drivers do need to practice, and the station needs to be designed with a curb (either steel or a Kassel curb) that does not damage the bus tires or allow the bus to strike the platform.

Recently, most U.S. transit agencies have been purchasing low-floor buses. The Guangzhou BRT system uses low floor buses and they are fully compatible with platform level boarding. They have slightly lower seating capacities and are slightly more expensive, but they also ease boarding and alighting outside of the BRT trunk corridors. A higher platform, when situated in the middle of the road, feels a bit more protected for passengers as it is farther up and out of the traffic. It also tends to control chaotic pedestrian behavior as it is quite difficult for pedestrians to jump up onto a high-platform mid-block. The high-platform doors are not usable off the trunk corridor, however, so they are somewhat less flexible.

The *BRT Standard* awards up to five points for BRT systems in which stations have platform-level boarding. Where there are fewer stations with platform-level boarding, fewer points should be awarded.

QUALITY OF SERVICE AND PASSENGER INFORMATION SYSTEMS

Passenger information at stops and on vehicles

A high-quality BRT system should be easy to understand and to use. The system must provide clear information to passengers at the stations and onboard buses. This should include maps, timetables, and real-time arrival and next-stop information.

BRT in the United States is generally well equipped with passenger information. The provision of passenger information does not require a political battle and it is one of the easier wins. Additionally, technology is readily available in the United States and BRT is often seen as a good way to pilot real-time information systems for the rest of a city's transit system.

The *BRT Standard* awards up to two points for this measure.

Branding of vehicles and system

In order to distinguish BRT in the public and media's perception, it is important to brand the system as different and better than the existing system. This requires a strong communications and marketing plan leading up to system launch, as well as high quality branding that will touch all elements of the system, from communications products to signage to maps and the buses themselves.

In the United States, where high value is placed on branding and marketing, most bus systems already have a brand identity. The challenge here is to preserve the BRT brand, and not brand "improved bus service" as BRT if it does not meet the criteria explored above. Branding "improved bus service" as BRT may lead to public disappointment and compromise the city's ability to implement true BRT in the future.

The *BRT Standard* awards up to three points for this measure.

Safe, wide, weather-protected stations with artwork

Station design is the keystone of a BRT project. BRT's image depends on it being portrayed as a major, modern transit system. Therefore, attractive stations are essential to a system's design. Further, stations should be safe with good lighting, security personnel, and weather protection. Depending on need, stations may require bulletproof glass and security cameras so that passengers may feel safe waiting in less safe areas. They don't need to be huge; a width of about eleven feet provides a feeling of openness and a smooth passenger flow.

American cities have had varying degrees of success constructing attractive stations. Median-aligned systems are generally more likely to include well-designed stations because the stations sit in the median rather than on the curb. While good stations can also exist on the curb, stations are generally built on the curb because the city is unwilling to give up additional road space to the BRT system. So, instead of being built in its own space on a bulb-out, where a full station could be built, stations are generally built on the sidewalk. As a result, they are kept small and insignificant to avoid conflicts with pedestrian traffic.

An Emerald Express vehicle in Eugene, Oregon is branded with the signature "EmX." Photo: Annie Weinstock, ITDP

Neighborhood artists add local flavor to iconic BRT stations in Johannesburg. Photo: Aimée Gauthier, ITDP

The unwillingness of many cities to give up road space usually results in a station width of less than eleven feet, and sometimes half that. Further, a greater emphasis needs to be placed on the need for weather protection. Las Vegas, a city with a high heat index and direct sunlight throughout most of the year, built beautiful stations, but they lack protection from the sun. In extreme climates, climate-controlled BRT stations merit consideration. Dubai offers air-conditioned bus and metro stops to encourage transit use.

The *BRT Standard* awards three points for stations that are at least eight-feet wide, safe, and weather-protected. Fewer points are awarded for lower-quality, narrower stations.

INTEGRATION AND ACCESS

Improved safe and attractive pedestrian access system and corridor environment

As most transit trips begin or end in a walking trip, it is important that the walking environment around transit stations be safe and attractive. A safe and attractive walking environment is also attractive to developers and businesses. This means that all stations should include crosswalks or other amenities to ensure safe street crossings, and sidewalks in the nearby area should be sufficiently wide. Public art and street trees, to provide shade, should be added to enhance the pedestrian environment.

BRT affords cities the opportunity to improve the pedestrian environment as they reconstruct streets and station areas. The *BRT Standard* awards up to two points for this measure.

Bicycle lanes in corridor

Often, a corridor chosen for BRT is chosen for its high level of passenger demand. This is because the corridor is likely to include many desirable origins and destinations. Additionally, BRT routes are often designed on relatively straight paths, with a minimal number of turns. Because of this, a good BRT corridor shares many of the same characteristics of a good bicycle corridor.

When a road is being reconstructed for BRT, there is an opportunity to recreate the entire street, building line to building line. It is, thus, a prime opportunity for creating complete streets, including bicycle lanes. The *BRT Standard* awards a maximum of two points for BRT corridors which include bicycle lanes.

Secure bicycle parking at station stops

According to the *Bus Rapid Transit Planning Guide*, "the provision of secure bicycle parking infrastructure is essential for cyclists to feel comfortable in leaving their bicycles prior to boarding the system… To an extent, the location of the bicycle parking facility can act as a marketing tool to encourage bicycle use. The more visible and attractive the cycling facility, the more likely it is to gain the attention of potential users."[6]

The *BRT Standard* awards up to two points for secure bicycle parking at station stops.

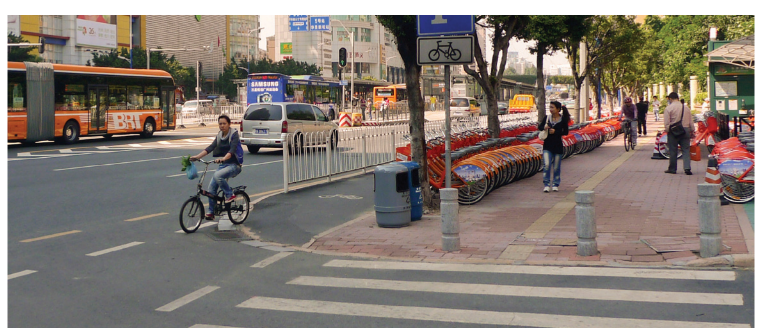
Bicycle sharing systems at BRT stations

Bicycle sharing systems, which provide city dwellers with easy access to bicycles at little or no cost, have gained widespread popularity in recent years. Across the world, non-profit organizations and local municipalities have dotted cities with strategically located bicycle terminals where, for a nominal fee, riders can pick up and drop off borrowed bikes at their convenience.

Including bicycle sharing terminals at BRT stations facilitates "last mile" access for BRT passengers while ameliorating the burdens of bicycle cost, security and storage. In June 2010, the Chinese city of Guangzhou successfully integrated bicycle sharing into its BRT system, installing 1,000 bikes at eighteen stations throughout the city.[7]

The *BRT Standard* awards up to two points for the integration of bicycle sharing systems into BRT stations.

Secure bike lockers and racks outside an Orange Line BRT station in Los Angeles make bicycling a viable mode for access to BRT. Photo: Ramon Cruz



Bicycle-sharing terminal along the BRT route in Guangzhou. Photo: Karl Fjellstrom, ITDP

Chapter III:

BRT in the United States Today

Approximately twenty cities[1] around the United States are currently operating at least one bus line that they are calling BRT in some forums. New York City, Kansas City, and Seattle have dedicated curb-side lanes, upgraded stations, signal priority measures at some intersections, unique branding, and special buses. The Orlando LYNX, and the South Miami-Dade busway, both in Florida, have bus-only roadways and signal priority or grade separation at some intersections. Miami-Dade also has upgraded stations, and competitively-tendered operating contracts. These systems, with relatively few BRT characteristics, have helped confuse the American public about what exactly constitutes BRT.

A few U.S. cities have implemented systems with a significant number of BRT characteristics. We visited the seven systems that appeared to have the most effective BRT. Based on the *BRT Standard*, they are rated as follows:

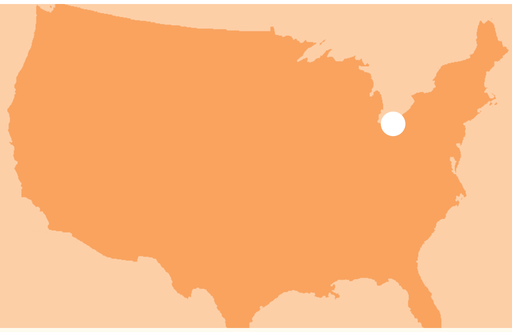
Cleveland	Eugene	Los Angeles	Pittsburgh
63	61	61	57
Bronze	Bronze	Bronze	Bronze

Las Vegas	Boston	New York City
50	37	35
Bronze	Not BRT	Not BRT

This is as compared to the highest-ranking BRT systems internationally which are rated as follows:

Bogotá	Guangzhou	Johannesburg	Ahmedabad
93	89	79	76
Gold	Gold	Silver	Silver

A detailed table, depicting the full scoring for each of these eleven cities, can be found in Annex A. The U.S. systems that we visited are discussed in greater detail in this chapter.



Cleveland, Ohio

BRT *Standard* Score: 63

BRT *Standard* Tier: Bronze

Population (city/metro): 431,369/2,091,286[2]

Land area (city/metro): 77.58 sq mi/ 6,274.48 sq mi[3]

Name: Euclid Corridor Transportation Project/HealthLine

Managing Entity: Greater Cleveland Region Transit Authority (RTA)

Opening Year: 2008

System Length: 7.1 miles

Key characteristics: Off-board fare collection, median-aligned dedicated bus-only lanes, at-level boarding

Average bus speeds along corridor *before*: 9.3 mph

Average bus speeds along corridor *after*: 12.5 mph (13.5 mph in exclusive lane section)

Speed increase: 34%

Average time savings: 12 minutes

Ridership increases: 60%

Project Cost: $200 million (only $50 million for buses and stations, $150 million for streetscape & roadway improvements along the corridor)

Cost per mile: $7 million/mile

Funding: FTA New Starts, state, and local sources

This project was created in response to the need for efficient transit service connecting the city's main employment centers—downtown Cleveland, the major hospitals including the Cleveland Clinic, and University Hospital in University Circle. The Greater Cleveland RTA, the Northeast Ohio Areawide Coordinating Agency (NOACA), and the City of Cleveland had been studying transit options in Cleveland for four decades, culminating with the consensus in 1995 that BRT would be the most cost-effective option to provide high-capacity transit service for the city. The NOACA provided the project details for the Euclid Corridor Transportation Project in 1999 following a series of twelve public consultation meetings and the necessary coordination with various local agencies, including the City of Cleveland.[4]

Before the system opened, average bus speeds in the corridor were only 9.3 mph. Line #6 on the Euclid Avenue corridor was one of the most heavily used routes in the city, accounting for ten percent of total RTA passengers. Euclid Avenue also had the #7 and #9 buses operating on part of the corridor. The operational plan for the HealthLine converted the #6 to new articulated BRT buses that operate mostly within newly-constructed segregated right-of-way. The original low-floor #7 and #9 buses are also able to use the BRT infrastructure at station stops with right-side boarding. #32 buses also use the BRT corridor in some places. Together, these four lines average an interval of 2.1 minutes between buses during the peak, and speeds in the corridor average a respectable 12.5 mph (Curitiba BRT averages about 12.5 mph; Bogotá averages 18 mph). Over thirteen additional routes that overlapped the corridor for short distances, or were in the impact area of the corridor, have been rerouted.[5] Some of the speed increase resulted from the elimination of stops. Door-to-door travel times are harder to gauge. Some residents complained about the elimination of stops and inconvenience resulting from the changes in routes.

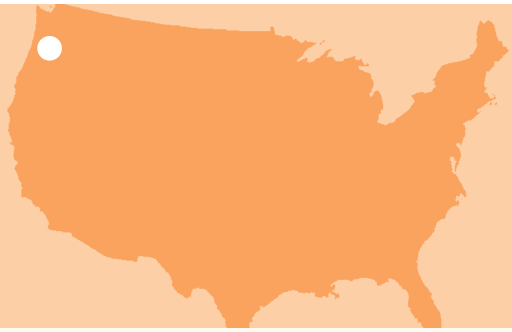
Cleveland, Ohio

The Euclid Corridor Transportation Project, or HealthLine, is helping revitalize Cleveland, and has already brought $4.3 billion in real estate investment. Photo: Annie Weinstock, ITDP

Nevertheless, the statistics are good. Daily ridership increased by sixty percent after two years of operation. One major success of the system so far has been $4.3 billion in real estate investments along Euclid Avenue, one of the city's most historically significant corridors.[6]

The project's total budget was approximately $200 million, but only $50 million was allocated for buses and stations—the remainder was directed towards other corridor improvements like roadway, utilities, new sidewalks, and street furniture. The cost of the busway itself was therefore only about $7 million per mile including the rolling stock. The FTA assisted by providing an $82.2 million New Starts grant.

The Greater Cleveland RTA made the decision to sell the naming rights of the line to help fund the system. The Cleveland Clinic and University Hospital jointly purchased the naming rights, naming it the HealthLine. This partnership will provide the system with $6.75 million of additional funding, dedicated to maintenance, over the next 25 years.[7]



Eugene, Oregon

An Emerald Express vehicle, stopped at a station in Eugene, Oregon. Photo: Annie Weinstock, ITDP

BRT *Standard* Score: 61

BRT *Standard* Tier: Bronze

Population (city/metro): 153,275/351,109[8]

Land area (city/metro): 40.56 sq mi/ 4,722.00 sq mi[9]

Name: Emerald Express (EmX)

Managing Entity: Lane Transit District (LTD)

Opening Year: 2007

System Length: 4 miles/1.6 miles with dedicated running way

Key characteristics: Off-board fare collection, near-level boarding, dedicated bus-only lanes along 1.6 miles of system

Average bus speeds along corridor *before*: 11.5 mph

Average bus speeds along corridor *after*: 15 mph

Speed increase: 30.4%

Ridership increases: 74% (2,700 to 4,700 daily riders)

Project Cost: $24 million

Cost per mile: $12 million/mile (for dedicated trunk line only, includes planning, engineering and rolling stock costs)

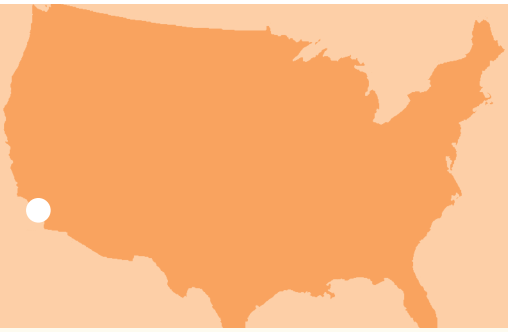
Funding: FTA Small Starts, State, and LTD general fund

In the the mid-1990s, Eugene, Oregon began looking to upgrade its bus system by improving travel times and overall service.[10] Light rail was considered in the original plans, but it was eventually deemed to be too expensive. Decision makers visited Curitiba's BRT system, which helped convince them that BRT would be the best option to address long-term transit issues in the region.

The Green Line opened in 2007 as a pilot project, the success of which has been used to justify the roll-out of the rest of the Emerald Express (EmX) BRT system.[11] Currently, the EmX system features many true BRT characteristics, such as dedicated busways, off-board fare collection, and near-level boarding. The EmX replaced the #11 bus route. The dedicated right-of-way is currently only 1.6 miles. Average speeds on the corridor have increased from 11.5 mph to 15 mph. The upgrade led to an increase in daily ridership from 2,700 to 4,700. The Green Line operates on a four-mile stretch between Eugene and Springfield and has inspired system expansion, though further expansion is currently under political dispute.

EmX encountered several implementation barriers. First, system planners decided not to grant the right-of-way for a fully dedicated busway along the entire corridor, due to traffic concerns. Instead there is a mix of dedicated median busway and curbside bus lanes with signal priority. These same planners and engineers also worried about taking away or narrowing lanes, so instead of a wider busway that would allow for bus passing, the system was designed with one-way busways, in which buses must wait for oncoming buses to pass before entering the lane. Finally, the system had to be designed around several clusters of trees because a local city ordinance prevented the removal of street trees over fifty years-old.[12] For this reason, the system's path does not follow a straight trajectory. Nonetheless, the system is mostly viewed as a success, despite some NIMBY-ism along future corridors.

Eugene's BRT cost roughly $12 million per mile of dedicated trunk lines for the infrastructure, rolling stock, planning, and engineering.



Los Angeles, California

BRT Standard Score: 61

BRT Standard Tier: Bronze

Population (city/metro): 3,831,880/12,874,7972[13]

Land area (city/metro): 498.29 sq mi/35,316.94 sq mi[14]

Name: Metro Orange Line*

Managing Entity: Los Angeles County Metropolitan Transportation Authority (LACMTA)

Opening Year: 2005

System Length: 14.2 miles

Key characteristics: Dedicated right-of-way, three-door buses, off-board fare collection, passenger information displays, unique branding

Average bus speeds along corridor *before*: N/A: This project was built on a former freight right-of-way and is a new route

Average bus speeds along corridor *after*: 18 mph peak period (low due to bus speed limit restrictions and priority that is given to cross-traffic instead of buses)[15]

Speed increase: N/A

Ridership increases: New corridor, carries nearly 25,000 passengers per day

Project Cost: $349.6 million.[16] Project costs were elevated since this system was built on an old railroad right-of-way which required removing old tracks, constructing a new road and installing sound barriers along the entire length of the corridor

Cost per mile: $25 million/mile[17]

Funding: FTA New Starts, state, and local sources

** LACMTA refers to its entire MetroRapid system as BRT, but the larger system fails to meet some of the most basic BRT criteria; therefore for this review we are focusing only on the Metro Orange Line component.*

The Los Angeles County Metropolitan Transportation Authority (LACMTA) uses the term BRT to describe two distinct projects. Most extensive is their MetroRapid BRT system. MetroRapid is a network of fourteen bus lines with some transit priority improvements but with few elements associated with BRT. Other than some sections of Wilshire Boulevard, little of the network has a dedicated busway, and all of the routes operate curbside. The main BRT characteristics are signal priority (a five second extended green phase) at select intersections, more frequent service than for conventional buses (ten minute intervals), the elimination of some stops, and the use of nicer, articulated buses with special red and silver branding. On all but three of the routes, the MetroRapid replaced existing bus routes. On these three routes, local bus services continue to operate and the new limited-stop MetroRapid services were added. Fares are paid on-board the buses, and stations are little more than standard bus shelters.

Still LACMTA has branded the entire MetroRapid system as BRT. LACMTA claims that speeds on MetroRapid buses increased by twenty-nine percent. Given this dramatic time savings on such a large number of corridors, MetroRapid performs extremely well in a cost-effectiveness analysis. But because it lacks other BRT system characteristics, it has failed to adequately demonstrate to the public the viability of BRT as an alternative to rail-based modes.

Los Angeles also opened its 14.2-mile Metro Orange Line to the public in October 2005 in the San Fernando Valley.[18] The Orange Line is closer than MetroRapid to being proper BRT, with features including an exclusive right-of-way, three-door buses, off-board fare collection, passenger information displays, and unique branding. It does not have at-level boarding.

The Orange Line runs along an old railroad right-of-way from the Warner Center, the system's western terminus, to the Red Line subway in the east. Intervals during the peak hour are every ten minutes, and the system is currently carrying nearly 25,000 passengers a day. Travel time improvements are not available since there was no bus service along the corridor previously.

The system was expensive to build, $38.5 million per mile, because the tracks had to be removed, a new road had to be constructed, and sound barriers were required throughout the length of the corridor.

Discussions about building a transit system in the east-west corridor of the San Fernando Valley date back to 1980 when Los Angeles County voters approved Proposition A, a policy document enacted by voters that allowed for a half-cent sales tax to help fund transit systems in thirteen designated corridors. According to an article by

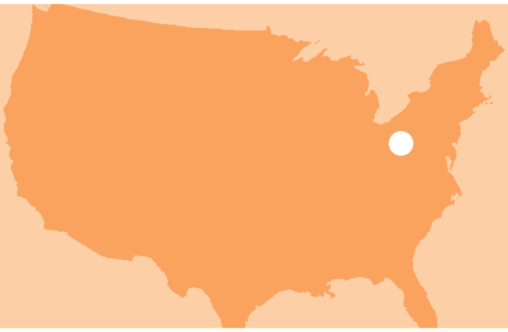
A BRT vehicle travels along the Orange Line corridor in Los Angeles's San Fernando Valley. Photo: Annie Weinstock, ITDP

Wendell Cox, a former representative of the now defunct Los Angeles County Transportation Commission:

> "Proposition A set aside provided funding for the Blue Line light rail line and the local match for the Red Line subway throughout the 1980s. By 1990, it had become clear that the promised rail system could not be delivered within the constraints of the Proposition A funding. A new one-cent tax was placed on the ballot by LACTC in 1990 (I had left LACTC in 1985). Even that tax, however, was insufficient to deliver on the 1980 promise. At this point it appears likely that Proposition A and the 1980 Proposition C will have ultimately contributed to only three lines, the Blue Line, the Green Line and the Red Line. A moratorium has been placed on further rail construction in Los Angeles, due to overwhelming financial problems and a legal action filed by labor and low income advocacy groups that has required the Los Angeles County Metropolitan Transportation Authority (a body formed from the merger of the Los Angeles County Transportation Commission and the Southern California Rapid Transit District) to reorient funding toward bus services."[19]

Implementation was plagued by several problems. First, there was significant opposition from residents beginning in the 1980s that feared that transit infrastructure would be too noisy and would reduce property values. After over fifteen years of conflict, the community became convinced that improvements were necessary. LACMTA was now strongly resisting opposition.[20]

The second problem was that, once operational, several high-profile crashes during the early stages of implementation led to LACMTA setting a reduced speed limit of 10 mph through intersections for Orange Line vehicles. Officials also chose to give signal priority to cross traffic instead of the busway. Together, this has led to a reduction in overall system speed from what would have been 25–30 mph, to an average of 18 mph in the peak period.[21]



Pittsburgh, Pennsylvania

***BRT Standard* Score:** 57

***BRT Standard* Tier:** Bronze

Population (city/metro): 311,647/2,356,285[22]

Land area (city/metro): 55.5 sq mi/5,280 sq mi[23]

Name: Martin Luther King, Jr. East Busway

Managing Entity: The Port Authority of Allegheny County

Opening Year: 1983 (extended in 2003)

System Length: 9.1 miles (East Busway only)

Key characteristics: Dedicated busway, direct service operations, frequent service

Average bus speeds along corridor *before*: N/A: This project was built on a former rail right-of-way and did not replace any routes

Average bus speeds along corridor *after*: 35 mph

Speed increase: N/A since this project did not replace any routes

Ridership increases: N/A since this project did not replace any routes but current daily ridership is 25,600

Project Cost: $183 million

Cost per mile: $20 million per mile

Funding: FTA, City of Pittsburgh, Allegheny County, Commonwealth of Pennsylvania

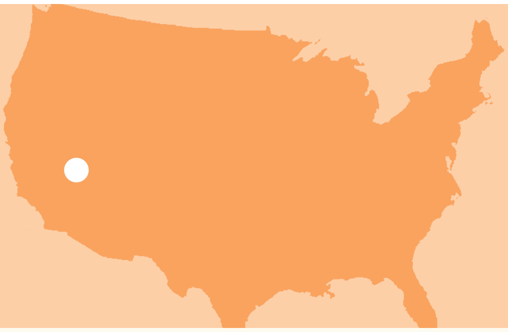
The city of Pittsburgh can be credited with paving the way for BRT in the United States. With financial assistance from the U.S. Department of Transportation, the Commonwealth of Pennsylvania, and Allegheny County, Pittsburgh unveiled its 4.3-mile South Busway in 1977, demonstrating the city's commitment to relieving urban traffic congestion. A precursor to BRT, its success encouraged the city to develop additional, more advanced busways to reach underserved parts of the metropolitan area. Pittsburgh worked closely with key community stakeholders in the late 1970s to assess local needs, and in 1983, the Martin Luther King, Jr. East Busway—the city's first full-fledged BRT system—began operations. Originally 6.8 miles in length, a 2.3-mile extension was completed in 2003, providing the city's eastern suburbs with quick and easy access to Downtown Pittsburgh.[24]

Pittsburgh's East Busway is an innovative and versatile BRT system tailored to meet the travel demands of the city's residents. Current daily ridership is 25,600. Owing to a twenty-eight-year history of operating this busway, Port Authority has had much time to optimize operations. First, the East Busway operates local, limited, and express services to accommodate diverse travel patterns. In addition, some suburban bus routes transfer from local roads onto the East Busway's designated bus lanes via connection ramps, facilitating convenient, transfer-free trips. This type of service plan enables the East Busway to be the main thoroughfare for about sixteen routes. The sheer number of routes operating during the peak period means that on the busway, bus frequencies are as low as every two minutes.

While Pittsburgh has the only BRT system in the United States to employ a direct service model, (other systems are still stuck in trunk-and-feeder mode), it comes in short on some of the more common elements of BRT. The East Busway lacks off-board fare collection, platform-level boarding, shared, central-verge stations, intelligent passenger information systems, and a common system brand. The buses also look very much like buses, rather than modern, sleek vehicles that signify a modern form of transit. Interestingly, it is some of these latter elements which other cities use to falsely brand their systems as BRT while Pittsburgh, which embraces the underlying fundamentals of BRT, fails to fully brand it as such.

Pittsburgh is expanding its network. For the first time, it is considering repurposing on-street lanes for BRT. The first line would connect Downtown Pittsburgh with Oakland, home to some of the region's major medical institutions and universities. Current bus ridership in the proposed corridor is 68,000 daily boardings, or 24% of Port Authority's total ridership.[25] And Port Authority is potentially looking to use this opportunity to begin incorporating some of the more commonly known features of BRT into its system. Pittsburgh is working to create a full network of BRT and, if implemented properly, could soon reach the gold standard.

Martin Luther King, Jr. East Busway, Pittsburgh.
Photo: Port Authority of Allegheny County



Las Vegas, Nevada

BRT Standard Score: 50

BRT Standard Tier: Bronze

Population (city/metro): 567,610/1,902,834[26]

Land area (city/metro): 113.36 sq mi/ 39,719.10 sq mi[27]

Name: Metropolitan Area Express (MAX)

Managing Entity: Regional Transportation Commission of Southern Nevada (RTC)

Opening Year: 2004

System Length: 7.5 miles/4.5 miles with dedicated running way

Key characteristics: Off-board fare collection, unique branding, specialized buses, stations, at-level boarding, 4.5 miles of dedicated curbside lanes (shared with right-turning traffic)

Name: Strip & Downtown Express (SDX)

Managing Entity: Regional Transportation Commission of Southern Nevada (RTC)

Opening Year: 2010

System Length: 9 miles/2.25 miles with dedicated running way

Key characteristics: Off-board fare collection, unique branding, specialized buses, stations, at-level boarding, central median aligned dedicated right-of-way and left turn restrictions at intersections.

Average bus speeds along corridor *before*: 45.5 mins (MAX)/SDX—routing change makes before/after comparison impossible

Average bus speeds along corridor *after*: 38 mins (MAX)/SDX—routing change makes before/after comparison impossible

Speed increase: 20% (MAX)/SDX—routing change makes before/after comparison impossible

Ridership increases: 25% (MAX)/11% (SDX)

Project Cost (not including rolling stock): $20.3 million (MAX)/$47.3 million (SDX)

Cost per mile: $2.6 million per mile (MAX)/ $6 million per mile (SDX)

Funding: MAX (NDOT, City of Las Vegas and FTA)

The Metropolitan Area Express (MAX) was the first BRT-type service in Las Vegas. The MAX system features several components of BRT, such as off-board fare collection, unique branding, specialized buses, and stations with at-level boarding in most places. Its 4.5 miles of dedicated lanes (out of 7.5 total) are curbside, which is shared with right-turning traffic, slowing speeds somewhat.[28] MAX's success enabled the city to go forward with a new BRT route called the Strip & Downtown Express (SDX), which has all the elements of MAX, as well as a central median dedicated right-of-way for part of its route.[29]

The MAX line operates in tandem with Route 113. Route 113 was previously the only route to operate on MAX's corridor along North Las Vegas Boulevard. After MAX opened, Route 113 continued to operate along the corridor but within the exclusive BRT lanes and using the BRT stations; however, Route 113 continues to use the older buses and makes more frequent stops. In essence, it acts as a local complement to MAX.

In the early planning stages, transit advocates generated interest in the MAX system by raising concerns about the automobile-centric development style typical of the Las Vegas Metropolitan Area and investments made through the Nevada Department of Transportation (NDOT). The street design along the MAX corridor included wide shoulders and/or breakdown lanes, giving project planners plenty of right-of-way to work with. Community watchdogs helped assure the project was delivered on schedule.[30] Financing was secured through NDOT, the City of North Las Vegas, and the FTA. MAX also employed an aggressive marketing campaign to gain public support.[31]

The local transit agency, the Regional Transportation Commission (RTC), faced several challenges while implementing MAX, partly because neither the State of Nevada, nor many of their counterparts at Federal agencies had previous experience with planning and implementing BRT infrastructure. Even the procurement of the buses was problematic. The RTC needed to demonstrate that the bus features they required were not available from an American manufacturer, and then apply for a waiver from FTA for the Buy

SDX stations in Las Vegas are beautifully landscaped and include decommissioned neon signs to help identify the system as uniquely Vegas.
Photo: Annie Weinstock, ITDP

American provisions. Then they were faced with communicating bus design concerns to a manufacturer in France, followed by the issue of how to procure spare parts. Importing special buses from France led to problems with the local supply of spare parts, and certain contractual disputes arose with the manufacturer.

Nevada's dry, desert climate presented challenges as well. Dust, dirt, and oil built up on the Optical Guidance System (OGS) pavement markings, which were designed to enable precision docking at all of the station platforms.[32] Eventually use of the OGS was discontinued. However, at any time, the pavement markings could be freshened up and following recalibration of the OGS, precision docking could be re-established.[33]

The SDX line built on MAX's success and raised the bar for BRT in Las Vegas. The route is nine miles in length with 2.25 miles (4.5 lane miles) of central median-aligned dedicated right-of-way, and left turn restrictions at many intersections. The SDX route operates primarily between the Strip and downtown. A double-decker bus, the "Deuce" carried over 32,000 passengers per day along the corridor before SDX. With the introduction of SDX, the Deuce continued to operate, using the BRT infrastructure for much of its route, but making more frequent stops. The SDX served as the limited-stop service. Peak-hour headways on both the SDX and the Deuce are every twelve minutes for a combined average frequency of about six minutes. Daily ridership in the corridor today is 21,500 on the Deuce and 14,000 on the SDX, a 3,500 passenger increase on the corridor overall.

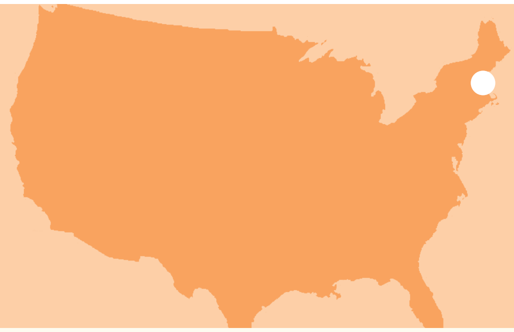
The SDX line's most significant deficiency is that the dedicated infrastructure does not continue onto the main part of the Strip, largely because the casino owners did not want to make it easier or more attractive for their clientele to leave their casinos. RTC had to fight to get permission to operate the buses along the Strip, even without dedicated infrastructure. Though RTC eventually succeeded in this (and even got permission to

Las Vegas, Nevada

Las Vegas's BRT vehicles are sleek and modern-looking.
Photo: Annie Weinstock, ITDP

construct attractive stations and some other BRT elements, the result is that in the most congested and popular part of Las Vegas, the SDX operates more or less like a normal bus route, incurring countless delays. Nonetheless, the SDX line is a positive example to all residents of Las Vegas that BRT can provide high-quality transit at a lower cost than rail, and it is viewed as a political and operational success.

Las Vegas continues to expand its BRT system. Residents, disheartened by the severe waste of funds incurred by the failed Las Vegas monorail, view this new system as a positive use of public funds. However, SDX is likely to remain, for now, the closest example to true BRT in the city. Future lines, such as the Sahara Express, which broke ground in February 2011, will be operating along the curb and some streets will be widened to accommodate them. However, the expansion remains a positive sign that BRT is an accepted form of mass transit in Las Vegas.



Boston, Massachusetts

BRT *Standard* Score: 37

BRT *Standard* Tier: Not BRT

Population (city/metro): 645,187/4,588,680[34]

Land area (city/metro): 89.63 sq mi/ 6,192.51 sq mi[35]

Name: Silver Line Waterfront*

Managing Entity: Metropolitan Boston Transit Authority (MBTA)

Opening Year: 2004

System Length: 8.9 miles/1 mile of dedicated right-of-way mostly in an underground tunnel

Key characteristics: The majority of the system lacks basic BRT features. The one-mile portion operating in the tunnel includes dedicated right-of-way, and off-board, barrier-controlled fare collection

Average bus speeds along corridor *before*: Not available

Average bus speeds along corridor *after*: 14 mph

Speed increase: -25% along the SL1 route (one of three the Silver Line Waterfront replaced), due to delays when buses switch from diesel to electric in tunnel

Ridership increases: 98%[36] (from 3,756/day to 7,434/day, due in part to growth in South Boston)

Project Cost: $619 million ($477 million for construction of the 1-mile tunnel & tunneled stations)[37]

Cost per mile: $70 million per mile (heavily skewed since the biggest investment was in the 1-mile tunnel)

Funding: FTA New Starts, MBTA bonds[38]

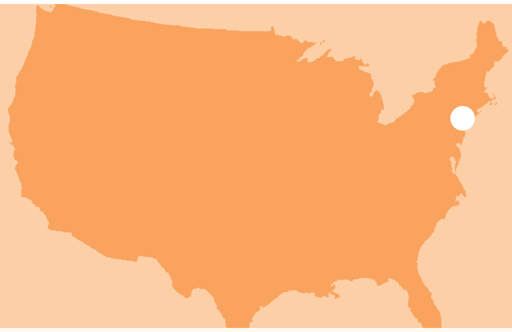
**There is also a Silver Line Washington Street, which operates in a combination of mixed traffic and curb-aligned bus lanes with no physical separation. The system features real-time passenger information, and three-door, low-floor articulated Neoplan CNG buses. Despite the shortcomings of the system, it saw initial travel time improvements of about 25% and ridership increases along the route of up to 100%. Some of these gains appear to have fallen off according to more recent reviews, which has led to community criticism that the Silver Line Washington Street was just a bus.*

Boston, Massachusetts

In Boston, the MBTA has also decided to brand modest bus improvements as BRT. The Silver Line has two sections, one called the Silver Line Waterfront, connecting Logan Airport to South Station, and the other called the Silver Line Washington Street connecting Dudley Square in Roxbury to Downtown. Both were evaluated under FTA's BRT Initiative. The Waterfront line runs three services, SL1, SL2, and SL3, which replaced or re-routed former bus routes #3, #4, #6, #7, and #11. All three services share the one mile of exclusive right-of-way, which is almost entirely in an underground tunnel. Otherwise, the routes operate in mixed traffic, on streets, or on highways. At the three underground stations, the system has off-board barrier-controlled fare collection like a metro station, but elsewhere passengers pay the driver on-board. The system operates with ten minute intervals. The system's services are about nine miles long, to the airport and to South Boston. The Silver Line Waterfront cost $619 million, or about $70 million per mile, a skewed figure because $477 million of the total cost was for the one-mile long tunnel segment. Despite its enormous cost, the travel time of SL1 is slower than the #3 bus line that it replaced. There is a significant delay when the buses enter the tunnel and switch from diesel power to an electric conduit, and the tunnel has a maximum speed of 25 mph.[39] The new system did lead to an increase of ridership by about ninety-eight percent, some of this due to growth in South Boston, but still, the total ridership is relatively low. BRT detractors often use the Silver Line Waterfront's low cost-effectiveness as an example of BRT's inferiority.

The Silver Line Washington Street operates in mixed traffic or in standard curb-aligned bus lanes frequently plagued by double-parked vehicles and other obstacles. In one short section, a contra-flow bus lane was added on a one-way arterial to improve the directness of route and reduce travel time. The system has real-time information systems and an operational control center. The Silver Line Washington Street replaced the former route #49, the main differences being the elimination of some stops and the straightening of the route due to the contra-flow lane. The system has new three-door low-floor articulated Neoplan CNG silver buses. Ridership increased significantly, by as much as one hundred percent, and travel time also improved by about twenty-five percent according to an earlier FTA evaluation. But some of these gains have disappeared in more recent reviews. The system has no other BRT system features, leading to extensive community criticism that it was merely a bus. Today, transit advocates in Boston generally want light rail and recently opposed the expansion of the Washington Avenue BRT further into Roxbury.[40]

Boston, Massachusetts's Silver Line has one-mile of dedicated right-of-way in an underground tunnel. Photo: ITDP



New York, New York

BRT *Standard* Score: 35

BRT *Standard* Tier: Not BRT

Population (city/metro): 8,391,881/ 19,069,796[41]

Land area (city/metro): 468.87 sq mi/ 13,117.93 sq mi[42]

Name: Select Bus Service

Managing Entity: Metropolitan Transit Authority (MTA) and New York City Department of Transportation (NYC DOT)

Opening Year: 2009

System Length: 7.8 miles on Fordham Road in the Bronx, 8.5 miles on 1st and 2nd Avenues in Manhattan

Key characteristics: Off-board proof-of-payment fare collection, Fordham Road has red-painted dedicated lanes and signal priority, First and Second Avenues have red-painted dedicated lanes with soft separation, three-door, low-floor buses and both will soon have camera enforcement

Average bus speeds along corridor *before*: 8 mph Fordham Rd

Average bus speeds along corridor *after*: 9.4 mph Fordham Rd

Speed increase: 20% on Fordham Rd[43]/ 19% on 1st and 2nd Avenues

Ridership increases: 7% on Fordham Rd[44]

Project Cost: $10.5 million[45] (Fordham)

Cost per mile: $1.35 million/mile (Fordham)

Funding: FTA and local funding

New York City's Select Bus Service in painted curbside lanes, along Fordham Road in the Bronx. Photo: New York City Department of Transportation

New York City's Department of Transportation and the MTA decided to call their new improved bus service Select Bus Service (SBS), though many officials refer to it as BRT. There are two SBS corridors operating as of early 2011: Fordham Road in the Bronx, and First and Second Avenues in Manhattan (with some elements of SBS on 34th Street). Both originally had limited-stop services and local services. On both corridors, SBS has replaced limited service, while local services continue at slightly reduced frequencies. Intervals on SBS routes are between four and five minutes during the peak. The Fordham Road corridor has off-board proof-of-payment fare collection and red-painted curb-aligned bus lanes, with signal priority (extended green phase) at a few intersections. These measures increased average speeds by about eighteen percent, with off-board fare collection responsible for about sixty percent of that. The First and Second Avenue corridors opened in late 2010. The system is similar to the Fordham Road SBS, except it also has new articulated low floor buses with three wide doors instead of two. Travel time improvements of nineteen percent have been reported as of January 2011.

New York City has prepared for the installation of camera enforcement of the bus lanes and so far five cameras have been installed. The exclusive lanes are only in effect during extended peak periods. Enforcement has been stepped up but violators in the bus lane remain frequent. Right-turning vehicles are permitted to turn from the bus lane, which, given the pedestrian crossing volumes, sometimes introduces delay. Some customers were confused initially about why they could not get on the local if it came first, using the off-board proof-of-payment ticket. New York City has adopted a phased-in approach, and plans to upgrade the corridors by adding nicer stations built on bus bulbs. The introduction of bus bulbs creates the possibility that high-quality new stations can be built with platforms level with the bus floor, as they would not obstruct the sidewalk. No formal commitment has been made to this as of yet.

Chapter IV:

Getting Better BRT in the United States

A growing number of American cities have taken a hard look at how much heavy or light rail they will be able to build over the next decade, and they are realizing that with rail investments alone, they will be unable to keep pace with public demand for new transit services. Given increasing demand and decreasing budgets, many cities are turning to BRT.

Once a gold-standard BRT is in operation in the United States, American cities will have a true example to look to. Today, the models are in cities abroad and international examples do not always play well domestically. Instead, American cities aiming to implement BRT often model themselves after other American cities which have good—but not gold-standard—BRT and this leads to more systems in the United States which do not reach their potential. The effective implementation of one gold-standard BRT in the United States will have the likely impact of spurring other cities to see BRT as a viable, high class transit system.

At least twenty cities have or are now developing bus-based transit projects and calling them BRT. This chapter reviews the reasons why few of the American BRT projects and proposals are comparable to the best world-class systems.

From July to October, 2010, ITDP reviewed most of the U.S. BRT proposals in the pipeline. The first phase was a broad survey of what projects exist, looking at applications for TIGER and New Starts/Small Starts (NS/SS) grants and interviewing experts in the field. We then reviewed these projects to determine what sort of BRT characteristics they were likely to include. Finally, we assessed the degree of political will that existed for implementation. From there, we narrowed our focus to a smaller set of cities: Austin, Boston, Chicago, Las Vegas, Los Angeles, New York, the San Francisco Bay Area, and Washington, D.C./Montgomery County. This chapter summarizes our findings of the obstacles that project champions have faced implementing a higher-standard BRT system, and some innovative ways cities are moving past them.

The obstacles can be grouped into the following categories:

a. **Technical obstacles**

b. **Political obstacles**

c. **Administrative and institutional obstacles**

Before Guangzhou built its BRT, large volumes of buses significantly impacted traffic flow for all vehicles. BRT reorganized Guangzhou's traffic. Photo: Karl Fjellstrom, ITDP

TECHNICAL OBSTACLES

In much of the developing world where gold-standard BRT systems have been implemented, the BRT corridor had such a high volume of buses, and the bus behavior was so weakly regulated, that buses and their erratic behavior were a principle cause of traffic delay. In this condition, placing buses inside an exclusive BRT lane and regulating their behavior tends to result in an improved level of service for both motorists and bus passengers even without road widening.

In Guangzhou, China, huge volumes of buses previously stopped chaotically, parking three or four abreast at bus stops, and blocked the entire road. With most of the road congestion caused by buses, the new BRT system has improved mixed vehicle flows, even though it consumes six traffic lanes at each station stop. This sort of win-win scenario is rarely—if ever—observed in U.S. cities. Buses represent a much smaller share of total traffic in the United States than they do in most other cities with gold-standard BRT systems.

Outside of the most congested corridors, giving buses a dedicated lane will still result in a net time savings benefit overall, as time savings to multiple bus passengers outweigh any time loss to individual motorists. This condition, which is widespread in the developing world on most major roads, is also often observed on U.S. corridors with high bus volumes, though not always. A mixed traffic lane generally carries around 2,000 passengers per hour, and only popular bus routes in major U.S. cities tend to have passenger volumes exceeding this.

Despite these difficulties, U.S. cities tend to have many more roads, many parallel roads, and wider roads than many cities in developing countries. While it is difficult to avoid at least some adverse impact to mixed traffic on a specific corridor, this greater road density creates a lot of opportunities for area-wide mitigation measures.

In the cases where the public has been promised traffic improvements and BRT has failed to deliver, there has been political backlash. For example, in Delhi, India, the project engineers implemented a design that placed two parallel station platforms in each direction at each intersection, consuming six lanes for the busway at these points. They also shifted from three- or four-phase signals to six-phase signals. These changes led to severe congestion for mixed traffic, and relatively modest improvements in bus speeds. Political support for further BRT thus evaporated.

Overcoming the obstacles

Engineers can attempt to design their BRT systems to both minimize traffic impacts *and* maximize system performance. Different BRT system designs have very different impacts on mixed traffic flow. For example, pulling the bus stops away from intersections may slightly inconvenience pedestrians but will improve bus speeds and considerably mitigate mixed traffic impacts. It is also possible to take space from a median strip, or restripe a road so as to maintain the same number of through traffic lanes, even while using a lane for BRT. This may be possible on roadways where lanes are particularly wide. BRT also needs more space at the station stops than it does between stops, so sometimes it is possible to only widen the road in these specific locations.

The U.S. needs a gold-standard BRT to serve as an example to inspire more BRT development.

Second, the numerous parallel streets in the United States make it easier to divert some traffic onto parallel roads which can handle an increase in demand without saturating. It is also frequently the case that a relatively small volume of turning vehicles is inconveniencing a large volume of through traffic even before the BRT is opened. This density of parallel streets means that forbidding left turns across the busway and requiring left turning vehicles to make three right turns instead can lead to aggregate time savings benefits.

As buses themselves cause a significant amount of delay for motorists, relocating some buses from parallel streets onto the new BRT trunk corridor will allow deteriorating levels of service on the BRT trunk line to be mitigated by improvements in the level of service on parallel routes.

All technical solutions for mitigating adverse traffic impacts should be fully explored to minimize the risk of adverse political impacts. Communicating these solutions clearly to the public is also critical.

POLITICAL OBSTACLES

Lack of Political Leadership

Most gold-standard BRT systems were promoted by a political champion who had both the understanding of what constitutes full-featured BRT and the political power to implement such a system. In most cases, political leaders embraced the project because they knew they could open the system within their term of office, and they knew the project would benefit many voters. Their main motivation was political. In the United States, bus passengers are a smaller voter constituency, however, most voters profess to want more public transit and see the lack of public transit as an important concern.

In the case of Curitiba, BRT was first implemented (invented, in fact) by Mayor Jaime Lerner. Though initially appointed by the military government, he later successfully ran for mayor of Curitiba, and then governor of the State of Parana. In Quito it was planning director César Arias who pushed the project with the full backing of the mayor. In Bogotá it was Mayor Enrique Peñalosa. In Jakarta it was Governor Sutiyoso who was initially appointed, but then elected largely on his promise to implement a BRT system in one term. In Mexico City, Mayor López Obrador implemented the first corridor as part of his future ambition to become president. In Johannesburg, Rehana Moosajee, the Member of the Mayoral Committee for Transport, had the full backing of Mayor Masondo of the ruling African National Congress (ANC). In Cape Town it was Mayor (and now Premier) Helen Zille. In Ahmedabad it was Municipal Commissioner I.P. Gautam with the full backing of Chief Minister Narendra Modi. In Seoul the busway was implemented by Mayor Lee Myung-bak, (now the President of South Korea). In Guangzhou, Deputy Construction Commissioner Lu Yuan had the full backing of Mayor Zhang Guangning, (now the Secretary of the Guangzhou Municipal Committee of the Communist Party).

In each of these cities, the mayors or governors controlled urban transportation and could implement the projects with minimal involvement of national or state-level governments. When problems emerged due to local political opposition or technical opposition from conservative engineers, the project team escalated the decision to the political leader of the project who then was able to overcome such obstacles.

In the United States political will is no less important, but there is seldom just one all-powerful political figure that can or will champion a project. Instead, the head of a transit authority or a department of transportation and sometimes a mayor or county supervisor can help bring others along.

Four of the five best American BRT systems (Cleveland, Eugene, Las Vegas, and Los Angeles) were initiated similarly to international projects. They began with visits to Curitiba, Brazil—many of them sponsored by the W. Alton Jones (now Blue Moon) Foundation—by local political leaders. None of these systems, however, is particularly associated in the public's mind with a specific politician. The Los Angeles Orange Line had the support of Zev Yaroslavsky, the powerful and influential county supervisor for Santa Monica, Malibu, the San Fernando Valley, and other influential parts of Los Angeles County. The Cleveland system had the support of George Voinovich, former Cleveland mayor and former Ohio Senator and governor. Eugene, Oregon is associated with the political leadership of Representative Peter DeFazio. None of these political leaders had full control over the transit system, nor did they stand to be the main political beneficiary of a successful implementation. Given the amount of political capital it takes to win over various stakeholders in the United States, it is quite difficult to implement a gold-standard BRT.

In cities where the BRT projects have lacked some of the key characteristics of BRT, the senior political leadership was not terribly engaged in the project. In Boston, the proposed extension of the Silver Line into Roxbury was opposed by most of the elected officials in the area, and only the transportation and planning departments of the City of Boston, and the Executive Office of Transportation of the Massachusetts DOT were fully behind the project. In New York, the NYCDOT Commissioner was fully behind making the project a gold-standard BRT, as was the former head of the NYC Transit Authority, as well as some state assemblymen like Brian Cavanaugh, but neither the mayor nor the governor weighed in with strong political engagement in the project. In Chicago, Mayor Daley never made it a major political focus. In Los Angeles, Mayor Villaraigosa put his political capital into the implementation of the "subway to the sea" but not behind any BRT expansion. In San Francisco, while Mayor Newsom was supportive of BRT, he was not focused on it and never invested much political capital into the projects, as he was focused on becoming Governor, and then Lieutenant Governor.

In short, U.S. BRT has suffered from a lack of political leadership. Most major politicians in the United States are still unaware of BRT and do not think of it as a worthy platform on which to campaign. In fact, many politicians would rather promise a rail system that they cannot deliver than promise a BRT system that they do not quite understand. Most transportation commissioners have limited faith in their political leadership's understanding of transportation issues and are reluctant to elevate their BRT projects to a higher political level for fear that the political leadership will intervene in a largely non-constructive way. Perhaps because BRT is still seen as a lower-cost consolation prize for cities without the funds to implement a rail project, rather than a viable alternative with significant operational advantages, political leaders tend to pay less attention to BRT projects than to rail projects.

Overcoming the obstacles

Securing a higher level of awareness and understanding for BRT among mayors and governors is one of the highest priorities for BRT in the United States. BRT projects must be sold on their merits and demonstrate time-savings over other modes, as well as cost-effectiveness. Meetings and idea exchanges between high-level political figures, as well as study tours, are generally the most effective way of creating political champions. In nearly every city with gold-standard BRT, mayors or governors became familiar with other gold-standard BRT systems through visits to Curitiba, Bogotá, or Mexico City. In each case, the politicians hoped to gain politically from a successful implementation, and in most cases they were successful.

In U.S. cities, mayors, county executives, and governors are often less powerful than their international counterparts. Additionally, the potential for creating a political legacy through one project is much greater outside the United States. However, the support of a political champion is still critical, as without it, projects are less likely to move forward. And the cases of Cleveland, Eugene, and Los Angeles, where political champions were all pushing the projects ahead, are testament to this.

With some initial political leadership, a long-term vision for a full BRT network can help build lasting momentum for a project. Montgomery County Councilmember Marc Elrich was the top vote-getter among a large slate of at-large County Council candidates in 2010 in a campaign with a major focus on building a full BRT network in the County. Other political leaders in San Francisco have envisioned a multi-corridor

BRT network. Rahm Emanuel included a BRT network in his winning campaign platform during the recent Chicago mayoral election. The New York City PlaNYC 2030 advanced by Mayor Bloomberg includes BRT in its long-term transportation strategy.

Lack of an organized pro-BRT lobby

In some locations, like Montgomery Country, Maryland, groups of business leaders have joined together to push for BRT projects. But in general, there is not a cohesive group of companies actively pushing governments to implement BRT. While the private sector rail lobby is far weaker in the United States than the road lobby, it is able to advance specific projects in specific corridors where beneficiary interests can be mobilized. The New Starts Working Group, a coalition of more than sixty transit authorities, local government entities, architectural and engineering firms, and rail car manufacturers, has had some success in shaping federal regulations and law to favor investment in large rail projects. The annual "Rail~Volution" conference manages to attract an impressive list of private sector sponsors and exhibitors, including Siemens and most major American engineering firms. There is no similar annual BRT meeting in the United States, and no group of private sector bus industry supporters for similar efforts.

A well-organized business community can be helpful in getting BRT off the ground.

Many of the progressive transportation reform advocacy organizations, as well as community and environmental justice advocates, are rather suspicious of BRT. Some suspect it is a trick by conservatives to deprive American cities of proper transit funding. In Montgomery County, Maryland, community groups like the Action Committee for Transit rallied in favor of a light-rail alternative, and for this reason opposed the Purple Line BRT alternative. In Boston, after the unimpressive results of the initial Silver Line, its proposed extension through Roxbury was opposed by most of the local community groups who had earlier been promised a light rail line.

Overcoming the obstacles

A strong, well-organized business community can be extremely helpful in getting a BRT project off the ground. The interest of the business community in BRT is purely economic and it is thus a matter of demonstrating that a BRT system can generate more income or real estate value than either the status quo or any other mode.

As chambers of commerce represent the interests of business in an area and sometimes even include economic development corporations, a local chamber of commerce is often the place to begin. Once a chamber of commerce is on board, it is likely that much of the rest of the business community will follow.

In Montgomery County, Maryland, a group of property owners formed the White Flint Partnership that has provided important leadership advocating for gold-standard BRT. The Partnership successfully pushed back against proposals for lower quality BRT or priority bus lanes recognizing that gold-standard BRT would provide a greater sense of permanence and better support for transit-oriented development. This coalition of developers in 2010 won approval for denser infill development that is dependent on a supplemental ten percent property tax special assessment which will help fund BRT and other transportation improvements in the development corridor. Through outreach efforts into the big business community, New York City gained support from the Partnership for New York City for their BRT plans and Cleveland won the support of the Downtown Cleveland Alliance.

The focus of the environmental community on rail is not inalterable. But given what is often a slightly more idealistic approach, it will take cultivating the right leaders within the environmental community in order to bring the benefits of BRT to the forefront of their agenda.

To boost support for BRT from the industry side, a conference similar to Rail~Volution could be organized by private sector bus industry supporters. Bringing in some of the specialized BRT vehicles could help capture the imagination of industry professionals who still believe that rail is a more attractive mode.

Fiscal conservatives and fiscally-conservative organizations, such as the libertarian Reason

Foundation, can be strong allies in support for BRT. Many fiscal conservatives recognize the need for mass transit or accept that the government will continue to pursue it. But the high cost of rail does not necessarily fit into a fiscally conservative agenda. Thus, fiscal conservatives are likely to be swayed by the case for an equal (or better) transit solution that is a fraction of the cost of rail. The Reason Foundation, which already supports BRT, states that "funds available for transit will always be limited. It is therefore incumbent on policymakers to invest these limited funds in ways that produce the greatest value for the taxpayer dollar."[1] Further, fiscal conservatives are likely to support performance-based contracting of BRT operations over public monopoly operations. The Reason Foundation also argues that "competition is one of the best ways to improve transit service."[2]

The role of organized labor

So far organized labor has played a relatively minor role in BRT initiatives in the United States. Some unions are keen to become more assertive and involved.[3] There is often tension within labor unions. Some traditional union leaders are simply moribund, and others are narrowly focused on protecting the prerogatives and wages of their existing members. On the other hand, there is a new group of reformist union leaders who are focused on organizing, bringing in new members, and looking for joint initiatives with community activists to tackle larger structural and political issues, like loss of union jobs.

Recently, new reformist leadership was elected to the presidency of the Amalgamated Transit Union (ATU), the branch of the Teamsters that works in public transportation. ATU represents most of the bus drivers in most cities in the United States. The Transport Workers Union (TWU) represents bus drivers only in New York City,[4] Philadelphia, Houston, and San Francisco.[5] The rest belong to ATU.

Due to the current fiscal crisis, the union movement is taking a new interest in BRT. There were 1,100 layoffs in Chicago recently. Detroit lost twenty-five percent of its bus drivers, and the remainder took a pay cut. The entire bus system of Clayton City, Georgia (a suburb of Atlanta) was shut down, resulting in the loss of hundreds of union jobs. Transit sector job losses are a major issue in dozens of cities across the country.

Overcoming the obstacles

ATU's new president, Larry Hanley, comes from the Staten Island ATU where he rose to prominence in part due to his leadership of a joint union-community campaign that led to the creation of express bus lanes on the Staten Island Expressway, a fare reduction, and newer, more comfortable buses. This campaign led to an over one-hundred percent increase in ridership and the addition of over 500 new employees and ATU members. President Hanley is keen to take this experience national. ATU organized a major meeting of community activists and thirty-five union locals in Chicago during November 2010 to discuss the creation of bus riders unions, and sponsored keynote talks on BRT at its recent legislative assembly. ATU also has a new seventeen-city national initiative, together with the Service Employees International Union (SEIU), to work on joint labor and community organizing.

Although the unions have rarely articulated views on technical issues, they are supportive of those BRT elements that reduce operating costs without a loss of wages or employees. In some interviews, local officials suggested that union seniority rules introduced some rigidity into changes in bus routes, which are sometimes important to implementing an optimal BRT system. Interviews with union representatives indicated that this was a non-issue; union members generally liked the BRT routes and unions were happy to help sort out any issues related to implementation.

A recent report on the effects of the 2009 American Recovery and Reinvestment Act (aka, the "stimulus") on job creation showed a disproportionately greater number of jobs created per dollar spent on public transportation versus highway infrastructure (19,299 job-months per billion dollars spent on public transportation and 10,493 job-months per billion dollars spent on highway infrastructure).[6] The main explanation for this is that "public transportation spends less on land [than highway infrastructure] and more on people." Such findings could thus be extrapolated for BRT investment. By choosing a public transportation alternative with minimal infrastructure costs and higher overall cost-effectiveness, more BRT can be built and more jobs will be needed to operate this more extensive system. More interaction with transit unions on these issues will help garner support.

On the other hand, contracting out bus services to private operators and quality-of-service contracting raised legitimate concerns that it would be used to undermine union wages, benefits, and representation. Interviews with union leadership suggested that the unions were more than open to changes that improved the quality of service, but not at the expense of jobs and wages. Some said some locals were more constructive than others. In every case, union representatives complained that many local unions were too weak to have much impact one way or the other, and emphasized that their main request was to have a seat at the table where decisions were being made.

Community concerns

Many communities in the United States have opposed new BRT lines in higher-income neighborhoods because they feared it would bring lower-income minorities and elevated crime rates to the neighborhood, though groups will rarely admit that this lies behind their opposition.

On the other side, some lower-income neighborhoods have opposed BRT because of the concern that they are getting a second-class solution. This is especially the case in cities where higher-income neighborhoods get light rail or where lower-income communities have been promised rail and are instead getting BRT.

Some groups, like the Westwood Community Organization, opposed BRT-type improvements along the Wilshire Boulevard "Condo-Canyon" because of very localized traffic concerns. Sometimes, BRT projects are implemented in ways that require the widening of roads, the removal of trees, or the loss of other natural amenities, which angers local environmentalists. While central median BRT is usually much more effective at improving bus travel speed and schedule adherence, these changes can spur some local opposition from drivers concerned about traffic impacts.

Overcoming the obstacles

Working with communities to identify their transit needs and keeping them involved at every step of the process are the keys to community acceptance. In this way, communities are less likely to feel blindsided by a final recommendation with surprise elements.

Ensuring that BRT plans span both upper- and lower-income communities helps to offset concerns of lower-income communities that they are getting a second-class system. Working with lower-income communities to demonstrate that BRT can be as high quality as light rail can also help to reduce community opposition. Bringing BRT buses to upper- and lower-income communities, in a sort of BRT "Vehicle Petting Day," could help capture imaginations. Vehicle manufacturers, such as Volvo, Scania, or Mercedes should be approached to lead such efforts.

Transit advocates and community activists may also be swayed by the often much shorter implementation timeline for BRT, which can deliver nearly immediate benefits as compared to light rail or metro which could take years or longer to construct.

Non-governmental and grassroots organizations can also play a role in solidifying community support for a project. They already know many of the issues faced in getting a project implemented. Local groups are familiar with local political situations. In Oakland, AC Transit has received support from TransForm, an NGO whose mission is "to create world-class public transportation and walkable communities in the Bay Area and beyond."[7] During the early planning stages for the East Bay BRT project, TransForm worked to build a support base among community groups, church groups, and labor unions.

Parking

In order to create dedicated running ways and stations, it is often necessary to eliminate parking spaces or at the minimum change curbside parking regulations during peak periods. This can raise opposition from local businesses, motorists, and even church-goers. Local business parking concerns fall into two categories: fear that loss of parking will inconvenience customers and fear that loss of curbside access will hinder ability to receive deliveries. The portion of the proposed BRT in the East Bay that travels along Berkeley's Telegraph Avenue faced strong opposition from the local business community. As a result, the Berkeley City Council voted against dedicated lanes, so the portion of the route proposed to run through Berkeley will operate in mixed traffic.

Motorists share the first fear, that loss of parking will hinder convenient access to workplaces or

Transit and community advocates can be swayed by the much shorter implementation timeline for BRT which can deliver more immediate benefits.

services, or even their own homes. Most of the community boards in Midtown Manhattan were opposed to key BRT measures on the First and Second Avenue corridors because of concerns about adverse parking and traffic impacts.

Church groups tend to be highly protective of on-street parking around their churches on Sundays. This was an issue for the proposed Roxbury (Mattapan to Ruggles) BRT corridor in Boston. After decades of middle-class flight from urban centers, many suburban residents still return to their "home" churches on Sundays, usually in cars. As this population ages, the accessibility of their churches becomes more essential and a more sensitive topic.

Overcoming the obstacles

The solutions vary but system planners would be wise to have an understanding of how parking-dependent the various businesses and institutions are along a proposed BRT corridor and how much residential parking currently exists. Some businesses may be convinced if they can be shown that most of their clients already arrive by foot or transit. Even in Berkeley, where BRT was ultimately defeated, assessments and education of the business community resulted in a very close vote.

Others, however, such as big box stores, gasoline stations, or automobile repair shops are unlikely to have many of their customers arriving by transit. For these businesses, as well as for those that require curbside delivery space, it is important to consult with them and devise solutions that can help them, including potentially altering curbside parking regulations on side streets to make up for lost parking or delivery space, and/or creating delivery windows where delivery vehicles are allowed into BRT lanes off-peak. Side-street parking regulation changes can help local residents as well. And off-hour parking regulations can be employed to make allowances for church parking on Sundays. New York City has used these techniques to resolve community concerns.

Construction impacts

Transit projects can be disruptive to streets during construction. When the Bay Area's rail line, BART, was being constructed in the 1960s, dozens of businesses shut down during the construction process.[8] However, construction for BRT can be quick relative to projects that require heavier infrastructure. But even a two-year period can be fatal to a small business. The unfortunate combination of BRT construction during the worst recession since the Great Depression may have accelerated the demise of some businesses in Cleveland. But the project's overall economic development impact has been extremely positive.

Overcoming the obstacles

In constructing the HealthLine, the City of Cleveland engaged in an intensive outreach campaign with the existing businesses and business partnerships along Euclid Avenue to gain support from that community. All businesses were given the opportunity to comment on plans, and plans could not move forward until each business signed off on the specific design and construction plans. In the end, business owners became so supportive that many demanded additional stations, thereby increasing the number of stations along the corridor. Though some businesses suffered during the construction phase, to date, $4.3 billion of new investment has been made in the corridor.

The construction process should be strategically timed and well-managed, with businesses being informed well in advance. Construction impacts should be minimized through well-planned phasing and area-wide traffic impact and environmental mitigation measures to address construction impacts that are unavoidable.

Other concerns

There are a few specific cases where a car-oriented business model became a specific obstacle to a BRT project. Curiously, the major casinos along the Strip in Las Vegas blocked the extension of the BRT system to serve their casinos because they reportedly did not want to do anything that would make it easier or more attractive for people to leave their casinos. Their business model, like that of a major shopping mall, is to get people to park at their casino and then remain inside the entire time. As a result, the large casino corporations have not been interested in sharing customers or improving the street life between unaffiliated casinos. The elevated tram that connects some of the casinos was only extended to casinos owned by the same corporate group. It is unclear whether this is fundamentally a case of shortsightedness or a case of core business interest. Surely the nightmarish traffic along the famous Las Vegas Strip will begin to have adverse business implications.

Overcoming the obstacles

Extensive dialog with the big business community and impacted businesses, explaining to them about BRT and the possible benefits, should pay significant dividends.

ADMINISTRATIVE AND INSTITUTIONAL OBSTACLES

City and State DOT design guidelines

Planning and design guidelines in the United States have a lot more power than in most developing countries. While similar design guidelines often exist in developing countries, they are frequently so out of date, so general, and so unrelated to actual conditions that they are largely ignored by most practicing engineers. While this frequently results in poor basic traffic engineering, it also makes things far easier to change when the political will to change things exists. This is not the case in the United States. The United States is quite litigious and tort law has made it increasingly possible for citizens to sue public entities in the event of injuries or damages from accidents. Senior engineers, while not personally liable, are nonetheless responsible for protecting the interests of the city. Engineers must personally approve street designs and re-designs, and by doing so, they are personally accountable for design flaws and safety ramifications.

The Cleveland RTA was granted a design exception to allow eleven-foot bus lanes in order to fit their BRT into the existing right-of-way. Photo: Annie Weinstock, ITDP

Though it varies state-by-state, traffic engineers in city and state DOTs are generally required to follow state design guidelines, which generally follow the AASHTO Green Book and the Manual on Uniform Traffic Control Devices (MUTCD). These manuals take fairly conservative approaches to street design, focusing primarily on maximizing traffic flow and overdesigning for safety, with little thought to transit priority, traffic calming, or complete street design. Traffic engineers are generally reluctant to deviate from these design standards.

An interesting example of this phenomenon occurred during the effort to implement full BRT on San Francisco's Van Ness Avenue. Van Ness Avenue is also U.S. Highway 101, and as such is under the control of Caltrans, the California Department of Transportation. Caltrans' administrative procedures require the city to adhere to strict rules, such as retaining throughput on Van Ness, even if automobiles could be diverted or traffic suppressed. This requirement would be easy to meet in the developing world, where creating a bus lane will generally increase the corridor's throughput substantially, but this is less than certain in the United States. Caltrans' street design requirements are also antiquated and do not easily adapt to transit- and pedestrian-friendly design. Design exceptions are necessary and moving through this bureaucracy is proving to be difficult for those involved in the project.

Overcoming the obstacles

Design exceptions are possible and have been granted in several cases. In Cleveland, several design exceptions were granted with the most significant one being for the reduction of BRT lanes widths from twelve to eleven feet. As more DOTs are moving beyond car-oriented designs, senior engineers can justify changes if there is a well-documented alternative practice that can serve as precedent. Unfortunately, given the relatively limited experience with BRT in the United States, the range of domestic experience with alternative designs is fairly limited. Documentation of recent BRT-related design interventions already implemented would therefore be a useful tool. On rare occasions, U.S. engineers are willing to look beyond the United States for new precedent. When there is precedent, it must have been implemented under conditions close to local conditions. Thus, American engineers tend to turn to Canada, Australia, or Europe first, and to Latin America in very limited cases. Some DOTs are also beginning to adopt design manuals other than AASHTO's Green Book and the MUTCD. Guidelines published by the Institute for Transportation Engineers (ITE) are somewhat less conservative and some locales are even willing to look to the American Planning Association (APA). But most see this as more risky, because the APA is not an engineering association. Promisingly, in March 2011, the U.S. National Association of City Transportation Officials (NACTO) announced a new set of street design standards more sensitive to urban needs to complement the ossified standards of the state DOTs.

Finally, more DOTs have been using pilot programs as a way of testing alternative designs without the same level of accountability. Pilot programs generally involve paint and other temporary measures, rather than full infrastructure build-out. If a pilot proves successful, more permanent infrastructure can be put in place and it is much more likely that the DOT will sign off on even more unconventional elements of projects down the road.

While DOTs often do not have final say over project implementation, their buy-in is important. Opposition from city or state engineers can be circumvented by:

- Leadership from a strong mayor, governor, or DOT leader
- Leadership from a strong-willed city council
- Leadership by other political or institutional sponsors backed by the judgment of a respected outside engineering firm willing to sign off on a project.

City and State DOT operational guidelines

Similar to the issues that arise due to DOT stringency on design guidelines, DOTs also tend to have strict regulations on traffic operations. Level of service (LOS) is the most common metric for measuring the operational efficiency of a roadway or intersection for mixed vehicle traffic. However, as discussed by Smart Growth America, "design decisions based on high level-of-service performance measures can end up serving only the motorist at the expense of the very communities that the road is supposed to serve. Decisions made only for the peak hour may tune the roadway to work well for motorists during those hours, but render the road over-designed for the rest of the day and ineffective for all other users."

Sometimes, the repurposing of a mixed traffic lane for BRT can result in a degraded level of service to mixed traffic. While person throughput may increase within a corridor due to an increased number of high capacity vehicles moving at greater speeds, it is rarely the metric used by traffic engineers in the United States Generally, any decrease in LOS to mixed traffic is met with DOT resistance.

Pedestrian and bicycle LOS standards laid out in the *Highway Capacity Manual* have been adopted by many cities around the country. Transit LOS standards, laid out in the *TCRP Report 100: Transit Capacity and Quality of Service Manual, 2nd Edition* (TCQSM),[9] are sometimes used in designing transit facilities. However, most LOS analyses have been developed for single modes and it is rare that all modes are considered in an integrated and context-sensitive manner.

Overcoming the obstacles

Smart Growth America proposes that DOTs should not automatically impose LOS standards without first considering the transportation context. "For roads of statewide importance, high levels of mobility may need to be maintained and higher level-of-service targets can be warranted. For secondary and tertiary roads, high levels of mobility may not be a priority. For these, maintaining or enhancing the quality of the community should take precedence. There should not be an automatic mandate to address poor level-of-service at all costs every time it arises… State transportation departments should review how they apply level-of-service standards and, if necessary, work with local governments to revise how the level-of-service is measured."[10]

Well-documented examples of alternative designs are needed to build support for design exceptions that some BRT systems will require.

Some efforts have been made to integrate the various LOS standards into a single multi-modal LOS standard. The National Cooperative Highway Research Program (NCHRP) released a report in 2008 detailing a method "for evaluating the multimodal level of service (MMLOS) provided by different urban street designs and operations." In 2009, the Florida DOT released a set of guidelines for evaluating LOS among four modes (auto, transit, bicycle, and pedestrian).[11] This is perhaps the only state DOT to adopt a multi-modal approach to LOS analysis. Other city and state DOTs should consider a similar approach in LOS guidelines.

It is also the case that some BRT projects improve the overall passenger LOS for a larger area, even if the overall LOS for passengers on the corridor degrades in the short term. This is not generally acceptable to most DOTs but is accepted by some.

Fragmentation of control of metropolitan transportation systems

In the United States, urban transportation is rarely under the control of a single politician. To implement BRT in the United States one needs the full support of the metropolitan transportation authority, which controls bus operations, as well as the municipal department of transportation, which controls most streets, and sometimes the support of state departments of transportation, which control some major roads. Many U.S. metropolitan areas are agglomerations of smaller city-level governments. The metropolitan transportation authorities are not generally under the control of the mayor but of some combination of city, state, and other nearby municipal governments.

Federal funding bottlenecks

Many cities in the United States rely on federal funding to cover capital costs of transit projects. This has undoubtedly helped advance many worthwhile transit projects that otherwise might not have happened and improved the quality of many projects. However, it also slows projects significantly and subjects projects to additional bureaucratic hurdles. There are several obstacles to using federal funding to create a full BRT network:

1) The federal funding process is drawn out and bureaucratic. Some of these procedures are reasonable checks and balances to ensure quality control, and others are merely red tape. The biggest source of delay is the profound mismatch between available discretionary federal resources to support such initiatives and the demand for state and local funding. This is evident from the large number of applications for BRT project funding in the recent TIGER Grant Program and the modest resources available. Slowing project speed gives those opposed to a project additional time to organize against it.

2) FTA funding is based on a corridor-level approval process, which is based on the historical precedence for rail projects, where high capital costs and the demand for establishment of new operational structures ensure that projects will roll out one corridor at a time. BRT projects, on the other hand, would often be better off if treated as transit-network operational improvements. Operational improvements are often ill-considered in the current MPO transportation planning process, which tends to focus on higher capital cost investment strategies, rather than cost-effective optimization of performance of the existing transportation network and service structures.

3) Since 2007, there is no longer any particular anti-BRT bias in the federal process for evaluating New Starts/Small Starts (though BRT is usually too cheap to qualify for New Starts). However, the federal review process currently does not proscribe the use of methodologies that commonly bias the decision-making and technical analysis in favor of rail-based outcomes.

These and other elements of federal policy and funding are reviewed at greater length in Chapter V.

Chapter V:

BRT and the Feds

In general, the Federal Transit Administration (FTA) has been an important supporter of BRT in the United States. There is no particular bias in federal funding that would prejudice project promoters at the city and state level to opt for a rail project rather than a BRT project. There are funding levers at the federal level that could be used to place a stronger emphasis on cost-effectiveness in transit spending decisions. More use of these would likely increase the success rate of BRT projects with optimal operational plans, but this leverage has seldom been applied. Willingness to use this leverage has been weakened rather than strengthened by the Obama Administration which is captivated by the concept of "livability," an amorphous term which makes it impossible to separate cost-effectiveness from mediocre plans.

FEDERAL FUNDING FOR MASS TRANSIT

Since the 1970s, the majority of federal transportation dollars have been secured through the Highway Trust Fund (HTF),[1] which generates revenue by levying an excise tax on transportation fuel and tires weighing more than forty pounds. These tariffs were last increased in 1993 and are currently as follows: $0.184 per gallon of gasoline, $0.244 on diesel, and $0.13 on gasohol.[2] From the 1970s until 1990 the HTF dedicated two percent of total funds to urban mass transit, and these funds were administered by a body that we now call the Federal Transit Administration (FTA). After 1990, states were given additional discretion to flex federal transportation assistance previously earmarked for highways to fund mass transit.

Also starting in the 1990s, the FTA increased its scrutiny of the cost-effectiveness with which federal funding was committed to new major transit projects. New criteria blocked funding for highly ineffective projects and to a degree limited funds being awarded solely on the basis of political influence. However, such reasonable funding criteria were—and have continued to be—circumvented by Congressional earmarks. These earmarks are difficult to track and are not under the authority of the FTA. Though the earmark process has fallen increasingly into disfavor, many bus and rail projects have won funding primarily through that means.

FEDERAL FUNDING FOR BRT

Federal support for urban mass transit managed by the FTA has generally been responsive to the demand of a marketplace dominated by persuasive rail-oriented interest groups. Many of these groups have lobbied successfully for costly rail projects, even when less costly bus proposals might have equally well or better addressed the mobility problem at hand.

> In the late 1980s, the discretionary grant program was split so that 40% of funds were dedicated to rail starts and extensions (also known as "New Starts"), 40% to rail modernization projects, 10% to major bus projects, and 10% to a discretionary fund... [3]

New Starts was restricted to projects with a "fixed guideway" for at least fifty percent of the route. According to the FTA:

> A "fixed guideway" refers to any transit service that uses exclusive or controlled rights-of-way or rails, entirely or in part. The term includes heavy rail, commuter rail, light rail, monorail, trolleybus, aerial tramway, inclined plane, cable car, automated guideway transit, ferryboats, that portion of motor bus service operated on exclusive or controlled rights-of-way, and high-occupancy-vehicle (HOV) lanes.[4]

As such, BRT projects are eligible for funding under the New Starts program. New Starts is for projects over $250 million, meaning it excludes some Phase I BRT projects. In 2007, with the creation of the Small Starts program, it became easier to fund BRT and other less-expensive projects with federal money. Small Starts provides support for lower-cost systems (below $250 million), and provides a maximum of $75 million. Most U.S. BRT projects are funded by this program.[5]

In 2011, of the roughly $1.8 billion in federal funding for New Starts and Small Starts, only about $220 million is dedicated to bus projects. Of this, about $60 million is slated for projects that have at least some key BRT features, like exclusive lanes or off-board fare collection. This does not seem to represent a bias in favor of rail projects on the part of the FTA; rather, the FTA has been highly supportive of BRT but is receiving more requests from state and local governments for rail projects, and such projects are much more expensive.

Thus, there is no federal obstacle to receiving funds for BRT projects, other than an overall limitation on funding for the program, and a lack of requests for high-quality projects. In fact, the FTA has played an important role in the growing recognition of BRT as a viable option for urban mass transit. FTA's BRT Initiative, which started in 1999, played a key role in initiating many U.S. BRT projects. The purpose of the BRT Initiative was "to introduce the concept of bus rapid transit into American cities—demonstrating how a combination of bus infrastructure, equipment, operational improvements, and technology can significantly increase bus speed and ridership, as well as reduce travel time, operating costs, and emissions."[6] The initiative has been reasonably successful in this regard.

As part of the initiative, the FTA supported inception studies for various BRT projects across the country, including systems in Las Vegas, Honolulu (never implemented), and Boston. Through establishing other research initiatives, such as the BRT Policy Center, the FTA built upon its funding mechanisms for BRT projects in hopes of providing Americans with high-quality, low-cost transit systems. This initiative was monumental in directing federal funding towards BRT development, and in providing the scientific and technical knowledge necessary for cities to implement and receive funding for new BRT systems.

Upon completing an evaluation of all of the systems implemented under its BRT Initiative, the FTA has developed standards for measuring, evaluating, and funding high-quality BRT systems in the United States, though these standards have not yet been publicly vetted. It will be interesting to compare them to the *BRT Standard* criteria recommended in Chapter II.

LENIENCY OF FEDERAL FUNDING CRITERIA TOWARDS DUBIOUS RAIL PROJECTS

While there is no outright pro-rail bias at the FTA, there is indeed FTA complicity in the rail bias of city and state level mass transit project sponsors. The FTA, when evaluating New Starts and Small Starts project applications, tends to bow to political pressure to favor locally preferred alternatives and ignore certain forms of rail bias by the project sponsors.

In order for project sponsors to meet the requirements for major capital funding for New Starts and Small Starts projects, they must complete what is known as an alternatives analysis. In recent years, the FTA has been putting pressure on applicants to include a BRT alternative. From this analysis, project sponsors select a locally preferred alternative (LPA). This LPA is then subjected to an appraisal of its cost-effectiveness. Cost-effectiveness weighs capital and operating costs per 'new passenger' against projected ridership. To receive funding, the project must receive a cost-effectiveness rating of medium-high from the FTA. These procedures are manipulated to favor rail projects in several ways, which are examined below.

Exaggerated ridership estimates

Numerous studies have shown that travel demand for large transportation infrastructure projects worldwide—especially rail projects—is frequently overestimated while costs are frequently underestimated, due to systematic optimism bias and strategic misrepresentation of project costs and benefits. Looking at 210 projects in fourteen nations, Bent Flyvbjerg found that nine out of ten rail projects overestimated passenger demand by an average of 106 percent. For seventy-two percent of rail projects, forecasts were overestimated by more than two-thirds.[7] This bias is often a product of the political competition for public investment that pushes analysis to favor locally-preferred alternatives. Such pressure is typically more pronounced in the competition for major transit investments than for roads.

Various methods exist for forecasting travel demand and estimating the impacts of new transportation facilities and services. When a project is privately financed and investors seek conservative analysis that will help limit their exposure to demand-sensitive financial risks, there are engineering firms that will certify the demand estimates and even expose themselves to liability if the projection is inaccurate. But when project promoters are seeking to sell projects to public agency investors or to the public, there are a number of ways that transit ridership projections can be biased to support a politically-favored alternative.

All of the internationally-accepted methodologies for estimating demand begin with a small sample size, expanded into a baseline origin-destination matrix of total existing trips by all modes in the affected area, and then form a clear operational plan for the new system. Then, analysts use some form of a gravity model, often in combination with discrete choice models and network assignment models, to estimate the change in total riders based on changes in travel time and travel cost. Some analyses take into account the impacts of anticipated or induced development at travel nodes.

One of the most common strategies to bias transit alternatives analyses in the United States is the use of a mode-specific constant to calculate the demand for the new system, as permitted by the FTA. The mode-specific constant simply multiplies the demand estimated by the travel demand model by a specific constant. Because many within the industry have a preconceived notion that users have an innate preference for light or heavy rail over BRT, if the project is a rail project, it will have higher demand estimates due to the use of this constant.

This sort of bias was apparent in the recent alternatives analysis completed by the Detroit Department of Transportation for the Woodward light-rail project. The application of a mode-specific constant to the baseline ridership was wholly responsible for the higher projected ridership on the light-rail alternative in comparison to the BRT alternative. Because the cost-effectiveness of the project is a function of the relative capital and operating costs per new passenger, this inflation of the projected ridership directly translates into a higher cost-effectiveness rating. In the Detroit case, the mode-specific constant was directly responsible for the choice of light rail as the locally-preferred alternative.[8] There is no technical basis for such a mode specific constant, and it is not considered an acceptable demand modeling practice internationally.

Such methods of biasing results are relatively common. Modelers can easily remove these factors to generate ridership estimates that will more accurately represent likely outcomes under different investment alternatives.

While it is certainly true that riders prefer to travel comfortably and safely, an equally comfortable and safe trip can be provided on a variety of modes, and there is no evidence that travelers' preference is necessarily linked to mode. Therefore, mode-specific constants should be replaced with improved transportation demand model specifications, including quality-of-service variables.[9]

Internationally, it is more common to bias an analysis in favor of rail by manipulating the expansion factors that are used to translate small-scale travel surveys data so it represents the total population for specific origin-destination pairs. These and other manipulations of highly-detailed and often secretly prepared data within complex models can be used to generate results that support what powerful political interests desire, especially in the absence of independent peer review or use of reference class forecasting methods.[10]

It is sometimes impossible to determine from public documents the basis of the demand projections. For example, while the public documents regarding New York's Second Avenue Subway proposal included extensive notes on the methodology used to model the demand, insufficient information was provided in the documentation to understand the assumptions from which the demand estimate was derived. It was as if, in the name of transparency, the instructions on how to use a generic traffic model were released rather than the details of the actual proposal and a description of where the numbers come from (i.e., how many of the projected passengers were transferring from alternative subway routes, or bus routes, and how many were new passengers from cars, and whether these assumptions were in any way reasonable).

Selection of weak alternatives

Under current law, the FTA has minimal requirements for what types of alternatives must be included within an alternatives analysis. Specifically, project sponsors are only mandated to include a "no build" alternative. Otherwise, only those alternatives put forth by the project sponsor are the ones reviewed by the FTA. As long as one or more of them meets the cost-effectiveness medium-high threshold, due diligence has been done and those alternatives may be considered for funding. This allows a project sponsor to choose and potentially receive federal funding for an alternative that may not be the most cost-effective, provided that it is cost-effective *enough*.

Moreover, the project sponsor can modify the alternatives in ways that will change their cost-effectiveness ratings. For example, during the alternatives analysis phase of the Maryland Transit Administration's Purple Line project, the light-rail alternative was designed to travel on a straight path while the BRT alternative was forced onto local streets, on a roundabout route. This added unnecessary travel time to the BRT alternative, making it less attractive to riders and thus, decreasing projected ridership.

Another example of this deck-stacking technique is the 2002 Dulles Corridor (West Falls Church to Dulles Airport) Environmental Impact Statement, which considered fewer stations for BRT alternatives than for the metro-rail alternatives, and envisioned BRT as a closed system, running only on the new alignment. The analysis thus failed to consider the most obvious potential strength of a BRT option in the Dulles corridor—the ability for buses to operate off-corridor at one or both ends of their trip, picking up and delivering passengers at locations off the BRT corridor, while gaining travel time advantages from use of dedicated bus lanes in the corridor. Indeed, it is this ability of open-system BRT to deliver many more one-seat rides that can accrue significant environmental benefits by making mass transit attractive to a larger share of the potential travel market.

Similarly, the Detroit light-rail proposal on Woodward Avenue also included a BRT alternative, but the BRT alternative was less than optimal. The fact that the estimated demand, prior to the application of the mode specific constant, was exactly the same for the BRT and light-rail alternatives, indicates that the operational plan for both was assumed to be the same. In fact, an operational plan that included bus routes operating in mixed traffic and then joining the BRT trunk infrastructure without requiring a transfer would have shown a much higher ridership if properly modeled. This may not be evidence of bias, but rather a lack of awareness among project sponsors of this option.

Developing criteria for ensuring a fairer appraisal of best viable alternatives is advised. Alternatively, evaluation of project effectiveness might be done by an independent entity, rather than by the project sponsor. Or the current politically-driven award of discretionary transit funding might be replaced entirely with a competitive performance-based model that awards funds only to projects with the highest cost-effectiveness across regions.

Cost-effectiveness weighting

When applying for federal funding for a new transit project, a transit agency must calculate the benefits of the proposed project through what is called a project justification formula. Currently, the project justification formula weighs cost-effectiveness and transit-supportive land use equally—each make up fifty percent of the total score. As described above, the cost-effectiveness measure is calculated based upon the total projected consumer surplus in terms of travel time and travel cost savings of both existing and projected future riders for each proposed alternative. Economic development benefits tend to be ignored in this appraisal methodology because they are rather difficult to predict. However, as the economic development benefits are, in fact, a function of the time and cost savings to passengers, ignoring the economic development benefits does not tend to distort the project selection process.

In some cases, such as the proposed M1 light-rail line in Detroit, it seems that the FTA waived the requirement to perform a cost-effectiveness analysis, and allowed the project's proponents to rely on the former, simpler methodology which was based only on projected new riders. This former analysis would bias the results of an alternatives analysis in favor of light rail if the project proponent used a "modal specific constant" as described above, which was used in the case of Detroit.

Recently, the FTA has been holding hearings and discussions with experts about whether and how to include additional environmental or economic development benefits in its assessment of projects. The net impact of the proposed changes would be to weaken the importance of cost-effectiveness—perhaps to as low as thirty-three percent of the total feasibility assessment—ostensibly in order to bring in these new factors. It is likely that the relative cost benefits of BRT systems will be further overshadowed if these new factors enter the evaluation matrix, and diminish the weight of cost-effectiveness. This seems particularly poorly timed, given the fiscal crisis that national, state and city governments currently face.

In theory, the FTA could require consideration of a wider range of alternatives that achieve minimum federal, state, and local requirements while striving to maximize the cost-effectiveness with which each alternative achieves environmental and other objectives. For this to be effective, the federal government would need to mandate the use of internally consistent land use, urban design, pricing, and incentive policies that reflect likely indirect, secondary, and induced impacts of proposed investments and complementary local commitments. However, given that there is a lack of methodological agreement on how to do this, and relatively limited accountability even for the existing procedure, further complicating the appraisal process is only likely to make it even less transparent. This could invite further gaming of the assessment process by project proponents in favor of politically desired outcomes.

Alternatively, the FTA might require consideration of comparable cost "best case" BRT alternatives to proposed rail investments. Such a requirement might lead jurisdictions to consider a larger public transport network expansion in a BRT alternative than in a comparable-cost rail alternative serving the same travel-shed, since well-designed BRT alternatives can often provide more one-seat rides and a higher level of public transport service for the same cost as rail alternatives, while providing equal opportunity for transit-oriented development.

The FTA should also require consideration of cumulative benefits to the environment over a twenty-year planning horizon for investments, considering capital and operating costs, and the timing of project impacts. For example, if a well-designed and extensive BRT alternative can deliver more widely-distributed high-quality transit services to many more people over more years than a rail alternative on a proportional cost basis, per capita vehicle miles traveled and related greenhouse gas emissions will be significantly reduced. Thus, the BRT alternative should be rated significantly higher than the competing equal-cost metro alternative. However, such an approach could be challenging to police.

In general, then, the FTA has created a reasonable enabling environment for BRT, but ultimately has been quite responsive to pressure from client states and cities to fund their locally-preferred alternatives. Given the incredible fiscal pressure on the United States today, and the shortage of funds for New Starts and Small Starts, it is wise that the new Congress has decided to forbid earmarks, but more action is needed. The FTA should apply even more rigorous cost-effectiveness criteria to New Starts and Small Starts.

OPPORTUNITY TO REFINE DOT PLANNING RULES OR GUIDANCE

As part of its effort to refine the New Start and Small Start rules, U.S. DOT should refine the SAFETEA-LU planning rules issued in 2007, and related guidance, in a way that helps ensure states and Metropolitan Planning Organizations better consider alternatives to minimize fuel use and emissions while supporting economic development and mobility objectives. Under the existing statute, the DOT has authority to define criteria related to these factors so that state and metropolitan transportation plans might focus the definition of alternatives more clearly on obtaining more optimal performance across these several measurement dimensions. By issuing such guidance, the DOT could help foster wider consideration of highly cost-effective world-class BRT options in the planning process. This opportunity is discussed in greater depth in comments filed during the rulemaking process by the Environmental Defense Fund, Natural Resources Defense Council, and others that were not addressed in the final 2007 U.S. DOT transportation planning rule. Acting on this would also help the Administration advance its livability initiative, support progress on improving U.S. energy security, and consideration of climate impacts in transportation decisions.

Opportunity to expedite environmental reviews of BRT Small Starts

While funding delays typically provide the most barriers to the development of BRT projects in the United States, the U.S. DOT could reduce another source of potential delay to BRT Small Starts projects by developing a framework in which these projects could be eligible for Programmatic Categorical Exclusions under the National Environmental Protection Act (NEPA). This could enable more BRT projects to proceed without the need for environmental assessments, except in circumstances where major environmental impacts need to be considered along with strategies for mitigation and impact avoidance.

Opportunity to establish new FTA grant program

There is an opportunity for U.S. DOT and Congress to boost the priority for funding gold-standard BRT by incorporating it into their grant programs. By embracing a scoring system like the *BRT Standard*, FTA can rank BRT projects based on a broad range of criteria. This will enable them to more optimally determine funding priorities.

DOT could incentivize high-quality BRT initiatives through a competitive performance-focused discretionary program, similar to the Urban Partnership Agreements or Congestion Reduction Pilot Projects initiatives under the Bush Administration or the Livable Communities initiatives of the Obama Administration.

Additionally, as changes now under consideration are made in the rules for the New Starts and Small Starts programs to give more weight to environmental factors, BRT projects could be given priority for funding if they meet the gold-standard on the *BRT Standard* scale. Such projects would be much more likely to produce positive environmental benefits with high cost-effectiveness compared to low-scoring BRT projects.

Chapter VI:

BRT Branding and the Media

There is a small but growing body of work devoted to the role of communications, branding, and marketing in the success of both getting BRT projects started and making them successful once implemented. BRT proponents are challenged to improve the public image of buses, which has been sullied by a number of factors in the United States, not least of which are slow speeds and infrequent service. These service factors lead to the perception (which in many cases is supported by reality) that buses are a transit means of last resort for the poor, the elderly, and the disabled. Second, there is the problem in the United States. that many cities have branded marginal bus system improvements as BRT, despite not meeting the standards, thus tarnishing the brand. Beyond just improving the image of buses, BRT proponents must find successful strategies for communicating the advantages of BRT projects (often over light-rail alternatives), in order to win and maintain public support for these projects. ITDP undertook a brief literature review and then set out to interview experts in three cities, where communications has played a make-or-break role in the success and expansion of BRT projects.

In "Quantifying the Importance of Image and Perception to Bus Rapid Transit," published by the U.S. Department of Transportation in March 2009, researchers found that:

1. In general, people's overall opinion of public transit will be a stronger factor in their perception of BRT than whether they favor BRT over light rail;
2. BRT can attain the same public perception ratings as rail-based transit, at a fraction of the capital cost investments; and
3. Tangible benefits, including reliability and service frequency, seemed to be the most important drivers of public perception, along with the intangible attribute of rider safety.

Though these findings are based on research in just one city (Los Angeles), it seems reasonable to use these considerations when developing a communications strategy and figuring out what parts of BRT service to highlight.

Another study examined the practice of aligning vehicle design with the design aesthetics associated with high-speed rail. This report, "Bus Rapid Transit Ridership Analysis," commissioned by the U.S. Department of Transportation and published in June 2005, concludes: "In fact, one can infer from this [anecdotal] evidence that a strong design is a necessary BRT vehicle component for it significantly increases the system's potential to increase ridership and thereby achieve the overall goal of BRT system implementation."

While riders' perceptions of Los Angeles's Orange Line are generally good, poor media perception has inhibited broader public acceptance.
Photo: Ramon Cruz

A forthcoming report from EMBARQ will look more broadly at marketing and branding best practices from BRT systems around the globe. This chapter focuses on communications and branding and how they affect public perception of BRT in the pre-planning, planning, and post-implementation phases of a project.

It is worth taking a deeper look though at case studies of projects (both successes and failures) where communications—rather than operational or system design features—have played a critical role. ITDP commissioned an assessment of three questions:

1. How have media perceptions of BRT helped or hurt the implementation of future BRT systems?
2. How has rail been portrayed in comparison to BRT?
3. How has momentum been built to boost or kill a plan?

The intent is to shed light on the conventional wisdom surrounding buses, and how this creates barriers to BRT acceptance across the United States.

These questions were evaluated in the context of three different cities — Los Angeles, Las Vegas, and Oakland — where ITDP staff also interviewed key officials about other issues surrounding BRT implementation and media response. These three cities provide an interesting spectrum of experience. Las Vegas has implemented two BRT lines since 2006 (the MAX and the Strip-Downtown Express) with excellent citywide media and public reception, and they are now building out their entire BRT network. Los Angeles successfully implemented one of the best BRT lines in the United States, with high ridership and positive reviews by riders. However, while the Los Angeles County Metropolitan Transportation Authority (LACMTA) had a strong marketing strategy, media reception was tepid, and despite the operational successes of its BRT lines, the city is now focused almost entirely on expanding their rail system. Finally, San Francisco's East Bay is in the late planning stages for a BRT line that will operate from San Leandro, through Oakland, and into Berkeley. The project lacks an effective communications' strategy, and the Berkeley media mostly covered opposition from the business community and select citizen groups, resulting in significant degradation of the plan.

LESSONS FROM THREE U.S. CITIES

The circumstances surrounding the planning and development of BRT routes in Los Angeles, Las Vegas, and Oakland vary drastically. Every community has its own political landscape, community organizations, press outlets, previous experiences with infrastructure projects, and other individuating circumstances. However, certain trends with regard to media treatment exist across the board. What follows is a summary of the common themes, and then an examination of each city's broader narrative.

Common themes

- **First impressions can make or break a project:** In Los Angeles and Las Vegas, both of which have already implemented some BRT plans, the news media and the public's first impressions of the system at opening helped define the slant of subsequent coverage for months, if not years. In Las Vegas, the BRT system opened to great fanfare and praise, and benefited from the negative attention of the city's trouble-prone monorail project. Los Angeles's BRT system opened late, over budget, had a series of collisions with automobiles, and brought with it a batch of service cuts on parallel bus routes. High ridership volumes and free rides were not enough to overcome the Orange Line's troubled start.
- **BRT will be compared to light rail:** In all three cases, BRT was compared to light rail. This is in part an outcome of the alternatives analysis process—which put BRT and light rail side-by-side—but also because implementing agencies use light rail as a jumping-off point to explain to the public the less familiar concepts of BRT, including what it is and isn't. Las Vegas made the most of this comparison by positioning BRT as a less expensive alternative to light rail that could better meet the city's needs. In Los Angeles and the East Bay, BRT was framed only as a cheaper alternative to light rail, without added benefits. The lesson is thus that BRT must be sold on the benefits it can provide above and beyond light rail, not just its cheaper price tag.
- **There is skepticism around buses which must be overcome:** Each of the cities had constituencies that were highly skeptical of buses and bus-based transport. This is a result of the pre-existing reputation—that they are dirty, slow, and for people who cannot afford a car—that surrounds buses in the United States. Las Vegas dealt with this skepticism by stressing the technological innovations of its new system and almost never referring to the vehicles as buses. Los Angeles made some efforts to rebrand its system—by calling it the Orange Line—but described the route as a busway. Their efforts were not well received. In San Francisco's East Bay, officials called the project a bus project and the portion proposed to travel through Berkeley has yet to move forward due to community opposition.
- **Future BRT lines and networks can build on initial successes:** In the two case studies that have successfully implemented their BRT plans—Los Angeles and Las Vegas—the popularity and success of follow-up projects was directly related to the success of the first project. Los Angeles is extending its Orange Line and has included a few busways in its long-term transportation plan, but for the most part, interest and funding have shifted to rail-based projects. In Las Vegas, a popular BRT corridor has paved the way for more BRT projects in the city, including one that was originally slated to be a light rail project, and another that competes directly with the city's monorail.

It should also be pointed out that some of the media reaction was based on differences in the systems. While both the Las Vegas and Los Angeles systems have nice buses and stations, the Las Vegas system's buses and stations are higher end, with design elements that clearly distinguish them from normal buses and normal bus stops. This played a role in its public acceptance.

LAS VEGAS, NEVADA

Of the three case studies examined in this chapter, Las Vegas's system has been received the most positively by the public and the press. Las Vegas's success can be attributed to at least three main factors:

1. *Strong positioning of BRT as more than just a light rail alternative and much more than a regular bus. The system was sold as modern and efficient, something locals could be proud of.*

From the start, city officials in Las Vegas emphasized that the proposed BRT system was groundbreaking, cost-effective, and something more than a regular bus.

The opening paragraph of an October 6, 2000 press release reads: "North Las Vegas Mayor and

City officials in Las Vegas worked hard to brand their BRT system as groundbreaking and an improvement on regular buses. Photo: Annie Weinstock, ITDP

City Council yesterday announced that the City will be the first municipality in the nation to use cutting-edge, European technology to develop a new, innovative public transportation system." That one sentence alone uses the words "first," "cutting-edge," "European," "new," and "innovative." Instead of relating their planned BRT system to bus, light rail, or any other existing transit system, they billed it as something unique, even novel.

A 2001 *New York Times* article that covers the Las Vegas BRT system has the headline "It's a Trolley! It's a Rail Car! No, It's an Optically Guided Bus," which reiterates BRT's novelty and distinction. The same story goes on to state that transit planners believe this new mode will "provide the speed and convenience of light rail at a fraction of the cost of development," and then quotes an agency spokesperson saying, "'It's like a rail system, only at far less cost." Although this talking point forces the bus into a comparison with rail —a tactic that has fared worse in other cities—the fact that this story appears almost a year after the original press release shows that BRT proponents were staying on message: BRT as modern and efficient. The consistent use of certain messages, particularly early on, can help shape long-term public perception of a project.

2. *The operating authorities continued to build public buy-in to the system with a naming contest.*

Las Vegas officials were smart when it came to naming their BRT system. They used a contest as a way to build public awareness and interest. Although that did open the door to the publication of critical names like The Bust, more importantly, it engaged community members early on in the development process. The pride that this kind of early buy-in engendered was fostered through the opening weeks of the system. Both local papers and the Regional Transportation Commission (RTC) stressed that cities all over the country had their eyes on Las Vegas's new groundbreaking system, implying that they were a trendsetting city and an object of envy.

3. *The "luck" that at the same time the BRT system was launching, the Las Vegas monorail was coming on-line late, over budget, and full of glitches.*

Served alongside the media strategy was a huge helping of circumstantial luck: the city's other major transit investment, a monorail, opened late, millions of dollars over budget, and with significant technical issues. Although that cannot be part of a media strategy, it is worth taking two lessons from this. The first is that transit projects do not get a second chance to make a first impression. Oftentimes, the first impression sets the tone for every media story to follow. With that in mind, new BRT projects need to open smoothly, ideally on time and on budget. There should be fanfare, free rides, extra people to help out, and every type of protective measure (whether lane cameras or extra police officers at crossings) installed and ready for deployment at the opening.

The second lesson is that a successful BRT system can take advantage of other systems' shortcomings. Of course, Las Vegas's MAX did not just look better because of the monorail's struggles—it actually performed better too. MAX was soon extended into the monorail's operating area, and eventually worked so well that it was put in contention to replace a planned light-rail route reaching north of the city. The headline of the story that announced this change was "Light Rail May Get MAXed Out." It went on to restate the talking point that MAX can achieve similar results as light rail at a fraction of the cost.

Las Vegas was also successful in emphasizing the flexibility MAX offered in terms of expansion—if a light-rail expansion failed, the city would be stuck with it. That is not the case with BRT. This emphasis on flexibility, like the earlier insistence on technological breakthroughs, reframed a potential downside as a benefit, and insisted that only a BRT system like MAX could deliver it.

As the MAX routes began to come online, the RTC continued to hammer home the efficiency of MAX when compared to buses, and used some remarkable language to tie the system to trains and rail. In one article, an RTC spokesperson even refers to the MAX as a "train emulation system" that "has the speed benefits of a train and doesn't cost as much money," which, though not the best sound bite, consistently frames the story. Following this quote, the reporter notes, in reference to the newest BRT line (the SDX): "To emulate a train, shiny covers that blend in with the body of the vehicle, mask the wheels. The buses are not referred to as such; instead they are called [SDX] vehicles. Bus stops are described as ticket stations."

An SDX vehicle in Las Vegas, designed to emulate a train more than a bus. Photo: Annie Weinstock, ITDP

An analysis of media coverage showed that the repetition of this kind of language can be effective. A March 2010 headline in the *Las Vegas Sun* reads, "On an [SDX] bus, you'll feel a bit like you're on light rail, and that's by design." Thus, the system has succeeded in billing itself as a higher-tech, cheaper, revolutionary improvement on light rail. Unfortunately, it is on the Las Vegas Strip—where resorts successfully opposed dedicated BRT lanes—that riders report that SDX feels most like a bus. Still there is some hope that, like they once did for the monorail, the casinos will cede enough land to the city so that Las Vegas' BRT system can continue to be something special and not just a bus.

LOS ANGELES, CALIFORNIA

Los Angeles has had remarkable success with its Orange Line BRT, which, according to the U.S. DOT, has high ridership volumes and is well perceived by the riders. However, overall public perception of BRT in Los Angeles has suffered for several reasons and, as a result, the city has shied away from BRT in recent years. First, BRT was perceived from the start as a "cheap" alternative to light rail. Second, community members and businesses felt the BRT planning process was too top-down and faulted L.A. Metro and the City for failing to engage and respond adequately to their concerns. And third, construction delays and a high-profile crash left a cloud over the system as it opened.

From the start, the L.A. media pigeonholed so-called "busways" as no more than a cheap alternative to light rail, ignoring BRT's operational advantages. In addition, a series of high-profile legal challenges and well publicized BRT/car collisions led to damaging media coverage during the system's opening days. On top of this, Los Angeles's current mayor seems to be enamored with rail, and campaigned with the promise of a "subway to the sea." Lack of support from the public and politicians has severely diminished Los Angeles's BRT prospects.

One of the earliest stories on the proposed system opens: "With the long-awaited North Hollywood Metro Red Line station set to open in June, the MTA is considering building a busway along the abandoned Burbank-Chandler railroad corridor to link commuters to the subway. The proposal is one of several options the Metropolitan Transportation Authority is studying in the San Fernando Valley, including light rail and subway extension projects. A rapid bus system, however, is by far the cheapest alternative, transit officials say."

In this story, the busway is introduced as an afterthought or an oddity. Unlike Las Vegas, which stayed on-message and introduced BRT as an exciting new option, Los Angeles allowed the public to be introduced to the possibility of bus-based transit through an alternatives analysis that, although nuanced in an environmental impact report, translates best to the language of journalism as no more than a price tag—a low one. In a 2000 *Los Angeles Times* story, a group of business and civic leaders expressed the sentiment that "the Valley [through which the Orange Line passes] deserved to get rail for the taxes it has paid over the years." And although less public spending is typically desirable, few would want a capital project that is marketed as a cheap alternative to rail. People appreciate value. Las Vegas was able to convey the value of its BRT line by promoting its benefits as well as its price. The lesson here is that the lower price of BRT is a selling point, but it has to be seen as a good value and not simply cheap.

Despite initial success, public perception of BRT in Los Angles has suffered and the city has shied away from BRT in recent years.

Early on in the process, Los Angeles also had trouble overcoming the perception that their BRT route was implemented from the top-down. Governor Gray Davis offered state assistance for the construction of a busway with no community input on possible alternatives. That, combined with the lack of a grassroots group of boosters, created a climate of news stories where the little guys—business owners, community residents, even the Bus Riders Union, which opposed the plan because it called for cuts in local service—were often framed as the protagonists fighting against pressure from outside of the community. In a story on the Orange Line, the *Los Angeles Daily News* quotes a lawyer as saying, "It's because MTA wants a busway and they're not going to let anything get in the way." The same sentiment was repeated over and over again for years and it eventually became a kind of leitmotif for coverage of the project. Identifying and working with local groups who want a bus-based transit system and see it as the best option provides a necessary counterpoint in this story angle.

Failure to lock down community support, or at least failure to offer up voices of community support to the media, left Los Angeles with a chorus of dissenting voices surrounding the Orange Line project. Businesses complained that they had not been properly compensated for the losses they suffered during construction, communities along the route tied the project up in legal actions, and advocates who would be obvious partners saw the busway as a pyrrhic victory. Even the name Orange Line was panned by the press. "I don't understand this…[this] will not be user-friendly. This will be user-confusing," said a transit advocate to the *Los Angeles Daily News*. Las Vegas handled the situation of naming with care, while Los Angeles did it without thought to the repercussions.

The shortsighted planning continued through to the line's opening. Legal challenges slowed construction timelines, which—even if delay costs were negligible compared to cost-savings gained elsewhere—helped critics and journalists in search of a story to paint the project as a boondoggle. Worse, in a test ride just days before the opening, an Orange Line demonstration trip carrying reporters, camera operators, and city officials was nearly struck by a car running a red light. This story, and the handful of similar collisions that followed, defined the opening of the Orange Line in Los Angeles's media, despite the best efforts of officials to offer free rides, promote art projects in the stations, and the actual success of the route.

Although it is nearly impossible to predict lawsuits, construction problems, or car crashes, or prevent descriptive headlines like, "More Toxic Sites Found Along New Busway Route," "Crashes Heighten Busway Concerns," or "Orange Line Pavement Crumbling," a variety of difficulties ought to be anticipated in the pre-planning phases of a project of this scale. Where possible, they ought to be addressed before memorable blunders blemish a good project. If Los Angeles officials had budgeted additional time into their schedule, the delays might not have been so severe; if they had spent more time in their preparatory paperwork, perhaps a lawsuit could have been avoided; and if they had worked with the police and local traffic engineers to ensure that traffic signals were obeyed and timed to allow a larger margin of error, much of the negative press could have been avoided.

Despite the bad press surrounding the system, the Orange Line itself has been a success. The route was lengthened, ridership has exceeded expectations (so much so that critics claim it ought to have been a light-rail corridor) and "metro rapid" BRT-lite lines have appeared throughout the city. However, Los Angeles seems reluctant to build more full BRT corridors. Given their PR problems with the Orange Line, this is perhaps not surprising. Now, judging by Mayor Villaraigosa's auspicious "30/10" initiative, it could be at least a decade before Los Angeles is open to trying a full-fledged BRT line again.

EAST BAY, CALIFORNIA

The case of the East Bay illustrates the importance of having a strong communications plan from the start, picking appropriate messaging and winning the support of key stakeholders and surrogates who can speak for the project.

Perhaps the transit agency and local governments did not consider this such a pressing concern at the beginning of this project. Transit projects, especially one that has been called by *Next American City* magazine "one of the most promising transit projects in the country, at least from a cost-benefit perspective,"[1] might be expected to sail through a liberal enclave like Berkeley.

Instead, a persistent, well-funded, and media-savvy group of community activists, composed of residents and business owners, got out ahead of transit authorities and BRT proponents. Berkeleyans for Better Transportation Options (BBTO), the deceptively named anti-BRT group, has succeeded in raising fears that BRT will actually damage the local environment. They exaggerate the harmfulness of bus exhaust, and claim that removing automobile travel lanes will create congestion and increase levels of automobile exhaust.

California's strict environmental laws have led to other similar cases where groups have exploited environmental rhetoric and pro-environment sentiment to achieve NIMBY goals.

Quotes and talking points from BBTO members have appeared in dozens of news stories alongside quotes from BRT boosters that focus only on cost and functionality. Next to the environmental fear or at least uncertainty BBTO has managed to evoke, the messages of BRT supporters fall flat.

BBTO has also succeeded in raising concerns that the BRT line would be bad for business along Telegraph Avenue. Based on the media coverage, BBTO seems to have developed a stable of business owners, ready to speak with reporters, who feel that their businesses will severely suffer from reduced parking and a reduction in automobile accessibility. While there may be winners and losers when parking is removed, BRT supporters have demonstrated that only twenty percent of shoppers along Telegraph Avenue arrive by car, which means BRT has the ability to help increase accessibly for clients of the vast majority of businesses along this congested corridor. Sadly, this data alone, with the strong voice of a stakeholder from the business community, is lost in the public debate.

A more proactive strategy built around the environmental benefits of BRT, and including voices of business owners and others concerned about congestion, could have helped position BRT as the environmentally-friendly solution to local traffic congestion, good for the environmental and good for business.

Lessons Learned

No transit agency, municipal government, or BRT advocacy group can anticipate every criticism of a project. However, building a strong narrative—based on the true benefits of the project (going beyond just a comparison with light rail)—that can be touted by the transit agency, government officials, advocates, and community and business leaders, can be critical to getting a project implemented. Once implemented, a similar narrative can be used to maintain political and public support for a project once it is built, and eventually even expand the BRT network over time.

Early in the planning process, communications experts, BRT systems planners, and key government and transit officials should work together to identify the benefits most likely to appeal to various important constituencies. Once identified, they should create an agreed-upon set of messages that should be tested, refined if needed, and used to drive the narrative of BRT in that community. This group should also identify surrogates—community and business leaders who will be willing to speak up for the project on their own behalf—who will provide more credibility to the project, and if it becomes necessary, a counterweight to those who oppose BRT out of NIMBYism or fear of new ideas.

WRITERS AND REPORTERS ON BRT IN THE UNITED STATES

Just as a great deal can be learned from an examination of opinion-forming news stories, the views of opinion-formers themselves can instruct advocates and implementing agencies on improving BRT media strategies and messaging. To this end, ITDP conducted a number of interviews with leading American journalists and writers who primarily cover transportation or have written significant works of long-form journalism on BRT or topics closely related to it. These people are channels to opinion-makers, as well as being opinion-makers in their own right.

ITDP interviewed each participant using the same discussion guide which included the following topics: awareness and impressions of BRT in the United States; comparisons between buses and light rail; the recognition of opponents and proponents; and evaluations of existing media strategies. Though their answers tended to reflect the individual slant of their previous projects and research, there were some frequently repeated themes. Ideas, criticisms, suggestions or concerns that were mentioned by more than three of the participants appear below, as do quotes that seemed particularly germane. The journalists and writers interviewed include:

- **Lionel Beehner**, a *New York Times* contributing writer;
- **Damien Newton**, Editor of *Streetsblog Los Angeles*;
- **David Owen**, a *New Yorker* staff writer and author of *Green Metropolis*;
- **Robert Sullivan**, contributor to *New York* magazine and the *New Yorker* and has written books on Thoreau, rats in New York City, and the Meadowlands region of New Jersey;
- **Yonah Freemark**, founder and editor of the *Transport Politic* blog;
- **Julia Serazio**, Executive Editor of *Next American City* magazine;
- **Matthew Roth,** Deputy Editor of *Streetsblog San Francisco*;
- **Tom Vanderbilt**, transportation writer for *Slate* and author of *Traffic*.

On the general perception of BRT

The majority of respondents believe that the general public has little to no awareness of BRT as a mode of transportation distinct from buses. Most imagine that this lack of knowledge extends even to people who live in cities with successful BRT lines. Some questioned whether there are any BRT systems in existence that are widely considered to be successful. Yonah Freemark, who has seen more BRT systems than any of the other respondents said, “In the U.S. we haven’t built a BRT line that makes it clear why a BRT line was the right choice and until we do that we don’t have much to draw from.”

This lack of awareness provides an opportunity to establish a stronger identity for BRT as distinct from the bus. As Tom Vanderbilt put it: “The litmus test here is Curitiba, Brazil. If that means something to you, you’re in the circle…for everyone else I know, Curitiba brings head-scratching. The negative here is awareness; the positive, I suppose, is that people have few preconceptions, so the opportunity is there for creative branding, positioning, and so on.”

On the general perception of light rail

Most of those interviewed believe that the public is aware of light rail, but they feel that the majority would have a hard time distinguishing between light rail and other rail-based modes. Unlike BRT, where its association with buses is not seen as helpful, light rail’s association with rail strengthens the offering. Interestingly, four of those interviewed remarked on how much more photogenic light rail appears to be than BRT, and cited this as a significant point of distinction.

Yonah Freemark sharply contrasted BRT and light rail in his response, saying: “Rightly or wrongly, light rail has been portrayed as a mobilizer for increased development, a truly modern transportation mode. It has a good reputation right now because of projects in Portland and Charlotte. They’re very photogenic. People considering similar projects can look at these great pictures and these stats from American cities and say ‘This is positive.' And BRT hasn't proven its case in the same way. In Los Angeles, in Ottawa, BRT hasn't had enough photogenic examples of generated development. The presentations of BRT don't tell the same story."

On the impacts of the current economic climate on BRT

All those interviewed agreed that the current economic climate could benefit BRT, but the majority cautioned against promoting public transportation projects by price. BRT's relative low cost can be misconstrued as evidence of a lower value system. Two respondents mentioned time-to-completion as an alternative metric; while three mentioned appropriateness.

Damien Newton expressed a particularly salient point: "I believe that the current economic climate should boost the case for BRT, but my California-based readership thinks otherwise. The state just passed a transit expansion sales tax and they think that the money would be better spent on rail. They assume that the costlier system is better and they haven't been shown otherwise."

On the need for a BRT champion

There was a unanimous view that BRT is in need of a champion, or champions. Ideas ranged from mayors with a successful track record of implementing BRT, armed with powerful statistics and a compelling PowerPoint presentation, to New York City DOT Commissioner Janette Sadik-Khan, to a wealthy and/or famous spokesperson. Al Gore was mentioned by several. One suggested President Clinton, noting his mention of BRT in ITDP's 25th anniversary video message. Another argued that the more unexpected the champion, the greater the potential impact, and that a senior Republican politician promoting BRT might have more of an impact than a Democrat.

Yonah Freemark suggested that BRT is BRT's best champion: "There is a mistaken idea that you can form an organization and advocate and then a system will be built, but you have cities and metro regions that choose how to spend their own transportation dollars. Every decision is based on how to invest a set amount of money and politicians want to invest in projects that they can count on to be successful. It's very difficult to use an abstract model proposed by a lobbying group or someone outside, as opposed to a concrete system that has already been proven: a successful American system would be BRT's greatest champion."

On comparing U.S. BRT systems with those in developing countries

While the United States is still slow to embrace BRT, some developing countries are moving ahead by implementing large-scale BRT projects, operating at a more advanced level than those in North America. The respondents were evenly divided as to whether pointing this out would help U.S. BRT advocates.

Julia Serazio spoke for several when she commented, "I think the comparisons help. People are starting to see the rest of the world as leading the transportation innovation charge. I think savvy city dwellers will want to stay competitive and will model their infrastructure after China's especially, and showing that relatively poorer cities can do it should inspire as well."

David Owen epitomized the opposing view, raising the difficulties with challenging the mindset of American exceptionalism: "I worry about the marketability of 'defining transit down,' i.e., we're borrowing these ideas from countries with much lower GDPs, and I'm quite sure that won't play well to the public at large."

One suggested that a senior U.S. politician—Republican Secretary of Transportation Ray LaHood, perhaps—having a photo op on China's Guangzhou BRT would help reframe BRT's public image.

On pro- and anti-BRT groups

All those interviewed commented on the extent to which local groups influence BRT's public image. With no mainstream pro-BRT or anti-BRT groups on the national stage, they fill a perceived vacuum. This tends to work in the critics' favor, with small, anti-BRT groups able to punch above their weight in media coverage, if they are left unchallenged.

Sullivan characterized BRT opponents as, "everyone who doesn't know that there's a problem with what we've got, which is just about every non-transit user, plus everyone whose transit commute isn't that bad, plus everyone who doesn't believe that things could really get better." On the pro side of the debate, he sees only "the facts and bus riders."

Two writers mentioned the labor unions as an untapped source of support. All saw the absence of a national organization championing BRT as a significant problem.

The problem is exacerbated by the media's appetite for conflict and negative stories, rather than simply good news. Matthew Roth, who worked as an advocate for sustainable transportation before becoming a journalist said, "One of the big problems with the mainstream media's coverage is the need for conflict. With BRT it seems like the fight is usually with people portrayed as little guys getting worked up about something like parking and that means a small but vocal minority can have a huge impact." He added, "The best way to handle [a small group's ability to have a big impact] is to cover your bases by partnering with a wide array of interest groups."

One interviewee argued strongly that the current fiscal crisis in government is potentially fertile ground for promoting BRT. Seen this way, BRT's relative low cost is a more compelling argument than one based on its environmental benefits.

On whether the name BRT is a hindrance

There was an overwhelming sense that the name "BRT" is a hindrance, both because of the clunky nature of the acronym and, perhaps more importantly, because of its inclusion of the word "bus." The sense was that the word "bus" has too many negative associations that are difficult to overcome. One respondent went further and argued that because of the iconic position of the bus in the civil rights battles in the South, it is associated with America's history of racial strife.

Yonah Freemark, on the other hand, argued that if the service is good, none of these other concerns would matter.

Two of the respondents mentioned the danger of lumping one city's good BRT project with another city's "BRT-lite." Two respondents suggested a name that references neither buses nor trains. For everyone, the term "BRT" presents a major hurdle to its acceptance as a high-quality mass transit system. As Lionel Beehner argued, "From a PR perspective it's basic: If you really want to distinguish BRT from the bus then you have to get 'bus' out of the name."

Conclusion

Despite having built some of the earliest prototypes of BRT, the United States has been lagging behind much of the world in modern implementation. Countries in Latin America, Asia, and Africa have been the world's leaders in building high-quality, service-oriented BRT. Too often, U.S. replication has been sub-standard.

But in recent years, the United States has been beginning to step up. Since 2005, five bronze-standard BRTs have opened: Cleveland, Eugene, Los Angeles, Pittsburgh, and Las Vegas have become the national leaders. And even more recently, plans that aim even higher—perhaps to the silver standard—have been developed by cities nationwide. But even in the most conceptual plans, no city is aiming for the gold standard. Perhaps it is a paradox that until a gold-standard BRT has been built in the United States, no city will build it. And as long as no city builds it, there will be no gold-standard BRT for other cities to replicate. Someone has to make the first move.

As cities outside the United States have already opened gold-standard BRTs, international exchange and best-practice sharing is critical. Outside technical assistance can help give these bronze- and silver-standard plans an extra boost. The building of political champions through international study tours can help move projects from plans on paper to implementation. Philanthropic aid can be useful in supporting local NGOs who are adept at communicating controversial projects to the public. Local NGOs may also be effective in supporting local leaders to make the tough decisions that are key to high-quality BRT. In general, U.S. cities could benefit from independent third-party support for BRT projects currently supported only by consultants apprehensive to look beyond the status quo.

Changes to the federal funding process could push cities who depend on federal funding to up their standards and go for the gold. A more robust alternatives analysis process could help ensure that the most cost-effective option is included in the analysis and selected for funding. An independent, third-party evaluator might take pressure off of FTA staff who are subject to influence from political pressures. The federal government should also consider dedicating a pot of money to fund projects that meet the gold standard.

The BRT timeline is short. If done right, from planning to implementation, a project may take only four years. That means that by 2015, the United States could see its first gold-standard project. And given the good proposals already in motion, an extra boost can help to open the first American gold-standard BRT by 2014. This is well within the current terms of many U.S. politicians. Now the question is: who will be the first?

Annex A

SCORING ELEVEN CITIES WITH THE *BRT STANDARD*

	Maximum	Cleveland	Eugene	Los Angeles	Pittsburgh	Las Vegas	Boston	New York City	Bogotá	Guangzhou	Johannesburg	Ahmedabad
Bus lanes in central verge of the road (nowhere in network=0; in low-demand segments only=3; in high-demand segments=7)	7	7	7	7	7	3	0	0	7	7	7	7
Off-vehicle fare collection	7	7	7	7	0	7	4	7	7	7	7	7
Physically-separated right-of-way (nowhere in network=0; in low-demand segments only=3; in high-demand segments=7)	7	7	7	7	7	3	3	3	7	7	7	7
Platform-level boarding	5	4	4	0	0	3	0	0	5	5	5	5
Buses have 3+ doors on articulated buses or 2+ very wide doors on standard buses	4	4	4	4	0	4	4	4	4	4	4	4
Intersection treatments (elimination of turns across the busway and signal priority)	4	3	3	3	3	2	0	0	4	4	4	4
Multiple routes use same BRT infrastructure	4	1	0	2	4	3	2	0	4	4	4	3
Peak period frequency (>10 min=0; 7–10 min=1; 5–7 min=2; 3–5=3; <3 min=4)	4	2	1	2	4	0	3	2	3	3	2	3
Physically-separated passing lanes at station stops	4	0	0	4	4	0	0	0	4	4	4	0
Routes in top 10 demand corridors	4	4	4	1	4	4	2	4	4	4	4	2
Branding of vehicles and system	3	3	3	3	1	3	3	3	3	2	3	3
Integrated fare collection with other public transport	3	2	0	1	1	0	2	3	1	1	1	0
Limited and local stop services	3	0	0	0	3	3	0	1	3	0	0	0
Multiple docking bays and sub-stops (separated by at least half a bus length)	3	0	0	3	2	0	0	0	3	3	3	0
Off-peak frequency (>15 min=0; 10–15 min=1; 7–10 min=2; <7 min=3)	3	0	0	0	1	0	1	1	2	2	0	1
Part of (planned) network	3	0	3	0	3	3	3	1	3	3	3	3
Performance-based contracting for operators	3	0	0	0	0	1	0	0	3	3	2	3
Safe, wide, weather protected stations with artwork (>/=8 feet wide)	3	3	3	0	2	1	1	0	3	2	3	3
Stations occupy former road/median space (not sidewalk space)	3	3	2	3	3	2	1	0	3	3	3	3
Stations set back from intersections (nearside) (100 feet min)	3	3	0	2	3	1	0	1	3	3	3	3
Bicycle lanes in corridor	2	1	1	2	0	0	0	1	2	2	0	2
Bicycle sharing systems at BRT stations	2	0	0	0	0	0	0	0	0	2	0	0
Enforcement of right-of-way	2	0	1	0	2	0	0	1	2	2	1	2
Improved safe and attractive pedestrian access system and corridor environment	2	2	2	1	1	1	1	0	2	2	1	1
Operates late nights and weekends	2	2	1	2	1	1	1	1	2	2	1	1
Operational control system to reduce bus bunching	2	1	2	2	0	2	2	0	2	2	2	2
Passenger information at stops and on vehicles	2	1	2	1	0	1	2	0	1	2	1	2
Peak-period pricing	2	0	0	0	0	0	0	0	0	0	0	0
Secure bicycle parking at station stops	2	0	1	2	1	0	1	0	2	2	0	0
Stations are in center and shared by both directions of service	2	1	2	0	0	0	0	0	2	0	2	2
Total	**100**	**63**	**61**	**61**	**57**	**50**	**37**	**35**	**93**	**89**	**79**	**76**
BRT Standard		Bronze	Bronze	Bronze	Bronze	Bronze	Not BRT	Not BRT	Gold	Gold	Silver	Silver

Gold	**85–100**
Silver	**70–84**
Bronze	**50–69**
Not BRT	**0–49**

Notes

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Chapter V

1. Receipts to the Highway Trust Fund (HTF) are expected to continue to decline as a share of total federal expenditures on transportation infrastructure. Increased fuel efficiency brought on by technological innovation is a major cause. Section 1919 of SAFETEA-LU calls on the federal highway administration to develop a pilot mileage-based system that would charge drivers for miles traveled rather than gallons consumed. There are no plans at this time to implement such a system within the next authorization bill. For a more detailed discussion of the HTF read the GAO Report "Highway Trust Fund: Options for Improving Sustainability and Mechanisms to Manage Solvency." *http://www.gao.gov/new.items/d09845t.pdf*
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Back cover: Washington Street, downtown Chicago, circa 1950s.

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Clayton Lane, *EMBARQ/ World Resources Institute*
Joe Marinucci, *Downtown Cleveland Alliance*
Brian McCollom, *McCollom Management*
Gerhard Menckhoff, *Institute for Transportation and Development Policy*
Ann Mesnikoff, *Sierra Club*
Dennis Mondero, *Chicago Transit Authority*
Kathryn Phillips, *Environmental Defense Fund*
Venkat Pindiprolu, *Federal Transit Administration/USDOT*
Jeff Rosenberg, *Amalgamated Transit Union*
Brittny Saunders, *Center for Social Inclusion*
Jacob Snow, *Regional Transportation Commission, Las Vegas*
Sam Staley, *Reason Foundation*
Helen Tann, *Federal Transit Administration/USDOT*
Polly Trottenberg, *USDOT*
Francine Waters, *White Flint Partnership/Lerner Enterprises*
David Winstead, *White Flint Partnership*
Lloyd Wright, *Viva Cities*
Chris Ziemann, *Institute for Transportation and Development Policy*
Chris Zimmerman, *Arlington County Board*
Sam Zimmerman, *World Bank*

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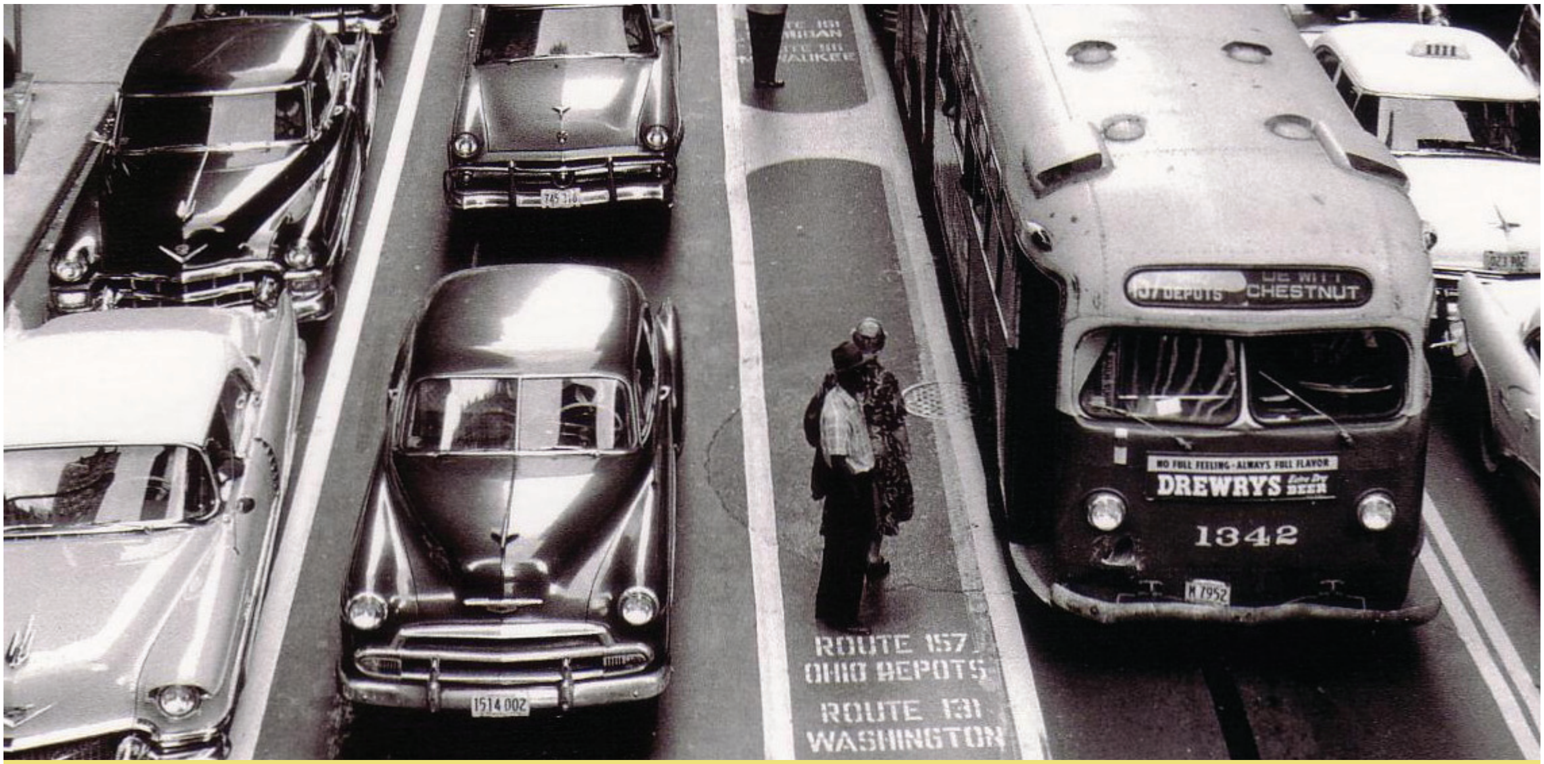

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