

# Research of Viable Attributes and Potential to Integrate Curbside Intercity Buses

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**ABSTRACT**

Outpacing air and rail transportation, the curbside intercity bus industry now represents the fastest growing mode of intercity travel in the United States. The paper highlights the industry's unresolved transportation policy issues associated with its unprecedented growth—particularly within the Northeast Corridor (NEC). Follow-up on several topics of research was suggested, including the need to plan for and invest in intermodal transportation facilities that serve all methods of transportation and facilitate interconnections among all modes. Incorporating multiple modes of transportation—including curbside intercity buses—into transportation facility master plans can further leverage public and private investment/resources to better meet the needs of all transportation users. While barriers to intermodalism exist, paper findings suggest that development and investment in intermodal transportation facilities—which serve as a hub for all modes of transportation, including curbside intercity buses—will promote a more integrated and sustainable transportation system. Through a case study approach, viable attributes of successful intermodal facilities in the NEC were identified. A matrix was developed to provide a planning framework and consider viable attributes of successful intermodal facilities. This planning framework approach is applied to Washington, D.C.'s Union Station, which is identified as a model intermodal transportation facility.

## 1 INTRODUCTION

2 The curbside intercity bus industry is a relatively new mode of transportation and has experienced  
3 exponential growth since operations began in the Northeast Corridor (NEC) in 2008 (1, 2) (3). Unlike  
4 traditional intercity bus companies (e.g., Peter Pan and Greyhound) that operate from terminals, corporate  
5 curbside intercity bus companies (e.g., Megabus, BoltBus, and DC2NY) and “Chinatown” bus operators  
6 save money and time by selling tickets online and operating from street curbsides. The paper highlights  
7 transportation policy issues stemming from the deregulation of the bus industry, a fragmented regulatory  
8 environment, and impacts of the unprecedented growth of the new curbside intercity bus industry (4) (5)  
9 (6). It notes that government rulemaking, legislation, policymaking, adoption of regulatory guidelines,  
10 and management approaches are attempting to address issues stemming from the lack of bus-industry  
11 regulation and unscrupulous operators (7). Despite the new regulatory emphasis, transportation policy  
12 challenges and opportunities abound.

13 Several transportation challenges and opportunities, as they relate to inclusion of curbside  
14 intercity buses in intermodal facilities, were identified (8). Follow-up on several topics of research was  
15 suggested, including the need to improve intermodal linkages to ensure smooth and efficient transfers  
16 among modes at transportation hubs and plan for an integrated network of individual transportation  
17 facilities, services, modes, and linkages.

18 Intermodal transportation facilities can be described as hubs where interfaces and  
19 interconnections occur among transportation systems and modes of travel (Henry and Marsh, 2008) (9)  
20 (10). Generally, passengers arrive at these transportation hubs via one mode and leave by another (e.g.,  
21 airplane; long-distance, regional, light, or commuter rail; public bus transit; private intercity bus; charter  
22 bus; limousine service; private automobile; taxi; rental car; car share; bicycle; or on foot).

23 Intermodal transportation facilities are strategically located. They most often are located in major  
24 metropolitan areas in proximity or convenient access to central business districts, major centers of  
25 employment, public transit, and activity-oriented destinations. Successful intermodal transportation  
26 facilities support and enhance transit usage, promote seamless transfers among modes, provide clear  
27 access to transportation networks, maximize transportation options, and create efficiencies of shared costs  
28 and transportation infrastructure (11).

29 In addition to providing transportation benefits, intermodal transportation facilities are being  
30 reinvigorated as hubs of economic, commercial, and mixed-used development activity. Financing  
31 strategies and development techniques, such as public-private partnerships, have catalyzed reinvestment  
32 in public infrastructure and adjacent property. The older “legacy” or iconic “union stations” are being  
33 revitalized to serve as destinations in their own right and targeted to support economic and transit-  
34 oriented development. Most notably, master plans for Washington, D.C.’s Union Station consider the  
35 need to centralize transportation, mitigate congestion, facilitate intermodal connectivity, and enhance its  
36 potential for economic development. Curbside intercity bus operations are included within Union  
37 Station’s current and future operational plans.

38 While the curbside intercity bus industry continues to expand, efforts also are underway to  
39 address increasing traffic congestion, travel demands, and aging infrastructure within the NEC. Amtrak is  
40 advancing plans to fund, finance, and deliver its vision for high-speed rail (HSR), rail infrastructure  
41 improvements, and system-capacity upgrades. These plans acknowledge the need to leverage additional  
42 federal funding for the current government-subsidized rail system. In addition, financial support is sought  
43 from the private sector and state and local governments.

44 With respect to transportation demands within the NEC—and competing interests among  
45 transportation modes—several policy issues come to mind. First, should government investment in  
46 transportation infrastructure (e.g., intermodal transportation facilities) benefit all modes of  
47 transportation—whether publicly or privately owned? Second, how can the needs of all stakeholders and  
48 modes of transportation be equitably balanced to encourage fair competition among modes? Third, what  
49 are viable attributes of intermodal transportation facilities that consider all modes—including curbside  
50 intercity buses? Finally, does the business model of the curbside intercity bus industry support the fees or

costs associated with operating from intermodal transportation facilities instead of, or addition to, transient curbside locations?

The primary goal of Intermodal Transportation Facilities: Research of Viable Attributes and Potential to Integrate Curbside Intercity Buses is to assess the potential of integrating curbside intercity bus operations within intermodal transportation facilities. This research focuses on identifying viable attributes of successful intermodal facilities in the NEC that have the potential to support integration of curbside intercity buses.

Research tasks included:

- Conducting a literature review to:
  - Provide an overview of the growth of the curbside intercity bus industry.
  - Highlight factors that support intermodalism and the development of intermodal transportation facilities that incorporate all modes of transportation and provide seamless connections.
  - Summarize challenges and barriers to intermodalism that may hinder inclusion of curbside intercity buses within intermodal transportation facilities.
  - Provide a synopsis of funding opportunities for new or improved intermodal transportation facilities.
- Conducting case studies of major intermodal transportation facilities within the NEC— from Washington, D.C., to Boston, Massachusetts—to identify the extent to which curbside intercity buses are being or have been considered in the planning, design, or operations of facilities.
- Developing a matrix to highlight key attributes that are either highly, somewhat, or not supportive of intermodal transportation facilities.

## 2. BACKGROUND

### 2.1. National Spotlight on Intermodalism

The primary goal of intermodalism is to incorporate various modes of transportation into a system that not only transports freight and people, but also improves community livability. This goal is achieved by taking a holistic approach to transportation policy that incorporates land use, demographic, socioeconomic, environmental, health, security, and public policy issues (12). The National Commission on Intermodal Transportation (NCIT), created by the Intermodal Surface Transportation Efficiency Act of 1991, explained how a focus on this strategy could benefit the country.

Basically, NCIT's argument is that intermodal transportation is a more efficient use of resources and infrastructure as opposed to an automotive-focused strategy that leads to congestion, inefficiency, and transportation justice issues—where certain segments of the population cannot access the nation's transportation system due to the cost of travel. According to the NCIT, it became apparent during the 1990s that for many cities “a central downtown multimodal transportation center would be the heart of a viable passenger intermodal system” (13). Ultimately, the national goal is to create an intermodal transportation system. This can be accomplished through the construction of facilities that accommodate multiple modes of transportation (e.g., rail, buses, automobiles, taxis, walking, and bicycling) in which individuals can seamlessly transition from one mode of transit to another in a safe, efficient, and cost-effective manner (14) (15), (16).

### 2.2. Need for Intermodal Facilities

Another key strategic goal for USDOT is to “advance environmentally sustainable policies and investments that reduce carbon and other harmful emissions from transportation sources” (17). While progress has been made toward achieving this goal over the years, transportation-related activities currently account for 28 percent of the total energy use in the United States and created approximately 33 percent of the total greenhouse gas emissions in 2009. To reduce greenhouse gas emissions, the USDOT aims to promote the use of alternative forms of transportation such as “transit, car- and van-pooling, intercity passenger buses, rail...biking, and walking”.

One of the primary reasons necessitating the planning, design, and construction of intermodal facilities is traffic congestion. According to the Texas A&M Transportation Institute, traffic congestion is “the result of an imbalance between travel demand and the supply of transportation capacity; so if the number of people or jobs goes up, or the miles or trips those people make increases, the road and transit systems also need to expand (18). Unfortunately, due to financial costs and other barriers, the expansion of road and transit systems has not been able to sufficiently meet the transportation demands of the nation, leading to congestion. The negative effects caused by traffic congestion for 2011 included \$121 billion of costs related to time and fuel, 5.5 billion hours spent in traffic, and an added 56 billion pounds of carbon dioxide released into the atmosphere. For the average commuter this meant 38 extra hours spent waiting in traffic and 19 gallons of wasted fuel. For commuters who live in areas with over three million people, the traffic delays rose to an average of 52 hours (18).

Due to changing demographic trends, primarily the growth of “older, non-family, non-white households [that] have historically used transit in higher numbers,” it is expected that demand for alternative forms of transportation will increase greatly in the coming decades (17). The older adult population, of which 71 percent desire to live within walking distance of some form of transit (U.S. Department of Transportation, 2012), will see the largest growth. By 2050, it is estimated that approximately one in five Americans will be 65 or older, with the total population of the country expected to range from 404–440 million individuals (18).

### 2.3. Challenges to Intermodal Transportation

While the expansion of infrastructure necessary for intermodal transportation would benefit the country greatly, certain barriers exist that hinder attempts to construct new facilities that could accommodate multiple modes of transit. According to a 2007 Government Accountability Office (GAO) report, the three primary barriers to the construction of these facilities include “limited federal funding targeted toward intermodal projects...limited collaboration among stakeholders...and limited resources to evaluate intermodal projects” (19). For example, of the 26 projects that received credit assistance valued at approximately \$9.1 billion (as of April 2012) through the Transportation Infrastructure Finance and Innovation Act (TIFIA), 17 have been focused on highways, five on transit, and four on intermodal projects (20).

Issues similar to these were mentioned as barriers to intermodalism at the 1997 North American Intermodal Transportation Summit at the University of Denver. These include the planning processes and lack of cooperation of involved organizations, financial resources along with an unequal distribution of them, “labor and management relations,” and organizational willingness to approach transportation issues from a holistic viewpoint that includes other policy considerations in the decision-making process (Jones Jr. and Turner, 2004). A speech by former U.S. Congressman and Chairman of the House Transportation and Infrastructure Committee James Oberstar cited primary obstacles to expanding intermodalism.

Hurdles cited include the “stovepipe” organizational structure of transportation agencies, the competition for funding and customers that exists between modes of transit, the method through which transportation projects are funded, and the cost and scope of the projects themselves. Ultimately, the primary barriers hindering intermodalism include organizational culture and structure of transportation agencies, political barriers, and financial barriers.

Barriers that hinder the inclusion of privately owned curbside intercity buses into intermodal facilities are related primarily to the business model that these companies utilize. These are privately owned businesses that are concerned with earning a profit. Because curbside intercity bus companies cut costs by picking up and discharging passengers at easily changed curbside locations, operating from an intermodal facility may not be in their economic best interest due to the costs, such as facility fees. Other obstacles to facility contracts may include increased overhead expenses, decreased decision-making autonomy, and inflexibility to adjust routes based on rider demand. For privately owned curbside intercity buses, it may be more cost effective to utilize a curbside in an urban setting as a pick-up/drop-off point, in conjunction with online ticketing, because it decreases costs and responds to customer demands for service. New routes can be planned, implemented, and changed in response to customer demands or

1 service demand shifts. Unless measures are in place that incentivize the use of intermodal facilities, or  
2 that regulate the use of the curbside as a pick-up/drop-off point, along with a sufficient demand for the  
3 service within the community, it may be difficult to integrate privately owned intercity buses into an  
4 intermodal station.

## 6 **2.4. Funding Opportunities**

7 Acquiring funding for the design and construction of a new or improved intermodal facility can be a very  
8 difficult process due to the high costs and complexity of these projects. Intermodal projects are typically  
9 long-range, multi-phased endeavors that require the developer to leverage funds from multiple sources—  
10 often public and private sources. The needs and interests of various stakeholders, the traveling public,  
11 sources of financing, and levels of government also must be considered and carefully balanced.

12 Funding can be attained through a variety of sources including public-private partnerships,  
13 specific federal grant programs/earmarks (e.g., Moving Ahead for Progress in the 21st Century Act  
14 [MAP-21], Transportation Investment Generating Economic Recovery [TIGER] grants, and Partnership  
15 for Sustainable Communities Programs), the General Services Administration's Federal Buildings Fund,  
16 state and local government funding, and financial support from public transit agencies/authorities. In most  
17 cases, federal funding programs require the leveraging of matching funds from a combination of sources  
18 such as private investors, state and local government, transit agencies, public-private partnerships, hybrid  
19 organizations such as Amtrak, or non-profit organizations. The U.S. Environmental Protection Agency  
20 (EPA) Office of Sustainable Communities also has identified several innovative financing options that  
21 can be used to leverage traditional financing for TODs. Ultimately, the completion of an intermodal  
22 project is dependent upon utilizing a mix of these funding streams and financing strategies.

23 One mechanism that can be utilized to acquire funding for the construction or modification of  
24 intermodal facilities is a public-private partnership. According to the National Conference of State  
25 Legislatures (NCSL), while many definitions of what constitutes a public-private partnership exist, nearly  
26 all of them share "certain key characteristics, such as ultimate public sector responsibility for and  
27 ownership of an asset; sharing and allocation of risk among public and private entities; contribution of  
28 resources by both public and private partners; a contractual agreement; and transfer to the private sector  
29 of traditionally public responsibilities" (21).

## 31 **3. ANALYSIS APPROACH**

### 32 **3.1. Case Study: Washington, D.C.'s Union Station**

#### 33 *Short-Term Strategies to Accommodate Intercity Buses*

34 To address the challenges of motorcoach parking, routing, curbside stop locations, and enforcement of  
35 regulations, the District Department of Transportation (DDOT) issued a notice of proposed rulemaking  
36 for intercity buses on June 25, 2010. A second notice of proposed rulemaking was made on March 11,  
37 2011, and legislation to amend Title 24 "Public Space and Safety" of the District Code of Municipal  
38 Regulations was adopted on June 24, 2011 (District of Columbia Department of Transportation, 2011).  
39 The regulations require intercity bus operators to apply for and obtain a public space permit, pay an  
40 annual permit fee, display the permit when occupying a passenger loading zone during approved hours,  
41 obtain a public liability insurance policy, and pay fines for ordinance violations (District of Columbia  
42 Department of Transportation, 2011).

43 To implement the Action Plan recommendations, USRC and the District government launched a  
44 six-month pilot program that allowed several intercity bus carriers to depart from Union Station. Under  
45 the pilot program, BoltBus, DC2NY, and Washington Deluxe began offering service from the Union  
46 Station Parking Garage Bus Deck to New York City.

47 In April 2011, following DDOT's decision to regulate intercity bus operators, the U.S. Secretary  
48 of Transportation tasked USRC with creating a plan to incorporate curbside intercity bus operations into  
49 Union Station. USRC was given 90 days to develop a plan with a bus deck design that accommodated  
50 double-decker buses, met the Americans with Disabilities Act of 1990 (ADA) standards, provided a  
51 financial plan, and allowed an onsite alternative for tour bus parking (Scott, Wicks & Collins, Curbside

Intercity Bus Transportation Policy Forum: Forum Proceedings Summary, 2012). Based on the success of the pilot program, USRC reached an agreement on August 1, 2011—with popular intercity bus carriers Greyhound, Bolt Bus, Washington Deluxe, and Megabus—to relocate their services from curbside areas to Union Station. As a result of USRC's agreement with intercity bus carriers, more than 70 percent of intercity bus service in the District is now centralized at Union Station; bus traffic and congestion has been reduced on city streets.

### ***Long-Term Strategies to Accommodate Intercity Buses***

The District of Columbia Department of Transportation (DDOT) initiated a Union Station Intermodal Transportation Center Feasibility Study (USITCS) in 2008. With an extensive outreach process and participation from a diverse group of stakeholders, DDOT conducted a comprehensive assessment of facility improvement (District of Columbia Department of Transportation, 2009) by evaluating several factors, including:

- Growth of Union Station's usage across all modes.
- Needs of various Union Station stakeholders (including rail operators, pedestrians, intercity buses, tour buses, and streetcar services).
- Emergency evacuation concerns.
- Plans for mixed-use development as well as the potential growth of commercial and/or residential development in adjacent areas.

To guide the feasibility study, DDOT established planning framework goals (i.e., multimodal hub, pedestrian environment, safety and security, cultural significance) and concurrent planning principles (Table 1).

**TABLE 1 USITCS Planning Framework**

Planning Framework Goal	Planning Principles
<b>1</b> Maintain and enhance Union Station As a multi-modal transportation hub.	Transportation First
	Connectivity
<b>2</b> Promote Union Station as a fluid pedestrian environment that supports comprehensive connectivity.	Pedestrian Priority
	Signage
<b>3</b> Ensure enhanced safety and security in and around the station	Safety and Security
<b>4</b> Respect the architectural, cultural, and regional significance of the historic station	Heritage Preservation
	Neighborhood Integration

(Source: District of Columbia Department of Transportation, 2009)

Stakeholder input was garnered via agency meetings, public workshops and presentations, committee meetings, a telephone hotline, website, and design charrette. After an extensive planning period, a matrix was developed that sets forth a plan for improvement in relation to framework goals. An implementation timeframe identified improvements that can be phased in both on a short-term (2–10 year) and long-term (10–20 year) basis (District of Columbia Department of Transportation, 2009).

**TABLE 2 ISICS-Planned Improvements in Relation to Framework Goals**

Framework Goal	Related Improvements
<b>1</b> Maintain and enhance Union Station As a multi-modal transportation hub.	<ul style="list-style-type: none"> <li>• Construct Bikestation</li> <li>• Incorporate Streetcar into H Street</li> <li>• Return Catenary to Platform 8-10</li> <li>• Construct High Level Platforms for Tracks 25-26</li> <li>• Improve Intercity Bus Connections through Construction of an Intercity Bus Station</li> <li>• Complete Electrification of the Northeast Corridor South of Union Station</li> <li>• Improve Connections to the Metropolitan Branch Trail</li> </ul>
<b>2</b> Promote Union Station as a fluid pedestrian environment that supports comprehensive connectivity.	<ul style="list-style-type: none"> <li>• Construct Train Concourse Connector</li> <li>• Develop along North Entrance/Taxi Lane</li> <li>• Expand East-West Concourse to North</li> <li>• Expand the Mezzanine Level</li> <li>• Improve Pedestrian Spaces along First Street NE</li> <li>• Complete North Pedestrian Walkway</li> <li>• Construct First Street Lobby</li> <li>• Conduct Metrorail Station Access Study</li> <li>• Add and Improve Interior Signage</li> </ul>
<b>3</b> Ensure enhanced safety and security in and around the station	<ul style="list-style-type: none"> <li>• Improve Traffic Flow and Pedestrian Safety on Columbus Circle</li> <li>• Construct Emergency Egress at H Street</li> <li>• Complete Facilities Improvements at H Street</li> <li>• Implement Emergency Access/Egress Strategies</li> </ul>
<b>4</b> Respect the architectural, cultural, and regional significance of the historic station	<ul style="list-style-type: none"> <li>• Implement TOD Principles</li> </ul>

(Source: District of Columbia Department of Transportation, 2009)

Intercity bus deck improvements are part of the overall plan to revitalize Union Station. Master planning for Union Station is an ongoing and collaborative process. In addition to Amtrak, stakeholders involved in Union Station visioning and master planning include USRC, USDOT, Maryland Transit Administration, Virginia Department of Rail and Public Transportation, the Washington Metropolitan Area Transit Authority, and other public and private entities. Amtrak released its revised Union Station Master Plan in 2012, developed with HOK and Parsons Brinkerhoff, to transform the facility into a dynamic intermodal center with enhanced retail activity. “The power of the Master Plan lies in its ability

1 to create a high-functioning and well-integrated multimodal transportation hub, as well as a wonderful  
2 new urban neighborhood—all within a relatively confined space” (Parsons Brinckerhoff, Helmuth, Obata,  
3 and Kassabum, 2012).

4 The Master Plan (Table 2) provides a long-term blueprint for growth and improvements that may  
5 be accomplished incrementally through phased construction over a 15- to 20-year period. In addition to  
6 intercity bus deck improvements, current Master Plan initiatives underway include upgrades to the  
7 pedestrian circulation system and the 1st Street Metro entrance as well as redevelopment of the adjacent  
8 Columbus Plaza (Union Station Redevelopment Corporation, 2012). Facility improvements also will  
9 enhance transportation services and connections among the various modes—including a new streetcar  
10 service to the H Street corridor, increased commuter and intercity rail service, and future expansion of  
11 high-speed rail within the NEC. Long-term improvements will triple passenger capacity, double train  
12 service, improve the passenger and visitor experience, and provide transit-oriented development and  
13 economic growth to the area by 2030 (Parsons Brinckerhoff, Helmuth, Obata, and Kassabum, 2012).

### 14 15 **3.2. Case Study: Intermodal Plans for Baltimore, Maryland**

16 Baltimore has recognized the importance of transportation in revitalizing the economy of the former  
17 industrial city and its heritage as a strategically located East Coast port. To achieve this goal, state,  
18 regional, and local transportation plans support transit-oriented development, major transportation system  
19 capacity improvements, investments in transportation facilities and local redevelopment opportunities,  
20 and multi-modal transportation options responsible growth and economic development.

#### 21 22 ***Short-Term Strategies to Accommodate Intercity Buses***

23 Baltimore’s light-, commuter-, or heavy-passenger rail lines each independently have the potential to be,  
24 or are considered, multi-modal transportation hubs. Yet many of these rail lines appear to be seamless  
25 connections to other regional or local transportation systems. The Metro subway system lacks easy  
26 connection to the light rail system and has no connectivity to the MARC commuter rail system. There  
27 appears to be two on-foot Metro subway–light rail connection points at the State Center/Cultural Center  
28 and Lexington Market Stations. Transfer appears to be possible between MARC and the light rail system  
29 at two points—Camden Yards and Penn Station.

#### 30 31 ***Long-Term Intermodal Plans***

##### 32 **I. Penn Station**

33 As one of the busiest stations on the Northeast Corridor, Amtrak has invested \$7 million over the past  
34 three years to improve Penn Station’s concourse, lighting, and train information board. An additional \$1  
35 million investment is planned for restroom upgrades, landscaping, painting, and electronic signage  
36 (Mirabella, 2013)., Amtrak selected Beatty Development, with the backing of the City, MDOT, the  
37 Central Baltimore Partnership, and the Baltimore Development Corporation, to be the master developer of  
38 a TOD concept for an area adjacent to Baltimore’s Penn Station. The 1.5-acre parcel currently is a surface  
39 parking lot that fronts East Lanvale Street between North Charles and St. Paul Streets. The master plan  
40 calls for 1.5 million square feet of mixed-used development, which will cost over \$500 million over the  
41 next decade, and complement the Charles North Vision Plan that will reinvigorate the entire Charles  
42 Street corridor.

##### 43 44 **II. State Center TOD**

45 The “State Center” complex is a large concentration of state government offices located in midtown  
46 Baltimore City’s Cultural Arts area. The 28-acre campus borders Preston Street and the State  
47 Center/Cultural Center Metro Station and is across the street from the Cultural Center light rail station.

48 Maryland’s Department of General Services (DGS), MDOT, and the Maryland Department of Planning  
49 (MDP), began planning for the redevelopment of the property in 2004. Other champions that have  
50 supported redevelopment of the State Center include the Maryland Economic Development Commission,  
51 the Maryland Governor’s Office, the City of Baltimore, and other local governments. The draft State

Center Transit-Oriented Development Strategy provides a framework for disposition of state-owned properties and promotion of TOD in the corridor between Penn Station and Pennsylvania Avenue. The project also will utilize a network of streets and bolster transit linkages between the MTA Metro subway and MTA light rail systems to reconnect nine neighborhoods.

### 3.3. Case Study: Newark, Delaware Regional Transportation Center

The Newark Train Station in Newark, Delaware, provides Amtrak intercity passenger rail service, Acela high-speed rail services, and Southeastern Pennsylvania Transportation Authority (SEPTA) commuter rail services, which is under contract by the Delaware Transit Corporation (DTC) and operates under the name of DART First State. In FY 2012, the station provided transportation for approximately 14,682 passengers and earned \$943,407 in ticket revenue (Amtrak, 2013). Septa's FY 2011 Annual Service Plan reports that the R2 Line, which runs from Newark, Delaware, to Philadelphia, Pennsylvania, averaged 9,274 passengers and 2,541,095 riders annually.

While sufficient parking and a connecting service through DART is available, amenities such as an enclosed waiting area, restrooms, ticketing booth, lounge, and Wi-Fi are not (Southeastern Pennsylvania Transportation Authority, 2013 and Amtrak, 2013). Commuter rail services between Newark and Philadelphia also are limited to weekday travel with only early-morning and late-afternoon arrival/departures. On weekdays, there is an average of 332 passengers boarding and 280 passengers alighting at the Newark Train Station. Due to an increase in demand for services, the 20-mile commuter gap, a lack of commuter rail service that exists between Newark, Delaware, and Perryville, Maryland, and a railroad bottleneck that limits freight transport due to an insufficient amount of tracks at the station, improvements are planned in the future.

A DART First State bus shelter, located on South College Avenue, is adjacent to the Newark Train Station and provides transit connections for rail passengers. However, a Newark Transit Hub was constructed in 2008 on East Main Street and was designed to serve as a boarding, alighting, and transfer point for DART First State bus riders and former Newark trolley riders. It is convenient to Newark's downtown business district and has on-site parking and a sheltered waiting area.

#### *Short-Term Strategies to Accommodate Intercity Buses*

Currently, curbside intercity buses (i.e., Megabus and Greyhound Express) offer premium nonstop service to major East Coast destinations from a stop on Christiana Drive in Newark at a north-campus parking lot owned by the University of Delaware (UD). Other than parking, which is owned by UD, there are no accommodations provided to the patrons of intercity buses at this location. The parking lot is approximately 1.5 miles away from the Amtrak/SEPTA station, which is located on South College Avenue.

#### *Long-Term Strategy to Accommodate Intercity Buses*

In FY 2010, the Wilmington Area Planning Council (WILMAPCO) applied for and received a USDOT Transportation Investment Generating Economic Recovery, or TIGER II Discretionary Planning Grant. A large number of agencies collaborated on the grant application, including the Delaware Department of Transportation, University of Delaware, Delaware Transit Corporation, New Castle County, City of Newark, Delaware Economic Development Office, and Norfolk Southern Railroad Corporation. The TIGER II grant provided \$2.25 million toward a total project cost of \$3.025 million for the design of a proposed multi-modal transportation facility in Newark, Delaware. Funding will transform the current Newark Train Station into a "Newark Regional Transportation Center" on a site formerly occupied by the Chrysler automotive plant that is now owned by the University of Delaware. The TIGER II funds were used to develop a preliminary plan for transit-oriented services in and around the Newark Rail Station. The plan focused on transportation solutions to support economic development, accessible housing, and multi-modal transportation choices for the area surrounding UD's Science, Technology and Advanced Research (STAR) campus.

1 As a follow-up to the TIGER planning grant, WILMAPCO submitted and was awarded a \$10  
2 million TIGER IV capital grant in FY 2012 to construct the Newark Regional Transportation Center. The  
3 total project cost is expected to be \$26 million. The balance of project costs (61.5 percent) will be  
4 financed through funds provided by both public and private partnerships (17).

5 The Newark Regional Transportation Center is being constructed to align with the six livability  
6 principles of the USDOT, and, ultimately, it is expected to lead to more transportation choices, affordable  
7 housing, an increase in the area's economic competitiveness, and the creation of new TOD opportunities  
8 as well as bolster UD's vision to transform the site to a science and technology campus (Wilmington Area  
9 Planning Council, 2010). UD's Star campus will host a Bloom Energy manufacturing facility, health  
10 sciences complex, and mixed-use development (Krape, 2012).

11 The multi-modal facility also is significant to the entire Northeast Corridor. It is expected to  
12 enhance SEPTA/MARC commuter rail service and lead to the closing of the 20-mile commuter rail gap,  
13 expand future Amtrak rail service, provide an alternative to automobile travel via I-95, and offer seamless  
14 national and regional rail connections. As an intermodal hub, the facility ideally should be designed to  
15 facilitate greater coordination of UD transportation services, DART First State bus routes, taxi services,  
16 and intercity bus services with accessible facilities for both pedestrians and bicyclists (Wilmington Area  
17 Planning Council, 2010).

### 18 19 **3.4. Case Study: Philadelphia, Pennsylvania Intermodal Strategies**

#### 20 ***Short-Term Strategies to Accommodate Intercity Buses***

21 The Philadelphia Greyhound Terminal is located on Filbert Street in Center City Philadelphia,  
22 immediately north of The Gallery at Market East shopping mall and the SEPTA Market East Station. The  
23 terminal underwent interior renovations in 2007, offers an array of passenger amenities, and in 2010 was  
24 the sixth-busiest terminal in the United States and Canada, based on passenger volume (Greyhound,  
25 2013). While budget intercity bus operators used Philadelphia's Chinatown as a curbside location, newer  
26 low-cost, premium intercity bus services arrived in Philadelphia in 2008. As in other areas of the country,  
27 corporate carriers like BoltBus and Megabus have challenged Greyhound's market share.

#### 28 29 ***Long-Term Strategy to Accommodate Intercity Buses***

30 As part of its 2012–2017 strategic plan, Drexel University has set forth a campus master plan that  
31 includes a vision for Drexel to anchor a vibrant "Innovation Neighborhood" in University City. Drexel  
32 University envisions bringing together education and research institutions, the commercial sector, and  
33 entrepreneurs in a partnership to spur development that is centered around the 30th Street Station  
34 transportation hub (Drexel University, 2013).

35 In December 2012, the Pennsylvania General Assembly approved an expansion of the Innovation  
36 Neighborhood's designation as a Commonwealth of Pennsylvania Keystone Opportunity Zone (KOZ). As  
37 an economic development strategy, KOZs offer incentives to develop targeted sites through greatly  
38 reduced or eliminated state and local taxes (Pennsylvania Department of Revenue, 2013). The Central  
39 Philadelphia Development Corporation prepared a Real Estate Development Plan for the Innovation  
40 Neighborhood. The preliminary strategy calls for developing ten sites and 6.4 million buildable square  
41 feet from 30th to 32nd Streets, and Market Street to JFK Boulevard. The strategy outlines the existing  
42 conditions of the sites, the potential economic impact of the development, financing incentives,  
43 prospective corporate and developer partners, and recommendations for the next phase of planning.  
44 According to the Real Estate Development Plan, the ultimate goal of the comprehensive redevelopment of  
45 the superblock area around the 30th Street Station is "establishing a lively, mixed-use, multipurpose  
46 district featuring academic, residential, retail, commercial, and technology-incubation use" (Central  
47 Philadelphia Development Corporation, 2013).

### 48 49 **3.5. Case Study: New York City Proposed Intermodal Upgrades**

#### 50 ***Short-Term Strategies to Accommodate Intercity Buses***

1 The steady growth of the new intercity bus industry has caused operational pressures at both the curbside  
2 locations in Lower and Midtown Manhattan and at PABT. A local business improvement district, called  
3 the 34th Street Partnership, has exerted pressure on the City to relocate curbside intercity bus stops to less  
4 crowded blocks west of Penn Station.

#### 5 6 ***Long-Term Strategy to Accommodate Intercity Buses***

7 In 2013, PANYNJ issued a request for proposals from firms to develop a Midtown Bus Master Plan. Its  
8 \$5.5 million, 18-month contract was awarded in June 2013 to architecture firm Kohn Pedersen Fox and  
9 construction consultants Parsons Brinkerhoff. The Midtown Bus Master Plan will study the feasibility of  
10 renovating or possibly replacing PABT, explore a state-of-good-repair investment program, and consider  
11 new bus staging and storage facilities on Manhattan's West Side. The goal is to address the growing  
12 demands for intercity bus services, improve bus operations, provide facilities and upgraded amenities for  
13 intercity bus passengers and commuters, and limit buses idling on city streets. In a press release issued  
14 by PANYNJ, Chairman David Samson stated, "The development of a Master Plan underscores the Port  
15 Authority's commitment to make the Bus Terminal a worldclass facility and bus transit the most reliable  
16 mode of access to Midtown Manhattan. While the Port Authority has already begun the work of  
17 revitalizing the Bus Terminal...this comprehensive approach is the best way to ensure the Bus Terminal  
18 keeps pace with future passenger growth over the next fifty years" (The Port Authority of New York and  
19 New Jersey, 2013).

20 The Midtown Bus Master Plan will demonstrate that PABT may serve as a centerpiece of  
21 economic activity and will complement the redevelopment and revitalization of west Manhattan. An  
22 upgraded and modernized bus terminal will support the demand for intercity bus and commuter travel  
23 between New York City and New Jersey. As with any major transportation infrastructure improvement or  
24 facility expansion project, securing funding has been problematic. In the past decade, PANYNJ has made  
25 several unsuccessful attempts to expand the terminal and upgrade its capacity by trying to establish  
26 public-private partnerships, lease air rights, and increase tolls. The Midtown Bus Master Plan will  
27 develop a sustainable funding strategy that leverages private-sector investment and considers a fair-share  
28 funding strategy from terminal occupants and passenger bus carriers. This strategy will include the  
29 development of air rights above PABT to generate revenues for phased-in improvements to the facility  
30 (Neuhauser, 2013).

#### 31 32 **3.6. Case Study: South Station, Boston, Massachusetts**

##### 33 ***Short-Term Strategies to Accommodate Intercity Buses***

34 Because parking is scarce and comes with premium pricing, steps have been taken to control curbside  
35 parking in Boston. In most areas, however, curbside on-street parking is unregulated. Some districts use  
36 parking meters to regulate parking or various parking regulations to address specific uses (e.g., tour bus  
37 parking, loading zones, public transit).

##### 38 39 ***Long-Term Strategy to Accommodate Intercity Buses***

40 In FY 2010, the Massachusetts Department of Transportation (MassDOT) launched a \$43 million plan to  
41 expand Boston's South Station. With a match of \$10.5 million, MassDOT received a \$32.5 million High-  
42 Speed Intercity Passenger Rail (HSIPR) grant from the USDOT. Funds were awarded to plan for the  
43 design of a larger station and facilities that will relieve MBTA commuter rail congestion, increase the  
44 number of platform tracks from 13 to 20, and advance the federal vision for a national network of high-  
45 speed rail in the Northeast Corridor. Specifically, the South Station Expansion (SSX) project is consistent  
46 with goals to target investments to support future economic growth and environmental and energy goals,  
47 as identified in the Northeast Corridor Infrastructure Master Plan (The NEC Master Plan Working Group,  
48 2010).

#### 4. CONCLUSIONS

A list ranking the attributes needed was made that is based on a review of case studies of major intermodal transportation facilities in the Northeast Corridor from Washington, D.C., to Boston, Massachusetts (Table 3).

The planning framework established in this paper—using the ten key attributes contributing to the success of an intermodal transportation hub—may provide a first step for stakeholders to move toward the planning, design, and implementation of an intermodal transportation facility. In addition, three major barriers to intermodal transportation need to be overcome. These include limited federal funding for intermodal projects, lack of cooperation among stakeholders, and inadequate resources to evaluate intermodal projects. Instead of competing for funds to direct toward one mode of transportation, partnerships need to be formed and diverse interests need to come together to leverage funding and resources. A holistic approach is needed to identify priorities, reach consensus, and target investments to a transportation system that supports all modes, provides transportation interconnectivity, and fosters activity-oriented destinations.

Additional research is needed on the business models of curbside intercity bus companies to better understand the “cost of doing business” using the curbside model and whether costs of operating from an intermodal transportation facility are sustainable. Curbside intercity bus companies have been incorporated successfully in and are operating from Union Station in Washington, D.C. The extent to which curbside intercity bus companies either desire, or can afford, to replicate this arrangement at other intermodal facilities needs to be fully explored.

1 **TABLE 3 Attributes Affecting Intermodal Facilities**

Attributes Affecting	Highly Supportive of	Somewhat Supportive of	Not Supportive of
Intermodal Facilities	Intermodal Facilities	Intermodal Facilities	Intermodal Facilities
<b>Availability of Funding Sources and Financing Strategies</b>	Project is eligible for funding from federal, state, and local governments along with private and non-profit organizations. Multiple financing strategies are also available.	Project is eligible for funding from federal and state governments along with private and nonprofit organizations. Financing strategies are limited.	Funding sources and financing strategies are limited to the point where completion of the project is highly questionable or nonexistent.
<b>Cooperation among Stakeholders</b>	The vast majority of stakeholders agree on the size, scope, and location of the project. Garnering support and funding for it will not be difficult.	A majority of stakeholders agree on the size, scope, and location of the project, but there are notable opponents.	Few stakeholders can agree on the size, scope, or location of the project. There also may be multiple projects in consideration that are competing for funding.
<b>Project Champions and Public Support</b>	Project has the support of identifiable national, state, and local champions along with community, private, and nonprofit leaders. Public opinion for the project is favorable.	Project has the support of state and local officials along with a few community, private, and nonprofit leaders. Public opinion is inconsistent.	Project is supported by few public officials or community, private, or nonprofit leaders. Public opinion is unfavorable.
<b>Location Is Viewed as a Destination</b>	Location is a commuter and tourist hub. The demand for transit is strong.	Location has some attractive features, but the majority of individuals do not view it as a destination.	Location is only visited out of necessity. Negative attributes are associated with the location (e.g., safety and security issues).
<b>Transportation Modes Supported</b>	Multiple modes of transportation (national rail, commuter rail, public bus transit, private intercity buses, taxis, car-share, walking, and biking) will be supported. Service will be reliable, and transitions will be safe and seamless. Parking is available.	Multiple modes of transportation (rail, bus, walking) will be supported and service will be reliable but may lack connectivity. Does not consider private modes of transportation. Parking may be problematic.	Few modes of transportation will be supported and service will be unreliable and not coordinated.
<b>Benefits of Facility</b>	Project will be viewed as a regional transportation hub, promoting economic development and livability.	Project will be a link to a regional transportation hub, but it is not a primary hub.	Project will be outside of a regional transportation network. Providing linkages to it would not be cost-effective.
<b>Accessibility</b>	Facility will be ADA compliant, accessible to pedestrians, and have adequate signage.	Facility will be ADA compliant, accessible to pedestrians, and have adequate signage. While existing facilities have physical barriers that may prevent persons from having equal access, there is a plan to address the barriers and provide phased-in improvements.	Facility will meet minimum ADA requirements. However, existing facilities have not been upgraded and have physical barriers that may prevent persons with disabilities from having equal access to transportation services.
<b>Available Amenities</b>	Retail, parking, inside waiting areas, restrooms, restaurants, and entertainment are readily available. The facility will be a destination in its own right.	Sheltered or inside waiting areas, restrooms, and fast food facilities are readily available.	Very few, if any, amenities are available. Waiting areas may be outside, and restrooms may not be readily available.
<b>Proximity to a Central Business District (CBD) or Activity Center Location that Embraces Mixed-Use Development</b>	Project will be located in a CBD or activity center that embraces mixed-use development. Residents can live, work (or commute), and shop in one neighborhood; visitors view it as an activity hub for the city.	Project will be located in a CBD or activity center that will allow for seamless transportation connections.	Project will be located in decentralized area that lacks seamless transportation connections or connections are unreliable and/or sporadic.
<b>Atmosphere of the Facility</b>	Project will exemplify the culture of the city and is well lit, safe, secure, welcoming, and viewed as a landmark in its own right.	Project will be safe, well lit, and welcoming.	There are safety and security concerns regarding the project's location. Negative perceptions are associated with the built environment and patrons feel uncomfortable. It will give a bad first impression of the city.

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