

GROUND TRANSPORTATION GAPS:

The Most Heavily Traveled Intercity Routes Without Express Coach or Rail Passenger Service in the United States

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ABSTRACT

Gradual expansions to the express coach and rail system since 2006 have provided millions of Americans new alternatives to private automobile travel in intercity trips. The expansion of services by Amtrak, BoltBus, and Megabus, as well as various small express coach lines, helped create a more balanced transportation system on many city-to-city routes.

More than a decade after this expansionary period began, however, many routes still lack options that many travelers seeking to avoid flying or driving would consider minimally acceptable. Through a review of the status of express coach and intercity rail service, this study shows:

- **Despite the momentum behind rail and bus services in recent years, prominent “Ground Transportation Gaps” remain, leaving travelers without practical alternatives to automobile and air travel.** Although conventional bus service, such as Greyhound, may be available, the absence of express coach lines and Amtrak leave many to regard themselves as having no choice but to fly or drive.
- **Among the short- and mid-distance routes without rail or express coach service generating more than one million trips per year are** Los Angeles – Phoenix, Cleveland – Detroit, Columbus, OH – Detroit, Chicago – Columbus, OH, and Phoenix – San Diego. Numerous routes generate more than one million passenger trips annually.
- **Nine metropolitan areas with populations of 700,000 or more lack any service by Amtrak or express coach lines.** These “Pockets of Pain,” such as Phoenix, Columbus (OH) and Dayton, Tulsa, and Ft. Myers and Sarasota, are largely inaccessible to intercity travelers who seek to avoid flying or driving but are unwilling to use conventional bus lines.

The study calls for practical steps to restore momentum to bus and rail travel that require a relatively small amount of public investment, including ways to cultivate new express coach service and promote greater rail/bus integration. It also calls for initiatives to overcome the lack of institutional planning and investment that is thwarting planning for rail services that cross state lines and thus require a great deal of interjurisdictional coordination. Such efforts, the study shows, would help foster more fuel-efficient and comparatively safe forms of travel.

[Click here](#) for interactive maps
of the most heavily traveled routes without express coach or rail service.

Between 2005 and 2015, expansions to the intercity bus and rail system provided millions of travelers in the United States with increasingly viable alternatives to driving, particularly on short- and middle-distance routes. Amtrak added frequency to numerous corridors while enjoying steady gains in passenger traffic. Billions of dollars in federal investment were directed toward high-speed rail, suggesting that breakthroughs in train travel may be around the corner. Express coach operators such as BoltBus and Megabus, as well as a bevy of specialty lines, burst onto the scene, pushing intercity bus ridership to its highest levels in decades (13).

Nevertheless, while the expansion was impressive, travelers on many routes do not enjoy the benefits of these new travel options. Many lack practical alternatives to driving and short-haul airline trips. This study explores the dynamics of this setback in improvements to intercity travel by:

- I. Reviewing the differing service qualities of major air, bus, and rail operators, and the factors that spurred the expansion of express coach and rail service after 2006;
- II. Illustrating how, despite past expansion, many travelers on major routes in the 120–400 mile range remain without ground-travel options that are considered as being viable alternatives to flying or driving;
- III. Identifying the largest metropolitan areas without either Amtrak or express coach service, making them difficult to reach by those seeking to avoid driving and flying but are unwilling to travel on Greyhound or another conventional bus line.

Drawing upon these findings, and statistical analysis to rank routes by approximate traffic volume, the study outlines practical steps that public entities can take to cultivate a more attractive market for ground-based intercity services.

BACKGROUND: DEFINING THE MODES

Travelers often consider a wide range of options when making intercity trips. On many routes, travelers can choose among at least four types of services. This study uses a simple typology (Table 1) to categorize these options.

Commercial air service: This service is often the fastest option when distances are more than 250 miles, but is generally more costly than driving or taking a bus or train. On shorter trips, time spent traveling to and from the airport, navigating security, and arriving at the gate comfortably before departures can nullify air travel's otherwise timesaving benefits. Commercial air service encompasses both *network airlines* and *low-cost airlines*, which primarily focus on relatively long-haul routes, with Southwest Airlines also having an extensive presence on short-hop routes.

Passenger rail service: Provided exclusively by Amtrak on most of the U.S. mainland, this intercity service tends to be considerably less costly than flying but is generally more expensive than a bus (Schwieterman, 2012). Travelers enjoy a roomier on-board environment than buses and most airplanes, although the frequency of service is often limited.

Express oriented carriers (“express coach”): This service, provided by such carriers as BoltBus, Go Buses, Megabus, and Red Coach, appeals to a somewhat more affluent and tech-savvy market segment than

conventional bus lines. These scheduled bus lines:

- I. *Specialize in express service between the downtowns of relatively large population centers with an emphasis on point-to-point travel rather than connections through centralized hubs;*
- II. *Offer guaranteed seating for all reservation holders on their chosen departure, which eliminates the need for passengers to wait in line to assure they get a seat;*
- III. *Extensively utilize curbside drop-off and pickup in place of conventional terminals, except when required by municipal regulation, or maintain small station facilities that are not shared with conventional bus lines, and;*
- IV. *Emphasize online ticketing directly on the carrier's website to eliminate the need for dedicated ticketing facilities at most pickup locations.*

Several other characteristics commonly associated with express coach lines also distinguish them from conventional lines. For example, most express lines lack “interline agreements” with other bus lines, thus requiring passengers traveling to destinations that require the use of connecting carriers to purchase – on their own – a separate ticket for that leg of the journey. Almost all large conventional bus lines, by comparison, sell interlined tickets to offline destinations, with a significant share of these interline tickets sold through Greyhound’s website (greyhound.com). Express lines also generally allow passengers to change their reservation online at a modest cost (generally \$7.50 or less), plus any difference in fare – a convenience not yet offered by Greyhound or most other conventional bus lines.

Conventional bus service: This category includes Greyhound Lines, various Trailways affiliates, and many smaller lines that operate from centralized terminals. Conventional bus lines serve a vital role providing reliable transportation in both heavily used and lightly trafficked corridors. These providers cumulatively have near-universal coverage across the country. Many are part of a vast web of connecting services sold on greyhound.com. Passengers can arrive at the terminal only a few minutes before departure, but seating is generally not guaranteed, which encourages some to arrive early. Conventional bus lines typically require travelers to go to a bus station to change a ticket, and pay a \$20 change fee.

The distinction between express coach operators and conventional bus lines has been partially blurred by the creation of Greyhound Express, which has some of the qualities of express coach lines (such as guaranteed seating) but not others (such as emphasis on curbside drop-off and pickup as well as the ability to change reservations online). There are, of course, many different kinds of bus lines, including ethnically oriented lines (such as Chinatown bus companies) and campus-shuttle providers. For the purposes of this study, they are included in the conventional bus service category.

Express coach and rail service are described in this study as “Middle Modes” as they have qualities that attract a broader demographic base than most conventional bus services but are less costly than airlines—a concept discussed in greater detail below.

TABLE 1: Categorization of Modes on Short- and Middle-Distance Intercity Trips

CARRIER	KEY FEATURES	MARKET ROLE
COMMERCIAL AIR		
Network Airlines		
	<ul style="list-style-type: none"> • Extensive global coverage • Reserved seat usually free of charge • \$200 fee to change reservations • Relatively high “walk up” fares 	<ul style="list-style-type: none"> • Limited role on routes <300 miles • Strong emphasis on hub-and-spoke
Low Cost Airlines		
	<ul style="list-style-type: none"> • Reserved seat/early boarding generally extra fee • Lower “walk up” fares than network airlines 	<ul style="list-style-type: none"> • Serve larger cities and busiest routes • Southwest has greater focus on short-haul routes than most others
PASSENGER RAIL		
	<ul style="list-style-type: none"> • Guaranteed seat with purchase¹ • Most tickets changeable online • Onboard food sales on most routes • Greatest seat pitch of four modes 	<ul style="list-style-type: none"> • Emphasis on 75 – 400 mile range • Frequency limited on many routes
EXPRESS COACH		
	<ul style="list-style-type: none"> • Guaranteed seat generally provided • All tickets changeable online or flexible • Emphasis on curbside drop-off & pickup • Reserved seats offered by some carriers 	<ul style="list-style-type: none"> • Emphasis on 125 - 400 mile range • Limited service to smaller cities • Limited stops on all routes • Point-to-point orientation
CONVENTIONAL BUS LINES & BASIC GROUND TRANSPORTATION		
	<ul style="list-style-type: none"> • Free Wi-Fi and outlets standard • First come, first seated on many routes • Usually can change reservation only at terminal 	<ul style="list-style-type: none"> • Widespread U.S. coverage • Hub-and-spoke orientation • Not all services typically express oriented

MIDDLE MODES

THE IMPORTANCE OF “MIDDLE MODES”

Expansions to intercity bus and train travel are widely regarded as contributing to enhanced mobility, lessened congestion, reduced fuel consumption, and greater economic activity in the downtown areas of cities.² The attractiveness of such services to travelers, however, depends heavily on the

characteristics of the traveler and the journey undertaken. Although federal agencies have not collected recent data on the choice of modes at various distances across the United States, the available data shows that intercity trips of less than 100 miles are overwhelmingly taken by car.³ Flying is rare for trips less than 200 miles and accounts for only about 11% of trips in the 200 – 299 mile range. The share of travelers who fly jumps to 23% of trips between 300 to 399 miles, and to 33% from 400-499 miles. Well over half fly for trips of 600 miles or more.⁴

Intercity bus and rail travel is most viable on trips in the 100-400 mile range. These trips can generally be traversed on a ground-travel mode in about two to eight hours, a distance which can be uncomfortable when driving, particularly with heavy traffic. Longer trips, however, can be tedious on a ground-transportation mode, especially on a bus. Bus and rail combined account for about 4% of trips in the 200 -299 mile range, but less than 3% of trips between 400-409 miles, and below 2% of longer trips.

Prior research by the Chaddick Institute shows that express coach service is particularly competitive in the 120 – 400 mile range. More than 90% of BoltBus and Megabus schedules fall within this distance interval.⁵ Express carriers have experienced great difficulty providing service on routes less than 120 miles, being only weak players in most such markets and withdrawing from others.⁶

At the same time, many travelers are categorically unwilling to consider using conventional bus lines on trips of any length, perhaps due to apprehension over the station environment and the onboard experience. Our prior research shows, for example, that just 14% of those riding Megabus would have used Greyhound or another conventional bus line if this express coach line's service were unavailable.⁷ Perceptions appear to be changing, but many passengers still exclude conventional bus lines from their "choice set," even when schedules are convenient and their other options are limited. The results of surveys of intercity bus passengers by state governments show a similar pattern.⁸ Rightly or wrongly, many travelers with higher incomes avoid using conventional bus lines.

The avoidance of conventional bus lines by certain travelers, of course, varies widely between regions and the carriers involved. Conventional bus service attracts a much broader swath of the population in densely populated regions, particularly in the Northeast Corridor (NEC). As such, there is a wider range of services emanating from Boston, New York, and other major Eastern cities than in other parts of the country. These bus lines are more part of the travel mainstream in that region due in part to their extensive presence, the difficulty of automobile travel, and familiarity with public transit.⁹

In most of the country, however, having service provided by a middle mode (i.e., rail or express coach service) is essential if certain demographic segments are to be attracted from private vehicle travel. Without such service, many consider themselves as having a binary choice of driving or flying—if they decide to travel at all. Since flying is often impractical, they default to driving in these situations. As such, the expansion of middle modes appears important to reducing dependence on private vehicles, enhancing mobility for those who do not drive, and achieving environmental goals.¹⁰

KEY FINDINGS

To generate insights about how recent changes to bus and train service are affecting the ability of travelers to avoid using private vehicles, our analysis considered changes in supply and demand for

these services between U.S. metropolitan regions since 2005. Five findings were particularly noteworthy:

FINDING 1:

The expansion of rail and intercity bus service since 2006 has provided millions of Americans new alternatives to driving and flying on short- and middle-distance routes. Both Amtrak and express coach lines such as BoltBus and Megabus attracted many travelers who otherwise would have used a private vehicle.

The eight-year period beginning in 2006 was a particularly bullish time for bus and rail operators. Amtrak posted gradual gains in passenger traffic, which pushed passenger-miles of travel from 5.4 billion at the start of the period to 7.3 billion in 2013.¹¹ During that time, Amtrak added an extensive amount of new service, often in cooperation with state governments eager to enhance the vitality of short- and medium-distance corridors. Amtrak boosted frequency on numerous routes (Table 2) while also investing in improvements in speed and reliability.

TABLE 2: Notable new Amtrak Routes 2006 – 2017

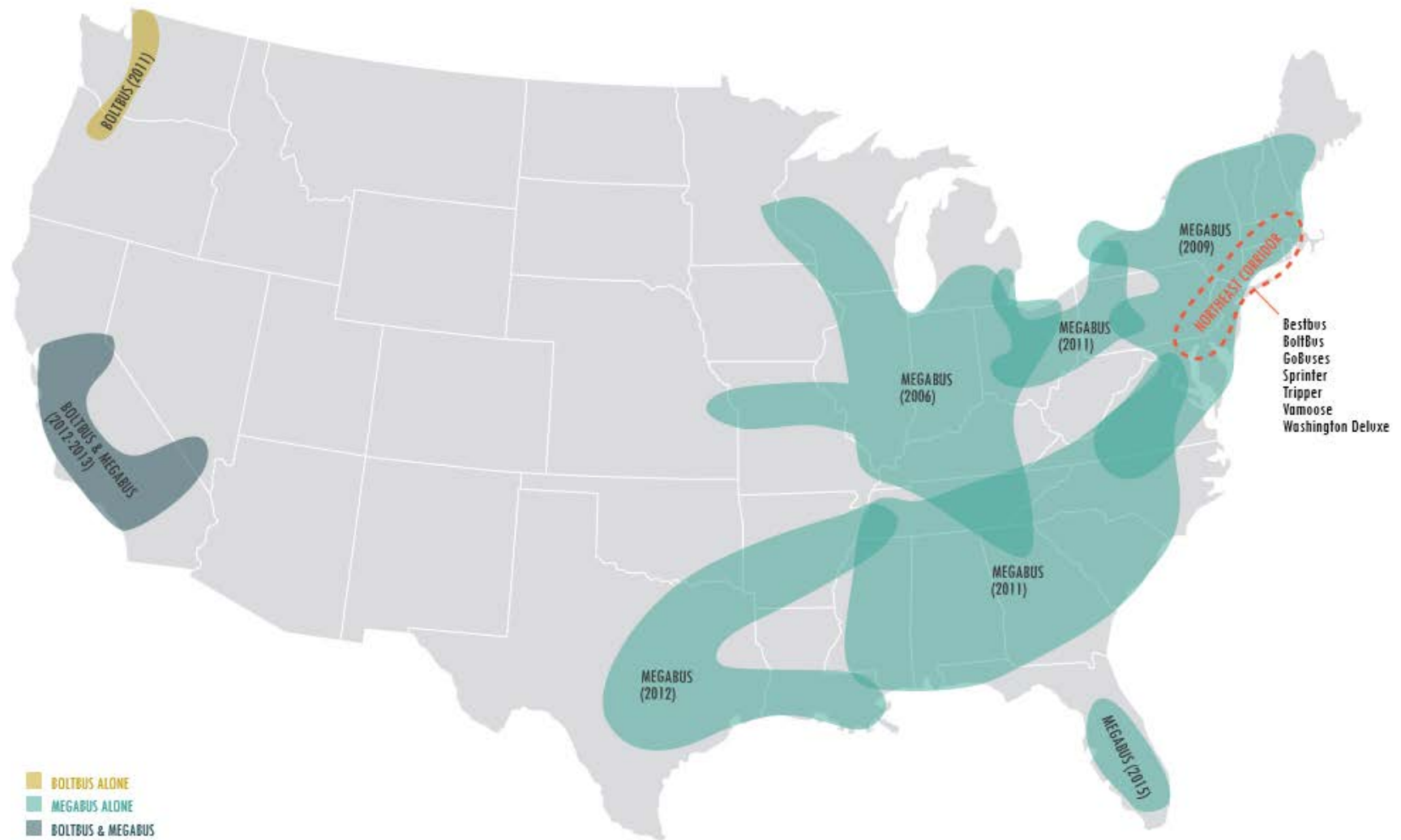
CORRIDOR	SERVICE ADDITIONS 2006 – 2017
BOSTON – PORTLAND/BRUNSWICK, ME	5 th train added. Speeds raised (2007)
CHICAGO – CARBONDALE	3 rd train added (2006)
CHICAGO – MILWAUKEE	5 th and 6 th cars added to all trains (2007, 2009)
CHICAGO – ST. LOUIS	4 th and 5 th daily trains added (2006)
CHICAGO – WEST QUINCY, IA	2 nd daily train added (2006)
NORFOLK – RICHMOND, VA	Service launched (2012)
OAKLAND – BAKERSFIELD	7 th daily train added (2016)
PORTLAND – SEATTLE	4 th train added (2006)
OAKLAND – SACRAMENTO	Frequency increased from 12 to 16, later reduced by one (2006)
RICHMOND – WASHINGTON	Frequency increased from 6 to 9 trains (2008-12).
WASHINGTON – LYNCHBURG	Service launched 2009. Extension to Roanoke scheduled for October 2017

Although the passenger railroad still accounted for less than one percent of intercity passenger miles of travel in the U.S., this period brought significant expansion. Ambitious plans announced in 2011 by the Obama administration called for \$53 billion over six years to support a high-speed rail (HSR) program with the expressed desire to bring 80% of the country’s population within 25 miles of a high-speed rail line within 25 years.¹² In that year’s State of the Union Address, President Obama called for HSR to “allow you to go places in half the time it takes to travel by car. For some trips, it will be faster than flying.”¹³ Although the ambitious funding target was never achieved, roughly \$12 billion was eventually awarded to state governments that matched the funds.¹⁴ Since 2013, the number of service expansions has dropped. Although Table 2 is not a comprehensive list of *all* service changes, it shows how much of the growth was concentrated in the 2006 – 2012 period.

The intercity bus sector, meanwhile, grew dramatically. In 2006, Scotland-based Stagecoach, Ltd., the owner of Coach USA, a set of established bus lines operating mostly in the eastern U.S., introduced its Megabus brand to the U.S. market. The carrier, relying on curbside drop-off and pickup from a hub in

FIGURE 1: Expansion of Express Coach Lines in U.S. Market

Approximate Service Range and Year Regional Service Started



Chicago, offered travel times that were comparable to Amtrak, albeit with fewer intermediate stops on most routes, thus leaving many smaller points unserved.¹⁵

Passenger travel on Greyhound Lines also firmed up, ending a difficult period of retrenchment that ended service to many smaller communities. In early 2009, the company was purchased by another U.K. company, London-based First Group. Later that year, Greyhound created its own curbside express carrier, BoltBus, with a hub in New York. FirstGroup also shored up Greyhound's image by buying new buses and launching the Greyhound Express service in 2009. This new offering featured limited-stop service with guaranteed seating, and later on, Wi-Fi. Unlike BoltBus and Megabus, however, it used conventional stations rather than emphasizing curbside service.¹⁶

Buoyed by these and other investments, the intercity bus industry enjoyed its greatest expansion in decades. Amid a sustained push to gain a foothold in new markets, Megabus established its own New York hub, going head to head against BoltBus, and added additional hubs in Philadelphia (2009) and Washington, DC (2010). Megabus launched hubs in Atlanta and Pittsburgh in 2011 before spreading its reach to California, Florida, and Texas between 2012 and 2014 (Figure 1).¹⁷

BoltBus also grew, albeit more cautiously, adding Pacific Northwest service in 2011 and California and Nevada routes in 2013. Many smaller carriers, such as DC2NY (later rebranded as BestBus) and Vamoose, joined the fray, operating side-by-side with corporate powerhouses Megabus, Boltbus and Greyhound Express in the NEC.

Definitive estimates of the amount of traffic on intercity buses are not available due to the lack of comprehensive federal reporting requirements for motor coach travel. Research by the Chaddick Institute data team suggests that ridership on *express coach* carriers grew from approximately 2.3 million in 2008, to 4.7 million in 2010, to 11.6 million in 2015, with most trips less than 400 miles.¹⁸ The growth of express coach lines far outpaced the growth of air travel, Amtrak, and automobile travel between major metropolitan areas. Cumulatively, traffic on all types of scheduled intercity bus services, including conventional lines such as Greyhound, grew from an estimated 46.0 million to 61.6 million passenger trips over this period.

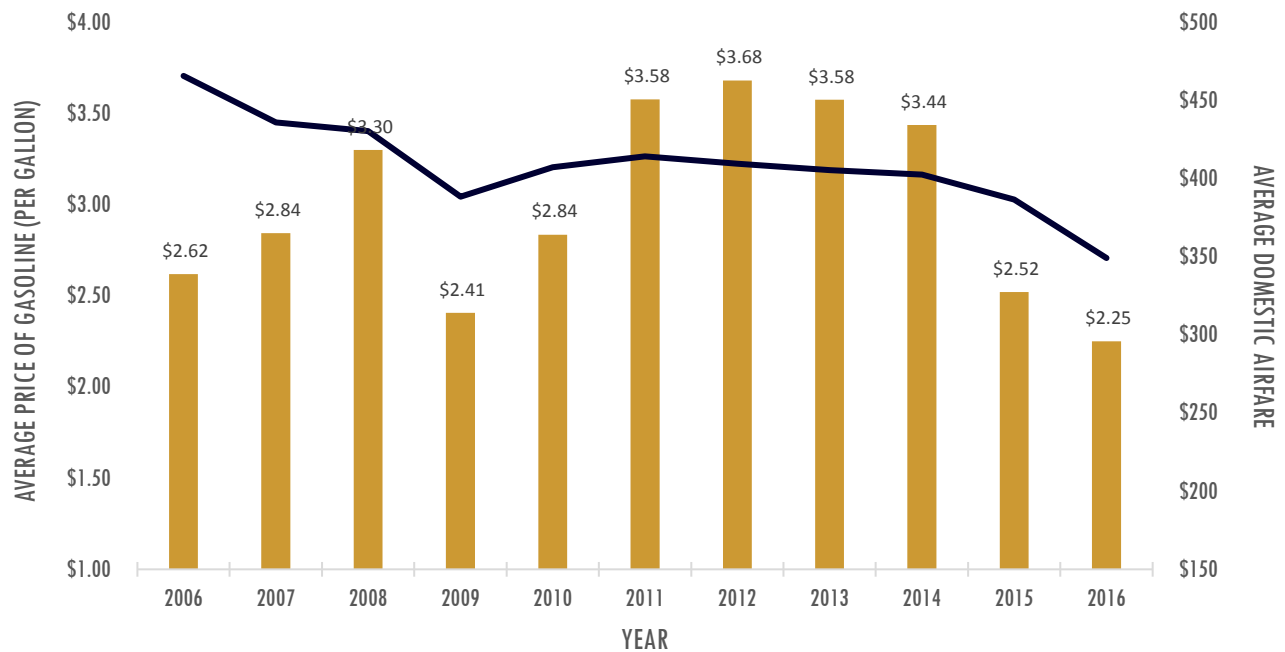
FINDING 2:

Express coach operators have not expanded since 2014 on a trajectory similar to that observed between 2006 and 2013, apparently due to both lower fuel prices and heightened airline competition. The relocation of pickup points by express coach lines to less-desirable spots also appear to have reduced the opportunity for growth.

A confluence of factors interrupted the growth of service by express coach lines after 2014:

Falling Fuel Prices. The average price of gasoline in the U.S. plummeted starting in late 2014, making it much less costly for people to drive. The average price fell from more than \$3.50 per gallon to around \$2.50 in 2015, and to just \$2.25 in 2016 (Figure 2).¹⁹ Since then, prices have inched still lower. Such declines have lowered the variable costs of automobile travel far more than bus and train travel, which tend to be affected less by fuel costs than by flying or driving.

FIGURE 2: Trends in Domestic Airfares and the Average Price of Gasoline, United States (In Constant 2016 Dollars)



Source: Bureau of Transportation Statistics (2017), U.S. Energy Information Administration (2017)

Heightened Competition from Airlines. The cost of air travel is falling as carriers grow more bullish about expanding seat capacity, and as new “ultra-low-cost” carriers—including Allegiant Airlines, Frontier Airlines, and Spirit Airlines—expand. The average cost of a domestic roundtrip airline ticket, expressed in constant 2016 dollars, fell from \$403 in 2014, to \$387 in 2015, to \$349 last year.²⁰

Less Attractive Pickup and Drop-Off Points for Express Coach Lines. Since 2014, express coach lines, most notably BoltBus and Megabus, have in some cities moved to less centrally located pickup and drop-off locations. Development pressures and political factors have made many locations no longer viable, forcing these carriers to end service at vibrant downtown locations and relocate to less centralized sites.

- **CHICAGO:** Megabus relocated twice, each time putting it further from the center of the “Loop” business district. The most recent move to Polk Street between Canal and Clinton is a considerable distance from the nearest CTA rapid transit stop and separates the pickup point from retail businesses.
- **CINCINNATI, ORLANDO, MEMPHIS, AND SEVERAL OTHER CITIES:** Megabus moved to locations further out from the city center, in some cases to provide passenger more amenities, which are nonetheless less walkable from the downtown businesses and attractions.
- **NEW YORK:** BoltBus and Megabus have both moved from the center of Midtown to the west side of Manhattan—a location near the Javits Convention Center. This location, while well-managed

and near retail establishments, was almost a mile from the nearest MTA Subway stop until a new line to the area was opened in late 2015.²¹

These moves, in addition to reducing convenience, may have lessened customer awareness of the availability of express coach service. Other factors may also be at play.²² As noted in Finding 4 below, this has resulted in service cutbacks by express coach operators on some routes outside the Northeast region.

FINDING 4:

Twenty-eight routes without viable rail or express coach service have annual traffic estimated to exceed a half million passengers per year. Eight of these “Ground Transportation Gaps” have lost their middle-mode service due to cutbacks by express coach operators since 2014, with Los Angeles – Phoenix easily being the most heavily traveled route without a middle mode. None of the Gaps are attributable to recent Amtrak service cuts.

The study team used the typology of transportation modes discussed above to measure the availability of four types of services linking *large cities* (defined as metropolitan areas with populations of one million or more) to *large and mid-size cities* (defined as have metropolitan populations of 500,000 or more). In other words, the analysis considered all routes linking major metropolitan regions with at least one million residents to ones at least half of this size. The study team also developed a statistical model to estimate the annual traffic between cities, which is discussed in greater detail in Appendix A, and used populations based on 2016 U.S. Census estimates.

The analysis included express coach and train services that involve transfer, so long as the total elapsed travel time met a minimum standard. Services that involved multiple stops or transfers that reduced the average speed to less than 25 mph were excluded because they would not be considered viable by most travelers. Connections involving Amtrak trains and Amtrak Thruway buses were included unless they involved transfers between 11:30 p.m. - 6 a.m., which were deemed to be of insufficient quality to be viable to most. Trips that involved traveling overnight on a bus or train, including those with middle-of-the-night originating times and arrival times are included. More details of the criteria used are discussed in Appendix B.

The analysis identified 152 routes in the 120 - 400 mile range linking metropolitan regions with populations of more than one million that lack a viable “middle mode” in August 2017. This represents about one-fifth of all routes in this mileage range. The most heavily traveled routes are Los Angeles – Phoenix (estimated to have 2.5 million trips annually); Cleveland – Detroit (1.9 million); Dallas to Oklahoma City (1.9 million); Cleveland – Columbus, OH (1.5 million); Miami – Ft. Myers (1.5 million); and Detroit – Columbus (1.4 million) (Table 3).

Recent service cuts by express coach lines are responsible for some of these “Ground Transportation Gaps.” Of the 50 most heavily traveled routes without a middle mode, seven of those routes (Chicago – Columbus, Cincinnati – Nashville, Cleveland – Columbus, Cincinnati – Cleveland, Dallas – Oklahoma City, Detroit – Cleveland, Columbus – Indianapolis, and San Diego – Las Vegas) have lost service since 2014 (all shown in bold on Table 3). Thirteen have lost service since 2005. Except for the Las Vegas – San Diego route, previously served by BoltBus, the most recent middle-mode carrier withdrawing from these routes was Megabus. A summary of the service history on several notable routes appears in Figure 3.

Our estimates of traffic volume should be regarded as a relatively rudimentary estimate because it is based on only a few variables. Nevertheless, several of these corridors rank among the largest in the United States in mileage range considered, according to a Federal Highway Administration data set. This data set indicates that Los Angeles – Phoenix is among the 25 most heavily traveled routes in the 120 – 400 mile range, while several others rank in the top 100.²³ (Amtrak recently expanded Thruway bus options on this route by providing a new bus connection to its Sunset Limited line, which is significantly faster than its previously available service. This tri-weekly link, however, does not meet the formal criteria for consideration for reasons described in endnote 22.) Even consumers traveling to and from major markets such as Chicago face the prospect of diminished ground transportation options, as is evident in the map on Page 22 in Appendix.

Travelers in these Ground Transportation Gaps unwilling to take Greyhound or another legacy line will find it highly difficult to avoid driving on these routes, particularly if they cannot meet advance-purchase airfare conditions. Although air service is available in all but two of the routes on Table 3, “walk-up” airfares are more than \$200 on all but four of the routes, and more than \$300 on most, with several topping \$400.

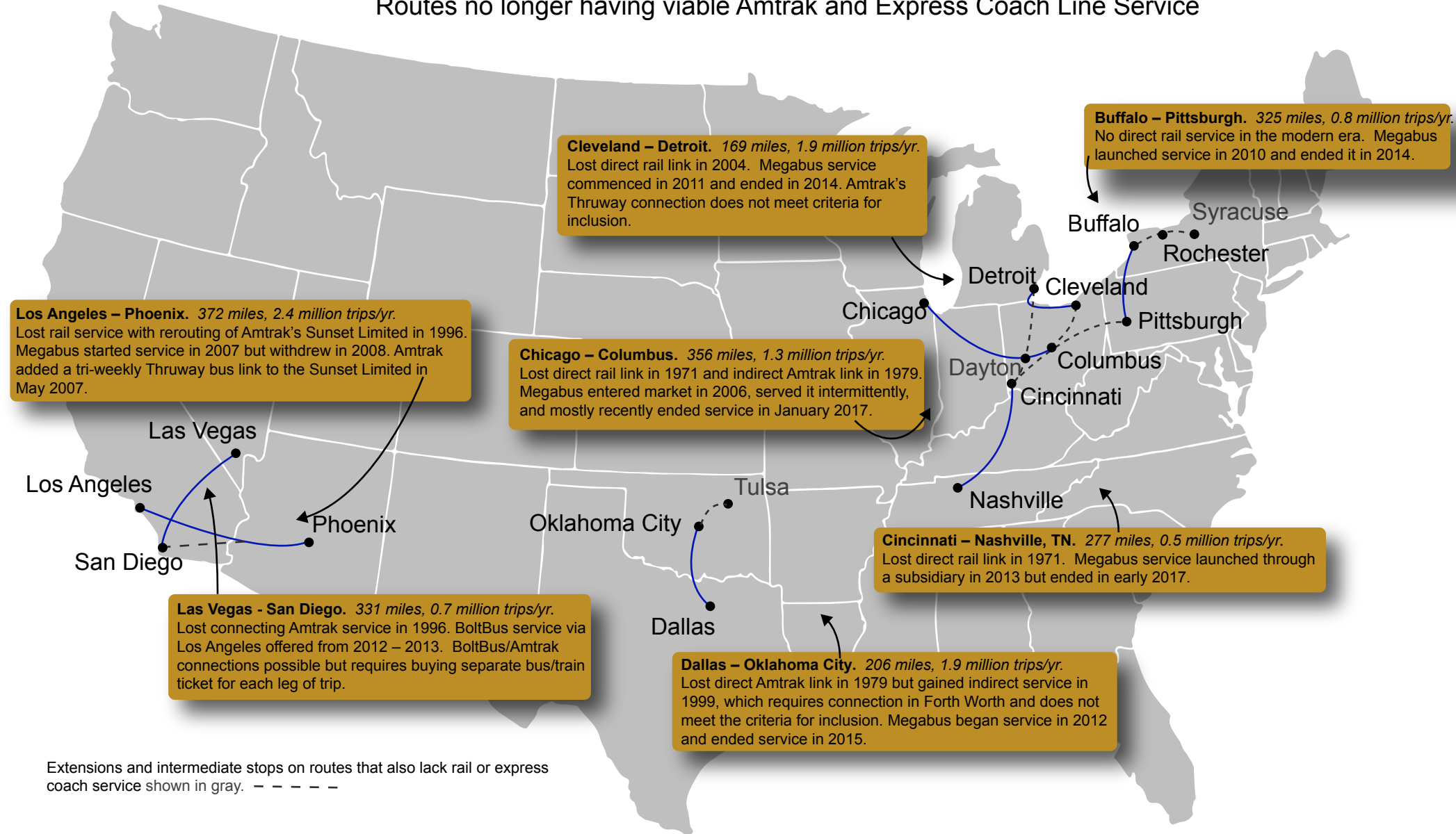
TABLE 3: Ground Transportation Gaps: America’s Most Heavily Traveled Routes with *neither* Express Coach nor Rail Service

Routes 120 – 400 miles & ranked by estimated passenger traffic | **Bolded** routes lost service since 2014

RANK	ORIGIN	DESTINATION	HIGHWAY MILEAGE	ESTIM. ANNUAL TRIPS (000)	WALK-UP AIRFARE	CONVENTIONAL BUS TRAVEL TIME	YEAR(S) EXPRESS COACH/RAIL SERVICE ELIMINATED
1	Los Angeles, CA	Phoenix, AZ	372	2,477	\$192	6h 40m	Megabus 2008 (1)
2	Detroit, MI	Cleveland, OH	169	1,927	\$414	3h 30m	Megabus 2014
3	Dallas, TX	Oklahoma City, OK	206	1,915	\$222	4h 40m	Megabus 2015 (2)
4	Cleveland, OH	Columbus, OH	143	1,463	\$466	2h 25m	Megabus 2016 (3)
5	Miami, FL	Fort Myers, FL	158	1,457	\$325	4h 10m	
6	Detroit, MI	Columbus, OH	203	1,383	\$378	4h 35m	
7	Chicago, IL	Columbus, OH	356	1,278	\$262	7h 50m	Megabus 2017
8	Pittsburgh, PA	Columbus, OH	182	1,200	\$379	3h 20m	Megabus 2012
9	Phoenix, AZ	Las Vegas, NV	297	1,078	\$241	8h 15m	
10	Tampa, FL	Fort Myers, FL	125	1,035	\$347	3h 40m	
11	Detroit, MI	Cincinnati, OH	263	1,002	\$350	5h 15m	
12	Dallas, TX	Tulsa, OK	258	984	\$216	6h 25m	
13	Miami, FL	Sarasota, FL	231	893	\$447	6h 25m	
14	New York, NY	Youngstown, OH	398	845	N/A	10h 5m	
15	Columbus, OH	Indianapolis, IN	176	785	\$328	3h 0m	Megabus 2017
16	Chicago, IL	Dayton, OH	297	689	\$208	7h 5m	
17	Saint Louis, MO	Indianapolis, IN	243	674	\$432	4h 00m	
18	Detroit, MI	Indianapolis, IN	320	672	\$323	5h 45m	
19	Cincinnati, OH	Cleveland, OH	250	664	\$233	4h 35m	Megabus 2016 (3)
20	San Diego, CA	Las Vegas, NV	332	662	\$187	7h 55m	BoltBus 2014 (4)
21	Pittsburgh, PA	Cincinnati, OH	289	632	\$213	5h 35m	Megabus 2012
22	Kansas City, MO	Omaha, NE	189	588	\$380	3h 15m	
23	Saint Louis, MO	Nashville, TN	309	557	\$278	6h 5m	
24	Detroit, MI	Dayton, OH	209	537	\$322	4h 5m	
25	Saint Louis, MO	Louisville, KY	261	519	\$328	6h 45m	
26	Atlanta, GA	Augusta, GA	145	516	\$330	2h 30m	
27	Houston, TX	McAllen, TX	346	505	\$262	5h 45m	
28	Cincinnati, OH	Nashville, TN	277	505	\$353	5h 15m	Megabus 2016 (3)
29	San Diego, CA	Phoenix, AZ	355	489	\$223	8h 10m	Megabus 2008
30	Saint Louis, MO	Cincinnati, OH	349	420	\$352	7h 25m	
31	Columbus, OH	Toledo, OH	148	408	\$510	3h 20m	
32	Kansas City, MO	Wichita, KS	197	393	\$378	4h 10m	
33	Pittsburgh, PA	Indianapolis, IN	374	386	\$298	7h 25m	
34	Washington, DC	Youngstown, OH	303	385	\$0	9h 4m	
35	Dallas, TX	Wichita, KS	363	383	\$224	8h 5m	
36	Kansas City, MO	Des Moines, IA	193	381	\$208	2h 55m	
37	Louisville, KY	Dayton, OH	153	342	\$324	4h 5m	
38	Cleveland, OH	Indianapolis, IN	315	331	\$308	7h 00m	
39	Cleveland, OH	Dayton, OH	211	324	\$333	4h 25m	
40	Kansas City, MO	Oklahoma City, OK	356	323	\$363	6h 20m	

Notes: (1) Amtrak began operating a Thruway bus connection via Maricopa, AZ, on May 1, 2017 that meets the speed criteria. Due to an early morning connection, it does not qualify for inclusion in this study, although it significantly reduces travel time (see endnote 22), (2) This Megabus-branded service was provided by a Stagecoach subsidiary Kerrville Lines. Amtrak offers Ft. Worth to Oklahoma City service but the connection from Dallas falls below minimum threshold for average speed, being 24 mph. (3) This Megabus-branded service was provided by a subsidiary Lakefront Lines. (4) BoltBus service required connections in Los Angeles.

Figure 3 Examples of City Pairs that Have Recently Lost their “Middle Mode”
 Routes no longer having viable Amtrak and Express Coach Line Service



To appreciate why these fares are unaffordable to many, consider the Cleveland – Detroit route as an example. A family of three that is unable to meet a seven-day advance purchase requirement can expect to pay more than \$2,400 to fly roundtrip. Even when buying two weeks ahead, the cost will generally be more than \$1,000. When express coach service was available, the cost was likely around \$120 - \$180 (or less) when with a booking two weeks ahead.

FINDING 5:

Between 2006 and late 2014, new services added by Amtrak and express coach lines more than offset any cutbacks in service that occurred, resulting in a gradual reduction in Ground Transportation Gaps. Since then, however, no new services have filled the gaps identified by our study.

The rapid expansion of express coach service between 2006 and 2014 resulted in a sharp net gain in available service. Since then, however, no new service has emerged to fill any Ground Transportation Gaps we identified as having existed in 2014.

Express coach lines have made targeted expansions. For example, new frequencies have been added in the NEC and small communities. Similarly, Megabus added service to major cities in Florida (in 2015 and 2017), eastern Virginia (2016), and several other areas. These new routes, however, are primarily in corridors already served by Amtrak, and none filled “gaps” based on the population/distance criteria used in this study. (The analysis, as previously noted, considered only routes linking metropolitan areas with at least one million residents to those with populations of at least one-half million.)

Several hoped-for expansions by Amtrak that could have filled Ground Transportation Gaps have yet to materialize. Amtrak is not presently planning the launch of a Cincinnati – Cleveland via Columbus route, which was slated to be part of the federal HSR program. Plans to extend Amtrak’s Fort Worth – Oklahoma City train to Tulsa and Kansas City also have not yet moved forward.

FINDING 6:

Nine metropolitan areas with populations of more than 700,000 stand out for having neither service by Amtrak nor express coach lines to any destination. In these so called “Pockets of Pain,” an overwhelming share of population likely never contemplates anything but driving or flying on intercity trips to and from their home region.

Despite the expansion of the rail and express coach network, many cities remain without either of these modes. As a result, travelers who, rightly or wrongly, are unwilling to take Greyhound or another conventional bus line (which, as noted earlier, accounts for an appreciable share of the population, particularly outside of the Northeast Corridor), may regard themselves as having no viable options besides driving or flying, if their budget allows it on longer trips (Table 4). Of course, for those without automobiles, mobility may be impaired.

Phoenix, AZ, Columbus, OH, and Tulsa, OK, are easily the largest, having metropolitan populations of more than one million. (Please refer to pages 24-25 for maps depicting notable routes to and from Columbus and Phoenix lacking service). Other notable metropolitan areas that have less-than-daily Amtrak service and no express coach lines include **Charleston, WV (217,916) El Paso, TX (841,971) and**

Tucson, AZ (population). **Denver, CO** (2,853,077) and **Salt Lake City, UT** (1,186,187) see only one Amtrak train in each direction daily, and have no express coach lines, while **Kansas City, MO** (2,104,509) is the largest metropolitan area that has lost express coach service in the past five years.

TABLE 4:

“Pockets of Pain”: The Largest U.S. Metropolitan Areas with neither Amtrak nor Express Coach service (U.S. Mainland)

Ranked by estimated 2016 metropolitan (Combined Statistical Area) population

- 1. Phoenix, AZ (4,661,637)**, easily the largest metropolitan area with neither Amtrak nor express coach service, lost Amtrak’s tri-weekly *Sunset Limited*, a Los Angeles - New Orleans train, when it was rerouted via Maricopa, AZ, in 1995. Megabus left after only briefly serving Phoenix in 2007-08. Restoring rail service to Los Angeles over the preserved but dormant former *Sunset* route is in the discussion stage. Amtrak expanded its Thruway bus connections in May 2017 to this metropolitan area. See map (Figure 7C) on page 23.
- 2. Columbus, OH (2,041,520)**, the largest city on the U.S. mainland more than 100 miles from both an Amtrak or express coach stop, has not had rail service since the discontinuation of the New York – Kansas City *National Limited* in 1979. Megabus launched Chicago service via Indianapolis in 2007 and later added Cincinnati, Cleveland, and Pittsburgh, along with routes to Nashville and Atlanta by Stagecoach Ltd. subsidiary Lakefront Lines. The carrier gradually cut back and curtailed its Chicago/Indianapolis route, its last, in early 2017. Planning is underway for restoring rail service to Chicago on a route via Fort Wayne, IN. See map (Figure 7B) on page 22.
- 3. Tulsa, OK (1,016,206)** is the largest metropolitan area in the central U.S. without a “middle mode” and the second largest more than 100 miles from an Amtrak or express coach stop. Tulsa lost rail-passenger service in 1971 and has never been served by an express coach line. Residents must travel more than 200 miles to reach the nearest express coach stop. Proposals to extend Amtrak’s Fort Worth – Oklahoma City *Heartland Flyer* to Tulsa are being discussed but remain in a preliminary stages.
- 4. McAllen, TX (849,843)** is a fast-growing metropolitan region that has never been served by Amtrak or an express coach line.
- 5. Allentown, PA (835,652)** is the largest metropolitan area in the Northeastern U.S. that is served by neither Amtrak nor an express coach line. Express coach line OurBus briefly served it in 2017 but soon withdrew. Frequent motor coach service is available to New York and Philadelphia by conventional carriers that do not offer guaranteed seating. Proposals for rail service to both cities face many obstacles. Amtrak partially filled the void by launching new Thruway bus connections, primarily from Philadelphia, this July.
- 6. Dayton, OH (800,683)** lost Amtrak service with the 1979 discontinuance of the *National Limited*, and has never been served by an express coach line. The metropolitan area’s Greyhound station is now in Trotwood, OH, seven miles from downtown, making this the largest metropolitan area on the mainland with neither an intercity bus nor a rail-passenger stop within or near its urban core. Dayton also lost its Southwest Airlines service in 2017. See map (Figure 7A) on page 22.
- 7. Sarasota-Bradenton, FL (788,457)** lost rail-passenger service in 1971 and has never been served by Amtrak nor an express coach line, although a variety of conventional bus lines without guaranteed seating serve it..
- 8. Cape Coral/Ft. Myers, FL (722,336)** has the same service history as Sarasota-Bradenton.
- 9. Colorado Springs, CO (712,327)** lost rail service in 1971 and has never been served by Amtrak or an express coach line. State subsidized conventional bus service to Denver launched in 2015.
- 10. Akron, OH (702,221)** lost Amtrak service in 2005 when Amtrak’s Chicago – Washington, DC *Capital Limited* was rerouted via Cleveland. Megabus served the city in 2011-12. See map (Figure 7A) on page 22.

CONCLUSIONS AND RECOMMENDATIONS

The expansion of intercity bus and rail service between 2006 and 2014 gave travelers many new alternatives to privately owned vehicles or airline travel on relatively short-distance intercity trips. The interruption of this trend, however, constitutes a step backward in the effort to promote a more balanced transportation system that provides travelers a wide range of options.

Five strategies can be undertaken without extensive capital investment to help address the shortfalls:

I. Take advantage of the slowdown in route expansion and traffic growth to experiment with new marketing strategies and technological innovation in anticipation of the rebound that appears likely in the next several years.

Amtrak and intercity bus lines are in a good position to experiment with tech-oriented strategies to attract new customers. The passenger railroad and most major bus lines have already taken the positive step of making schedules available as General Transit Feed Specification (GTFS) feeds, which are used in Google Maps and other trip planners, setting an example for smaller bus lines to follow. Rail and bus lines can also leverage the dramatic innovations underway in “shared mobility,” including working with ridesharing and “microtransit” providers to make doorstep-to-doorstep travel on a single ticket more widely available. Such innovations can help foster creative solutions to gaps in service explored in this paper without major capital investment.

Amtrak’s ambitious plans for its major terminals, most notably at Chicago Union Station and New York Penn Station, and its longstanding partnerships with state governments, create opportunities to expand corridor development with an emphasis on intermodal connections. Momentum behind Florida’s Brightline rail service suggests that opportunities exist for using prospect real estate development around major stations to attract private capital. Lastly, intercity bus lines can build on past success by rolling out business-class services, dynamic schedules created in response to crowdsourcing apps, and more sophisticated pricing strategies akin to those of airlines.

II. Prioritize public resources and technical support to find or create suitable pickup and drop-off locations for express coach operators.

City and state transportation planners have often been agnostic about the problems facing express coach lines with respect to finding attractive locations from which to pick up and drop off passengers. Such a noncommittal stance posed little risk of service cuts when these carriers were rapidly expanding, but this is no longer the case. More assertive steps are now warranted, including planning initiatives to make local transit facilities available, or finding vacant parcels that could be used for off street pickup and drop-off. Cleveland and Detroit serve as role models for other cities. Both have forged agreements that allow express coach carriers to use well-located city bus facilities with basic amenities for travelers.²⁴

III. Follow the examples of Boston, Denver, Washington, DC, and other cities by creating dedicated terminals for intercity bus lines that are centrally located and well suited for connections to public transit services and intercity rail.

Boston, Denver, and Washington have gone a step further than most other cities, creating conveniently located stations that are equipped with waiting rooms and ticket-counter facilities; are connected to their main downtown rail systems; and are used by both conventional and express-coach operators.²⁵ Fees paid by bus lines using these facilities can offset much of the cost. Facilities with the support of public institutions can help alleviate curbside congestion, are visible, and easy to reach. More cities should follow this approach. Boston actually *requires* bus lines to depart from a geographic zone in the downtown area. Philadelphia is planning to build a facility near its main Amtrak station, but construction is still years away.

IV. Improve the potential to provide connections between trains and buses by pushing for improvements to Amtrak's Thruway bus network.

As noted throughout this report, Amtrak has gradually expanded its Thruway bus network. Nevertheless, many "missed opportunities" remain for improving short- and middle-distance travel through expanded bus-rail connecting services. The lost opportunities to build synergy between the country's bus and train systems appear particularly substantial along the NEC and other routes with significant Amtrak schedule frequency. There has nonetheless recently been some positive momentum in this area:

- **CALIFORNIA** remains the "gold standard" for bus-train integration, focusing primarily on routes that connect with corridor trains to fill in gaps in the system. The faster route from the Los Angeles to San Francisco metropolitan areas, for example, involves bus/train Thruway connections.
- **MICHIGAN** launched a program with Indian Trails bus lines in 2016 to coordinate that carrier's schedules with Amtrak, which includes bus-train connections that cover missing links in direct train service, such as Detroit – Grand Rapids, MI, and lightly served routes, such as Chicago – Grand Rapids.²⁶
- **OREGON** has six daily Thruway buses to complement its three trains between Eugene and Portland. These buses give travelers a wider choice of pickup points and are timed to provide efficient connections to Amtrak's Portland – Seattle trains.

As noted earlier in this report, Amtrak earlier this year added several new routes that provide travelers alternative options to reach Allentown, PA, Phoenix, AZ, and other underserved metropolitan regions. Other opportunities, however, remain untapped. Although regulation prevents Amtrak from selling bus tickets for trips that do not involve train connections, many opportunities exist for greater bus/rail integration, which can allow rail corridors to expand their geographic reach at only a modest cost. The above examples show how strategically placed bus service can give passengers on corridors with limited frequency greater range options.

V. Push federal officials to develop new strategies to manage the multijurisdictional complexities that prevent coordinated planning between states and regions around the development of intercity rail corridors.

In sharp contrast to planning for travel *within* metropolitan regions, there are few policies in place to support institutions working to enhance transportation services *between* metro regions, particularly on routes that require numerous states to work together. This problem is a central theme of the Transportation Research Board’s recently published *Interregional Travel: A New Perspective for Policy Making* (Special Report 320), which calls for “state-of-the-art analytical tools for planning and prioritizing interregional transportation investments to support effective decisions.”²⁷

Such tools could include programs for coordinated, multi-state planning initiatives for service expansion, eliminating choke points in the rail system that affect large geographic regions, and integrating bus and rail service to maximum advantage. The Northeast Corridor Coalition and the Northern New England Passenger Rail Authority serve as examples of how such multijurisdictional planning can work to enhance service between states. Strengthening federal policies to support the work of such coalitions could help with new corridor development throughout the country, Amtrak’s capital plan for the Midwest, the ambitious CrossRail plan proposed by the Midwest High Speed Rail Association to enhance traffic flow in Chicago, and other initiatives. Similarly, federal officials should make collecting accurate data on intercity traffic levels—including intercity bus traffic—a priority, another recommendation of the TRB report. Such data are needed for effective investment and policymaking—and to give the intercity bus greater visibility in long-range planning initiatives.

APPENDIX A: Estimates of Intercity Travel Between Metropolitan Areas

Estimates were made to fill the gap resulting from the absence of a reliable dataset on the amount of travel between most metropolitan regions in the United States. The gap stems largely from the federal government’s discontinuance of the American Travel Survey, which was last administered in 1995. The data team developed a simple statistical model to estimate traffic in city pairs. This model was calibrated using the travel estimate from Multimodal Interregional Passenger Travel Origin Destination Data, compiled by the Federal Highway Administration.

The study team applied data from the federal Multimodal Interregional Passenger Travel Origin Destination Data to a statistical model. The model is a “gravity model” that considers the population of the metropolitan regions, the distance separating them, and other variables. This basic gravity model was used as a starting point.

$$1. \text{ Passenger traffic} = \frac{k (P_1 P_2)}{d^b} + e$$

- P₁: Population of the first city
- P₂: Population of the second city
- d: The distance separating them
- k: A constant
- b: A parameter measuring the rate of transport “friction” associated with travel between two locations
- e: Error term

The variable *b*, or “friction,” reflects the rate at which travel demand diminishes as distance increases. This will depend on the cost, speed, and hassle associated with travel. (See Haynes and Fotheringham, 1984.) More sophisticated models, of course, consider many other variables, such as socio-economic, demographic, and geographic factors, while still drawing upon this fundamental size/distance relationship. Even so, as shown below, using the simple model described is a valuable exercise that can provide new insights and point the way for additional research.

This basic model was expanded to consider the region (R) in which the corridor lies and whether or not it was interstate or intrastate route (I). The enhanced “gravity model” formula is shown in equation 2. I and R were used as part of interaction terms in the model. The population of metropolitan areas is based on 2016 U.S. Census estimates. Only metropolitan statistical areas (MSAs) with populations of 100,000 or more were considered. Travel distances were based on highway mileage. The population of each MSA, and their respective distance to Chicago for certain routes, appears in *Table 2*.

The gravity model is based on the following formula:

$$2. \text{ Passenger traffic} = \frac{k (P_1 P_2)}{d^b} \quad +/- \quad \frac{R_i (P_1 P_2)}{d^b} \quad +/- \quad \frac{I (P_1 P_2)}{d^b}$$

P1:	Population of the first city
P2:	Population of the second city
d:	The distance separating them
k:	A constant
R:	The region in which corridor lies
i:	An indicator of whether the corridor is an intrastate or interstate route
b:	A parameter measuring the rate of transport “friction” associated with travel between two locations

Regression analysis ($R^2 = .83$) revealed a coefficient of b of 1.56. Regional differences and adjustments to account for differences in intrastate and interstate trips were also determined through regression. The model suggests a reasonably good estimate of the variability of traffic in the corridors.

Perhaps the greatest weakness of using this approach to compare corridors is that it utilizes only the second step of what is traditionally a two-step travel estimation process. Similarly, the model ignores the local-specific effects of income levels, population growth, and affinity factors that will affect travel, such as the presence of colleges and universities, patterns of commerce, and the ethnic settlement patterns of years ago. Although the region (R) variable accounts for some of these differences, additional variables would likely increase the accuracy of the model.

The simplicity of this approach nonetheless offers two important advantages: i) it avoids mixing data from different sources, which can introduce biases related to timing issues and differences in the way information is collected; ii) it allows for comparisons in way that is transparent and has results that are easy to replicate. At a minimum, the gravity model approach can be a jumping-off point for future analysis and can serve as a useful tool to illustrate complex demand-forecasting concepts to policymakers.

APPENDIX B: Criteria Used to Assess Service Availability

Amtrak and express coach service were considered as being viable unless they failed some minimal criteria. Trips involving middle-of-the-night arrivals and departures were included. Those with only one daily train or bus, as well as those requiring two transfers were included, as were Amtrak Thruway services. Four types of routes and schedules, however, were deemed non-viable and excluded:

1. Those with an average speed of less than 25 mph, based on the mileage of the highway route recommended by Google Maps.
2. Amtrak Thruway connections that involved middle-of-the night transfers, defined as those involving waits during the interval between 11:30 p.m. and 5:30 a.m., or those involving waits of four hours or more.
3. Trips that required travelers to buy separate tickets for different legs of the journey. For example, the Las Vegas – San Diego trip, which requires using Amtrak on one leg and BoltBus on the other, each requiring a separate reservation, was not included.

The travel times are based on bus schedules between the larger of the two metropolitan areas, by definition having a population of at least one million, to the small one, having a population of 500,000 or more. Akron, OH, is excluded from the results shown on Table 3 due to its close proximity to Cleveland

(39 miles). Similarly, Worcester, MA, is excluded due to its proximity to Boston (49 miles). More details on Amtrak's Thruway service to Phoenix is provided in the endnote section.²⁸

APPENDIX C: ANNOTATED MAPs ILLUSTRATING GROUND TRANSPORTATION GAPS

- a. Notable underserved routes to/from Chicago
- b.. Notable routes from Columbus, Ohio, lacking both Amtrak and express coach service
- c. Notable routes from Phoenix, Arizona, lacking both Amtrak and express coach service

Figure 4A

Notable Gaps and Underserved Routes to/from Chicago with limited Amtrak/Express Coach Line Service

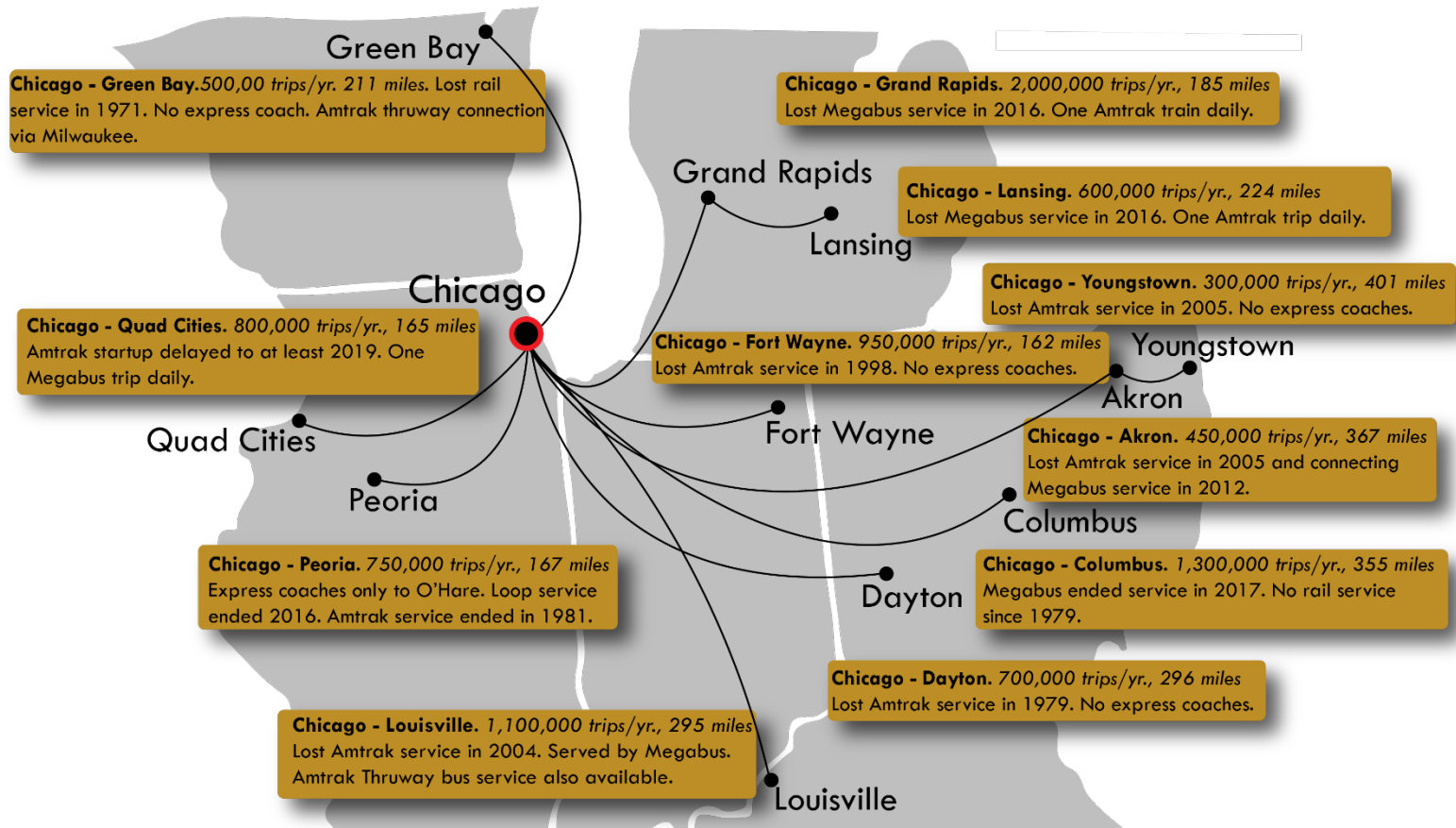


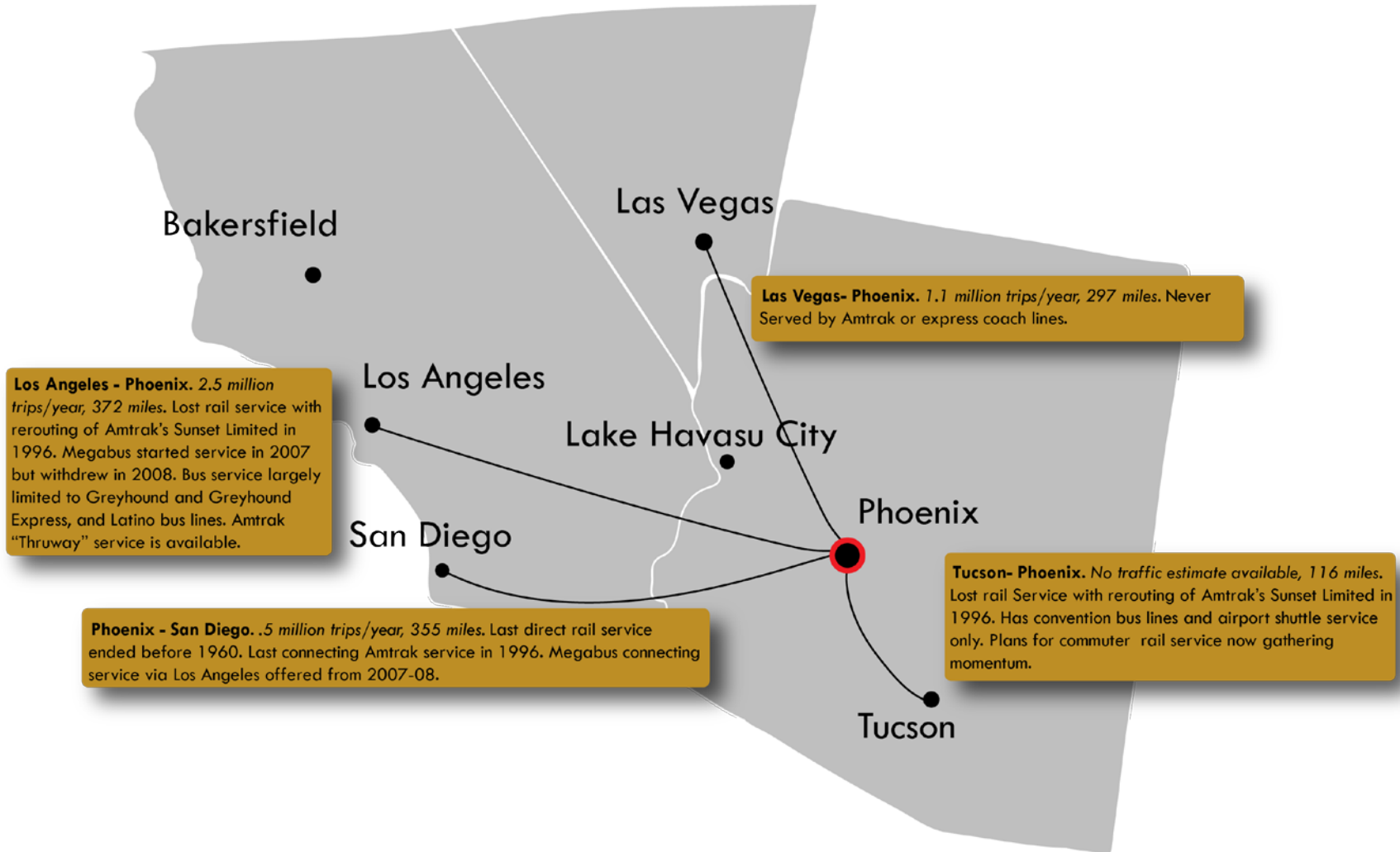
Figure 4B

Notable Routes to/from Columbus, Ohio lacking both Amtrak and Express Coach Line Service



Figure 4C

Notable Routes from Phoenix, Arizona lacking both Amtrak and Express Coach Lines



REFERENCES

1. Florida Department of Transportation. (2009). *Florida Intercity Bus Service Needs Assessment and Action Plan. Florida Intercity Bus Service Tech Memo One: Baseline Conditions*. Retrieved from www.fdot.gov/transit/Pages/FloridaIntercityBusBaselineConditions.pdf
2. Grengs, Joe. (2009). *Intercity Bus and Passenger Rail Study: Prepared for the Michigan Department of Transportation*. University of Michigan Department of Architecture and Urban Planning.
3. Hall, David. (2013). The Intercity Bus Renaissance: One Company's Experiences, *TR News: A Publication of the Transportation Research Board*, 303 (May/June 2013, pp. 11–16).
4. Higgins, Laura, Jeff Warner, Curtis Morgan, and Philip Dunham. (2011). *Examining Long-Distance Express Buses as an Extension of and Feeder to Passenger Rail Systems*. University Transportation Center for Mobility, Texas Transportation Institute, The Texas A&M University System.
5. Klein, Nicholas J. (2009). Emergent Curbside Intercity Bus Industry: Chinatown and Beyond. *Transportation Research Record: Journal of the Transportation Research Board*, 2111 (pp. 83–89).
6. Klein, Nicholas J. (2015). Get on the (curbside) bus: The new Intercity Bus. *Journal of Transport and Land use*, 8(1), (p. 155).
7. McGuckin, N. (2013). *Intercity Travel Market Analysis*. Prepared for Committee for a Study of Intercity Passenger Travel Issues and Opportunities in Short-Haul Markets. Retrieved from <http://www.travelbehavior.us/Nancy--ppt/Intercity%20Travel%20Market%20Analysis.pdf>
8. Scott, Marcia, Eileen Collins, Arthur Wicks. (2013). *Curbside Intercity Bus Industry: Research of Transportation Policy Opportunities and Challenges*. University of Delaware, University Transportation Center.
9. Schwieterman, Joseph and Lauren Fischer. (2012a). Competition from the Curb: Survey of Passengers on Discount Curbside Bus Operators in Eastern and Midwestern Cities. *Transportation Research Record*, 227 (pp. 49–56).
10. Schwieterman, Joseph, Frederick J. Klein, and Alexander Levin, *Direct to Your Destination: The Size, Scope and Competitive Status of Express Coach Carriers in the United States*, DePaul University working paper, 2017.
11. Schwieterman, Joseph, Scott Smith, and Riley O'Neil, *Stuck in the Middle: Setbacks in Intercity Bus and Rail Service in an era of Lower Cost Fuel*, Chaddick Institute working paper, 2017.
12. Schwieterman, Joseph and Lauren Fischer. (2012b). The Decline and Recovery of Intercity Bus Service in the United States: A Comeback for an Environmentally Friendly Transportation Mode. *Environmental Practice*, 13 (pp. 7–15).

13. Schwieterman, Joseph, Brian Antolin, Alexander Levin, Matthew Michel, and Heather Spray. (2016). *The Remaking of the Motor Coach: 2015 Year in Review of Intercity Bus Service in the United States*. Chaddick Institute for Metropolitan Development, DePaul University.
14. SRF Consulting Group, Inc. (2010). *Intercity Bus Network Study, Final Report*. Prepared for Minnesota Department of Transportation.
15. Stagecoach Group Ltd., *Preliminary results for the year ended 29 April 2017*.
16. Transportation Research Board. (2016). *Interregional Travel: A New Perspective for Policy Making*. Transportation Research Board Special Report 320.
17. Woldeamanuel, Mintesnot, Evaluating the Competitiveness of Intercity Buses in Terms of Sustainability Indicators, *Journal of Public Transportation*, 15, No. 3, 2012 (pp. 77–96),
18. U.S. Energy Information Administration.
www.eia.gov/dnav/pet/pet_pri_gnd_a_epm0_pte_dpgal_a.htm

¹ In some routes, such as the Chicago – Milwaukee “Hiawatha Corridor”, Amtrak does not offer guaranteed seating but does offer guaranteed boarding for passengers with a ticket on a particular train. In rare circumstances, some passengers are required to stand.

² The higher fuel consumption of bus and train travel compared to other modes can be found in Woldeamanuel (2012).

³ Estimates of mode-share by trip distance are relatively dated due to fact that the American Travel Survey has not been conducted in many years. Among the most detailed breakouts available are by Nancy McGuckin (2013), whose analysis shows that around 95% of trips less than 200 miles were made with private vehicles. These estimates are based on the American Travel Survey from 1995. For an analysis this data, see *Interregional Travel: A New Perspective for Policy Making* (2016), p. 27.

⁴ See *Interregional Travel*, pg. 27. Estimates by the Bureau of Transportation Statistics for travel in 2001 are also available, although these figures have less-precise breakouts for distance than McGuckin and are reported on a roundtrip, rather than one-way, basis.

www.rita.dot.gov/bts/sites/rita.dot.gov/bts/files/publications/highlights_of_the_2001_national_household_travel_survey/html/table_04.html

⁵ The Chaddick Institute collected a data set of all schedules operated by BoltBus and Megabus in early 2015. This showed that more than 90% of routes (which often consist of several intercity segments) are in the 120 – 400 mile range. Please contact the study authors for details.

⁶ Several examples suggest express coach lines often do poorly on routes less than 120 miles. Amtrak has no express coach bus competition on the Los Angeles – San Diego route (119 miles); both Megabus and BoltBus withdrew from this route after serving it for relatively brief periods. The Oakland – Sacramento “Capitol Corridor” (82 miles) has nine Amtrak trains each way daily but just one Megabus. On the Chicago – Milwaukee corridor (90 miles), the pair of Megabus daily trips (although as many as four in summer) compete with Amtrak’s seven. Megabus typically has three departures in each direction between Harrisburg and Philadelphia, whereas Amtrak has 14. New York – Philadelphia (90 miles) has much more competition owing to the fact that train fares for same-day travel often exceed \$50, far more than most other comparable routes. Even on this route, however, express

coach bus lines run less frequently than on less-densely traveled (but longer) routes, such as Washington, DC – New York to Boston.

⁷ See Schwieterman and Fischer (2012a), p. 53. This study finds that just 14.1% of Megabus travelers would take a conventional bus line such as Greyhound if Megabus service were not available. This result is based on a survey administered to 750 Megabus travelers at pickup points in six cities.

⁸ Survey results consistently show a tendency for intercity bus lines to serve lower-income travelers and those without employment. See especially Grengo (2009) and Florida Department of Transportation (2009). Schwieterman and Fischer (2012b) also find that express coach lines serve younger passengers than conventional bus lines such as Greyhound.

⁹ The survey in Schwieterman and Fischer (2012a) indicates that 17.9% of Megabus travelers in the Northeast would switch to Greyhound if Megabus service were not available, versus 10.2% in the Midwest. This difference is notable considering that Amtrak is much more prevalent in the Northeast, giving passengers more options to conventional bus service. Despite this rail competition, more express coach riders in the Northeast consider conventional buses to be their next-best option.

¹⁰ See Woldeamanuel (2012) for a summary of some of the research illustrating the mobility and sustainability benefits of intercity bus travel.

¹¹ This information is obtained from Bureau of Transportation Statistics, Table 1-40: U.S. Passenger-Miles (Millions)

¹² “Delays Persist for U.S. High Speed Rail,” *New York Times*, August 8, 2014.

<https://www.nytimes.com/2014/08/07/us/delays-persist-for-us-high-speed-rail.html>

¹³ *Ibid.*

¹⁴ “Has High Speed Rail Been Derailed?” *Govtech.com*. May 13, 2013.

<http://www.govtech.com/transportation/Has-High-Speed-Rail-Been-Derailed.html>

¹⁵ For a chronology of the industry’s development, see Joseph Schwieterman, *The Decline and Revival of Intercity Bus Service*, *TR News: A Publication of the Transportation Research Board*, 303 (May/June 2013), 4–15.

¹⁶ See Hall (2013).

¹⁷ See Schwieterman (2013).

¹⁸ This data is summarized in Schwieterman, Joseph, et. al. (2016). *The Remaking of the Motor Coach: 2015 Year in Review of Intercity Bus Service in the United States*, pgs. 13–19.

¹⁹ U.S. Energy Information Administration. www.eia.gov/dnav/pet/pet_pri_gnd_a_epm0_pte_dpqal_a.htm

²⁰ Data from Bureau of Transportation Statistics: *Annual U.S. Domestic Average Itinerary Fare in Current and Constant Dollars*:

https://www.rita.dot.gov/bts/airfares/programs/economics_and_finance/air_travel_price_index/html/AnnualFares.html

²¹ The difficulty of finding pickup/drop-off locations in New York City is described in a *New York Times* article on March 11, 2013. www.nytimes.com/2013/03/11/nyregion/critics-see-city-action-to-rein-in-discount-bus-lines.html

²² The decline could also be precipitated by changing preferences due to rising discretionary income. To the extent that bus and train service are inferior goods – meaning they are used less frequently as income rises – rising disposable incomes may be having an adverse effect, although this observation is speculative.

²³ Based on analysis of data in Federal Highway Administration. *Multimodal Interregional Passenger Travel Origin Destination Data*, compiled by the Federal Highway Administration. Consult the authors for details. Available at <https://www.fhwa.dot.gov/policyinformation/analysisframework/03.cfm>

²⁴ For a discussion of the benefits of operating out of a transit center in Cleveland, see *Cleveland Plain Dealer*, August 1, 2013. www.cleveland.com/metro/index.ssf/2013/08/megabus_now_operates_out_of_rt.html

²⁵ Denver presently does not have express-coach service based on the criteria used in this study.

²⁶ Michigan’s expansion of the Amtrak Thruway network is described in the Indian Trails press release by Indian Bus Lines, “Trails’ Entire Bus Network Now Connects with Amtrak”, issued on March 1, 2016. www.prlog.org/12623505-indian-trails-entire-bus-network-now-connects-with-amtrak.html

²⁷ *Interregional Travel*, p. 8

Publication note: KH edited version

²⁸ Amtrak has long offered daily Thruway bus connections between Los Angeles – Phoenix, a service provided via connections to the Southwest Chief route in Flagstaff, AZ. This service did not meet criteria for inclusion in the analysis on account of having an average speed below 25 mph and the requirement that passengers make a

middle-of-the-night connection. In May 2017, Amtrak added a new Thruway connection via Maricopa that is considerably faster and more direct. Although this service also requires a middle-of-the night connection, and is only available three times per week, it constitutes a notable new option for travelers. Moreover, the westbound trip involves a connection at a more convenient time.