

Tending to Transit:

The Benefits and Costs of Bringing Public Transport in the Chicago Region into Good Repair

Chaddick Institute for Metropolitan Development



December 3, 2012

Joseph P. Schwieterman, Ph.D.*

Laurence F. Audenaerd, Ph.D.**

Marisa Schulz***

*Professor, School of Public Service and Director, Chaddick Institute

Visiting Scholar, Chaddick Institute *Assistant Director, Chaddick Institute

Schwieterman, the corresponding author,
can be reached at jschwiet@depaul.edu or 312/362-5732

EXECUTIVE SUMMARY

The Chicago region has thrived on well-integrated transportation systems to support its global-oriented economy. Financial support for maintaining these systems, however, has become unstable and inadequate in recent years. This study explores the current status of public transit within the Chicago region, as well as the costs and benefits of bringing the system into a state of good repair.

By evaluating available data and research, the analyses indicate the following:

- ***Demand and Support for Transit Service is Strong:*** After several years in which passenger traffic was hurt by recession, transit ridership is growing much faster than the rate of GDP expansion. Use of transit is more than 5% higher than it was in 2010—one of the largest increases since 1999—while regional attitudes toward supporting investment in improvements is strong.
- ***Investment in State of Good Repair Has Been Shown to Yield Positive Returns:*** Each dollar invested in transit generates \$1.21 - \$1.90 in benefits such as direct labor effects, regional mobility effects, household savings from reduced auto usage, reduction in highway accidents and improved air quality. Additional benefits not included relate to factors that cannot be effectively measured, such as the benefits of induced physical activity and the role of transit in tourism and in shaping the global identity of the city.
- ***Transit Contributes Positively to Property Values and Employment:*** Proximity to major transit corridors contributes 5- 20% to property values in the region. Bringing transit into a state of good repair also provides an estimated \$1.5 billion in annual benefits by giving employers access to a larger and more qualified workforce pool. Regional models show direct job gains upwards of 41,000 as a result of these improvements.
- ***Backlog of Capital Projects Continues to Grow:*** The condition of the transit system has been continuously deteriorating due to the chronic shortfalls in capital investment. The recent downturn in investment has left the system's needs, adjusted for inflation, approximately 20% greater than they were just two years ago. Without additional investment, system performance will likely be seriously impaired.
- ***Transit System Requires a Predictable Funding Stream for Capital Investment that Provides a Minimum of \$2 Billion Annually Over a Multi-Year Period:*** With capital funding projected to remain relatively flat, and the federal government becoming an unreliable funding source, additional state government funding will be necessary to bring total capital spending to a level sufficient to avoid further deterioration.

These findings provide a strong justification—and urgent need—for greater capital investment. If the region only maintains current levels of financial support, the system will see increased failures in infrastructure and deteriorating vehicle stock, leaving transit agencies to face mounting concern for maintaining operational safety as service quality declines.¹ At the same time, the transit agencies must continue to develop prioritization strategies for such investment based on a clear strategy to maximize the associated societal benefits.

I. INTRODUCTION

Public transit systems require sustained investment to maintain their capital assets. In the Chicago region, however, much public and political discourse surrounding this issue has taken place without a clear understanding of the benefits and costs associated with such investment. As a result, there is a heightened risk that policy will not be properly aligned with the system's needs.

This report takes a critical look at the benefits and costs associated with investments to bring the transit system in the Chicago region into a state of good repair. It considers a wide body of research devoted to this issue and provides new analyses about the payoffs of modernizing the region's bus, rail rapid transit, and commuter rail systems. The paper looks broadly at the evidence of the effects of a well-maintained transit system on the economic health of the region.

The report is organized into four sections. Section II explores the role and status of transit in the region and provides key observations summarizing the condition of the system's equipment, infrastructure, and right-of-way. Section III evaluates the evidence that exists about the benefits and costs of bringing the system into a state of good repair. The final section offers conclusions and recommendations.

The research for this report was conducted in two phases between July and December 2012. The first involved assessing the available research and data used in these reports, as well as reviewing public opinion and cost estimates. The second phase involved statistical analysis and stakeholder discussions to provide new perspective on the issue.

II. The Role and Status of Transit

The Chicago region's transit system, encompassing 735 miles of rail routes and 248 bus lines, is the second largest transit system in the United States when measured on the basis of passenger-miles of travel. This system carries more passengers today than it has at any time in the last 20 years and more *rail* passengers than any other year in the past 40 years.² Rising gasoline prices, worsening congestion, and technological advances improving the ease of transit riding have also helped foster significant ridership gains.³

The Illinois state government has been actively involved in transit planning and investment for most of the past century. Legislators took the pioneering step of creating the Regional Transportation Authority (RTA) in 1974—considered a model for the rest of the country at the time—to provide oversight and financing for the CTA, the commuter rail lines, and the suburban bus system (Schwieterman, et al., 2009). More recently, in 2008, the state amended the act creating the RTA to strengthen its oversight of the system and increase revenues for transit by imposing a higher sales tax rate. Local sales taxes levied only in the RTA counties for several decades have been the predominant source of funds for transit operations. Fares, however, remain the largest source of revenue.

The vitality of downtown Chicago—in which approximately two-thirds of employees arrive to work by bus or train—has also kept transit at the region's forefront. New markets for urban transit have emerged as a result of housing development near the central core of the city.⁴ As noted below, however, the system faces serious challenges, and transit accounts for a diminishing share of total trips

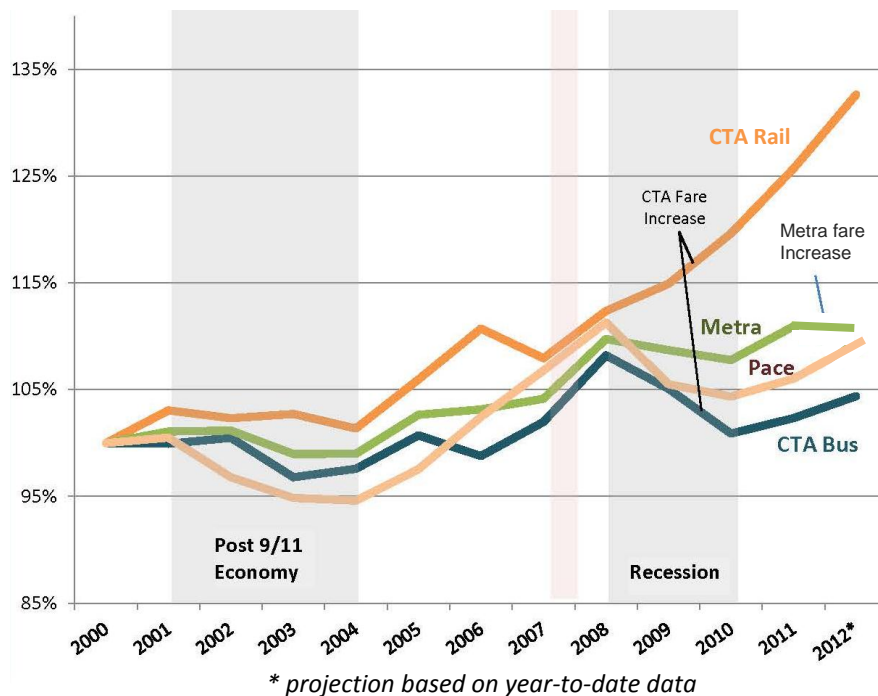
made by travelers, largely due to the growing number of trips that do not involve travel to or from the city of Chicago.

The following five observations highlight key aspects of the Chicago region’s transit system and provide a brief synopsis of the opportunities and challenges associated with bringing the system into a state of good repair.

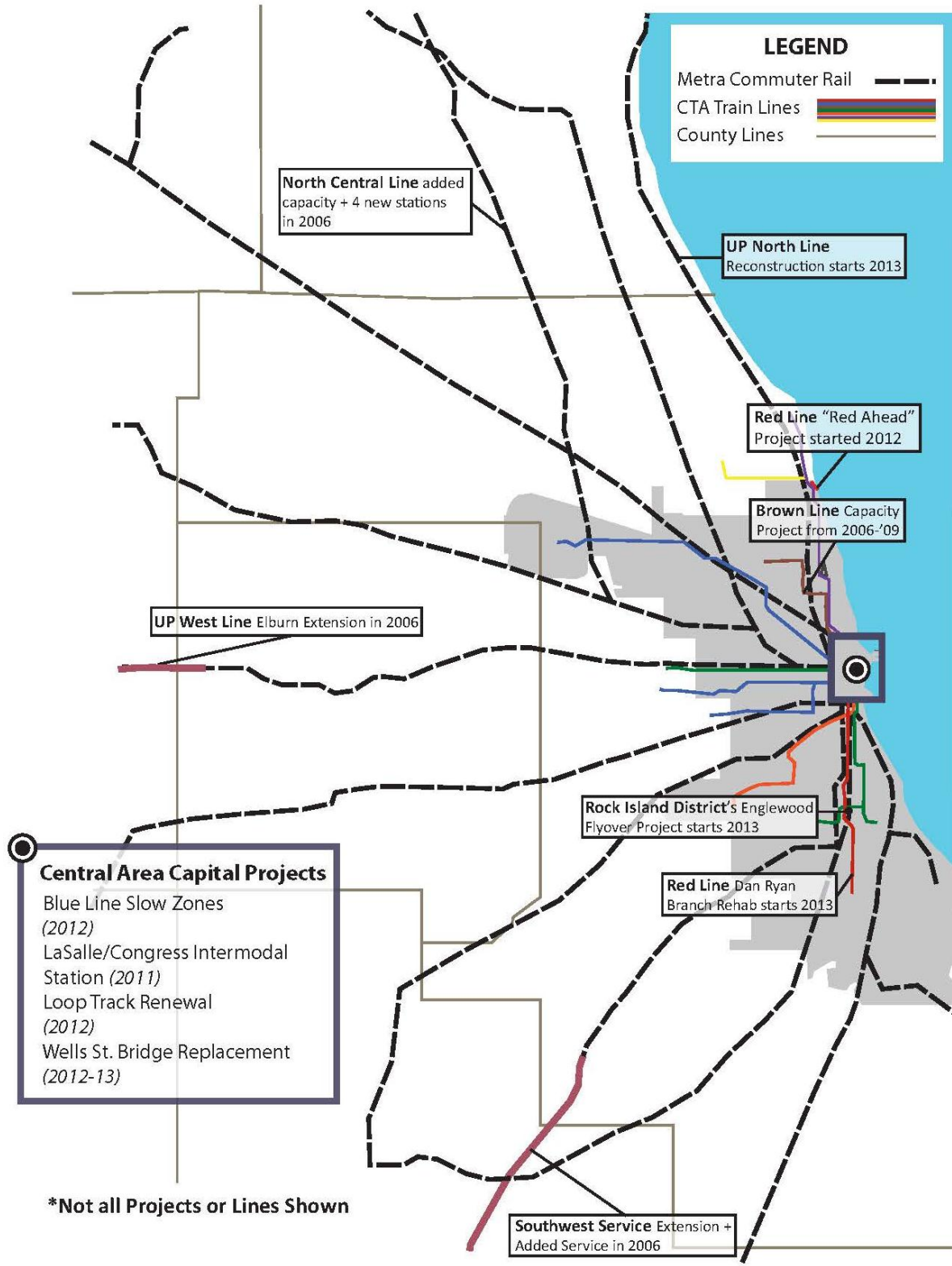
Observation 1: The push to bring the transit system into a state of good repair draws vitality from renewed optimism about the passenger-carrying potential of this system. Transit ridership in the region is more than 5% higher than it was in 2010, restoring the sense of upward momentum that was lost during the recent recession.

Transit ridership has been strong this year at each of the three “service boards” under the stewardship of the RTA, including the CTA, Metra, and Pace Suburban Bus. The CTA is reporting its highest ridership levels in 20 years, with year-over-year gains averaging about 4%. Pace traffic was up about 2% during the first half of this year. Metra posted its third-highest ridership ever in 2011 and is reporting a modest 0.4% decline in ridership so far this year in the wake of a 25% increase in fares beginning in February 2012.

Fig. 1: Passenger Trips on Public Transit Since 2000
Expressed as % of Base Year



MAP 1: Notable Capital Projects on Rail Routes 2006 - present



The increasing transit demand over this past summer and a modest rise in employment suggest that annual growth across the system (by our estimate) will be up more than 2.5% for the second straight year—the first time this has happened since 2000. Such growth is taking place despite soft ridership on certain CTA bus routes.

Overall, the sense of momentum that was lost in 2009 and 2010 as a result of recession-induced ridership declines has been restored. Recent improvements, such as the opening of two new CTA rapid transit stations in May, the elimination of certain slow zones, the impending introduction of bus-rapid-transit service (linking the Loop to South Chicago), and improvements to Bus Tracker and Train Tracker mobile device applications (providing information about vehicle locations and departures to users), bode well for next year's ridership levels. Please refer to *Map 1* for a summary of notable recent capital projects.

Newly collected data suggests that the strength in demand is partially a result of dramatic changes in “travel demand” in the metropolitan region.⁵ Two trends are particularly noteworthy:

First, ***total mileage traveled within the region is growing***. The Chicago Metropolitan Agency for Planning (CMAP) data shows that travel increased by 26% from 1990 to 2008, primarily due to population growth and increases in miles traveled per person. The average person travels about 16 miles daily, with those in outlying suburban areas traveling twice as far as those in central urbanized areas.

Second, ***commuters are carpooling less***. While passenger vehicles (cars and vans) account for 86% of all person-miles traveled, many increasingly see travel as the simple choice between driving alone and using transit. As fuel prices have risen, transit has experienced significant ridership gains.

Observation 2: The Chicago region's system performs well relative to its peer group in other cities with respect to the service provided, the share of cost paid through the fare box, and the efficiency of that service. The system faces serious challenges, however, in serving areas with low population density and in serving markets that do not involve downtown Chicago.

Comparisons show the Chicago region's system ranks highly among 10 peer systems that include Atlanta; Boston; Dallas; Houston; Los Angeles; Miami; New York; Philadelphia; and Washington, DC transit systems with respect to:

Service Coverage: measured by such factors as transit capacity per resident and passenger trips per resident. The region ranks 2nd in the amount of transit service per square mile (RTA, 2012).

Service Level Solvency: measured by such factors as fare revenue per trip and capital expenditures. The region ranks 2nd in the share of costs paid through the fare box, but in the lower half in capital expenditures per capita. The latter measure accounts for the fact that a significant portion of travel occurs outside the competitive service range of the current system.

Service Efficiency and Effectiveness: measured by operating cost per unit of transit capacity and operating cost per passenger trip. The region ranks 4th best with respect to the cost per “unit of capacity” provided.

Most revenues are derived from three sources: i) ticket sales, projected to account for 41% of the total this year; ii) regional sales tax (39%); and iii) the state's Strategic Capital Improvement Fund (12%). The remaining 8% is derived from real estate transfer taxes and other smaller sources. As a result of planned fare increases by the CTA and Metra, fares will remain the dominant source of revenue. Total revenues for the system are projected to be \$3.4 billion in 2012.

On the expenditure side, the CTA accounts for about half (49%) of outlays, followed by Metra (27%), and Pace, inclusive of its Americans with Disabilities Act (ADA) services (12%). Repaying outstanding debt and interest currently accounts for about 9% of revenue, while the remaining 3% of expenses are divisible into smaller categories.

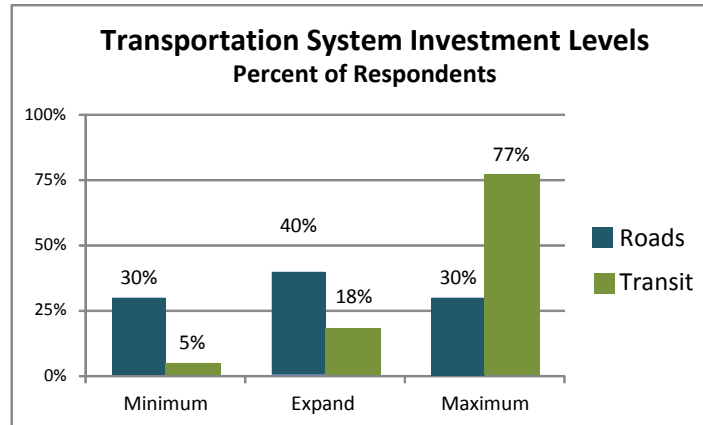
The share of all trips made by transit has gradually fallen over the past several decades. This is partly due to the fact that all rail routes—unlike those of Los Angeles and New York—radiate from downtown Chicago. The appeal of low density suburban settings, rising automobile access, and the mobility afforded by convenient expressway travel have all encouraged growing numbers to inhabit areas poorly served by transit. Although commuter-rail lines and bus lines have gradually expanded, residents living in less-dense parts of the region remain far less apt to use transit service than their closer-in counterparts do.

Social and technological changes, as well as the rising cost of doing business in the Greater Loop, have similarly encouraged businesses to migrate toward the region's periphery. As discussed later in this report, recent data suggests reversal of this trend in some employment sectors as major corporations relocate from the suburbs to the city center (CLA, 2011). Partially as a result of the dispersion of people and businesses into an ever-expanding geographical area since World War II, however, the Chicago region today ranks only 11th in per-capita transit usage (i.e., riders per person) among U.S. cities. Chicago Metropolis 2020, noting that our region's growth in transit usage has greatly lagged behind that of Los Angeles, New York, and other cities, has called for plans to double ridership over the next 20 years (Chicago Metropolis 2020, 2007).

Observation 3: Public support for transit investment remains much higher than support for highway investment. Only one in 20 respondents believe that transit funding should be limited to maintaining the system as it is configured today. Recent policy actions suggest there is strong public opposition to some recent tax increases but not to sales taxes supporting the RTA.

Two recent efforts to solicit citizen opinion about transit indicate that support for transit or transit-oriented investment remains strong among residents across the Chicago metropolitan region. As part of the input for CMAP's *GO TO 2040* plan, respondents expressed considerable support for transit and alternative transportation options, with 95% expressing support for expanding or maximizing investment in transit. Support was much weaker for maximum investment in highways (*Figure 4*).⁶ Respondents also expressed their desire to see more moderate-density development that is more suitable to expanding the role of transit than low-density development (Cervero and Guerra, 2011).

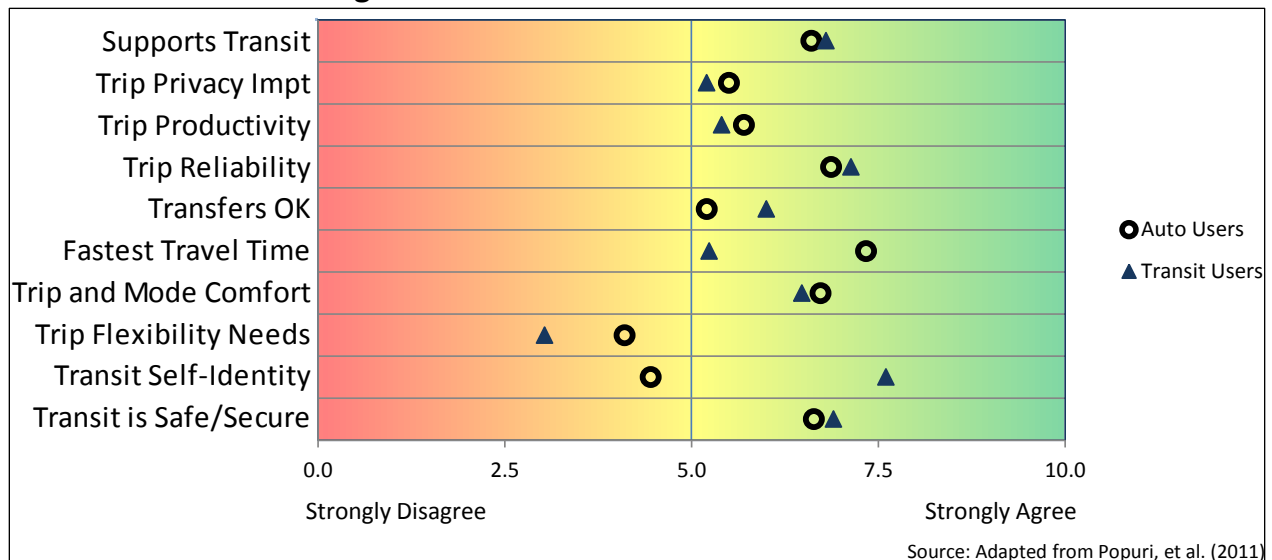
Fig. 2: Public Interest in Transportation System Investment



(Source: CMAP, 2009)

The second survey, conducted by the RTA and evaluated by Popuri, Y., et al. (2011) shows that highway and transit users favor policies to improve the performance of the transit system.⁷ Both groups consider trip reliability and predictability (features common to well-functioning transit systems) more important than privacy and flexibility (features most commonly associated with auto travel), while expressing strong support for transit investment in general.⁸

Fig. 3: Attitudes of Auto and Transit Users



The RTA results are especially noteworthy considering that they suggest that transit investment is viewed favorably in spite of the region’s sensitivity toward higher sales taxes, which became evident during the backlash to Cook County’s one-percent increase in 2009, which is currently being rescinded. No public resistance to maintaining the RTA Sales Tax was voiced, suggesting that the public accepts the current methods of transit finance. Nor has there been extensive vocal opposition to the planned fare increases recently announced by the CTA and Metra.

Observation 4: Enhanced federal and state capital investment between 2008 and 2010 temporarily alleviated crisis conditions on the region's transit system, particularly on the CTA. Since then, combined capital support for the transit system had dropped, with the result being further deterioration of corridors and equipment.

Trends in total funding (both capital and operating funds combined) for the three service boards over the past five years, without adjustments for inflation, appear in *Figures 4-6* below. Capital spending appears as a solid yellow line.

Chicago Transit Authority: A spike in capital funds in 2008 and 2009 allowed for the elimination of many slow zones, as well as the completion of other critical repairs. This temporary increase, resulting from American Recovery and Reinvestment Act (ARRA) funds (followed more recently by state Illinois Jobs Now funds) was not sustained.⁹ Since then, capital funding from federal sources has fallen. The capital funding shown on *Figure 4* are based on budgeted amounts and do not include recent state support from the Illinois Jobs Now program for the Red Line's rehabilitation, which will allow for an increase in overall capital funding this year. Such funding will likely not be available in 2013.

Metra: Total funding for Metra rose between 2008 and 2010, partially due to the sales tax increase, which took effect in 2008. Illinois Jobs Now funds allowed for a capital boost in 2011. Due to the dire situation facing the agency's budget in recent years, however, capital spending is still well below that considered necessary to keep its system in good repair and is projected to fall sharply next year. Total funding for the agency will likely fall this year despite the recent fare hike, while the current fare hike proposal for February 2013, which is projected to raise \$8.3 million in revenue next year, will recover only a small fraction of the capital shortfall.

Pace: Pace experienced a decline in both total funding between 2010 and 2011 and capital funding has been flat. A recent decline in federal funding has been particularly problematic for the agency. Despite this, the agency was able to institute "shoulder riding" service on newly widened shoulders of the I-55 Stevenson Expressway in 2011, an offering that has proven popular among commuters.

The funds needed to bring all three systems to a state of good repair over the next 10 years, based on an estimate by URS Corporation for the RTA (and noted in a report released on September 28, 2012), have risen to \$30.9 billion from \$26.1 billion in 2010. These figures are converted to current dollars. URS made its projection by sampling inventory and estimated that 191 bridges will need renovation by 2019, 42% of rail cars are beyond their useful life, and over a third of Metra stations are in poor condition.

URS estimated the capital needs for the CTA to be \$15.9 billion (60.9% of the total need), Metra \$7.8 billion (30.0%), and Pace \$2.4 billion (9.2%). These estimates were provided in the 2010 URS study and have not been adjusted for inflation. This analysis, together with a capital prioritization tool developed by the RTA, is allowing for the extensive study of the systems short- and long-term needs.

Figure 4: CTA Funding Trends

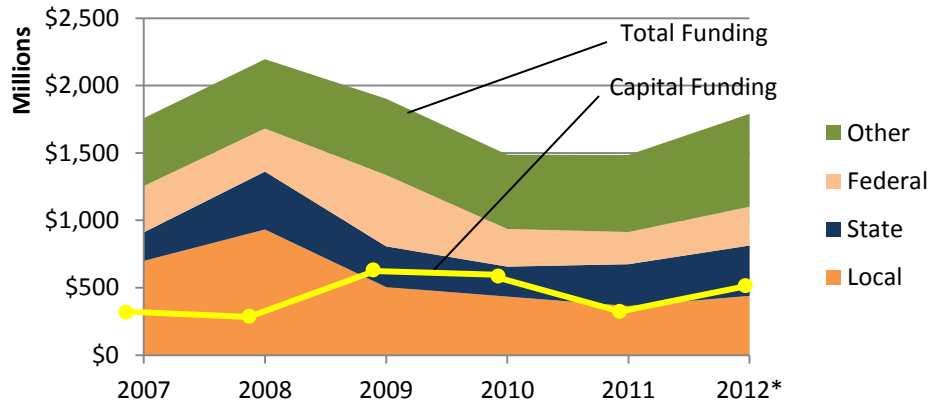


Figure 5: Metra Funding Trends

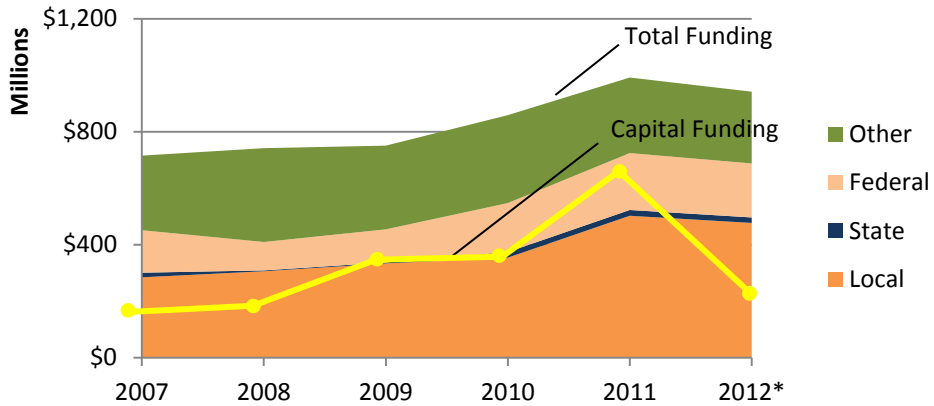
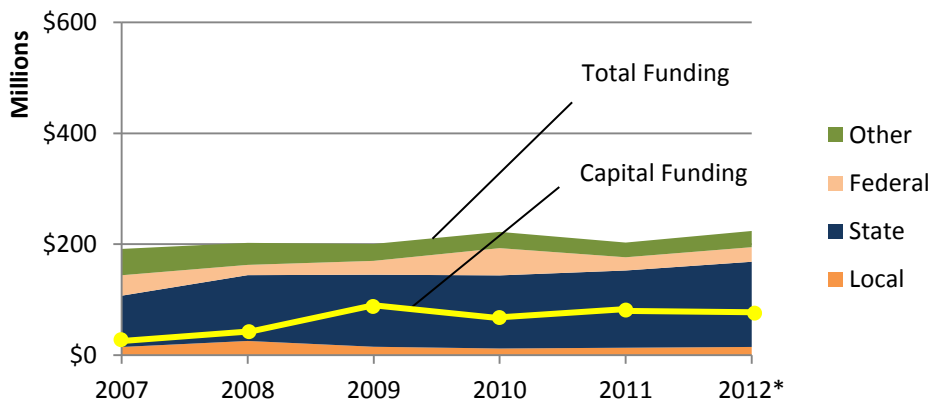


Figure 6: Pace Funding Trends

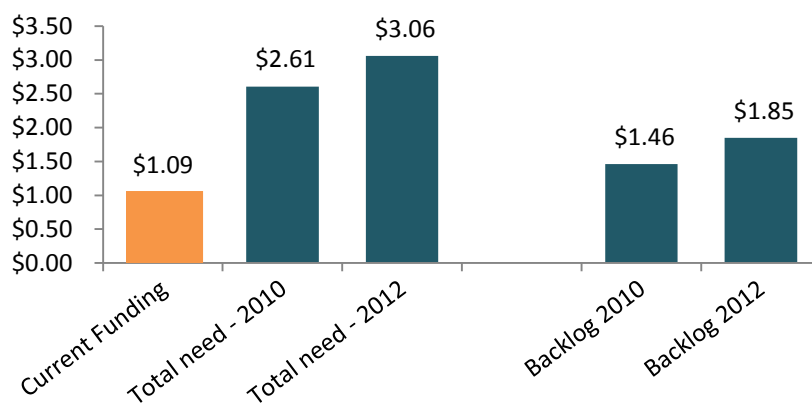


* 2012 totals, based on RTA budget estimates, do not include funds from the issuance of bonds or recent appropriation of Illinois Jobs Now funds for the CTA Red Line. A breakdown by revenue source is not available for this year.¹⁰

We used this information to develop shortfall estimates between annual funding needs and recent appropriations, which are shown below in *Figure 7*. The URS estimates suggest that at least \$3 billion will be needed annually to prevent the backlog from growing. By comparison, capital funding between 2009 and 2011, excluding proceeds of newly issued CTA bonds and the associated interest payments (and not taking into account budgetary transfers to operations), averaged slightly less than \$1.1 billion annually. Moreover, the peaks and valleys in funding create serious problems that make long-range planning for improvements and repairs extremely difficult.

As we discuss in the *Recommendation* section, we believe that, without substantial increases in capital funding, the deterioration of the system will continue. Funds from the Illinois Jobs Now program, from which more than \$500 million were being appropriated in both 2011 and 2012, have been exhausted. This creates additional uncertainties for the future.

Fig. 7: Annual Capital Funding Needs
Ten year planning cycle in billions of current dollars



Source: Cost estimates based on analysis by URS Corporation for the RTA. Current funding estimates provided by RTA exclude proceeds from CTA bonds and do not account for budgetary transfers from capital to operations.

Observation 5: The resulting backlog in capital projects creates a growing risk of declining system performance. As the gap between capital needs and funds widens, agencies are bracing for increased service-quality problems and more system failures.

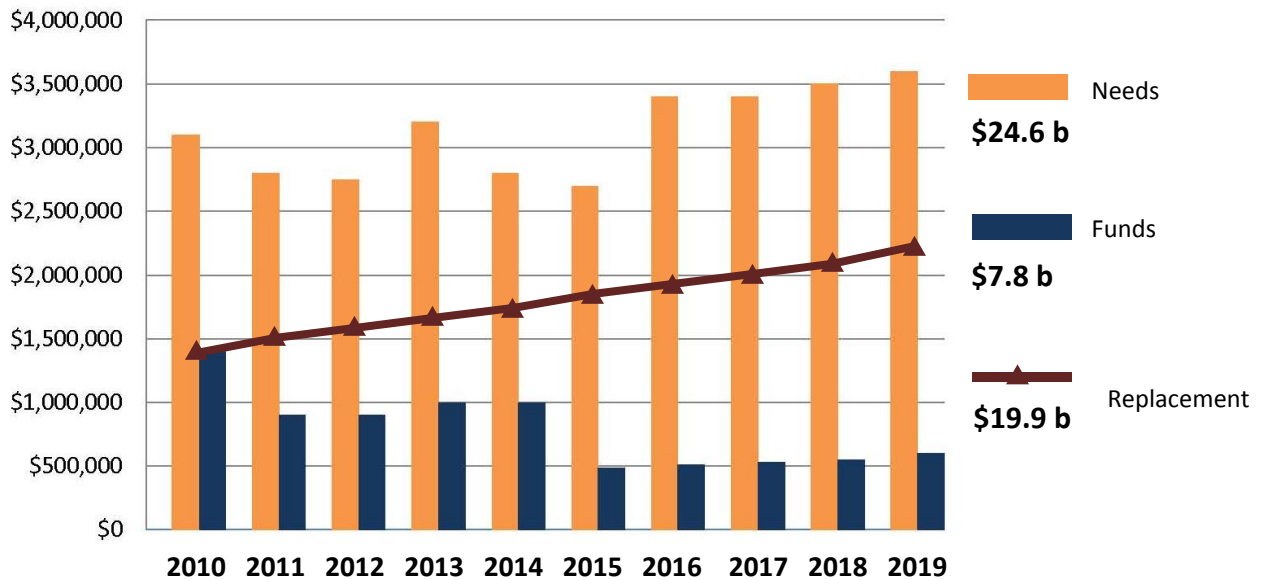
The gap between available funds for capital projects and capital needs is projected to grow worse in 2013, based on budget projection at the RTA. Capital spending is anticipated to remain relatively flat through 2014 and then fall precipitously starting in 2015. Meanwhile, the funds needed to replace assets reaching obsolescence will steadily grow.

The consequences of sustained underfunding for capital investment can be put into perspective considering the case of Metra locomotives. These units are often targeted for rehabilitation after 12

years of service and can, with proper maintenance, often be given a “service life extension rehabilitation” after 24 years that increases their total useful life to 36 years.¹¹ Failure to follow a strict maintenance and rehabilitation cycle, however, diminishes the feasibility of life extension investments and can result in catastrophic failure that cuts the unit’s life by many years. Current funding streams allow for neither full rehabilitation nor unit replacement.

Figure 8: CTA, Metra & Pace 10-Year Total Capital Needs

In Thousands of Dollars



Source: Regional Transportation Authority (2012)

The values provided in Figure 8 should be regarded as estimates. Some assets in which replacement is considered necessary, such as certain stations, may function longer than previously anticipated. Nevertheless, the evidence is compelling that the system’s equipment and infrastructure has deteriorated to a point that the efficiency of operations is being impaired, and that the problem will grow appreciably worse over the next several years.

III. BENEFITS AND COSTS OF BRINGING THE TRANSIT SYSTEM INTO A STATE OF GOOD REPAIR

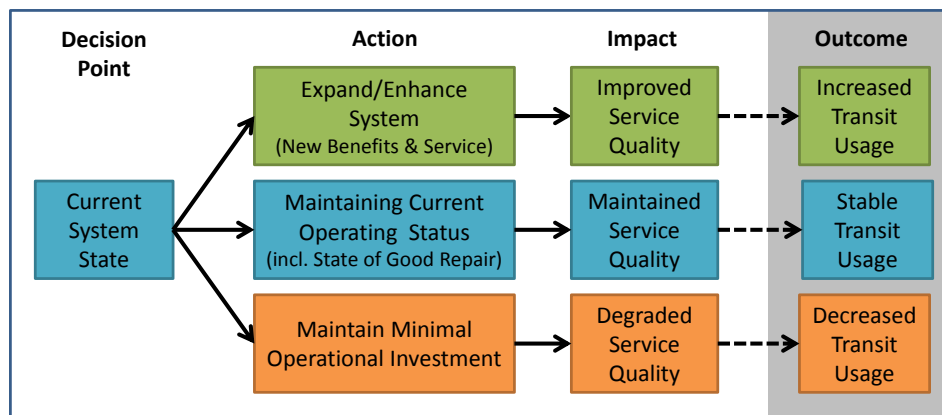
A wide body of research explores the benefits and costs of investment in transit systems. This section, using the results of 30 studies on transit investment—including 12 focusing on the Chicago region—assists the reader in understanding the dynamics of transit investment by:

- analyzing these various studies and the different assumptions made that impacted their findings
- highlighting similar—and conflicting— findings
- discussing important benefit areas that are missing from these types of studies

Despite the differences between the studies, almost all exploring the benefits and costs of transit investment consider three possible scenarios (Figure 9):

- 1) Maintain Minimal Operational Investment:** Adopting a strategy that involves only maintaining operations as they currently exist and not investing in the backlog of maintenance and capital investment. As vehicles and infrastructure extend beyond their service lifetimes, this typically results in increased vehicle failure, service cuts, and rising unreliability.
- 2) Maintain Current Operational State:** Adopting a strategy that involves making additional capital investment to remedy the backlog and service-lifetimes issues identified above *and* to provide reliable service at the current levels. This can help mitigate the degradation of performance.
- 3) Expand/Enhance the System:** Adopting a strategy that involves not only the capital maintenance investments, but also includes funds for enhancements, such as modernized system technology (e.g., GPS bus or rail vehicle tracking), increased or optimized capacity on existing routes, or new route structures. This scenario also allows for the development of new service to areas not currently served.

Fig. 9: Approach Framework for Economic Analysis



These strategies, of course, are simplified characterizations of the choices available to policymakers, but they serve to provide a framework for considering the benefits and costs of various options.

Our review of the available evidence generated the following conclusions:

FINDING 1: Adopting the “minimal investment” scenario will result in ridership losses of at least 15% - 20% relative to today’s levels, as well as additional losses stemming from growth that will not occur. This result is corroborated by recent research about the effects of “slow zones” on the CTA rapid-transit system.

Investing to bring the transit system to a state of good repair is supported by three studies on the region’s transit system, which measure the consequences of allowing for continued deterioration of the system. While somewhat dated, but nevertheless still quite relevant, a large-scale Cambridge Systematics study (1995) projected a 14% - 16.9% decline in ridership from levels after 15 years of sub-adequate investments. The Regional Transportation Authority’s *Moving Beyond Congestion* (2007) estimates a reduction of more than 20% on the CTA and somewhat less of a reduction on Metra and Pace. Chicago Metropolis 2020’s *Time is Money* (2007) estimates a 23.9% decline over 13 years.¹² More recently published studies focusing on other metropolitan areas draw similar conclusions.

Table 1: Estimated Loss in Ridership from System Deterioration	
<i>Studies on Chicago-area transit</i>	
Cambridge Systematics (1995)	14.0% - 16.9% loss within 15 years
Chicago Metropolis 2020 (2007)	23.9% loss by 2020
Moving Beyond congestion (2007)	> 20% loss on CTA; less on Metra and Pace ¹³
UIC study on slow zones (2011)	Ridership decline significant at .01 level

Ridership declines, of course, are affected by many factors in addition to service quality, including low funding, the public image of the transit system, and safety. A “middle ground estimate” that traffic would fall by 15-20%, however, is consistent with studies from other regions (see Litman, 2011, State of Wisconsin, 2006, and TranSystems, 2005).

The sensitivity of passenger demand to service levels is also evident in a 2011 study by the University of Illinois-Chicago exploring the effects of “slow zones” on the CTA rail lines. This study concluded that “delays have a significant effect on ridership” (with a result that is significant at a .01 level of significance) and that “prolonged slow zones... affect ridership to a greater degree.”¹⁴

FINDING 2: Empirical evidence shows that the deterioration of the transit system will impose costs on existing highway and transit users of more than \$500 million annually, primarily as a result of higher travel times and congestion. This equates to at least \$175 per household within the region annually.

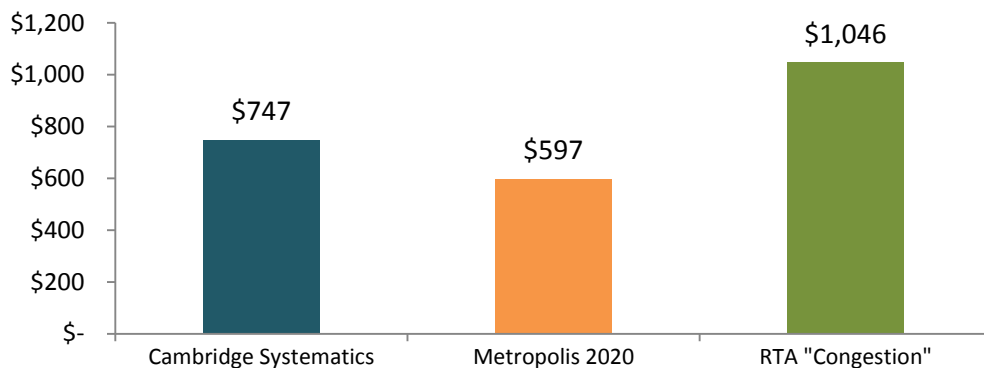
The three aforementioned studies indicate the costs to existing highway and transit users that would result from deterioration of the system, which results in slower transit trips and greater levels of vehicular traffic on the highway system. When adjusted to current dollars, the Cambridge Systematics

estimates the losses at \$747 million per year. Chicago Metropolis 2020 and *Moving Beyond Congestion* place it at \$597 million and \$1,046 million, respectively. None of these estimates includes the benefits from new trips generated by improvements to the system.

To avoid large-scale increases in congestion from the ridership drops on Metra alone, state and local agencies would need to add as many as eight expressway lanes, which, of course, is not a feasible

Fig. 10: Annual Cost of Congestion and Travel Time due to Transit System Detrioration

*Cost to Chicago regions to Existing Users Estimates
in millions of 2012 dollars*



proposition given the present budgetary environment and public attitudinal climate.¹⁵ The aforementioned ridership losses on the CTA and Pace traffic would also greatly add to the burden on expressways, tollways, and city streets.

The changes that have taken place since the estimates were made warrant discussion. Automobile traffic has grown more sluggishly than these studies likely anticipated (delays per rush-hour for travelers have dropped since), partially due to the effects of the recession on employment and rising fuel costs.¹⁶ As a result, the number of hours of motorist delays from less efficient transit service may be less than projected. Conversely, rising fuel costs and increases in the value travelers place on their time have added to the cost associated with each hour of delay. Accordingly, it is unclear whether these estimates *understate* or *overstate* the costs.

Overall, however, the estimates appear to be robustly made and reasonable in size. Economist Jack Wells estimated the cost of *all* highway-related forms of congestion in metropolitan Chicago, excluding airlines and railroads, at \$10.9 billion (in current dollars) in a 2006 federal study. The Texas Transportation Institute estimated regional highway congestion costs in 2010 to be \$8.2 billion annually. Neither study explored how investment in transit could reduce congestion but they did suggest that increases of congestion of around 10% due to declining transit performance are in fact quite reasonable.

FINDING 3: Proximity to extensively used transit corridors increases property values of homes between 5% and 20% in the Chicago region. Changes in the quality of transit can significantly affect the valuation of homes.

A wide body of empirical research focusing on the Chicago region documents links between high-quality

transit service and property values. Using hedonic modeling that takes into account neighborhood factors and home features, this research shows that a home in close proximity to high-quality transit

corridors increases in value by 4% - 15%, and possibly more (See *Table 2A* below). A study by Gruene found that, whether located in lower- or higher-income neighborhoods, being within 1,000 feet of a CTA or Metra station contributes 20% to the value of a home (1999). McMillian and McDonald, economists at the University of Illinois-Chicago, found that the CTA Orange Line’s construction increased home values by at least 4% almost immediately and, over a longer period, by about 19% (2004).¹⁷ A study focusing on two Metra stations in Arlington Heights found that housing prices decreased by \$12,776 with each 100 meter of distance from the station (Chaney, 2005).

Table 2	
Research about the Impact of Transit Investment in Metropolitan Chicago	
Composite Results Eleven Studies and Data Compilations	
<i>Measure</i>	<i>Finding <Study></i>
a. Land Value Impacts	
Impact of CTA rail transit on property values	Between 4.2% and 19.4% <1> <10>
Impact of proximity to CTA or Metra Stations	20% if within 1,000 ft. <7>
Metra in suburbs- case study	fall of \$12,776 with each 100m distance <8>
b. Economic Benefits	
Increased worker output from maintaining system:	\$1.4 billion <3>
Increase in Retail Sales in 2020	\$4.6 billion <5>
Hours saved per household from maintaining system	16 hr. on highways; 5 hrs on transit <3>
Monetary cost savings per capita from transit:	\$998/month for Chicago area residents <4>
Net loss of jobs in the region from deteriorating service:	15,000 <3> 41,209 <5>
c. Environmental and Safety Benefits	
Benefits of reduced accidents (net present value):	\$858 million <2>
Environmental benefits (pollution/GHC):	\$35 million/yr. <3> and \$642 n.p.v. <2>
Reduced parking requirements (net present value):	\$3.4 billion <3>
d. Recent studies and Compilations on Jobs in Downtown Chicago	
Dependence of airline travelers on rapid transit	15% use transit in CTA service area <11>
Employers with main office in downtown Chicago (2010)	12 of largest 30 employers in region <9>
New Jobs Created in downtown region (2011)	10,000 <12>
United Airlines relocation transit use study (2011)	8% before relocation, 94% after <6>

References: <1> McMillen and McDonald (2004) <2> RTA Moving Beyond Congestion (2007) <3> Chicago Metropolis 2020 (2007) <4> America Public Transit Association (2011) <5> Cambridge Systematics (1995) <6> Civic Consulting Alliance (2011) <7> Gruen (1997) <8> Chaney (2005); <9> Crains Chicago Business (2012) <10> McDonald and Oruji (1995) <11> Foote, Labelle, and Stuart (1997) <12> Chicago Loop Alliance (2011)

Simple extrapolation of such numbers suggests that the aggregate benefits with respect to property appreciation are in the tens of billions of dollars.¹⁸ These results, and selected findings from eight other studies looking at the role of transit and development in transit-oriented areas, appear in *Table 2* above.

Local governments have a tremendous stake in this outcome. Not only does the associated tax revenue

support local services, many are exploring value capture strategies to leverage property appreciation generated by transit to help finance local development plans.¹⁹

FINDING 4: A strong and reliable transit system provides employers access to a larger and more skilled labor pool, while enhancing worker productivity. Economic models estimate the job-related benefits of bringing the system into good repair at \$1.4 billion annually and a net addition of 15,000 – 41,000 jobs.

A well-functioning transit system gives employers access to a larger and more highly qualified labor pool. This “economies of agglomeration” creates benefits from firms operating in close proximity to complementary services (Jenkin, et. al, 2011). Statistical models suggest the benefits are at least \$1.4 billion annually within the Chicago region. Studies also place the loss of direct jobs from *declining* service quality at between 15,000 and 40,000 (Table 2).

The benefits are particularly significant to firms in the Central Area of Chicago, which can draw from more than six million workers. A 2011 Chicago Loop Alliance study found that there are currently 510,000 employees within the Chicago Central Area, with more than 85% of these employees in the private and nonprofit sectors. Downtown jobs are disproportionately highly skilled. The five largest accounting firms, 20 of the 25 largest law firms, and the three largest banks are all located within the Loop. Crain’s Chicago business compilations show that 12 of the 30 largest private sector employers in the region have their main offices downtown within walking distance of major rail stations.

A study by the Civic Consulting Alliance demonstrated the role of transit in the relocation of 2,800 United Airlines employees from Elk Grove Village to the Willis Tower in 2011. Prior to the move, 92% of these employees drove to work. Following relocation, 94% used public transit. Similar factors characterized the relocations of Combined Insurance (500 jobs), MillerCoors (300 jobs), Walgreens (65 jobs), and Sterling Financial (50 jobs) to downtown over the last two years. Google and Motorola both plan to move 3,000 workers downtown next year. The proximity of these firms to major transit corridors and stations is evident in Map 2.

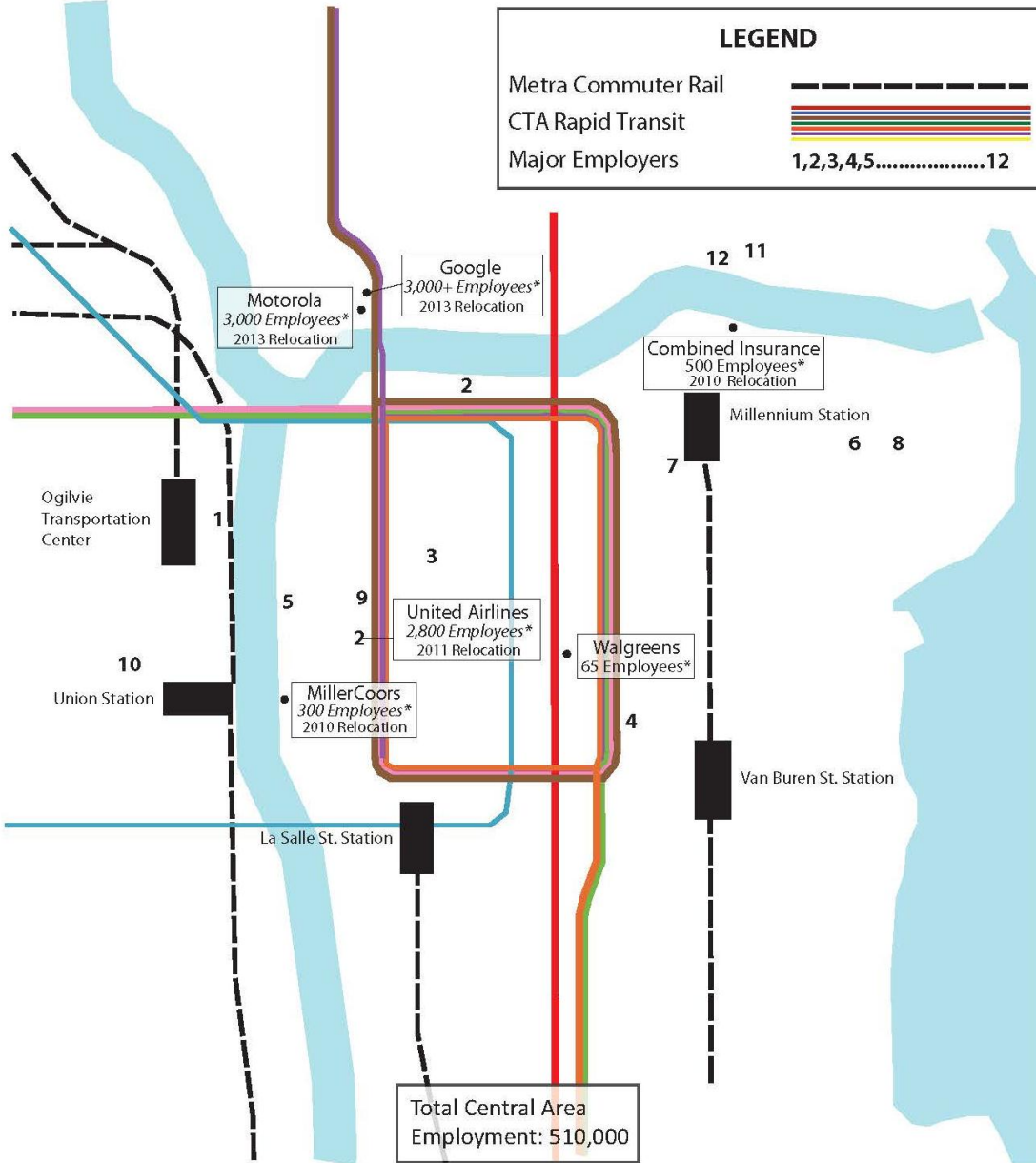
Another employer benefit stems from transit’s role in serving the “reverse commuter”. Metra operates express trains, including weekday trips on the UP North and West lines, catering to city workers commuting to suburban jobs. Many transit users rely on the Shuttle Bug program along Lake-Cook Road to reach Walgreens, Underwriters Laboratories, Baxter, and other corporations. Aon Hewitt uses a private carrier to shuttle employees from two Metra stations (Deerfield and Highland Park) to their Lincolnshire campus. Sears Holdings in Hoffman Estates works with Pace to provide service from the Rosemont CTA Station.

FINDING 5: Cumulatively, the return on every \$1 invested to help bring the system into a state of good repair generates a return of between \$1.30 to \$1.90, not including benefits that are more difficult to quantify, such as those pertaining to health, land-use, and the public image of the region.

The return on investment for transit spending is a focus of a rich body of economic research. These

studies, as noted below, employ different methods and make different assumptions. Their results, however, are relatively consistent across the various scenarios considered.

MAP 2: Major Employers in Downtown Chicago Ranking among the Region's 30 Largest Public Companies



* Number of New Downtown Employees due to Office Relocations

List of Employers Ranking among the Region's 30 Largest Public Companies: Gross Sales > \$4.6 billion With Headquarters or Main Office in Downtown Chicago

- | | |
|------------------------------|----------------------------------|
| 1) Boeing Co. | 7) Smurfit-Stone Container Corp. |
| 2) UAL Corp. | 8) Integrus Energy Group Inc. |
| 3) Exelon Corp. | 9) Ryerson Inc. |
| 4) CNA Financial Corp. | 10) USG Corp. |
| 5) R.R. Donnelley & Sons Co. | 11) Tribune Co. |
| 6) Aon Corp. | 12) Wm. Wrigley Jr. Co. |

Chicago Metropolis 2020 (2007) estimates that each dollar invested in transit returns between \$1.21 and \$1.64. The first lower figure was derived from estimated differences between maintaining the current funding levels and investing in backlogged maintenance and capital programs. The upper bound is derived from comparing the current funding scenario with one based on the benefits of expanding transit while concurrently adopting new land-use strategies, which are beyond the scope of this paper. Metropolis’ estimates are unfortunately derived from a series of highly sophisticated, proprietary models, but provide little detail in the published report.²⁰

Table 3: Studies on Transit Investment Relevant to the Chicago Region	
<i>Studies on Chicago-area transit</i>	
Cambridge Systematics (1995)	\$1 returns > \$3 in benefits
Metropolis 2020 (2007)	\$1 returns 1.21 - \$1.62 in benefits
Moving Beyond Congestion (2007)	\$1 returns \$1.90 in benefits
Ian Savage, Northwestern University (1997)	\$1 cut in total fare revenue from lower fares on CTA returns \$1.12– 19.0 cents in benefits
<i>Studies in other regions</i>	
CUTA/ACTU (Canada, 2010)	\$1 returns \$1.22
State of Wisconsin (2006)	\$1 returns \$3.41
Litman (U.S., 2010)	\$1 returns \$2.79

The *Moving Beyond Congestion* study concludes that every \$1 in investments generates a \$1.90 return, while Cambridge Systematic puts the ratio of benefits closer to \$3 per investment dollar, not including major gains resulting from rising personal income. (We excluded some of the Cambridge Systematics income related multiplier affects since we consider them speculative).²¹ Northwestern University economist Ian Savage estimates that for each 10 cents that revenue is reduced through fare cuts returns 11.8 – 19.0 cents by stimulating use of the transit system (1997).

All three estimates are within transit-research norms. Litman’s (2010) analysis of U.S. cities suggests that every \$1.00 collected in subsidies, fares, and high quality transit returns \$2.79 in benefits.²² The state of Wisconsin estimates a \$3.41 return per dollar invested.²³ For large-scale capital investments in Canada, every dollar invested in transit has been shown to return \$1.22 annually over its lifetime (CUTA-ACTU, 2010). Another study found a new light rail line in Montreal, Quebec returned \$1.11 in benefits for every \$1 spent.²⁴ As some of these other studies focus on new start programs (those involving new systems or extensions of existing systems), one might expect them to show a lower rate-of-return. These findings are also consistent with research showing that Illinois derives large benefits from its rail infrastructure (Audenaerd, et al. 2010).

Both the Chicago Metropolis 2020’s *Time is Money* (2007) and the Regional Transportation Authority’s *Moving Beyond Congestion* (2007) studies include the benefits of reduced numbers of traffic incidents and accidents, including bike and pedestrian accident strikes, which generate significant private and public expenses. As noted below, however, these estimates all exclude certainty of difficult-to-measure benefits.

Finding 6: Most studies on benefits of transit investment do not include measures of health and land use impacts or the role of transit-related development in the “branding” and marketing of cities—benefits that are appreciable in major cities such as Chicago.

A growing body of literature suggests that transit projects have benefits in areas not considered in most of those mentioned above. These benefits are particularly noteworthy in three areas:

1. Ancillary benefits associated with transit-oriented land development and lifestyles:

Increases in transit use improve *air quality* and the *social costs of decentralized land uses*, such as the prevalence of non-permeable pavement that aggravate flooding problems. Transit has been also shown to reduce the public cost of on-street parking, social costs associated with energy usage, and more speculatively, the stability of housing costs (Litman, 2012).

More recently published research focuses on the benefits of the increased level of physical activity associated with transit use, which many posit as beneficial. Studies show that when a commuter shifts from auto to transit, that commuter typically walks an extra 50 miles annually (Kittelson & Assoc, 2003).

2. Benefits to the occasional user: Research suggests the benefits flow from providing transit service to the periodic user, which account for as much as 15% of ridership in the Chicago region (Weyrich and Lind, 2003). Some consider the mere availability of transit an important benefit (even for households that infrequently use it) while others use transit to reach stadiums, entertainment venues, leisure events, and other activities in which travel demand is subject to heavy peaking. In these instances, transit greatly reduces pressures for investment in highways and public parking. Transit’s role in evacuation planning in Chicago also provides an economic benefit (Moulton, 2007).

3. Branding and civic identity: Transit is inseparable from the identity of Chicago. Simply put, Chicago would not be the cosmopolitan city it has become without a well-functioning transit system. The density of downtown, which transit makes possible, and the area’s art and architecture, are inseparable from its image.

Not only do rapid-transit lines handle a significant share of travelers using Midway and O’Hare airport, the Loop Elevated Tracks are a historic backdrop to the economic activity of the urban core. The “L” is an icon and a well-known architectural symbol. Researchers have indicated that this is indeed a recognizable value to users, albeit one difficult to quantify (Popuri, Y., et al, 2011).

Finding 7: Increased investment in projects that bring the system to a state of good repair should be guided by additional analyses showing which projects will generally result in the highest rate of return. The needs are sufficiently large that the CTA, Metra, and Pace should make clear the tradeoffs they face to assure maximal public benefits.

These organizations are much better equipped to deal with complex investments and management of life cycle of capital assets than they were five years ago. The CTA uses two separate computer-aided tools, including a maintenance infrastructure management system, for its vehicles and rights-of-way.

This year, Metra and Pace have stepped up their efforts to assess the condition of its assets.

Our investigation, however, suggests a need for additional materials to inform policymakers about the prioritization projects in the time of growing financial stress. Although published estimates of the backlog of capital projects are compelling, additional details about how limited funds would be spent—and the projected payoffs of these investments—should be part of the process of educating policymakers and the general public.

In addition, our analysis suggests that the benefits of *expanding* the transit system are less clearly documented in the literature than the benefits of bringing the system into good repair. As we explain below, our review similarly suggests a need for additional research about the long-term effects of the underfunding of capital projects.

V. RECOMMENDATIONS

The research conducted for this paper suggested important implications for both public policy and research.

Implications for Policy

CTA, Metra, and Pace should continue to provide safe and high quality service even while confronted with mounting challenges within an aging system. Closing the “infrastructure gap” for transit in the Chicago region, however, will require attention to these three areas:

1. Capitalize on Strong Public Support to Develop Policies that Focus on Bringing the System into a State of Good Repair: After several years in which passenger traffic was hurt by recession, a sense of momentum has been restored to the transit system. Public support for investment is strong, which suggests that the public would support policies to ensure that the transit system remains in a state of good repair once the system is returned to this state.

2. Evaluate and Build Stakeholder Awareness of the Backlog of Capital Projects: The condition of the transit system has deteriorated due to chronic underfunding and a recent downturn in capital investment. Findings released this past September suggest that capital needs are roughly 20% greater than just two years ago. As another crisis in transit funding looms, agencies can do more to educate policymakers about the risks of underinvestment and explore how funding would be channeled to deal with the deterioration of the system. The recent devastation of transit along the East Coast, attributable to Hurricane Sandy, demonstrates the need to have contingency planning for aging systems that are costly to repair.

3. Develop a Predictable Funding Stream for Capital Investment that Provides a Minimum of \$2 Billion Annually over a Multi-Year Period: The evidence suggests the level of support needed to avoid further deterioration of the system and replace obsolete assets is approximately \$2 billion annually over an extended period. (See *Appendix* for estimation sources). This is approximately twice the average level of capital funding of recent years and substantially above the amount of anticipated future funding, which is projected to drop to about \$500 million annually—only 25% of what is needed. Evidence we examined suggests a greater amount could possibly be in order, but such a

conclusion necessitates more data and analysis that is incumbent upon the transportation agencies to document.

The instability of existing funding sources and the rising capital project backlogs highlight the inadequacy of current funding arrangements and the urgency of larger, more reliable, and more predictable monetary streams. The surge in capital funding for public transportation started in 2008 due to ARRA, but proved only temporary. While federal support may remain in the \$400 - \$500 million range, there appears little chance that federal grants will return to ARRA levels due to mounting budget constraints. Although the federal government has demonstrated itself to be an unreliable funding source, it will also need to make transit a major part of the next surface transportation bill. In the short term, however, the prospects for heightened federal funding appear uncertain. Few expect another round of stimulus spending to provide stopgap support for transit's capital needs. Therefore, it is incumbent on the state government to step in and fill the void left by Congress.

In 2011 and 2012, capital funding (not including proceeds from CTA bonds, which must be repaid) totaled \$1.0 and \$1.5 billion respectively, which was above long-term norms but well below the minimum need. During both years, more than \$500 million of total capital support was attributable to "Illinois Jobs Now." This state-funded program, however, is exhausted.

Achieving a high quality state of good repair standard for the metropolitan area's public transportation networks requires significant commitment to leadership and funding from the Governor and the Illinois General Assembly in order to provide the stable, long-term financial commitment necessary to accomplish this goal that has wide reaching benefits.

Implications for Further Research

An opportunity exists to deepen understanding among policymakers and researchers about how bringing the system into good repair can generate public benefits.

1. Conduct Research Drawing upon Newly Available Data to Provide More Up-to-Date Estimates of the Importance of Having Transit in a State of Good Repair: Some of the research reviewed in this report is now quite dated. New research, for example, could help provide a fresh perspective on the costs and benefits of various investment strategies. Not every investment made in the system will have the same effect on the performance of the system. Funds can flow to infrastructure needs or to purchasing new vehicles, or they can be spent to increase speed, improve stations, or enhance reliability. The development of the RTA's Capital Decision Prioritization tool is an important step in this effort.

2. Provide Analysis to Policymakers on Stable and Predictable Funding Sources for the Regional Transit System: As a result of the uncertain outlook for capital investment in transit over the next several years, a pressing need exists to identify and evaluate options for providing more adequate and consistent funding for transit. Previous analyses have focused primarily on the need for funding to resolve periodic financial crises or to provide funding for specific projects rather than providing a systematic look at the alternatives available for putting the transit system's capital program on a solid financial footing over the long term. Such analysis should give policymakers a menu of choices that range from realigning the state's budget priorities to tapping new revenue sources.

3. Use Newly-Available Data and Behavioral Knowledge to Develop Capital Investment Strategies Oriented Toward Increasing Passenger Demand:

CMAP's *Travel Tracker* household travel survey and RTA attitudinal data, reported in Popuri, Y., et al. (2011), are particularly promising sources of data to help policymakers better understand the payoff of investment.²⁵ The data offers an excellent opportunity to explore the effects on different "rider classes," such as people who travel within the city, between city-and-suburb, and connecting to intercity transportation.

The price- and service- elasticity estimates made possible by the survey efforts can help more accurately qualify the effect of investments on the transit system. For example, these estimate can help study how transit operators can take advantage of the downward trend in vehicular ownership. The data provides a method to better understand how the presence of an available vehicle in the household strongly influences a person's decision to drive. Newly available data can also offer perspective on how the branding and image of transit can enhance ridership.

Additional discussion about notable research opportunities to measure the benefits of heightened transit investment can be found in the Appendix on the following page. Details of some of our preliminary analyses using this new data are available upon request.

VI. APPENDIX

a) Estimates of Annual Capital Needs for RTA System

The estimate provided in the Recommendations section— that \$2 billion in annual capital funding will be needed over a multi-year period to avoid further deterioration of the system—is based on evidence from four sources:

1. The Regional Transportation Authority's *Capital Asset Condition Assessment*, prepared by URS Corporation, in August 2010. This suggests a need for more than \$30 billion in capital projects over the next 10 years to keep up with the aging of the system.
2. Estimates in the U.S. Department of Transportation's *State of Good Repair Initiative: Report to Congress*, December 2011. The aggregate estimates provided in this report on the annual capital needs for the U.S. transit system, when apportioned among the country's transit agencies on either the basis of vehicle-miles, passenger miles or unlinked passengers, all suggests that at least \$2 billion annually would be needed over a multiple-year period to avoid further deterioration of the Chicago region's system.
3. A review of 10-year capital spending by the service boards and measures of the system's condition over the period spanning 2001-2011. This data suggests that capital investments in recent years, which have remained well below \$2 billion, have been inadequate.
4. An estimate in the travel-demand model used in the *Chicago Metropolis 2020 Time is Money* study (2007), which estimates that maintaining the system would require \$1.42 billion annually above and beyond that of the present "decline scenario." When put in 2011 dollars, this suggests a need for \$1.98 billion. When expressed in 2012 dollars, the need exceeds \$2 billion.

Additional research, such as an independent cost analysis, would help policymakers develop a more precise understanding of the annual capital needs of the system. On the basis of these and other sources, however, we believe the estimate provided here is conservative.

b) Notable Demand-Oriented Research Suggested by Newly Available Data

A review of the demand-elasticity estimates provided by newly available data suggests promising areas of research exploring the payoffs of heightened transit investment. These estimates allow for new estimates of the benefits of heightened reliability and reduced travel times. The data also suggests, with rates of vehicle ownership declining among younger populations, transit operators have an opportunity to attract many high-intensity users.

The data similarly suggests that an individual's attitude influences his or her decision to choose transit almost as much as the presence of an available vehicle. Using transit is more than a utilitarian choice for many users; many regard it as an extension of their personality and values. For this reason, Popuri et al. suggest that agencies should consider a "friends and family" marketing plan to attract transit users. Similarly, this newly available information suggests that providing highly reliable service and putting customer-friendly services adjacent to major transit stops will make transit more viable for these travelers.²⁶

VII. REFERENCES

- American Public Transit Association (2009). Economic Impact of Public Transportation Transit Cooperative Research Program Report J-11. Transportation Research Board.
- American Public Health Association (2010). The Hidden Health Costs of Transportation. Retrieved from: <http://www.apha.org/advocacy/reports/reports/>
- Audenaerd, L. et al. (2010, May 14). Beyond Transportation: The Economic impact of Rail in Illinois. *Report prepared for Illinois Governor Pat Quinn.*
- Audenaerd, L., Schofer, J., and Boyce, D. (2012). Trade-Space Analysis of Surface Alternatives for Short-Haul Passenger Air Travel. *Transportation Research Record – Aviation.*
- Bailey, L., P. Mokhtarian, and A. Little (2008, February). The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas. ICF International.
- Frank, P. (2010, June). Chicago Regional Household Travel Inventory. Chicago Metropolitan Agency for Planning.
- Cambridge Systematics, Inc. (1995). Investment in Public Transportation: The Economic Impacts of the RTA system on the Regional and State Economies.
- Cambridge Systematics, Inc. (2010, September 21). Regional Transportation Authority Travel Market Analysis. The Cambridge Systematics, Inc.
- Cambridge Systematics, Inc. with Economic Development Research Group (1999) Public Transportation and the Nation's Economy: A Quantitative Analysis of Public Transportation's Economic Impact. American Public Transit Association.
- Cambridge Systematics, Inc. (2008, March) Measuring the Economic Development Benefits of Transit Projects: Proceedings of an Expert Panel Workshop, US Department of Transportation – Federal Transit Administration, Washington, D.C.
- Cervero, R. and Guerra, E. (2011, September) Urban Densities and Transit: A Multi-dimensional Perspective. Paper UCB-ITS-VWP-2011-6, Institute of Transportation Studies, University of California – Berkeley.
- Chaney, H. (2005) Evaluating the Capitalization Effects of Metra Commuter Rail Transit Upon Land Values in the Suburban Chicago Municipality of Arlington Heights: A Tale of Two Stations, A Master's Project. *Submitted to the faculty of the University of North Carolina at Chapel Hill, Department of City and Regional Planning.*
- Chicago Loop Alliance (2011, February). Loop Economic Study and Impact Report. Available at www.chicagoloopalliance.com.
- Chicago Metropolis 2020 (n.d). Various studies including Time is Money: The Economic Benefits of Transit Investment (2007); Building a Great Transit System for the Chicago Region (2007); The Metropolis Freight Plan: Delivering the Goods (2004). Retrieved from www.chicagometropolis2020.org.
- Chicago Metropolitan Agency for Planning (2009, September 2). Memorandum: GO TO 2040 Public Engagement Results.
- Chicago Metropolitan Agency for Planning (2012, July 5). "MAP-21 -- Major Programmatic and Policy Changes."

Retrieved from: <http://www.cmap.illinois.gov/policy-updates/-/blogs/map-21-major-programmatic-and-policy-changes>

CUTA-ACTU (2010) The Economic Impact of Transit Investment: A National Survey. Canadian Urban Transit Association.

Davis, T. and Hale, M. (2007, September). Public Transportation's Contribution to U.S. Greenhouse Gas Reduction, Science Applications International Corporation (SAIC).

Illinois Department of Transportation (2011), Illinois Highway Statistics Sheet. Office of Planning and Programming Retrieved from: http://www.dot.state.il.us/travelstats/2011_IHSS.pdf

Foote, P., Labelle, S., and Stuart, D. (1997). Increasing Rail Transit Access to Airports in Chicago. Transportation Research Record.

Gruen, A. (1997) The Effect of CTA and METRA Stations on Residential Property Values. Regional Transportation Authority.

Jenkin, J., Colella, M., and Salvucci, F. (2011). Agglomeration benefits and transportation projects: a review of theory, measurement, and application. Transportation Research Record.

Kittelsohn & Associates, Inc. et al. (2003). Transit Cooperative Research Program - Report 100: Transit Capacity and Quality of Service Manual, 2nd. Transportation Research Board.

Litman, T. (n.d.) Various studies available at Victoria Transport Policy Institute, Vancouver, B.C. Retrieved from: www.vtppi.org.²⁷

McDonald, J.F. and Osuji, C. (1995). The effect of anticipated transportation improvement on residential land Values. *Regional Science and Urban Economics* 25, pp. 261-268.

McMillen, D. and McDonald, J. (2004). Reaction of House Prices to a New Rapid Transit Line: Chicago's Midway Line, 1983-1999 *Real Estate Economics*, 32:3.

Metaliz, C. (2007, October). Retrieving Transit's Benefits: And Other Advantages of Funding Transit from Land Value, Henry George School Research Note #5a.

Metropolitan Planning Council, *Bus Rapid Transit: Chicago's New Route to Opportunity*, August 2011.

Paaswell, R., Audenaerd, L., and Jafari, M. (1997). Application of Industrial Standards to Bus Maintenance Procedures. *Transportation Research Record - Public Transit*. 1571, pp. 50-55.

Popuri, Y., et al. (2011) Importance of Traveler Attitudes in the Choice of Public Transportation to Work: Findings from the Regional Transportation Authority Attitudinal Survey. *Transportation*. 38:4, pp. 643-61.

URS Corporation (2010, August). Regional Transportation Authority, Capital Asset Condition Assessment.

Regional Transportation Authority (2007). Moving Beyond Congestion: 2007 - The Year of Decision, Regional Transportation Strategic Plan, Regional Transportation Authority.

Regional Transportation Authority (2012, February). Regional Performance Measures – 2010 Regional Peer Report Card, RTA Department of Finance & Performance Management. Available at www.rtachicago.org.

- Savage, I. (1997) Evaluating transit subsidies in Chicago, *Journal of Public Transportation* 93.
- Schwieterman, J. P., & Mammoser, A. P. (2009). *Beyond Burnham: An illustrated history of planning for the Chicago region*. Northwestern University Press.
- Shapiro, R. and Hassett, K. (2005) *Healthy Returns: The Economic Impact of Public Investment in Surface Transportation*. American Public Transportation Association.
- TranSystems Corporation (2005), *Elements Needed to Create High Ridership Transit Systems*, Transportation Research Board TCRP Web Document 32.
- U.S. Department of Transportation (2011, December). *State of Good Repair Initiative: Report to Congress*.
- Washington Metropolitan Area Transit Authority (2011) *Making the Case for Transit: WMATA Regional Benefits of Transit –Technical Report*. Washington Metropolitan Area Transit Authority.
- Wells, J. (2006, November 21). *How Congestion Affect's Chicago's Competitive Position*. [Presentation]. *Presented at the University of Illinois-Chicago*.

¹ Reported by Alexander D. Clifford, METRA during presentation of “State of Good Repair and Beyond: Analyzing Metra’s 2013 Strategic Plan,” at Northwestern University Transportation Center, October 18, 2012

² Rail ridership is up more than 10% since Metra began operations in 1980. These estimates exclude transit use on routes in northwestern Indiana.

³ For a summary of the growing prevalence of portable technology on commuter trains in the Chicago region, and evidence of its significance to growth in ridership, see [Growing Use of Tablets and other Electronic Devices on Commuter Trains: Technology Brief](#), published by the Chaddick Institute in May 2012 and available at las.depaul.edu/chaddick.

⁴ US Census data from 1950 until 1970 indicates a significant migration from City of Chicago to the surrounding suburban region. This effect continued to a lesser extent from 1970 to 1990. The city’s population grew between 1990 and 2000 but has fallen again since 2010. The population living in the central business district, however, has steadily risen since the mid 1990s.

⁵ CMAP’s *Travel Tracker* household travel survey and RTA attitudinal data (reported in Popuri, Y., et al. (2011)) are particularly promising sources to data to help policymakers better understand the payoff of transit investment.

⁶ These results are corroborated by the public interest in creating policy for increasing and maximizing options for transportation alternatives and managing natural resources (90% and 89% of respondents, respectively).

⁷ This analysis considers a wide variety of factors that can affect the choice to travel by auto or transit, such as trip flexibility needs, travel time requirements, and acceptance of modal transfers.

⁸ Part of the reason for the consistency in responses between automobile and transit users is that auto users would prefer to invest in transit to ensure that transit riders remain out of their cars and not add to area roadway congestion.

⁹ Approximately \$100 million of the annual decline in funding since 2008 is attributed to the transfer of certain ADA services to Pace.

¹⁰ Estimates of the division of state, federal, and local revenue is not available. It should be noted, however, that much of the increase in CTA capital funding in 2012 was due to state support. These estimates do not include funds from the issuance of CTA bonds.

¹¹ Reported by Alexander D. Clifford, METRA during presentation of “State of Good Repair and Beyond: Analyzing Metra’s 2013 Strategic Plan,” at Northwestern University Transportation Center, October 18, 2012.

¹² This estimate is derived by adding the losses from the decline (11%) and the normal gains associated with maintaining the system (12.8%), which would not occur if the system declines. The latter estimate was based on a 10% increase in travel time and significant reductions in schedule frequency assumed in the study.

¹³ This estimate is based on a finding in the study that system deterioration would result in the loss of 100 million rides lost on the CTA. This is equivalent to about 20% of total ridership at the time the study was conducted.

¹⁴ The study does not, however, indicate the degree of the traffic loss.

¹⁵ Metra posits that in its report, “State of Good Repair and Beyond: Analyzing Metra’s 2013 Strategic Plan,” that the discontinuation of Metra service would require 29 additional traffic lanes. Assuming proportionality, this suggests (hypothetically) that a 25% drop in Metra ridership would require the construction of slightly more than seven additional traffic lanes. Of course, such extrapolations are relevant only to illustrate the scale of the traffic losses.

¹⁶ 2011 Annual Urban Mobility Report. University of Texas A&M Transportation Center. Available at <http://mobility.tamu.edu/ums/>

¹⁷ The authors also found that some of the relative appreciation may have diminished as the prices of property throughout the city boomed in the late 1990s. The significance of the Line's construction on property values, however, remained large.

¹⁸ An informal estimate of this is made in Chuck Metalitz's "Retrieving Transit's Benefits: And Other Advantages of Funding Transit from Land Value," (see reference section).

¹⁹ See, Transportation Value Capture for the CMAP Region, Chicago Metropolitan Agency for Planning. Available at www.cmap.illinois.gov. This report was prepared in conjunction with S.B. Friedman Associates and other firms.

²⁰ The study used consultants, including SmartMobility, Inc., TREDIS, and Fregonese Associates, to derive these estimates.

²¹ We exclude income-multipliers that contribute to an overall ratio of benefits to costs of more than 7 in this study. We place less weight on a study commissioned by the American Public Transit Association, which estimates that, in the aggregate, the national surface transportation network produces over \$4 in direct benefits for each \$1 in direct costs (Shapiro and Hassett, 2005). This study does not look specifically at the cost of declining transit performance.

²² This value is estimated by showing that for every \$1.00 in fare revenue collected, \$2.58 is required in subsidies to produce high quality transit. In doing so, \$10.00 worth of vehicle operating costs, parking costs and congestion costs are saved.

²³ See Wisconsin Department of Transportation, The Socio-Economic Benefits of Transit in Wisconsin, Phase II: Benefit Cost Analysis (Prepared by HLB Decision Economics Inc.), May 2006.

²⁴ In Vancouver, British Columbia, a proposed network connection linked to elevated light rapid transit was analyzed to indicate that dollars invested returned between \$1.13 and \$1.27 depending on the selected corridor. These values were determined by several proprietary models estimating many of the same measures used above.

²⁵ This analysis is partially based on the US Census *American Community Survey* (ACS) [2005-2007] as well as older regional travel surveys and census data.

²⁶ See "Chicago Top Transit Suburbs," Chaddick Institute Policy Study, July 2012.

²⁷ Litman, T. (2010). *Raise My Taxes, Please! Evaluating Household Savings from High Quality Public Transit Service*; (2010a) *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*. Victoria Transport Policy Institute, Vancouver, BC. (2012) *If Health Matters: Integrating Public Health Objectives in Transportation Planning*. (2012a) *Safer Than You Think! Revising the Transit Safety Narrative*. Victoria Transport Policy Institute, Vancouver, BC. Submitted to Transportation Research Board 2013 Annual Meeting as Paper 13-4357. (2011), *Valuing Transit Service Quality Improvements – Considering Comfort and Convenience in Transport Project Evaluation*. November 24; Litman, Todd (2002), "Evaluating Transportation Equity," *World Transport Policy & Practice*, Volume 8, No. 2, Summer, pp. 50-65.