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## ***Economic Perspectives on Benefits and Costs of the CTA Red and Purple Modernization Project***

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This paper provides a research perspective on the Red and Purple Modernization (RPM) Project under consideration by the Chicago Transit Authority (CTA). The paper is based on recent literature on the likely benefits and costs of capital investments in transit projects within the Chicago region. The objective is to present an initial assessment of the economic ramifications associated with the proposed improvements to the 9.6-mile Red/Purple Line segment between the Belmont and Linden stations. While additional analyses are needed to understand the full range of benefits and costs of the project, the strong performance and apparent growth potential of this corridor suggests that investments would generate significant benefits.

### **RPM Project Overview**

The targeted section of the Red/Purple Line route, running roughly parallel to the Lake Michigan shoreline, is more than 90 years old and encompasses 21 stations in Chicago, Evanston, and Wilmette. The line is equipped with four tracks that extend most of the distance between Belmont and Howard Street Station—a segment jointly used by Red and Purple Line trains—and two tracks between Howard and Linden used solely by Purple Line trains. Three alternatives (not including a “Continued Deterioration” Alternative) are under consideration as of publication of this document.

The *Basic Alternative*, costing an estimated \$3 billion, would bring the corridor into a state of good repair and provide general improvements to reliability and service quality over a 20-year period. This option, while markedly enhancing reliability and efficiency, would not dramatically expand the line’s passenger-carrying capacity nor reduce travel times much beyond that for which the line was presently designed. Travel times, however, would fall by as much as 7.5 minutes compared to the “Continued Deterioration” scenario by reversing the corridor’s deterioration.

The *Modernization Alternative*, costing at least \$4 billion, is more ambitious. It realigns portions of the corridor, replaces numerous stations with more modern facilities, and provides capital improvements to more than double the passenger carrying capacity. Wider station platforms, new viaducts at many

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locations, and a complete overhaul of electrical systems are among the improvements that would reduce dwell times and allow for faster service. Additionally, several stations would also be consolidated to improve the quality of service (current options consider eliminating from one to five stations). Station consolidation is expected to include the construction of additional station entrances to minimize the impact on walking distances to and from the trains.

Altogether, these investments would enable travel times to be reduced by an additional three to five minutes beyond the Basic Alternative (for Purple and Red Lines, respectively) and offer the additional benefit of bringing all Red Line stations within 30 minutes of the Loop District. Compared to the “Continued Deterioration” scenario, travel times would fall by as much as 12 minutes. The value derived from such reductions in travel time have been demonstrated in past research to be a function of the wage rates of passengers, which, in the aggregate, suggests that the benefits would be large.

The *Modernization without Consolidation Alternative*, costing a similar amount to the *Modernization Alternative*, an estimated \$4 billion, offers a hybrid between the above alternatives. The salient difference between this and the *Modernization Alternative* is the lack of station consolidation along the corridor. Travel times would fall by perhaps two minutes less than the *Modernization Alternative* due to the higher number of station stops, but service would still be substantially faster than in the Basic Alternative.

Regardless of which alternative the CTA chooses, plans call for conducting the RPM Project on an ambitious timetable. One timetable option under consideration calls for completing environmental analysis and moving to the engineering stage by 2015. The findings below focus primarily on the scholarly and technical perspective on the benefits and costs associated with the *Modernization Alternative*.

## Findings

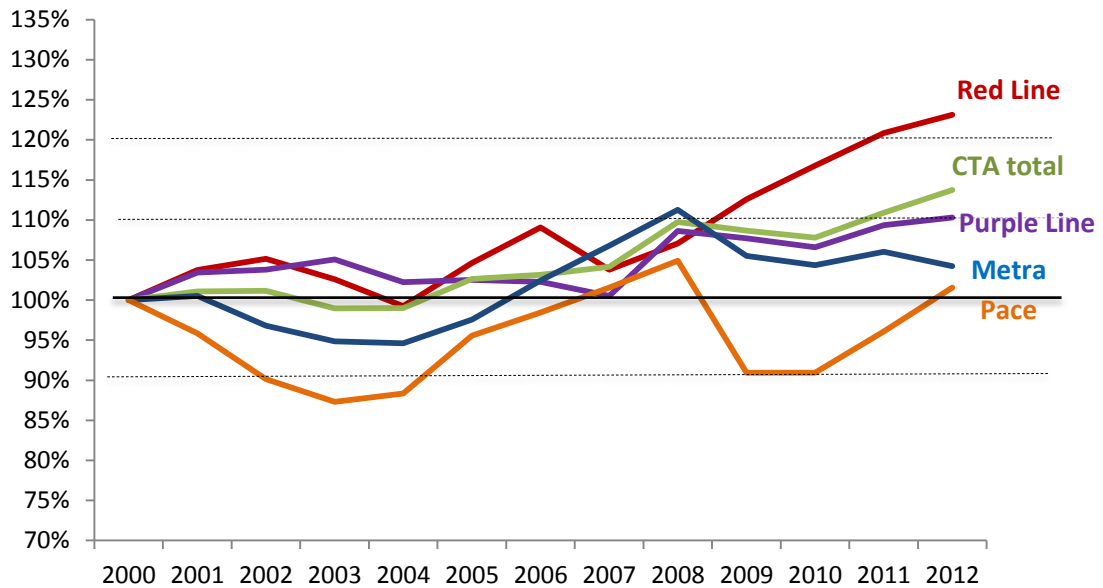
***FINDING 1:* The RPM Project would improve a transit corridor that is experiencing steadily rising passenger traffic, outpacing its ability to provide adequate capacity. While these lines have collectively outperformed Chicago’s transit system as a whole since 2000, there is the potential to capture a large amount of additional ridership through improved service quality.**

The Red Line averages about 270,600 passenger boardings each weekday—a level of traffic higher than all individual rapid transit routes in the United States, not including the subway lines of New York City and the Blue Line of the Washington, D.C. Metro. Traffic on the Red Line is up more than 24% since 2000, more than the CTA as a whole and that of Metra and Pace. Purple Line traffic is up 10%, which is less than both the CTA system average (14%) and the regional average (12%). When evaluated as a pair, however, traffic on the two lines is up 23%, well above the CTA average and almost twice the regional average (Figure 1).

Recent ridership gains on the Red and Purple Lines have been particularly impressive. Between 2006 and 2012, ridership grew about 18.6% and 9.8% on the Red and Purple lines, respectively, compared to the overall ridership growth on the CTA (9.2%) as well as the region (5.3%). Demand levels have created significant passenger crowding, particularly on the Red Line during peak periods. It is common for morning rush-hour passengers at Belmont and Fullerton Stations to have to wait until the second or

third train to find a place to stand. Such delays, in addition to routine system delays and service disruptions experienced by this corridor, only serve to dissuade ridership. The platforms at major stations are also narrower than is preferable for the high-density conditions, creating crowding and access and egress problems during peak periods.

*Figure 1*  
**Ridership Trends 2000 - 2012**  
**Red/Purple Lines vs. CTA, Metra and Pace Totals**



Five of the 15 busiest stations outside of the Greater Loop District are along the RPM Project. These stations include: Belmont, Howard, Wilson, Addison, and Sheridan (listed with respect to the amount of passenger traffic they handled in January 2013).<sup>1</sup> Each of these stations see more than 5,000 daily riders. Belmont, with 12,000 daily users, is second only to Fullerton in terms of daily passenger traffic among all rapid-transit stations outside of the downtown area.

The planned improvements are poised to capture new riders from a variety of market sectors. Travel time and reliability are two important characteristics of enticing ridership. Additionally, renovating stations so that they are compliant with the American with Disabilities Act (ADA) regulations not only enables access for riders with physical limitations who are deterred from climbing to station platforms, but entices others who would otherwise elect for alternative transportation modes, such as the elderly, cyclists, and parents with strollers.

<sup>1</sup> Based on data published on RTAMS.com for January 2013. The Greater Loop District is defined as the area bounded by Halsted Avenue on the West, the Lake on the East, and Division Street and Roosevelt Road on the north and south, respectively.

**FINDING 2:** The RPM Project is a mix of investments that bring the existing corridor into a state of good repair as well as enhance and upgrade many components of the corridor to improve the quality of service. Past research on capital investment in Chicago’s transit corridors suggests that the payoffs from such investment range from between \$1.21 and \$1.90 per dollar spent, not including economic benefits that are significant but difficult to measure.

The reported \$4 billion cost of the Modernization scenario would achieve a dual purpose:

**Achieving a State of Good Repair for the Corridor:** Much of the investment is planned to remedy the backlog and service-lifetime issues on the portion of the route north of Belmont. These needs are considerable. Recent audits of the CTA’s physical plan shows that a significant share of the stations, viaducts, and electrical systems have reached or are approaching obsolescence (URS, 2010). Routine delays, slow zones, and frequent interruptions of service are experienced by riders as a result.

Past rehabilitation projects have only partially eliminated the capital project backlog. In 2012, the CTA made investments to significantly improve stations and rehabilitate tracks as part of the Red Ahead program,<sup>2</sup> funded largely through a special state-government appropriation. These improvements, while critical, proved insufficient to deal with much of the capital backlog on the line north of Belmont Avenue.

In the Spring of 2013, work commenced to overhaul the Red Line’s Dan Ryan Branch—the portion between downtown and 95<sup>th</sup> Street. This project also focuses primarily on lessening the capital project backlog. Neither project was designed to allow for major service improvements or capacity expansion (beyond those made possible by moving closer to a state of good repair).

**Expanding/Enhancing the Corridor:** The Modernization Alternative includes many enhancements that have been raised repeatedly by transit officials for decades. Among the most notable examples are: lessening the severity of the sharp curves near the Sheridan Station, installing a more modern signal system, creating new track arrangements north of Belmont Avenue at Clark Junction that alleviate delays occurring when Brown Line trains cross and then merge onto Red/Purple line tracks, and replacing much of the elevated superstructure with a newer and less maintenance-intensive structure.

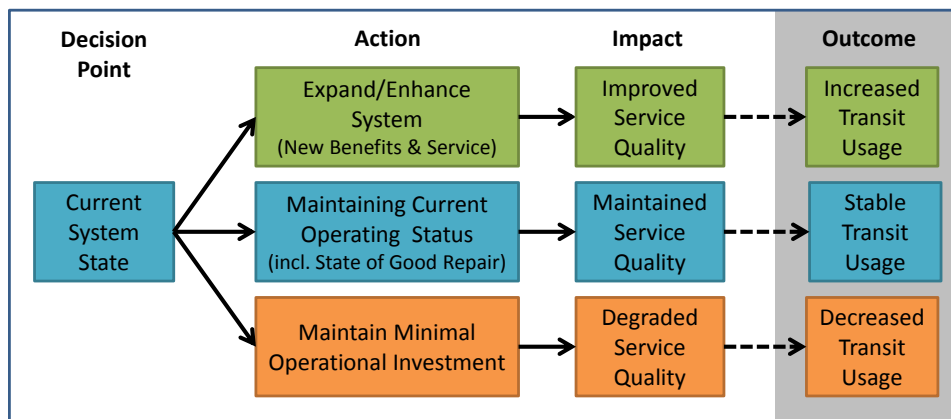
Station improvements are also notable here with significant platform expansion to accommodate longer trains and greater boarding and alighting efficiency. Platforms would be lengthened to accommodate longer trains (eight-car trains in Evanston, 10-car trains from Howard to Belmont). Platforms would be widened to streamline boarding and lower dwell time. Such improvements, by allowing for quieter, faster, and safer operations, would improve performance far beyond simply bringing the corridor into a state of good repair.

Research about capital investments in transit system make a clear distinction between investments that maintain current operating status and those that expand or enhance service (Figure 2). Investments in either, however, have sizeable payoffs.

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<sup>2</sup> The CTA’s Red Ahead program is a comprehensive plan for maintenance, modernization, and expansion along the Red and Purple rail lines. The program includes three major improvement projects between the far north terminal (Linden), to the current southern terminal (95th Street), expanding to the proposed 130th Street terminal further to the south. Additionally, the Red Ahead program includes several individual projects, such as station renovation along the Red Line.

*Figure 2*  
**Approach Framework for Economic Analysis**



Additional analysis is needed to understand the full range of benefits and costs of the project, but the strong performance and apparent growth potential of these corridors suggests that investments would generate benefits at least as great as those identified in by these general analyses (Table 1).

*Table 1*  
**Payoffs from Each Dollar of Investment in Capital Projects on the Chicago Transit System**  
*Results of Three Comprehensive Studies*

	<i>Payoff per Dollar Spent</i>	
	<u>Maintain</u>	<u>Expand/Enhance</u>
Cambridge Systematics (1995)	Returns > \$3	Returns > \$2.00
Metropolis 2020 (2007)	Returns \$1.21	Returns > \$1.34
Moving Beyond Congestion (2007)	-- Returns \$1.90 in the Aggregate --	

These three comprehensive studies, discussed more extensively in the recent Chaddick Institute study, *Tending to Transit: The Benefits and Costs of Bringing Public Transport in the Chicago Region into Good Repair*, suggest that the payoffs would be anywhere from \$1.21 (Metropolis 2020, 2007) to more than \$3 per dollar spent (Cambridge Systematics, 1997) for maintaining systems. Payoffs from expanding corridors or building new corridors range from \$1.34 to more than \$2 per dollar spent, respectively. Each of these studies considers reductions in highway congestion, time savings, reduced emissions, and operating-cost reductions.

The scope of the investments proposed for the RPM Project suggests that the payoffs would likely be closer to those in the “maintain” category than the “expand/enhance” category. Land-use patterns

along the corridor are already heavily-oriented toward transit use, and achieving the Modernization project's goals are not contingent on promoting large-scale real estate development or raising the density of population living along the route. Relatively little new property would need to be acquired.

These existing studies, however, do not include certain "difficult to measure" effects, such as 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. Nor do they include possible multiplier effects often considered in most fiscal-impact studies.

***FINDING 3: Proximity to extensively-used transit corridors increases property values of homes in the Chicago region between 5% and 20%. A consensus in the academic community exists that investments in metro systems, such as CTA rapid-transit ("L") routes, increase the value of adjacent land.***

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% to 20%, and possibly more. 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).<sup>3</sup> A study focusing on two Metra stations in Arlington Heights found that housing prices decreased by \$12,776 with each 100 meters of distance from the station (Chaney, 2005).

More recent research shows that proximity of a home to a transit line increased housing prices relative to homes within greater distances from transit following the 2008 recession. Research published by the American Public Transit Association last month shows that, throughout the Chicago region, the average price for residential properties declined by nearly a third between 2006 and 2011. Properties near transit lines, however, were much more resilient and outperformed the region by 29.7% (APTA, 2013). Residential properties along the CTA system proved particularly resilient, outperforming the region by 47.3%. The largest gains occurred at the Noyes Purple Line station in Evanston.

## Conclusion

As presented, the proposed Red and Purple Modernization Project would provide benefits in the form of bringing a heavily-used corridor into a state of good repair, expanding capacity, and improving service quality. Although additional research and data are needed to evaluate the benefits and costs of this project through an engineering analysis, the research on transit development in metropolitan region suggests clearly that these types of projects tend to have distinctly positive payoffs.

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<sup>3</sup> 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 Orange Line's construction on property values, however, remained large.

Several aspects of the Red and Purple Line provide reason to be relatively bullish about the payoffs:

1. Recent trends in ridership on both the Red and Purple Lines have been favorable and are expected to remain favorable into the future.
2. Land-use patterns along the corridor have evolved favorably for expanding ridership. Consequently, achieving the RPM project's goals are not contingent on promoting large-scale real estate development or raising the density of population living along the route.
3. Modernization will allow for significant improvement in speed and reliability rather than merely increasing passenger capacity, thereby stimulating demand through enhanced regional accessibility.
4. The stated costs of modernization appear to be only marginally higher than the costs needed to bring and keep the corridor in a state of good repair due to some of the efficiency gains.

Based on this initial assessment, with full acknowledgement that much more intensive research is needed, these factors suggest that the Red and Purple Modernization Project should move forward on a deliberative timetable and that the project is in the best interest of Chicago.

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