



# Memorandum

Date: December 1, 2017

To: Ken Kaltenbach, Senior Vice President, The Corradino Group

From: Brian Peterson, Senior Analyst

Re: Economic Impacts of Lansing Region Transit Improvements

Cc:

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The Lansing region is home to three local public transportation agencies—the Capitol Area Transportation Authority (CATA), EATRAN, and Clinton Transit. Over 185,000 individuals in the region live within one quarter mile of a transit stop, with CATA providing the majority of local public transit trips.

The Tri-County Regional Planning Commission (TCRPC) helps guide public transportation investments in the Lansing metropolitan area. TCRPC retained The Corradino Group (Corradino) to conduct a transit needs assessment to identify gaps in, and potential improvements to, the Lansing region public transportation system. Making improvements to the public transportation system will provide several benefits to new and existing riders. Corradino retained Anderson Economic Group (AEG) to identify potential economic impacts arising from these improvements.

The purpose of this memorandum is to outline our findings on the economic impacts of improving the Lansing area public transportation system through implementing the recommended alternative—alternative 2.3—identified in Corradino’s Transit Needs and Economic Prosperity report.

## Overview of Approach

Using data from Corradino’s Transit Boarding Estimation and Simulation Tool (TBEST), we quantified some of the economic impacts resulting from implementing the recommended transit improvements for 2015 and 2040. Each time we show 2040 dollar amounts, they are in nominal terms. We reviewed empirical research on labor market impacts of improving public transit systems, and then applied these findings to the tri-

county region. We also researched other economic benefits of public transit improvements and estimated their impact on the region.

Our research identified two significant relationships between improved bus transit service and labor markets. First, improved transit access is associated with decreased rates of employee turnover in the manufacturing and retail industries. Decreased employee turnover results in cost savings for employers, and increased job stability for employees. Second, proximity to transit is associated with an increase in the average number of weeks worked per year, potentially resulting in increased incomes.

Public transportation improvements also provide quality-of-life benefits, such as savings from decreased driving or increased public health. In this memo, we discuss these benefits, and quantify them, where possible.

## Key Findings

Our research and analysis led to the following findings:

*1. Implementing the recommended transit improvements will lead to decreased employee turnover in manufacturing and retail occupations, resulting in savings to employers of approximately \$1.3 million to \$2.2 million annually, and improved job stability for 168 to 288 workers per year. By 2040, annual savings from reduced turnover will range from \$1.8 million to \$3.1 million, with improved job stability for 179 to 309 workers.*

Empirical research on the impacts of improved bus transit on employee turnover shows that every \$10 increase in per capita public transportation spending leads to a 0.3 to 0.5 percentage point decrease in employee turnover in manufacturing and retail occupations.<sup>1</sup> The recommended transit improvements will increase transit operating expenditures by roughly \$5.0 million per year—an increase in spending of \$10.49 per capita.

The Lansing region is home to 21,232 manufacturing jobs, and 33,829 retail jobs, with average annual turnover rates of 4.7 and 10.6 percent, respectively. Turnover costs, as measured as a proportion of wages are 20.4 and 16.1 percent in manufacturing and retail, respectively, with total annual turnover costs in manufacturing and retail estimated at \$13.1

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1. Dagny Faulk and Michael Hicks, “The impact of bus transit on employee turnover: Evidence from quasi-experimental samples,” *Urban Studies Journal* 53, no. 9 (2016): 1836-1852.

million and \$15.1 million, respectively, as shown in Table 1.

**TABLE 1. Lansing Metropolitan Area Estimated Employee Turnover Costs, 2015**

Industry	Lansing Area Employment <sup>a</sup>	Average Annual Wage <sup>b</sup>	Turnover Cost (% of Annual Wage) <sup>c</sup>	Turnover Cost Per Employee	Turnover Rate <sup>d</sup>	Total Annual Turnover Cost
Manufacturing	21,232	\$64,423	20.4%	\$13,142	4.7%	\$13,114,746
Retail	33,829	\$26,206	16.1%	\$4,219	10.6%	\$15,129,398

Sources:

(a) Tri-County Regional Planning Council estimates, 2015.

(b) U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages, 2015.

(c) Boushey and Glynn, 2012.

(d) U.S. Census Bureau Longitudinal Employer-Household Dynamics Quarterly Workforce Indicators, 2015.

Regional employment and wages in manufacturing and retail are expected to increase slightly through 2040, resulting in increased turnover costs. We estimate that turnover costs in 2040 will be \$21.8 million in manufacturing and \$20.0 million in retail as shown in Table 2.

**TABLE 2. Lansing Metropolitan Area Estimated Employee Turnover Costs, 2040**

Industry	Lansing Area Employment <sup>a</sup>	Average Annual Wage <sup>a</sup>	Turnover Cost (% of Annual Wage) <sup>b</sup>	Turnover Cost Per Employee	Turnover Rate <sup>c</sup>	Total Annual Turnover Cost
Manufacturing	24,271	\$82,590	20.4%	\$16,848	5.3%	\$21,836,753
Retail	34,639	\$33,596	16.1%	\$5,409	10.7%	\$19,997,700

Sources:

(a) AEG analysis of base data from The Corradino Group.

(b) Boushey and Glynn, 2012.

(c) U.S. Census Bureau Longitudinal Employer-Household Dynamics Quarterly Workforce Indicators, 2001-2015 average.

Implementing the recommended transit improvements will reduce the need to replace 65 to 111 employees in manufacturing, and 103 to 177 employees in retail, depending on the extent to which turnover decreases. The total savings to businesses from this reduced turnover will range from \$850,000 to \$1.5 million for manufacturers and \$430,000 to \$750,000 for retailers, as shown in Table 3. Total savings will range from \$1.3 to \$2.2

million.

**TABLE 3. Estimated Savings from Decreased Employee Turnover, 2015**

Industry	Current Employee Turnover <sup>a</sup>	Employee Turnover with Improved Transit System <sup>b</sup>	Decrease in Employee Turnover	Savings from Decreased Turnover <sup>a</sup>
<b>0.30% Decrease in Turnover</b>				
Manufacturing	998	933	65	\$848,755
Retail	3,586	3,483	103	\$434,146
			<b>Total:</b>	<b>168</b>
				<b>\$1,282,901</b>
<b>0.52% Decrease in Turnover</b>				
Manufacturing	998	887	111	\$1,463,371
Retail	3,586	3,408	177	\$748,528
			<b>Total:</b>	<b>288</b>
				<b>\$2,211,899</b>

Sources:

(a) AEG analysis using base data from Tri-County Regional Planning Council, U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages, 2015; U.S. Census Bureau Longitudinal Employer-Household Dynamics Quarterly Workforce Indicators, 2015.

(b) AEG analysis using base data from The Corradino Group; Boushey and Glynn, 2012.

By 2040, employee turnover will be reduced by 74-127 replacements in manufacturing and 105 to 182 replacements in retail. Savings to manufacturers will range from \$1.2 million to \$2.1 million, and savings to retailers will range from \$570,000 to \$980,000 as shown in Table 4. Total savings will range from \$1.8 to \$3.1 million.

**TABLE 4. Estimated Savings from Decreased Employee Turnover, 2040**

Industry	2040 Employee Turnover <sup>a</sup>	Employee Turnover with Improved Transit System <sup>b</sup>	Decrease in Employee Turnover	Savings from Decreased Turnover <sup>a</sup>
<b>0.30% Decrease in Turnover</b>				
Manufacturing	1,296	1,222	74	\$1,243,848
Retail	3,697	3,592	105	\$569,902
			<b>Total:</b>	<b>179</b>
				<b>\$1,813,750</b>
<b>0.52% Decrease in Turnover</b>				
Manufacturing	1,296	1,169	127	\$2,144,565
Retail	3,697	3,515	182	\$982,590
			<b>Total:</b>	<b>309</b>
				<b>\$3,127,155</b>

Sources:

(a) AEG analysis using base data from The Corradino Group; U.S. Census Bureau Longitudinal Employer-Household Dynamics Quarterly Workforce Indicators, 2001-2015.

(b) AEG analysis using base data from The Corradino Group; Boushey and Glynn, 2012.

2. *Expanding the public transportation market area could lead to an increase in hours worked for individuals near new bus stops.*

Research shows that individuals living within walking distance of bus stops tend to work more days per year than individuals who do not live within walking distance of a bus stop.<sup>2</sup> Implementing new bus stops as recommended by Corradino will lead to an increase in the number of individuals within walking distance of a bus stop, and therefore a potential increase in hours worked by residents that now find themselves within walking distance of a transit stop.

Although individuals living near transit stops tend to work more than those who do not, the overall economic impact of this phenomena is unclear. We did not find any empirical evidence to suggest that increased public transit access *causes* individuals to work more. It may be the case that individuals who wish to work more tend to move to transit-accessible locations, and that these individuals would still work as many hours even if they did not have access to public transportation.

Furthermore, even if increased access to bus stops increases the amount of hours worked by individuals within walking distance of a stop, the increased number of hours worked by these individuals could be partially offset by decreased amounts of work for other workers in the region. An increase in total hours worked would only have a positive regional economic impact insofar as it results in an aggregate increase in the number of hours worked by workers in the region.

The per capita income of households that will be within one quarter mile of a bus stop after implementing Corradino's recommended improvements will be \$23,395. Decreasing the average distance of riders from transit stops from one-half to one-quarter mile is, on average, associated with a 5.9% increase in days worked.<sup>3</sup> This would result in an increase in per capita income of \$1,380, and a total increase in earnings of \$11.4 million as shown in Table 5.

By 2040, an additional 58,679 individuals who would not otherwise be within the market area in the absence of the improvements will be within the market area, with per capita

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2. Thomas Sanchez, "The Connection Between Public Transit and Employment," Paper presented at the Association of Collegiate Schools of Planning Annual Conference, Pasadena, CA, November 1998.

3. A larger decrease in average distance could lead to additional days worked and additional earnings.

incomes increasing by \$1,892 due to increased hours worked. The total increase in income in 2040 due to the transit improvements will total \$111 million.

**TABLE 5. Potential Increased Earnings from Additional Hours Worked**

Year	Population Newly-Within Market Area <sup>a</sup>	Market Area Per Capita Income <sup>a</sup>	Increase in Days Worked <sup>b</sup>	Increase in Per Capita Income	Total Increase in Income
2015	8,283	\$23,395	5.9%	\$1,380	\$11,430,540
2040	58,679	\$32,070	5.9%	\$1,892	\$111,028,296

Sources:

(a) AEG analysis of base data from The Corradino Group.

(b) Thomas Sanchez, "The Connection Between Public Transit and Employment," Association of Collegiate Schools of Planning Annual Conference, November, 1998.

3. *Increased access to public transportation provides a number of quality-of-life benefits. In the Lansing region, these benefits will be relatively small due to the scale of the recommended transit system improvements.*

Increased public transportation usage can result in savings for individuals who would otherwise make a trip by driving. Decreased driving, in turn, also leads to fewer traffic fatalities. Implementing Corradino’s recommended improvements will lead to a modest decrease in driving. This decrease in driving will result in a negligible decrease in traffic fatalities.

**Savings from decreased driving.** According to the TBEST model, the average bus trip in the Lansing region is 2.1 miles, and replaces an average personal vehicle trip of 1.7 miles. The cost of owning and operating a personal vehicle was 76 cents per mile in 2015, so each 1.7-mile driving trip costs \$1.31.<sup>4</sup> The standard CATA fare is \$1.25 per ride—roughly 6 cents less per trip than driving.

The recommended improvements will increase direct transit boardings by 214,148 trips. We estimate that 211,349 of these trips will be direct boardings by individuals who decide to take transit rather than drive.<sup>5</sup> Assuming that each transit trip made by individuals who have the choice of driving or taking transit leads to one less auto trip, we estimate that the transit improvements will result in 374,510 fewer personal vehicle miles traveled, and a total driving cost reduction of \$283,878 as shown in Table 6.

By 2040, we estimate that the transit improvements will lead to 565,532 fewer auto trips. Assuming that driving costs continue to increase at their current rate, we estimate that the

4. American Auto Association, "Your Driving Costs: How Much are you Really Paying to Drive," 2015.

5. Approximately 89.3% of current annual trips (9.26 million) are made by individuals who have the option of driving or taking transit. Under alternative 2.3, 89.5% of trips (9.47 million) will be made by individuals who have the option of driving or taking transit.

cost of driving in 2040 will reach \$1.22 per mile, with total savings from reduced driving reaching \$1.2 million per year by 2040.

**TABLE 6. Potential Savings to Auto Owners from Reduced Driving**

Year	Direct Transit Boardings by Auto Owners		Reduction in Auto Trips	Reduction in Personal Vehicle Miles Traveled	Savings from Reduced Driving	Transit Fare	Net Savings after Fares
	Current System	Improved System					
2015	9,262,517	9,473,866	211,349	374,510	\$283,878	\$1.25	\$19,693
2040	9,996,058	10,561,590	565,532	1,002,123	\$1,222,590	\$1.25 \$2.00	\$515,675 \$91,526

Source: AEG analysis of base data from The Corradino Group, and AAA, “Your Driving Costs: How Much are you Really Paying to Drive?”

Savings to drivers from reduced auto travel will be offset by increased spending on transit trips. Currently, an additional 211,349 trips with a standard fare of \$1.25 would cost drivers approximately \$264,200 annually. After accounting for additional transit costs incurred as a result of choosing to take transit rather than drive, total savings to drivers would amount to approximately \$20,000.

Net savings to drivers in 2040 will depend on the price of transit fares. We show two 2040 savings scenarios in Table 6. In the first scenario, the standard transit fare remains at \$1.25, leading to net savings from reduced driving of \$515,675 annually by 2040. In the second scenario, transit fares increase to \$2.00—consistent with a 2% annual increase in inflation, leading to net savings of \$91,526 annually.

**Decreased traffic fatalities.** Decreased driving also leads to decreased traffic fatalities; however, the estimated decrease in personal vehicle miles traveled after implementing Corradino’s recommended improvements—374,510—is so small that any decrease in fatalities is negligible. Nationwide, there were an estimated 1.13 traffic fatalities for every 100 million vehicle miles travelled in 2015.<sup>6</sup> By 2040, vehicle miles travelled will be reduced by 1.0 million miles.

**Additional Impacts.** In addition to the effects discussed above, public transportation may provide additional quality of life benefits that are not easily quantified. These include:

- Increased convenience from extended route hours or frequency;
- Increased physical fitness for riders who walk longer distances than they otherwise would have if they did not choose to take transit; and
- Improved air quality from reduced emissions.

The extent of the first two impacts depend on individual choice. Individuals who value their time more will experience greater benefits from more efficient bus service. Public

6.National Highway Traffic Safety Administration Fatality Analysis Reporting System Encyclopedia, 2015.

health benefits are realized when individuals walk or bike farther as a result of the transportation improvements. These benefits could be lessened if increased walking to and from transit results in transit users choosing to exercise less frequently outside of their commute to and from bus stops. The benefits of improved air quality will depend on the characteristics of new buses.

## Works Consulted

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### **About Anderson Economic Group**

Anderson Economic Group, LLC is a boutique research and consulting firm, with offices in Chicago, East Lansing, New York, and Istanbul. The experts at AEG specialize in economics, public policy, business valuation, and industry analyses.

The Public Policy and Economic analysis consultants at AEG have conducted numerous studies of the impacts of transportation and infrastructure on Michigan's economy. Publications from our firm include:

- "Economic Impacts of the St. Clair Power Plant," published in 2017.
- "An Economic Impact and Policy Analysis of Four Michigan Transportation Investment Proposals," published in 2012.

Work by AEG has been utilized in legislative hearings, legal proceedings, and public debates, as well as major planning exercises and executive strategy discussions.

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