



# Appendix F

## Supporting Technical Reports

### F.4 Economic Impacts of Bottineau LRT



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**DATE:** December 21, 2015

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**FROM:** Todd Graham, Regional Policy and Research (602-1322)

**SUBJECT:** Economic impacts of Bottineau LRT

This memo describes a Bottineau LRT economic impact analysis, prepared to inform the project's EIS. A baseline and an alternative build scenario are specified in Metropolitan Council's REMI-PI economic model. This model returns the following impacts representing our expectations for Bottineau LRT.

During the construction phase, 2018-20:

- Minnesota employment (jobs) will expand **+3,762 more jobXyears** for the 2018-20 period.
- Personal income for the 3-year period will be **+\$349 million higher** than in the base case. (All figures expressed in constant 2015 \$)
- Workers employed will come from both the metro region and Greater Minnesota: \$223 million (58%) of the personal income gained will situate in the metro region, \$125 million (32%) in Greater Minnesota, and \$38 million (10%) will be earned by workers from out-of-state.
- Gross domestic product for the state (GSP), representing the size of the Minnesota economy, will be **+\$593 million higher** than in the base case.
- Of that **\$593 million** of additional economic activity, 93% will be situated at businesses in the metro region; 7% in Greater Minnesota.

Over the long-term:

- The economic impact of Bottineau LRT will be small initially, but will grow as accessibility gains and mode shifts bring benefits to the metro industries.
- Minnesota employment (jobs) will be **+279 jobs higher** in 2030 than in the base case.
- Annual personal income will be **+\$30 million higher** in 2030 than in the base case.
- Gross domestic product for the state (GSP) will be **+\$118 million higher** in 2030 than in the base case.
- The cumulative additional GSP grows from **\$593 million** for 2018-2020 to **\$1.197 Billion** for 2018-2030 to **\$3.012 Billion** for 2018-2040. It takes 15 years of accessibility gains and mode shift benefits for the project to "pay for itself" through economic returns.

*Economic impact analysis.* Metropolitan Council uses a REMI-PI model for economic impact analyses. For the Bottineau LRT project, I have prepared a scenario to represent the Bottineau LRT project as a major infrastructure investment, which may generate spillover economic activity. In the short-term, 2018-20, the construction phase provides an economic stimulus to the regional economy.

In the long-term, beyond 2020, the Bottineau LRT marginally improves transit accessibility for commuting workers who use the expanded transit system, and also marginally mitigates car ownership and associated costs.

In this scenario, I assume:

- The new LRT improves labor accessibility, specifically for transit-dependent residents who are newly connected to worksite locations because of Bottineau LRT service. Overall regional labor accessibility improves +0.03% in the first year of service, rising to +0.04% in the second year, and beyond.
- Additionally, there will be a small fraction of new frequent riders who are motivated to reduce their car ownership. After five years, the new LRT will reduce regional car ownership by -1,200 and car-ownership costs by \$10 million per year.
- Household expense for transit will increase. Given the transportation forecast of 12,100 net new daily trips, the corresponding transit costs are higher by \$6.1 million per year.
- The Bottineau LRT has no effect on roadways drive times and congestion, and no benefit to freight movement. While Bottineau LRT will mitigate 200,000 regional vehicle miles traveled (VMT) per day, a separate transportation model analysis find that drive times do not improve as a result.

For comparison with the build scenario, the *base case* is the economic growth path found in Metropolitan Council's long-range forecast to 2040.

**Data inputs.** Data inputs needed to construct the build scenario are drawn from the project's environmental impact statement:

- \$1.293 Billion of transitway capital investment during 2018-20, including.
  - \$860 million for construction.
  - \$433 million for administration, design, engineering, and other professional services.
- \$748 million in local and state taxes collected *in Minnesota* to fund the construction phase.
  - In economic modeling, taxes are a debit against disposable personal income, and can slow economic growth. Still, in the case of Bottineau LRT, an equal-sized investment comes from a national revenue pool – this is external investment.
  - For expediency, the build scenario assumes that the timing of local and state tax revenues coincides with the spending of same.
- Following the conclusion of the construction phase, Bottineau LRT will have permanent employment of 145 jobs for operations and maintenance.
  - For this modeling, I specify a fixed public sector budget scenario in which the operation and maintenance of Bottineau LRT is a fiscal substitute for other public spending and employment that would have occurred in a *no-build* scenario.
  - Infrastructure maintenance for Bottineau LRT is assumed to be 1% of the initial cost and is credited as annual expenditure to maintain the nonresidential capital stock. (The infrastructure maintenance estimate does not include operations.)

**Not considered in the scenario.** The modeling accounts for the local, metro and state taxes raised and directed to the Bottineau LRT project. Other factors and costs expected during the construction phase have *not* been introduced to the model.

- \$136 million budgeted for LRT-vehicles is *not* considered as a stimulus factor. The LRT-vehicles are manufactured out of state; thus their manufacture induces no additional economic activity here.
- \$67 million for purchase of right of way does not by itself generate economic activity, and so is also *not* considered as a stimulus factor.

- While the FEIS acknowledges disruptions to business (noise, disrupted access to local streets), those costs have not been quantified, and have not been introduced to the model.

**Short-term economic impact results.** Short-term impacts, now to 2020, are substantially positive during the construction phase – and this is mainly a windfall gain from the external (federal government) investment in the region.

**Table 1. Net effects of construction (short-term) activity**

External investment (US FTA investment)	\$748,000,000
2018-20 Economic Impact	
• Output	\$1,135,000,000
• Gross State Product	\$593,000,000
• Personal Income	\$349,000,000
• Employment (jobs x years)	3,762
Impact compared to external investment	
• Output	1.517 x external invest.
• Gross State Product	0.792 x external invest.
• Personal Income	0.467 x external invest.
• Employment (jobs x years)	5.03 per \$1 million

Source: Metropolitan Council analysis.

In response to the direct stimulus of the construction phase:

- **Metro region.** Cumulative employment located in the metro region during 2018-20 will be +3,275 more *jobXyears* in the build scenario than the base case. The construction and professional services industries will account for the largest share of this new employment.
- The REMI-PI model estimates that Bottineau LRT project itself accounts for 4,850 construction industry *jobXyears*. The construction resources needed to accomplish Bottineau LRT are diverted during this period to an extent that some other projects and some industries lose employment temporarily.
- Cumulative personal income for the metro region during 2018-20 will be +\$223 million larger (constant 2015 \$) in the build scenario than the base case.
- Cumulative gross domestic product for the metro (GMP) will be larger by +\$556 million (constant 2015 \$) for the three-year period 2018-20.
- **Greater Minnesota.** Cumulative employment located in the rest of Minnesota during 2018-20 will be +487 more *jobXyears* in the build scenario than the base case. This is all indirect and induced economic growth.
- Cumulative personal income for the rest of Minnesota during 2018-20 will be +\$125 million larger (constant 2015 \$) in the build scenario than the base case; most of this personal income gain are paycheck earnings from worksites in the metro region, brought back by commuters to home locations in Greater Minnesota.
- Cumulative gross domestic product for the rest of Minnesota will be larger by +\$37 million (constant 2015 \$) for the three-year period 2018-20; this amount only accounts production situated in Greater Minnesota.

- **Minnesota, statewide.** Cumulative employment for the state during 2018-20 will be +3,762 more *jobXyears* in the build scenario than the base case.
- Cumulative personal income for the state during 2018-20 will be +\$349 million larger (constant 2015 \$) in the build scenario than the base case.
- Workers employed will come from both the metro region and Greater Minnesota: \$223 million (58%) of the personal income gained will situate in the metro region, \$125 million (32%) in Greater Minnesota, and \$38 million (10%) will be earned by workers from out-of-state.
- Cumulative gross domestic product for the state (GSP) will be larger by +\$593 million (constant 2015 \$) for the three-year period 2018-20. Of that \$593 million of additional economic activity, 94% will be situated at businesses in the metro region; 6% in Greater Minnesota.

**Long-term economic impact results.** Following the conclusion of the construction phase, *after 2020*, the indirect and induced impacts of the construction itself will quickly taper off.

Residents will enjoy improved accessibility to workplaces and other destinations. Overall labor accessibility (the metro region average number of workers within commute distance of workplaces) improves slightly. Some transit-dependent workers are enabled to reach workplaces they could not have reached prior. At higher levels of labor accessibility improvement, the region’s industries are more successful in finding and hiring workers who best fit industries’ talent needs.

Long-term economic impact derives from these marginal accessibility gains and also car ownership mitigation. These adjustments to the economy should mature 5-7 years after the start of Bottineau LRT operation.

**Table 2. Long-term net impacts of Bottineau LRT**

	2018-20	2021-30	2031-40
	3 years	10 years	10 years
• Gross State Product	\$593,000,000	\$603,000,000	\$1,815,000,000
o Construction	\$636,000,000	-\$115,000,000	\$33,000,000
o Professional and technical services	\$52,000,000	\$155,000,000	\$210,000,000
o All other private sector	-\$95,000,000	\$477,000,000	\$1,422,000,000
o Transit and ground passenger transportation	0	\$75,000,000	\$80,000,000
o All other government	0	\$11,000,000	\$70,000,000
• Personal Income	\$349,000,000	\$114,000,000	\$561,000,000
• Employment (jobs x years)	3,762	751	5,260

Source: Metropolitan Council analysis.

- **Minnesota employment.** In the 10th year of Bottineau LRT operation (2030), state total employment will be +279 jobs higher than the base case.
  - o Throughout the forecast period, the transit industry itself is the largest employment gainer, with 145 directly created jobs in the metro region. Initially, during 2021-27, transit’s gain is balanced by slight losses in other industries.

- Beyond that, as industries absorb the benefit of the improved labor accessibility, the long-term employment gains are broad-based, spread among all industry sectors.
- **Annual personal income.** Closely related to employment, annual personal income in 2030 will be +\$30 million higher (constant 2015 \$) than the base case.
- **Gross domestic product for the state (GSP).** The most complete measure of the economy's expansion due to Bottineau LRT is gross domestic product. Gross domestic product is a summarization of "final goods and services" production, removing duplication of intermediate inputs and supplies. Gross domestic product in 2030 will be +\$118 million higher (constant 2015 \$) than the base case.
  - Summarizing all of the economic gains, the cumulative additional GSP grows from \$593 million for 2018-2020 to \$1.197 Billion for 2018-2030 to \$3.012 Billion for 2018-2040.
  - In the first years of operation, all of the economic impacts from accessibility improvements and car ownership mitigation will be situated in the metro region. Gradually, the metro's economic growth spills over. For the entire period 2018-2040, 96% of the additional economic activity is situated at businesses in the metro region; 4% in Greater Minnesota.

An Excel spreadsheet accompanying this memo provides a time-series of results for each year, 2018 to 2044.

**Assumptions details.** Projections of the economic return from labor accessibility gain are based on average economic returns observed historically and in other regions – data available to the REMI-PI model. The eventual Twin Cities results for the forecast period could be higher or lower than the historically-based, average, generic case.

Beyond the construction phase economic stimulus, Bottineau LRT's economic impact depends on what it does for the greater transportation system, providing residents expanded transit. These outcomes are introduced to the REMI-PI model as factors affecting economic performance.

From a separate transportation modeling analysis, SRF Consulting forecasts that Bottineau LRT will prompt 12,100 net new trips by transit. Most of that new transit use will be for work commutes (5,800 net new home-based work trips). For economic modeling purposes, these trips only constitute a labor accessibility gain if they connect workers to workplaces that the workers could not reach prior, but for the new LRT service.

Additionally, SRF Consulting forecasts that Bottineau LRT will prompt a reduction of 200,000 daily vehicle miles traveled, due to travel mode shift; equivalent to -0.2% of daily VMT in the region. However, there will be no improvement in average roadway speeds, and no measureable improvement to overall accessibility *on roadways*.

For economic modeling, the build scenario assumes a +0.03% regionwide labor accessibility improvement in the first full year of service, with the improvement growing to +0.04% in the second year, and beyond. I arrive at this estimated improvement by considering the transit accessibility improvement for the workforce most certain to benefit:

- From analysis of Census data, an estimated 0.08% of the metro workforce is both transit-dependent (no vehicles) *and* living in the immediate area of Bottineau LRT stations.
- Within these station areas, SRF Consulting finds that transit accessibility will improve by 47%.
- The multiplicative product of these two variables is 0.04%.

*The assumption of accessibility gains is an exogenous input to the REMI-PI model, not a prediction of the model. (REMI-PI is not a transportation model designed to project accessibility and transportation network outcomes.)* This and all of the exogenous inputs and have leverage on the economic model results. The economic impact of Bottineau LRT is most sensitive to the extent of regional labor accessibility improvement. Attentive to this, the specific assumption – a +0.03% to 0.04% improvement in regionwide labor accessibility improvement – is deliberately conservative.

The regional economy may benefit in another way as well: There will be new frequent transit riders who are motivated to reduce their car ownership. For this analysis, after five years the new LRT will reduce total regional car ownership by -0.05% (or -1,200 vehicles) and associated car-ownership costs by \$10 million per year. This mitigated spending by households outweighs the increased spending on transit fares (12,100 net new trips / 2 trips per day X \$85 monthly pass X 12 months = \$6.1 million per year), and the balance allows other uses or savings. Long-term economic benefits result.