ROI for Partnerships

Return on Investment from Public-Public and Public-Private Partnerships

Evaluating the Economic Efficiency of Transportation Partnerships

Final Report

June 2015

This report was prepared for the Minnesota Department of Transportation by:

Table of Contents

Acronyms and Abbreviations

AHT	auto hours traveled
B/C analysis	benefit/cost analysis
B/C ratio	benefit/cost ratio
DCF	discounted cash flow
MnDOT	Minnesota Department of Transportation
NPV	net present value
O&M	operations and maintenance
OTSM	Office of Transportation System Management, MnDOT
PHT	person hours traveled
PV	present value
ROI	return on investment
ROIC	return on invested capital
ROR	rate of return
TED	Transportation Economic Development
THT	truck hours traveled
VHT	vehicle hours traveled
VMT	vehicle miles traveled

Introduction

There is much debate surrounding Partnerships (Public-Private/Public-Public) and their role in supplying infrastructure, mostly due to the inconsistent use of terminologies by stakeholders and the controversial misconceptions surrounding them. However, Partnerships, in the broadest sense, are simply financing schemes that allow for a different allocation of risk, responsibilities, and costs among participants than a traditional scheme would allow. For this reason, they have become a popular source of innovative financing to help supply the ever-growing demand for public infrastructure in an efficient manner. Nonetheless, the perceived opacity of these Partnerships necessitates that they be comprehensibly evaluated in order to determine the value of their contribution. That is, determining precisely how much more efficient they are and how the State has benefited by engaging in them.

This report looks at a series of Partnerships on behalf of the Minnesota Department of Transportation (MnDOT) and evaluates them by their return on investment (ROI) to the state, as measured by their net contribution to tax revenue relative to costs and by their relative benefit/cost (B/C) ratios, as measured by their net contribution to society (i.e., travel time savings). In this report, we analyze six distinct MnDOT Partnerships with a variety of financing structures (Table 1). The partnerships were developed either through the Transportation & Economic Development (TED) program or unique unsolicited proposals made to MnDOT. TED is an ongoing solicitation managed jointly by MnDOT and the Department of Employment and Economic Development that utilizes partnerships with public agencies and the private sector to advance transportation projects which have economic development objectives.

Table 1 Partnership by Type and Stake

Name of Partnership	Type	MnDOT Stake	Program
TH 7 and Louisiana Avenue	Public-Public	25.6%	TED
Penn Avenue and I-494	Public-Private-Public	22.2%	Unsolicited Proposal
US HWY 169/Bren Road	Public-Private-Public	54.6%	Unsolicited Proposal
US HWY 10/CSAH 34	Public-Private-Public	62.7%	TED
TH 15 and 33rd Street South	Public-Public	69.0%	TED
ABC RAMPS Improvements	Public-Public	100.0%	Unsolicited Proposal

Project Selection

The projects analyzed in this report were selected from a range of partnership projects that MnDOT has completed in the past twenty years. The pool of projects considered was developed by interviewing stakeholders. After developing a list of projects a review was done to select the best projects to analyze. The goal was to gain a variety of types of projects representing geographic distribution as well as different types of partnerships. The final set of projects was determined based on type of project and

ultimately the quality of data available to conduct the analysis. Several partnerships were eliminate from consideration due to lack of data about the project

Range of Results

Overall, the Partnerships are estimated to produce significant gains to the state in the form of both increased tax revenue and enhanced transportation benefits to society. Although not all Partnerships considered are anticipated to be profitable, on average each Partnership evaluated is anticipated to generate approximately a **2.2 percent** real rate of return per year and a B/C ratio of **7.3** over 20 years (Table 2). Due to the sharing of costs, risks, and responsibilities inherent in Partnerships, these gains are significantly higher than would otherwise be achieved using a traditional financing scheme. In other words, the state generates additional benefits as a result of developing these projects through cost-sharing Partnerships.

Table 2 Partnership Results (State Investment)

Partnership	Real Rate of ROI per year	B/C Ratio
TH 7 and Louisiana Avenue	1.3%	8.4
Penn Avenue and I-494	N/A*	2.3
US HWY 169/Bren Road	9.2%	2.4
US HWY 10/CSAH 34	4.1%	N/A*
TH 15 and 33rd Street South	-10.0%	16.1
ABC RAMPS Improvements	6.3%	N/A*

N/A*= data not available

Partnerships with higher real rates of return are directly correlated with projects that are associated with higher job creation impacts. Similarly, higher B/C ratios correspond to projects with higher changes to travel demand, which in turn are directly impacted by the volume of trips. Due to the uncertain job creation impacts, which are the main source of revenue generation, only direct job creation associated with the Partnerships was considered. These impacts were later adjusted to reflect baseline assumptions that are more conservative than is traditionally used in these types of analyses. More specifically, the change relative to the baseline (partnership is not pursued) is assumed to be less than the direct jobs stipulated by the Partnership stakeholders. Therefore, even under significantly conservative assumptions, these Partnerships are expected to create significant gains to the state (

Table 3). Partnerships listed without corresponding results reflect a lack of data needed to complete the analysis.

Table 3 Partnership Results (Return on Investment Analysis)

Partnership	Millions of 2014$			Over 20 Years	
	Benefits	Costs	NPV	ROI	ROR per Year
US Hwy 169/Bren Road	79.6	17.5	62.1	355%	7.9%
US Hwy 169/Bren Road (state)	55.7	9.6	46.2	483.6%	9.2%
TH 7 and Louisiana Avenue	25.9	25.0	0.9	3.6%	0.2%
TH7 and Louisiana Avenue (state)	18.1	13.9	4.2	30.3%	1.3%
US Hwy 10/CSAH 34	10.9	5.3	5.6	104.9%	3.7%
US Hwy 10/CSAH 34 (state)	7.6	3.4	4.2	122.6%	4.1%
TH 15 and 33rd Street South	1.2	11.1	(9.9)	-88.9%	-10.4%
TH 15 and 33rd Street South (state)	0.9	7.1	(6.2)	-87.9%	-10.0%
ABC RAMPS improvements	23.4	18.3	5.1	27.8%	6.3%

NPV = net present value
ROI = return on investment
ROR = rate of return

Context of Results: What is a Good Result?

Typically, the choice of the discount rate and the estimated impacts of a project (relative to its baseline) greatly affect the analysis result. In this report, we assume a 3 percent real discount rate, consistent with the U.S. Department of Transportation's guidance as laid out in the TIGER 2014 guidance[1] referencing OMB circular A-94[2] and higher than MnDOT's guidance, which recommends the use of a 2-percent real rate. Only direct and verifiable project impacts were considered in the analysis in order to remain conservative and realistic in our approach.

Unfortunately, little data is publicly available regarding the exact range of results for public sector investments—making comparison difficult. However, general guidelines on ROI and benefit/cost (B/C) analysis are available. These guidelines typically recommend an investment to be undertaken if the ROI is positive and the Benefit/Cost ratio is above 1 once discounted or adjusted for the opportunity cost of capital. That is, a project yielding results that meet or surpass these benchmarks is better than the alternative investment available. A positive ROI indicates the project's net benefits exceed its costs. While a B/C ratio above 1 implies a project's benefits to society exceed its costs. Since the analysis only considers net impacts relative to a baseline, adjusted for inflation, and discounted using a rate that incorporates the real opportunity cost of capital, the results can be interpreted using the same guidelines. Therefore, a "good result" would meet the following criteria: ROI > 0 and B/C ratio > 1.

[1] http://www.dot.gov/sites/dot.gov/files/docs/TIGER%20BCA%20Guidance%202014.pdf
[2] http://www.whitehouse.gov/omb/circulars_a004_a-4/

Key Lessons Learned

This study was conducted to determine the value of partnership projects. The results of this study are intended to inform MnDOT and partners as they consider future partnerships. A key next step being considered is the formation of a Joint Program Office (JPO) for Partnerships as permitted by a 2013 state law. This study provides important lessons about partnerships as well as lessons that can guide the successful formation of a JPO, these lessons include:

Partnerships have proven benefits to the State. Each of the six partnership projects evaluated returned a transportation benefit exceeding the State's investment. All of the projects were able to utilize the State's financial investment to leverage additional investment from public and/or private sources. In effect, MnDOT was able to build projects at a lower cost to the State because of the partnership. Partnerships enhance the financial effectiveness of MnDOT.

Beneficial partnerships can take many forms. The study looked at projects developed through partnerships between MnDOT and other public agencies (public-public) and partnerships that included private capital (public-private). Both models delivered a positive return on investment. The public-private investments studied drew private capital for specific improvements related to the source of the private capital. Typically, the private investor was interested in funding a transportation improvement so they could create better access to their business or the investment would allow them to expand the business. Public-public investments were tied to the potential for economic development occurring after the investment.

Another type of partnership that has proven beneficial in many examples nationally is a public –private investment that generates a revenue stream (typically tolls). These investments have not been undertaken in Minnesota and face many administrative barriers that limit their feasibility in the State. Though the barriers are high, a JPO could eventually be a mechanism for overcoming barriers for larger partnership projects that have revenue streams.

The fiscal benefits of partnerships do not necessarily accrue to the funding agencies, but they do accrue to the public. Several of the partnerships studied showed a large economic benefit to the state in terms of increase in jobs and thus an increase in the tax base. The tax revenue often was projected to exceed the MnDOT and State investment in the project. However, the tax revenue does not accrue to MnDOT through the dedicated Trunk Highway Fund, but to the general fund of the State of Minnesota. This is not a problem with partnership formation as the benefits are real. It simply should be recognized when partnerships benefits are communicated to policy makers and the public. In some of the partnerships considered, MnDOT did receive direct fiscal return for their investment or a return of services that the Agency would have had to pay for if the partnership had not formed.

Regardless of anticipated fiscal return (ROI), it is critical for MnDOT that the partnerships have a clear transportation benefit in excess of the MnDOT investment. Both public-public and public-private partnerships are undertaken with some risk. For instance, expected economic expansion may not occur or revenue projections from the investment may fall short. In a partnership this is often a shared risk. For MnDOT, the investments that also create transportation benefits help mitigate this risk. At a minimum, when MnDOT enters a partnership they should expect a return on transportation benefits

that exceeds their fiscal investment. This return can be in reduced user costs (delay, fuel consumption. etc.), improved safety, or extended asset life. By setting the MnDOT investment at a point no higher than the expected transportation benefits, MnDOT protects its investment from situations where the economic benefits of the project never materialize.

Partnerships can leverage private capital for public projects. Typically, MnDOT projects are built entirely with public funding. The analysis of past partnerships show there are project types that can attract private investment to complete a project that normally would only have public funds involved. This private investment essentially lowers the public costs but still retains all of the transportation benefits. The right type of project can generate private investment. Understanding this dynamic and structuring programs and processes to identify these projects is a function well suited for a JPO. Partnerships should be formed with long-term monitoring in mind. A JPO would assume responsibility for this monitoring which does not exist on current partnerships.

Partnerships do not need to be big to be valuable. Large scale public private partnerships are often held up as examples of success that is possible when partnering. The partnerships undertaken by MnDOT are relatively small but still successful. Organizationally and financially MnDOT is capable of delivering smaller partnership projects. The partnerships done to date have lower risk and complexity. Mega projects developed as partnerships, such as have been used elsewhere, are very different partnership undertakings than MnDOT is currently prepared to undertake. However, by continuing to invest human and capital resources in partnership projects the Agency can work towards larger sized project opportunities that have public benefits.

Legislative and policy risks with partnerships can be managed. Over the years, partnerships have come under various degrees of legislative and public scrutiny and criticism associated with co-mingling public and private money, project selection criteria, labor agreements, risk sharing and other issues. Under Public-Public or Public-Private Partnership models, risks change, but by setting minimum thresholds for transportation improvements and economic development the public sector can ensure state funds and interests are protected. Continued management of partnerships through a well-reasoned, objective and pragmatic approach can ensure value is attained under these agreements.

Conclusions

It is important to be clear in the investment study that fiscal analysis and transportation analysis provide different benefits. Partnerships should evaluate a fiscal return on investment as well as the transportation benefits (i.e. Benefit/Cost). ROI measures the return on a financial investment whereas the latter considers the societal return on investment. The dual analysis creates some confusion when presented side by side. Clearly defining terms and purpose for ROI and Benefit/Costs are important steps when communicating partnership benefits.

The quality of an ROI analysis is dependent on quality of project data. There are many partnerships left unanalyzed that have apparent value for the State but could not be studied due to lack of basic data sources. Establishing the value of partnerships through a return on investment approach is a fairly

straightforward effort. However, an ROI analysis is dependent on having key data. For a partnership program to flourish it should be able to document the benefits derived from the State's investment. Data needs should be defined in advance of partnership formation and the results should be documented within a few years of project completion.

Case Study: New Trunk Highway 7 and Louisiana Avenue Interchange in St. Louis Park, TED Project

Introduction

An economic evaluation of the Trunk Highway 7 and Louisiana Avenue Interchange project was conducted in order to estimate the potential benefits or ROI that this project will generate for the state of Minnesota. The evaluation was performed considering the objectives of the partnership program that facilitated its development, the Transportation Economic Development (TED) pilot program. Accordingly, part of the analysis relied on measuring the project's contribution to economic development and its other contribution to transportation development. The interchange is expected to generate an annual rate of return (ROR) of **1.3 percent** and a B/C ratio of **8.4** over 20 years. Given the uncertainty associated with projecting benefits into the future, a sensitivity analysis was performed that determined that even under substantially conservative assumptions the project return is only modestly negative at **-0.4 percent**.

Table 4 Summary of Results

	Return Metrics		Leverage		Payback Metrics				
	Annual Rate of Return	Income Increase Per Public Dollar	Private Money Per Public Money	All Money Per State Money	Internal Rate of Return	Years to Break Even	NPV (Fiscal Analysis)	NPV (Social Benefits)	Benefit/ Cost Ratio
State + Local Investment	0.2%	$8.8	N/A*	N/A*	3.3%	20.3	$0.9M	$99.8M	5.6
State Investment	1.3%	$15.6	N/A*	2.9	5.4%	16.3	$4.2M	$107M	8.4

NPV = net present value
N/A*= data not available

Table 5 Selected Project Impacts

Total Project Costs (2012$)	$25.0M
Total State and Local Investment (2012$)	$17.4M
Total State and Local Revenue Generated (2014$)	$25.9M
State and Local Investment per job (2014$)	$47,700
State investment per job (2014$)	$26,750

Key Assumptions

- Analysis period = 2013 to 2033
  - First year of benefits 2016
  - Last year of benefits 2033

- Interchange becomes operational at end of 2014

- Only **direct jobs** were considered in the analysis (Table 6)
  - Jobs estimates provided for 2 and 5 years after project becomes operational.
  - From 2016–2018, total net new jobs are assumed to remain constant at 119.
  - From 2019–2033, total net new jobs are assumed to start at 540 and then gradually decline by a fixed amount such that by the end of the analysis period half of the jobs created by the project would be jobs that would have been there anyway. This is a conservative assumption designed to mitigate potential over-estimation of benefits.

Table 6 Project Jobs and Income Data

Employer/Development	Jobs after 2 Years	Jobs after 5 Years	Average Wage	Wage Adjusted for Inflation
Hardcoat Corporation	10	50	45,000	46,156
Hwy 7 Corporate Business Center		80	45,000	46,156
Oak Hill Medical Phase II		40	55,000	56,413
Office/restaurant complex		180	45,000	46,156
Furniture store expansion	4	10	30,000	30,771
Office Flex redevelopment on vacant lot	20	30	35,000	35,899
Tower Light	85	85	45,000	46,156
Redevelopment/Office Flex		40	35,000	35,899
Methodist Hospital office expansion		25	50,000	51,285

- Total costs of the project
  - 25,008,000 nominal 2012 dollars (Table 7)
  - **25,758,240 real 2014 dollars**

Table 7 Project Funding Source and Use Information

	Right-of-Way	Design	Environ-mental	Construction	Construction Engineering	Utilities	Total
FHWA				$7.630M			$7.630M
Local	$2.7M	$1.768M	$0.05M	$5.866M		$0.66M	$10.984M
MnDOT				$4.594M	$1.8M		$6.394M
Total	**$2.7M**	**$1.768M**	**$0.05M**	**$18.090M**	**$1.8M**		**$25.008M**

- Effective tax rate
  - State and local average rate after 2,000 iterations = 11.8 percent
    - Every analysis year, the effective tax rate used to calculate net new revenue generated is randomly selected from this distribution.
  - State Share = Effective rate X 0.7

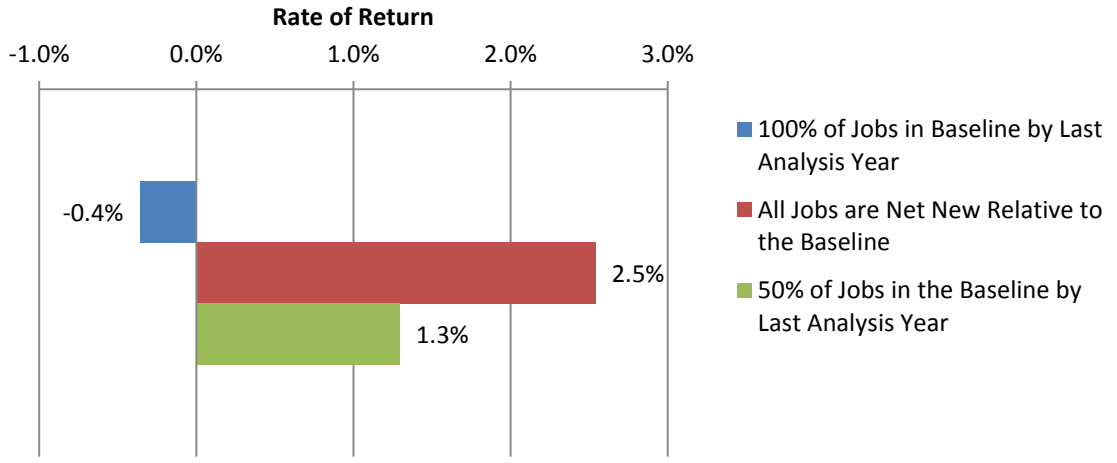
Real Rate of Fiscal Return Results

The analysis predicts the real ROR to be approximately **1.3 percent** over 20 years.

Sensitivity Analysis

A sensitivity analysis was performed to test the variation in the real rate of return given several job-creation scenarios. Fundamentally, we are measuring how much our rate of return changes if the project underperforms or over performs on the economic development criterion. As evidenced by Figure 1, the return is very sensitive to the economic development scenarios. However, it only becomes negative in the most extreme of the scenarios considered.

Figure 1 Range of Rates of Return under Different Job Creation Scenarios



Description of Scenarios

- **100 percent of jobs**—Baseline job creation increases every year until matching the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits.
- **All jobs are net new**—All jobs created by the project result in net new jobs relative to the baseline. That is, all of the new employment would not have been there otherwise.
- **50 percent of jobs**—Baseline job creation increases every year until matching **50 percent** of the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits. This is the headline figure used in Table 4.

Transportation Evaluation/ Benefit Cost Analysis

The City of St. Louis Park provided the anticipated changes to travel demand and crashes shown in Table 8 and Table 9.

Table 8 Yearly Changes in Travel Demand—Build vs. No Build

Year	VMT		VHT	
	Build	No Build	Build	No Build
2014	21,576,253	20,989,131	554,004	825,688
2034	24,804,708	22,364,057	710,842	1,266,271

VMT = vehicle miles traveled
VHT = vehicle hours traveled

Table 9 Changes in Crashes to VMT

	Build	No Build
Ratio of all crashes to VMT in one year	0.0000005777	0.0000013197

Given the changes to travel demand listed above, three main types of benefits were considered:

- **Travel time savings**—Results from changes in VHT
- **Vehicle operating costs**—Results from changes in VMT
- **Crash avoided savings**—Results from changes in VMT and the crash rate

Monetized values and other parameters used to calculate these benefits are listed in Table 10. All values used in the analysis are expressed in real 2014 dollars.

Table 10 Parameters for Analysis

	Value	Source	Units
Value of travel time			
Auto	16	MnDOT OTSM	Real 2014 dollars
Truck	27.3	MnDOT OTSM	Real 2014 dollars
Growth Rate			
Percentage	0.00%		
Fraction of traffic			
Auto	0.9625	City of St. Louis Park	
Truck	0.0375	City of St. Louis Park	
Vehicle occupancy ratio			
Auto	1.3	MnDOT OTSM	
Operational costs per mile			
Auto	0.31	MnDOT OTSM	Real 2014 dollars
Truck	0.96	MnDOT OTSM	Real 2014 dollars
Crashes monetized values			
Fatal	10,300,000	MnDOT OTSM	Real 2014 dollars
Injury type A	550,000	MnDOT OTSM	Real 2014 dollars
Injury type B	160,000	MnDOT OTSM	Real 2014 dollars
Injury type C	81,000	MnDOT OTSM	Real 2014 dollars
Property damage only	7,400	MnDOT OTSM	Real 2014 dollars
Type as a percent of all crashes at location			
Fatal	0.00%	City of St. Louis Park	
Injury type A	0.00%	City of St. Louis Park	
Injury type B	2.60%	City of St. Louis Park	
Injury type C	17.90%	City of St. Louis Park	
Property damage only	79.50%	City of St. Louis Park	

OTSM = Office Transportation System Management

Benefit/Cost Analysis Assumptions

- Analysis period = 2013 to 2034
  - First year of benefits 2014
  - Last year of benefits 2034
  - Interchange becomes operational in 2014
- Total costs of the project
  - 25,008,000 nominal 2012 dollars
  - **25,758,240 real 2014 dollars (cost used in analysis for state and local evaluation)**
  - **14,444,720 real 2014 dollars (cost used in analysis for state evaluation)**
  - **The residual value of assets is subtracted from costs in the last year in the S&L case**

- There is no service disruption to network as a result of the construction of the interchange.
- There are no savings in operations and maintenance costs relative to the no build case.
- The composition of crashes by type is expected to remain constant over the analysis period.
- Traffic shares (truck vs. auto) are assumed to remain constant.
- The reduction in the crash rate is expected to remain constant over the analysis period.
- The changes in VMT/VHT relative to the no build scenario are interpolated for the intervening years given the outputs for the years listed in Table 8 above.

Benefit/Cost Results

Table 11 Investment Evaluation

	State and Local	State
PV benefits	$121,534,740	$121,534,740
PV costs	$21,714,091	$14,444,720
NPV	$99,820,649	$107,090,020
BCR	5.6	8.4

PV = present value
NPV = net present value
BCR = benefit/cost ratio

Case Study: New Trunk Highway 15 and 33RD Street South Interchange in St. Cloud, TED Project

Introduction

An economic evaluation of the Trunk Highway 15 and 33rd Street South Interchange project was conducted in order to estimate the potential benefits or ROI that this project will generate for the state of Minnesota. The evaluation was performed considering the objectives of the partnership program that facilitated its development, the Transportation Economic Development (TED) pilot program. Accordingly, part of the analysis relied on measuring the project's contribution to economic development and its other contribution to transportation development. While the interchange is expected to generate substantial transportation benefits to the state, its contribution to economic development, as measured by permanent jobs created, is not expected to be high enough to generate a positive to the state in the form of increased tax revenue. The B/C ratio is expected to be **16.1** over 20 years. On the other hand, the annual rate of return is expected to be **-10 percent** over the analysis period. Given the uncertainty associated with projecting impacts into the future, a sensitivity analysis was performed that determined the effect on the rate of return given several job creation scenarios.

Table 12 Summary of Results Preliminary

	Return Metrics		Leverage		Payback Metrics				
	Annual Rate of Return	Income Increase Per Public Dollar	Private Money Per Public Money	Other Money Per State Money	Internal Rate of Return	Years to Break Even	NPV (Fiscal Analysis)	NPV (Social Benefits)	Benefit/ Cost Ratio
State + Local Investment	-10.4%	$0.9	N/A*	N/A*	N/A*	N/A*	-$9.9M	$105M	12.5
State Investment	-10%	$1.5	N/A*	$0.5	N/A*	N/A*	-$6.2M	$107M	16.1

NPV = net present value
N/A*= data not available

Table 13 Selected Project Impacts

Total Project Costs (2012$)	$12.9M
Total State and Local Investment (2012$)	$12.9M
Total State and Local Revenue Generated (2014$)	$1.2M
State and Local Investment per job (2014$)	$739,822
State investment per job (2014$)	$473,155

Key Assumptions

- Analysis period = 2014 to 2034
  - First year of benefits 2016
  - Last year of benefits 2034
  - Interchange becomes operational at end of 2014
- Only **direct jobs** were considered in the analysis (Table 14)
  - Jobs estimates provided for 2 and 5 years after project becomes operational.
  - From 2016–2018, total net new jobs are assumed to remain constant.
  - From 2019–2034 total net new jobs are assumed to remain constant.
  - Due diligence on the job creation aspects of the project revealed the termination of a planned development and, therefore, the jobs associated with this potential employer have been excluded from the analysis

Table 14 Project Jobs and Income Data

Employer	Jobs after 2 Years	Jobs after 5 Years	Average Wage
Lumber One	10	15	52,000
Crowne Point Development	No longer being pursued		

- Total costs of the project
  - 12,900,000 nominal 2012 dollars
  - 11,097,331 real 2014 dollars after discounting debt service
- Effective tax rate
  - State and local average rate after 2,000 iterations = 11.81 percent
    - Every analysis year, the effective tax rate used to calculate net new revenue generated is randomly selected from this distribution.
  - State share = effective rate x 0.7

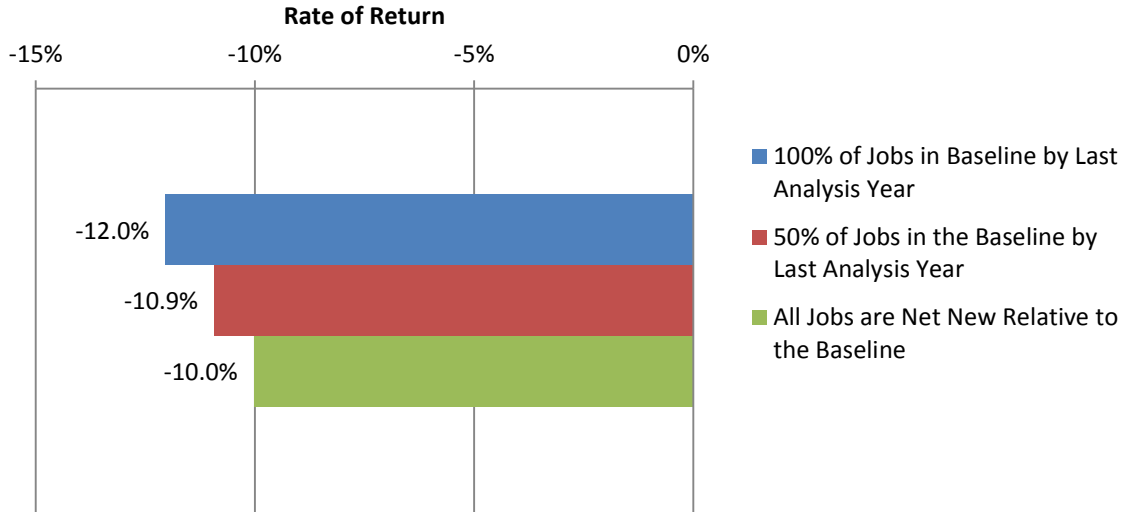
Real Rate of Return Results

The analysis predicts the real rate of fiscal return to be approximately **-10 percent** per year over 20 years.

Sensitivity Analysis

A sensitivity analysis was performed to test the variation in the real rate of return given several job-creation scenarios. Fundamentally, we are measuring how much our rate of return changes if the project underperforms or over performs on the economic development criterion. As evidenced by Figure 2, the return is very sensitive to the economic development scenarios. Nonetheless, the estimated net new jobs fail to generate a positive return. This is primarily due to the reduction in job creation attributable to Crowne Point Development no longer pursuing its planned expansion.

Figure 2 Range of Rates of Return under Different Job Creation Scenarios



Description of Scenarios

- **100 percent of jobs**—Baseline job creation increases every year until matching the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits.
- **All jobs are net new**—All jobs created by the project result in net new jobs relative to the baseline. That is, all of the new employment would not have been there otherwise.
- **50 percent of jobs**—Baseline job creation increases every year until matching **50 percent** of the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits. This is the headline figure used in Table 12 above.

Transportation Evaluation/Benefit Cost Analysis

The St. Cloud Area Planning Organization provided the anticipated changes to travel demand shown in Table 15.

Table 15 Yearly Changes in Travel Demand—Build vs. No Build

	VMT		VHT	
Year	Build	No Build	Build	No Build
2014	4,562,322	4,491,540	162,616	163,006
2034	6,287,746	6,292,065	271,043	273,512

Given the changes to travel demand listed in Table 15, two main types of benefits were considered:

- **Travel time savings**—Results from changes in VHT

- **Vehicle operating costs**—Results from changes in VMT

Monetized values and other parameters used to calculate these benefits are shown in Table 16. All values used in the analysis are expressed in real 2014 dollars.

Table 16 Parameters for Analysis

	Value	Source	Units
Value of travel time			
Auto	16	MnDOT OTSM	Real 2014 dollars
Truck	27.3	MnDOT OTSM	Real 2014 dollars
Growth Rate			
Percentage	0%		
Fraction of traffic			
Auto	0.9	St. Cloud APO	
Truck	0.1	St. Cloud APO	
Vehicle occupancy ratio			
Auto	1.3	MnDOT OTSM	
Operational costs per mile			
Auto	0.31	MnDOT OTSM	Real 2014 dollars
Truck	0.96	MnDOT OTSM	Real 2014 dollars
Annualization Factor	260		Days

OTSM = Office of Transportation System Management

Benefit/Cost Analysis Assumptions

- Analysis period = 2013 to 2034
  - First year of benefits 2014
  - Last year of benefits 2034
  - Interchange becomes operational in 2014
- Total Costs of the Project
  - Nominal 2012 dollars
  - **Real 2014 dollars (cost used in analysis for state and local evaluation)**
  - **real 2014 dollars (cost used in analysis for state evaluation)**
  - **Since the useful life of the assets will exceed the analysis period, the residual value of assets is subtracted from costs in the last year in the State and Local case in order to account for those future benefits**
- There is no service disruption to network as a result of the construction of the interchange
- There are no savings in operations and maintenance cost relative to the no-build case.
- Traffic shares, truck vs. auto, are assumed to remain constant
- The changes in VMT/VHT relative to the no-build scenario are interpolated for the intervening years given the outputs for the years listed in Table 15 above.

Benefit/Cost Results

Table 17 Investment Evaluation

	State and Local	State
PV benefits	$114,493,669	$114,493,669
PV costs	$9,177,617	$7,097,331
NPV	$105,316,051	$107,396,338
BCR	12.5	16.1

PV = present value
NPV = net present value
BCR = benefit/cost ratio

Case Study: US Highway 10/County Road 34 Interchange in Perham, TED Project

Introduction

An economic evaluation of the US Highway 10/County Road 34 Interchange project in Perham was conducted in order to estimate the potential benefits or ROI that this project will generate for the state of Minnesota. The evaluation was performed considering the objectives of the partnership program that facilitated its development—the TED pilot program. Accordingly, part of the analysis relied on measuring the project's contribution to economic development and its other contribution to transportation development. The interchange is expected to generate substantial benefits to the state in the form of increased tax revenue. However, due to the lack of data on transportation related benefits, a B/C analysis was not performed. Over 20 years, the project is expected to generate an annual rate of return of approximately **4 percent** and an NPV of **$4.2 million**. Given the uncertainty associated with projecting benefits into the future, a sensitivity analysis was performed that determined that even under the most conservative of assumptions, the project return remains substantially positive at **2.5 percent**.

Table 18 Summary of Results

	Return Metrics		Leverage		Payback Metrics				
	Annual Rate of Return	Income Increase Per Public Dollar	Private Money Per Public Money	Other Money Per State Money	Internal Rate of Return	Years to Break Even	NPV (Fiscal Analysis)	NPV (Social Benefits)	Benefit/ Cost Ratio
State + Local Investment	3.6%	$18.2	$0.03	N/A*	17.7%	9.3	$5.6M	N/A*	N/A*
State Investment	4.1%	$26.8	$0.08	$0.6	30.7%	8.6	$4.2M	N/A*	N/A*

NPV = net present value
N/A*= data not available

Table 19 Selected Project Impacts

Total Project Costs (2012$)	$5.1M
Total State and Local Investment (2012$)	$4.9M
Total State and Local Revenue Generated (2014$)	$18.1M
State and Local Investment per job (2014$)	$36,294
State investment per job (2014$)	$24,635

Key Assumptions

- Analysis period = 2012 to 2032

- First year of benefits 2014
- Last year of benefits 2032
- Interchange becomes operational at end of 2012

- Only **direct jobs** were considered in the analysis (Table 20)
  - Jobs estimates provided for 2 and 5 years after project becomes operational.
  - From 2014–2016, total net new jobs are assumed to remain constant at 165.
  - From 2017–2032, total net new jobs are assumed to start at 280 and then gradually decline by a fixed amount such that by the end of the analysis period half of the jobs created by the project would be jobs that would have been there anyway. This is a conservative assumption designed to mitigate potential over-estimation of benefits.

Table 20 Project Jobs and Income Data

Employer/Development	Jobs after 2 Years	Jobs after 5 Years	Average Wage	Wage Adjusted for Inflation
Barrel O 'Fun Snack Foods	70	120	27,000	27,694
Tuffy's Pet Foods	50	70	29,000	29,745
Perham Memorial Hospital	25	40	44,000	45,131
Kenny's Candy	20	50	27,000	27,694

- Total costs of the project
  - 5,127,230 nominal 2012 dollars
  - **5,351,173 discounted real 2014 dollars**

- Effective tax rate
  - State and local average rate after 2,000 iterations = 11.81 percent
    - Every analysis year the effective tax rate used to calculate net new revenue generated is randomly selected from this distribution.
  - State Share = Effective rate X 0.7

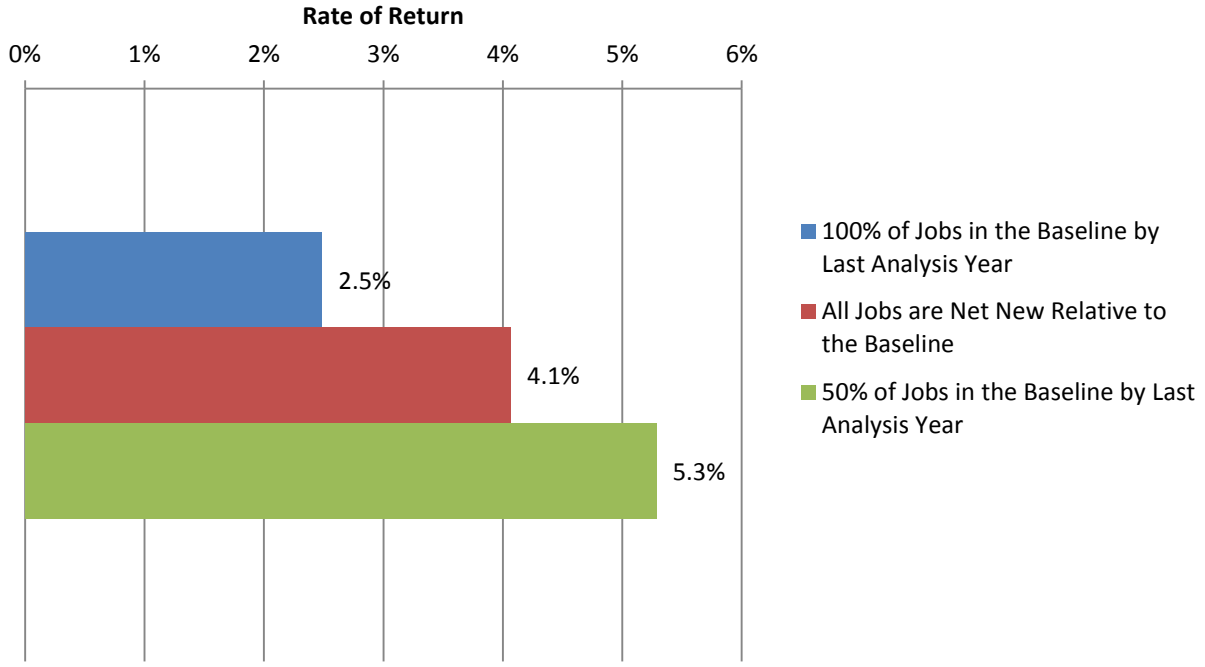
Real Rate of Fiscal Return Results

The analysis predicts the real rate of fiscal return to be approximately **4.7 percent** over 20 years.

Sensitivity Analysis

A sensitivity analysis was performed to test the variation in the real rate of return given several job-creation scenarios. Fundamentally, we are measuring how much our rate of return changes if the project underperforms or over performs on the economic development criterion. As evidenced on Figure 3, the return is sensitive to the economic development scenarios. However, even under the most conservative of the scenarios considered, the project will yield about a **2.5 percent** return to the state.

Figure 3 Range of Rates of Return under Different Job Creation Scenarios



Description of Scenarios

- **100 percent of jobs**—Baseline job creation increases every year until matching the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and therefore income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits.
- **All jobs are net new**—All jobs created by the project result in net new jobs relative to the baseline. That is, all of the new employment would not have been there otherwise.
- **50 percent of jobs**—Baseline job creation increases every year until matching **50 percent** of the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits. This is the headline figure used in Table 18 above.

Case Study: Penn Avenue and I-494 Interchange in Richfield

Introduction

An economic evaluation of the Penn Avenue and I-494 Interchange project in Richfield was conducted in order to estimate the potential benefits or return on investment that this project will generate for the state of Minnesota. The analysis relied on measuring the project's contribution to societal benefits that arise as a result of the transportation development that was undertaken. The interchange is expected to generate substantial benefits to the state. The B/C ratio is estimated to be **2.3** over 20 years, with an NPV of **$30.7 million**. Due to lack of sufficient data on job creation impacts, no fiscal return analysis was performed on this project.

Table 21 Summary of Results

	Return Metrics		Leverage		Payback Metrics				B/C
	Annual Rate of Return	Income Increase Per Public Dollar	Private Money Per Public Money	Other Money Per State Money	Internal Rate of Return	Years to Break Even	NPV (Fiscal Analysis)	NPV (Social Benefits)	Benefit/ Cost Ratio
State + Local Investment	N/A*	N/A*	$0.3	N/A*	N/A*	N/A*	N/A*	$5.9M	1.1
State Investment	N/A*	N/A*	$1.0	$3.7	N/A*	N/A*	N/A*	$30.7M	2.3

NPV = net present value
N/A*= data not available

Table 22 Selected Project Impacts

Total Project Costs (2001$)	$30.8M
Total State and Local Investment (2001$)	$23.8M

Transportation Evaluation/Economic Benefit Cost Analysis

MnDOT provided the changes to travel demand shown in Table 23.

Table 23 Yearly Changes in Travel Demand

Year	THT	AHT
2003	(2,664)	(86,136)
2022	(4,802)	(155,249)

THT = truck hours traveled

AHT = auto hours traveled

Given the changes to travel demand listed above, one main type of benefit was considered:

- **Travel time savings**—Results from changes in hours traveled

Monetized values and other parameters used to calculate these benefits are found in Table 24. All values used in the analysis are expressed in real 2014 dollars.

Table 24 Parameters for Analysis

	Value	Source	Units
Value of travel time			
Auto	16	MnDOT OTSM	Real 2014 dollars
Truck	27.3	MnDOT OTSM	Real 2014 dollars
Growth Rate			
Percentage	0%		
Vehicle occupancy ratio			
Auto	1.3	MnDOT OTSM	

OSTM = Office of Transportation System Management

Benefit/Cost Analysis Assumptions

- Analysis period = 2001 to 2022
  - First year of benefits 2003
  - Last year of benefits 2022
  - Interchange becomes operational in 2003
- Total Costs of the Project
  - 30,809,800 nominal 2001 dollars
  - **40,982,878 real 2014 dollars (cost used in analysis for state and local evaluation)**
  - **22,913,276 real 2014 dollars (cost used in analysis for state evaluation)**—Total State adjusted for debt service + Federal funding.
  - The residual value of assets is subtracted from costs in the last year in the State and Local case—$8,191,797 RSV based on real costs of structures of $26,936,341 expressed in 2014 dollars.
  - All costs were adjusted to 2014 dollars using the Consumer Price Index-U and later discounted forward to the 2014 base year where applicable.
- There is no service disruption to network as a result of the construction of the interchange.
- There are no savings in operation and maintenance cost relative to the no-build case.
- Traffic shares (truck vs. auto) are assumed to remain constant.
- The changes in hours traveled relative to the no build scenario are interpolated for the intervening years given the outputs for the years listed in Table 23 above.

Table 25 Funding Table

Source	Amount Spent in Nominal 2001 dollars
MnDOT	$6,847,000
Federal	$9,878,300
Local	$7,100,000
Private	$6,984,500
Total Project Costs	$30,809,800

Benefit/Cost Results

Table 26 Investment Evaluation

	State and Local	State
PV benefits	$53,571,577	$53,571,577
PV costs	$47,709,387	$22,913,276
NPV	$5,862,190	$30,658,301
BCR	1.1	2.3

PV = present value
NPV = net present value
BCR = benefit/cost ratio

Case Study: US Highway 169/Bren Road Interchange Expansion in Minnetonka

Introduction

An economic evaluation of the US Highway 169/Bren Road Interchange expansion in Minnetonka was conducted in order to estimate the potential benefits or ROI that this project will generate for the state of Minnesota. The evaluation was performed considering the contribution to tax revenue that may result given the long-term job creation impacts associated with the project and the benefits to society that will result from the expansion. The project is expected to generate substantial benefits. Generating over **$79 million** in total state and local tax revenue and over **$450 million** in net social benefits over 20 years, assuming a 3-percent discount rate. Given this increase in revenues, the project is expected to produce a real return on investment to the state of **9.2 percent**. The NPV of the project is expected to be over **$46 million**. Given the uncertainty associated with projecting benefits into the future, a sensitivity analysis was performed that determined that even under substantially adverse assumptions the project return on investment will remain well above **7.5 percent**. Given the societal benefits, the expansion will generate a B/C ratio over **2**.

Table 27 Summary of Results

	Return Metrics		Leverage		Payback Metrics				
	Annual Rate of Return	Income Increase Per Public Dollar	Private Money Per Public Money	Other Money Per State Money	Internal Rate of Return	Years to Break Even	NPV (Fiscal Analysis)	NPV (Social Benefits)	Benefit/ Cost Ratio
State + Local Investment	7.9%	$60.6	$0.5	N/A*	33.4%	4.2	$62.1M	$-0.8m	0.9
State Investment	9.2%	$76.0	$0.6	$0.8	41.9%	3.3	$46.2M	$7.1m	2.4

NPV = net present value
N/A*= data not available

Table 28 Selected Project Impacts

Total Project Costs (2012$)	$15.9M
Total State and Local Investment (2012$)	$10.9M
Total State and Local Revenue Generated (2014$)	$79.6M
State and Local Investment per job (2014$)	$7,073
State investment per job (2014$)	$5,459

Key Assumptions

- Analysis period = 2011 to 2030
  - First year of benefits 2014
  - Last year of benefits 2030
  - Interchange becomes operational at end of 2012
- Only **direct jobs** were considered in the analysis (Table 29)
  - Permanent jobs estimates provided by the City of Minnetonka and United Health Care Group.
  - From 2014–2016, total net new jobs are assumed to remain constant at 1,750.
  - From 2017–2032, total net new jobs are assumed to start at 1,750 and then gradually decline by a fixed amount such that by the end of the analysis period half of the jobs created by the project would be jobs that would have been there anyway. This is a conservative assumption designed to mitigate potential over-estimation of benefits.

Table 29 Project Jobs and Income Data

Employer/Development	Jobs after 2 Years	Jobs after 5 Years	Average Wage	Wage Adjusted for Inflation
United Health Care Group	1,750	1,750	31,200	32,002

- Total costs of the project
  - 15,850,000 nominal 2012 dollars
  - **17,506,083 discounted real 2014 dollars (cost used in analysis for state and local evaluation)**
  - **9,553,793 discounted real 2014 dollars (cost used in analysis for state evaluation)**
- Effective tax rate
  - State and local average rate after 2,000 iterations = 11.8 percent
    - Every analysis year the effective tax rate used to calculate net new revenue generated is randomly selected from this distribution.
  - State Share = Effective rate X 0.7

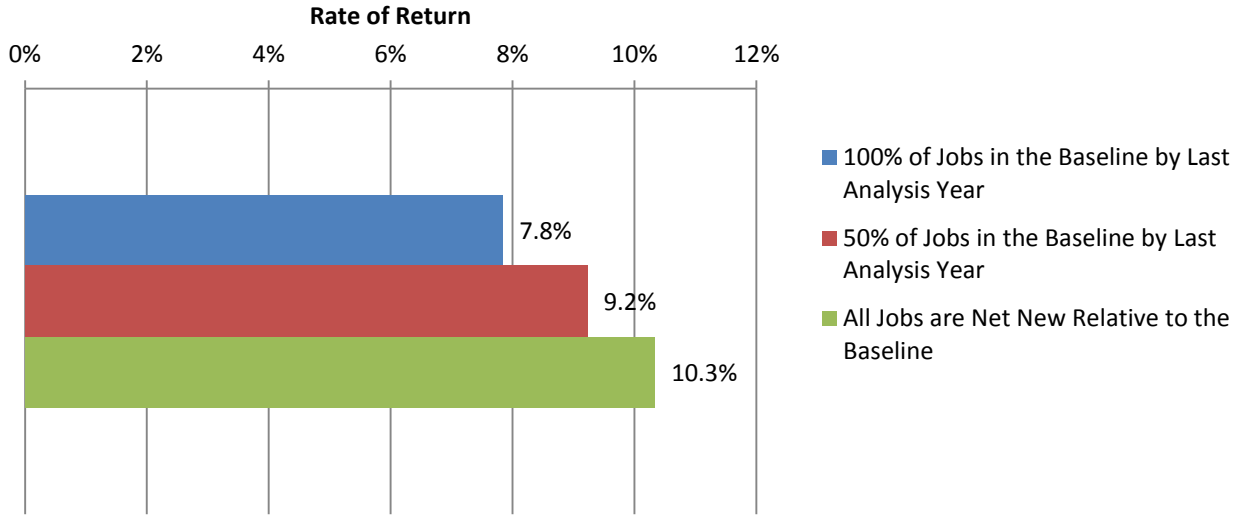
Real Rate of Fiscal Return Results

The analysis predicts the real rate of fiscal return to be approximately **9.2 percent** over 20 years.

Sensitivity Analysis

A sensitivity analysis was performed to test the variation in the real rate of return given several job-creation scenarios. Fundamentally, we are measuring how much our rate of return changes if the project underperforms or over performs on the economic development criterion. As evidenced by Figure 4, the return is sensitive to the economic development scenarios. However, even under the most conservative of the scenarios considered, the project will yield about a **7.8 percent** return to the state.

Figure 4 Range of Rates of Return under Different Job Creation Scenarios



Description of Scenarios

100 percent of jobs—Baseline job creation increases every year until matching the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits.

All jobs are net new—All jobs created by the project result in net new jobs relative to the baseline. That is, all of the new employment would not have been there otherwise.

50 percent of jobs—Baseline job creation increases every year until matching **50 percent** of the amount created by the project by the final analysis year. Effectively, this cuts the amount of net new jobs and, therefore, income in the analysis by a considerable amount since only changes relative to the baseline can be considered as net new benefits. This is the headline figure used in the summary results table.

Transportation Evaluation/Benefit Cost Analysis

The Metropolitan Council's Metropolitan Transportation Services provided the anticipated changes to travel demand shown in Table 30.

Table 30 Yearly Changes in Travel Demand—Build vs. No Build

	VMT		VHT	
Year	Build	No Build	Build	No Build
2010	69,473,040	69,474,288	2,037,991	2,038,104
2030	90380127	90,382,142	3,188,305	3,188,352

Given the changes to travel demand listed above, two main types of benefits were considered:

- **Travel time savings**—Results from changes in VHT

- **Vehicle operating costs**—Results from changes in VMT

Monetized values and other parameters used to calculate these benefits are listed in Table 31. All values used in the analysis are expressed in real 2014 dollars.

Table 31 Parameters for Analysis

	Value	Source	Units
Value of travel time			
Auto	16	MnDOT OTSM	Real 2014 dollars
Truck	27.3	MnDOT OTSM	Real 2014 dollars
Operating costs per mile			
Auto	0.31	MnDOT OTSM	Real 2014 dollars
Truck	0.96	MnDOT OTSM	Real 2014 dollars
Vehicle occupancy ratio			
Auto	1.3	MnDOT OTSM	
Annualization factor	365		Days
Auto	97	Metro Council	Percent
Truck	3	Metro Council	Percent

OTSM = Office of Programming and Planning

Benefit/Cost Analysis Assumptions

- Analysis period = 2010 to 2030
  - First year of benefits 2013
  - Last year of benefits 2030
  - Interchange becomes operational in 2013
- Total costs of the project
  - 15,850,000 nominal 2012 dollars
  - **17,506,083 real 2014 dollars (cost used in analysis for state and local evaluation)**
  - **9,553,793 real 2014 dollars (cost used in analysis for state evaluation)**
- There is no service disruption to network as a result of the construction of the interchange.
- There are no savings in operations and maintenance cost relative to the no build case.
- There are no safety savings.
- Traffic shares (truck vs. auto) are assumed to remain constant.
- Given the useful life of assets exceeds the analysis period, a residual value of $4.4M is subtracted from the costs at the last analysis year in order to capture those future benefits.

Benefit/Cost Results

Table 32 Investment Evaluation

	State and Local	State
PV benefits	$12,306,929	$12,306,929
PV costs	$13,145,689	$5,193,399
NPV	$-838,760	$7,113,531
BCR	0.9	2.4

PV = present value
NPV = net present value
BCR = benefit/cost ratio

Case Study: ABC Ramps Improvements

Introduction

A discounted cash flow analysis was performed on a series of investments undertaken by ABC Ramps between 2009 and 2010. These investments are termed Improvements and correspond to a series of renovations and installations that improved the overall operational efficiency of the ramps. The improvements allowed the Ramps to capture an increasing share of demand resultant from the development in the surrounding areas and to reduce its expenditure per unit of revenue. The analysis reveals that the investment has succeeded in generating a healthy return for the Ramps and that the total costs have likely been paid back with profit. The results are robust to optimistic baseline revenue assumptions.

Table 33 Summary of Results

ROIC	NPV	PV Benefits	PV Costs	Payback
6.3%	$5,081,172	$23,368,256	$18,287,054	3.1 years

ROIC = return on invested capital
NPV = net present value
PV = present value

Project Summary

ABC Ramps is a major parking and transportation hub located in downtown Minneapolis. The structure has been servicing Minneapolis for over a decade, providing residents in the area with safe, affordable, and convenient parking options. The Ramps are operated by the City of Minneapolis under contract with MnDOT. In the late 2000s, raising population density and new developments in the surrounding areas, including the construction of Target Field and the opening of the Northstar Commuter Rail line, saw ABC ramps poised to take advantage of several opportunities to expand its operational efficiency and modernize its capabilities in order to expand is sales volume. Accordingly, the Ramps undertook a series of improvements, between 2009 and 2010, as part of a broad-based partnership with a combination of stakeholders from both the private and the public sector.

Some of the improvements undertaken are shown in Table 34.

Table 34 Description of Improvements Source: MnDOT

Ramp	Improvement
Ramp B	New 2nd Avenue entry/exit
	Renovation of elevator/escalator
	Charter bus area and restrooms
Ramp A	Pedestrian walkway
Ramp A, B, and C	Parking revenue control, installation of automated equipment, and wayfinding

In the years preceding the improvements, the Ramps experienced major operational constraints that prevented it from efficiently handling large influxes of vehicles during an event. These inefficiencies would often result in major delays for consumers and eventually acted as a deterrent for future customers. Accordingly, it was expected that in the absence of these improvements, the Ramps would not be able to accommodate the influx in demand resultant from the increased commercial development in the surrounding areas. This is especially important considering the Ramps' strategic position in relation to Target Field. Due to its proximity, the Ramps enjoy a natural competitive advantage. However, in the presence of these operational inefficiencies, the Ramps could have risked this advantaged, as the convenience to consumers would have been eroded by the added inconvenience of queuing in the ramps. Therefore, while ramp revenue would have continued to benefit from the increased demand, it would have done so at a diminished pace.

What follows is a financial analysis of the ROI to MnDOT as a result of these improvements.

Methodology

Fundamentally, the ROI was determined by estimating the net present value of the improvements over the analysis period. Depreciation of the asset was not computed into the calculation and therefore was not added on to the yearly free cash flow estimates. In addition, we do not consider any possible revenue loss as a result of service disruption during construction. We expect both these issues to likely offset each other over the analysis period. Net earnings as a result of the improvements were estimated given the yearly financial reports of ABC Ramps from 2003–2013. Total capital costs and associated costs of financing were determined given the expenditure reports and loan-lease agreements as provided by MnDOT. Although debt service payments extend into 2028, the analysis period under consideration spans from 2008 to 2013. This is done in order to arrive at a rate of return over the years without needing to forecast revenues and expenses into the future for both the current (improvement-in-place) scenario and the baseline (no-improvement). Since we calculate the present value of the entire stream of debt payments, the NPV remains unimpacted and the rate of return reflects an accurate accounting of all costs and benefits. The equations below summarize the calculations performed for this analysis.

$$NPV = \sum_{t=0}^{N} \frac{NCF_t}{(1+I)^t}$$

Where NCF_t is the net cash flow generated as a result of the investment/partnership in time t and I is the discount rate. For this analysis we assume a discount rate of 3 percent and a base year of 2014. All values are presented in 2014 dollars.

$$\text{ROR} = \left(NPV^{\frac{1}{(tn-t0)}} \right) - 1$$

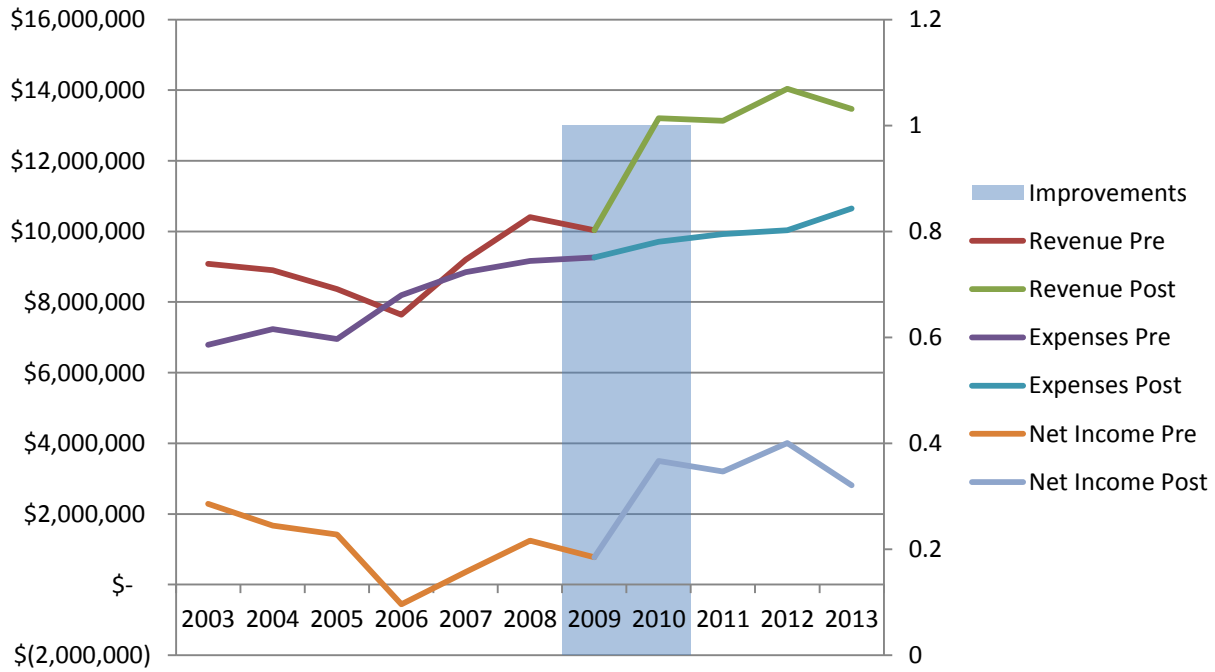
Where tn and t0 represent the last (2013) and first year (2009) of the investment, respectively. In estimating net cash flows, we assumed a baseline scenario in which the surrounding commercial development exists (example: Target Field) but the ramps would not be able to fully accommodate the increase in demand. Therefore, while it continues to increase performance, it captures a lesser amount of business than in the current scenario.

Calculation of Net Earnings

In order to produce reliable estimates of the earnings attributable to the project, we compared revenues and expenses prior to the improvements and afterward to isolate a discernable trend. Since the investment affects the operational efficiency of the Ramps, the impacts of the improvements will be reflected in both increased revenues and decreased costs. First revenues are disaggregated by source and baseline estimates are subtracted from it. Then expenses ratios are calculated to arrive at an estimated efficiency savings. Lastly, these flows are discounted according to the year in which they occur. Because this is an ex-post analysis, flows that occur prior to the base year are discounted forward.

Figure 5 shows financial performance for ABC Ramps from 2003 to 2013. The different components of net income are classified in two stages, one pre and one post, denoting the behavior of the respective indicators prior to the improvements and after the improvements. The graph clearly shows top-line revenue displaying a distinct trend prior to and after the investment. The acceleration in top-line performance is so pronounced that nearly all increases translate into net income, as shown by the shape of the net income curve which closely tracks the revenue curve after the improvements. Moreover, the changes in operational efficiency are visibly discernable from this graph. We see that while expenses have increased in the post stages, the rate of growth is significantly muted and smaller in proportion to the revenues associated with it. Effectively, the Ramps are spending less per unit of revenue. The changes in these two indicators are the main sources of net earnings. In the following section, we further disaggregate these sources and isolate flows attributable to the project.

Figure 5 Revenue, Costs, and Net Income per year Source: ABC Ramps Annual Reports



Revenues

Revenues are driven by changes in price or changes in quantity. In the case of the Ramps, since it is constrained by the amount of spaces, the changes in quantities reflect changes in occupancy or the ratio

of the amount of vehicles to spaces. Similarly, since the Ramps engage in variable pricing, price changes are better captured by average prices or the ratio of revenue to occupied spaces. Figure 6 shows that in the post stages, while average prices had been falling occupancy rose significantly and in a distinct trajectory than in the pre-2009 stages. The behavior of these variables suggests that in the absence of the improvements, the Ramps would likely have been unable to capture the increased revenue as the majority of the changes can be explained by changes in the occupancy rate and therefore volume of vehicles. The increase in revenue in the post stages is mostly attributable to an increased volume of vehicles serviced.

Figure 6 Average Price and Volume Source: ABC Ramps Annual Reports

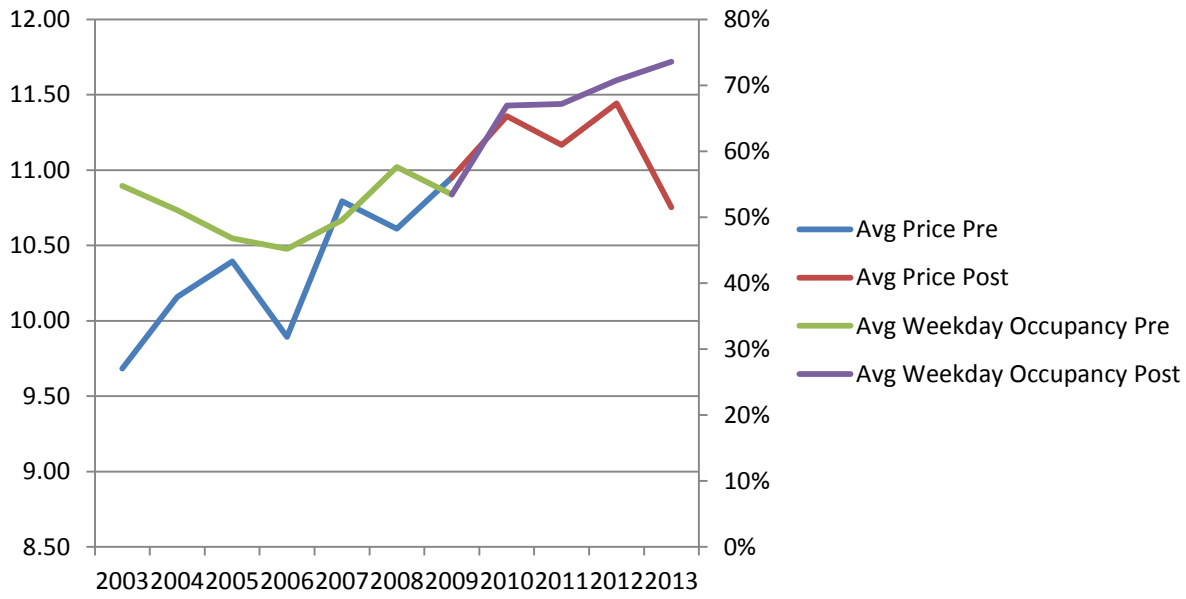


Figure 7 shows the relative composition of sales volume by revenue stream. As evidenced by the graph, the Ramps have been accommodating an increasing amount of vehicles since the improvements. In addition, while most categories have increased modestly or decreased slightly, event parking has increased significantly since 2009. This trend chronologically correlates with the opening of Target Field.

Figure 7 Sales Counts by Category Source: ABC Ramps Annual Reports

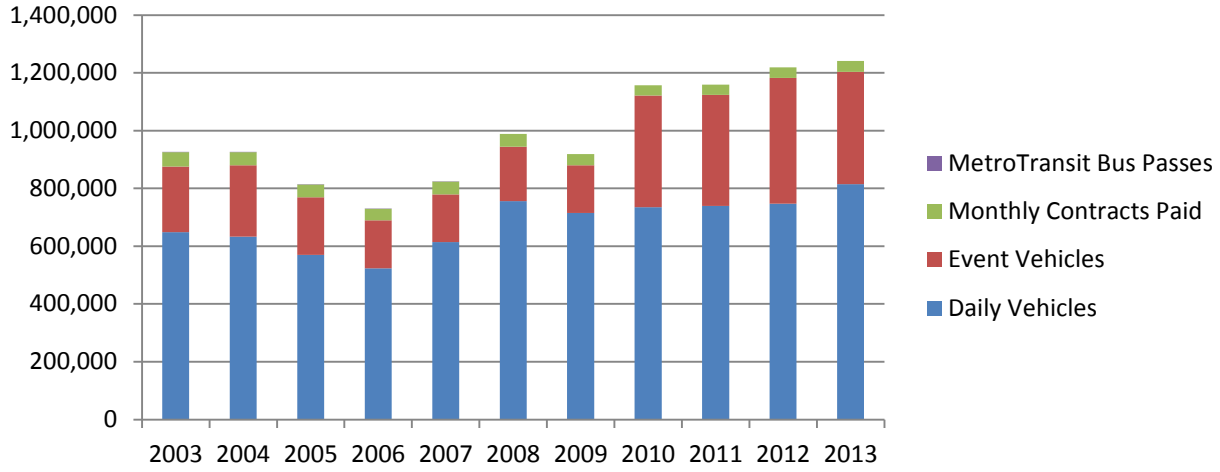


Figure 8 displays total revenues by category. Disaggregating the revenues by source, we can ascertain that a large share of the gross change in revenue is directly attributable to the increase in event parking. This explains the large share of growth from 2003 to 2009 average revenues stemming from this category. Figure 9 shows how the share of total growth from average 2003 to 2009 levels attributable to event parking ranges from 89 percent to 73 percent.

Figure 8 Total Revenues by Category Source: ABC Ramps Annual Reports

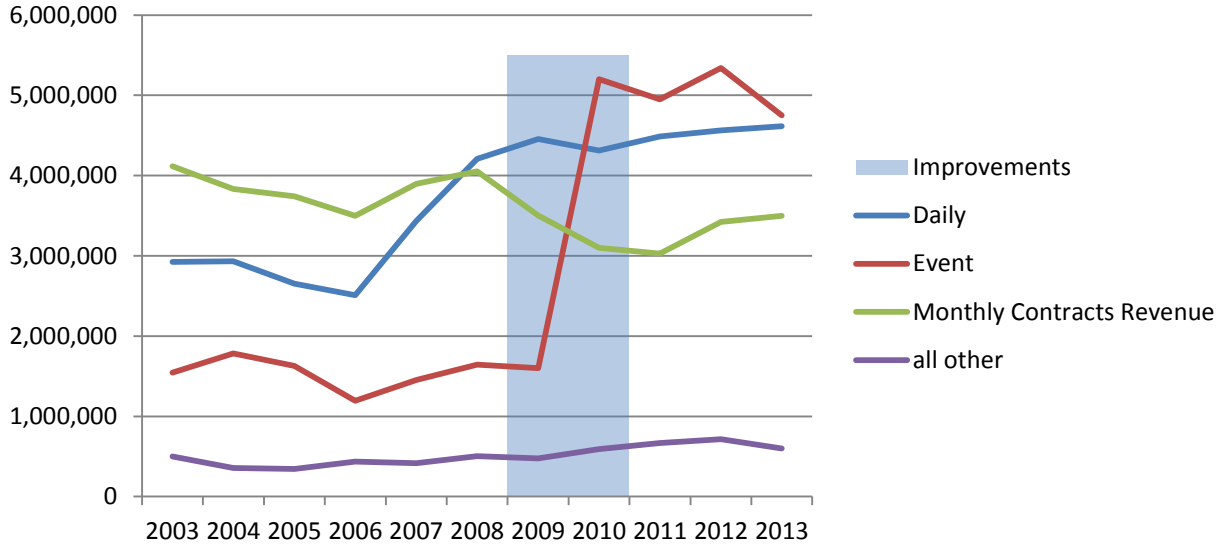
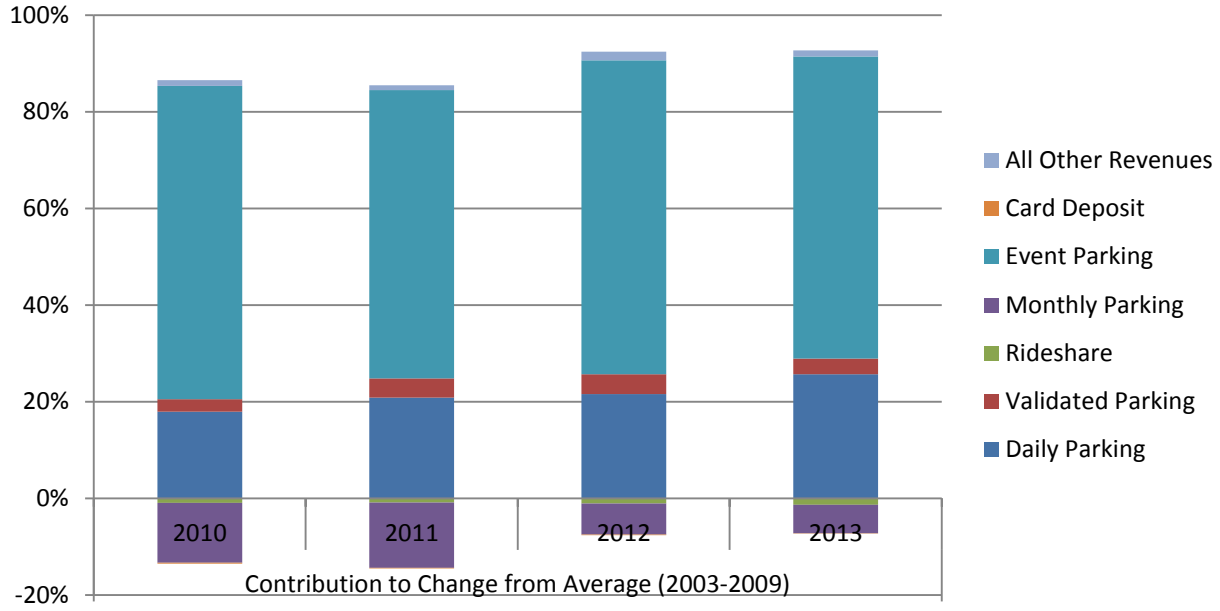


Figure 9 Change in Sales by Category relative to 2003- 2009 Averages Source: ABC Ramps Annual Reports



As demonstrated above, the growth in revenues stems primarily from a growth in volume and more specifically volume associated with event parking. In order to isolate revenues attributable to the investments and compute net revenue gain, the portion of revenue that would have occurred regardless needs to be subtracted from the actual revenues. Figure 10 and Figure 11 show the behavior of individual revenue streams compared to their long-run averages. The figures demonstrate that while certain streams significantly outpace their trend, others do not. For example, Figure 10 shows the decline in monthly contract revenue compared to its previous performance. It is difficult to determine whether this represents a secular shift in consumer attitudes or a result of the improvements. Therefore, rather than separating individual revenue streams into baseline and improvement related gains; we look at total revenues to calculate the net amount generated by the improvements.

Figure 10 Event Parking Revenue per Year Relative to Pre-Improvement Average Source: ABC Ramps Annual Reports

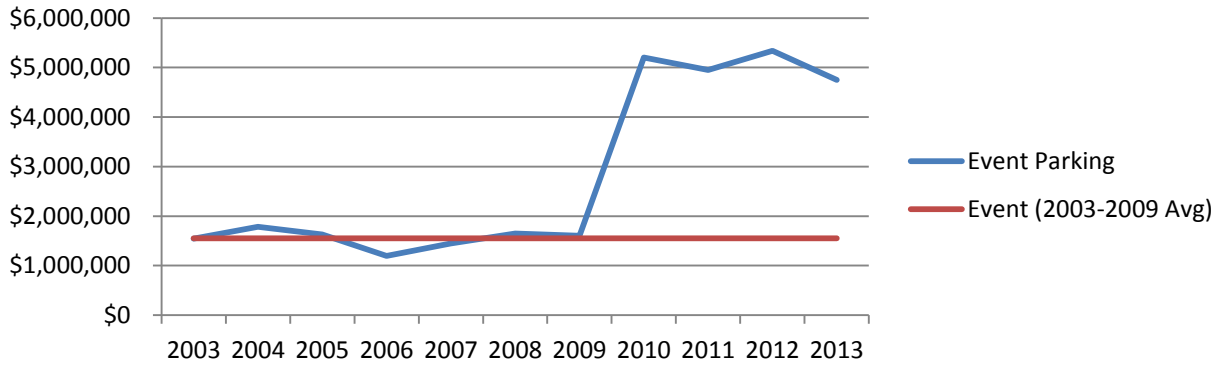
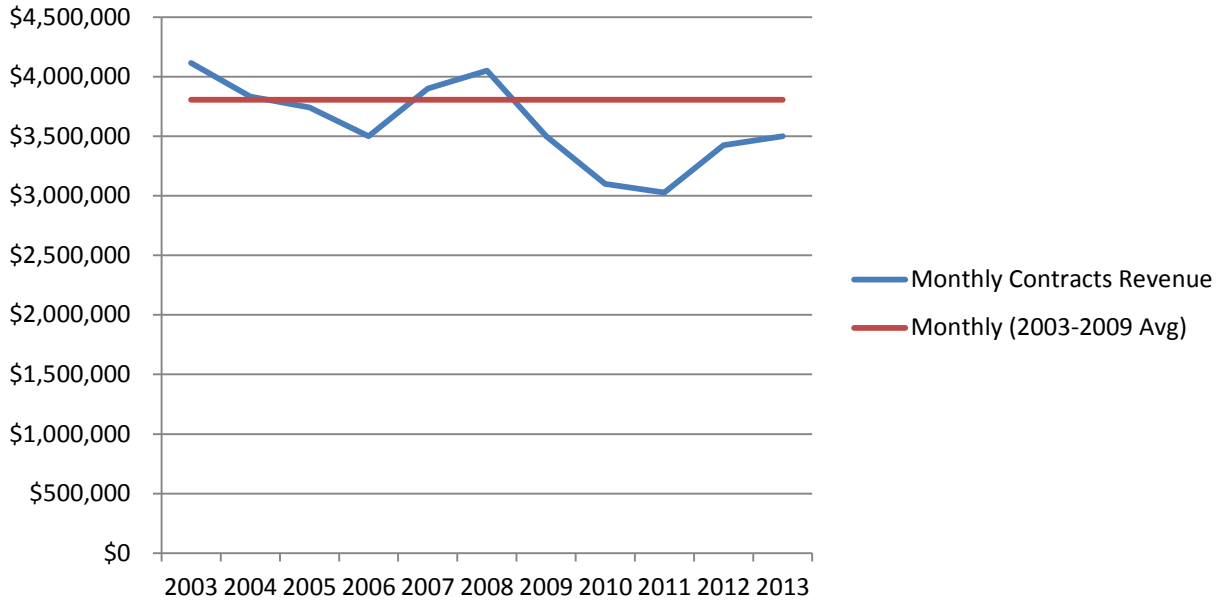


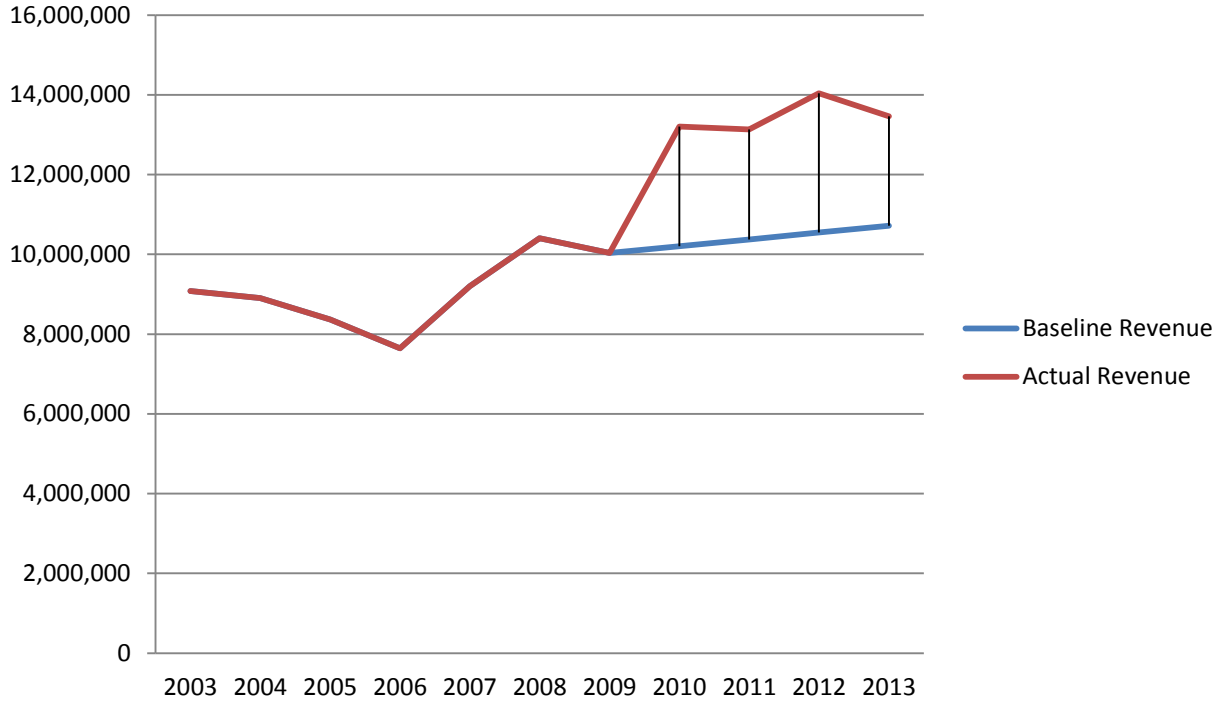
Figure 11 Monthly Contracts Revenue per Year Relative to Pre-Improvement Average Source: ABC Ramps Annual Reports



Computation of Net Revenue Gains

We estimate total revenue generated as a result of the improvements as the actual revenue produced minus the baseline projected revenues in a given year. Baseline projected revenues reflect average annual growth rates experienced during the 2003 to 2009 period (approximately 1.7 percent). These figures were forecasted to 2013 assuming a constant annual growth rate. In sum, Figure 12 demonstrates the difference between the two and the corresponding net revenue gain used in the analysis. In the sensitivity analysis section of this report, we provide a range of baseline revenue estimates to demonstrate the robustness of the analysis given changes in baseline growth assumptions.

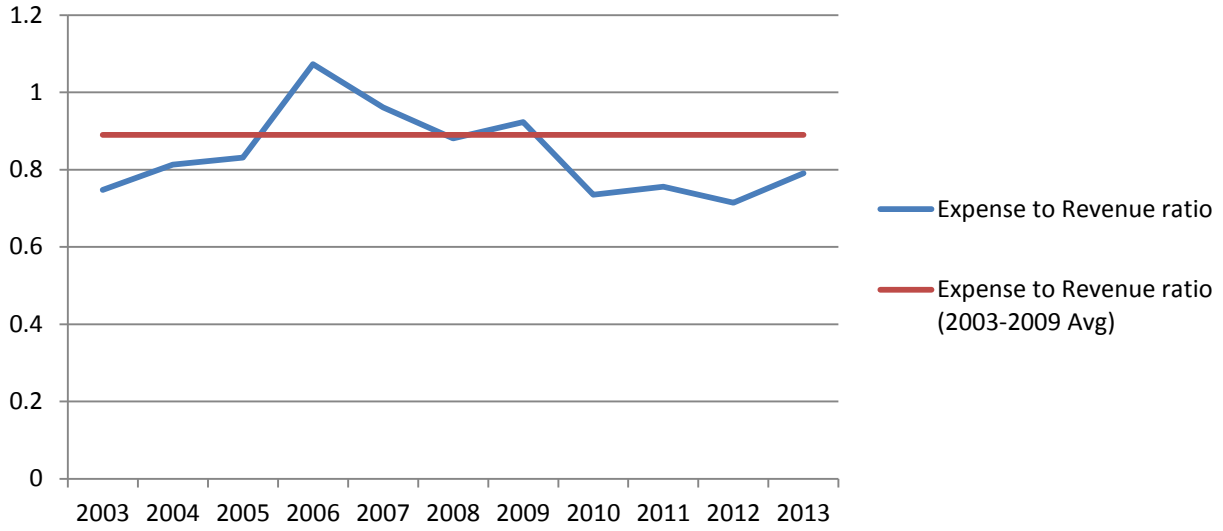
Figure 12 Baseline Revenue estimates and Actual Revenues per Year Source: ABC Ramps Annual Reports



Expenses

In addition to the increased revenue generation demonstrated above, the improvements have led to an increase in operational efficiency as measured by the Ramps' ratio of expenses to revenue. As evidenced by Figure 13, the ratio runs significantly below average in the latter stages of the analysis period corresponding to the implementation of the improvements. In order to estimate the net gain from this impact on expenses, we need an estimate of cost savings. However, we cannot compare baseline costs with actual costs, given that they would result in cost increases since revenues are simply lower. Therefore, in order to isolate this savings, we determine the difference between the baseline average ratio and the actual ratio in a given year and multiply it by the actual revenues. That is, we provide an estimate of how much costs would have been if we generated the same amount of revenue that was produced but maintained the historical expense ratio. In order to remain conservative in our analysis, we assume no growth rate in the baseline expense ratio. We only consider the long-run pre-improvement average.

Figure 13 Expense to Revenue Ratio per Year relative to Pre-improvement Average Source: ABC Ramps Annual Reports



Calculation of Costs

Total estimated capital cost of the project was $15,419,216 in 2009/10 dollars. These costs were funded using a variety of sources. Figure 14 shows the distribution of these sources. All loans refer to transportation revolving fund loans with terms that are specified in Table 35. Approximately 57 percent of the costs were financed via debt or capital lease, while the remainder was funded with cash. Annual debt service payments were calculated using amortization schedules and debt terms provided by MnDOT. The streams of these payments were discounted to 2014 dollars using a discount rate of 3 percent. In total, the PV of costs used in this analysis was $18,287,054 expressed in discounted 2014 dollars.

Figure 14 Distribution of Financing Source: MnDOT, ABC Ramps

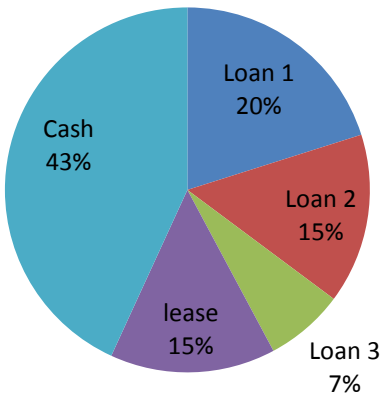


Table 35 Financing Details Source: MnDOT

Nominal Value	Maturity	Rate	Approximate Payment
$ 3,100,836	20	2.6%	$ 200,794
$ 2,325,000	20	3.229%	$ 159,604
$ 1,078,587	20	3.23%	$ 74,048
(Lease) $ 2,260,898	5	5%	$ 522,210
(Cash) $ 6,653,894	0	0	$ 6,653,894

Results and Sensitivity Analysis

As shown in Table 36, the improvements have generated a positive real rate of return of over 6 percent. In addition, the sensitivity analysis reveals that our results are robust to substantial changes in baseline assumptions. Figure 15 and Figure 16 detail the changes in the rate of return and the net present value given different baseline revenue growth assumptions. As evidenced by the graphs, baseline revenue growth needs to accelerate to 5 percent, compared to the 1.7 percent in the analysis, in order to materially impact the results while still remaining positive. This rate corresponds to a near tripling of the historically observed growth rate.

Table 36 Results

PV Costs	$ 18,287,054
PV Benefits	$ 23,368,226
NPV	$ 5,081,172
ROR	6.3%

Figure 15 Sensitivity Analysis Real Rate of Return (given changes in baseline revenue growth)

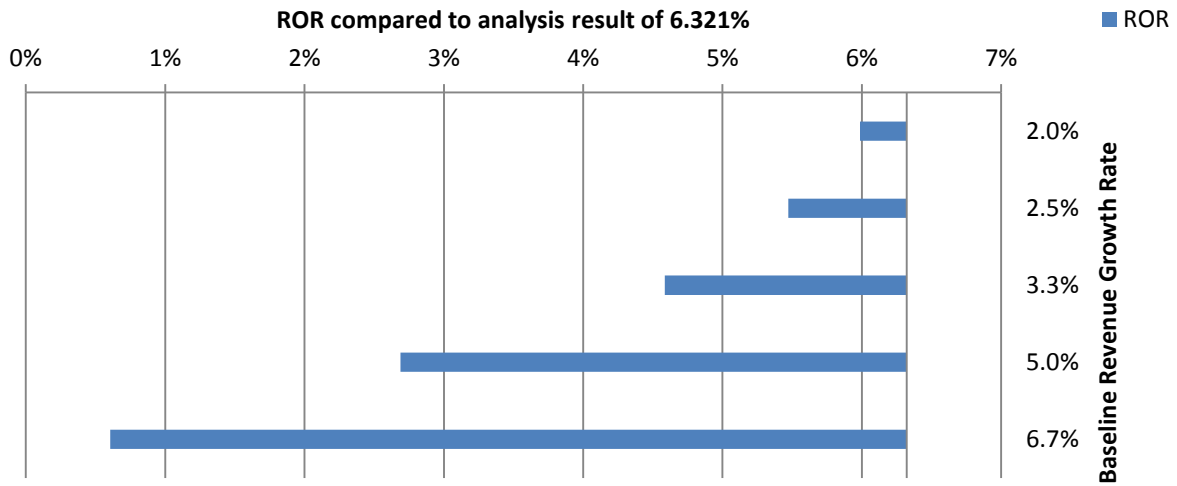
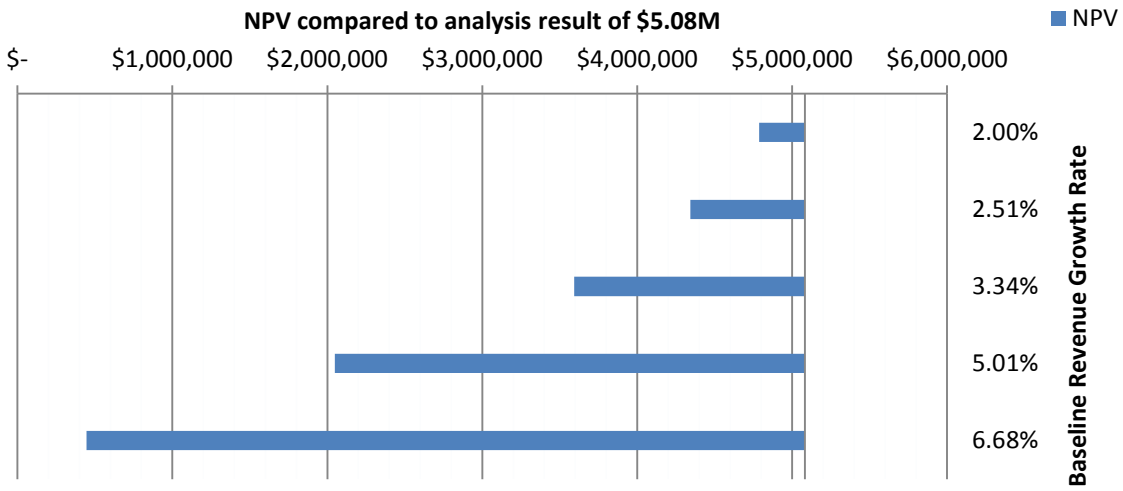


Figure 16 Sensitivity Analysis Net Present Value (given changes in baseline revenue growth)



Technical Appendix

Economic Evaluation/Fiscal Analysis Methodology

Net new income is estimated, for each project, given the anticipated amount of jobs & corresponding wages and subsequently verified by contacting local stakeholders. Wages were adjusted to 2014 dollars from 2012 nominal dollars using the Consumer Price Index. Once net new income is estimated, by summing the products of the total amount of jobs by the corresponding annual wages, total new tax revenue is calculated using a statistical technique known as bootstrapping in order to find and apply an effective tax rate. Bootstrapping is similar to a Monte Carlo simulation. Historic effective tax rates and forecasted future rates for the state of Minnesota, provided by the Minnesota Department of Revenue Tax Research Division, are used in order to randomly generate effective tax rates in every analysis year. This procedure allows the effective tax rate to change over time, consistent with the historic experience of the state. Since 1957, effective tax rates have varied from a low of 10.14 percent to a high of 13.28 percent. Therefore, in order to provide a robust result, we incorporate risk and variation into our analysis by applying this technique.

Since the effective tax rate calculation reflects total state and local tax revenue generated from total state income, we apply a fixed factor of 0.7 to the randomly generated effective tax rate in order to calculate the state's share of total tax revenue. The 0.7 factor was derived from the state of Minnesota's 2013 tax incidence report, which determined the state share to be 0.692. Since this value fluctuates slightly over time, above and below the most recent estimate, we chose to keep it fixed at 0.7. These procedures allow us to isolate state-specific as well state and local metrics.

After total state and local and state-only new tax revenue is calculated, the value is discounted using a 3-percent real discount rate and a base year of 2014. Finally, yearly net new discounted revenue is summed across the analysis period to arrive at a total present value (PV) of benefits.

The total PV of benefits is compared to the total PV of costs of the project to arrive at a fiscal real rate of return over the analysis period. The costs of the projects were adjusted to 2014 dollars from the nominal 2012 dollars used in the application. In addition, if they were incurred prior to the base year of 2014, costs were discounted forward. This provides for a substantially conservative analysis.

Benefit Cost Analysis Methodology

Total benefits to society that result from the project are estimated given the anticipated changes in travel demand after the construction of the interchange. Yearly changes in vehicle miles traveled (VMT) and vehicle hours traveled (VHT) are used to determine net yearly benefits by applying a series of standard monetized values. This allows for a more relevant comparison between project costs and societal benefits.

Travel time savings are calculated by determining the yearly difference in VHT between the build and no build scenarios, isolating the relative shares of traffic (truck vs. auto), multiplying the respective shares by the corresponding vehicle occupancy ratio (1 in the case of trucks) to derive person hours traveled (PHT), and then multiplying PHT by the appropriate value of travel time. If VHT decreases under the build scenario, then these changes will generate positive benefits in the form of time savings.

Vehicle operating costs are calculated by determining the yearly difference in VMT between the build and no build scenarios, isolating the relative shares of traffic (truck vs. auto), and then multiplying the shares by the appropriate operating cost per mile. Since VMT increase under the build scenario, these changes generate negative benefits in the form of increased vehicle operation and maintenance (O&M) costs.

Finally, savings due to avoided crashes are estimated given the changes in VMT between the two scenarios and the change in the crash rate under the two scenarios. The reduction in the crash rate is due to the structural change in the network as the interchange creates a graded intersection in place of an at-grade intersection. The amount of crashes avoided is calculated by determining the total number of crashes under both scenarios given their respective crash rates (number of crashes per VMT) and VMT and subtracting them. This difference is then multiplied by the sum of the products of the monetized values for each type of crash and the proportion of crashes by type. As detailed above, VMT increase under the build scenario. However, the crash rate decreases sufficiently to overcompensate for this increase in VMT. Accordingly, these changes will generate positive benefits in the form of avoided crashes.

Every year we sum across benefit categories and discount the stream of benefits using a 3-percent discount rate and a 2014 base year. The total PV of benefits is then divided by the total PV of costs of the project to arrive at a B/C ratio.

Residual Value Methodology

If the useful life of an investment exceeds the analysis period, then it is likely that the investment will generate benefits that are not fully captured within the analysis. In order to account for these benefits, a residual value at the end of the analysis period is calculated for the investment. This value serves as a proxy for future benefits and once calculated it is subtracted from the total costs of the investment in the last analysis period. The residual value was only calculated and used in instances where sufficient data was available.

In order to calculate the residual value we assume a straight line depreciation schedule. The accumulated depreciation from the beginning of operations until the end of the analysis period is subtracted from the cost of the asset. The amount left over is the nominal residual. This amount is then divided by the amount of “useful” years left and used to in the following PV of an annuity equation in place of the variable A.

$$RSV(t+m) = A * [\frac{1-(1+d)^{-n}}{d}]$$

Where,

RSV(t+m) = residual value at time t + m, the end of the analysis period

A= nominal residual value per year

d = real discount rate used in the analysis

n = useful years left

The RSV(t+m) is then multiplied by the appropriate discount factor at the end of the analysis period to calculate the PV of the RSV. This final amount is subtracted from the present value of costs.