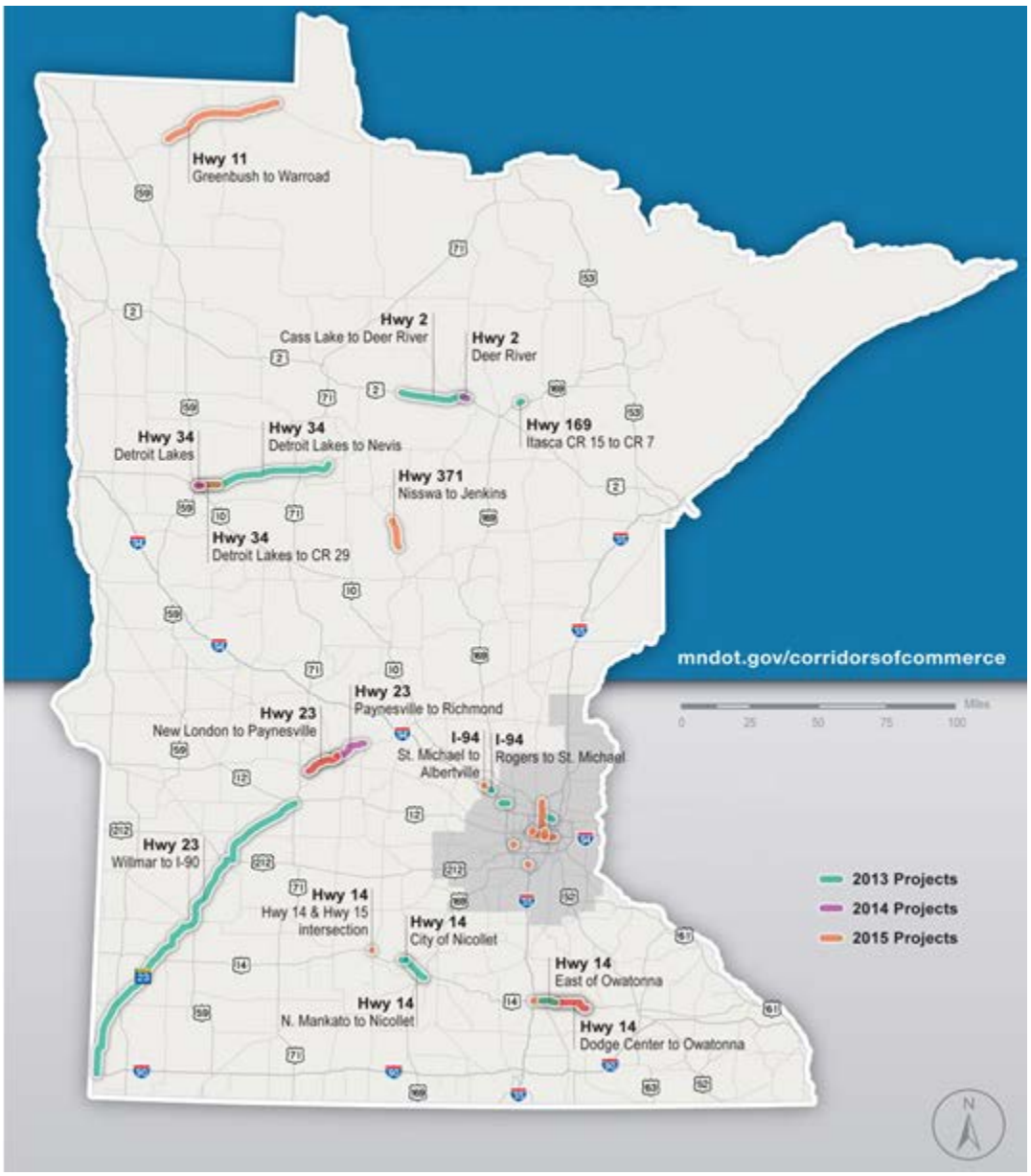
2016 Report on the

Corridors of Commerce Program

November 2016



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Contents

Legislative Request

This report is issued to comply with Minnesota Statutes 161.088, subdivision 7.

161.088 Corridors of Commerce Program.

Subd. 7. Legislative report; evaluation. (a) Starting in 2014, annually by November 1, the commissioner shall electronically submit a report on the corridors of commerce program to the chairs and ranking minority members of the legislative committees with jurisdiction over transportation policy and finance. At a minimum, the report must include:

(1) a summary of the program, including a review of the project selection process, eligibility and criteria, funds expended in the previous selection cycle, and total funds expended since program inception;

(2) a listing of projects funded under the program in the previous selection cycle, including:

(i) project classification;

(ii) a breakdown of project costs and funding sources;

(iii) any future operating costs assigned under subdivision 6; and

(iv) a brief description that is comprehensible to a lay audience;

(3) a listing of candidate project recommendations required under subdivision 5, paragraph (b), including project classification and disposition in the selection process; and

(4) any recommendations for changes to statutory requirements of the program.

(b) Starting in 2016, and in every even-numbered year thereafter, the commissioner shall incorporate into the report the results of an independent evaluation of impacts and effectiveness of the program. The evaluation must be performed by agency staff or a consultant. The individual or individuals performing the evaluation must have experience in program evaluation, but must not be regularly involved in the program's implementation.

The cost of preparing this report is under $5,000.

Corridors of Commerce Program Summary

Transportation contributes to a growing economy by supporting commerce. Transportation investments directly and indirectly foster economic growth through a commerce-friendly network of corridors to ship goods and provide mobility to citizens.

The 2013 Minnesota Legislature created the Corridors of Commerce program.[1] The program is designed for competitive selection of projects on the trunk highway system, targeting transportation routes identified as important links for regional and statewide economic growth. It is administered by MnDOT's central office and involves consultation with the MnDOT districts.

The program contains two major goals:

- Provide additional highway capacity on segments where bottlenecks occur in the system
- Improve and preserve the movement of freight and reduce barriers to commerce

Project Eligibility

The law established eligibility requirements for a trunk highway project to be included in the program.[2] To be eligible, a project must: (1) fit within one of the classifications of highway capacity or freight and commerce improvement; (2) be consistent with MnDOT's state transportation plans; (3) for projects outside the Twin Cities metro area, be located on the interregional corridor system (which connects regional trade centers throughout the state and provides a network for effective movement of freight); (4) meet a project readiness threshold; (5) carry a cost estimate that does not exceed a cost cut-off; and (6) not have already been committed for funding through the regular project selection process (i.e., included in the State Transportation Improvement Program).

Following the statutory framework, MnDOT established the following project classifications. They were refined following the initial year of the program.

- **Metro Capacity Improvement** – projects within MnDOT's Metro District that increase capacity on segments in the Twin Cities area that do not end at other trunk highways or that have fewer lanes than adjacent segments
    - **Interregional Corridor Capacity** – projects outside MnDOT's Metro District that increase capacity on IRC segments that do not connect to other trunk highways or that have fewer lanes than adjacent segments
    - **IRC Capacity Development** (added in starting in 2014 selection round) – project development work to prepare for construction, which could include land acquisition, environmental analysis and preliminary design
- **IRC Capacity Improvement** (added in starting in 2014 selection round) – development and construction work to complete a capacity expansion project
- **Freight Bottlenecks** – projects that remove or reduce barriers to commerce and ease or preserve freight movement
    - **Freight Improvement** – projects to provide for improved movement of freight
    - **Freight Movement Preservation** – projects to maintain efficiency on existing freight corridors

[1] Laws 2013, Ch. 117, Art. 3, sec. 1.
[2] Minn. Stat. 161.088, subds. 3 and 4.

Public Recommendations

Another aspect of the legislation is a directive to recommend a process that stakeholder groups and the general public can submit project ideas for consideration by MnDOT. MnDOT encouraged its district offices, key stakeholders and the public to suggest potential projects. Far more project recommendations were received than available Corridors of Commerce funding. However, MnDOT appreciated the efforts of district staff, stakeholders and the public in identifying potential projects for the program.

A list of all the suggestions received is available on the Corridors of Commerce webpage. It was first created in 2013 and was then expanded with additional suggestions submitted in conjunction with program funding in subsequent years.

Project Selection

Project selection for funding in the Corridors of Commerce program was undertaken following a process that is separate from the approach for regular highway project programming. It follows legislative criteria for selecting projects, which consists of:

- Commerce and economic impacts
- Return on investment
- Efficiency in freight movement
- Traffic safety improvements
- Transportation system connections
- Transportation policy objectives addressed
- Community support

MnDOT varied some of the selection criteria over each of the program years (as authorized under the statute), which was based on the circumstances in each year for funding and program development. For instance, there were some project selection constraints because trunk highway bonds were used to finance the program in 2013. As another example, a higher emphasis was placed on project readiness in 2013 and 2014 based on MnDOT's understanding of legislative intent. For the 2015 selection round, MnDOT further developed the criteria used to determine projects. This is discussed in the summaries for each funding year.

In response to the Office of the Legislature Auditor program evaluation on MnDOT highway project selection[3], further refinement and clarification of project evaluation is in progress. Revised evaluation criteria along with a process for keeping the public well informed will be instituted with future Corridors of Commerce program funding.

Funding

Initial funding for the program in 2013 was provided from $300 million in trunk highway bonds, which MnDOT supplemented with funds from other state and federal sources. In the 2014 legislative session, the legislature provided trunk highway funds totaling $31.5 million for fiscal years 2014 and 2015. The program did not receive funding as part of the 2016-2017 transportation budget, so there has not been a 2016 solicitation and project selection round.

The majority of Corridors of Commerce project costs are generally covered by funds made available for the program. Other sources are regularly used, such as the trunk highway fund. Gap funding has been provided in a couple of cases. Some projects are only funded for the design and development

[3] Office of the Legislative Auditor, "MnDOT Highway Project Selection," March 2016.

work. These projects are not funded and will need to have future funds identified for construction. A summary of Corridors of Commerce funding follows.

Table 1: Corridors of Commerce Funding Overview

Year	Trunk Highway Bonds	Trunk Highway Funds	Total Funding	No. of Projects
2013	$300 million		$300 million	10
2014		$6.5 million	$6.5 million	4
2015		$25 million	$25 million	12
Total	**$300 million**	**$31.5 million**	**$331.5 million**	**26**

Note: amounts exclude project funding from other sources

2013 Corridors of Commerce Summary

In conjunction with the creation of the Corridors of Commerce program, the 2013 Minnesota Legislature authorized the sale of up to $300 million in trunk highway bonds for the construction, reconstruction and improvement of trunk highways. Additional funds, such as the trunk highway fund and federal sources, were also regularly used on projects selected in the program.

Projects considered in 2013 were classified in one of three eligibility categories: (1) Metro Capacity Improvement, to increase capacity within the Twin Cities metropolitan area, (2) Interregional Corridor Capacity Improvement, for capacity or expansion outside of MnDOT's Metro District, and (3) Freight Bottlenecks, for improvements or preservation of the movement of freight.

Since the funding for Corridors of Commerce in 2013 came in the form of bonds, there are notable project funding limitations. In particular, the bonds had a specific end date associated with them and could not be used to buy right of way. Because the legislative intent of the funding was to deliver actual construction projects, MnDOT initially screened all submitted suggestions for delivery time frame and additional funding needs.

Projects deemed as viable advanced for further consideration using the following criteria:

- Construction start date
- Relative return on investment
- Travel time improvement
- Local support
- Multimodal connections

In November 2013, MnDOT selected 10 projects to receive the 2013 Corridors of Commerce funds. They are shown in Table 2 below. Note that two Highway 14 projects between Mankato and Nicollet were merged into a single project after the initial selection process and are shown as one combined entry. At the time of selection, the scope for many of the chosen projects was not fully known or defined and the cost estimates were preliminary. MnDOT conducted a process in January 2014 to better define project scopes and increase confidence in the cost estimates. This process included the following goals:

- Recommend budgets for each project based on available funds
- Identify project risks and risk management strategies
- Recommend a process for managing program contingency

Although MnDOT identified $5.79 million more in program costs than was available in funding from all sources, MnDOT's risk management process concluded there was an 83 percent probability that all projects could be delivered without exceeding the available funds; MnDOT proceeded to program and deliver all of the selected projects.

Table 2: Original 2013 Projects Selected

District	Route	Description	Project Category	Project Delivery*	Construction	Total Funding
D1	Hwy 169	Lane expansion in Itasca County	Freight Bottleneck	$1,930,000	$8,300,000	$10,230,000
D2	Hwy 2	Passing lanes between Cass Lake and Deer River	Freight Bottleneck	$120,000	$10,500,000	$10,620,000
D3	I-94	Auxiliary lanes from Rogers to St. Michael	IRC Capacity Improvement	$3,550,000	$32,400,000	$35,950,000
D4	Hwy 34	Passing lanes between Detroit Lakes and Nevis	Freight Bottleneck	$630,000	$10,000,000	$10,630,000
Metro	Hwy 610	Freeway completion to I-94	Metro Capacity Improvement	$7,870,000	$100,300,000	$108,170,000
Metro	I-694	Reconstruction and lane expansion in Arden Hills and Little Canada	Metro Capacity Improvement	$270,000	$42,300,000	$42,570,000
D6	Hwy 14	Lane expansion near Owatonna	IRC Capacity Improvement	$820,000	$15,000,000	$15,820,000
D7	Hwy 14	Lane expansion from Nicollet to North Mankato; Nicollet bypass	IRC Capacity Improvement	$3,950,000	$38,500,000	$42,450,000
D8	Hwy 23	Passing lanes between Willmar and I-90	Freight Bottleneck	$900,000	$10,900,000	$11,800,000
Projects Total				**$20,040,000**	**$268,200,000**	**$288,240,000**
Management Reserve						**$29,280,000**
Total Funding						**$317,520,000**

*Professional/Technical Only

Notes: Table excludes project funding from other sources. No 2013 Corridors of Commerce funds were used for right-of-way acquisition, due to constraints on use of trunk highway bonds.

Following the original project selection, MnDOT placed a significant emphasis on managing the scope and cost of the selected projects to minimize the risk of exceeding the program budget. The efforts resulted in projected total costs coming in substantially below the original amount, allowing MnDOT to capture project savings and delivery efficiencies. As a result, additional projects were added to the program using 2013 funding:

- With initial cost savings, MnDOT decided to fund a four-lane widening project on Highway 371 from Nisswa to Jenkins in District 3 (classified as an IRC Capacity Improvement project). This project fit well with the program, as it was deliverable within the desired timeframe and was competitive in the initial project selection process. The Highway 371 project had $5.8 million already identified in federal funds, so the project did not rely solely on Corridors of Commerce funding.
- As projects progressed through construction and completion, additional savings amounting to nearly $18.3 million were subsequently identified. Using the savings, MnDOT is currently undergoing a selection process to identify an additional project (or projects) and reallocate the remaining 2013 funds.

Table 3 shows a revised list of the projects and their costs.

Table 3: Revised 2013 Projects Selected

District	Route	Description	Project Category	Project Delivery*	Construction	Total Funding
D1	Hwy 169	Lane expansion in Itasca County	Freight Bottleneck	$1,800,000	$6,100,000	$7,900,000
D2	Hwy 2	Passing lanes between Cass Lake and Deer River	Freight Bottleneck	$110,000	$13,800,000	$13,910,000
D3	I-94	Auxiliary lanes from Rogers to St. Michael	IRC Capacity Improvement	$2,900,000	$28,400,000	$31,300,000
D4	Hwy 34	Passing lanes between Detroit Lakes and Nevis	Freight Bottleneck	$46,000	$8,566,000	$8,612,000
M	Hwy 610	Freeway completion to I-94	Metro Capacity Improvement	$4,643,000	$75,657,000	$80,300,000
M	I-694	Reconstruction and lane expansion in Arden Hills and Little Canada	Metro Capacity Improvement	$2,800,000	$36,000,000	$38,800,000
D6	Hwy 14	Lane expansion near Owatonna	IRC Capacity Improvement	$46,000	$12,054,000	$12,100,000
D7	Hwy 14	Lane expansion from Nicollet to North Mankato; Nicollet bypass	IRC Capacity Improvement	$2,200,000	$32,500,000	$34,700,000
D8	Hwy 23	Passing lanes between Willmar and I-90	Freight Bottleneck	$286,000	$8,400,000	$8,686,000
D3	Hwy 371**	Lane expansion from Nisswa to Jenkins	IRC Capacity Improvement	$3,500,000	$41,900,000	$45,400,000
Projects Total				**$18,331,000**	**$263,377,000**	**$281,708,000**
To be Reallocated						**$18,292,000**
Total Funding						**$300,000,000**

*Professional/Technical Only

** Project was added using cost savings accumulated from other projects

Notes: Table excludes project funding from other sources. No 2013 Corridors of Commerce funds were used for right-of-way acquisition, due to constraints on use of trunk highway bonds.

Appendix A contains project sheets providing details on each of the selected projects using the 2013 funding, including the added project on Highway 371.

2014 Corridors of Commerce Summary

As part of a supplemental budget, the 2014 Minnesota Legislature provided $31.5 million in trunk highway funding for Corridors of Commerce. Of that amount, $6.5 million was available in fiscal year 2014 for projects in Greater Minnesota, and $25 million was available in fiscal year 2015 for projects statewide. One of the primary intents of the legislation was to use the funding to prepare potential projects for future construction. Preparations could include right of way purchases (in contrast to the 2013 funding), environmental work and design engineering.

Because of the need to identify fiscal year 2014 projects as soon as possible, MnDOT opted to use the projects previously suggested by the MnDOT districts, stakeholders and the public. Since the focus of the 2014 program was to prepare projects for future construction, MnDOT adjusted its project consideration criteria to include following:

- Advancement of the readiness of a future project
- Preservation of efficient freight movement
- Return on investment
- Local support

Four projects were selected (See Table 4). Two of the projects, Highway 14 and Highway 23, involve preparing major corridors for future expansion should additional funding become available. The Highway 34 project is for construction to complete a gap on the corridor that was not covered with the project funded in 2013 Corridors of Commerce. When finished, the combined projects will greatly improve the corridor. The final project selected, Highway 2 in Deer River, is a reconstruction along the main corridor through town. This "Main Street" rebuilding project is an example of how the Corridors of Commerce program is able to provide statewide transportation benefits (through the improved condition and operation of Highway 2) and local economic benefits. In this instance, the community was able to access and improve their underground utilities.

Table 4: Projects Selected with FY 2014 Funding

District	Route	Description	Project Category	Cost Estimate	Current Status
D6	Hwy 14	Purchase right of way for expansion between Dodge Center and Owatonna	IRC Capacity Development	$1.5M	Combined with Hwy 14 project in 2015 funding. 18 of 20 offers have been made, with 4 offers accepted.
D8, D3	Hwy 23	Environmental work for expansion on two segments, from New London to Paynesville and from Paynesville to Richmond	IRC Capacity Development	$1.5M	Southern segment: environmental work complete, and the layout is under review. Northern segment: environmental work and layout are under development.
D4	Hwy 34	Center left turn lane in Detroit Lakes from Highway 59 to County Road 141	Freight Improvement	N/A	Combined with TH 34 project in 2015 funding for construction efficiency
D1	Hwy 2	Reconstruct segment of roadway in Deer River	Freight Improvement	$2.3M	Scheduled for summer 2017 construction

2015 Corridors of Commerce Summary

For the $25 million allotted in fiscal year 2015, MnDOT used essentially the same consideration criteria as it used on the 2014 projects, with the addition of the following:

- Approximately 50 percent of the funding to go to the Twin Cities Metro area and 50 percent of the funding to go to Greater Minnesota

Unlike the fiscal year 2014 funding round, there was sufficient time to go through the same type of project suggestion process as was done in 2013. MnDOT again used the Corridors of Commerce website to allow stakeholders, businesses and the public to submit potential projects for consideration. MnDOT used the projects submitted during the 2013 project identification process as a starting point for the 2015 list. This meant that all the suggested projects from the 2013 process were automatically included on the 2015 list, unless the project was constructed. New suggestions were added.

With the focus of the 2014 legislation on getting projects ready for construction if new funding would become available, MnDOT's district offices and central office identified and selected projects for the funding that:

- Met the goal and eligibility of the program
- Were a high priority from the district perspective
- Would substantially accelerate the project's readiness
- Had local support

A total of 12 projects were selected for funding, with six in Greater Minnesota and six from the Twin Cities metro area.

In Greater Minnesota, five of the projects specifically accelerate major improvements along several key corridors. From preliminary design all the way to right of way acquisition, these five projects will enhance MnDOT's ability to deliver major corridor investments, should funding become available. The other Greater Minnesota project involves performing some greatly needed resurfacing work on Highway 34 to help maintain reliable east-west freight movements in northern Minnesota.

In the Twin Cities metro area, three of the six projects selected involve developing the designs for major bridge and roadway replacements that can improve freight movement. Two other projects involve design work for major capacity improvements on I-35W and I-94. One project was for actual construction work along Snelling Avenue in St. Paul to help with some freight improvements, as a part of a larger project on Snelling.

Table 5: Projects Selected with FY 2015 Funding

Route	Location	Description	Project Category	Cost Estimate	Current Status
Hwy 14 and Hwy 15	New Ulm	Preliminary design work	Freight Improvement	$700,000 (actual cost about $1 million)	Preliminary design almost complete; final design contract being pursued
I-94	St. Michael to Albertville	Design options for lane addition	IRC Capacity Development	$1.4 million	Traffic analysis completed in 2015; consultant working on layouts and environmental documents
Hwy 11	Greenbush to Warroad	Design passing lanes	Freight Improvement	$500,000	Corridor study is completed, with recommendations for approximately 10 future safety and operations projects
Hwy 14	Owatonna to Dodge Center	Purchase right of way for expansion	IRC Capacity Development	$7.3 million	Combined with Hwy 14 project in 2014 funding. 18 of 20 offers have been made, with 4 offers accepted.
Hwy 23	New London to Paynesville	Purchase right of way for expansion	IRC Capacity Development	$800,000	Pending completion of environmental work and final layout
Hwy 34	Detroit Lakes to Becker	Mill and overlay	Freight Movement Preservation	$3.0 million	Under construction
Hwy 169	Nine Mile Creek	Design work for bridge replacement	Freight Movement Preservation	$1.5 million	Project let Aug. 5, 2016
I-35W	Minnesota River crossing	Design work	Freight Movement Preservation	$5.5 million	Layout completed for approval; environmental document reviewed by FHWA. Project to be delivered using design/build as funding becomes available.
I-35W	Northern suburbs	Design work for MnPASS system	Metro Capacity Development	$1.1 million	Letting scheduled for Fall 2018. Project being prepared for a Fall 2017 letting in case funding becomes available.
Hwy 65	3rd Avenue Bridge over Mississippi	Design work for bridge deck replacement	Freight Movement Preservation	$1 million	Letting delayed one year. Started on scope of work for consultant.
I-94	Between Minneapolis and St. Paul	Design work for new pavement, bridges and managed lanes	Metro Capacity Development	$2 million	Design started; evaluating infrastructure assets and analyzing traffic forecasts. Anticipated study completion Fall 2017.
Hwy 51 Snelling Ave	Selby Ave. to Pierce Butler in St. Paul	Added funding for reconstruction	Freight Improvement	$1.4 million[1]	Construction complete

[1] Amount is only the portion provided from Corridors of Commerce program

Program Effectiveness Evaluation Summary

A feature of the Corridors of Commerce program is legislative direction to incorporate into the legislative report the "results of an independent evaluation of impacts and effectiveness of the program," which is to be provided biennially starting in 2016.[4] MnDOT staff uninvolved with regular Corridors of Commerce program implementation performed the analysis. Findings are summarized below and the full evaluation is provided in Appendix B.

The program effectiveness evaluation reviewed Corridors of Commerce projects funded from the initial implementation in 2013 and are now completed. A highway project is typically a multiyear endeavor and proceeds through project development (such as design, engineering and environmental analysis) and construction steps. As a result, for the initial evaluation there are four completed projects ready for review. The projects are listed in Table 6.

Table 6: Completed 2013 Projects

District	Route	Construction End Month
D2	Hwy 2	Oct. 2015
D3	I-94	Oct. 2015
D4	Hwy 34	Nov. 2015
D6	Hwy 14 ("Segment 1" of Owatonna to Dodge Center)	Oct. 2015

The evaluation focuses on the quantifiable criteria used in selecting projects, outlined below.

- **Construction timing and duration**. Project delivery effectiveness was gauged by comparing the original estimates of construction start date (made when projects were selected into the program) to actual commencement and completion of construction work.
- **Construction cost**. Cost management and oversight was reviewed by comparing construction cost estimates made at different points in the project development process and final cost amounts.
- **Vehicle speeds**. Traffic speed can be used to measure roadway capacity and efficient movement. Speed for both passenger-type automobiles and trucks were examined, comparing speed averages prior to construction against both predicted and observed speeds following project completion.
- **Traffic safety – crash incidence and severity**. Crash data provides an important way to help identify changes in traffic safety at each of the project locations. However, it is too soon following construction to be able to obtain information on crashes that occurred in the areas of the Corridors of Commerce projects. The evaluation established an analytical approach that can be used—once sufficient post-construction data is available—to identify any likely change in crashes. This approach is based on comparing crash incidents before and after a given Corridors of Commerce project.
- **Freight movement – commercial vehicle traffic growth**. To track developments in freight movement, a trend analysis evaluation technique was created that reviews truck traffic

[4] Minn. Stat. 161.088, subd. 7 (b).

changes in each of the Corridors of Commerce project corridors. This technique is designed to isolate traffic impacts that are more likely to come from the Corridors of Commerce project itself. It reviews heavy commercial vehicle growth over a period of years prior to each project, while adjusting for general statewide growth in truck traffic. As with the analysis of crashes, there is too little post-construction traffic data to observe whether there is commercial vehicle growth (beyond a general statewide "baseline") that is attributable to the Corridors of Commerce project.

Summarizing the findings, the first set of completed Corridors of Commerce projects uniformly score well on the dimension of construction scheduling, namely timing and duration. In all four projects, construction started before or in the originally estimated year. The majority of projects also demonstrate effective cost management throughout their development cycle with respect to initial construction cost estimates. Half of the corridors now support noticeably higher vehicle speeds than the pre-expansion baseline levels, although the magnitude of the speed improvement is generally below planning expectations. The remaining two criteria of traffic safety based on crashes and freight movement growth cannot yet be assessed because no performance data has been published to date reflecting actual conditions following the Corridors of Commerce work. For the time being, the descriptions for these measures include historical trend data as well as analysis examples with hypothetical data to guide upcoming before/after comparisons once a more complete data series extending beyond the end of construction can be compiled.

Appendix A: 2013 Project Details

This appendix contains details on each Corridors of Commerce project selected from the 2013 funding round.

District 1: Highway 169 – Four-Lane Expansion from Itasca CR 15 to CR 7

In Progress

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
3116-142	$10,196,000	$493,000	$1,800,000	$6,100,000	June 2016	2016-17

Description

This project will widen and reconstruct a portion of Highway 169 northeast of Grand Rapids. The reconstruction will expand 1.5 miles of Highway 169 from two lanes to four lanes from the east end of the Bovey Bypass at Itasca CR 15 to approximately 900 feet east of Itasca CR 7.

Funding

- $7,900,000 from Corridors of Commerce
- $624,000 from State Highway

Benefits

- Strengthen corridor reliability for freight by eliminating a bottleneck point on this important economic corridor for northeastern Minnesota
- Provide improved safety and pavement condition on the corridor

Status as of 8/01/2016

- The project was let on June 3, 2016
- Construction is scheduled to start in September 2016 and continue through fall 2017
- Project is on schedule

District 2: Highway 2 – Passing Lanes between Cass Lake and Deer River

Completed

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
1102-62	$10,557,000	$0	$110,000	$13,800,000	Aug. 2014	2014-15

Description

This project constructed new passing lanes on three segments of U.S. 2 between Cass Lake and Ball Club (three miles west of Deer River). In addition, three left-turn lanes, nine right-turn lanes and one bypass lane were constructed at various intersections along the corridor.

Funding

- $13,910,000 from Corridors of Commerce
- $110,000 from State Highway

Project Benefits

- Provide three new passing opportunities to reduce potential freight movement delays along the corridor
- Improve safety and pavement condition along the corridor
- Serve the Leech Lake tribal nation, since the project is within tribal boundaries

Status as of 8/1/2016

- The project was let on Aug. 22, 2014
- Gladen Construction was the successful bidder for the project
- The project was completed in fall 2015

District 3: Interstate 94 – Auxiliary Lanes from Highway 101 to Highway 241

Completed

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
2780-66	$35,906,000	$0	$2,900,000	$28,400,000	May-14	2014-15

Description

This project created an eastbound auxiliary lane on I-94 from the Highway 241 entrance ramp to the Highway 101 exit ramp. On the westbound side, there now is a general purpose lane from just east of Highway 101 to the Highway 241 exit ramp. This project has also widened the bridges over the Crow River and provided an extension of the current westbound exit ramp to Highway 101 by approximately 3,500 feet.

Funding

- $31,300,000 from Corridors of Commerce
- $653,296 from State Highway

Benefits

- Improve mobility and reduce congestion along the most heavily congested interregional corridor roadways in all of Greater Minnesota
- Improve travel time reliability and safety along this important economic corridor for the state
- Reduce freight congestion on this National Freight Corridor

Status as of 8/1/2016

- The project was let on May 14, 2014
- Hoffman/PCI was the successful bidder of the project
- The project was opened to traffic November 2015

District 3: Highway 371 – Four-Lane Expressway Nisswa to Jenkins

In Progress

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
1810-92	$58,000,000	$4,900,000	$3,500,000	$41,900,000	Oct. 2015	2016-17

Description

The project involves expanding an 8.7-mile segment of Highway 371 from a two-lane roadway to a four-lane roadway. The segment runs from Nisswa to Jenkins.

Funding on Project

- $45,400,000 from Corridors of Commerce
- $5,800,000 from federal Funds
- $3,124,000 from local funds

Project Benefits

- Improve mobility along this important tourism corridor for the state
- Improve the safety and general operation of the corridor
- Improve freight flows through the region by eliminating several miles of congestion

Status as of 8/1/2016

- The project was let on Oct. 14, 2015
- Construction began in February 2016 and will continue through fall 2017

District 4: Highway 34 – Passing Lanes between Detroit Lakes and Nevis

Completed

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
0303-64	$10,579,000	$20,000	$46,000	$8,566,000	Jun-14	2014-15

Description

This project made safety improvements at two intersections on Highway 34 between Detroit Lakes and Nevis. In addition, the project added five eastbound and four westbound passing lane opportunities along the corridor.

Funding

- $8,611,000 from Corridors of Commerce
- $622,327 from State Highway

Benefits

- Improve intersection safety at two key intersections along the corridor
- Reduce pressure for traffic to make high-risk passes when traveling behind slower moving vehicles, such as commercial trucks and recreation traffic
- Improve overall connectivity in north central Minnesota

Status as of 8/1/2016

- The project was let on June 27, 2014
- Anderson Brothers was the successful bidder for the project
- The project was completed October 2015

Metro District: Highway 610 – Complete Freeway from Interstate 94 to CR 81

In Progress

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
2771-37	$108,180,000	$45,000,000	$4,643,000	$75,657,000	Aug. 2014	2015-16

Description

This project will connect the existing Highway 610 freeway, which stops at Elm Creek Boulevard, with an interchange to I-94 near the 101st Ave. N. overpass.

Funding

- $80,300,000 from Corridors of Commerce
- $44,000,000 from State Highway
- $8,000,000 from Federal High Priority Project
- $1,500,000 from local funding

Benefits

- Provide travel options for commuters and freight transportation in the northern Twin Cities
- Provide relief to one of the more heavily congested corridors in the state
- Improve safety and overall operations of the Twin Cities freeway network
- Assist with improving and maintaining the I-94 as a National Freight Corridor

Status as of 8/1/2016

- The project was let on Aug. 8, 2014
- Lunda was the successful bidder
- Ground-breaking for the project occurred in October 2014
- Major construction began spring 2015 and will continue through fall 2016

Metro District: Interstate 694 – Reconstruction and Expansion from Rice St. to Lexington Ave.

In Progress

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
6285-143	$41,387,000	$2,500,000	$2,800,000	$36,000,000	Nov. 2015	2016-17

Description

This project constructs an additional lane on both the eastbound and westbound sides of I-694 between Rice Street and Lexington Avenue.

Funding

- $38,800,000 from Corridors of Commerce
- $250,000 from State Highway

Benefits

- Provide congestion relief via an additional travel lane in both directions along a critical corridor in the Twin Cities
- Reduce a significant freight bottleneck which affects both the Twin Cities and Greater Minnesota freight delivery system
- Improve safety and pavement condition along this critical corridor

Status as of 8/1/2016

- The project was let on Nov. 20, 2015
- Construction began in spring 2016 and will continue through fall 2017
- The project is on schedule

District 6: Highway 14 – Four-Lane Expansion from Highway 218 to CR 80

Completed

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
7402-30	$15,819,000	$0	$46,000	$12,054,000	April 2014	2014-15

Description

This project, completed in October 2015, expanded a 2.4-mile segment of Highway 14 from two lanes to four lanes just east of Owatonna, from Highway 218 to CR 80 (near an at-grade crossing for DM&E Railroad). The project represented "Segment 1" of a 16-mile, two-lane stretch of Highway 14 between Owatonna and Dodge Center.

Funding

- $12,100,00 from Corridors of Commerce
- $819,977 from State Highway

Benefits

- Improve travel time reliability, reduce congestion and address future safety concerns on a corridor that currently has 18,000 daily commuters
- Help close part of the two-lane gap on this important economic corridor for southeastern Minnesota
- Supports other planned investment in the region designed to make the Destination Medical Center a reality

Status as of 8/1/2016

- The project was let on April 25, 2014
- Mathiowetz was the successful bidder
- The project was completed October 2015

District 7: Highway 14 – Expansion of Nicollet to North Mankato & the Nicollet Bypass

In Progress

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
5203-104	$42,410,000	$5,000,000	$2,200,000	$32,500,000	May 2015	2015-16

Description

This project combines two separate corridor improvements: a widening of a 6.5-mile segment of U.S. Highway 14 from city of Nicollet to North Mankato; and construction of a 2.5-mile four-lane bypass of the city of Nicollet.

Funding

- $34,700,000 from Corridors of Commerce
- $5,000,000 from State Highway

Benefits

- Improve mobility along an important economic corridor for southern Minnesota
- Support pedestrian safety by moving through traffic out of the city of Nicollet
- Improve freight flows through the region by eliminating several miles of congestion bottleneck and provide a bypass

Status as of 8/1/2016

- About 6 miles of new Highway 14 were paved from east Nicollet to North Mankato
- Bridge construction at Highway 14/Highway 111 is complete
- Major work still to be completed:
  - Eliminating old Highway 14 around Nicollet
  - Tie in work on east and west ends of Nicollet (traffic is currently detoured)
  - Paving Highway 111 and the Highway 14 Nicollet Bypass
- Project expected to be completed by winter 2016

District 8: Highway 23 – Passing Lanes between Willmar and Interstate 90

In Progress

State Project #	Original Budget without ROW	ROW Estimate	Project Delivery	Construction	Letting Date	Construction Years
4206-22	$11,223,000	$0	$286,000	$8,400,000	Oct. 2015 and April 2016	2016

Description

This project constructs a number of eastbound and westbound passing lanes on six segments of Highway 23 between I-90 and Willmar.

Funding

- $8,686,000 from Corridors of Commerce
- $334,000 from State Highway

Benefits

- Reduce pressure for traffic to make high-risk passes when traveling behind slower moving vehicles, such as commercial trucks and recreation traffic
- Improve overall connectivity of southwestern Minnesota to the rest of the state

Status as of 8/1/2016

- This project has been divided into two smaller projects
- Southern Project, which covers Pipestone to Marshall, was let on Oct. 23, 2015
- Northern Project, which covers Marshall to Willmar, was let on April 22, 2016
- Construction for the southern project been completed
- Construction for the northern project is on schedule to be completed in fall 2016

Appendix B: Program Effectiveness Evaluation

This appendix provides the results of an evaluation of the Corridors of Commerce program. The discussion includes analysis and methodology details. As directed in the statute, the evaluation was performed by staff within MnDOT independent of those who oversee regular program implementation.

Four of the 10 projects that received funding following the 2013 formation of the Corridors of Commerce program are complete and open to the public as of August 2016: Highway 2 (between Cass Lake and Deer River), Interstate 94 (Rogers to St. Michael), Highway 34 (between Detroit Lakes and Nevis), and Highway 14 ("Segment 1" of Owatonna to Dodge Center). They form the set of projects that were evaluated.

Evaluation Criteria and Considerations

The 2015 legislative report on Corridors of Commerce[5] lists the following criteria that were applied to candidate projects in 2013 after pre-screening for delivery time frame and amount of additional funding required:

- Construction start date
- Relative return on investment
- Travel time improvement
- Local support
- Multimodal connections

The first three factors translate most readily to quantitative comparisons, which are the appropriate starting points in choosing the objective measures used for this evaluation. The target measures are identified below. The recent completion of the first Corridors of Commerce projects means before/after data is not yet be available in some cases. The comparison data is also limited because there are projects approved for Corridors of Commerce funding in subsequent years that partially overlap areas already improved by the 2013 projects. These overlaps are noted where they occur.

Projects are judged by whether they are performing in line with expectations with respect to the following:

- Construction timing and duration
- Construction cost
- Vehicle speeds
- Crash incidence and severity
- Heavy commercial vehicle traffic growth

Even where data exists to allow for comparisons between (1) the scoping and selection phase and (2) early post-opening operations on the facility, strict causality cannot be reliably assigned to each improvement funded under Corridors of Commerce. This is due to the difficulty of controlling for all other behavioral, economic, engineering and sample size considerations.

[5] Minnesota Department of Transportation, "2015 Report on the Corridors of Commerce Program," (see bottom of page 5).

Instead, the analysis seeks correlations and directional trends to understand how the priorities advanced by the Corridors of Commerce legislation are being brought to life.

Each project is populated with the best available estimates and projections, most specific and closest to the time of construction. In most cases, the planning or predicted values dating from the time of project selection are obtained from high-level modeling conducted by MnDOT's Office of Transportation System Management. For any projects with more detailed third-party consultant studies preceding construction, those results are shown here and supersede the preliminary planning inputs.

Construction Timing and Duration

Table 7 checks the actual beginning and endpoints of construction against the timing anticipated during project selection in 2013. (Expectations for duration or construction finish were not then established or known.) The construction schedule is defined as running from when traffic on the corridor first experiences road work impacts in the form of reduced speeds, temporary lane reconfigurations and related disruption. Similarly, the end of construction is considered to be the time when free-flow conditions are restored, as confirmed with project managers. This timing may not coincide with the dates specified in the contract in every case, due to preparation and wrap-up work undertaken that does not noticeably affect the roadway environment.

Table 7: Completed Project Construction Dates

District	Route	Potential Start Time Frame (2013 estimate)	Contract Letting Month	Construction Start Month	Construction End Month
D2	Hwy 2	2016 - 2018	Aug. 2014	Oct. 2014	Oct. 2015
D3	I-94	2016 - 2018	May-14	Jul-14	Oct. 2015
D4	Hwy 34	2014 - 2015	Jun-14	Aug. 2014	Nov. 2015
D6	Hwy 14	2014 - 2015	Apr-14	Jul-14	Oct. 2015

All four projects meet the broad guidelines specified for groundbreaking, and half of the projects were finished before the first year shown in their preliminary start schedules. These comparisons justify the high deliverability rating assigned to the awarded projects.

Construction Cost

Table 8 compares project cost estimates recorded at four major development stages. Chronologically from earliest to most current, the snapshots describe the cost progression from: the original 2013 construction estimate;[6] the pre-letting engineer's estimate; the awarded contractor bid; and the final total payment by MnDOT to the contractor (designated as the 95 percent or more complete value certified amount).

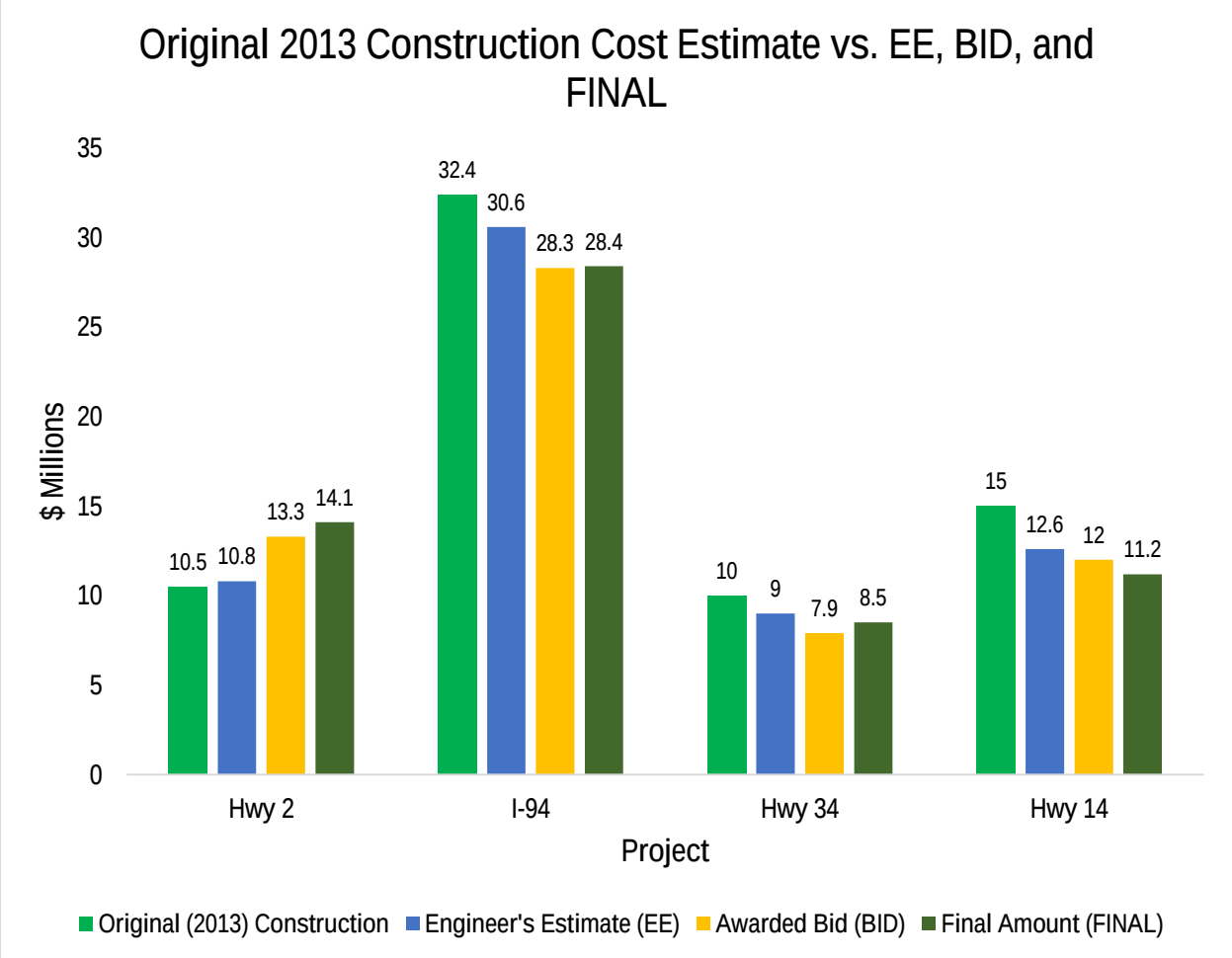
[6] 2013 estimates were presented in the "Construction Letting (Estimate)" field of Figure 1 on page 6 of the *2015 Report on the Corridors of Commerce Program* and exclude project delivery expense.

Table 8: Completed Project Construction Cost Comparison (millions)

Route	Original (2013) Construction	Engineer's Estimate (EE)	Awarded Bid (BID)	Final Amount (FINAL)
Hwy 2	$10.5	$10.8	$13.3	$14.1
I-94	$32.4	$30.6	$28.3	$28.4
Hwy 34	$10.0	$9.0	$7.9	$8.5
Hwy 14	$15.0	$12.6	$12.0	$11.2[7]

Figure 1 displays the same information as above, in a format that graphically highlights how the three ensuing cost levels compare with the original 2013 estimate, expressed as columns. Each amount is expressed as a column for that road project, with the columns arranged chronologically. The engineer's estimate ("EE"), awarded bid ("BID"), and final amount ("FINAL") area are different colors with the dollar amount listed at the top of the column.

Figure 1: Relative Construction Cost Estimates



[7] Highway 14 was rated as 99 percent complete as of September, 2016, showing a 7 percent savings against encumbered dollars pending final contractor review due in November.

Findings

For all projects except Highway 2, none of the engineer's estimates, awarded bids or final amounts are greater than the original construction estimate. This is one indicator of desired cost control and oversight. In other words, no more resources were consumed at later project stages than what was initially expected at the time of project selection. Additionally for the three projects other than Highway 2, the awarded bids and final amounts are both below the engineer's estimate. In one instance, FINAL is slightly higher than BID, in another BID is slightly higher than final, and in the third, FINAL and BID are virtually the same.

Only with Highway 2 do estimated and actual costs continually increase over the course of project preparation and execution from the low of the original estimate ($10.5 million) to the final amount ($14.1 million). The biggest escalation in cost of $2.5 million (24 percent of the original estimate) occurs between the engineer's estimate and awarded bid values. More than a third of this difference is attributable to higher mobilization and traffic control costs. Greater than anticipated traffic control expense and associated staging also partly explain the $0.8 million increase from awarded bid to the final amount, along with costlier winter work necessitated by federal wildlife regulation protecting the local bald eagle population.

Vehicle Speeds

Another requirement of the Corridors of Commerce legislation is that project selection must consider "efficiency in the movement of freight, including… measures of congestion or travel time reliability."[8] Although recurring reliability problems such as weather events or rush hour backups affect vehicle speeds, these types of events have at most a secondary influence on the Corridors of Commerce candidate routes. Of the four improvements now open, only the expansion of I-94 would be expected to noticeably increase reliability from an already high baseline. The measurement of reliability remains less systematic and routine than other traffic benchmarks, although progress is being made through pilot research led by MnDOT's Metro District that draws on new data collection technology to obtain, validate and report regular, widespread reliability information in the future. For these reasons, travel efficiency is chiefly judged by reference to average vehicle speeds, recorded for autos and trucks.

Required decades ago as a condition for receiving federal highway funding, speed monitoring was left up to state discretion in 1995, and since then has been carried out as a voluntary service by MnDOT to facilitate statewide analysis. Speed monitoring generally involves two methods to collect data. Fixed-point automated speed monitoring stations continuously collect geographically dispersed data for all state-owned roadway classifications—urban and rural, divided/undivided highways and limited-access freeways. Average travel speeds have traditionally been estimated on the basis of vehicle volume, capacity and presence of intersection traffic control.

Overlapping with Corridors of Commerce improvements around the state, a multiyear review is underway of speed limits governing two-lane highways having a posted limit of 55 miles per hour. The study, required by a 2014 law[9], was initiated in 2014 and is scheduled to continue through 2018. For each qualifying location, the review considers engineering and safety criteria to determine the appropriateness of raising the posted speed limit to 60 miles per hour. A current year-by-year list of routes that have been or will be evaluated is contained in the latest status report published in January 2016.[10]

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[8] Minn. Stat. 161.088, subd. 5.
[9] Laws 2014, Chapter 312, art. 11, sec. 36
[10] Minnesota Department of Transportation, "2015 Report on the Evaluation of Certain Highway Speed Limits," Jan. 2016.

However, none of the four Corridors of Commerce roadways analyzed here has yet been subject to the speed limit review, removing the possibility that observed prevailing speeds were influenced by an external change (i.e. a higher posted speed limit) unrelated to the Corridors of Commerce improvement.

The most recent speed limit report makes a point equally relevant to the Corridors of Commerce assessment about the nature of the relationship between faster allowed speeds and resulting safety outcomes:

> It is important to remember that raising a posted speed limit is not inherently making a road "less safe." A properly selected speed limit can increase the safety of the roadway by creating uniform travel speeds for all vehicles, and by setting realistic driver expectations of those trying to cross or enter the roadway.[11]

In other words, there is not necessarily a tradeoff between speed and safety of travel. This uncertainty supports the independent testing within each completed corridor of the speed and safety criteria described in this evaluation.

When investigating typical, representative speed conditions, there are two common reporting practices depending on context. Return on investment modeling, including the modeling that is run during Corridors of Commerce screening, adopts the simple arithmetic mean for an average measure, dividing vehicle miles traveled by vehicle hours traveled. Alternatively, engineering analysis of speed differentials for individual vehicles shows summary statistics in percentile terms, which has the effect of minimizing the impact of extreme but rare high- and low-speed (e.g. farm tractor) observations. Both types of speed measures will be checked here.

Since there are so many vehicles traveling at very similar speeds clustered around the posted speed limit, before-and-after mean speed comparisons tend to show larger changes rather than when using an equivalent percentile measurement. Likewise, speed changes will be greater when focusing on peak time-of-day travel—defined as 6 to–9 a.m. and 4 to7 p.m.—instead of 24-hour averages that include relatively uncongested intervals. To understand the magnitude of improvement under the high-traffic conditions of greatest concern to drivers, the actual speed data that follows is restricted to peak hours. Obtaining custom, timely actual speed information has historically been difficult, until the introduction of a still-emerging breakthrough technology application developed to advance regulatory effectiveness. As part of the Federal Highway Administration's National Performance Management Research Data Set, private sector probe data is available for analysis by public agencies at the federal, state and municipal levels on a near-real time basis.[12] Specifically, actual average travel times—and by extension vehicle speeds—are reported around the clock and throughout the year in monthly data tables containing fine detail by time-of-day (down to five-minute slices). Roadway network coverage consists of all Corridors of Commerce locations selected to date. Travel time information is obtained from smartphones, dedicated navigation devices, integrated personal vehicle technology and freight fleet reporting coordinated by the research division of the largest national trucking trade association.

Analysis of Vehicle Speeds

Table 9 contains speed information for each evaluated Corridors of Commerce project. Columns on the left display the absolute mean speeds estimated under baseline capacities and predicted after the Corridors of Commerce enhancements. The rightmost columns provide actual NPMRDS speed

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[11] Ibid., p. 7

[12] Introduction to the National Performance Management Research Data Set (NPMRDS) FHWA Office of Operations Webinar, August 8, 2013. (NPMRDS Webinar for state agency users)

point estimates recorded at peak times and averaged across all vehicles for the first six months[13] in the immediate pre- and post-construction years. For three of the four corridors, planning inputs were well-calibrated with observed speeds before construction, within a range of ± 2 miles per hour. Only in the case of I-94 did assumed baseline speeds turn out to moderately overstate the actual average, by more than five miles per hour.

Table 9: Comparison of Estimated/Predicted and Observed Mean Vehicle Speed Estimates[14]

Route	Estimated/Predicted (absolute mean speeds)				Observed Auto + Truck Combined Peak Periods (actual NPMRDS recorded speeds)	
	Auto		Truck			
	Baseline	Improved	Baseline	Improved	Jan. - June 2014	Jan. - June 2016
Hwy 2	55	60	55	55	57.0	55.2
I-94	62	70	62	65	56.7	64.6
Hwy 34	50	55	50	50	48.4	48.0
Hwy 14	55	65	55	65	56.9	59.9

Figures 4 and 5 below spotlight the anticipated and observed changes in speed, independently for autos and trucks, respectively. Truck-specific data is available for only about half of the five-minute time intervals in which sample speeds for any vehicle class were registered, adding to the margin of sampling error for trucks.[15] Ascending or positive data points, indicating higher speeds in the current time frame, are desirable.

In each figure, five columns are shown for each project corridor. The columns, reading left to right, are as follows:

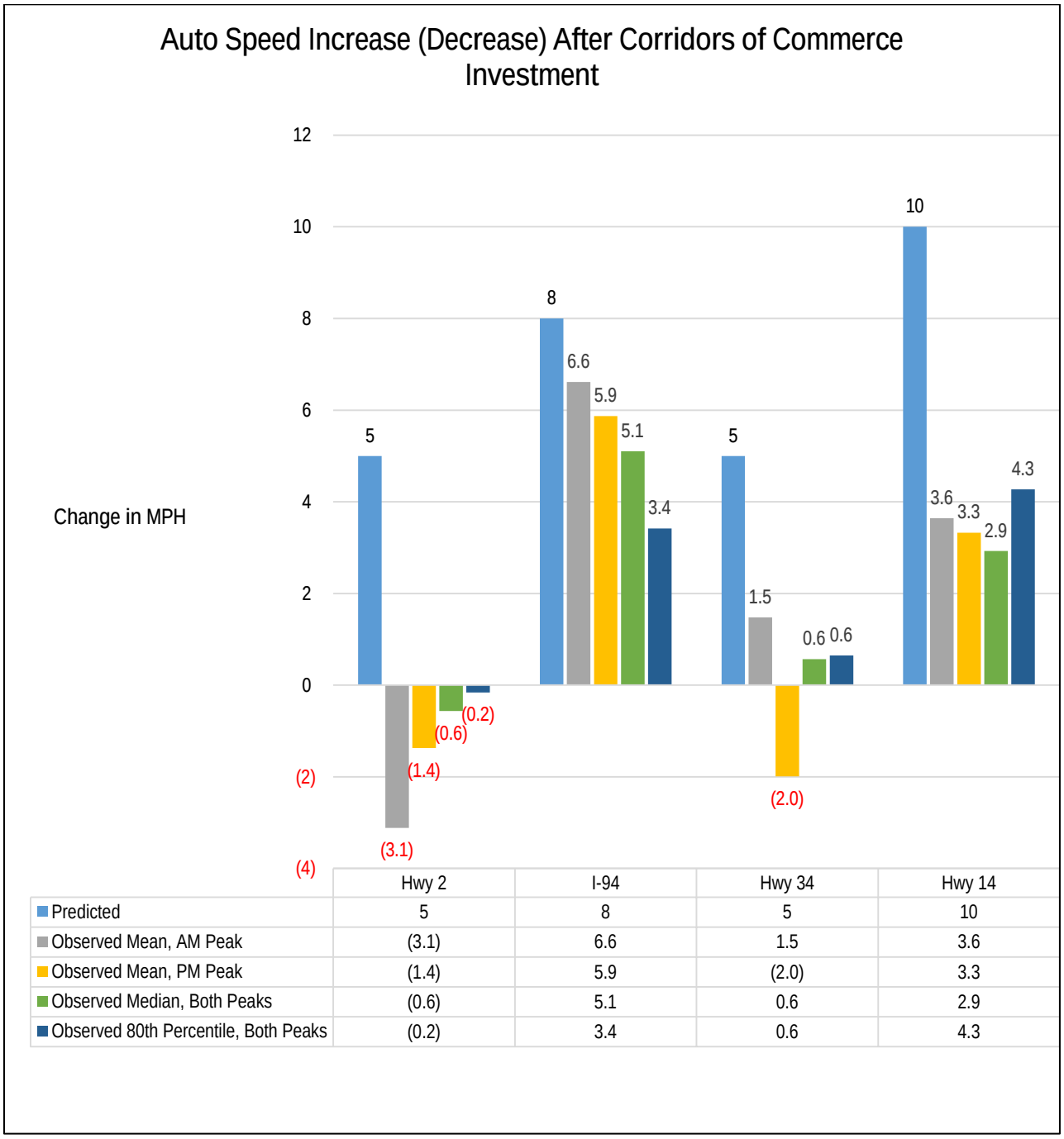
- Predicted (light blue column)
- Observed Mean, subdivided by two peak periods to demonstrate time-of-day variability—as well as some unquantifiable degree of NPMRDS sampling error
    - AM Peak (gray column)
    - PM Peak (yellow column)
- Observed Median, both peaks consolidated (green column)
- Observed 80th Percentile, both peaks consolidated (dark blue column)

[13] The NPMRDS speed data series begins in July 2013, making the presence of some winter months unavoidable in the pre-construction baseline. Future evaluation iterations can test the stability of post-construction speed snapshots so as to qualitatively control for unusually severe or mild winters.

[14] Because sample size is suppressed in the NPMRDS data made available, a margin of error cannot be calculated for observed speeds. Everything else being equal, higher-volume roads will have more precise estimates.

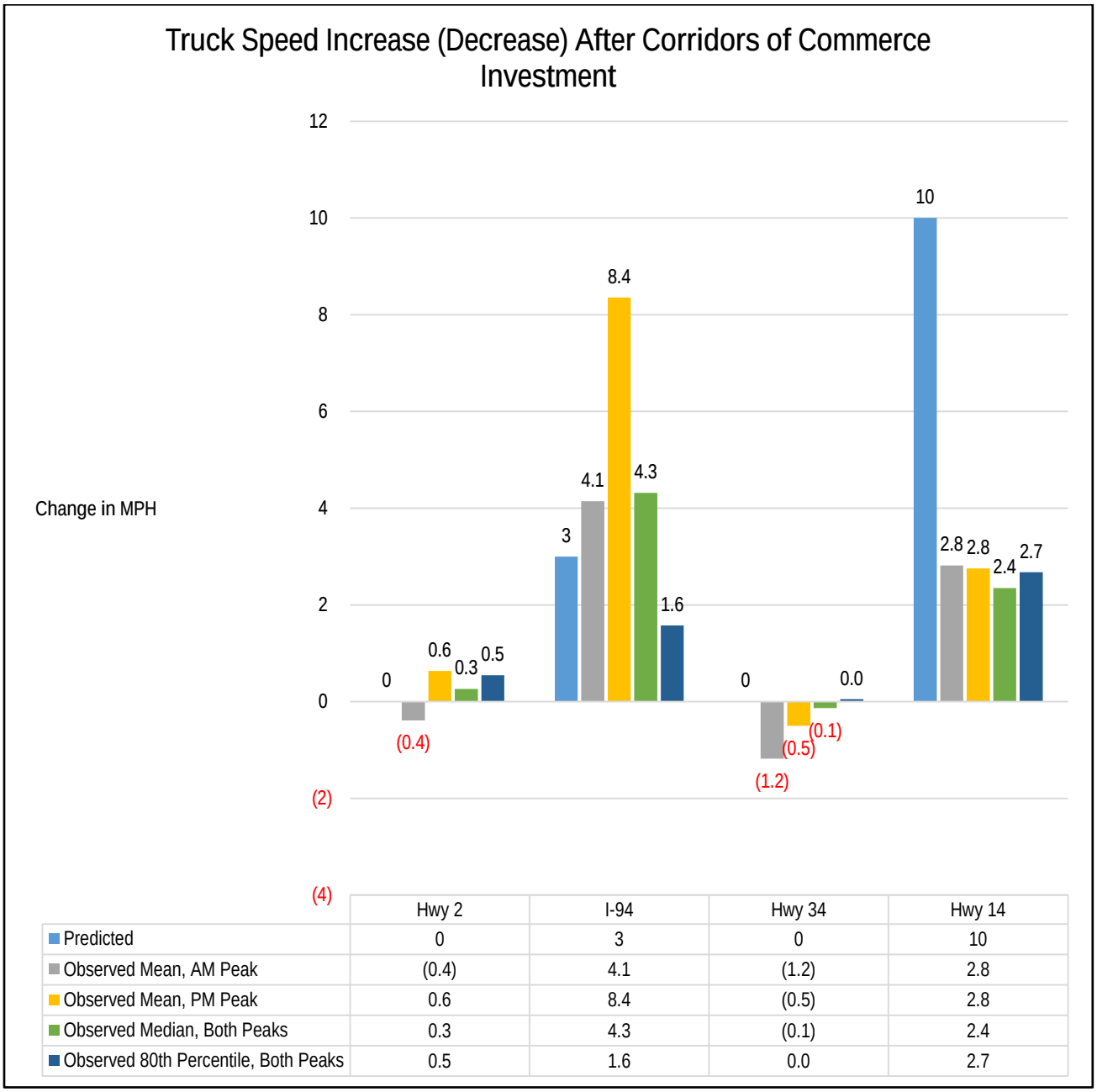
[15] Trucks make up around seven percent of total traffic in the Highway 2, Highway 34 and I-94 corridors, and roughly double that share along Highway 14.

Figure 2: Change in Auto Speeds for January-June 2016 Compared to January-June 2014



	Hwy 2	I-94	Hwy 34	Hwy 14
Predicted	5	8	5	10
Observed Mean, AM Peak	(3.1)	6.6	1.5	3.6
Observed Mean, PM Peak	(1.4)	5.9	(2.0)	3.3
Observed Median, Both Peaks	(0.6)	5.1	0.6	2.9
Observed 80th Percentile, Both Peaks	(0.2)	3.4	0.6	4.3

Figure 3: Change in Truck Speeds for January-June 2016 Compared to January-June 2014



	Hwy 2	I-94	Hwy 34	Hwy 14
Predicted	0	3	0	10
Observed Mean, AM Peak	(0.4)	4.1	(1.2)	2.8
Observed Mean, PM Peak	0.6	8.4	(0.5)	2.8
Observed Median, Both Peaks	0.3	4.3	(0.1)	2.4
Observed 80th Percentile, Both Peaks	0.5	1.6	0.0	2.7

Findings

Inspection of the two figures produces a summary of results observed to date, ordered beginning with the corridor that most substantially achieves the efficiency of movement objective:

1. **I-94**: All observed measures are strongly positive—truck even more so than auto. Both truck mean speeds (morning and afternoon rush hours) and the median exceed the predicted increase, and the PM peak jump is nearly three times the predicted gain. Although none of the auto readings top expectations, the means and median are approximately two-thirds of that goal. Collectively, the clear rise in sampled speeds supports the claim that the additional lane is delivering the projected mobility benefits.

2. **Highway 14**: As with I-94, all before and after speed comparisons show improvement substantially above the zero or "no change" reference level. However, none of the actual increases approach the planned magnitude. Auto measures, averaging over one-third of the planned level, are slightly superior to the truck counterparts that amount to one-quarter of the targeted change.

3. **Highways 2 & 34**: No consistent trend, pre- and post-Corridors of Commerce investment, can be observed in either of the passing lane applications. For each location, either auto or truck data is uniformly negative (meaning current speeds are nominally lower than before), although close enough to the neutral axis to suggest no significant speed change either way. The other vehicle type fluctuates between positive and negative, but again with little absolute difference. It may be that the natural dispersion of the passing lane additions sufficiently dilutes speed changes recorded along the surrounding corridor sections such that no change can be determined at the level of resolution achievable with NPMRDS reporting.

Crash Incidence and Severity

One of the mandatory Corridors of Commerce project selection criterion is "improvements to traffic safety." Adding to the overriding importance all highway users assign to safe travel, routes with significant commercial traffic volumes warrant further attention in a safety review. Differences in speed and acceleration/deceleration characteristics and reduced visibility around large vehicles, in combination with individual driver decisions, can produce hazardous conditions in certain weather, topography and roadway configurations. Building new lanes to create protected passing opportunities and promote increased vehicle separation is intended to mitigate some of this complex risk interaction.

Analysis of Crashes

MnDOT's Office of Traffic, Safety and Technology reports detailed trunk highway crash statistics in annual Crash Data Toolkit spreadsheet files. Drawing on records from the Department of Public Safety's Crash Facts, the toolkits are published midyear with data through the prior calendar year, and compile three, five and 10-year crash counts. Separate files cover intersections and corridor sections segmented by reference points. Crashes are categorized by severity according to the following coded scale:

- Fatal (K) – crash resulted in at least one fatality
- Incapacitating Injury (A) – crash resulted in at least one life-critical injury
- Non-incapacitating Injury (B) – crash resulted in at least one severe or clearly determined injury
- Possible or Unknown Injury (C) – crash may have resulted in an injury that was not diagnosed at the scene
- Property Damage Only (PD) – crash resulted in no apparent or recorded injuries but caused damage to vehicle(s) or other property

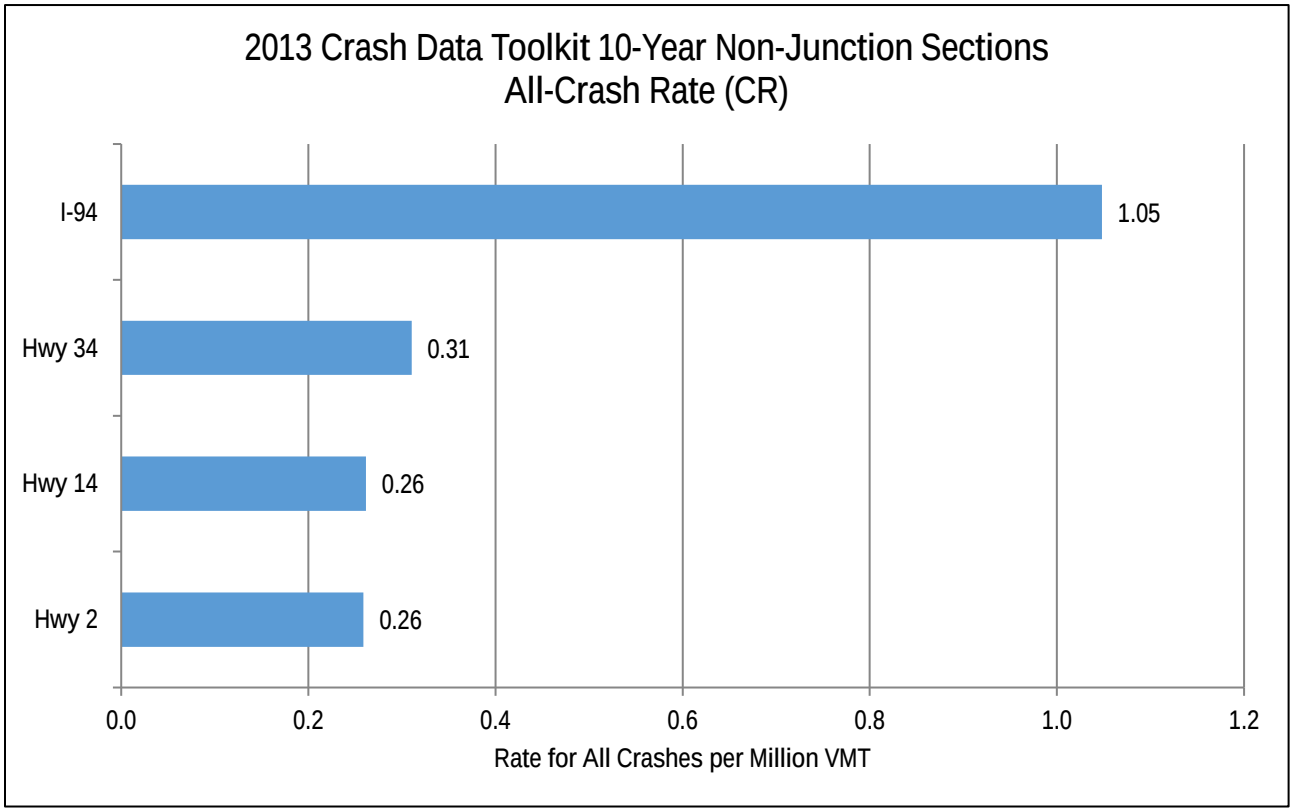
The Corridors of Commerce safety baseline was established from the 2013 Crash Data Toolkit by summing the 10-year section crash counts for the segments in the vicinity of the project scope. This information is shown in Table 10 below in raw form to ease traceability from the source file.

Table 10: Baseline 10-Year Crash Totals (2004-2013)

Route	Fatal Crashes	Injury A Crashes	Injury B Crashes	Injury C Crashes	PD Crashes
Hwy 2	6	6	8	34	80
I-94	1	4	45	146	579
Hwy 34	4	7	47	59	148
Hwy 14	7	5	13	23	68

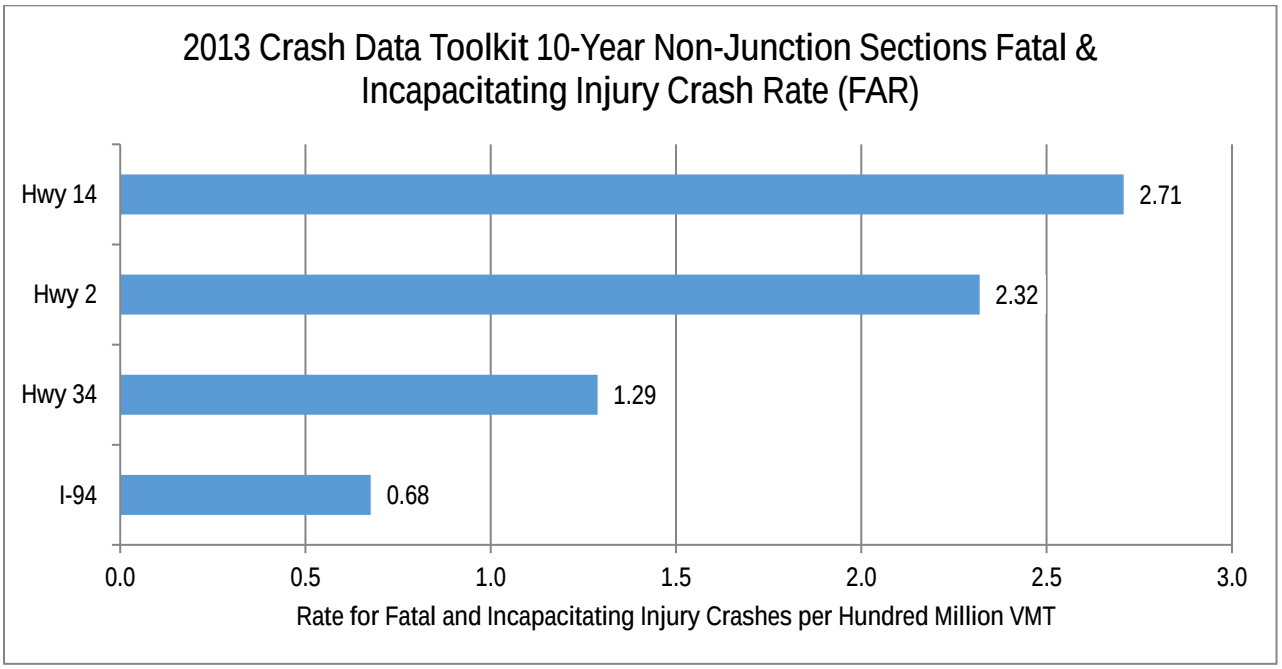
Because the traffic volumes—and resulting opportunities for conflict—vary substantially across the approved route improvements, an alternate crash rate measure that incorporates vehicle miles traveled gives a more instructive comparison within the project set.

Figure 4: 10-Year Rate for All Crashes (Any Severity) per Million VMT (2004-2013)



Looking at all crash types in Figure 4, the I-94 segment all-crash rate (CR) of 1.05 per million VMT is far higher than that for the other three selected corridors, grouped within a narrow band of 0.25 to 0.3 crashes per million VMT.

Figure 5: 10-Year Rate for Fatal and Serious Crashes per Hundred Million VMT (2004-2013)



This ordering is almost perfectly reversed, however, after applying a filter on crash severity to isolate fatal and incapacitating, A injury events, captured by the FAR statistic, is illustrated in Figure 5. Highways 14 and 2 together average 2.5 crashes from these two most severe categories per hundred million[16] VMT, with Highway 14 having a FAR quadruple the rate experienced on I-94.

The contrast between CR and FAR highlights the importance of including overall crash incidence and the severity when interpreting safety performance and rating the effectiveness of countermeasures. A safety-oriented project may be considered successful to the extent it reduces either or both: (1) total crash frequency across all severities, and (2) just fatal and A injury crash occurrences. Because the Corridors of Commerce legislation does not explicitly single out either of these objectives or prescribe a desired tradeoff between them (for instance, that FAR reduction should be prioritized even if accompanied by a higher all-crash incidence), each goal will be examined independently.

When projecting future safety data, it is customary to assume a near-term continuation of historical crash rates in the baseline, unimproved scenario. This is a different approach than that taken for traffic volume where background economic and population growth typically justify an assumption of increasing driving levels under all scenarios over the long run. The combination of higher future VMT and static crash rates progressively increases over time the absolute crash count benchmark against which a safety investment is evaluated. To simplify the data comparison then, and because more severe crashes can be rare events on lower volume roads, aggregated crash rates such as CR and FAR are more reliable in the statistical sense than raw crash counts at each level of severity.

In general, estimating the expected crash rates resulting from each new Corridors of Commerce investment follows a two-step procedure:

1. Determine the reasonable scope of the investment's effect on safety. The boundaries for crash data segments are commonly set by access points and changes in posted speed limits. Planning-level estimates concerning roadway expansion for part of a longer segment requires

[16] In keeping with Traffic Safety reporting practice and the relative frequency of different crash severities, note that CR and FAR are expressed with different VMT magnitudes for denominators.

pro rata downscaling of the reported data, assuming an even distribution of crash incidents throughout the segment.

Additionally, the benefit of some safety features can be anticipated to extend beyond the physical limits of the project. In the case of the two rural passing lane projects studied here, safety projections adopted the principle recommended by Missouri's state transportation agency that the zone of reduced crash risk continues two miles downstream from the endpoint of each passing lane.

2. Apply an appropriate crash modification factor to the determined scope. Crash modification factors represent the crash frequency that analysis suggests would remain following the introduction of a safety improvement. It is represented as a decimal (less than one) factor associated with each severity category. Multiplying a baseline crash count by the corresponding CMF yields modeled future crashes.

   The Federal Highway Administration sponsors the CMF Clearinghouse to collect and share CMF results from academic researchers and transportation agencies across the country. In the absence of well-documented experience with crash impacts of passing lanes added to Minnesota highways, a search of the Clearinghouse discovered suitable national CMFs describing safety benefits from the implementation of periodic passing lanes in a rural setting. A closer match on the attributes of Highway 14's expansion was made with other in-state projects, allowing its CMFs to be calculated as averages of the factors published in benefit-cost memorandums for three segments also competing for Corridors of Commerce funding—two of which were also approved.

One exception to the above approach among the now-completed Corridors of Commerce projects is the I-94 expansion. Due to its integration within the dense Twin Cities metro arterial road network, the safety benefit attributable to this interstate investment is computed in tandem with the regional travel demand traffic model. (This is detailed in the refined benefit-cost study performed by a consultant following the project selection stage.) In line with past urban projects, where multiple driving paths connect major origin-destination pairs, the improvement to safety from new I-94 capacity hinges on attracting trips away from using other routes (such local roads) and onto the interstate highway. In general, parallel minor highways and surface streets have higher crash rates compared to the interstate system. Due to reduced congestion on and around the widened I-94 section, drivers who had formerly avoided use of the interstate in peak hours will return to the corridor to find shorter travel times and, secondarily, benefit from a lower severe crash risk.

Because the safety benefit on I-94 is tied to redistribution of traffic throughout a road network that extends beyond the interstate itself, it would be unexpected to observe a reduction in crash counts or rates for that specific I-94 segment in crash data. Despite inability to directly confirm the modeled improvement in safety, crash statistics from before and after the lane addition can be compared to detect any actual change in safety on the isolated interstate section. It should also be noted that safety considerations play a relatively minor role in the I-94 business case, making up less than 7 percent of the total estimated present value of user benefits.

Table 11: Raw Crash Rate Forecasts and Associated 2013 Statewide Average Benchmarks (italicized)

Route/Facility Type	Non-Junction Sections All-Crash Rate (CR)	Non-Junction Sections Fatal & Incapacitating Injury Crash Rate (FAR)
Hwy 2	0.23	2.10
Hwy 34	0.28	1.17
3-Lane Undivided	*0.62*	*0.50*
I-94	1.05	0.68
Rural Freeway	*0.42*	*0.78*
Hwy 14	0.25	2.69
Rural Expressway	*0.35*	*0.82*

Table 11 lists the new raw crash rate reference levels produced from the methods described above. In addition to forecasting build scenario CR and FAR values for each Corridor of Commerce location on the basis of scope and crash modification factor calculations—or a continuation of historical performance, in the case of I-94—the table gives contemporary (10 years ending in 2013) historical statewide averages corresponding to the new facility type, specified by environment (rural or urban), design (freeway, expressway, or other), and lane count attributes. Taken together, the raw corridor forecast, historical statewide facility average and future statewide facility average will generate an adjusted corridor forecast against which future safety data can be evaluated, through the following formula:

Adjusted Corridor Forecast =
Raw Corridor Forecast
+
(Future Statewide Facility Average – Historical Statewide Facility Average)

By modifying each corridor's raw crash rate forecasts with the difference over time in statewide average rates for the upgraded facility type, the intent is to pinpoint the change in corridor crash rate due to the Corridors of Commerce investment while setting aside broader safety trends influenced by a host of unrelated factors. As previously mentioned, the standard short-run assumption is that there is no change in crash rates; however, if a rate increase or decrease does emerge between the time forecasts are established and when validation data becomes available years later, then this variance will be removed. Considering the modest improvements contained in the raw corridor forecasts, even a small correction using the statewide averages will assist with proper assessment of whether the expected safety improvement has materialized. This central yes/no comparison should be supplemented by measuring the size of the gap between actual and forecast performance—better or worse—as a basic gauge of the confidence we can have in drawing a positive or negative conclusion, lacking a formal statistic to control for sampling error.

Illustrating with hypothetical numbers, suppose that the 2018[17] edition of the Crash Data Toolkit indicates that the Highway 2 sections including and bookending the passing lane locations has most recently averaged a CR of 0.18 and FAR of 2.13, while the statewide benchmark for all three-lane undivided facilities now stands at 0.60 for CR and 0.52 for FAR. The two evaluation tests are then as follows:

CR: $0.18 \ \{<=>\} \ 0.23 + (0.60 - 0.62)$

$0.18 \quad < \quad 0.21$

- Interpretation: the observed all-crash rate is moderately lower than the level assumed at the time of project selection.

FAR: $2.13 \ \{<=>\} \ 2.10 + (0.52 - 0.50)$

$2.13 \quad > \quad 2.12$

- Interpretation: the observed top-severity crash rate is slightly higher than the level assumed at the time of project selection, but the comparison is within the range of sampling variability, particularly given the limited three-year history now available (written in future perspective).

Freight Movement Growth

The statute governing the Corridors of Commerce program lists "freight improvement" as one possible project classification:

> (2) freight improvement, for an asset preservation or replacement project that can result in:
>
> (i) removing or reducing barriers to commerce
>
> (ii) easing or preserving freight movement;… [18]

Two of the four projects completed to date—both passing lane additions, on Highways 2 and 34—received this designation, while the others were primarily considered "capacity development" work.

The law identifies project selection criteria, including:

> (3) efficiency in the movement of freight, including but not limited to:
>
> (i) measures of annual average daily traffic and commercial vehicle miles traveled, which may include data near the project location on that trunk highway or on connecting trunk and local highways;… [19]

To address the freight movement aspect of Corridors of Commerce performance, a trend analysis was generated for heavy commercial vehicle traffic on each affected corridor. Review of these traffic patterns—particularly in future evaluation summaries, once initial post-opening data becomes available—will provide a gauge of how the Corridors of Commerce improvements may have contributed to the corridors' relative attractiveness on the statewide freight network.

Bearing in mind that market factors can influence freight volumes independent of road infrastructure characteristics, placing the Corridors of Commerce investment in context along a

[17] 2018 is the first year when the shortest crash statistic interval of three years will consist entirely of post-Corridors of Commerce construction safety performance, to be reported in mid-2019.
[18] Minn. Stat. 161.088, subd. 3.
[19] Minn. Stat. 161.088, subd. 5.

longer timeline demonstrates how the current trajectory for truck traffic measures up against the historical benchmark.

Annual average daily traffic data is collected for trunk highway segments on a rotating basis approximately every other year. The intent is to capture typical prevailing conditions and avoid construction-related anomalies. A variety of methods are then employed for classifying vehicles to estimate truck volumes, expressed as heavy commercial annual average daily traffic. (Data for corridors that span multiple road segments can be calculated by averaging the HCAADTs for each shorter segment and weighting by segment length.) Details on these procedures can be found online from the Traffic Forecasting & Analysis unit of MnDOT's Office of Transportation System Management, which publishes the data presented below.

The related measure of heavy commercial vehicle miles traveled simply combines road segment length with vehicle counts registered at specific points within the segment. For instance, two trucks traveling a 5-mile segment yield a total of 10 HCVMT. Statewide HCVMT serves as a control or normalization factor for corridor-level HCAADT figures so that the adjusted HCAADT values can be directly interpreted as traffic changes particular to a given corridor, after netting out average "background" traffic growth observed across Minnesota.

Table 12—divided into two parts—and Figure 6 give an example with hypothetical data to simulate this adjustment process.

Table 12.1: HCAADT Normalization Example

Year	State HCVMT (billions)	Annual HCVMT Growth Rate	HCVMT Index to 2008
2008	2.50	-	1.00
2009	2.58	3%	1.03
2010	2.70	5%	1.08
2011	2.81	4%	1.12
2012	2.95	5%	1.18
2013	3.04	3%	1.22
…	-	-	-
2016	3.13	1%	1.25

Table 12.2: HCAADT Normalization Example (continued)

Year	Years Before (-) / After (+) Construction	Corridor XYZ Raw HCAADT	Raw Annual HCAADT Growth Rate	HCAADT Adjusted for State HCVMT	Adjusted Annual HCAADT Growth Rate
2008	-6	3,000		3,000	
2009	-5	3,120	4%	3,029	+1%
2010	-4	3.245	4%	3,004	(1%)
2011	-3	3.31	2%	2,955	(2%)
2012	-2	3,376	2%	2,861	(3%)
2013	-1	3,410	1%	2,795	(2%)
…	…	-	-	-	-
2016	+1	3,618	2%	2,895	+1%

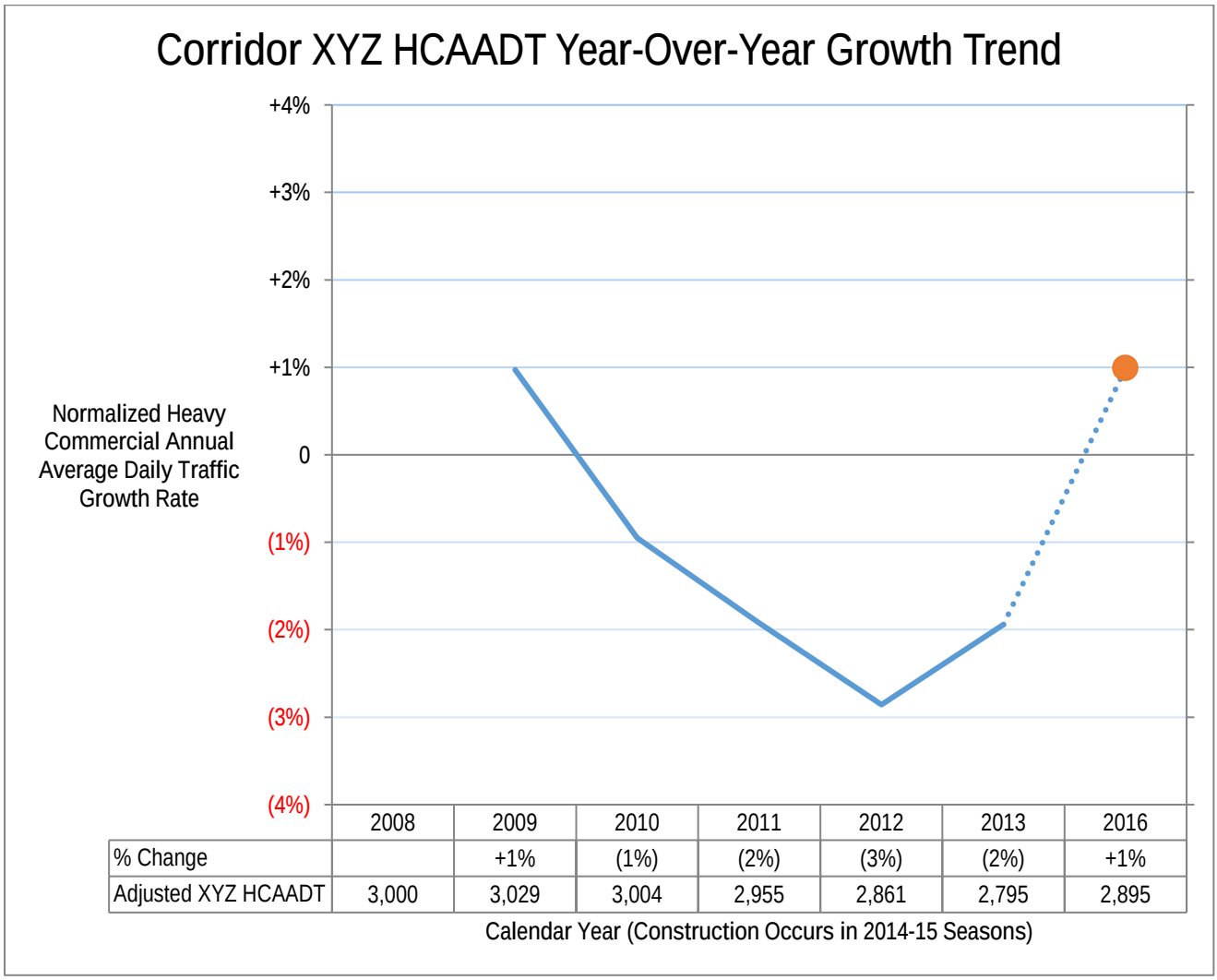
Table 12.1 contains an illustrated HCVMT trend for the period 2008 to 2016, with annualized growth rates ranging from 1 percent to 5 percent. The "HCVMT Index" column values are the result of dividing each year's HCVMT by the constant 2008 level of 2.50 billion. For instance, the 2013 HCVMT of 3.04 billion is 22 percent higher than the 2008 amount, producing an index reading of 1.22.

The second part, in Table 12.2, shows corridor HCAADT history for a number of years before construction and the first year after project completion. Construction lasted for two seasons (2014 and 2015) in this example. "Raw HCAADT" lists the actual reported traffic numbers alongside the resulting growth rate over the prior year. Finally, "HCAADT Adjusted for State HCVMT" divides raw HCAADT by the HCVMT index value in that year. For instance, the raw 2013 HCAADT of 3,410 becomes 2,795 after dividing by 1.22.

Consequently, adjusted HCAADT can be thought of as the corridor-specific traffic growth (or decrease) after "subtracting" overall state HCVMT change. When the adjusted annual HCAADT growth rate is positive, the corridor is experiencing faster growth than the state as a whole; when negative, the corridor's growth trails the statewide benchmark for that year. The adjusted annual HCAADT growth rate is very close[20] to the difference between raw HCAADT growth and HCVMT growth. For instance, adjusted HCAADT growth in 2013 of negative 2 percent is attributable to raw HCAADT growth at 1 percent being more than offset by the state HCVMT growth rate of 3 percent.

[20] The math is generally not exact due to the changing baselines used in the index adjustment step.

Figure 6: Chart for HCAADT Normalization Example



Charting the adjusted HCAADT growth rates is a useful way of summarizing traffic developments. In this example, the corridor registers growth in 2009 above the statewide reference level, but three years of declining relative performance follow in 2010 through 2012, as the corridor loses ground against the broader statewide trend. In 2013 the decline continues but at a slower rate. Following the two-year data gap during construction, in 2016 the corridor posts its first positive result since 2009, exceeding statewide HCVMT growth by 1 percent annualized. The dashed line signals the discontinuity in the annual series because of the construction gap. Although the investment is associated with encouraging ensuing growth, this better-than-average performance would need to be sustained for additional years just to catch up with the HCVMT track starting in 2008. Noting that the 2016 adjusted HCAADT of 2,895 lies below the 2008 baseline level of 3,000 leads to the conclusion that the deficit amassed in the down years collectively outweighs the progress made in 2009 and 2016.

Heavy Commercial Vehicle Traffic Growth Trends on Completed Projects

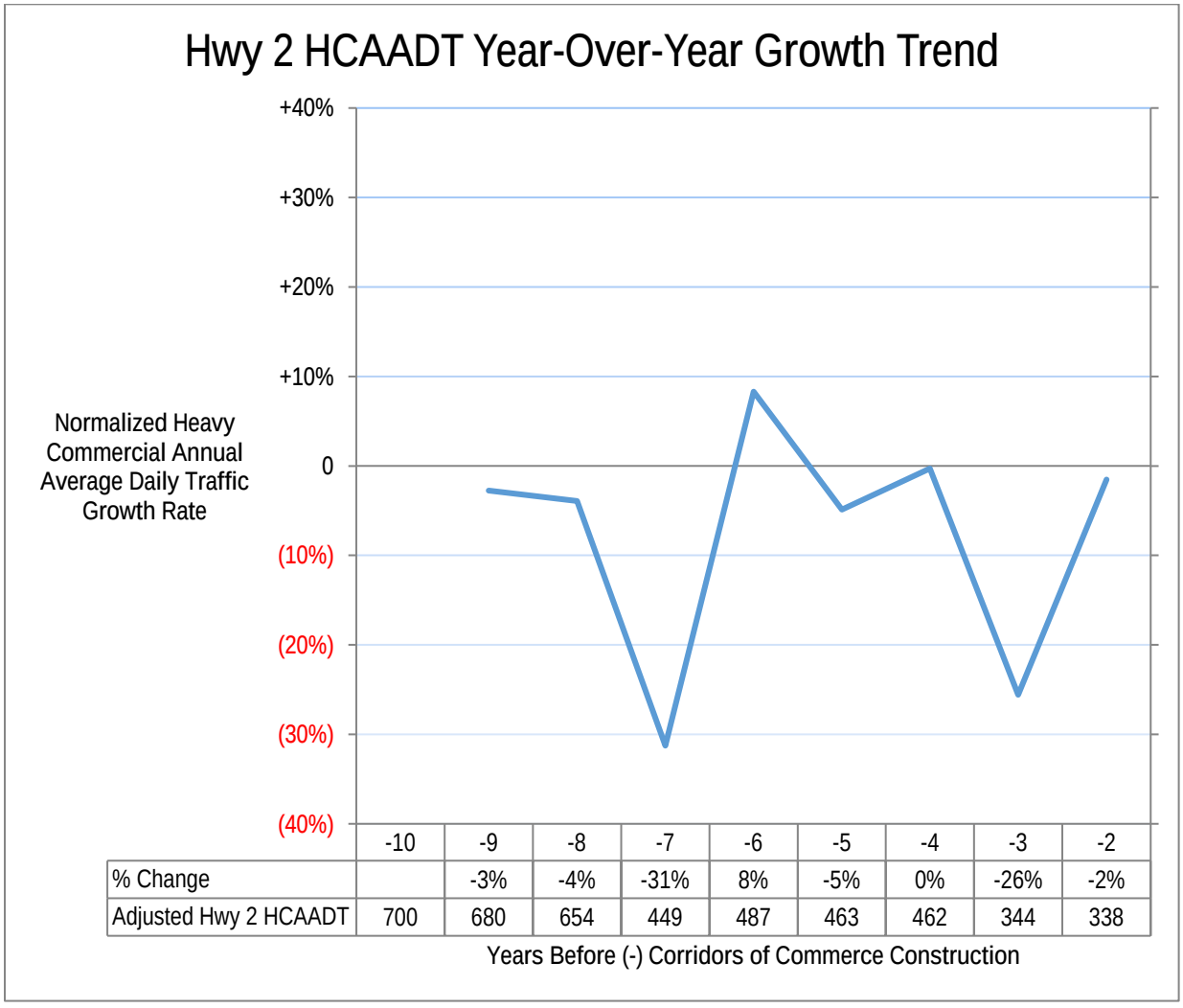
Replicating the traffic trend analysis with at least one year of post-construction data for Corridors of Commerce projects will only be possible in future reports, considering that the first projects opened

in 2015 while HCAADT collection and publication lags by two to three years. Currently, the most recent official HCAADT figures date from 2012.[21]

In the meantime, the 10-year historical trends for each Corridors of Commerce project location can be inspected and are summarized in the figures below. For the time dimension along the x-axis, [-10] (10 years before Corridors of Commerce construction) corresponds to the observation year 2004 and [-2] refers to the year 2012. (The growth rate scale on the y-axis is recalibrated in each case to fit the data range, and each graph is vertically centered at 0 percent.)

The segments of Highway 2 that include the Corridors of Commerce passing lane improvements generated low heavy commercial traffic growth in the preceding 10 years, beating the state HCVMT comparison just once (six years before, in 2008) and tying the benchmark on one other occasion (in 2010). Particularly sharp declines occurred in 2007 and again in 2011. From the beginning to the end of the period examined, adjusted HCAADT reduced by 50 percent.

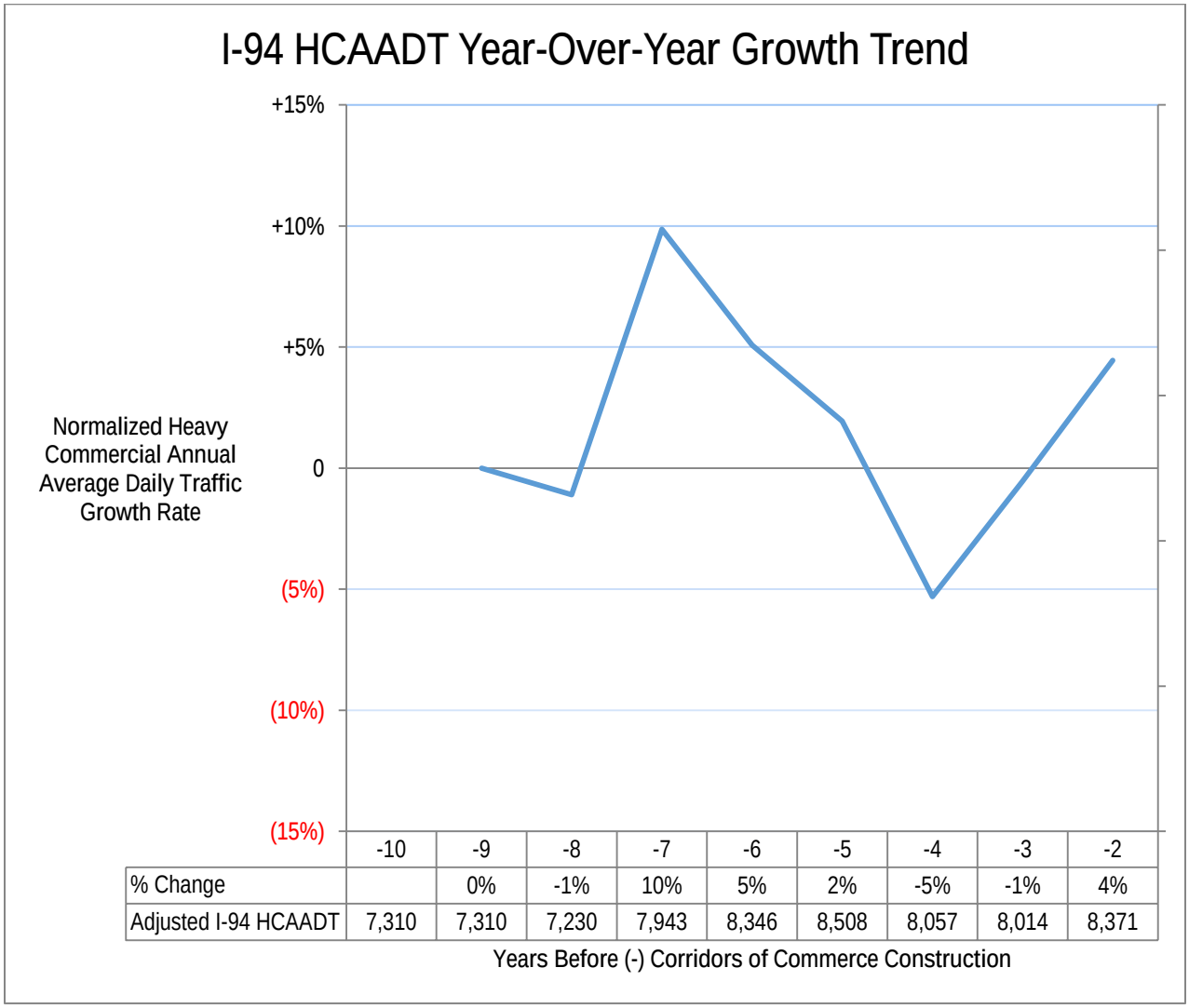
Figure 7: Highway 2 HCAADT Trend



[21] 2013 data was not yet available at the end of August 2016.

In the most recent 10-year period, the I-94 expansion segment between the Twin Cities and St. Cloud generally outpaced the statewide heavy commercial traffic rate of growth, only posting a single year that was substantially below the statewide level (during 2010). Recovery followed in subsequent years, pushing adjusted HCAADT up nearly 15 percent over the 2004 level.

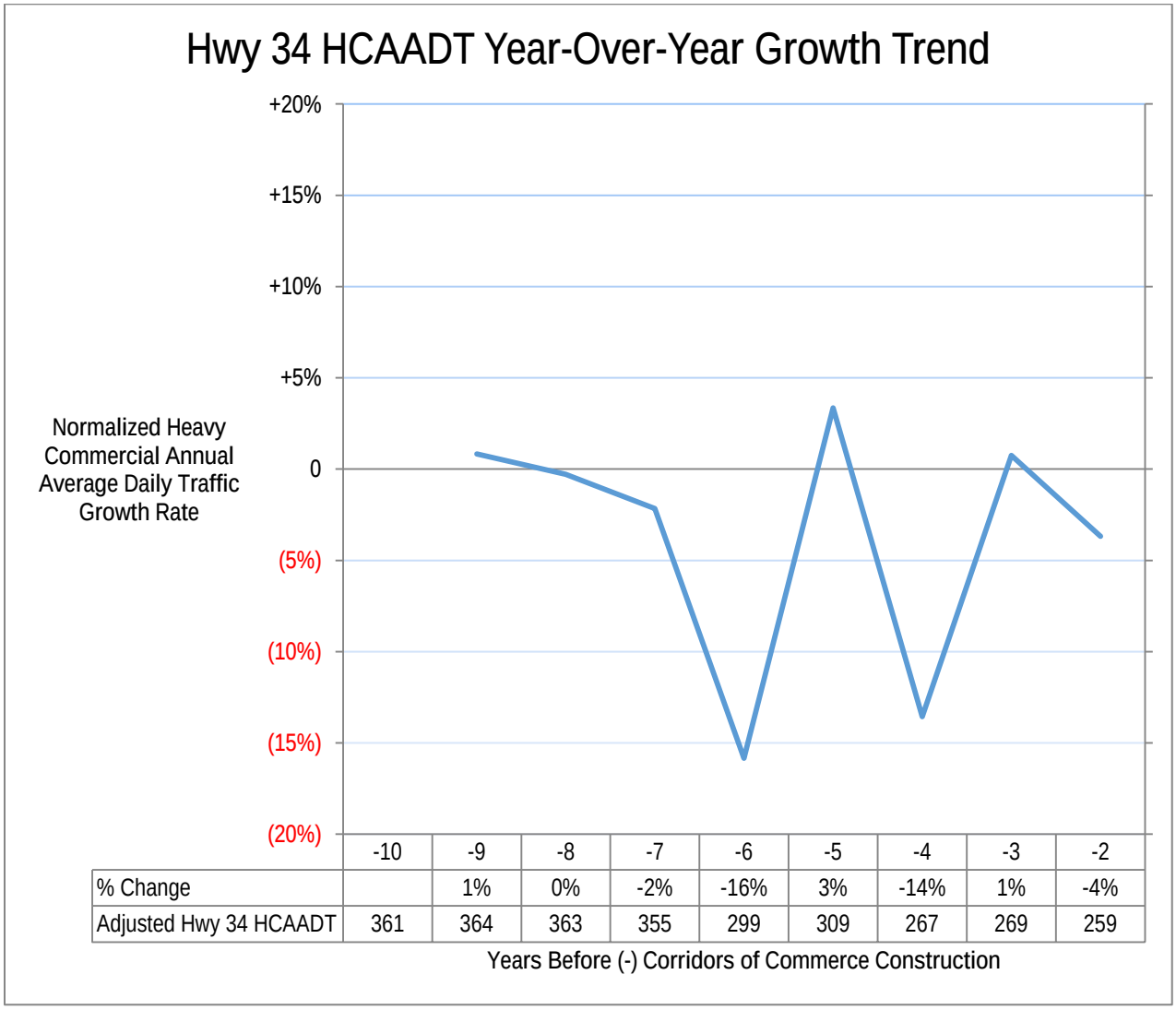
Figure 8: I-94 HCAADT Trend



	-10	-9	-8	-7	-6	-5	-4	-3	-2
% Change		0%	-1%	10%	5%	2%	-5%	-1%	4%
Adjusted I-94 HCAADT	7,310	7,310	7,230	7,943	8,346	8,508	8,057	8,014	8,371

Interestingly, the picture for Highway 34 resembles that for the nearby and parallel passing lanes project site along Highway 2. Each location featured two isolated years of sharp HCAADT reductions—although Highway 34's downturns were less severe—amid otherwise flat adjusted traffic.

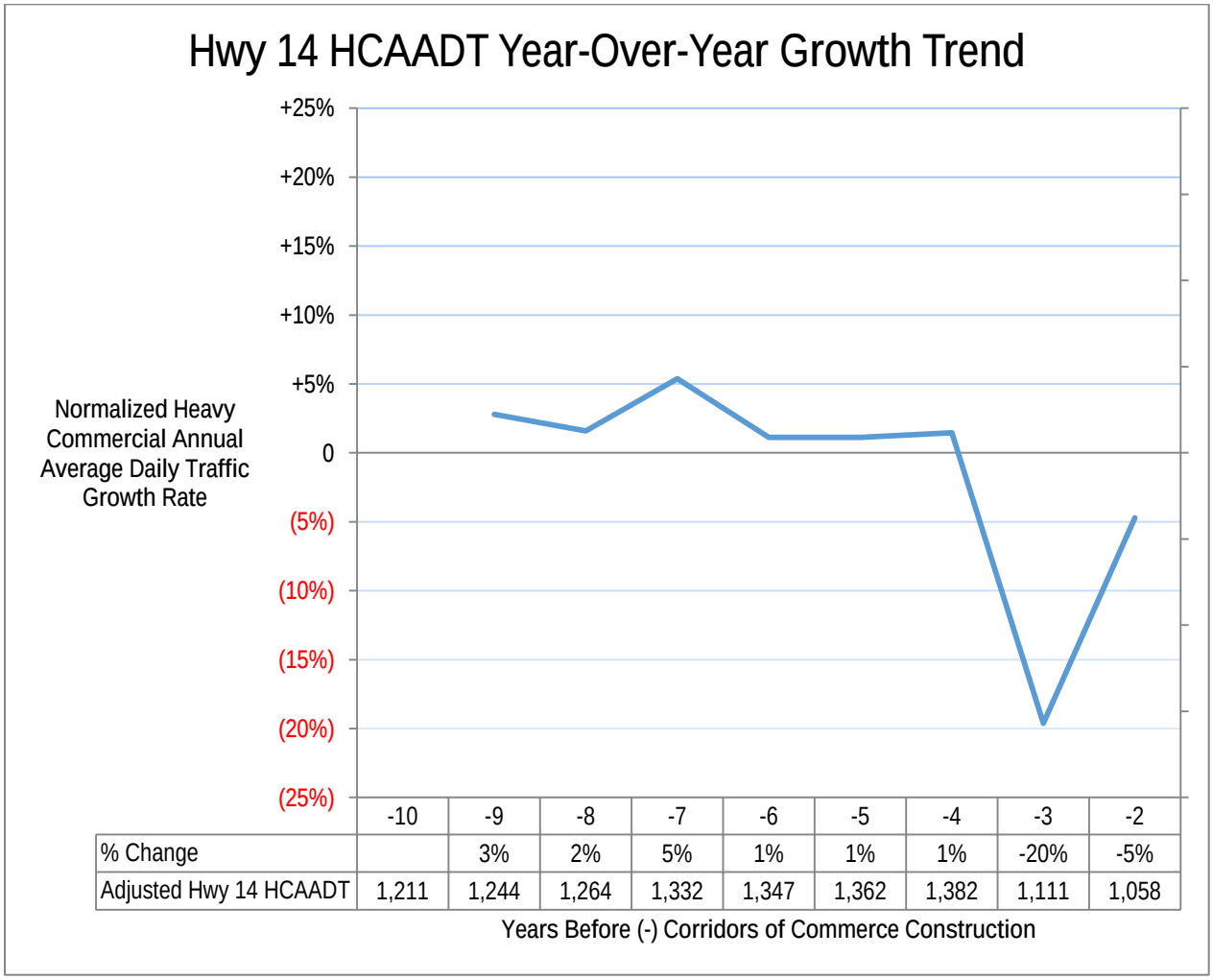
Figure 9: Highway 34 HCAADT Trend



	-10	-9	-8	-7	-6	-5	-4	-3	-2
% Change		1%	0%	-2%	-16%	3%	-14%	1%	-4%
Adjusted Hwy 34 HCAADT	361	364	363	355	299	309	267	269	259

Between 2005 and 2010, the segments of Highway 14 that surround the Corridors of Commerce expansion area (running just east of Owatonna) closely tracked with statewide growth in heavy commercial traffic, modestly exceeding that baseline by 1 percent to 5 percent each year. This period of parity ended abruptly in 2011, three years before the widening, when adjusted truck volume fell 20 percent. Although the sharp decline was a single-year phenomenon, the most recent adjusted HCAADT remained 13 percent below its level a decade prior.

Figure 10: Highway 14 ("Segment 1" of Owatonna to Dodge Center) HCAADT Trend



	-10	-9	-8	-7	-6	-5	-4	-3	-2
% Change		3%	2%	5%	1%	1%	1%	-20%	-5%
Adjusted Hwy 14 HCAADT	1,211	1,244	1,264	1,332	1,347	1,362	1,382	1,111	1,058

Economic Development Accomplishments

No specific goals were set at the time of Corridors of Commerce project selection for measurable economic development, including land use, employment and tax base changes. However, reports of new and expanded impacts emerging concurrently in the now-open improved corridors include activity around I-94:

- Completed construction plus additional commitments for transportation-intensive industrial facilities totals almost three million square feet in Rogers, Otsego and Dayton.
- Notably, FedEx Ground opened a new sorting and distribution center within weeks of the dedication of the new I-94 lanes (October 2015). Employing more than 250, the center will ultimately be an operational base for up to 300 delivery vehicles.