

# **The New I-64 Economic and Regional Mobility Study**

**Final Report  
Prepared For**

**Missouri  
Department of  
Transportation**



## **Final Report**

# **The New I-64 Economic and Regional Mobility Study Final Report**

Prepared for  
Missouri Department of Transportation  
Organizational Results

by

Dr. Lance Gentry, M.B.A. Ph.D.  
Dr. Venkata Chilukuri, Ph. D.  
Thomas Hiles, EI  
Michael Trueblood, P.E., P.T.O.E.  
Christopher Kinzel, P.E.  
Robert Frazier, PE, AICP  
Dr. Ghulam Bham, Ph.D.  
Jonathan Lee  
Daniel Hodge  
Marissa Witkowski  
Tom Ryan, P.E.

HDR Engineering, Inc.  
Heartland Market Research, LLC  
Missouri Science and Technology University

**November 2011**

The opinions, findings, and conclusions expressed in this publication are those of the principal investigators. They are not necessarily those of the Missouri Department of Transportation, the U.S. Department of Transportation or the Federal Highway Administration. This report does not constitute a standard or regulation.

## TECHNICAL REPORT DOCUMENTATION PAGE

1. Report No. DOT 34/232	20 Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle: <b>The New I-64 Economic and Regional Mobility Study - Final Report</b>		5. Report Date: <b>November, 2011</b>	
		6. Performing Organization Code	
7. Author(s) <b>Gentry, Chilukuri, Hiles, Kinzel, Frazier, Trueblood, Bahm, Lee, Hodge, Witkowski and Ryan</b>		8. Performing Organization Report No.	
9. Performing Organization Name and Address Missouri Department of Transportation Research, Development and Technology P. O. Box 270-Jefferson City, MO 65102		10. Work Unit No.	
		11. Contract or Grant No. RI 07 - 047	
12. Sponsoring Agency Name and Address Missouri Department of Transportation Research, Development and Technology P. O. Box 270-Jefferson City, MO 65102		13. Type of Report and Period Covered Final Report	
		14. Sponsoring Agency Code	
15. Supplementary Notes The investigation was conducted in cooperation with the U. S. Department of Transportation, Federal Highway Administration.			
16. Abstract: <b>The Final Report summarizes the 2008 and 2009 Annual Reports of all study's activities conducted during the I-64 Full-closure construction project in the St. Louis, Missouri region. These activities included project communications, public opinions, regional mobility, roadway safety, and regional economics. The main evaluation question answered was "what impacts did the full-closure construction project have on the St. Louis region".</b>			
17. Key Words: <b>Communication, Public Opinions, Regional Mobility, Safety, Regional Economics, and Full-closure Construction</b>		18. Distribution Statement	
		No restrictions. This document is available to the public through National Technical Information Center, Springfield, Virginia 22161	
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 63	22. Price

Form DOT F 1700.7 (06/98)

## **Executive Summary**

The research team has found the following results on the four key study areas:

### Communications

- MoDOT's public communication efforts were essential toward gaining and keeping public support for the project. Pre-closure awareness was reported as very high, 98% of the online survey respondents were aware of the closure before it closed. These responses have also reported that scheduled construction activities that impact travel were effectively communicated. By all measures, MoDOT effectively communicated the closure to the affected population in 2007 that began an effective communication plan throughout the 2-year closure.
- Television news was the best method for MoDOT to communicate project information according to 78.1% of respondents. A majority of respondents also suggested road signs near the closed highway (54.5%), radio news (53.5%) and newspapers (51.1%). Only 38.9% of the general public said the internet was an effective way for MoDOT to communicate with them.
- A reasonable conclusion from this research is that, if a project meets or exceeds all expectations, the initial public satisfaction with the project should be considered a baseline with the expectation that the public satisfaction will rise slightly as the project nears completion and then peak after the project is completed. Both the overall satisfaction with the project and satisfaction with the decision to complete the work by closing I-64 for 2 years instead of 6-8 years increased with the passage of time.
- One of MoDOT's goals for this study was to ensure ample minority participation. This was achieved, 21.3% of the responses came from an ethnic minority.
- Based upon all the research analyzed in this study, it is clear that the overwhelming majority of the general public views the project management on the New I-64 project as being successful. Overall, 94.6% of residents were satisfied (49.4%) or very satisfied (45.2%) with how the New I-64 Project closure was handled. After the project was completed, 95.1% of residents were satisfied with the decision to close I-64 for 2 years instead of 6-8 years with lane closures.

### Regional Mobility

- Traffic volumes when compared to pre-construction (2007) increased along designated marked alternatives roadways I-44, I-70, I-170 and I-270. The greatest increases occurred along I-270 and I-44 with increases in the range from 10 to 23% and 10 to 17%, respectively. Adjacent major arterials (Olive, Page, Manchester, etc.) near I-64 also experienced increased in both daily traffic volumes in the range of 30 to 35%; and peak hour traffic volumes approaching 50%.
- Travel speeds when compared to pre-construction (2007) remained about the same or saw a slight decrease in average travel speeds. There was a noticeable decrease in travel speeds along I-44 westbound near I-270 (increased exiting traffic over the designated primary alternative route). Enhanced traffic management, operation strategies and roadway improvements along adjacent arterials help maintain travel speeds and times during peak periods even with increased traffic volumes.
- The RideFinders (regional rideshare program) experienced a significant increase through most of 2008 as it approached the 10,000 membership plateau in November. In 2009, rideshare for both carpool and vanpool users dropped slightly or remained the same from the end of 2008. The increase in 2008 and stability in 2009 most likely reflects a combination of increase gas prices, economic conditions and/or the I-64 project. The isolation of which factor had the

greatest impact would be difficult to assess, since all of these factors were all mentioned in both public and business surveys conducted.

- Commuter park-and-ride facilities usage in 2009 in Missouri returned to similar levels experienced in 2007 demonstrating that park-n-ride facilities increase in 2008 were most likely impacted by 2008 higher gas prices and the economy downturn with only a potential minor impact from the I-64 closure.
- Transit usage varied significantly when comparing 2007 to 2008 on a month-by-month basis. MetroBus ridership varied from a monthly 8.3% decrease to a 13.1% increase. MetroLink ridership varied from a monthly 4.5% decrease to a 31.9% increase. Overall, MetroBus ridership experienced an increase of 5.5%, while MetroLink ridership experienced a 5.2% increase between 2007 and 2008. This showed a slight shift to mass transit that could be related to higher gas price increase in 2008, the downturn in the economy and/or the I-64 project. The public survey also reflects a slight increase in transit usage.
- Regional mobility did experience some minor impacts in mobility during both 2008 and 2009
- Advance planning and implementation of a region-wide maintenance of traffic plan during the closure was important in minimizing impacts
- The regional transportation network played a strong role in that it provided good alternative roadways needed to handle diverted traffic
- Long-term (i.e. arterial management on adjacent roadways) and short-term (i.e. widening adjacent freeways to add temporary traffic capacity) improvements to alternative roadways was important in minimizing impacts.

#### Regional Safety

- Seventeen roadways investigated had 15,111 crashes (8.9 percent reduction) in 2008 and 14,155 crashes (14.7 percent reduction) in 2009 when compared to the 4-year average pre-construction data of 16,595 crashes.
- Crashes and crash rates decreased for most freeways, expressway and major arterials with only I-70, Route 141, Route 100 and Route 115 showing increases during the 2-year closure period.
- The significant crash reduction along segments of I-64 of 50 percent to 70 percent (when compared to 4-year pre-closure crash data average (2004 to 2007)) that were not closed could be a good indicator on the regional awareness of the project and their willingness in using designated alternative roadways.
- In general, rear-end type (highest frequency of crashes) decreased noticeably from 7757 in 2007 to 6835 in 2008 and 6728 in 2009.
- Conclusion that no evidence was found to indicate that I-64 project and closure influence increased crashes on regional adjacent highways around the project.

#### Regional Economics

- Businesses expected the worst, but the conditions during the western and eastern closures were not as bad as they anticipated, all three business surveys reported high-levels of satisfaction (all above 86 percent) with delivery of the I-64 project;
- Design-Build delivery and an aggressive project schedule were successful in minimizing the duration of impacts to the region;
- During reconstruction 98,000 to 120,000 vehicles were diverted daily and transportation user costs increased by \$101.5 million during entire project compared to a fully operating system;

- Alternatively, if I-64 did not initiate the western and eastern closures for reconstruction, the project schedule would have lasted six to eight years, and increased user costs by \$45.6 to \$86.8 million compared to the full-closures; The project demonstrated a significant construction cost savings – between \$ 93 and \$187 million – from accelerating the reconstruction project schedule to two years versus a six or eight year staged construction schedule; and
- While the economic recession made the assessment difficult to determine the precise impact of the I-64 reconstruction, the analysis found the conditions in the impacted area were not statistically different from economic conditions across Missouri and the nation.

(Left Blank)

## TABLE OF CONTENTS

List of Figures .....	viii
List of Tables .....	ix
Introduction.....	1
Objectives .....	1
Present Conditions .....	1
Results and Discussion (Evaluation) .....	2
Conclusions.....	51
Principal Investigator and Project Members.....	53
Bibliography .....	53
Appendix A - The New I-64 Economic and Regional Mobility Study 2008 Annual Report	
Appendix B - The New I-64 Economic and Regional Mobility Study 2009 Annual Report	

## List of Figures

Figure I-1 – Full-closure General Location.....	Page 1
Figure C-1 – Mailed Surveys Results.....	Page 3
Figure C-2 – Part I Change in Overall Behavior Results.....	Page 8
Figure C-3 – Part II Change in Overall Behavior Results.....	Page 9
Figure C-4 – Change in Work Habits Results.....	Page 10
Figure C-5 – Part I – Satisfaction Results.....	Page 16
Figure C-6 – Part II – Satisfaction Results.....	Page 17
Figure C-7 – Best Method of Project Information.....	Page 18
Figure C-8 – Commuting Behavior Before and After Project Results.....	Page 22
Figure C-9 – Travel Time Change Results.....	Page 23
Figure C-10 – Frequency of Travel on I-64 Results.....	Page 24
Figure C-11 – Gender Results.....	Page 25
Figure C-12 – Ethnic Group Results.....	Page 26
Figure C-13 – Age Group Results.....	Page 27
Figure M-1 – I-64 Full-closure Location.....	Page 28
Figure M-2 – Park-and-Ride Summary.....	Page 35
Figure M-3 – Carpool Summary.....	Page 36
Figure M-4 – Vanpool Summary.....	Page 36
Figure M-5 – Transit Ridership Change.....	Page 37
Figure S-1 – General Crash Analysis Area.....	Page 38
Figure S-2 – All Crashes for Interstate Roadways.....	Page 38
Figure S-3 – All Crashes for Expressway Roadways.....	Page 39
Figure S-4 – All Crashes for Major Arterial Roadways.....	Page 39
Figure E-1 – Employment Growth Index by Region.....	Page 43
Figure E-2 – Location Quotients.....	Page 44
Figure E-3 – Unemployment Rates for St. Louis City, County, Missouri and Nation.....	Page 45
Figure E-4 – Taxable Sales Index by Region.....	Page 46



## List of Tables

Table C-1 – Change Where I Shop Results .....	Page 4
Table C-2 – Change Where I Buy Gas Results .....	Page 4
Table C-3 – Change Where I Bank Results.....	Page 5
Table C-4 – Change Where I Eat Out Results.....	Page 5
Table C-5 – Change How Often I Travel to Certain Areas Results.....	Page 6
Table C-6 – Change Where I Work Results.....	Page 6
Table C-7 - Change Where I Live Results.....	Page 7
Table C-8 – How Well Kept Informed About Project Results.....	Page 11
Table C-9 – Timeliness of Project Information Results.....	Page 12
Table C-10 – How Alternative Travel Options Communicated Results.....	Page 12
Table C-11 – Traffic Flow within Work Zone Results.....	Page 13
Table C-12 – How Understandable and Accurate of Work Zone Signs Results.....	Page 13
Table C-13 – How Well Movement Around the Region Results.....	Page 14
Table C-14 – Closure Decision – 2 Years Compared to 6 to 8 Years Results.....	Page 14
Table C-15 – Overall Satisfaction Closure Handling Results.....	Page 15
Table C-16 – Driving Alone Results.....	Page 19
Table C-17 – Driving with Multiple People Results.....	Page 19
Table C-18 – Riding the Bus Results.....	Page 20
Table C-19 – Riding MetroLink Results.....	Page 20
Table C-20 – Biking Results.....	Page 21
Table C-21 – Walking Results.....	Page 21
Table C-22 – Telecommuting Results.....	Page 21
Table M-1 – Traffic Volume Comparison.....	Page 30
Table M-2 – Travel Time Interstate Comparison 2008 Versus Pre-construction.....	Page 33
Table M-3 – Travel Time Interstate Comparison 2009 Versus Pre-construction.....	Page 34
Table S-1 – Crash Rates.....	Page 41
Table S-2 – Relative Crash Rates to Base Year 2004.....	Page 41
Table E-1 – Annual Transportation Costs in Thousands of Dollars.....	Page 49
Table E-2 – Transportation Impacts – All Scenarios (in Millions) in Present Value.....	Page 50

## Introduction

The Interstate 64 full-closure construction project evaluation uses a variety of tools to measure potential regional impacts during the construction and closure period. Figure I-1 to the right shows both closures that occurred in 2008 and 2009 and their general location.

This final report summarizes the extensive 2008<sup>1</sup> and 2009<sup>2</sup> Annual Reports. This report follows the evaluation format used in these annual reports in evaluating the four key areas of Communications (MoDOT's provision of information to the public, and the public's response to the project); Regional Mobility (the effects of the closure/project on travel behavior, choices, and flow), Regional Safety (the effects of the closure/project on the region's roadway safety); and Regional Economics (the effects of the closure/project on businesses within the corridor as well as the economic conditions of the region). This report is the culmination of the two previously published annual reports.

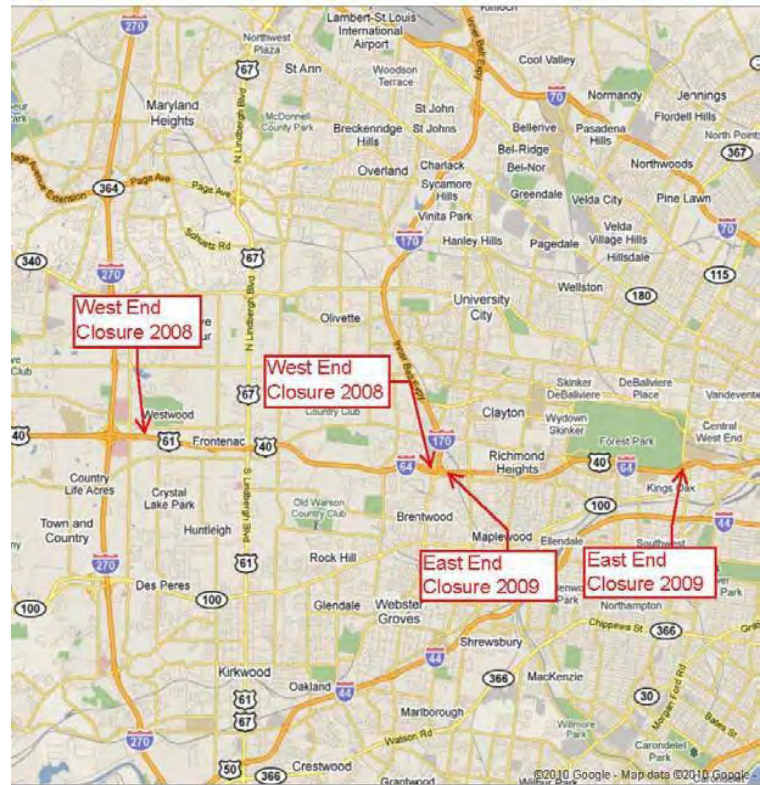


Figure I-1 – Full-closure General Location

## Objectives

Potential highways impacts were evaluated on the following key areas to the question on how the I-64 full closure construction project influenced regional activities:

- Communications
- Regional Mobility
- Roadway Safety
- Regional Economics

## Present Conditions

Full-closure is a roadway construction strategy that has been considered when regional conditions exist where alternative roadways are available and have additional traffic capacity. This strategy permits construction to be accelerated and normally at a reduce construction cost. The major concerns in implementing this strategy are the public concerns and potential impacts to the region's mobility, safety and economic.

## **Results and Discussion (Evaluation)**

### Communications

In order to ensure that accurate and useful information was measured from the population of interest, multiple survey methods were employed. Three mailed surveys, the gold standard for quantitative research, were mailed to 30,000 residents (10,000 per survey) in the St. Louis area that were potentially affected by the project.

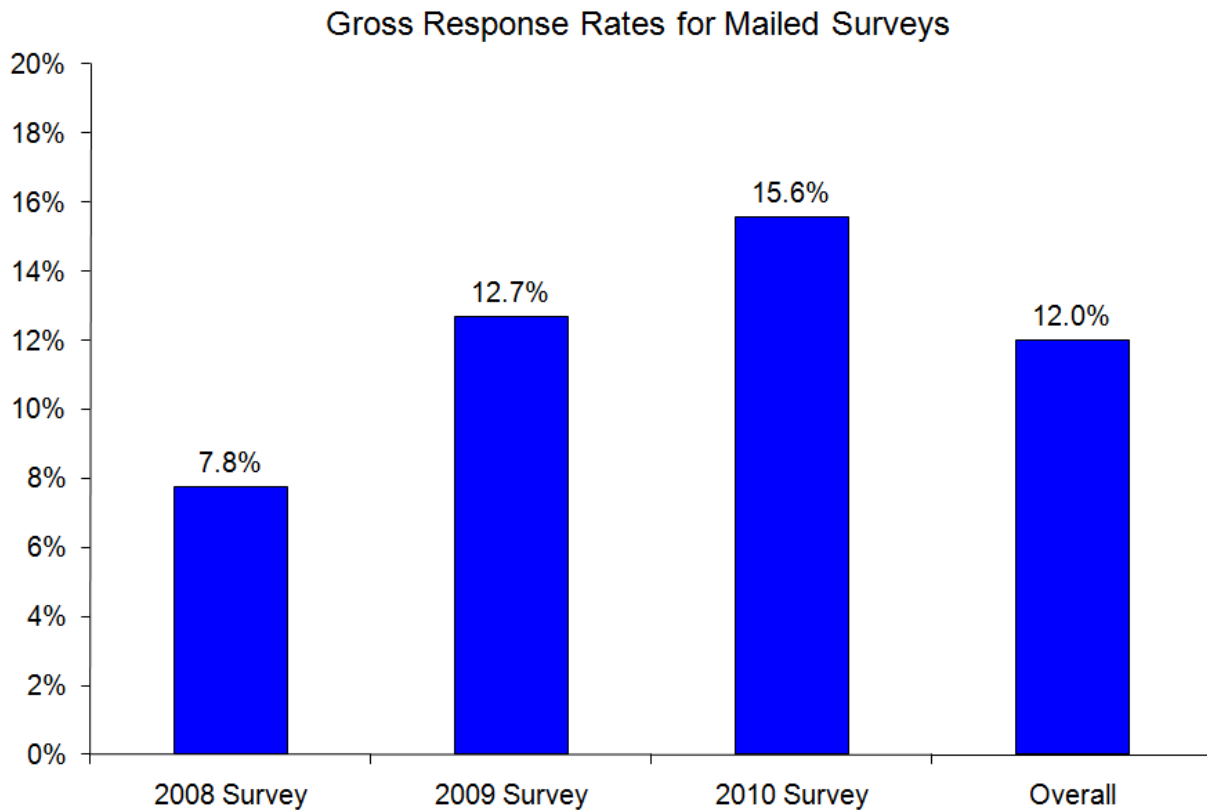
The first mailing was conducted in January 2008 and pertained to the western closure (the section of I-64 from Ballas Road to I-170). The second mailing was conducted in January 2009 and pertained to the eastern closure (the section of I-64 between I-170 and Kingshighway Boulevard). The third and final mailing was conducted in January 2010 and pertained to the completed project after it was reopened on December 7, 2009.

The survey questions were developed in conjunction with MoDOT and were designed to meet several goals. First, each mailing was intended to capture the impact of each part of the project (that is, the western closure, the eastern closure, and the overall project). Second, other than adjusting descriptions of what was recently closed and/or reopened, the questions for each mailing were generally identical to allow comparisons across surveys. A few questions differed as feedback from previous surveys suggested questions for future surveys. Third, the mailed surveys were intended to ensure that the general input of all local residents, over all demographics, were captured.

For the first mailing, 10,000 residents were randomly surveyed from multiple local zip codes of interest. 776 responses were received. For the second mailing, these 776 respondents were included as well as 9,224 randomly selected individuals in the zip codes of interest. The initial respondents were included in the second mailing for two reasons. First, this gave us the opportunity to look for changes in opinion over time for specific individuals, not just general opinion. Second, it was thought that sending surveys to those who had previously returned a survey would be more likely to generate a response. This turned out to be the case and we received 1,269 responses from the second survey. We followed the same methodology for the third and final mailing. In January 2010, we mailed new surveys to the 1,269 people who had responded to the second mailing as well as 8,731 randomly selected individuals in the zip codes of interest. By the end of March 2010, we had received 1,559 responses from the final mailed survey.

(Left Blank)

Figure C-1 - Mailed Surveys Results



In addition to these instruments, other measures were used to obtain information as needed and/or on a more frequent basis. Online surveys were utilized to provide constant measures of public perception. Three sets of in-person interviews were employed near the beginning of this research. The results of these interviews supported the findings of the online surveys, an initial concern since the online respondents tended to be more educated and wealthier than the general population.

Finally, two key questions were added to existing surveys being conducted by the Motorist Assist/Traffic Response programs. This was done to ensure these important questions were asked of the lower income segments – people who are less likely to respond to traditional survey methods and who are widely represented in those helped by the Motorist Assist program.

Most of the information provided in this summary was taken from the mailed surveys as this information is the most reliable<sup>3</sup> and comes from the most diverse population. When the other survey instruments provided different or additional conclusions, that information is also cited. Readers interested in the exact details from every survey instrument are invited to review previous publications with special attention to the previous two annual reports.

One of the key research questions of this research was to measure overall changes in resident behavior from before the construction work began with how residents behave after the project was completed. Therefore residents were asked if the closure had changed where they shop, buy gas, bank, ate out, how often they travel to certain areas, where they worked, and where they lived.

### **The closure has changed where I shop**

Approximately twenty-nine percent of the respondents developed new shopping habits during the closure that they are currently maintaining after the project has been completed.

Table C-1 - Change Where I Shop Results

	Frequency	Percent
Strongly Disagree	472	33.8%
Disagree	519	37.2%
Agree	246	17.6%
Strongly Agree	158	11.3%
Total	1,395	100.0%

### **The closure has changed where I buy gas**

Almost fifteen percent of the respondents found new places to purchase gas during the closure that they are currently continuing to frequent after the project has been completed.

Table C-2 - Change Where I Buy Gas Results

	Frequency	Percent
Strongly Disagree	591	42.8%
Disagree	587	42.5%
Agree	124	9.0%
Strongly Agree	78	5.7%
Total	1,380	100.0%

### **The closure has changed where I bank**

Less than four percent of the respondents developed new banking habits during the closure that they kept after the project has been completed.

Table C-3 – Change Where I Bank Results

	Frequency	Percent
Strongly Disagree	710	51.6%
Disagree	613	44.6%
Agree	26	1.9%
Strongly Agree	26	1.9%
Total	1,375	100.0%

### **The closure has changed where I eat out**

Approximately twenty-five percent of the respondents tried new restaurants during the closure that they are continuing to frequent after the project has been completed.

Table C-4 – Change Where I Eat Out Results

	Frequency	Percent
Strongly Disagree	498	35.9%
Disagree	547	39.4%
Agree	256	18.4%
Strongly Agree	88	6.3%
Total	1,389	100.0%

### **The closure has changed how often I travel to certain areas**

Almost sixty percent (58.4%) of the respondents have changed their behavior due to the project. This is the most general of the overall change questions and should show the highest impact as it incorporates all of the specific changes that were asked of the respondents as well as any other changes that the survey did not otherwise capture.

Table C-5 – Change How Often I Travel to Certain Areas Results

	Frequency	Percent
Strongly Disagree	298	20.7%
Disagree	303	21.0%
Agree	540	37.4%
Strongly Agree	302	20.9%
Total	1,443	100.0%

**The closure has changed where I work**

Slightly over four percent of the respondents found new places to work during the closure that they kept after the project has been completed. More details about this subject are documented under Change in Work Habits on page 10.

Table C-6 – Change Where I Work Results

	Frequency	Percent
Strongly Disagree	786	60.2%
Disagree	464	35.5%
Agree	32	2.5%
Strongly Agree	24	1.8%
Total	1,306	100.0%

**The closure has changed where I live**

Almost four percent of the respondents found new residences during the closure that they are currently kept after the project has been completed.

Table C-7 – Change Where I Live Results

	Frequency	Percent
Strongly Disagree	848	61.7%
Disagree	475	34.6%
Agree	30	2.2%
Strongly Agree	21	1.5%
Total	1,374	100.0%

**Project Review: Change in Overall Behavior**

Six of the preceding questions were asked in all three mailed surveys with the key difference being the survey focus. While the final survey looked for changes from the before the initial construction until after the project completion, the other two surveys looked for changes during the Western and Eastern Closures.

The charts on the next two pages show the mostly temporary impact of the two closures as well as the current overall impact of the project. Blue is used for agree and green is used for strongly agree. The *Where I Eat* change question was not asked on the first survey.

(Left Blank)



Figure C-2 Part I – Change in Overall Behavior Results

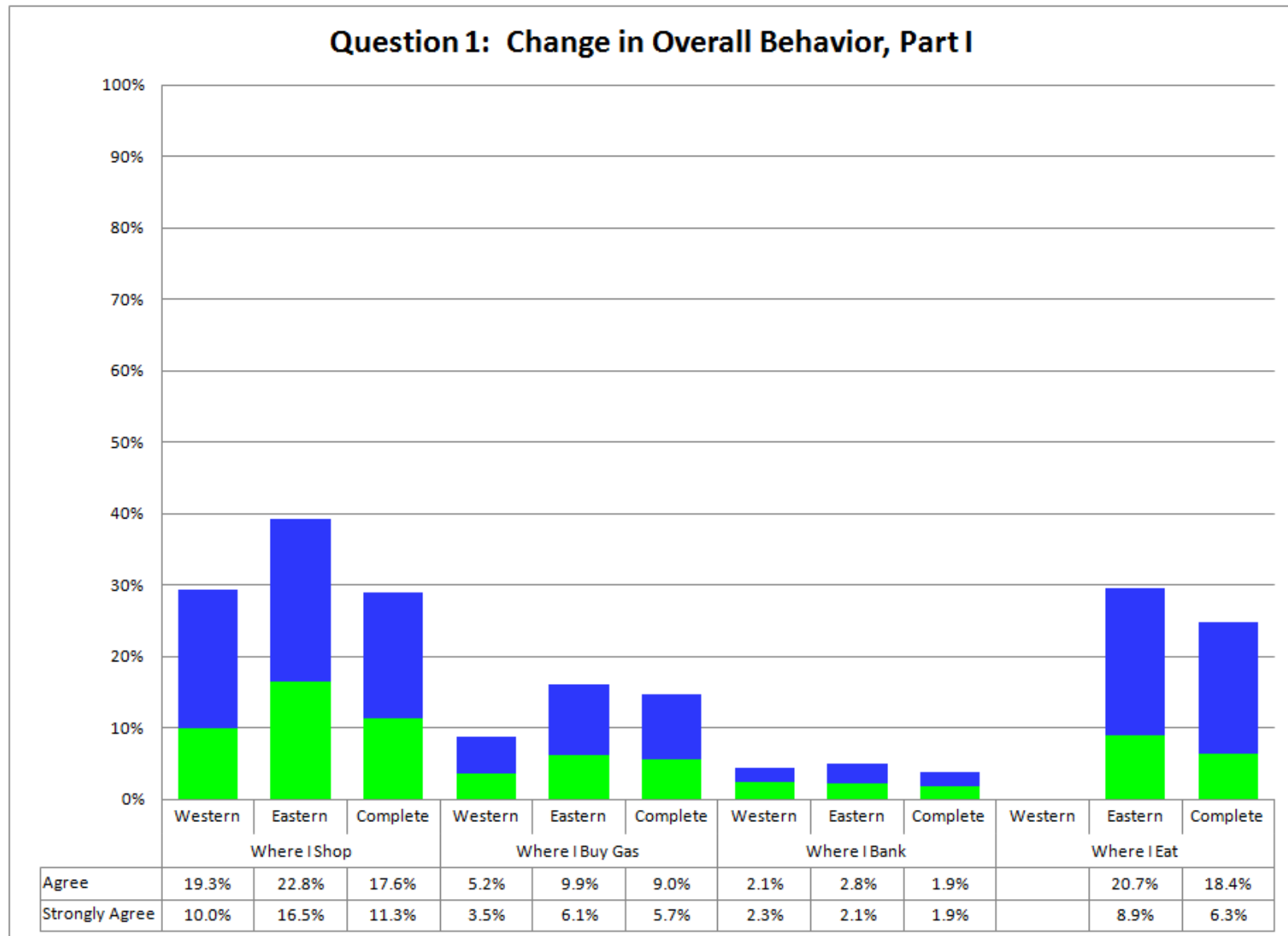
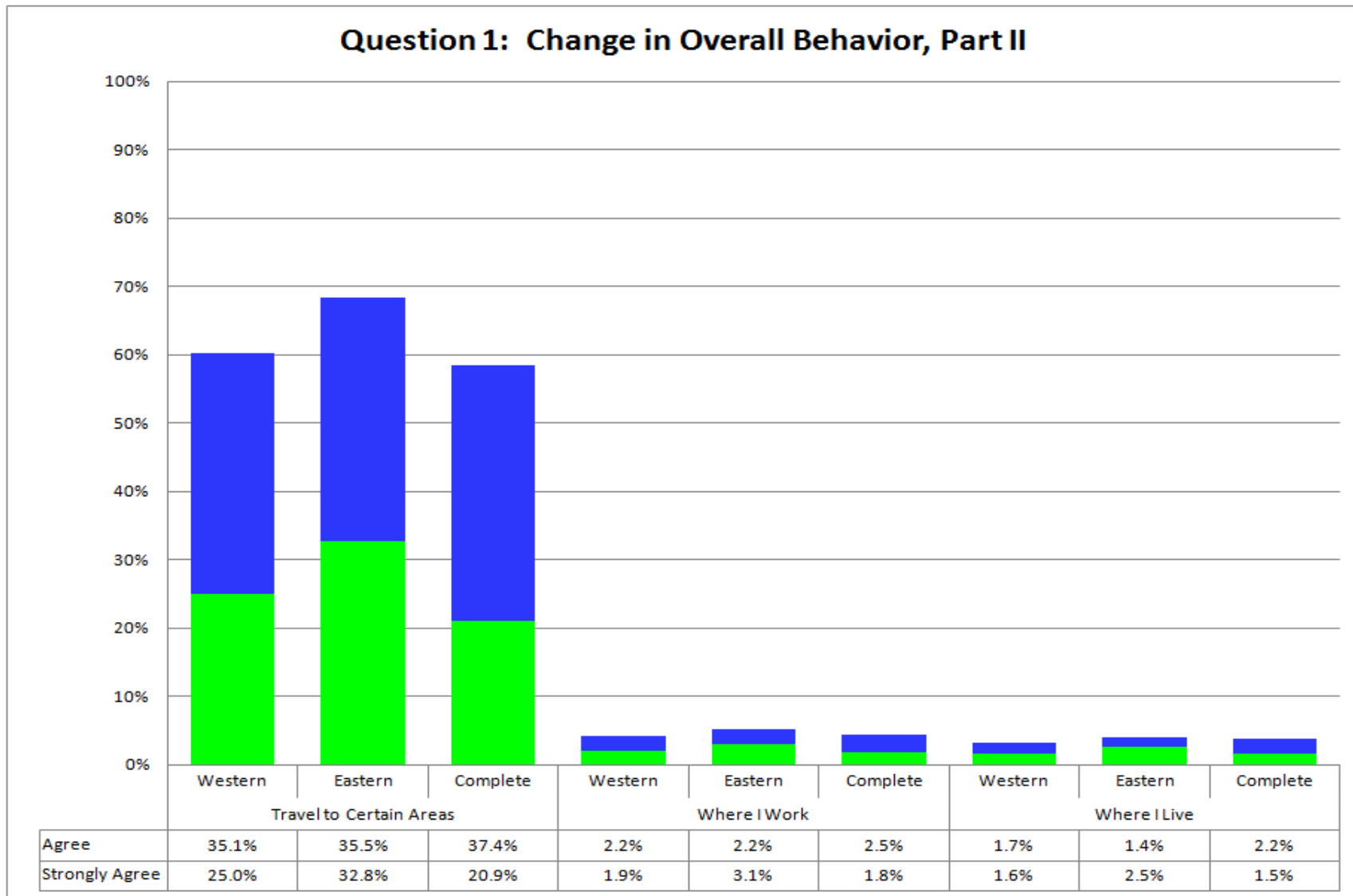


Figure C-3 Part II – Change in Overall Behavior Results

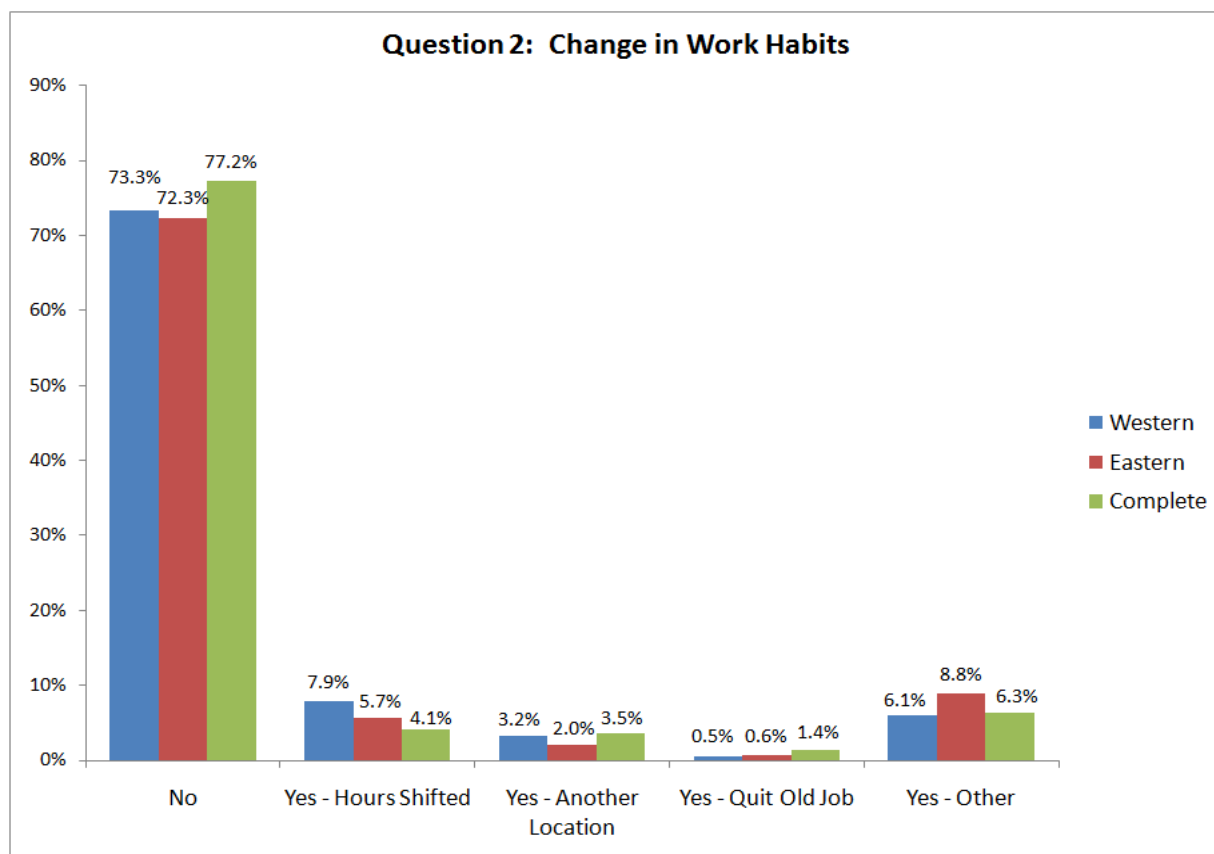


## Question 2: Change in Work Habits

In question 1, 4.3% of the respondents stated that they had changed where they worked because of the project. More details about this change were provided by the respondents with question 2. Almost all (92.6%) of the respondents answered this question. Most of those who skipped this question probably were retired or otherwise unemployed.

**Over three quarters of the respondents stated that the closure did not have a long-term impact on their work habits.** In other words, after the project was completed, 77.2% of the respondents still worked the same hours in the same location as they did before the closure. 4.1% of the respondents shifted their work hours. Another 3.5% now work from another location (home, another office, etc.) more often. 1.4% quit their job and now work somewhere else. 6.3% indicated that the closure had an impact on their work habits that was not otherwise captured by the survey. The figure below includes the information for this question from all three surveys.

Figure C-4 – Change in Work Habits Results



### **Question 3: Satisfaction**

People are satisfied when their expectations are met or exceeded. Respondents were asked to indicate their level of satisfaction (or dissatisfaction) with eight different measures. In accordance with standard methodology for MoDOT satisfaction measures, only answers that expressed an opinion were counted in the following calculations (in other words, those who skipped the question or indicated that they had no opinion had no impact on the satisfaction measure).

#### **How well the public has was kept informed about the New I-64 project**

Looking back over the entire New I-64 project, virtually all (97.7%) of the respondents were satisfied with how they were kept informed.

Table C-8 - How Well Kept Informed About Project Results

	Frequency	Percent
Very Dissatisfied	14	0.9%
Dissatisfied	20	1.3%
Satisfied	643	42.8%
Very Satisfied	824	54.9%
Total	1,501	100.0%

By all measures, results were slightly lower while the project was ongoing. In 2008 and 2009, 86% and 89% of online respondents expressed satisfaction with how well the public was kept informed about the New I-64 project. In the first two mailed surveys, the satisfaction on this measure was a bit higher than the equivalent online survey (95% for the first two mailings).

#### **The timeliness of the New I-64 Project information that was made available**

Similar to the previous response, 97.6% of the respondents were satisfied with the timeliness of the New I-64 information that was made available throughout the project.

(Left Blank)

Table C-9 – Timeliness of Project Information Results

	Frequency	Percent
Very Dissatisfied	12	0.8%
Dissatisfied	24	1.6%
Satisfied	678	46.1%
Very Satisfied	757	51.5%
Total	1,471	100.0%

Likewise, results were slightly lower while the project was ongoing. In 2008 and 2009, 86% and 87% of online respondents expressed satisfaction with the timeliness of the New I-64 project information that was made available. In the first two mailed surveys, the satisfaction on this measure was a bit higher than the equivalent online survey (94% for the first mailing and 93% for the second mailing).

#### **How alternative travel options were communicated**

Approximately ninety percent of the respondents were satisfied with how alternative travel options were communicated. While the mailed survey did not have room to probe for explanations for dissatisfaction, the primary reason for dissatisfaction is probably similar to that discovered in the online survey. Based on the online survey comments, it is likely that most of the 9.7% of respondents who expressed dissatisfaction with this measure were actually dissatisfied with the alternatives themselves, and not how these alternatives were communicated.

Table C-10 - How Alternative Travel Options Communicated Results

	Frequency	Percent
Very Dissatisfied	27	1.9%
Dissatisfied	111	7.8%
Satisfied	810	57.2%
Very Satisfied	468	33.1%
Total	1,416	100.0%

### **The traffic flow within construction work zones**

About three out of four (77.4%) respondents were satisfied with the traffic flow within the New I-64 Project construction work zones.

Table C-11 – Traffic Flow within Work Zones Results

	Frequency	Percent
Very Dissatisfied	71	5.2%
Dissatisfied	236	17.4%
Satisfied	791	58.2%
Very Satisfied	260	19.1%
Total	1,358	100.0%

### **How understandable and accurate were the construction work zone signs**

Just over ninety percent of the respondents thought the construction work zone signs were understandable and accurate.

Table C-12 - How Understandable and Accurate of Work Zone Signs Results

	Frequency	Percent
Very Dissatisfied	21	1.5%
Dissatisfied	111	8.1%
Satisfied	902	65.6%
Very Satisfied	341	24.8%
Total	1,375	100.0%

### **How well you managed to move around the St. Louis area with the New I-64 Project closure**

Similar to the response about the traffic flow within the New I-64 Project construction, 76.7% of the respondents were satisfied with how well they could move around the St. Louis area during the closure.

Table C-13 - How Well Movement Around the Region Results

	Frequency	Percent
Very Dissatisfied	88	6.0%
Dissatisfied	256	17.3%
Satisfied	845	57.2%
Very Satisfied	287	19.4%
Total	1,476	100.0%

Interestingly, the results from the Motorist Assist surveys – passed out to those helped by MoDOT roadside assistance program – were even more positive. Whereas 76.7% of the general public opinions were satisfied with how well they could move around the St. Louis area during the closure, 90% of those helped by Motorist Assist were satisfied.

**The decision to complete the work by closing I-64 for 2 years instead of taking 6-8 years with lane closures**

About nineteen out of twenty (95.1%) respondents were satisfied with the decision to close I-64 for two years opposed to take six to eight years to complete the project with lane closures.

Table C-14 - Closure Decision - 2 Years Compared to 6 to 8 Years Results

	Frequency	Percent
Very Dissatisfied	29	2.0%
Dissatisfied	44	3.0%
Satisfied	493	33.4%
Very Satisfied	909	61.6%
Total	1,475	100.0%

In 2008 and 2009, 76% and 83% of online respondents expressed satisfaction with the decision to complete the work by closing I-64 for 2 years instead of 6-8 years with lane closures. In the first two mailed surveys, the satisfaction on this measure was a higher than the equivalent online survey (85% for the first two mailing and 90% for the second mailing). The results from the Motorist Assists surveys were similar to that of mailed surveys with 94% expressing satisfaction with this decision in 2008 and 96% expressing satisfaction in 2009. **For all survey methods, satisfaction with the decision increased with the passage of time.**

### **Your overall level of satisfaction with how the New I-64 Project closure was handled**

Similar to the satisfaction about the decision to complete the project in two years by closing parts of the interstate, 94.6% of respondents were satisfied with how the I-64 Project close was handled.

Table C-15 – Overall Satisfaction Closure Handling Results

	Frequency	Percent
Very Dissatisfied	28	1.9%
Dissatisfied	53	3.5%
Satisfied	739	49.4%
Very Satisfied	676	45.2%
Total	1,496	100.0%

The online survey had similar, but slightly lower results. In 2008 and 2009, 78% and 79% of online respondents expressed overall satisfaction with how the I-64 closure had been handled. In the first two mailed surveys, the overall satisfaction was ten percent higher than the equivalent online survey (88% for the first mailing and 89% for the second mailing).

#### ***Project Review: Satisfaction***

Similar satisfaction questions were asked in all three mailed surveys with the key difference being the survey focus. While the final survey looked for changes from the before the initial construction until after the project completion, the other two surveys looked for changes during the Western and Eastern Closures.

The charts on the next two pages show the mostly temporary impact of the two closures as well as the current overall impact of the project. Blue is used for agree and green is used for strongly agree.

(Left Blank)



Figure C-5 – Part I Satisfaction Results

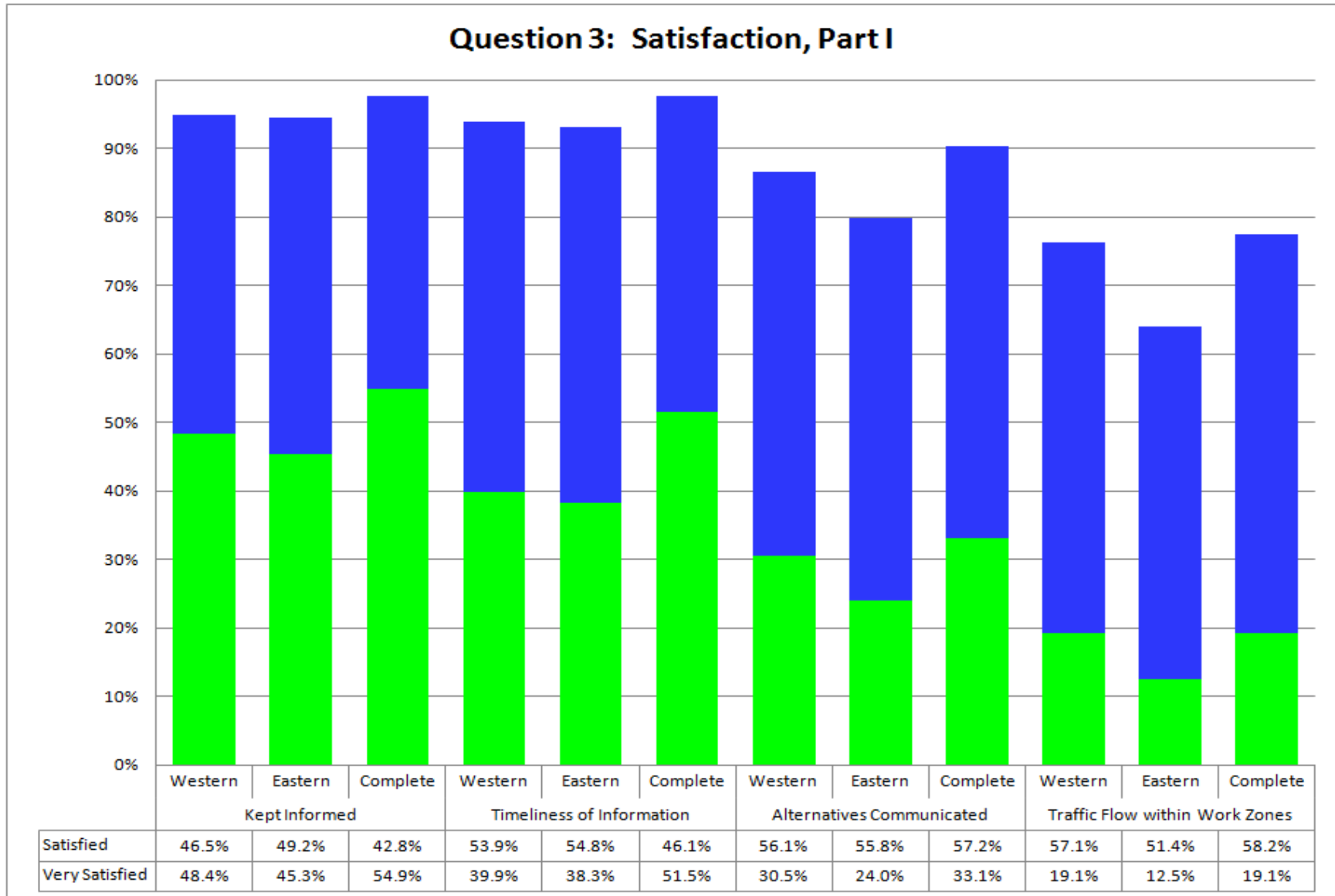
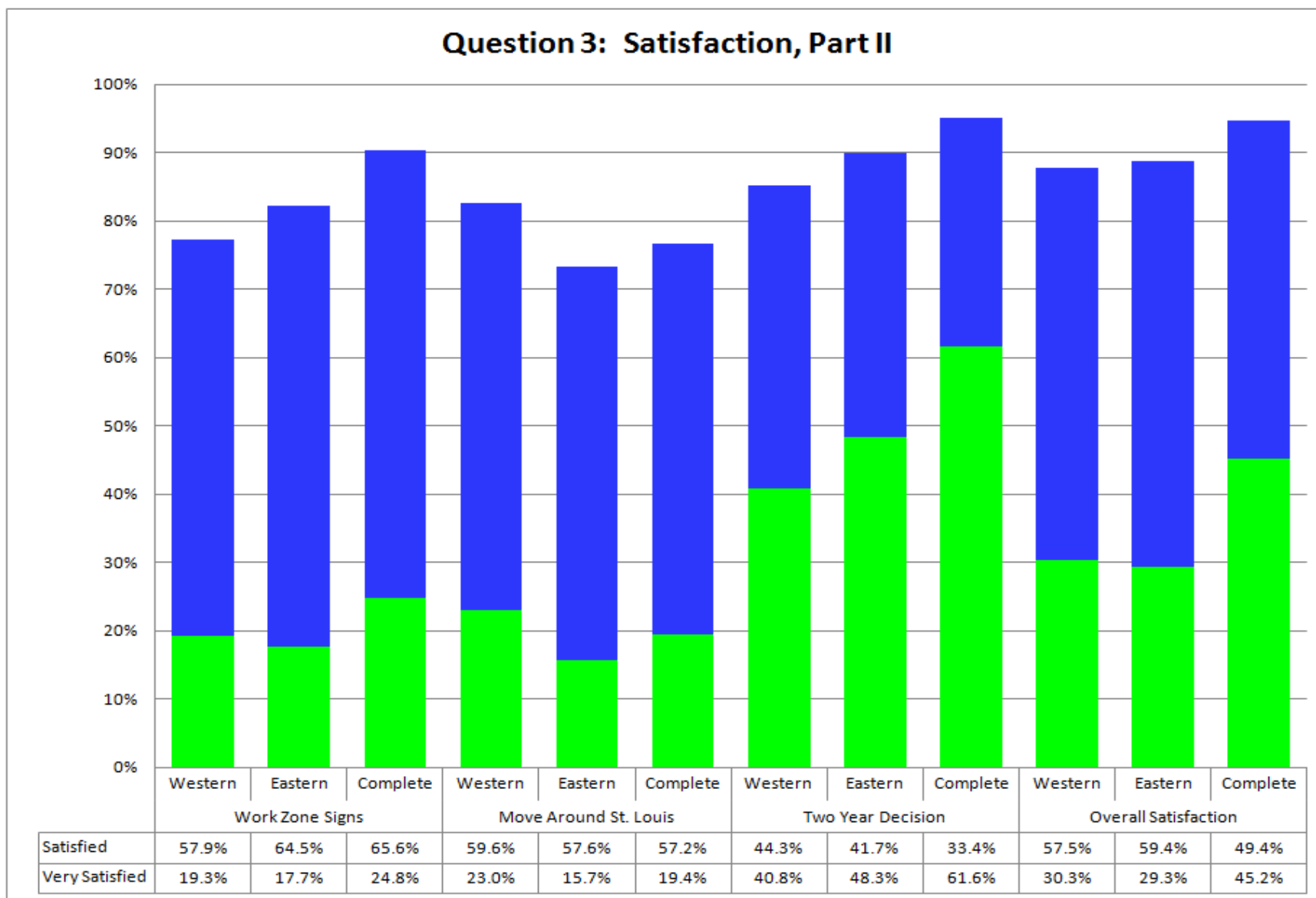


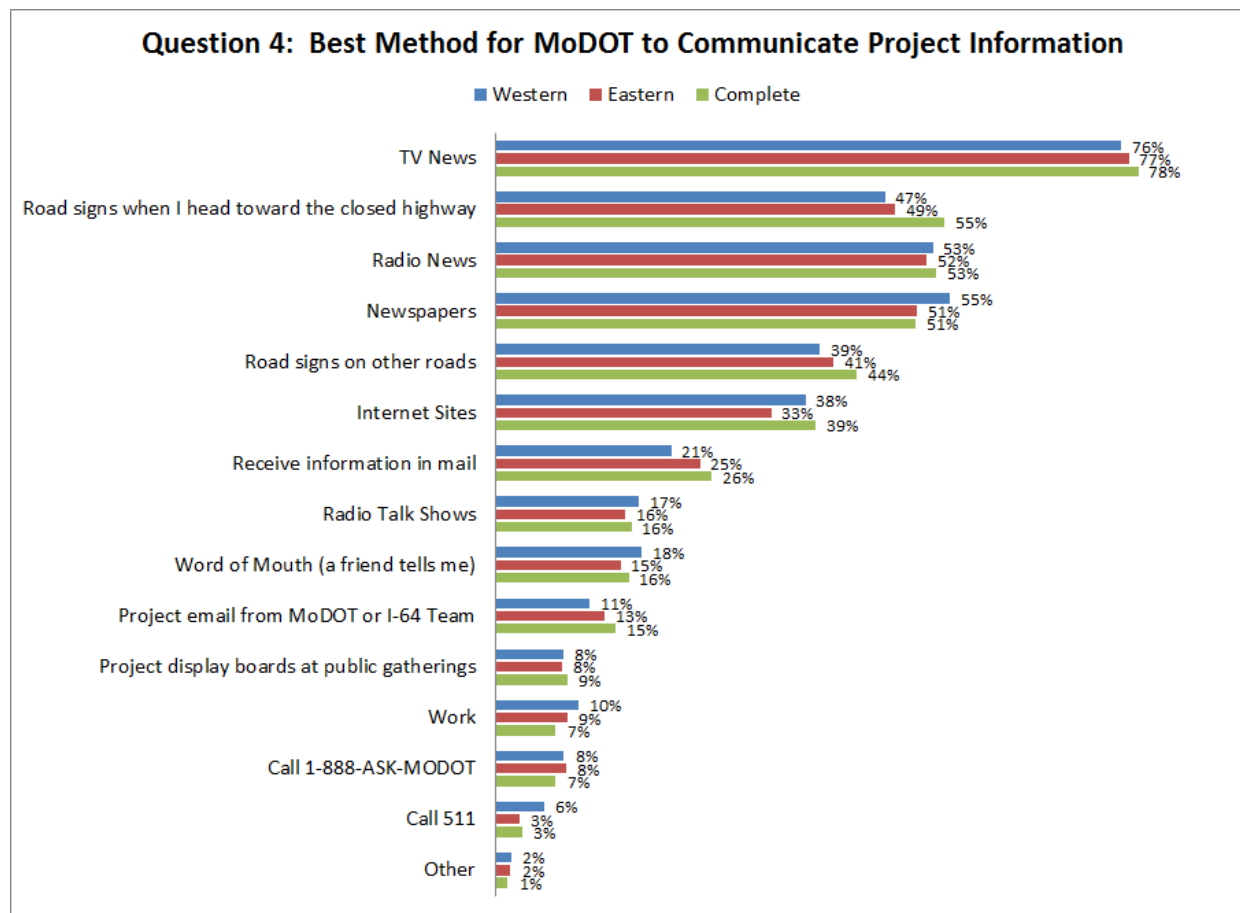
Figure C-6 – Part II Satisfaction Results



#### Question 4: Methods for MoDOT to Communicate

Respondents were asked which ways would be most effective for MoDOT to communicate project information to them. By a large margin, television news was the best method according to 78.1% of respondents. A majority of respondents also suggested road signs near the closed highway (54.5%), radio news (53.5%) and newspapers (51.1%). Only 38.9% of the general public said the internet was an effective way for MoDOT to communicate with them. The following chart summarizes this question.

Figure C-7 –Best Method of Project Information Results



## Questions 5 and 6: Commuting Behavior

Respondents were asked about their driving behavior before and after the New I-64 project. They were specifically asked how often they commuted in various ways in a typical week. Previous surveys captured changes in driving behavior during the construction. The most recent survey was intended to capture any change in behavior that persisted after the project was complete. Overall, the project caused very little change in how people commuted. Where differences exist, they are usually quite small (on the order of 1% or less).

### Driving alone

There was almost no shift in commuting behavior among those who usually drive alone. There was a one percent shift from those who drive alone most days to rarely.

Table C-16 – Driving Alone Results

Before Closure			After Closure		
Never	137	9.4%	Never	138	9.4%
Rarely	229	15.6%	Rarely	245	16.6%
Most days	1,099	75.0%	Most days	1,090	74.0%
Total	1,465	100.0%	Total	1,473	100.0%

### Driving with multiple people

There was virtually no change in the number of people who drive with multiple people.

Table C-17 – Driving with Multiple People Results

Before Closure			After Closure		
Never	609	49.0%	Never	613	48.8%
Rarely	424	34.1%	Rarely	429	34.1%
Most days	211	17.0%	Most days	215	17.1%
Total	1,244	100.0%	Total	1,257	100.0%

### **Riding the bus**

While small, there was a noticeable decrease in the number of people who commuted via the bus. In previous surveys, there was an increase in bus ridership during the construction project (part of which also corresponded with very high fuel prices). Based on the previous findings, it appears that the experience of commuting by bus has decreased the number of commuters willing to consider this option if they have an alternative.

Table C-18 – Riding the Bus Results

Before Closure			After Closure		
Never	1,095	93.4%	Never	1,115	94.8%
Rarely	33	2.8%	Rarely	29	2.5%
Most days	44	3.8%	Most days	32	2.7%
Total	1,172	100.0%	Total	1,176	100.0%

### **Riding MetroLink (light rail)**

Similar to the feedback on bus commuting, there was a small decrease in the number of people commuting via MetroLink.

Table C-19 – Riding MetroLink Results

Before Closure			After Closure		
Never	1,004	85.4%	Never	1,018	86.1%
Rarely	119	10.1%	Rarely	113	9.6%
Most days	53	4.5%	Most days	52	4.4%
Total	1,176	100.0%	Total	1,183	100.0%

### **Biking**

As with the mass transit options, biking saw a small, but noticeable, decrease in the number of people commuting by bike after the project completion.

Table C-20 – Biking Results

Before Closure			After Closure		
Never	1,078	92.6%	Never	1,094	93.2%
Rarely	59	5.1%	Rarely	56	4.8%
Most days	27	2.3%	Most days	24	2.0%
Total	1,164	100.0%	Total	1,174	100.0%

### **Walking**

There was also a small, but noticeable, decrease in the number of people who walked to work after the project completion.

Table C-21 – Walking Results

Before Closure			After Closure		
Never	955	80.9%	Never	963	81.6%
Rarely	121	10.2%	Rarely	128	10.8%
Most days	105	8.9%	Most days	89	7.5%
Total	1,181	100.0%	Total	1,180	100.0%

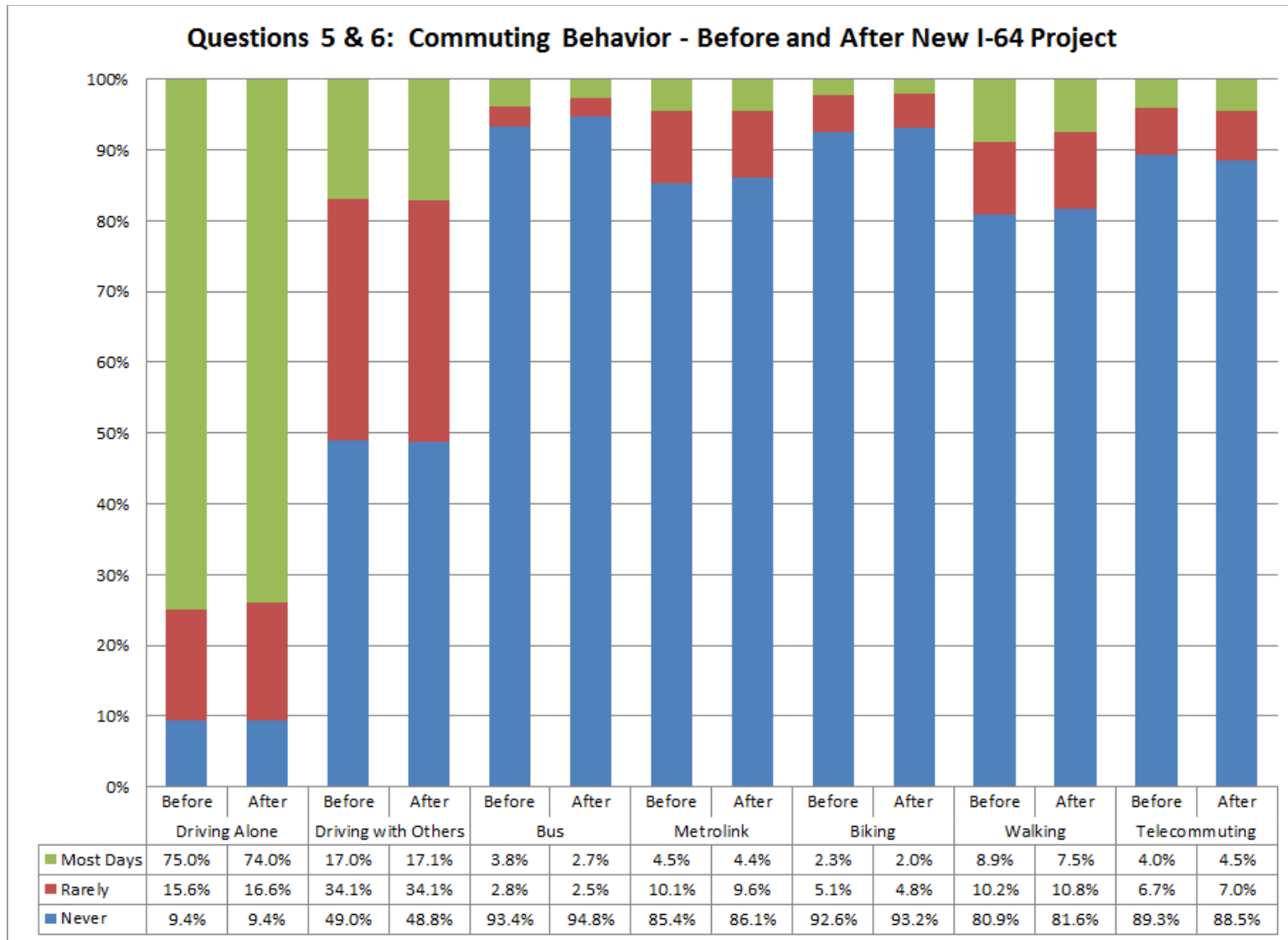
### **Telecommuting**

While there was a slight more away from mass transit among survey respondents, there was an increase (0.5%) among those who frequently telecommuted.

Table C-22 – Telecommuting Results

Before Closure			After Closure		
Never	1,044	89.3%	Never	1,036	88.5%
Rarely	78	6.7%	Rarely	82	7.0%
Most days	47	4.0%	Most days	53	4.5%
Total	1,169	100.0%	Total	1,171	100.0%

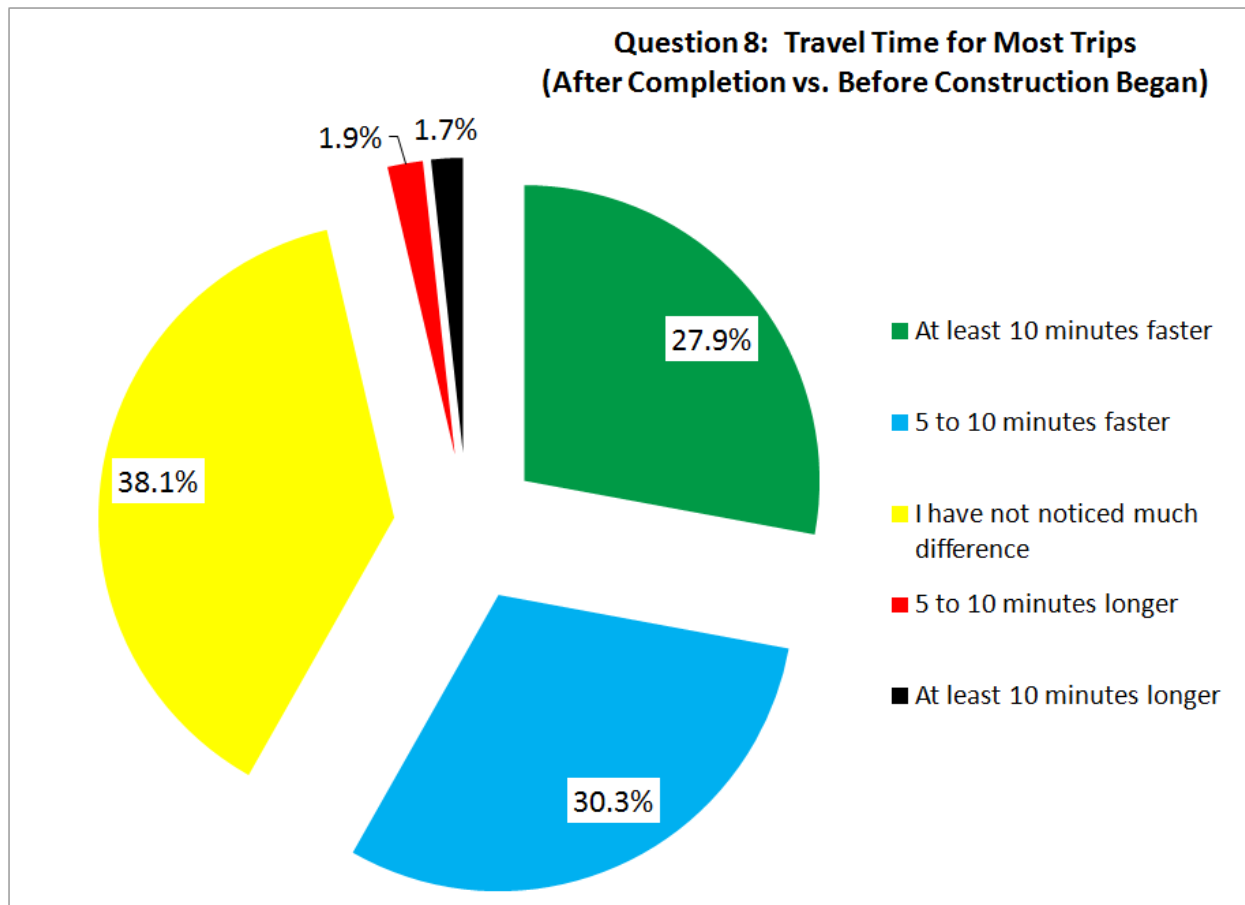
Figure C-8 – Commuting Behavior Before and After Project Results



### Question 8: Change in Travel Time

Residents were asked how long most trips in the area took after the project was completed compared to before construction began. 58.2% of respondents noticed a significant improvement (more than five minutes faster) in travel time. Another 38.1% did not notice a significant change. Only 3.7% of respondents stated that the change had resulted in a significant increase (more than five minutes slower) in travel time.

Figure C-9 - Travel Time Change Results



(Left Blank)



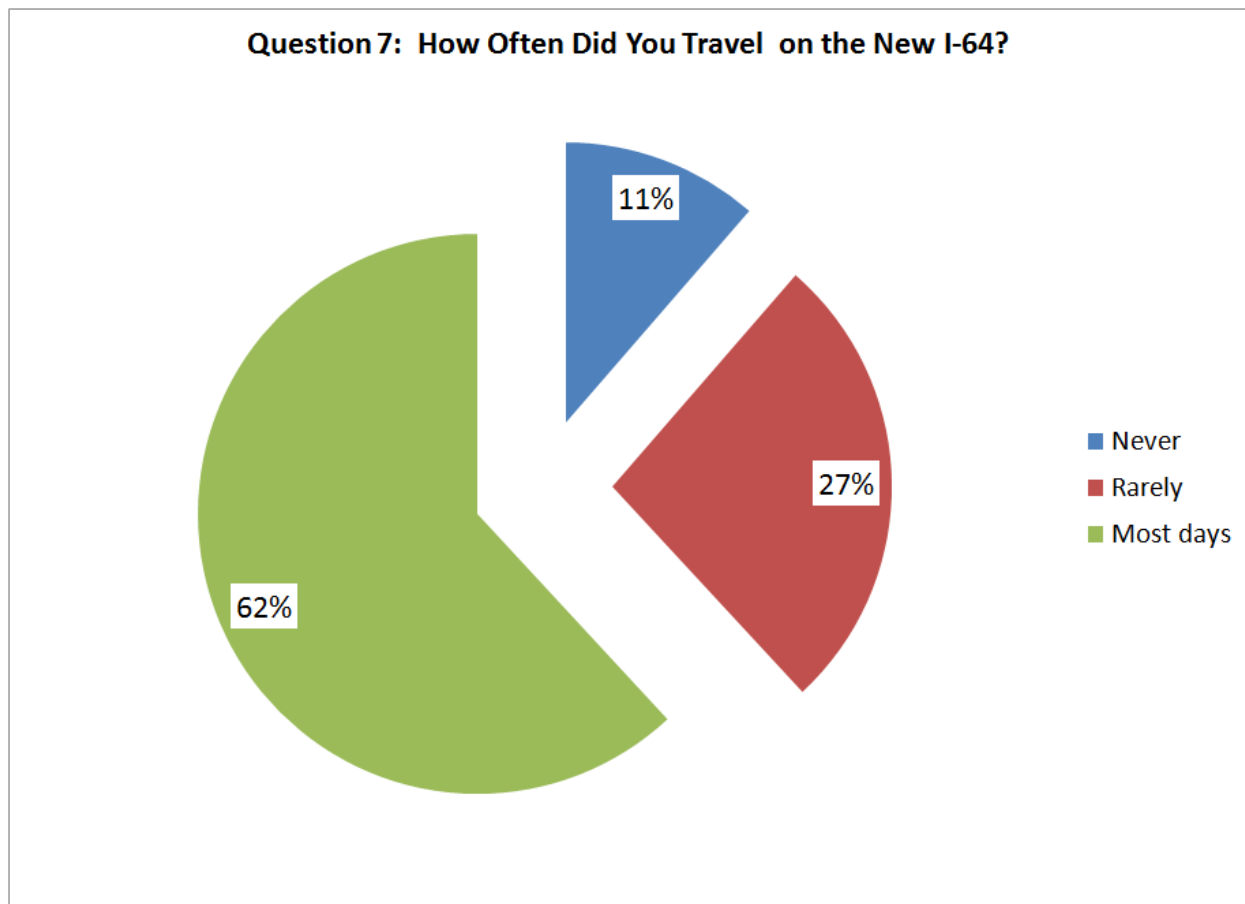
## Respondent Demographics (Questions 7, 9 through 11)

Five demographic questions were asked of all respondents. Two related to their driving habits (how often they traveled on the New I-64 and the zip code of their destination). The other three questions (gender, ethnic group, age group) were asked to ensure the study captured people from all groups of people in the area.

### Frequency of Travel on New I-64

Respondents were asked how often they traveled on the New I-64 during a typical week after the project was completed. 62% of the respondents frequently drove on this section of the interstate. 27% rarely drove on it and 11% stated they never drove on this section of I-64.

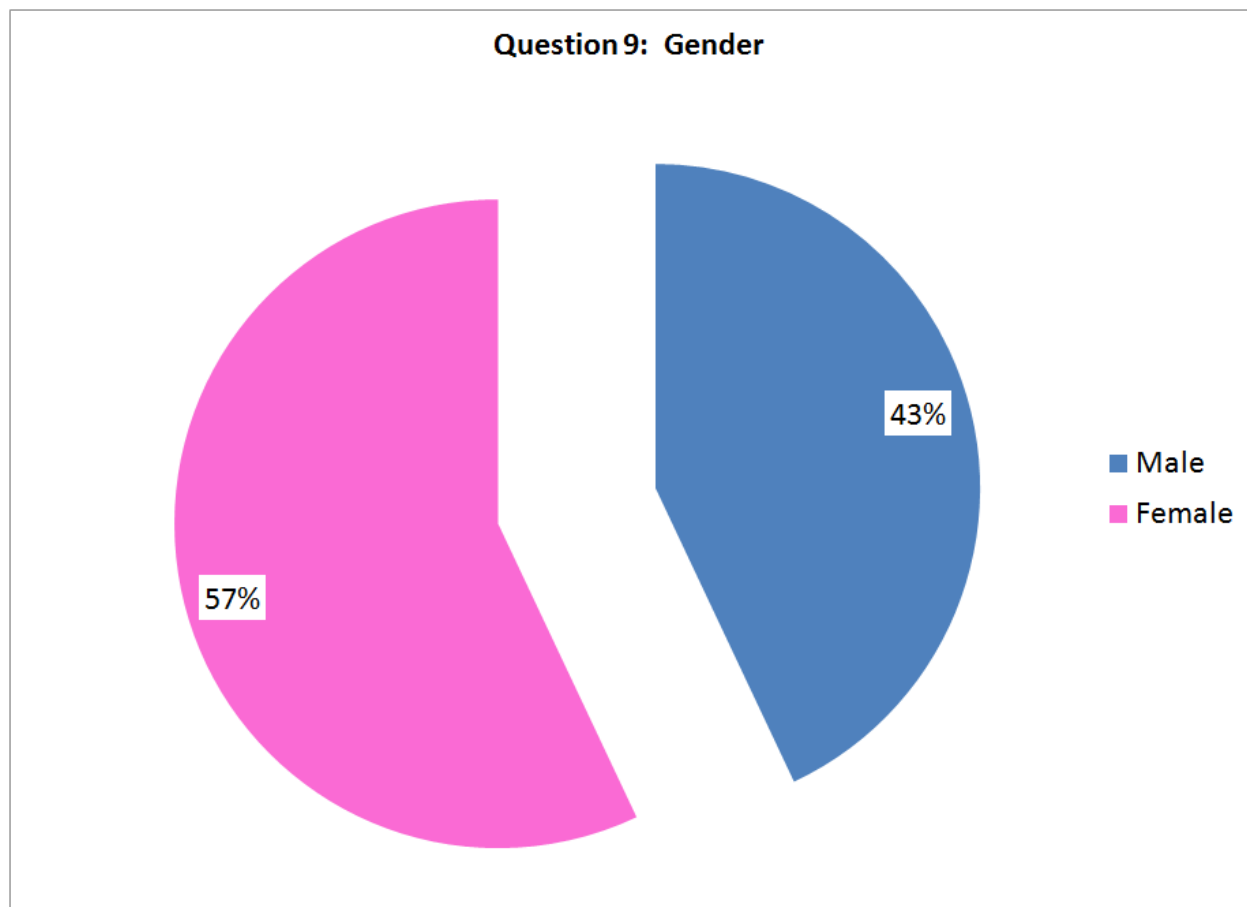
Figure C-10- Frequency of Travel on I-64 Results



## Gender

Both genders were well represented in the research, with a majority (57.0%) being female.

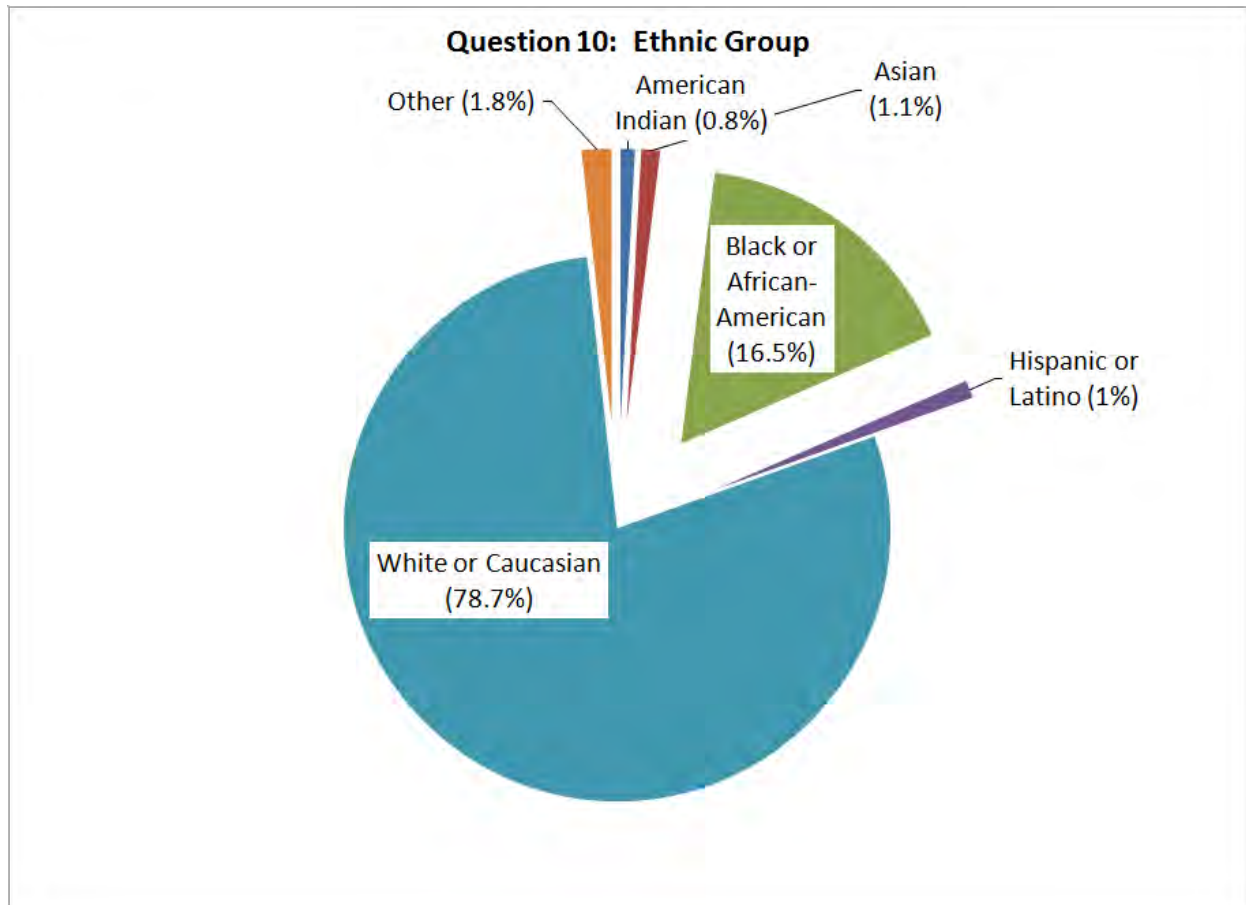
Figure C-11 - Gender Results



## Ethnicity

One of the goals of this study was to ensure ample minority participation. This was achieved, 21.3% of the responses came from an ethnic minority.

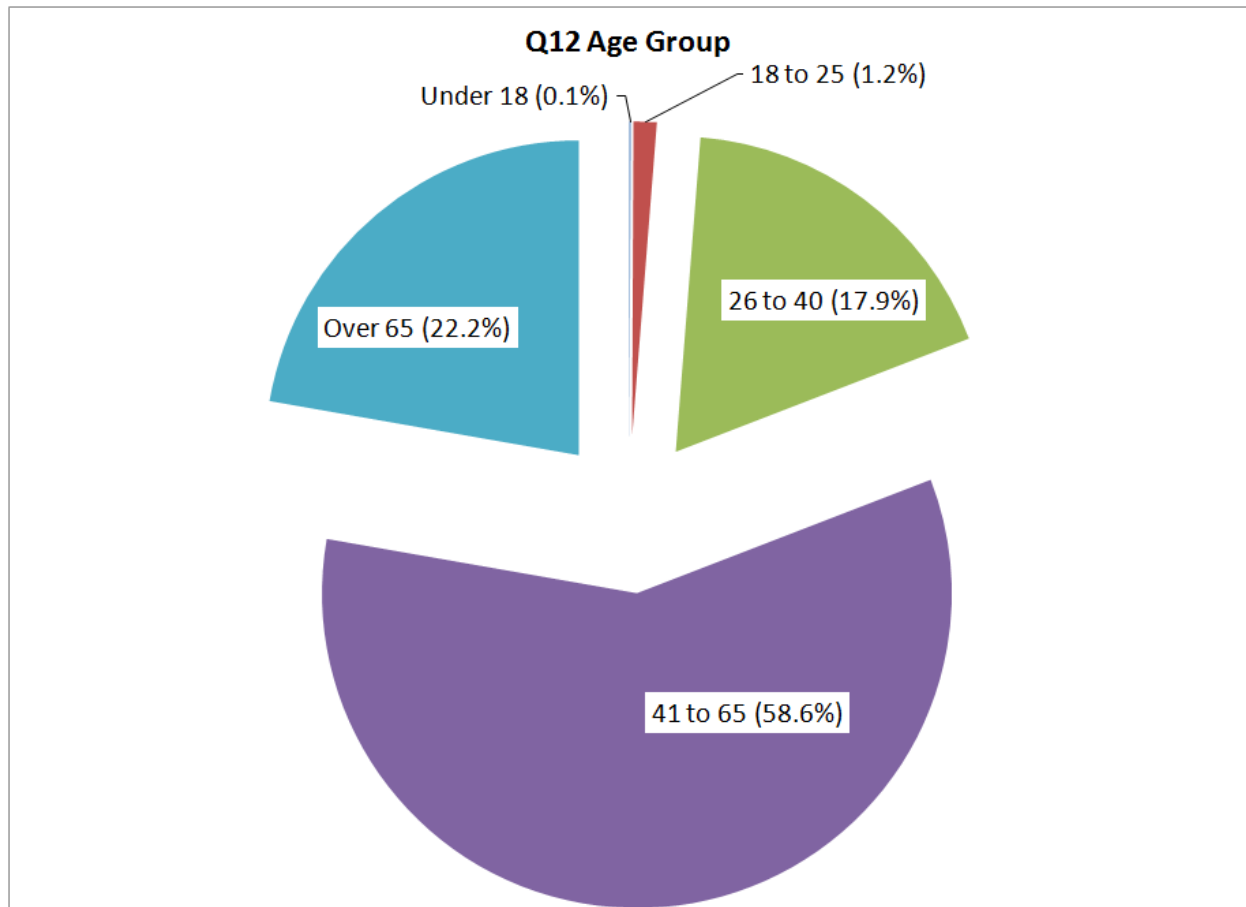
Figure C-12 Ethnic Group Results



## Age Group

Drivers of all ages were surveyed. The majority (58.6%) of respondents were between 41 and 65 years of age.

Figure C-13 Age Group Results



(Left Blank)

## Regional Mobility

The Interstate 64 full-closure construction project evaluation uses a variety of tools to measure the region's mobility before, during, and after the construction and closure period. The evaluation examined traveler shifts and their effects, using a multitude of data sources of varying resolution. The complexity and sheer size of the data set required examinations at several levels to gain the most relevant information. Figure M1 to the right shows both closures that occurred in 2008 and 2009 and their general location.

For each of these facilities, relevant mobility data (traffic volumes, travel speed and travel times) was gathered based on available information. It should be noted that data collection along the regions roadway network was significantly less during the eastern closure than during the western closure.

Experience gained by motorists during the western closure led to minimizing travel impacts and reduced the required monitoring of these corridors in 2009.

Mobility data was collected and processed through numerous sources including MoDOT, Traffic.com, St. Louis County, RideFinders, and the research team. Data included traffic volumes, average travel speeds and travel times.

### Pre-closure Capacity Improvements

#### Key Improvements to Regional Highways/Roadways

**I-70** Restriped from I-270 to I-170 (added lane in each direction)

**I-44** Restriped from I-270 to I-55/I-70 (added lane in each direction)

**I-270** Restriped from I-64 to Olive (added lane northbound)

**I-270/I-64** Restriped interchange's ramps to improve traffic flow (revised during 2008)

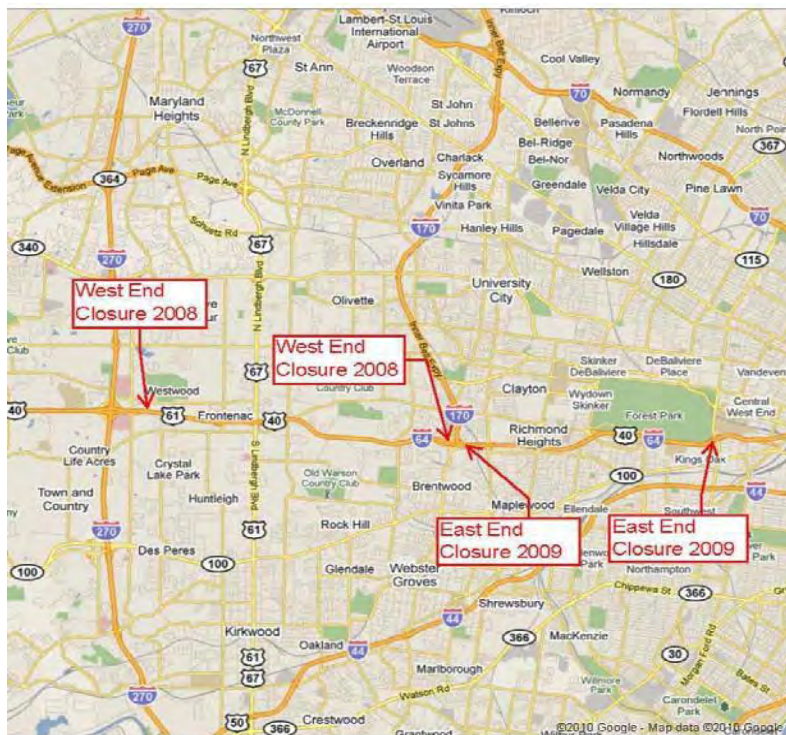
**I-270/I-44** Restriped interchange ramps to improve traffic flow

**Clayton Road** Restriped from Mason Road to Lindbergh Blvd; upgrade various traffic signals; new traffic signals at Topping Road and Bopp Road

**Ladue Road** Upgraded various traffic signals; various new left/right-turn lanes; new traffic signals at Graeser Road/Warson Road

**Improved Signal Timing** along Page Avenue, Olive Boulevard, Manchester Road, Lindbergh Boulevard, Clayton Road, Brentwood Boulevard, Hanley Road, Big Bend Boulevard, Kingshighway Boulevard, Grand Boulevard, and Forest Park Parkway

**Figure M1 – I-64 Full-closure Location**



It is important to note that regional mobility began to be impacted by the I-64 construction project when construction began in 2007, prior to the 2008 closure.

Perhaps most notably, several highway/roadway capacity improvements were implemented by MoDOT, St. Louis County and contractor on parallel and complementary facilities, as shown in the box to the left.

These improvements played a very important role in minimizing any

closure impacts with regards to both mobility and roadway safety. In addition to capacity improvements, temporary access management measures were also taken to increase traffic flow at or near key signalized intersections. Cross access (including left turns to and from key arterials) were restricted or discouraged to improve traffic flow, especially during the peak hours.

Crash reconstruction sites were located and marked along interstate facilities to assist in traffic incident management activities. The research team discussed the utilization of these sites with MoDOT staff and found that their utilization was limited based on several factors like size of the site, location of the site, and education of the motorist and the responding emergency service providers.

### **Traffic Conditions**

Prior to the closure, in the baseline Year 2006, I-64 carried approximately 170,000 vehicles per day (vpd) on a typical weekday in the heaviest segment – this is Annual Average Daily Traffic, or AADT (excluding “outlier” days – Monday, Tuesday, weekend or holidays). In January-February of 2007, one year before the closure, the eastern section of I-64 carried approximately 143,000 vpd on a typical weekday. This initial shift was potentially or partially caused by the anticipation of the construction along I-64. Travelers finding an early alternate route or beginning to use other travel demand opportunities (like reduction or combining trips, transit, etc.). One hundred (100) percent of this traffic was necessarily displaced (temporally and/or spatially) as a result of the closure.

One primary question of interest is, “where did all the traffic go?” Several sources have been used to determine the most appropriate answer to this question - including before/after volumes (from MoDOT, Traffic.com, and St. Louis County), responses to the various public surveys developed, and selected aggregated data reported by MoDOT in its frequent e-mail briefings. The project team summarized and analyzed roadway data based on the interstate, major expressway and major arterials approach. The following discussion highlights the trends in traffic volume, travel speeds, and travel time observed during 2008 and 2009.

Table M-1 displays traffic volumes by year and quarter for the Interstate roadways that were marked primarily as alternative routes. The results showed:

- Increases on I-270 south of I-64 to I-44 in the range of 10 to 23% and on I-44 east of I-270 to Kingshighway in the range of 10 to 17%.
- I-64 west of I-270 saw a decrease in 2008 when the west closure was in place and an increase in 2009 when I-64 west end was re-opened. Access along I-64 into I-170 and the major commercial and business activity center was likely the reason for this change in traffic conditions.
- I-70 appeared to show a slight decrease in traffic volumes over the two-year closure period and may be more characteristics of a national and regional downward trend in traffic volumes because the economy and gas prices than any impact from the I-64 project.
- Seasonal changes (traffic variation across the year) were in the range of 3 to 5% when comparing quarter's traffic volume conditions. The total impacted Interstate system showed a slight increase in traffic volumes.

Table M-1 Traffic Volume Comparison			2006 - 2007	2008				2009				2008 - 2009			Percent of Change	
Route	Location		Baseline	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q	Average	High	Low	High	Low
I-44	I-270	Kingshighway	109	124	127	128	125	120	126	127	123	125	128	120	117%	110%
I-64	Route 141	I-270	128	113	117	120	119	123	131	138	133	124	138	113	108%	88%
I-70	I-270	I-170	125	121	122	123	122	107	115	112	109	116	123	107	98%	86%
I-170	I-270	I-64	111	104	112	114	114	104	112	111	111	110	114	104	103%	94%
I-270 N	I-70	I-64	180	185	186	180	184	175	185	185	188	184	188	175	104%	97%
I-270 S	I-64	I-44	155	184	189	187	184	171	184	191	187	185	191	171	123%	110%
Total			808	831	853	852	848	800	853	864	851	844	864	800	107%	99%

Traffic Volumes listed in 1000 vehicle units

Left Blank

Major I-64 parallel arterial corridors (Routes 100, 340 and D) normally saw weekday daily traffic volumes increases in the range of 30 to 35% with peak hours approaching 50% increases. US Route 67 (Lindbergh), a I-64 perpendicular corridor near the west end of I-64 project, saw a slight traffic volume increase in 2008 and a slight decrease in 2009 when the west end was re-opened. The probable reason was US Route 67 was used in 2008 to move around the west end closure and returned to normal traffic volumes when the west end was re-opened. Other arterial corridors experienced similar increases based on field observations.

### **Average Travel Speed**

Average speeds were obtained from freeway detection sites (source Traffic.com) based on a one-minute resolution level. In this study, average speeds were used in the determination of travel time along the freeway network. Generally, travel time performance measurement is better understood by the general public, since it is how most travelers or commuters measure their trips.

The following is a summary of five spot locations along I-270, I-70, I-44 and I-170. It is important to note that this summary is based on average traffic conditions for Tuesdays, Wednesdays and Thursdays excluding every holiday, weekend and “outlier” weekday (Mondays and Fridays) from the available data sets. It should also be noted that baseline 2006 data was not available along all roadways.

- In general, peak hour travel experienced a slight decrease in average travel speed.
- In 2009, average travel speeds were slight higher than 2008.
- Average travel speeds along I-270 south at I-64 generally increased.
- Drivers along westbound I-44 experienced a decrease in average travel speeds of between 10 and 13 mph. Most likely related to increase traffic exiting I-44 to I-270, the designated major alternate route.
- Average travel speeds along I-70 generally increased slightly.
- Average travel speeds in 2009 along I-170 south of Forest Park Parkway increased to values higher than those observed during 2007. This is most likely related to the improved design of the I-64/I-170 interchange.

Observed average travel speeds along major arterial corridors remained about the same or increased slightly. Comments received in surveys generally supported these observations when statements were received on how well traffic flow and requested that improvements made along arterial corridors be retained after the project.

### **Travel Times**

Travel times along the freeway interstate network were calculated using the average travel speeds that were obtained from Traffic.com. Travel time statistics, as mentioned above, are a more “traveler- friendly” performance measurement, since most travelers or commuters measure their trips based on the time it takes to get from one location to the next. Travel times related to the time it takes a driver to get from one point to another point (e.g., along I-270 from I-64 to I-44 was 5 minutes during the morning peak period). Comparison of pre-construction (known as baseline), construction and post-construction periods will provide a better insight into impacts related to traveling during construction, as well as the future value gained from the



constructed improvements. Tables M-2 and M-3 depict a summary of twelve freeway segments within the St. Louis region. The pink shaded ratios indicate an increase in travel time, while the green shaded indicate a decrease in travel time. Travel Time Index is the ratio of construction period Travel Time compared to pre-construction Travel Time (baseline). In general, interstate construction travel time values were less than the pre-construction travel times. In 2008, 16 of the 96 (17%) evaluated sites showed an increase in travel times. In 2009, 4 of the 95 (4%) sites showed an increase in travel times

Based on the major arterial travel time data, the following were observed for 2008 and 2009:

- Average travel times along northbound Route 141 increased slightly. The maximum travel times, however, were noticeably higher than the pre-closure travel times.
- Average travel times along westbound Manchester at the beginning of the PM peak hour increased rather significantly, but generally decreased during the five to six o'clock timeframe.
- Page Avenue experienced higher average travel times during the AM peak hour and similar travel times during the PM peak hour.
- Ladue Road and Clayton Road experienced higher average travel times when compared to the pre-closure. Since traffic on these roadways increased significantly, this was not a surprise to the project team.

Left Blank

Table M - 2 Travel Time Interstate Comparison 2008 versus Pre-construction

AM Peak Period		Travel Time (min)					Travel Time Index			
Road Segment	Distance (mi)	8/1/2007	1/1/2008	3/1/2008	6/1/2008	9/1/2008	1/1/2008	3/1/2008	6/1/2008	9/1/2008
		12/31/2007	2/29/2008	5/31/2008	8/31/2008	11/30/2008	2/29/2008	5/31/2008	8/31/2008	11/30/2008
I-70 EB from I-270 (Exit 232) to I-170 (Exit 238)	5.8	5.6	5.4	5.7	5.7	5.6	0.972	1.023	1.025	1.003
I-70 WB from I-270 (Exit 232) to I-170 (Exit 238)	6.1	6.0	5.9	5.8	5.6	5.7	0.982	0.958	0.930	0.941
<i>I-170 NB from I-70 to I-64/US 40 (Exit 0)</i>	7.6	8.0	7.2	7.6	7.0	7.1	0.909	0.959	0.877	0.894
<i>I-170 SB from I-70 to I-64/US 40 (Exit 0)</i>	7.7	8.7	7.6	8.4	8.0	9.1	0.872	0.965	0.915	1.038
I-270 NB from I-70 (Exit 20) to I-64 (Exit 12)	7.7	7.8	8.0	7.8	7.7	7.7	1.034	1.003	0.997	0.993
I-270 SB from I-70 (Exit 20) to I-64 (Exit 12)	7.6	9.3	9.2	8.8	7.9	8.6	0.996	0.944	0.853	0.923
I-270 NB from I-64 (Exit 12) to I-44 (Exit 5)	6.5	7.0	6.3	7.6	7.6	7.3	0.902	1.082	1.085	1.040
I-270 SB from I-64 (Exit 12) to I-44 (Exit 5)	6.6	7.0	10.6	6.7	6.2	6.3	1.530	0.966	0.892	0.907
I-44 EB from I-270 to Kingshighway (Exit 287)	10.5	11.5	10.9	11.2	10.8	10.9	0.949	0.979	0.939	0.952
I-44 WB from I-270 to Kingshighway (Exit 287)	10.5	11.1	12.0	12.0	11.3	11.2	1.080	1.076	1.014	1.007
I-64 EB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3	3.9	3.5	3.6	3.6	3.7	0.910	0.945	0.925	0.967
I-64 WB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3	3.0	2.9	2.9	2.9	2.9	0.950	0.963	0.962	0.962

Note: Due to bad data on I-170 in late 2007, traffic data from the same period in 2006 was used for the baseline and travel time index

PM Peak Period		Travel Time (min)					Travel Time Index			
Road Segment	Distance (mi)	8/1/2007	1/1/2008	3/1/2008	6/1/2008	9/1/2008	1/1/2008	3/1/2008	6/1/2008	9/1/2008
		12/31/2007	2/29/2008	5/31/2008	8/31/2008	11/30/2008	2/29/2008	5/31/2008	8/31/2008	11/30/2008
I-70 EB from I-270 (Exit 232) to I-170 (Exit 238)	5.8	5.6	5.4	5.6	5.8	5.5	0.956	0.985	1.019	0.968
I-70 WB from I-270 (Exit 232) to I-170 (Exit 238)	6.1	6.3	5.9	5.8	5.7	5.7	0.940	0.927	0.901	0.901
<i>I-170 NB from I-70 to I-64/US 40 (Exit 0)</i>	7.6	8.3	7.2	7.8	7.1	7.2	0.868	0.932	0.850	0.866
<i>I-170 SB from I-70 to I-64/US 40 (Exit 0)</i>	7.7	7.8	7.6	7.8	7.3	7.7	0.974	0.994	0.933	0.985
I-270 NB from I-70 (Exit 20) to I-64 (Exit 12)	7.7	9.2	8.0	8.1	8.0	8.3	0.873	0.876	0.872	0.907
I-270 SB from I-70 (Exit 20) to I-64 (Exit 12)	7.6	9.8	9.2	8.9	7.8	8.8	0.947	0.916	0.800	0.903
I-270 NB from I-64 (Exit 12) to I-44 (Exit 5)	6.5	7.3	6.3	6.8	6.6	6.7	0.867	0.937	0.904	0.926
I-270 SB from I-64 (Exit 12) to I-44 (Exit 5)	6.6	12.7	10.6	10.6	9.6	9.8	0.840	0.838	0.757	0.774
I-44 EB from I-270 to Kingshighway (Exit 287)	10.5	11.5	10.9	10.8	10.5	10.7	0.949	0.940	0.917	0.930
I-44 WB from I-270 to Kingshighway (Exit 287)	10.5	12.0	12.0	11.9	11.6	12.2	0.999	0.990	0.967	1.015
I-64 EB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3	3.7	3.5	3.5	3.5	3.5	0.946	0.953	0.946	0.943
I-64 WB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3	3.7	2.9	2.9	3.0	3.0	0.788	0.790	0.806	0.807

Note: Due to bad data on I-170 in late 2007, traffic data from the same period in 2006 was used for the baseline and travel time index

Table M - 3 Travel Time Interstate Comparison 2009 versus Pre-construction

			Travel Time (min)					Travel Time Index			
			8/1/2007	1/1/2009	3/1/2009	6/1/2009	9/1/2009	1/1/2009	3/1/2009	6/1/2009	9/1/2009
Road Segment	Distance (mi)		12/31/2007	2/28/2009	5/31/2009	8/31/2009	11/30/2009	2/28/2009	5/31/2009	8/31/2009	11/30/2009
1. I-70 EB from I-270 (Exit 232) to I-170 (Exit 238)	5.8		5.6	5.3	5.3	5.3	5.4	0.944	0.947	0.933	0.959
2. I-70 WB from I-270 (Exit 232) to I-170 (Exit 238)	6.1		6.3	5.8	5.6	5.5	6.1	0.911	0.889	0.873	0.963
3. I-170 NB from I-70 to I-64/US 40 (Exit 0)	7.6		8.3	7.8	7.7	7.6	7.8	0.942	0.928	0.917	0.941
4. I-170 SB from I-70 to I-64/US 40 (Exit 0)	7.7		7.7	7.5	7.4	7.4	7.4	0.977	0.970	0.967	0.969
5. I-270 NB from I-70 (Exit 20) to I-64 (Exit 12)	7.7		8.9	7.3	7.5	7.6	-	0.826	0.841	0.855	-
6. I-270 SB from I-70 (Exit 20) to I-64 (Exit 12)	7.6		8.8	7.6	8.0	7.7	7.9	0.864	0.905	0.880	0.896
7. I-270 NB from I-64 (Exit 12) to I-44 (Exit 5)	6.5		7.3	6.4	6.9	6.7	6.7	0.878	0.944	0.920	0.928
8. I-270 SB from I-64 (Exit 12) to I-44 (Exit 5)	6.6		12.7	8.8	9.8	10.4	10.0	0.696	0.770	0.820	0.790
9. I-44 EB from I-270 to Kingshighway (Exit 287)	10.5		11.3	10.5	10.5	10.2	10.5	0.932	0.933	0.908	0.931
10. I-44 WB from I-270 to Kingshighway (Exit 287)	10.5		11.6	11.5	10.9	10.3	10.7	0.987	0.939	0.887	0.919
11. I-64 EB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3		3.7	3.5	3.7	3.7	3.8	0.939	0.992	0.987	1.026
12. I-64 WB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3		3.7	3.6	3.5	3.4	3.8	0.975	0.956	0.922	1.035
			Travel Time (min)					Travel Time Index			
			8/1/2007	1/1/2009	3/1/2009	6/1/2009	9/1/2009	1/1/2009	3/1/2009	6/1/2009	9/1/2009
Road Segment	Distance (mi)		12/31/2007	2/28/2009	5/31/2009	8/31/2009	11/30/2009	2/28/2009	5/31/2009	8/31/2009	11/30/2009
1. I-70 EB from I-270 (Exit 232) to I-170 (Exit 238)	5.8		5.6	5.4	5.6	5.8	5.5	0.956	0.985	1.019	0.968
2. I-70 WB from I-270 (Exit 232) to I-170 (Exit 238)	6.1		6.3	5.9	5.8	5.7	5.7	0.940	0.927	0.901	0.901
3. I-170 NB from I-70 to I-64/US 40 (Exit 0)	7.6		8.3	7.2	7.8	7.1	7.2	0.868	0.932	0.850	0.866
4. I-170 SB from I-70 to I-64/US 40 (Exit 0)	7.7		7.8	7.6	7.8	7.3	7.7	0.974	0.994	0.933	0.985
5. I-270 NB from I-70 (Exit 20) to I-64 (Exit 12)	7.7		9.2	8.0	8.1	8.0	8.3	0.873	0.876	0.872	0.907
6. I-270 SB from I-70 (Exit 20) to I-64 (Exit 12)	7.6		9.8	9.2	8.9	7.8	8.8	0.947	0.916	0.800	0.903
7. I-270 NB from I-64 (Exit 12) to I-44 (Exit 5)	6.5		7.3	6.3	6.8	6.6	6.7	0.867	0.937	0.904	0.926
8. I-270 SB from I-64 (Exit 12) to I-44 (Exit 5)	6.6		12.7	10.6	10.6	9.6	9.8	0.840	0.838	0.757	0.774
9. I-44 EB from I-270 to Kingshighway (Exit 287)	10.5		11.5	10.9	10.8	10.5	10.7	0.949	0.940	0.917	0.930
10. I-44 WB from I-270 to Kingshighway (Exit 287)	10.5		12.0	12.0	11.9	11.6	12.2	0.999	0.990	0.967	1.015
11. I-64 EB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3		3.7	3.5	3.5	3.5	3.5	0.946	0.953	0.946	0.943
12. I-64 WB from Rte 141 (Exit 22) to I-270 (Exit 25)	3.3		3.7	2.9	2.9	3.0	3.0	0.788	0.790	0.806	0.807

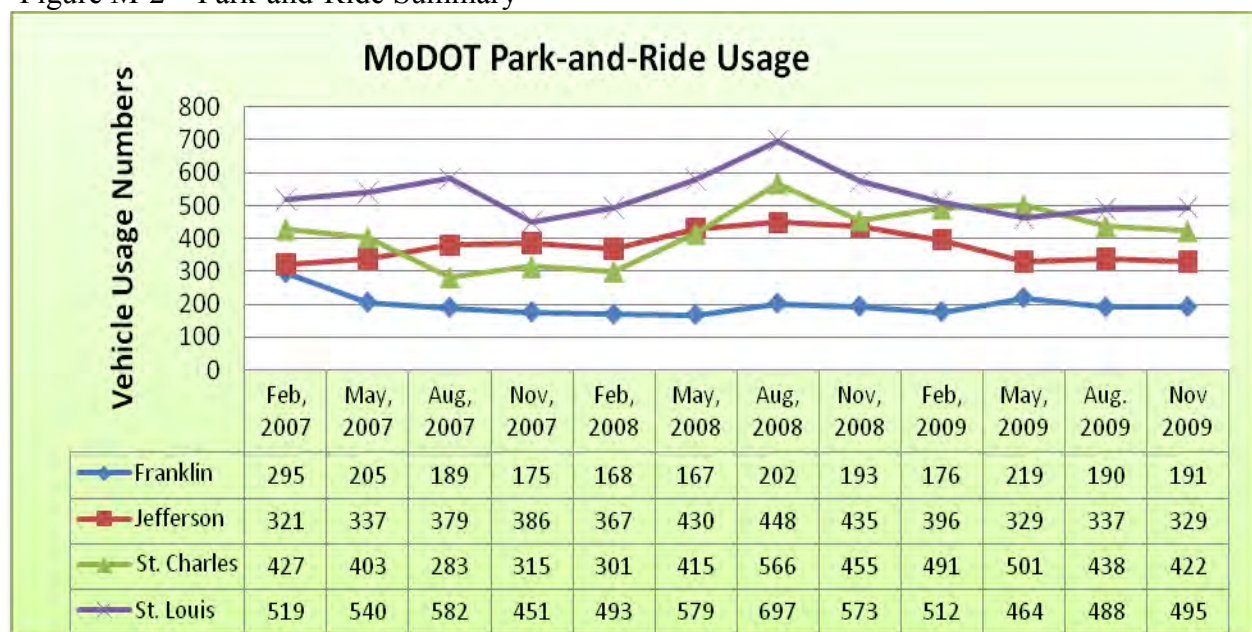


## Park-and-Ride

Figure M-2 below summarizes both baseline year 2007 and construction years of 2008 and 2009 based on quarterly usage counts at MoDOT's Park-and-Ride lots in St. Louis County and neighboring counties. As the display below indicates, a downward and stabilizing trend from mid-year 2008 was experienced in St. Louis, Jefferson and St. Charles counties. This increase could be somewhat related to gas prices and/or the economic downturn in 2008. Franklin County was stable after a downward trend in early 2007.

The construction and closure along I-64 may have had a limited impact on park-and-ride usage, since the 1<sup>st</sup> quarter in 2008 actually showed a decrease when concerns of the closure's impact were at their peak. The rise in mid-year 2008 was probably more caused by gas prices (near \$4 per gallon) and the economy than the closure of I-64. In 2009, the park-n-ride usage returned to similar levels experienced before the closure of I-64 in 2007.

Figure M-2 – Park-and-Ride Summary



## Rideshare

RideFinders, sponsored by Madison County Transit, is the St. Louis regional rideshare program. The figures shown below labeled M-3 and M-4 were developed from historical ridership information from RideFinders. In general, the graphs indicate a general upward trend since the second half of 2007 through the latter part of 2008. As previously mentioned, these increases could be due in part to gas prices and the economic down-turn in addition to the New I-64 construction project.

Figure M-3 Carpool Summary

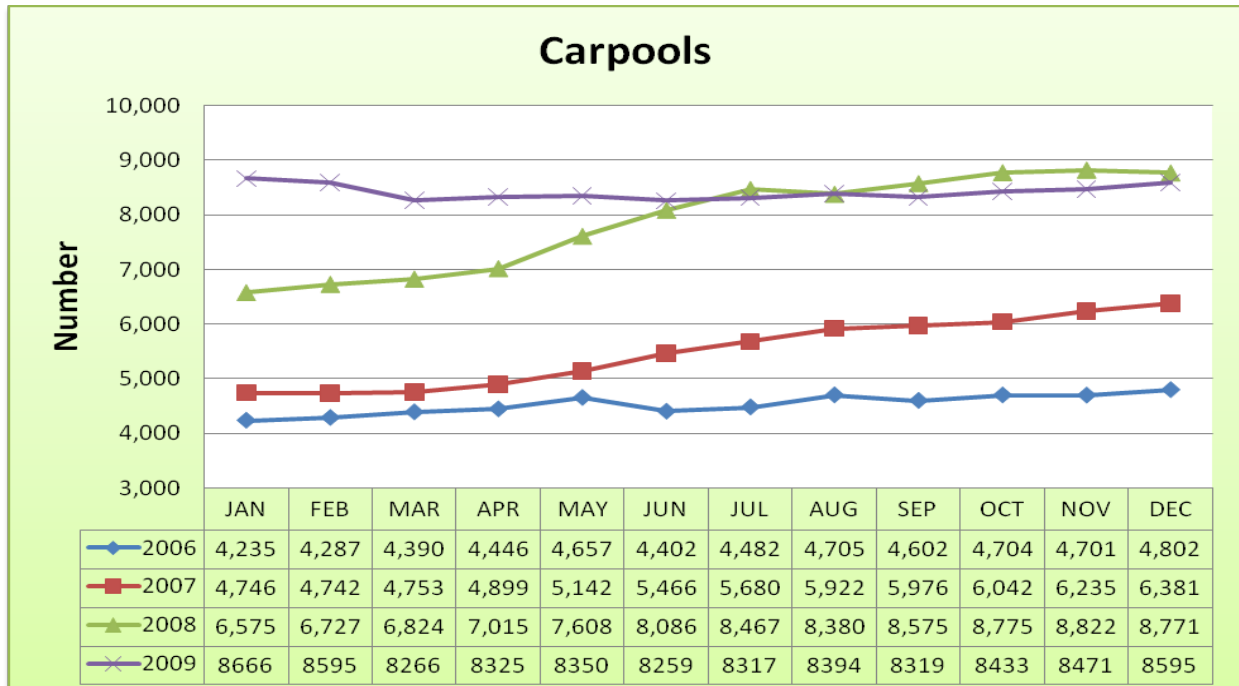
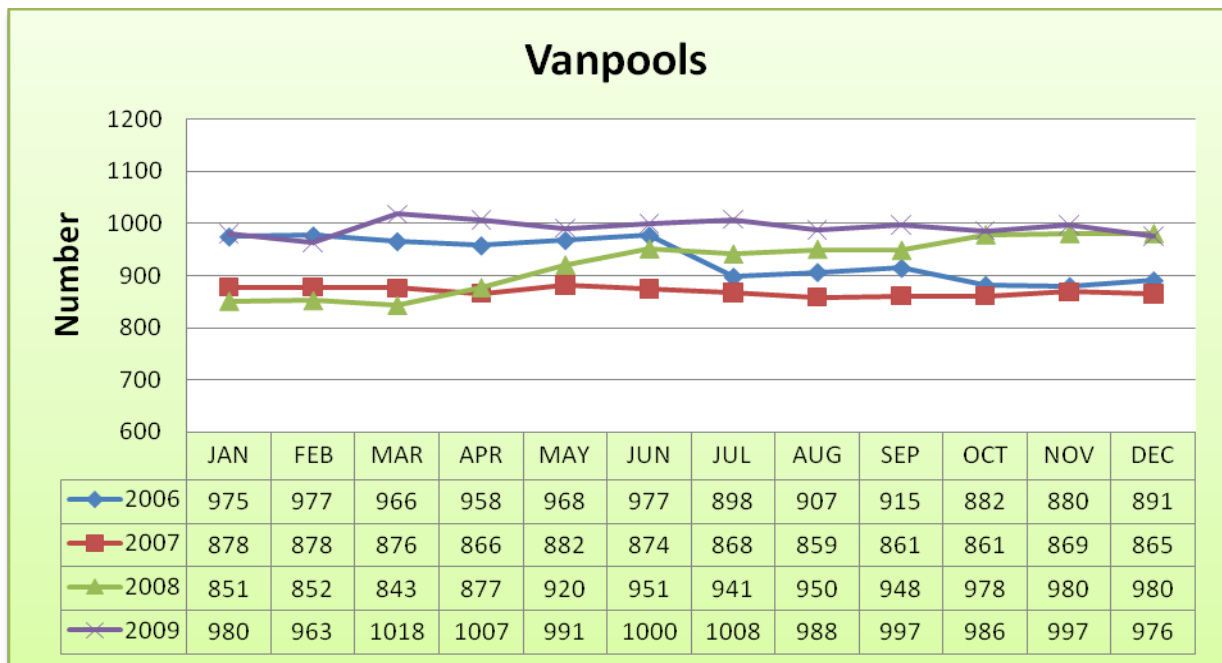
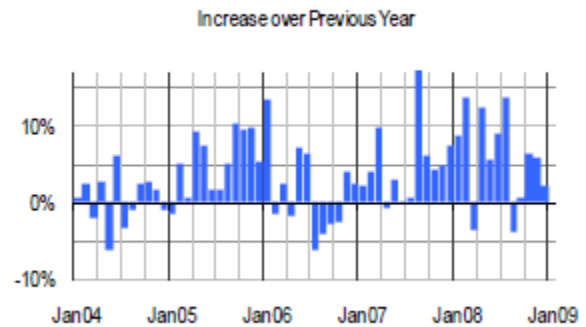


Figure M-4 - Vanpool Summary



## Transit

The figure to the right depicts the overall change in total transit ridership since 2004. In general, transit ridership has increased over the past several years. In terms of the potential changes in transit ridership during the I-64 closure, monthly transit ridership varied significantly between 2007 and 2008. Several factors could have contributed to this increase, such as an increase in gas prices, general downturn in the economy and I-64 construction.



In surveys, the general public was asked about the use of transit. In 2008, transit usage response showed 1% less Figure M-5 Transit Ridership Change and 1% less for Metro Bus and Metrolink, respectively when compared to 2007. In 2009, transit usage response showed 1% increase and 7% increase for Metro Bus and Metrolink, respectively when compared to 2007. Based on this information, transit usage is increasing, but may be the combination of several factors that include gas prices, economy downturn, encouragement of employers with incentives and construction.

## Regional Safety

January 2008 to December 2009, two separate closures occurred along I-64 to complete transportation improvements:

- Ballas Road to I-170 in 2008
- I-170 to Kingshighway Boulevard in 2009

Figure S-1, on the next page, shows the general location of the closure and the alternative routes analysis to determine any potential safety impacts caused by the diversion of traffic.

The research team was provided 6-years (2004-2009) of crash data, which included all crashes that occurred on 17 roadways (including parts of I-64 that remained opened) in the vicinity of the closure. In this study, crash data from 2004 through 2007 was used to develop the baseline information. Four years of pre-closure crash data was expected to provide a good base to evaluate and compare the I-64 two-year construction closure period. For more efficient comparison, all tables and graphs are grouped into three categories according to types of roadway:

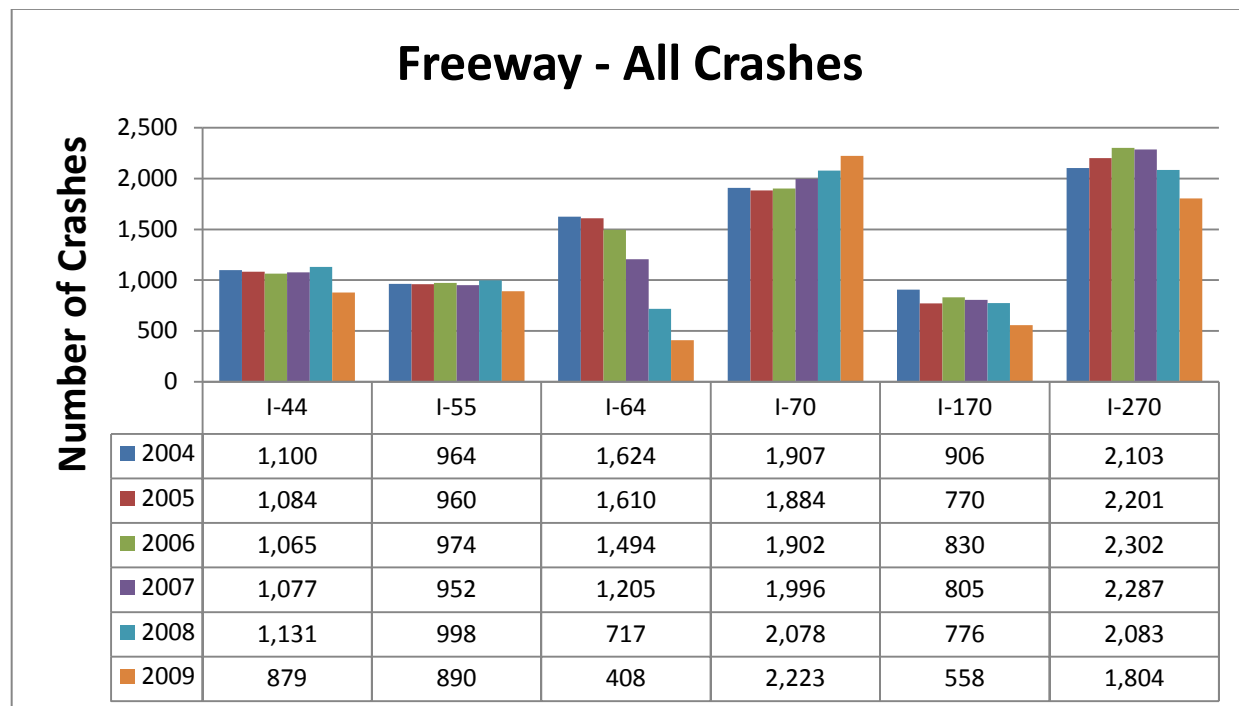
- a) Freeways including I-44, I-55, I-64, I-70, I-170 and I-270,
- b) Expressways including US 40, US 61, US 67, MO 141 and MO D, and
- c) Major Arterials MO 30, MO 100, MO 115, MO 180, MO 340 and MO 366.



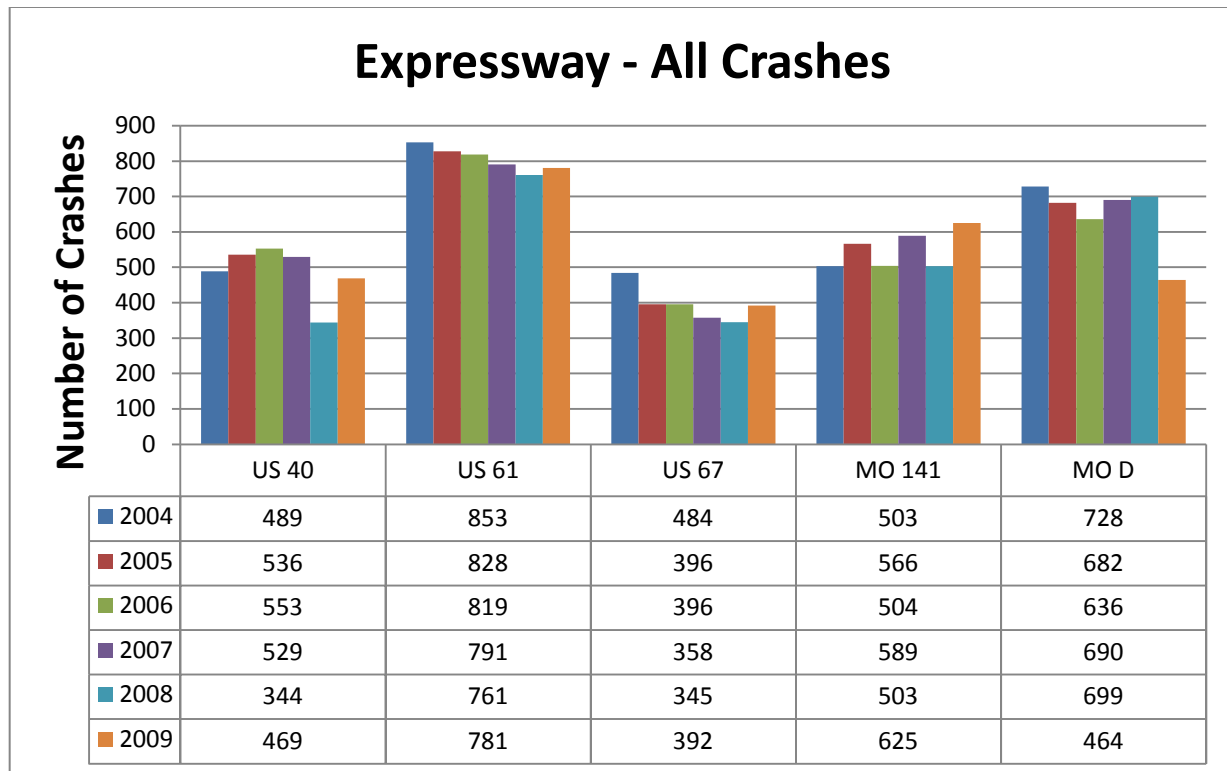
**Figure S-1. General Crash Analysis Area**

#### Crash Analysis

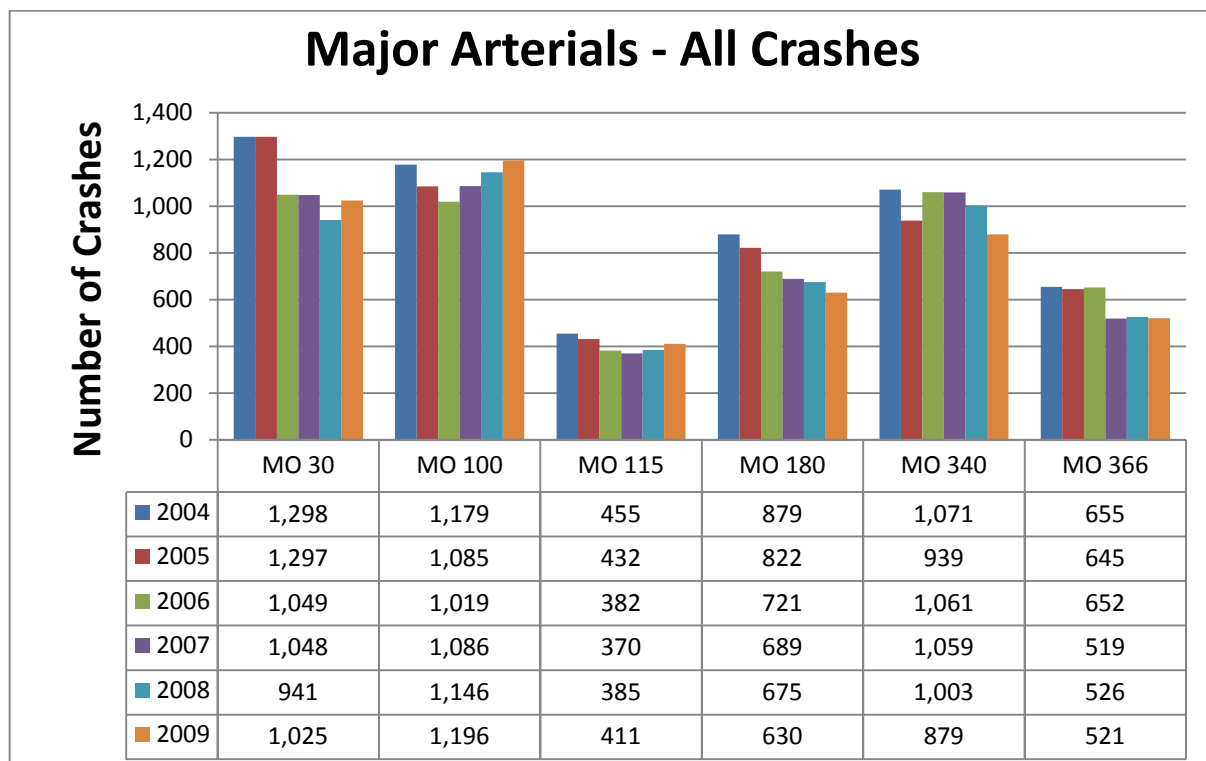
In order to understand the overall picture about the crash trends from 2004 to 2009, all crashes that occurred from 2004 through 2009 on a II roadway were summarized. Figures S-2 to S-4 illustrates the total frequency of crashes by roadway type.



**Figure S-2. All Crashes for Freeway Roadways**



**Figure S-3. All Crashes for Expressway Roadway**



**Figure S-4. All Crashes for Major Arterial Roadways**



Patterns and trends can be noticed when comparing several years of crash data. For all freeway crashes, there is noticeable decrease since 2006. Similar trend is also noticed on expressways since 2007, and major arterials since 2005. I-270 demonstrated decrease since 2007, while I-70 demonstrated an increase since 2007.

I-64 in 2008 and 2009 experienced significant reduction of 429 and 797 crashes less than those in 2007 (reduction of 36 to 66 percent). This reduction, however, was due to the I-64 reconstruction closure. Also, it should be noticed that total crashes in 2008 and 2009 on all freeway roadways also decreased by 539 and 1560, respectively compared to 2007. This overall reduction exceeds the reduction on I-64. This indicated that although I-64 closure caused the traffic to relocate to other routes, the total regional crashes on major interstate roadways around the closure area still had a noticeable reduction.

In summary, most roadways did not experience a significant change over the six-year period. This further enforces the noticeable conclusion that I-64 closure did not adversely impact safety on other highways that were used as alternative routes around the closed section. Overall crashes reduced during the two-year period but many of these roadways experienced an increase in traffic.

#### Crash Rate Analysis

Crash rate represents the intensity or exposure to crashes relative to total vehicle miles traveled. For example, if roadway A shows a higher crash rate than roadway B, it indicates that roadway A was more vulnerable to crashes than roadway B. Crash rates consider traffic volume, roadway length, and days (potential variables) to standardize a method for comparing roadways in a more equal manner. Crash rates over the past 6-years (2004-2009) are presented in Table S-1.

Another way to view crash rates is to analyze the annual crash rate to a base year (2004). This allows at a quick glance to see how the crash rates have changed over time when compared to the base year. A value greater than 1 shows an increase while a value less than 1 shows a decrease. Corresponding 'relative' crash rates are provided in Table S-2.

#### Freeways

I-44, I-64, I-170 and I-270 showed a general decreasing trend for crash rates especially after 2007. A gain I-64 (I-270 to I-55 downtown) was impacted by the closure and showed significant reduction in crash rates. In reviewing the 2009 crash rate index, I-44, I-55, I-64, I-170 and I-270 experienced reduction in crash rates from the 2004 base year, a 28 percent, 9 percent, 75 percent, 35 percent and 17 percent reduction, respectively. I-170 was the only freeway that experienced an increase in crash rate in 2009. Compared to 2008, 2009 had lesser crash rates for most of the freeways except I-70. An increased crash rate on I-70 in 2008 was partly due to the record breaking heavy rain in 2008. This finding is confirmed by Figure S-37 (Appendix page 57, 2008 Annual Report<sup>1</sup>).

**Table S-1- Crash Rates**

<b>Classification</b>	<b>Route</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Freeway	I-44	142	139	134	135	137	103
Freeway	I-55	158	157	149	144	152	144
Freeway	I-64	225	224	206	168	102	57
Freeway	I-70	182	179	189	196	203	210
Freeway	I-170	223	190	203	195	188	139
Freeway	I-270	142	149	152	150	138	117
Expressway	US 40	89	98	103	99	66	92
Expressway	US 61	425	423	402	388	382	401
Expressway	US 67	516	432	488	441	429	494
Expressway	MO 141	371	428	375	438	381	437
Expressway	MO D	398	380	353	384	397	254
Major Arterial	MO 30	574	584	468	470	434	477
Major Arterial	MO 100	413	389	370	395	426	435
Major Arterial	MO 115	426	482	431	417	444	511
Major Arterial	MO 180	448	434	429	410	411	404
Major Arterial	MO 340	446	400	477	475	453	369
Major Arterial	MO 366	443	438	444	353	366	364

**Table S-2- Relative Crash Rates to Base Year 2004**

<b>Classification</b>	<b>Route</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>
Freeway	I-44	1.00	0.98	0.95	0.95	0.97	0.72
Freeway	I-55	1.00	1.00	0.94	0.91	0.96	0.91
Freeway	I-64	1.00	1.00	0.91	0.74	0.45	0.25
Freeway	I-70	1.00	0.98	1.04	1.08	1.11	1.15
Freeway	I-170	1.00	0.85	0.91	0.87	0.85	0.62
Freeway	I-270	1.00	1.05	1.07	1.06	0.97	0.83
Expressway	US 40	1.00	1.10	1.15	1.11	0.74	1.03
Expressway	US 61	1.00	0.99	0.95	0.91	0.90	0.94
Expressway	US 67	1.00	0.84	0.95	0.86	0.83	0.96
Expressway	MO 141	1.00	1.15	1.01	1.18	1.03	1.18
Expressway	MO D	1.00	0.95	0.89	0.96	1.00	0.64
Major Arterial	MO 30	1.00	1.02	0.81	0.82	0.76	0.83
Major Arterial	MO 100	1.00	0.94	0.90	0.96	1.03	1.05
Major Arterial	MO 115	1.00	1.13	1.01	0.98	1.04	1.20
Major Arterial	MO 180	1.00	0.97	0.96	0.92	0.92	0.90
Major Arterial	MO 340	1.00	0.90	1.07	1.07	1.02	0.83
Major Arterial	MO 366	1.00	0.99	1.00	0.80	0.83	0.82

### Expressways

US Route 40 ( I-270 and Missouri Research Park) was recently designated as I-64 with the completion of the upgrade to I-70 near Wentzville. This roadway was at a freeway standard and its crash rates reflect the higher standard roadway with similar freeway crash rates. US Route 61, US Route 67 and Route D have been stable over the 6-year evaluation with Route D indicating a noticeable decrease in crash rates of 36 percent in 2009 based on 2004 base year. Route 141 showed no noticeable trend other than increasing one year and decreasing the next year. Reduction of crash rates in 3 of the 4 expressways in part have been the result of the long-term investment of the regional arterial management system on these adjacent roadways.

### Major Arterials

Routes 30, 180, 340 and 366 showed a decrease in crash rate throughout the 6-year or at least the past 3 to 4 years with respective decreases of 17 percent, 10 percent, 17 percent and 18 percent compared to the 2004 base year. Routes 100 and 115 experienced fluctuating trends across the 6-year period.

### Regional Economics

Large transportation projects often disrupt traffic patterns through lane closures, delays, and detours. These disruptions can impact businesses, commuters, and freight transport through traffic diversions or significant delays. Customers or clients can be inconvenienced enough that they avoid certain impacted areas, which can affect business districts. The analysis was performed to examine the economic impacts experienced in the corridor area during the western and eastern closures of I-64. The following sections will provide detailed information on the economic conditions before, during, and after I-64's reconstruction.

#### Employment

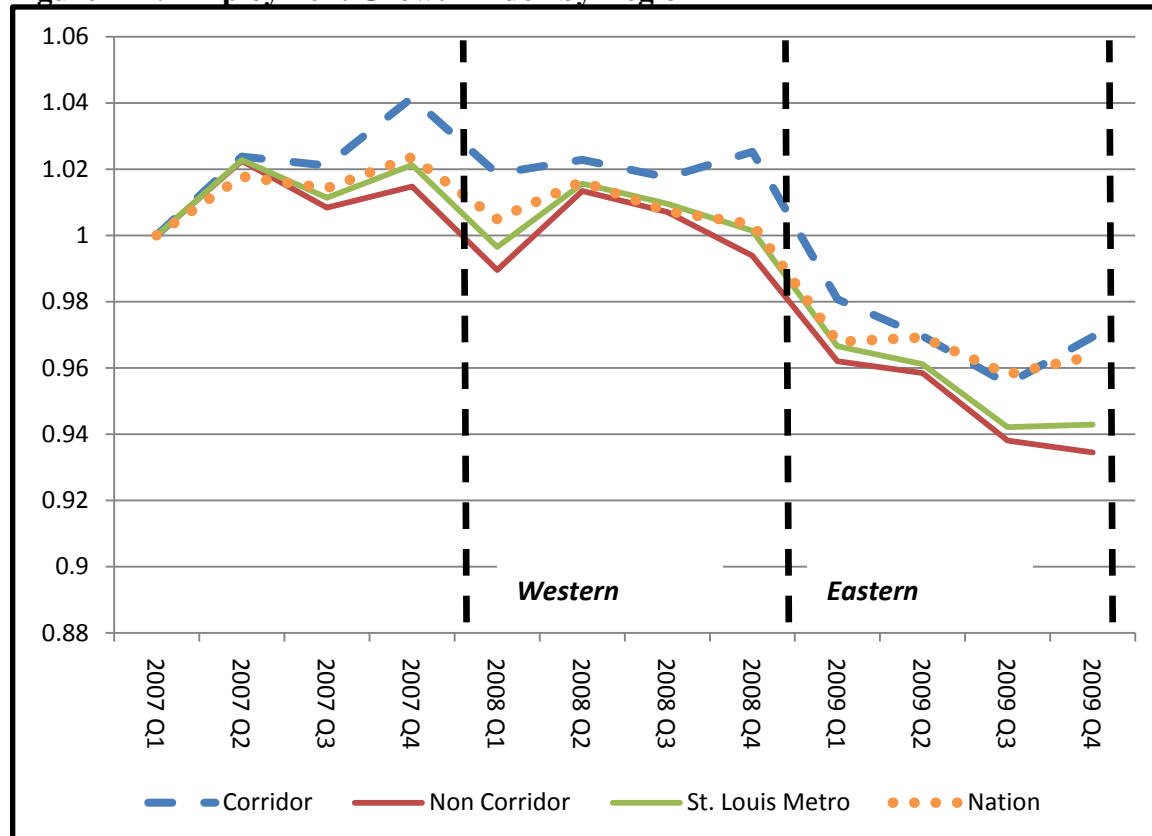
Employment trends were examined on regional basis overtime by industry. Figure E-1 below shows this growth index for each region, and the dotted lines denote the western and eastern closures of I-64. The index shows that the corridor's employment growth remains above all other comparison regions with the exception of the US in the second and third quarters of 2009, representing the point in time when eastern portion of I-64 was closed for reconstruction. Note a custom tabulation of ZIP code area employment data was provided by Missouri Economic Research and Information Center (MERIC).

Employment dropped 5.4 percent in 2009 for the corridor following stable job growth in 2007 and 2008. Following the start of the recession, job growth began to fluctuate for all regions, and in the second quarter of 2008 employment declined for the non-corridor area, state and nation. In general, all regions experienced similar trends in employment during the project period.

The flat employment trend in the corridor, during the start of the recessionary period and the start of the I-64 western closure, suggests that the construction and closure of I-64 did not significantly impact the corridor region. This major regional change to the transportation

network that occurred with the western closure did not seemingly affect employment, implying that the employment trends were more influenced by the recession. The corridor's industry mix was likely responsible for maintaining greater employment growth throughout and after the I-64 reconstruction.

**Figure E-1: Employment Growth Index by Region**



Source: MERIC QCEW

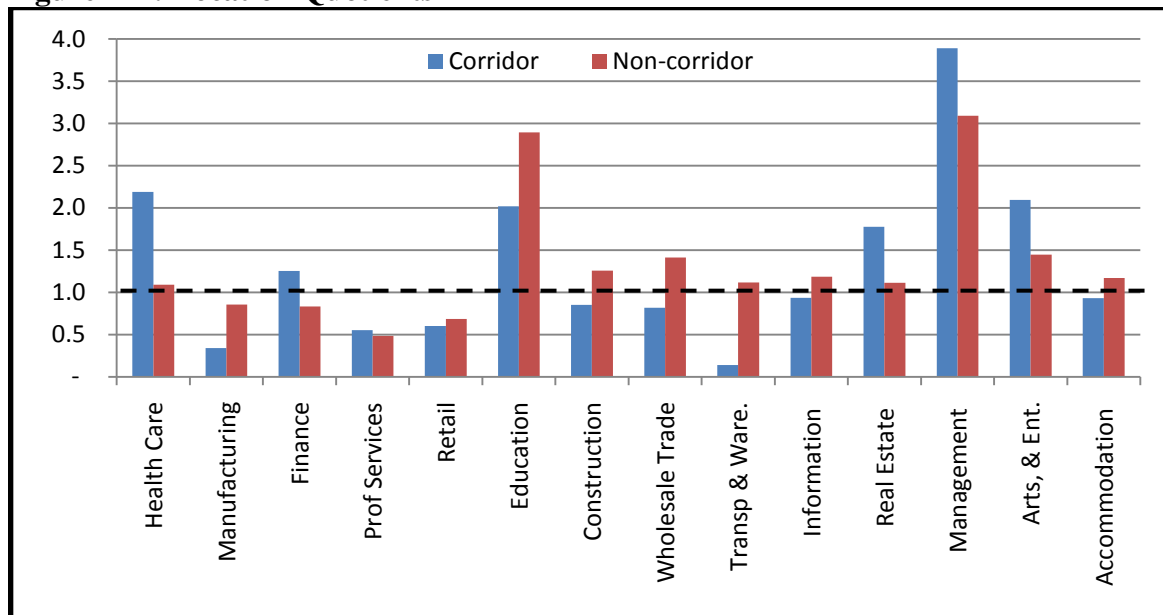
Industry employment trends for the county and city are summarized below.

- Despite the slight positive growth at the end of 2009, most retail growth has been flat. Wholesale trade employment has declined throughout 2009, at an average rate of -1.6 percent.
- From the beginning of 2009 through the end of the year, 5,324 manufacturing jobs have been lost. This represents a 10 percent decrease in manufacturing employment. The construction industry has experienced a decline in jobs, coinciding with national trends.
- The high concentration of hospitals and health care establishments in the corridor, and the unique nature of the health care services, as its services are generally critical for residents and have limited or no substitutes, have maintained stable employment levels in health care during the project period and economic recession. A note the Business Surveys and Interviews confirmed that hospital patients and activities were unaffected by I-64.

Location quotients measure the relative concentration of local and regional employment compared to the nation, as seen in Figure E-2. A value above one (the dashed line) represents an industry concentration greater than the national average; while a value below one represents an industry concentration lower than the national average. The corridor's industry mix relative

to the US, was important in providing stability during the closures as the prominent industries included health care, finance, education, real estate, and arts and entertainment. Whereas, heavy transportation dependent industries such as manufacturing, transportation and warehousing, and construction are a smaller portion of the corridor's overall employment. The industry mix was therefore helpful in maintaining stability throughout reconstruction and the economic recession.

**Figure E-2: Location Quotients**



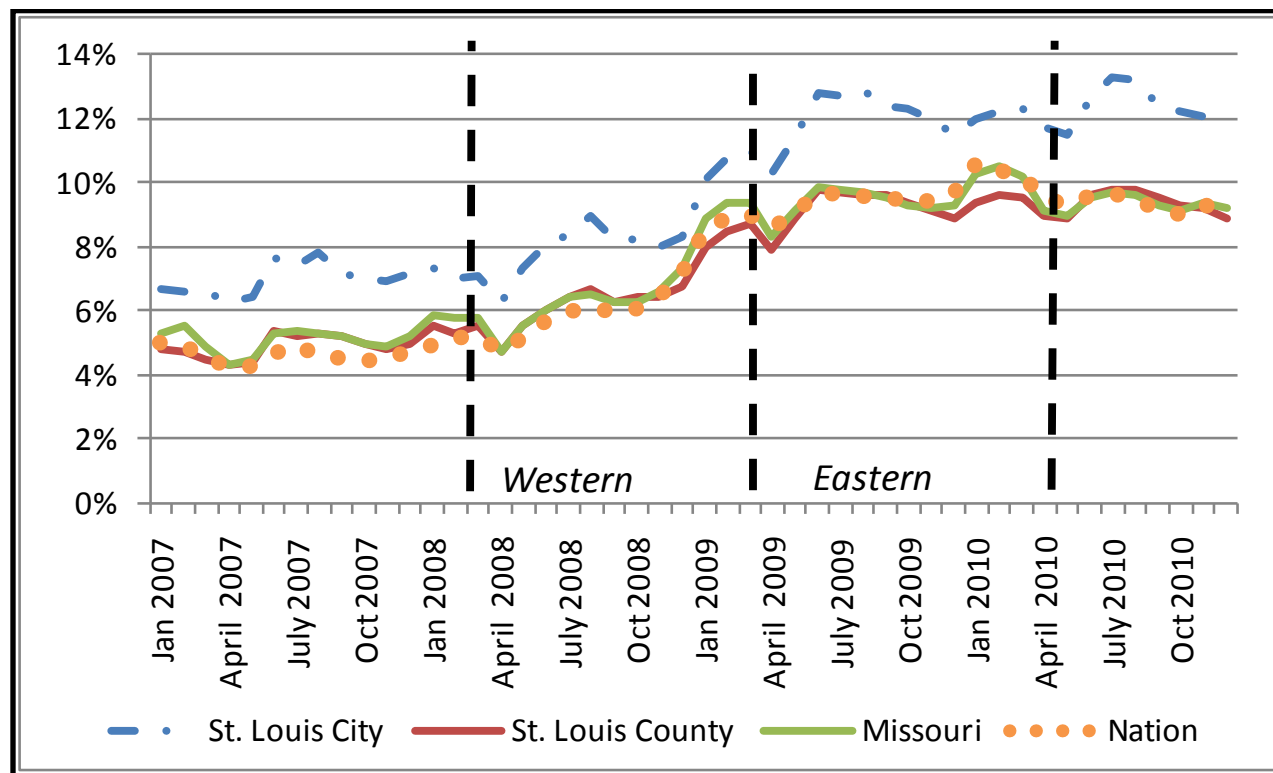
Source: MERIC QCEW, Bureau of Labor Statistics (BLS) Current Employment Statistics (CES)

### Unemployment and Wages

The economic recession, officially starting in December of 2007, began showing signs in St. Louis' labor market in mid-2008, likely just before the decline in the housing market. By June 2008, the unemployment rate for St. Louis City reached 8.1 percent; in January 2009 St. Louis County reached the eight percent mark. By the end of 2009, the unemployment rate for the city reached 11.5 percent, and 8.9 percent for the county. Figure E-3 shows the monthly unemployment trends for the St. Louis City, St. Louis County, Missouri, and the Nation for January 2007 through July of 2010. As the figure shows, St. Louis City's unemployment rate has remained higher relative to the county, Missouri, and nation from 2007 through July 2010. Unemployment rate trends remained flat during the start of the western closure, following national trends through the eastern closure and reopening of I-64.

(Left Blank)

**Figure E-3: Unemployment Rates for St. Louis City, St. Louis County, Missouri and Nation**



Source: MERIC LAUS

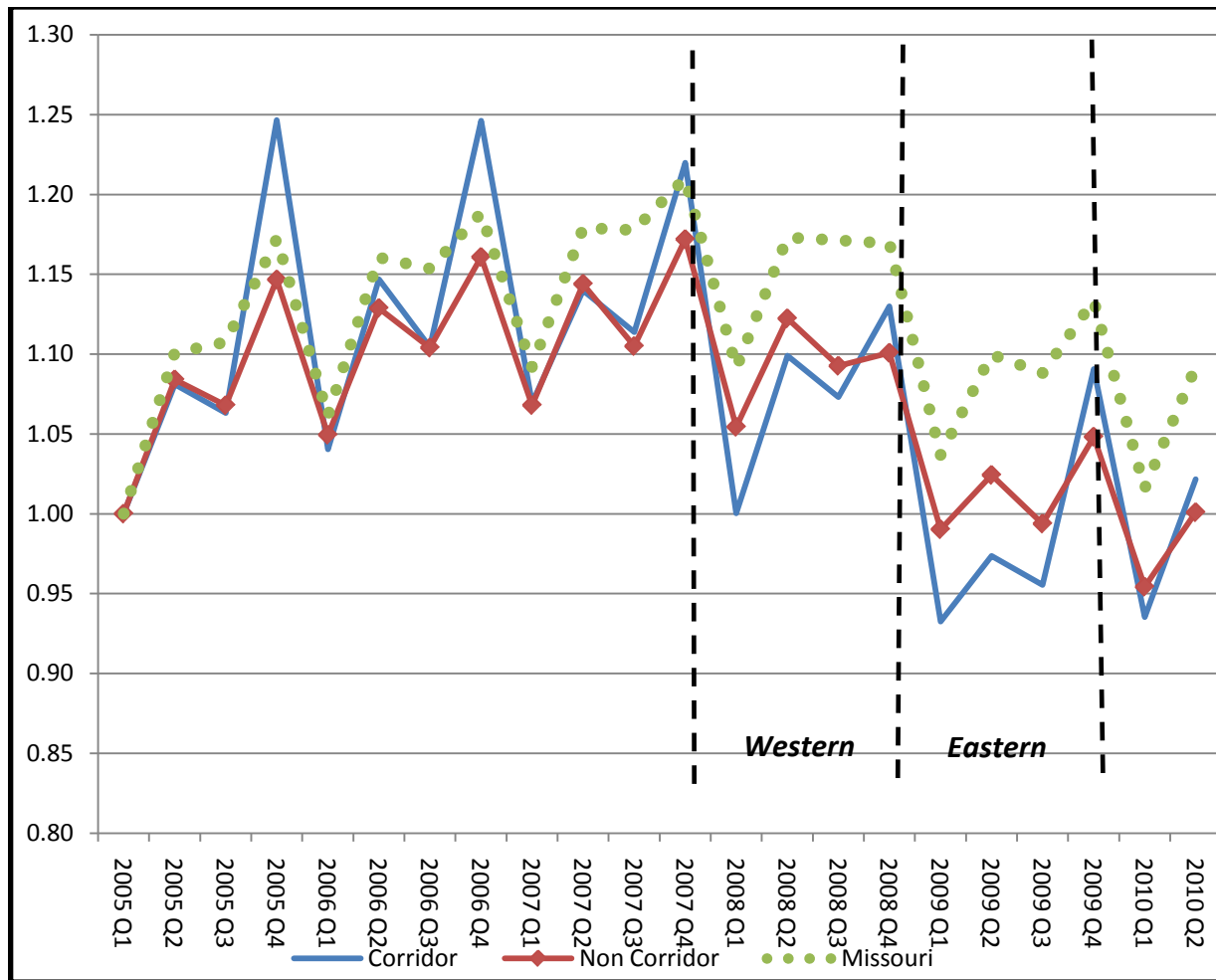
National economic conditions have placed more downward pressure on wages, like employment, across both the corridor and non-corridor regions in 2008. This pressure intensified in 2009. Aggregate wages for 2009 declined for both regions, but the corridor's share of total wages increased over 2009, suggesting that wage growth was greater in the corridor during the eastern closure relative to the non-corridor area.

### Taxable Sales

Taxable sales are a dynamic measurement of business and consumer expenditures and economic performance, as taxable sales measure the amount of spending within the region. As economic conditions change, spending patterns are the first to respond as consumers and businesses will be more likely to hold onto cash and reduce unnecessary spending.

The combined taxable sales for the city and county were \$4.86 billion in the fourth quarter of 2009, an increase of 7.6 percent over the previous quarter. When compared on a year-by-year basis, the fourth quarter 2009 taxable sales revenues dropped \$231 million dollars from the fourth quarter of 2008, a decline of 4.5 percent. The taxable sales index, Figure E-4, demonstrates quarterly taxable sales growth by region in the study area, county, city, non-corridor and corridor.

**Figure E-4: Taxable Sales Index by Region**



Source: Missouri Department of Revenue

The smaller corridor region's taxable sales show greater seasonal variation than the non-corridor throughout the entire period in Figure E4. Taxable sales in the corridor decreased immediately after the western portion of I-64 closed and the onset of the economic recession, however, the decrease was not significantly lower than the non-corridor. In 2009, during the eastern closure, the seasonal trend continued, although the decline in taxable sales for all regions was greater than in prior years. Seasonal taxable sales trends are continuing in 2010, following the reopening of I-64.

### Real Estate

Office vacancy rates in the St. Louis metropolitan area remained steady for the first three quarters of 2008. It was not until the fourth quarter of 2008 that vacancy rates began to tick upward, a negative impact, and continued to increase slightly through the third quarter of 2009. This trend indicates that the recession's impact on the office market was lagged due to a shift in the demand for office space. Office vacancy rates for the fourth quarter of 2009 increased to 16 plus percent and remained at the same level through the first half of 2010. These trends follow the regional unemployment patterns closely. As of May 2010, St. Louis ranks 34<sup>th</sup> in

terms of its office vacancy rate compared to the major metropolitan areas in the United States<sup>4</sup>. The additional changes to the real estate market include:

- The 24 percent decline in asking rents is likely due to decreased industrial demand, high vacancy, and elevated levels of unemployment within the region;
- The highest industrial vacancy rates occurred in the first half of 2010, after the reopening of I-64 and were not located along the impacted corridor region;
- The office vacancy rates rose through most of 2009, and continued to increase through the first half of 2010;
- Similar to industrial properties, office vacancies have increased in 2010 following the reopening of I-64;
- The shorter Design-Build delivery of the I-64 project over two years, as opposed to six to eight years, may have lessened the potential long-term relocation decisions by firms; and
- The number of building permits for single-family housing in the St. Louis metropolitan area has increased since the major declines in 2008 and the first half of 2009, consistent with national trends<sup>5</sup>, however, these increases do not offset the major drop experienced leading to the recession.

## **Business Surveys**

Business surveys were conducted to specifically understand the business climate and economic conditions of firms with various transportation needs throughout the region. The surveys' questions were directed at conditions just prior to the initial closure of I-64, the changes during the western and eastern closures, and conditions following the reopening of I-64. The surveys focused on three main impact areas: 1) commuting impacts, 2) transportation costs, and 3) sales and visitation. The following summarize the major impacts.

### Commuting Impacts

- At the start of the western closure, 41 percent of the respondents indicated noticeably earlier or noticeably later commute times, dropping to 32 percent in the second survey. During the eastern closure, 23 percent of respondents noticed a later commute time while 29 percent reported earlier commute times.
- During the western closure, 27 percent of respondents found a significant increase in commuter time or cost, followed by 14 percent during the first portion of the eastern closure.
- After the reopening of I-64, 62 percent of respondents confirmed that commute times have been noticeably reduced.

### Transportation Costs

- All three surveys returned positive feedback, over 90 percent, on the performance of alternative routes.
- During the western closure, 52 percent of respondents indicated transportation costs were not rising, and 94 percent attributed any rise in transportation costs were related to travel time delays.
- During the eastern closure, 19 percent of respondents reported an increase in freight shipping costs, while 77 percent reported an increase in travel time and delay.



- Following the reopening of I-64, nine percent of respondents reported a minor decrease in freight shipping costs, and 47 percent reported a minor or significant decrease in travel time and delay.

#### Sales, Visitation and Economic Activity

- During the western and eastern closures, respondents reported a decline in sales and business activity. Following the reopening of I-64, respondents noted that there was either no change in sales and business activity or the change in sales was not relevant.
- The first survey found nine percent of all businesses cited a lower volume of weekly sales. This percentage jumped to 17 percent by the second survey, and dropped to four percent in the third survey.

#### **Statistical Analysis**

The I-64 corridor and St. Louis metropolitan area exhibited similar employment and sales trends as the rest of Missouri and the Nation. These mirroring trends were evident prior to the start of the I-64 project and continued once the project was initiated, which was also the beginning of the economic recession. Based on data that were available for the project period, trends suggest that the St. Louis metropolitan area was more likely experiencing the impacts of the decline in the housing market and the subsequent recession than an economic impact due to I-64's closure.

The regression analysis was performed to determine if the change in economic conditions varied before and during the project period. The regression analyses focused on the impact taxable sales, region location, and seasonality had on the dependent variables of the unemployment rate and employment growth. The research team ran multiple regressions using both variables to determine if the statistical relationships changed when looking at employment concepts by place of work versus employment by place of residence.

The regressions found many of the variables were not statistically significant including the regional dummy variable, which re-enforces that the I-64 closures did not have a significant impact on the local economy. As the regressions demonstrated, the reconstruction of I-64 likely impacted the local economy temporarily, but the impact is relatively minor and not statistically significant.

#### Transportation Analysis - User Costs

In 2007, the year before the closures, average weekday traffic was slightly less than 130,000 vehicles per day on the section of highway that would become the western closure and nearly 139,000 per day on the eastern closure portion. In typical single-lane closure projects, there will be some diversion due to reduced road capacity; however in this case, all vehicles were diverted away from each closed segment. This diversion had the potential to cause significant impacts, through longer detour routes as well as the additional travel time associated with the detours. This analysis of transportation related user costs was performed to measure the monetary value of transportation cost compared to a fully operating I-64.

The western closure impacted 129,000 vehicles daily, 116,000 of which were diverted to other roads and lasted for 248 weekdays. Available interstate and arterial databases accounted for

most of the diverted vehicles for both closures. Vehicles unaccounted for were likely diverted to arterials that did not have traffic counts available.

The primary impacted roadways were: Clayton, Ladue, I-270, I-170, I-44 and I-70. The eastern closure began immediately upon the western closure's reopening and lasted for 255 weekdays. Prior to the closure, there were approximately 138,000 daily vehicles, of which approximately 125,000 were diverted during the closure period. The primary impacted roads were: Clayton, Delmar, Big Bend, Forest Park, I-170, I-270, I-44 and I-70. The operating costs include vehicle operating costs, pavement maintenance, and emissions. While the travel time costs include travel time delay and diversion. The results of the western and eastern closure analysis are in Table E-1.

**Table E-1: Annual Transportation Costs in Thousands of Dollars**

	<b>Western Closure</b>	<b>Eastern Closure</b>
Vehicle Operating Costs	\$28,237	\$26,975
Pavement Maintenance	\$1,352	\$1,067
Emissions	\$7,202	\$5,817
<i>Total Operating Costs</i>	\$36,792	\$33,860
<i>Total Travel Time Costs</i>	\$15,093	\$15,725
<b>Total</b>	<b>\$55,885</b>	<b>\$49,585</b>

### **Alternative Construction Scenario Analysis**

The analysis of alternative construction schedules compares user costs of partial long-term lane closures to the actual full closure of I-64. Alternative construction schedules were developed for a six and eight year construction period. For each alternative scenario there would be staged lane closures for sections of I-64 with traffic continuing to use two lanes in each direction at reduced speeds. The estimated user costs, in present value, for the actual design-build project and the two alternative project construction schedules are shown in Table E-2. User costs estimated using a five percent discount rate

(Left Blank)

**Table E-2: Transportation Impacts – All Scenarios (in millions) in Present Value**

<b>Partial Closure</b>	<b>Actual</b>	<b>6 Year</b>	<b>8 Year</b>
Vehicle Operating Costs	\$55.2	\$46.2	\$59.2
Pavement Maintenance	\$2.4	\$3.0	\$3.9
Emissions	\$13.0	\$12.6	\$16.1
<i>Total Operating Costs</i>	\$70.7	\$61.9	\$79.2
Monetized Diverted Costs	\$30.8	\$17.7	\$22.6
Monetized Delay Costs	-	\$67.5	\$86.5
<i>Total Travel Time Costs</i>	\$30.8	\$85.2	\$109.1
<b>Total</b>	<b>\$101.5</b>	<b>\$147.0</b>	<b>\$188.3</b>

Source: HDR Calculations Based Regional Traffic Conditions

The alternative analysis found:

- The reduced speeds and increased congestion due to lower capacity along I-64 under the alternative scenarios represent the largest category of user costs;
- Extending the I-64 project schedule to six years, total user costs increase by \$45.6 million or as much as \$86.8 million if the project schedule were extended to eight years;
- The potential construction costs savings from initiating a full closure of I-64 versus a six or eight year staged reconstruction is \$93 to \$187 million, assuming construction material costs were to remain consistent with inflation. Alternative costs based on I-64 Environmental Impact Statement's preferred alternative; and
- If construction material costs were to return to levels of high cost escalation experienced from 2003 to 2008, the alternative construction (six and eight years) cost schedules could see a dramatic increase in cost.

(Left Blank)

## **Conclusions**

### Communications

The Western closure had a noticeable impact on respondent behavior. A sizeable minority of respondents are reporting changes in their shopping and driving habits. Many respondents report their daily commute now takes longer than before the closure. However, despite these changes, the majority of respondents are satisfied with how they are able to get around St. Louis with the closure.

Further, the overwhelming majority of respondents are satisfied with MoDOT's decision to close parts of I-64 for two years instead of taking 6-8 years with lane closures (76.5% in the lowest measurement, 93.8% in the highest). Overall, the respondents have high level of satisfaction with how the I-64 closure has been handled with results ranging from 76.7% to 87.8%.

Considering the reported changes in respondents' behavior, these are extremely high levels of satisfaction and reflect the public consensus that this project was well planned and is being well managed. The general public was also well-informed with regards to the roadway closures, construction activities, alternative routes, alternative modes, etc. that help reduce mobility impacts around the project.

The Appendix to this report contains complete survey information for the online, mailed and in- person surveys conducted in 2008 and 2009 for further detail information and reference.

### Mobility

Based on these results, the following mobility conclusions can be made:

- Traffic volumes when compared to pre-construction (2007) increased along designated marked alternatives roadways I-44, I-70, I-170 and I-270. The greatest increases occurred along I-270 and I-44 with increases in the range from 10 to 23% and 10 to 17%, respectively. Adjacent major arterials (Olive, Page, Manchester, etc.) near I-64 also experienced increased in both daily traffic volumes in the range of 30 to 35%; and peak hour traffic volumes approaching 50%.
- Travel speeds when compared to pre-construction (2007) remained about the same or saw a slight decrease in average travel speeds. There was a noticeable decrease in travel speeds along I-44 westbound near I-270 (increased exiting traffic over the designated primary alternative route). Enhanced traffic management, operation strategies and roadway improvements along adjacent arterials help maintain travel speeds and times during peak periods even with increased traffic volumes.
- The RideFinders (regional rideshare program) experienced a significant increase through most of 2008 as it approached the 10,000 membership plateau in November. In 2009, rideshare for both carpool and vanpool users dropped slightly or remained the same from the end of 2008. The increase in 2008 and stability in 2009 most likely reflects a combination of increase gas prices, economic conditions and/or the I-64 project. The isolation of which factor had the greatest impact would be difficult to assess, since all of these factors were all mentioned in both public and business surveys conducted.
- Commuter park-and-ride facilities usage in 2009 in Missouri returned to similar levels experienced in 2007 demonstrating that park-n-ride facilities increase in 2008 were most

likely impacted by 2008 higher gas prices and the economy downturn with only a potential minor impact from the I-64 closure.

- Transit usage varied significantly when comparing 2007 to 2008 on a month-by-month basis. MetroBus ridership varied from a monthly 8.3% decrease to a 13.1% increase. MetroLink ridership varied from a monthly 4.5% decrease to a 31.9% increase. Overall, MetroBus ridership experienced an increase of 5.5%, while MetroLink ridership experienced a 5.2% increase between 2007 and 2008. This showed a slight shift to mass transit that could be related to higher gas price increase in 2008, the downturn in the economy and/or the I-64 project. The public survey also reflects a slight increase in transit usage.
- Regional mobility did experience some minor impacts in mobility during both 2008 and 2009
- Advance planning and implementation of a region-wide maintenance of traffic plan during the closure was important in minimizing impacts
- The regional transportation network played a strong role in that it provided good alternative roadways needed to handle diverted traffic
- Long-term (i.e. arterial management on adjacent roadways) and short-term (i.e. widening adjacent freeways to add temporary traffic capacity) improvements to alternative roadways was important in minimizing impacts.

Mobility impacts to the region were very minimum based the Maintenance of Traffic Plan used. Alternative roadways were improved by various best practices to increase traffic flow and reduce delays. Some of these improvements are long-term and will benefit the region for many years in the future.

### Roadway Safety

Based on these results, the following safety conclusions can be made:

- Seventeen roadways investigated had 15,111 crashes (8.9 percent reduction) in 2008 and 14,155 crashes (14.7 percent reduction) in 2009 when compared to the 4-year average pre-construction data of 16,595 crashes.
- Crashes and crash rates decreased for most freeways, expressway and major arterials with only I-70, Route 141, Route 100 and Route 115 showing increases during the 2-year closure period.
- The significant crash reduction along segments of I-64 of 50 percent to 70 percent (when compared to 4-year pre-closure crash data average (2004 to 2007)) that were not closed could be a good indicator on the regional awareness of the project and their willingness in using designated alternative roadways.
- In general, rear-end type (highest frequency of crashes) decreased noticeably from 7757 in 2007 to 6835 in 2008 and 6728 in 2009.
- Conclusion that no evidence was found to indicate that I-64 project and closure influence increased crashes on regional adjacent highways around the project.

This information and observations conducted as part of this study leads to a conclusion that there is no strong evidence proving that I-64 closure contributed to the crash increase on the highways that are potentially influenced by the closure. Continuation of this crash analysis for

2010 and beyond will help confirmed this conclusion and provide information on how the transportation improvements made along I-64 have impacted the corridor's roadway safety.

### Economics

Based on these results, the following economic conclusions can be made:

- Businesses expected the worst, but the conditions during the western and eastern closures were not as bad as they anticipated, all three business surveys reported high-levels of satisfaction (all above 86 percent) with delivery of the I-64 project;
- Design-Build delivery and an aggressive project schedule were successful in minimizing the duration of impacts to the region;
- During reconstruction 98,000 to 120,000 vehicles were diverted daily and transportation user costs increased by \$101.5 million during entire project compared to a fully operating system;
- Alternatively, if I-64 did not initiate the western and eastern closures for reconstruction, the project schedule would have lasted six to eight years, and increased user costs by \$45.6 to \$86.8 million compared to the full-closures; The project demonstrated a significant construction cost savings – between \$93 and \$187 million – from accelerating the reconstruction project schedule to two years versus a six or eight year staged construction schedule; and

While the economic recession made the assessment difficult to determine the precise impact of the I-64 reconstruction, the analysis found the conditions in the impacted area were not statistically different from economic conditions across Missouri and the nation. If economic conditions were to stabilize within a few years, it would be worthwhile to analyze economic changes along the I-64 corridor.

### **Principal Investigator and Project Members**

Dr. Lance Gentry, M.B.A. Ph.D., Lead Investigator, Project Communication and Public Opinion

Dr. Venkata Chilukuri, Ph. D., Regional Mobility – Arterial Assessment

Thomas Hiles, EI – Regional Mobility – Freeway Assessment

Michael Trueblood, P.E., P.T.O.E., Lead Investigator, Regional Mobility

Christopher Kinzel, P.E. Regional Mobility

Robert Frazier, P.E. AICP, Regional Mobility

Dr. Hojong Baik, Ph.D., Lead Investigator, Roadway

Safety Daxiao Liu (Student), Investigator, Roadway

Safety Jonathan Lee, Lead Investigator, Economics

Daniel Hodge, Investigator, Economics

Tom Ryan, P.E., Principal Investigator

### **Bibliography**

1. "The New I-64 Economic and Regional Mobility Study" 2008 Annual Report - <http://library.modot.mo.gov/RDT/reports/Ri07047/or11016Report.pdf> - Appendix A
2. "The New I-64 Economic and Regional Mobility Study" 2009 Annual Report - <http://library.modot.mo.gov/RDT/reports/Ri07047/or11017report.pdf> - Appendix B
3. Research has shown that the results from mailed surveys are more reliable than

those from telephone surveys and face to face interviews (Walker & Restuccia, 1984; De Leeuw, 1992, page 112). In general, the results from all methods were fairly consistent. The important differences are discussed in this report, but academic research on the subject suggests basing decisions on the mailed survey results over other methodologies.

4. Red Capital Group, "Market Overview St. Louis, Missouri"
5. National Association of Homebuilders was the source for national trends
6. "Current Economic Conditions" by Federal Reserve District
7. Bureau of Economic Analysis, National Economic Accounts - May 2009
8. Bureau of Economic Analysis, National Economic Accounts - May 2009