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Research Scoping Study:

Economic Benefits from Transportation Investments

May 2006

BBC Research & Consulting

Felsburg Holt & Ullevig

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16. Abstract

The study team reviewed more than 50 studies that examined the benefits of transportation investment in different parts of the country. Many of the studies were statewide analyses of the economic benefits of transportation improvements. For a number of past statewide studies, the study team interviewed the lead study sponsor, state DOT staff, and study researchers about each study's purpose, methodology and perceived success. The literature review and interviews helped reveal what questions were being asked in other economic benefits studies; why they were asked; methods used to answer the questions; how study sponsors used the research results; and how the messages were received by the target audiences. The study team also examined National Cooperative Highway Research Program (NCHRP) research that specifically provided guidance about communicating the economic benefits of transportation investments.

The study team also held seven focus groups with target audiences throughout Colorado to identify benefits of greatest interest and the best ways of communicating economic benefits of transportation investments. The focus groups were also used to test key messages from transportation benefits studies conducted in other states. According to focus group participants, the most important benefits are personalized benefits that directly affect Colorado residents on a daily basis. These benefits include reduced accidents and injuries, gas savings, higher personal income, employment growth, faster commutes, and business cost savings. Focus group participants found large monetary benefits.

Implementation:
The study team recommends that CDOT initiate a statewide study of the economic benefits of transportation investments in Colorado. The statewide study will provide measures to Colorado stakeholders consistent with the results of the scoping study and will identify additional information necessary to conduct more in-depth regional analyses at a later date.

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ECONOMIC BENEFITS FROM TRANSPORTATION INVESTMENTS

Prepared for:

Colorado Department of Transportation
Division of Transportation Development
4201 East Arkansas Avenue
Denver, Colorado 80222

Prepared by:

BBC Research & Consulting
3773 Cherry Creek N. Drive, Suite 850
Denver, Colorado 80209-3827
303.321.2547 fax 303.399.0448

and

Felsburg Holt & Ullevig
6300 South Syracuse Way, Suite 600
Centennial, CO 80111
303.721.1440

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TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY ---------- ES-1

I. Introduction ---------- I-1
Background ---------- I-1
Approach ---------- I-2
Report Organization ---------- I-3

II. Literature Review ---------- II-1
Audiences Interested in Transportation Benefit Studies ---------- II-1
Types of Transportation Benefit Studies ---------- II-3
Study Methodologies and Related Assumptions ---------- II-7
Types of Transportation Benefits ---------- II-9
Conclusions ---------- II-15

III. Focus Group Feedback ---------- III-1
Overview of Methodology ---------- III-1
General Discussion Topics ---------- III-1
Reactions to Specific Benefits ---------- III-5
Reactions to Broad Set of Benefits ---------- III-9
Overall Findings and Guidance from the Focus Groups ---------- III-14

IV. Key Person Interviews ---------- IV-1
State Study Interviews ---------- IV-1
National Researchers ---------- IV-6

V. Study Options ---------- V-1
Overview of Study Options ---------- V-1
Selected Approach ---------- V-3

VI. Work Scope for Statewide Study ---------- VI-1
Background and Overview ---------- VI-1
Objectives ---------- VI-1
Approach ---------- VI-1
Schedule ---------- VI-4

VII. Recommendations for Selecting a Contractor ---------- VII-1
Necessary Qualifications ---------- VII-1
List of Experienced Contractors ---------- VII-1

LIST OF APPENDICES

APPENDIX A WORKS CITED
APPENDIX B FOCUS GROUP METHODOLOGY

LIST OF EXHIBITS

Page

Exhibit I-1. Focus Group Participants ---------- I-3

Exhibit III-1. Focus Group Ranking of Statewide Study Results for Kansas, Maryland, and Wisconsin Studies ---------- III-6
Exhibit III-2. Ranking of Transportation Benefits in the "Top Three" Category ---------- III-10
Exhibit III-3. Ranking of Transportation Benefits in the "Less Important Topics" Category ---------- III-10
Exhibit III-4. Importance of Transportation Benefits by Geographic Region and Area of Interest --- III-15

Exhibit IV-1. Summary of State Transportation Benefit Studies ---------- IV-5

Exhibit V-1. Summary of Study Options Developed by the Project Team ---------- V-2

Exhibit VI-1. Proposed Project Schedule ---------- VI-4

EXECUTIVE SUMMARY

Introduction and Study Purpose

In order to better understand and communicate the importance of transportation infrastructure to the Colorado economy and to Coloradans in general, the Colorado Department of Transportation (CDOT) retained Felsburg Holt & Ullevig (FHU), a transportation engineering firm, and BBC Research and Consulting (BBC), an economic research firm, to address the following questions:

- Would a study of the benefits of transportation investments in Colorado help stakeholders? Why or why not?
- How have other states communicated transportation investment benefits to decision makers and the public? What worked and what didn't?
- Who is the appropriate audience for a Colorado study?
- What types of benefits from transportation are important to target audiences? How should the information be communicated?
- What study approaches best meet Colorado stakeholder needs?

This research provides a necessary first step in considering a larger study of the economic benefits of transportation investment specific to Colorado.

Approach

Assessment of similar benefits studies. The study team reviewed more than 50 studies that examined the benefits of transportation investment in different parts of the country. Many of the studies were statewide analyses of the economic benefits of transportation improvements. For a number of past statewide studies, the study team interviewed the lead study sponsor, state DOT staff and study researchers about each study's purpose, methodology and perceived success. The literature review and interviews helped reveal:

- What questions were being asked in other economic benefits studies;
- Why they were asked;
- Methods used to answer the questions;
- How study sponsors used the research results; and
- How the messages were received by the target audiences.

The study team also examined National Cooperative Highway Research Program (NCHRP) research that specifically provided guidance about communicating the economic benefits of transportation investments.

Focus groups. The study team held seven focus groups with target audiences throughout Colorado to identify benefits of greatest interest and the best ways of communicating economic benefits of transportation investments. The focus groups were also used to test key messages from transportation benefits studies conducted in other states. The focus groups were chosen in consultation with CDOT staff. Exhibit ES-1 shows the target audiences and organizations participating in these focus groups.

Exhibit ES-1. Focus Group Participants

Target Audience	Focus Group Participant
Planners and public works directors who are knowledgeable of transportation related issues	■ American Planning Association, Colorado Chapter
Regional, multi-county associations of policy leaders	■ Progressive 15 ■ Action 22 ■ Statewide Transportation Advisory Committee
Business organizations	■ Colorado Association of Commerce and Industry ■ Colorado Farm Bureau ■ Move Colorado

Key Findings

Key findings from the review of other state studies and the Colorado focus groups are summarized below.

Value of information. Focus group participants agreed that a study of the economic benefits of transportation investment in Colorado would be a valuable tool in explaining what could be gained from increased transportation funding. Sponsors in other states also indicated that having concrete information on economic benefits helped communicate the importance of transportation investments.

Lead sponsor. A lead sponsor other than CDOT is necessary to enhance the credibility of study results. Many of the studies conducted in other states had an organization other than the state DOT as the lead sponsor.

Transportation modes. In Colorado, it is important to evaluate multiple modes of transportation, including highways and mass transit. Only some of the studies conducted in other states examined multiple modes.

Study period. Focus group participants recommended examining the benefits of possible future transportation investments, as opposed to past spending. The state-level investment studies we reviewed in other states were evenly divided between prospective and retrospective analyses. Prospective studies examined benefits out to as many as 30 years in the future.

Benefits message. Colorado residents often think about transportation benefits in terms other than monetary value — communication of study results should not just focus on benefits such as increased economic output quantified in billions of dollars. Additionally, the importance of specific benefits differs by region and target audience.

Other statewide benefits studies typically monetized and aggregated benefits, and reported them as total benefits or return on investment (ROI) as opposed to the more personalized measures. In the interviews with study sponsors in other states, we found that more straightforward messages about economic implications, such as number of new jobs, were more easily communicated. Kansas, for example, switched from preparing complex studies of a series of economic benefits to relatively simple studies that just projected new jobs created.

Economic competitiveness. A transportation investment benefits study should show how the investment helps a region compete for jobs, according to feedback from the focus groups in Colorado. As examples, the Montana and New Jersey benefits studies included regional economic competitive analyses.

Long-range economic benefits vs. construction impacts. Focus group participants were interested in the long-term benefits of transportation investment, as opposed to the temporary construction impacts. Most state studies have separated the impacts of construction from the more long-term economic effects of transportation investment.

Geographic detail. Several of the focus groups stressed the importance of evaluating transportation investment across Colorado, and not just in the most heavily traveled areas. In addition, because preferences and transportation needs differ greatly between regions, Coloradans would like to know the benefits to their own regions.

Most states that have conducted transportation benefit studies have focused on the statewide benefits of transportation investment. No state has completed a comprehensive analysis of transportation benefits by region within the state, primarily due to the technical complexities and cost involved with this approach. Some states have recently initiated studies that will produce regional benefits estimates.

Evaluation of benefits. According to focus group participants in Colorado, the most important benefits are reduced accidents and injuries, gas savings, higher personal income, employment growth, faster commutes, and business cost savings. Rural area participants seemed to be more concerned with access to major metropolitan areas, safety improvements and economic development, while people living on the Front Range responded better to the benefits of reduced travel time and reduced number of accidents and injuries. Exhibit ES-2 presents a summary of the most important economic benefits identified by participants according to their location and target audience.

Exhibit ES-2.
Most Important Benefits by Geographic Area and Target Audience

	General Public	Business and Other Interests
Metropolitan Areas	Reduced accidents and injuries Increased personal incomes Faster commutes High rate of return on investment Gas savings	Reduced accidents and injuries Increased personal incomes Faster commutes Increased business productivity Business cost savings
Rural Areas	Reduced accidents and injuries Increased personal incomes High rate of return on investment Employment growth	Increased business productivity Business cost savings State/region competitiveness Reduced O&M costs Access to markets Access to recreation

Purposes and target audiences. With the exception of studies in Michigan and Montana, each of the examined studies in other states was used to communicate benefits to a state legislature or state agencies as a way to support transportation investment. Only the Michigan study was intended to address perceptions of the broader public. However, participants in the Colorado focus groups pointed out that the ultimate audience for a Colorado study may be the Colorado voter.

Recommendations

The study team recommends that CDOT initiate a statewide study of the economic benefits of transportation investments in Colorado that will lay the groundwork for comprehensive region-by-region analysis at a later date.

The statewide "desktop" study will estimate the economic benefits of transportation investment in Colorado based, in part, on research conducted in other states. The study should consider the economic benefits identified by the focus groups as the most compelling and relevant issues in Colorado. These issues include personalized benefits such as reduced number of accidents, employment growth, increased personal income and reduced travel time.

The statewide desktop study could be accomplished quickly (about 6-8 months) and relatively inexpensively (about $100,000, considerably less than the cost of a region-by-region study). The statewide study could also identify the data needs for a longer, more complex region-by-region analysis. This larger future study might be sponsored by groups other than CDOT.

I. INTRODUCTION

The Colorado Department of Transportation (CDOT) retained Felsburg Holt and Ullevig (FHU), a transportation engineering firm; and BBC Research and Consulting (BBC), an economic research firm, to:

- Identify the types of investment benefits that resonate with stakeholders;
- Learn the best ways of communicating information about these benefits to target audiences;
- Research alternative methods for economic benefits quantification; and
- Develop an approach and a scope of work for an economic benefit study of transportation investment in Colorado.

This research provides a necessary first step in considering a larger study of the economic benefits of transportation investment specific to Colorado.

Background

Many Departments of Transportation (DOTs) across the U.S. have studied the economic benefits of transportation investment in their states. Others have performed similar studies at the local, multi-state and national levels.

There is a wide variation in the types of benefits evaluated in these economic benefit studies. For example, a study conducted for the Kansas DOT quantified system user benefits such as changes in commute times, accidents and vehicle operating costs. This study also evaluated non-user investment benefits, including changes in air and noise pollution, urban sprawl, productivity, and economic development. Alternatively, a study in Wisconsin examined the economic impacts of the construction itself and, through multiplier effects, the resulting jobs and spending during the construction phase. Other studies have examined a variety of other system user benefits, such as gas savings, faster commute times, reduced stress from driving and business cost savings.

The intended target audience influenced the development and direction of each of the studies we researched. For example, the Wisconsin study calculated the rate of return associated with transportation investment in the state as a way to communicate the importance of transportation spending to the Wisconsin State Legislature. A study in New Jersey was initiated in order to assist New Jersey state agency staff with comprehensive planning issues pertaining to a statewide transportation plan, including land values, residential and industrial relocation, and other benefits largely associated with improved public transit. The New Jersey DOT also used study results to build a coalition in support of transportation funding.

Approach

The FHU study team used several techniques to complete this research.

Literature review. As a first step to this analysis, the study team conducted a literature review of available studies on the economic benefits of transportation investment. The purpose of this review was to:

- Assess the state of knowledge on the economic benefits of transportation improvements;
- Establish the groundwork for recommendations on methodologies to be used in a Colorado study; and
- Examine how different groups present economic benefits information to decision-makers and the public.

The literature review focuses on statewide and national transportation studies. It consists of both peer-reviewed journal articles and studies performed on behalf of other state departments of transportation and industry groups.

Key person interviews. The study team also contacted several of the authors and agencies responsible for studies conducted at the state and national levels. Through these key-person interviews, we obtained information including the purpose of each study; the study's relative success, target audience, cost, funding agency or organization; and other information specific to each study. Additionally, these interviews provide insight into different methodological choices.

Focus groups. As a second part of this research, the study team organized a series of focus groups with stakeholders and potential audiences throughout the state. These focus groups helped us determine:

- Whether a study of the outcomes of investing in transportation in Colorado would be valuable;
- Types of investment benefits that should be studied; and
- How best to communicate benefits to different audiences.

BBC conducted seven focus groups throughout the course of the study. These groups included those listed on Exhibit I-1.

Exhibit I-1.
Focus Group Participants

Target Audience	Focus Group Participant
Planners and public works directors who are knowledgeable of transportation related issues	■ American Planning Association, Colorado Chapter
Regional, multi-county associations of policy leaders	■ Progressive 15 ■ Action 22 ■ Statewide Transportation Advisory Committee
Business organizations	■ Colorado Association of Commerce and Industry ■ Colorado Farm Bureau ■ Move Colorado

Based on findings from the literature review and focus groups, the study team worked with CDOT to develop the scope for a study of the economic benefits of transportation investment in Colorado. We have also recommended evaluation criteria for CDOT to consider in selecting a contractor for this proposed study.

Report Organization

Section I introduces this study and the study team's methodology. Section II presents findings from the literature review. Section III discusses feedback obtained through the focus groups, and Section IV summarizes the key-person interviews. Section V outlines potential options for a Colorado-wide study of the economic benefits of transportation investment. Section VI proposes a scope for a recommended statewide study. Section VII recommends evaluation criteria for selecting study contractors. There are two appendices to this report: Appendix A contains a list of research cited in the literature review, and Appendix B covers the focus group methodology in more detail.

II. LITERATURE REVIEW

As a first step to this research, the study team conducted a comprehensive literature review of studies examining the economic impacts of transportation investment. This review focuses on studies conducted at the state and national levels. It consists of peer-reviewed journal articles and studies performed on behalf of state departments of transportation and industry groups.

This section organizes the findings of the literature review through a series of topics related to transportation benefit studies. Specifically, this review addresses:

- Audiences interested in these types of studies;
- Types of studies conducted;
- Range of benefits evaluated; and
- Study methodologies and related assumptions.

Audiences Interested in Transportation Benefit Studies

The National Cooperative Highway Research Program's (NCHRP) Guidance for Communicating the Economic Impacts of Transportation Investments stresses that it is critical to determine the purpose and target audience of a transportation benefits study. Determining the target audience for a report and the target audience's knowledge about transportation economics allows authors to effectively communicate the report's message.

For example, an effective method for communicating with state and federal policy makers may be to ensure that business leaders are involved in the presentation of the report's material. However, in order to communicate with the public, it may be more effective to utilize different forums, such as the Internet or the local media in order to communicate a message that will resonate with the public (e.g., job creation in rural areas or regional competitiveness in urban areas). This report also emphasizes that regional or local public demographics could emphasize the efficiency of any given message (NCHRP, 1999).

Policy makers. Department of transportation officials, state legislatures, local planning departments and other policy makers generally recognize the importance of investing in transportation infrastructure. This may be due to receiving complaints of congestion on local roadways, an understanding of the importance of transportation to economic development, issues of national security and many other reasons. For policy makers, a complete understanding of the benefits and costs of transportation investment is particularly important when limited public funds must be allocated among competing projects.

Policy makers often use analyses of the benefits of transportation spending simply to communicate to the general public or other public officials why transportation investments are important. For example, in both Michigan and Kansas, studies of the economic benefits of transportation investment are continually updated to incorporate new transportation planning initiatives. Representatives from these states believe that the

effective communication of the benefits of transportation has led to increased support for transportation spending from lawmakers and the public.

Policy makers also use reports about the benefits of transportation investment as a tool to help allocate transportation funding more efficiently. For example, the Montana Department of Transportation recently developed the Highway Economic Analysis Tool (HEAT). HEAT allows decision makers to evaluate the economic development impacts associated with highway transportation improvements. This quantification allows state planners to weigh different projects against one another by developing benefit-cost ratios for potential highway improvements (Wornum et al., 2005).

Analyses of transportation investments can also provide opportunities for policy makers to obtain input on transportation infrastructure from residents and local stakeholders. A recent report done for the Virginia Department of Rail and Public Transportation was conducted in order to better understand the concerns of Virginia residents (Southeastern Institute of Research, 2004). This study did not attempt to quantify any benefits from transportation investment, rather, the study authors conducted focus groups with stakeholders and residents from around the state of Virginia in order to understand their concerns, wants and needs.

Stakeholders. Many reports are completed on the behalf of specific businesses and groups directly affected by the decision to make an investment in transportation. These groups often finance studies that outline the positive impacts of transportation investments on a region's economy.

One such stakeholder group is the Transportation Development Association of Wisconsin (TDA). TDA recently completed a study that documented the rate of return on investment in transportation infrastructure (Cambridge Systematics, 2003). TDA uses this report to communicate the benefits of transportation to the local press and state policy makers. A group similar to TDA, but with a focus on California's transportation system, is the California Infrastructure Coalition. This group publishes a monthly newsletter and has published several studies outlining the impact of spending on transportation infrastructure in California (see for example, SAER Group, 2005).

The American Road and Transportation Builders Association (ARTBA) is a national stakeholder group that finances transportation research. In addition to tracking all local, state and federal spending on highway construction and maintenance, this group publishes many reports at the state and federal level outlining the impacts of transportation spending on the economy. For example, a 1999 ARTBA report documented that in 1998 public and private expenditures on transportation construction totaled $160 billion, employing over 2.2 million people in the U.S.

Academics. Policy makers and stakeholders often rely on academic studies to provide useful information on the economic benefits of transportation. While policy makers are generally interested in the return on a particular investment made in their state or region, academics have studied nearly every aspect of increased investment in transportation infrastructure. There is a large amount of academic literature surrounding the impacts of transportation infrastructure on the aggregate economy, land uses, labor markets, and many other

transportation-related issues. Academics are often hired (either as a primary or a secondary researcher) to conduct research on project- or region- specific analyses.

Types of Transportation Benefit Studies

Transportation infrastructure can influence many parts of a region's economy, and there are many different groups of people interested in quantifying these impacts. These groups often express the impacts of transportation investment in different ways depending on their intended target audience and goal. This has led to a large amount of literature surrounding the benefits of transportation investment, which may make it difficult to determine which analyses are well done and important.

Studies that are most useful for policy makers consist of the following three categories:

- Regional studies;
- State studies; and
- Top-down studies.

Regional studies. Regional studies can focus on an area as large as a group of states or as narrow as a particular metropolitan area. Studies encompassing groups of states typically focus on major highways and connecting corridors while studies at the metropolitan level generally focus on specific local issues or proposals.

An example of an analysis of a regional transportation project involving several state departments of transportation is the Ports to Plains Corridor Development & Management Plan (CDOT et al., 2004). "Ports to Plains" is a comprehensive study of the impacts, economic and otherwise, of the development of a road corridor between Denver, Colorado and Laredo, Texas. Benefits quantified include: safety benefits, travel time savings, vehicle operations savings, employment benefits from construction spending, increased tourism to areas in Texas, increased tax revenues and benefits resulting from an increase in NAFTA-related trade. The report concludes with a benefit-cost analysis that states every $1 in project costs will generate $3 in regional economic benefits.

The City of Denver commissioned a metropolitan level study to assess the economic benefits of a publicly financed light rail system in the Denver Metro Area (The Adams Group, 2004). The Denver Regional Council of Governments (DRCOG) also recently analyzed the benefits of an investment in highway transportation in the Denver Metro Area (BBC Research and Consulting, 2005). In Philadelphia, Richard Voith (1998) analyzed not only the benefits of a highway system, but also the geographic distribution of the benefits. He found that highway investment benefits suburban residents relative to those living in the city core, producing "an economically significant, although not overwhelming, incentive for suburban rather than city locations for people and firms."

Regional studies have also focused on the economic growth stimulated by highway development programs aimed at improving the connections between rural and urban areas within the state. For example, the Appalachian Development Highway System attempted to improve transportation in rural areas of Appalachia.

The project included the development of roadways in several different states. Several studies (e.g., Isserman et al., 1989 and Rephann and Isserman, 1994) attempted to parse out the effects of these roadway developments on the local economies of the area. The analyses found that high economic growth rates and proximity to the highway development are correlated; however, the causality of this relationship remains suspect.

Several state departments of transportation have also studied the effects of highway bypasses on small towns in rural areas. When considering a highway bypass for a town, policy makers and local residents are often concerned that the bypass will have detrimental effects on local business districts. However, most studies have found that bypasses generally do not result in adverse economic effects on a town. For example, a 1998 study from the Wisconsin DOT compares seventeen bypassed communities to a control group of similarly sized towns that were not bypassed. The study concludes that bypassed communities view the bypasses as beneficial to the town overall. Studies of bypassed towns in Kansas, Iowa, Texas and North Carolina all reach similar conclusions (Economic Development Research Group, 1999).

State studies. There is a wide-range of studies that have been conducted at the state level, most often for departments of transportation and other state policy makers. A review of available state studies found that the types of studies vary, ranging from qualitative discussions about the impacts of transportation investment to quantitative valuations identifying the most efficient allocation of state spending.

In an ongoing study entitled "Transportation and the Texas Economy," Burke et al. (2005) surveyed every state department of transportation in order to determine which states had conducted economic benefit studies. The survey indicated that out of the 49 states responding, 16 state departments of transportation had completed some type of economic valuation study, while 33 departments indicated that no economic valuation study had been done (note that not all 16 economic valuations are published and publicly available).

Examples of studies that are mostly quantitative in scope include a study for the Oregon Department of Transportation (DKS Associates, 1999, HLB, 1999). The report included many interviews from representatives of business and industry in the Portland area. The findings verified that business decisions are heavily influenced by the transportation infrastructure available, and that congestion was an issue for many of the businesses. Many commercial businesses did not think that congestion was an issue today, but that transportation investments should be made now in order to prevent congestion in the future.

A study conducted for the South Carolina Department of Transportation (Moore School of Business, 2003), quantifies the short-term impacts of spending on transportation but does not attempt to quantify the long-term benefits from an investment. Other studies quantify only the most basic benefits from an investment. For example, a study for the TDA of Wisconsin (Cambridge Systematics, 2003) analyzes, but does not include in its benefit-cost ratio, the short-term benefits from transportation investments. The report goes on to study time savings for individuals and time savings for on-the-clock commercial commuters, which together compose the study's benefit-cost ratio, found to be approximately 3:1. The study also contains frequent "side boxes," which describe the importance of transportation infrastructure for particular firms or industries.

Economic Development Research Group (2005) takes an approach for the Michigan DOT similar to that taken by the TDA of Wisconsin. EDRG's study analyzed both the short and long-term benefits from an investment in transportation infrastructure. Similar to the studies done in South Carolina and Wisconsin, the study first examines the short-term impacts from state spending on construction and engineering firms in the state. However, the study also uses the Regional Economic Models Inc. (REMI) economic and demographic model to estimate the benefits to individual commuters and businesses from changes in trip speeds caused by transportation investment.

Researchers from the City College of New York (Paaswell et al., 2002) analyzed the benefits of New Jersey's highway and rail system for the New Jersey DOT. The study tested whether counties in New Jersey with greater improvements in accessibility in the 1990s also had higher employment or income growth. Specifically, the authors determined job accessibility, based on the number of jobs accessible within a one-hour commute of the county, then statistically measured the correlation between the accessibility index and jobs and income growth. The authors find that there is a positive correlation between job accessibility and economic well-being. They conclude that New Jersey's investment enabled, but did not generate, economic growth in the state. The authors identify other factors important to economic growth in a region. The study also includes an estimate of the immediate construction impacts that occurred due to transportation spending.

A study prepared for the Maryland State Highway Administration (RESI, 1998) examines the financial impacts of transportation spending in Maryland between 1982 and 1996. The authors conclude that transportation spending during the study years supported 23,400 full-time jobs in the state, and that for every dollar spent on transportation in Maryland, industry saved approximately 17 cents per year.

A comprehensive analysis conducted for the Kansas Department of Transportation (Burress and Oslund, 1999) evaluates the Kansas Comprehensive Highway Program, a state spending bill that provided funds for investment in Kansas' highway system. The paper's basic benefit-cost ratio includes four benefits from investment in Kansas' highways: the financial effects associated with state spending, user benefits from time savings and reduced vehicle operating costs, the benefits from reduced accidents (these benefits were actually negative as fatalities in the state increased due to the increase in speeds), and the benefit to Kansas drivers because of comfortable and easy driving conditions. Overall, the study's benefit-cost ratio was found to be between 3 and 7, depending on the discount rate used in the calculation. The authors also discuss equity issues, the value of having additional options for transportation and the author's conclusion that much of the new business location accrued not because of new development but was simply a shift of development occurring elsewhere in the state.

Top-down studies. The Congressional Budget Office (CBO, 1998) provides a useful distinction between bottom-up and top-down studies. Bottom up studies incorporate local impacts and costs in order to draw conclusions about state or even nation-wide transportation investments. One example of a bottom-up study is the Kansas study mentioned above. The CBO notes that bottom-up studies have the convenience of being easily adapted for individual projects and investments, but often take an overly optimistic view of transportation investments, underestimating costs and overestimating benefits.

Conversely, top-down studies use complex statistical models to estimate the relationship between broad sectors of the economy and investments in public infrastructure. These studies employ cross-sectional or time-series data on macroeconomic conditions in order to test the correlation between economic growth and infrastructure investment. For example, Aschauer's work (1989, 1990) statistically tests the relationship between infrastructure investment at the national level and U.S. economic output. The conclusions of these early studies were met with suspicion from many economists for a variety of reasons. Many economists were skeptical because these studies found the return on infrastructure investment to be quite large – these studies implied that the return on an investment in public infrastructure was larger than private investments, a finding that was considered by many to be implausible. Aschauer's results were controversial and generated numerous papers that either supported or criticized his results. For two representative papers, see Munnell (1990a), and Hulten and Schwab (1991).

One way in which researchers were able to sidestep some of the statistical issues that arose out of Aschuer's use of national time-series data was by using state level data for all 50 states. For example, Munnell (1990b) estimates a production function on cross-section data for U.S. states. Holtz-Eakin (1994), McGuire (1992) and Garcia-Mila et al (1996) all run similar tests. These tests generally find that public infrastructure has a modest positive influence on economic productivity. The upper bound estimates put the return on capital to be on par with private capital. On the low side, studies find that the return is zero or close to zero. See Munnel (1992) for an overview of this debate.

This type of macroeconomic study is usually done at the national level. However, it is possible to test this relationship at the state level. Boarnet (1996) uses data from California counties to test whether counties with a large stock of highway capital also have high economic output. The results show that counties with large capital stocks have increased economic output. However, the results also indicate that counties adjacent to counties with large highway stocks see their economic output decreased, which may suggest that economic growth in one county comes the expense of growth in neighboring counties.

A method that allows researchers to avoid some of the statistical problems involved with top-down macroeconomic studies is to focus on business costs instead of economic productivity. These types of studies usually focus on manufacturing industries, and find that investments in roadways do provide savings to the economy, though the return on the investment is generally lower than what is found in the earlier works that examined productivity. Using this methodology, Shah (1992) estimates returns to public infrastructure to be less than 7 percent. Morrison and Schwartz (1991) and Lynde and Richmond (1993) find similar effects. A study for the Maryland Department of Transportation (RESI, 1998) estimates the savings to manufacturing from state investment in transportation to be 17 cents for every dollar spent on transportation.

Nadiri and Mamuneas (1996) estimate the cost functions for several U.S. industries using data from 1950 to 1989. They find that the benefit of highway capital is positive at the margin for the larger economy but that the benefits vary significantly across industry type. The marginal benefits are found to be negative for certain non-manufacturing industries. They also find that the return to highway capital was highest during the 1950s and 1960s (about 35 percent), but declined during the 1970s and 1980s (to about 10 percent).

Study Methodologies and Related Assumptions

While the scope, purpose and target audience for transportation studies can vary, all studies require some basic assumptions to be made. Before a report can quantify any benefits from an investment in transportation infrastructure, the authors of the study must:

- Develop an investment scenario;
- Construct a base case scenario; and
- Define the benefits to be included in the analysis.

Develop an investment scenario. The first step in a study of transportation investment is to define the investment scenario(s). The investment scenario further defines the types of transportation improvements and the level of investment associated with these improvements. The modes of transportation, study period, and the geographic scope of the study are also defined in this process.

Transportation modes. The majority of state and national studies focus on the benefits from investing in highways. See, for example, Burress and Oslund (1999), who completed a study of Kansas' Comprehensive Highway Program, and RESI (1998), which completed a study outlining the benefits of highway investment to businesses. Some state-level reports do consider a broader definition of transportation infrastructure. The Colorado Department of Transportation recently completed a study (CDOT, 2003) of the economic impact of all public-use airports in the state. The report quantified the economic impacts of on-airport spending, visitor spending, airport-dependent business impacts, and related multiplier effects. Another report completed for the Wisconsin Department of Transportation (HLB, 2003) analyzed the benefits of public transportation to healthcare, employment, education and congestion management in the state. Regional studies tend to focus more on public transportation and local roads.

Study period. State-level studies often focus on particular state spending programs or examine spending that is defined over a specified period. Additionally, studies can be either retrospective or prospective in nature. Retrospective studies analyze the benefits of past investments and often examine specific projects in order to prove their worth. Prospective analyses, on the other hand, are often completed in order to influence public support for a potential investment. Both study types compare the investment scenario to a base case scenario.

The Maryland State Highway Administration, the Kansas Department of Transportation and the State of New Jersey all completed retrospective analyses of the economic impact from spending on highways during the 1990s. The purpose of these studies was to determine the benefits of past state spending. The Kansas study evaluated both past and future benefits, while the others only examined past benefits.

An example of a prospective study is the Wisconsin TDA study (Cambridge Systematics 2003). This study estimates the benefits of new transportation projects outlined in the *2020 Wisconsin State Highway Plan*. The focus within the report is not necessarily on the benefit-cost ratio or the return on the state's investment (although a benefit-cost ratio is calculated), rather the focus is on the employment and output impacts of this future state spending.

Another prospective report was recently completed in order to influence the decision of the FasTracks vote in Denver in the fall of 2004 (The Adams Group, 2004). The study estimated the employment and output impacts that would accrue if taxpayers agreed to finance a light rail system. BBC Research and Consulting recently completed a report that outlined the benefits from an investment in transportation infrastructure in Denver (BBC Research and Consulting, 2005).

Geographic scope. When completing an analysis of government spending, it is important to carefully define the study area given its influence on the costs and benefits that are studied. Studies done at the national level tend to show more benefits than studies done at the state level (Munnell, 1992). Typically, studies done at the state level measure benefits and costs that are borne by people from that state. For example, Burress and Oslund (1999) explicitly state which costs and benefits are included in their analysis—federal spending is not included as a cost in the report because only a small portion of these taxes are paid for by Kansans. Benefits to residents living in other states are also not included. Studies done for the states of New Jersey and Maryland also limit the scope of their benefits and costs to those realized by residents of the state, although these reports acknowledge that benefits did accrue to residents of other states as well.

Having a clear understanding of the geographic scope of a study is also important when studying business development associated with an investment in transportation. In calculating the benefits from a particular investment in transportation, the analyst must determine whether a development following an investment is actually new or is simply a business that has relocated from somewhere within the study area. A firm relocating from one part of the study area to another does not result in new economic growth for that area. The study done for the Kansas DOT explicitly assumes that any new locations for businesses because of the transportation investment are not new growth; rather they are businesses that relocate from some other part of the state.

Construct a base case scenario. A transportation benefit study must analyze net, rather than gross, benefits. Analyzing the net benefits involves creating and analyzing a base case scenario without the transportation investment. By comparing the benefits that accrue under the investment scenario to that of the base case scenario, one can identify the true user benefits from a transportation investment. All studies include a base case scenario, but many studies include a base case scenario only implicitly and in these cases the study may be incomplete.

When analyzing the Kansas Comprehensive Highway Program (KCHP), Burress and Oslund (1999) explicitly differentiate between the base case (without KCHP) and the investment scenario (with KCHP). The base case did result in some benefits for the Kansas economy. For example, reduced state spending in the base case world would result in fewer taxes paid by residents, which would have positive financial impacts for the state's economy. However, this reduced spending would also impose costs on the state of Kansas. For example, federal highway matching grants were reduced because of the state's inability to provide matching funds. The study authors also assumed that certain variables did not change between the two situations. Examples of constant variables include miles traveled in Kansas, and therefore federal highway taxes paid by Kansans. Additionally, highways and bridges in the state were assumed to deteriorate at a specified rate with

limited maintenance and no reconstruction spending. By analyzing both the investment and the base case, the analysis attempts to estimate the actual benefits of the KCHP.

Other studies only implicitly include a complete base case scenario. For example, a study prepared for the Wisconsin TDA analyzes $5.8 billion in future state transportation spending over 21 years. However, the study does not mention or consider alternative uses for the $5.8 billion—a necessary step in estimating net benefits. Studies completed for the South Carolina Department of Transportation (Moore School of Business, 2003), the Michigan Department of Transportation (Economic Development Research Group, 2005) and the California Infrastructure Coalition (SAER Group, 2005) use a similar approach.

The Congressional Budget Office (CBO) has emphasized the importance of including the opportunity cost (i.e. alternative uses for investment funds) when analyzing the costs and benefits of government spending (CBO, 1998). Analyses included in this literature review rarely value the opportunity cost of project spending. The CBO outlines several methods to value the opportunity cost of a dollar of tax revenues. An upper-bound approach is to base the opportunity cost on returns to private investment. The Office of Management and Budget takes this approach, arguing that the most valuable alternative use of federal investment funds is private investment, not consumption. The OMB uses the standard rate of 7 percent (in constant dollars). A lower-bound approach, preferred by the CBO, uses a discount rate based on the government's cost of borrowing—2 percent per year in constant dollars.

Types of Transportation Benefits

In general, the different types of transportation benefits can be grouped into short-term impacts, direct user impacts, productivity gains, worker costs and other benefits.

Short-term impacts. The immediate economic impact from investment in transportation comes from government spending on transportation projects. This spending directly affects demand for construction services, raw materials, labor, and other goods. Secondary economic impacts occur as this money re-circulates through the economy as businesses purchase additional goods and services and workers spend their wages.

Most state-level analyses include some estimate of the short-term benefits from government spending. A study done for the South Carolina Department of Transportation (SCDOT) shows that the $950 million per year that the SCDOT spends on road construction and maintenance each year produce a total of $2.1 billion in economic output and supports 24,000 jobs in the state. The SCDOT analysis does not evaluate impacts of alternative spending of that money (for example as tax refunds). The SCDOT report also does not quantify benefits of the roads themselves and therefore likely underestimates the benefits of road expenditures to the South Carolina economy.

Burress and Oslund (1999) found that government expenditures on the Kansas Comprehensive Highway Program between 1990 and 1997 yielded a benefit-cost ratio of 0.8. That is, without taking into account any benefits of an improved transportation system in Kansas, state spending on road construction nearly paid for itself in benefits to the Kansas economy.

Direct user benefits. While impacts of government spending benefit a region's economy, these benefits are short-lived and generally do not impact a region's productivity in the long-term. The largest benefits that accrue from an investment in transportation infrastructure are recurring benefits such as reduced congestion, increased safety and economic development. Recurring benefits can accrue for as long as the roadway exists (and is maintained). Recurring benefits include direct user benefits as well as secondary benefits.

Changes in travel costs are the most direct benefits to users of an improved transportation system. Travel costs include time savings, reduced vehicle operating costs and increased safety. Secondary benefits accrue to those individuals who are directly affected by a transportation improvement as well as to those who may not use transportation. Secondary benefits include increased productivity, reduced inventory costs, and the benefits of economic development.

Time savings. The construction of a new roadway, the improvement of an old roadway or an investment in public transportation will directly or indirectly affect the travel times of commuters in the region. By calculating the time savings that come about because of any particular infrastructure improvement and applying generally accepted unit values of time savings (usually wage rages, see Weisbrod et al., 2001), it is possible to translate time savings into monetary value. Reduced travel times are generally the largest benefit from any transportation investment. These benefits accrue to both individual commuters, who value decreased time spent commuting, and businesses, as on-the-clock business travel can be accomplished more productively.

However, there are additional benefits to reduced travel times. Reduced commute times for individuals may lead to a higher quality of life, even if these trips do not directly increase business productivity. For example, economic research has shown that shorter commutes increase job satisfaction. Longer commutes may also have detrimental effects on employers. Traffic congestion may limit the market area for new employees. Additionally, Zax (1991) found that employers pay higher wages to compensate for longer commutes. Thus, analyses of the benefits from transportation infrastructure must be careful not to underestimate the total social value of such an investment.

Reduced vehicle operating costs. In addition to affecting travel time, the improvement of transportation infrastructure may reduce the costs of operating a vehicle. These benefits come from driving on improved street materials, decreasing the wear and tear of driving a vehicle. However, the amount of benefit due to reduced vehicle operating costs depends on the particular transportation investments involved. A transportation investment in a metro area may decrease the amount of stop-and-go traffic during peak travel hours, thus reducing the wear and tear on vehicles and the amount of gasoline used during a commute. However, if a transportation investment improves interstates/highways between cities, certain vehicle operating costs may actually increase. Improved pavement conditions should decrease the wear and tear on brakes and tires per mile driven, but an increase in the speed of traffic may increase the amount of gasoline used on any given commute.

State-level analyses that include the changes in vehicle operating costs due to an investment in transportation infrastructure generally find net benefits from changes in operating costs. For example, the Kansas

Department of Transportation finds that investment in the Kansas Comprehensive Highway Program led to higher speeds, which increased the operating costs of vehicles in Kansas because of increased fuel consumption. However, these increased costs were offset by reduced operating costs from better pavement conditions (Burress and Oslund, 1999). A study analyzing the user benefits from an improvement of a major North-South corridor in Indiana (Kaliski et al., 1999) found that the improvements would actually increase the cost of operating a vehicle because of increases in average speed along the corridor.

At the metro level, if a transportation investment is likely to decrease the amount of congestion in the area by reducing the amount of stop and go travel during rush hours, the savings in vehicle operating costs can be great. A study of the effects of an investment in Denver's transportation system estimated that the cost of operating a car during a typical Denver commute was 5 cents per minute. Study results implied that decreases in stop and go traffic and increases in the average speed of a commute in Denver would lead to significant savings in the operating costs of vehicles of Denver residents (BBC Research and Consulting, 2005).

Increased safety. A large social impact of an investment in transportation infrastructure is safety. Transportation investments may result in reduced accident rates and will affect other fatality rates. Research has found that it is generally variation in speed that influences accident rates, although for highway travel, greater speeds increase the severity of accidents. This relationship has not been determined for urban roadways (Stuster and Coffman, 1998). Researchers consistently find that accident and fatality rates are much lower for interstate travel than on two-lane highways. A study by Forckenbrock, Foster and Pogue estimates that if a typical two-lane highway is converted to a four lane highway with a wide shoulder, the accident rate per million vehicle miles traveled would drop from 1.28 to 0.56 (Forckenbrock, Foster and Pogue, 1994, from ICF Consulting, 2001).

Quantifying the safety effects of highway investment is technical and difficult, particularly because infrastructure investment may have different implications for different measures of safety. For example, KDOT found that investment in the KCHP resulted in a safer transportation system, but that the investments increased speeds on highways in Kansas. The net effect of the investment was that the new system reduced the number of accidents in Kansas, but increased the number of fatal accidents. Thus, the net safety impacts found in the KDOT study were ambiguous. In a study of the improvement to a North-South corridor in Indiana, researchers find that the number of accidents in the region would decrease by 2 percent, resulting in a large benefit for residents (Kaliski et al., 1999).

Some state-level studies simply do not address safety issues. For example, a study done for the Michigan Department of Transportation (Economic Development Research Group, 2005) only quantifies the benefits from time savings and the short-term financial effects of transportation investment.

Productivity benefits. Transportation infrastructure investment can increase business productivity. Productivity increases can result from reduced logistics and inventory costs and benefits from the changes in market area and industry mix (also called agglomeration economies).

Logistics and inventory costs. Recent economic literature assesses the impact that logistics costs have on the decision about where to locate a business. When deciding where to locate, firms must trade off the costs of acquiring and transporting goods with the cost of land and labor in any given area. Logistics cost considerations are central to not only location decisions, but also to freight modal choice and frequency of trips (McCann, 1993). Production location, transportation mode and shipment frequency are all interconnected decisions faced by firms that depend on the structure of the local transportation system.

Another area of research involving logistics costs analyzes so-called "just-in-time" processing. JIT literature emphasizes speed and reliability of delivery services (Blackburn, 1991). It is estimated that 28 percent of U.S. production is already based on JIT production practices and this figure continues to rise (Cambridge Systematics, 2002). JIT systems rely on frequent delivery of inputs in order to reduce the need for warehousing, thus decreasing costs to firms. An inadequate transportation infrastructure can impose costs onto local firms as JIT delivery can suffer from delays or become erratic, forcing firms to expand their inventories of production inputs. Often the benefits to JIT systems are generally not included in local cost-benefit analyses of local transportation improvements, therefore undervaluing the benefit of any particular transportation investment.

Agglomeration economies. In many industries, when firms cluster together geographically an industry can gain advantages through increased efficiency and decreased production costs. Classic examples of industries with agglomeration economies are the technology industry in Silicon Valley, the film industry in L.A., and the financial industry on Wall Street. Being located to similar firms allows for sharing inputs, attracts a specialized labor pool to the region and enhances the sharing of knowledge.

If a transportation investment improves a regional transportation system, firms will gain access to a wider variety of input products. This will allow firms to minimize costs, and will spur growth in the downstream industries. Similarly, an improvement in a transportation system will also increase the market area for potential employees from which employers can recruit labor. This expanded labor pool will encourage a better match of jobs and relevant labor, leading to improved productivity, and therefore higher wages, of workers. The literature surrounding agglomeration effects is important because it illustrates the value of transportation investments not only for businesses but also for future economic growth of cities or regions.

Changes in infrastructure that increase accessibility to markets may decrease the marginal cost of production. Many empirical studies have confirmed the value of agglomeration effects to firms. The importance of accessibility and market size as it affects business productivity becomes apparent when one looks at the major differences in productivity across regions. Urban industries are generally much more productive than their rural counterparts, presumably because of their greater access to specialized inputs, allowing for greater productivity (Krugman, 1995, and Ciccone and Hall, 1996).

Worker costs. Another branch of academic research examines how variation in location explains wage and rent patterns within the area (see White, 1976). It is expected that households are willing to pay a higher rent for a house with low commuting costs. Additionally, it is expected that businesses compensate workers for higher commuting expenses. Several empirical studies have been conducted in order to assess this

relationship. Madden (1985) analyzed data obtained from people who recently changed jobs, and found that employees do receive compensation for increased commuting costs. Zax (1991) used data from Detroit's labor market and commuting to confirm that employers pay higher wages to compensate for higher commuting costs. This literature confirms another value of adequate infrastructure to employers, because with increased transportation congestion comes an additional cost to employers, the cost of compensating their employees for commutes to and from work.

A study done for the New Jersey Department of Transportation (Paaswell et al., 2002) also confirms this relationship. The study found that if a county could decrease its average commute to work time by 10 percent, the result would be a 4.8 percent increase in the rate of job growth and a 15.7 percent increase in the rate of income growth. The authors conclude that the transportation investment does not generate economic growth, but instead it enables the growth to occur. In particular, they stress that other factors vital to economic growth must be present—a skilled workforce, proper zoning and institutional policies, and other basic components of a strong economy.

Other Impacts. The remaining benefits from transportation investment include those benefits that are difficult to quantify in monetary or numeric terms and are often incorporated into transportation benefit studies in qualitative terms. These types of benefits include:

- Air quality;
- Quality of life considerations;
- Network externalities; and
- Geographic changes.

Air quality. Any transportation investment that has a significant influence on traffic flow is bound to affect the air pollution created by this traffic. Small and Kazimi find that particulate matter brought into the atmosphere from driving impose costs equal to or greater than those from tailpipe emissions (1995). However, quantifying the economic impact of changes in air quality is extremely difficult. Auto air pollution is determined by several factors, including the speed of the vehicle, the variance in speed and the road type driven on. Emission rates for most pollutants vary at different rates by vehicle speed as well as the type of car being driven. Additionally, the impact of some pollutants may be local, while the impacts of others may be regional or global in scale.

Estimates of the costs of air pollution range from 1 to 8 cents per vehicle mile traveled, depending on study assumptions (Litman, 2002). However, quantifying changes in the economic value of air pollution caused by an investment in transportation often lead to ambiguous results. For example, in a study for the Kansas Department of Transportation, Burress and Ohlund (1999) find that a state-wide investment in highways most likely reduced pollution in Kansas. However, under a "worst-case scenario," pollution from highway traffic actually increased because of the investment, costing the Kansas economy between $50 and $80 million in pollution-related costs. Similarly, research about the benefits of infrastructure investment in Denver found that while some pollutants would decrease because of the investment, others would increase or not change at all (BBC Research & Consulting, 2005).

Quality of life considerations. There are many other benefits that accrue from an investment in transportation infrastructure that are more difficult to quantify and are rarely included in benefit-cost analyses. For example, the quality of life in a region may be improved by better access to alternative destinations. If a transportation investment leads to an increase in the number of possible destinations for shopping or entertainment, residents are better off than they previously were.

The literature indicates that system reliability is another important factor in a region's transportation system. For example, a commute that always takes 30 minutes may be preferable than one that on average takes 30 minutes, but regularly varies between 20 and 40 minutes. In a study completed for the California Department of Transportation, 44 percent of Californians indicated that it would be better to reduce surprise delays on highways than to decrease the normal time of a trip (BBC Research & Consulting, 2001).

A typical response by commuters to infrastructure congestion is to shift the commute time, mode or route of travel. For example, by leaving for work a half hour later than usual commuters may miss peak commute hours. Another response to congestion may be to take alternate routes to one's destination. Other commuters may respond to congestion by shifting to public transportation (McCann, 1993). Even though these shifts may result in time-savings for the commuter, there is a cost imposed by having to travel at sub-optimal times.

Another important issue concerning transportation infrastructure may be the accessibility of education and employment centers. Rural areas may benefit from improved access to job centers, and other goods and services. Another branch of literature describes the spatial mismatch of low-skill jobs and low-income neighborhoods. Efficient transportation connecting these areas to the rest of the city would be beneficial not just for the neighborhood itself, but also for the well-being of the entire region.

Similarly, providing first-rate access to higher education facilities, performing arts or museum districts may result in a more educated, more productive, happier populace. Transportation infrastructure can serve as a catalyst for obtaining education. A recent survey of Wisconsin public transportation found that of 22.6 million education-related trips, 2.8 million of those trips would not have occurred if not for public transportation (HLB, 2003).

Network externalities. Highway investments improve accessibility between cities and regions. Increasing the number of potential destinations accessible from any point in the network is beneficial to everyone who uses the network. When a network is fairly incomplete—such as the U.S. highway system in the 1950s—every new highway built added to the potential accessibility of the entire network. However, as the U.S. highway network has become more complete, the incremental benefits to the network of any new highway built begin to diminish. Nadiri and Mamuneas (1996) find the return to highway construction was highest during the 1950s and has decreased significantly through the 1980s. One implication of this change is that economic benefits from an investment today are likely to be highly localized. Gramlich (1994) mentions that license plate studies show that even on major interstate highways the majority of plates are from within the state, suggesting that any benefits from a highway project are likely to be realized locally.

Geographic impacts. Investment in transportation infrastructure also influences the geographic structure of the local economy. However, transportation infrastructure and metropolitan growth is extremely complex and encompasses several distinct issues. Transportation development is often seen as a cause of central city fiscal distress, urban sprawl and increased pollution. However, as Boarnet and Haughwout (2000) point out, the direction of causality between highway investment and suburban and exurban growth is not clear.

The literature regarding the relationship between transportation infrastructure and metropolitan growth is vast (two excellent review are Boarnet and Haughwout, 2000; and Burchell et al., 1998). However, the general consensus is that "highways influence land prices, population, and employment changes near the project, and that the land use effects are likely at the expense of losses elsewhere" (Boarnet and Haughwout, 2000). That is, transportation infrastructure influences the way cities grow, and gains that are made locally due to a transportation investment may very well come at the expense of another local area. Clearly, this has significant implications for public policy, and a sound infrastructure investment plan should take into account the effects of transportation investments on economic development and the other negative externalities that are often ignored by policy makers.

Conclusions

This section of the report has provided a comprehensive review of the different approaches to transportation benefit studies through a series of topics including the audiences interested in these types of studies, types of studies conducted, range of benefits evaluated, and study methodologies.

Many Departments of Transportation (DOTs) across the U.S. have studied the economic benefits of transportation investment in their state. Studies have also been conducted at the local, multi-state and national levels. Although these studies all set out to determine the economic benefits of transportation investment, the means for delivering the message may differ. Per NCHRP's Guidance for Communicating the Economic Impacts of Transportation Investments, the effectiveness of a study depends on identifying the target audience and matching the proper research tool to effectively communicate with that audience (NCHRP, 1999).

The audiences most interested in studies of the economic benefits of transportation investment include policy makers, stakeholder groups and academics. Policy makers and stakeholder groups often use these studies to communicate to the general public and other public officials why transportation investments are important. Policy makers, including departments of transportation and state legislators, also use these studies as a means to allocate state transportation funding more efficiently. Additionally, research on the economic benefits of transportation investment has allowed policy makers to obtain input on transportation infrastructure from residents and local stakeholders.

The different types of studies most relevant to this research include regional and state studies. While the scope, purpose and target audience for the different types of transportation studies can vary, all studies require some basic assumptions. Before a report can quantify the benefits from an investment in

transportation infrastructure, the authors of the study must develop an investment scenario, construct a base case scenario and define the benefits to be included in the analysis.

The types of transportation benefits included in the different studies vary, again according to the study's goal and intended target audience. In general, the different types of transportation benefits include short-term impacts, direct user impacts, productivity gains, worker costs and other benefits. While the short-term impacts of government spending on transportation benefit a region's economy, this spending does not affect a region's productivity in the long-term. The largest benefits that accrue from an investment in transportation infrastructure are recurring benefits such as changes in travel costs, increased productivity and economic development.

III. FOCUS GROUP FEEDBACK

The study team conducted seven focus groups with transportation investment stakeholders throughout the state. These focus groups gathered feedback about the value of a transportation investment benefits study, the types of benefits that should be examined and how best to communicate study findings to target audiences.

Overview of Methodology

We began each focus group with a very general discussion about the benefits of transportation investment. This discussion focused on the usefulness of a study on the economic benefits of transportation investment in Colorado and what questions this study should answer. These questions helped us gauge participants' initial reactions to the topic at hand.

After this broad discussion, focus group members participated in two interactive exercises. The first exercise obtained feedback on the most effective way to communicate study results with different audiences. The second exercise obtained feedback on which types of transportation benefits were important to study in Colorado.

Throughout the course of the focus group, the moderator discussed several transportation benefit studies recently conducted in other states. As the audience became more familiar with the subject matter, the questions we asked became more specific. This section presents a summary of the general topics covered with each focus group. Appendix B contains a more detailed discussion of focus group methodology.

General Discussion Topics

Possible use of a study. Every participant generally agreed that a study of the economic benefits of transportation investment in Colorado would be useful. However, participants had differing views on the possible uses of such a study:

- Educate the public and the Legislature in order to increase support for transportation funding. Several participants stated that this type of study would help to justify the use of public funds on transportation and show the need for additional investment.
- Help determine where to invest in transportation. Many stated that a "biggest bang for the buck" type of analysis would help to make spending more efficient and would help to reduce politics associated with transportation investment.
- Broaden the scope of investment beyond traditional goals. Several participants feel the use of a study would be to incorporate land use and economic issues into the criteria on investment decisions.
- Compare economic benefits of roads and highways with other modes of transportation such as public transit.

Definition of investments in transportation. Almost every focus group participant agreed that the definition of transportation investment encompasses more than just traditional highway improvements. The general feeling is that many different modes of transportation should be examined as part of transportation investment, including highways, roads and bridges, air, rail, and public transit. A few participants extended the definition of transportation investment to include non-network investments in the freight moving industry. Others mentioned bike paths. Moving products through pipelines and moving information across communication networks were also mentioned.

Those in rural areas seemed to focus more on improved access to major hubs (via highways and rail) and basic road improvements, such as more paved roads. Participants in rural areas, and specifically in the agricultural sector, stressed the importance of improved access to markets through alternative modes of transportation such as rail.

Many participants stated that transportation investment should account for business, agriculture, recreation, and tourism, as well as rural, urban and suburban needs. Participants with planning experience stated that transportation investment should incorporate land use issues.

Geographic focus. There was overwhelming agreement across focus groups that a study on the economic benefits of transportation investment in Colorado should include an analysis of benefits by region within the state. Broad regions identified include the Eastern Plains, the Western Slope, and the Front Range. The primary reason given in support of a regional analysis is that Colorado varies significantly across regions and does not function as one economic unit. Additional reasons include:

- Different regions within Colorado have different transportation needs. The Front Range may be interested in reduced congestion while the Eastern Plains may be more interested in job creation.
- Regional impacts may become lost in a statewide study. For example, two hundred new jobs created across Colorado may not be significant, while 200 jobs created in Pueblo would have a large impact on the local economy.
- Many parts of the state are doubtful that transportation investment will have benefits for areas outside of the Front Range. A regional level analysis would help to identify where the benefits and costs are accruing.
- A regional analysis would increase study credibility and support at the local level, particularly where new tax dollars are tied to specific projects.

Many participants stated that in addition to regional analyses, statewide benefits should be taken into account. Reasons given in support of a statewide study include:

- Transportation funding begins at the state level;
- Localized effects have statewide implications; and
- A statewide study would provide a more comprehensive view of the economic benefits of transportation.

A few participants feel that there is merit in conducting a study that encompasses multiple states within the western U.S. These participants stated that this broader geographic scope would be useful in evaluating corridors/connectors between states. There was little support for a study that would examine the national benefits resulting from transportation investment in Colorado.

NCHRP report 436 (Hagler Bailly Services, Inc and Morpace International, Inc, 1999) emphasizes that the demographic aspects of a region can heavily influence the effectiveness of communicating the benefits to transportation investment. The report emphasizes location (urban vs. rural), age, income as demographic factors that may influence a message's effectiveness.

Short-term versus long-term benefits. Participants had mixed reactions regarding how far into the future the study should extend. Most participants stated that a study covering more than a 10-year period begins to lose its effectiveness in communicating the importance of transportation investments. These participants agreed that as benefits accrue 15 to 20 years out, the public begins to lose interest as they see less direct personal impacts.

A small number of participants feel that the study should include a 25 to 50-year period in order to fully capture the benefits of transportation investment. Economic benefit studies typically use this longer period.

A second area of concern regarding short-term versus long-term benefits is whether the benefits associated with transportation construction should be included as part of the economic benefits of transportation investment. Most focus group participants agree that these types of benefits, which include construction jobs and the secondary impacts of construction, should not be included in this type of study. Participants tended to view these impacts as not contributing to sustainable economic growth. Some stated that these impacts would generally be the same across construction projects of similar magnitude and therefore do not necessitate evaluation.

Study credibility. Most participants stated that having a lead sponsor other than CDOT would enhance the credibility of the study (true for any State Department of Transportation). Participants acknowledged that it would be necessary for CDOT to be involved in the process. Suggestions on alternative study sponsors included chambers of commerce, universities, a broad coalition of businesses, economic development commissions, and state or local government agencies other than CDOT. Many participants stated that the lead sponsor should not be a government agency.

NCHRP's Guide to Communicating the Benefits of Transportation Investment (Hagler Bailly Services, Inc and Morpace International, Inc, 1999) points out that different groups may find different messengers to be more effective. For example, the report suggests that when attempting to communicate with public officials, utilizing the other public officials and the local business community will be the most efficient way to communicate a message. When attempting to convey the benefits to the local business community, the report recommends enlisting business executives as emissaries, since business leaders will be most interested in how a transportation investment will affect specific aspects of operating their business.

Most participants agree that in order for the study to be credible to the public, it has to be kept relatively simple. Along those lines, participants stated that only those benefits that are easily quantified in monetary terms should be included in the rate of return on investment. Benefits such as time savings should not be valued in dollars, but should be left in terms that are more meaningful, such as number of minutes saved on daily commutes or time saved on specific trips.

For some participants, study credibility means the extent of public participation in the development of the study. Others feel that in order to be credible, the study should compare similar investments in other sectors. For example, the study should evaluate the benefits of investment in education as compared to investment in transportation.

Target audience. Most participants indicated that the target audience of a transportation economic benefit study in Colorado should be the public. The reason given for targeting the public is Colorado's unique situation of transportation funding approval through referendum.

Participants familiar with the political process stated that this type of study must first be used to build support in the Legislature before it is targeted to the public. Other suggestions for target audiences include economic development councils, elected officials, and other community leaders. Participants also stated that study results should be presented differently to target audiences in different regions of the state.

Prospective versus retrospective study. Throughout the course of each focus group, BBC gave several examples of different state transportation benefit studies. Some of these examples consisted of a retrospective analysis of transportation investment, evaluating the benefits of transportation investment that has already occurred. Others were prospective in nature, evaluating the benefits of a proposed transportation plan or improvement project. For example, the City College of New York conducted a retrospective analysis for New Jersey evaluating the economic benefits that have resulted from a series of rail transit and highway improvement projects completed in the 1990s. The Transportation Development Association of Wisconsin conducted a prospective transportation benefit analysis of a proposed $3.2 billion additional investment in the state's highway system over a 21-year period (these examples are explored further in Section II).

While there were mixed opinions concerning whether or not a study on the economic benefits of transportation in Colorado should be retrospective or prospective in nature, the majority of participants thought that the study should be prospective in nature. Several reasons were given in support of this type of analysis, including:

- A retrospective analysis might be viewed as a waste of tax payers money on "another government study";
- A prospective study would help to make better decisions regarding transportation investment and would increase the efficiency of investment; and
- Colorado residents would respond better to a prospective study.

Those in favor of conducting a retrospective analysis stated that it would provide voters with a justification for further investment.

Most participants agreed that whether a study is retrospective or prospective in nature, it should compare a given level of transportation investment to an alternative scenario with additional transportation investment.

Reactions to Specific Benefits

At the outset of each focus group, BBC asked participants what type of benefits they think should be included in a statewide transportation benefit study in Colorado. Answers differed depending on the respondent's geographic region of the state (urban vs. rural). Participants responded with a range of benefits including:

- Direct and indirect benefits;
- Day-to-day time savings and time savings for specific trips;
- Reduction in commute times;
- Access to the mountains;
- Increased safety and number of lives saved;
- Benefits to businesses;
- Energy savings;
- Additional choices in transportation mode;
- Decreased air pollution;
- Increased freedom/choice in travel;
- Saved frustration;
- Reduced vehicle operation and maintenance costs;
- Impacts on the cost of goods, quality of life, and real estate values;
- Ability to get agricultural commodities to market;
- Increased tourism; and
- Influx of business to state.

After discussing some of the more general aspects of the economic benefits of transportation, focus group participants were given three sets of cards specific to statewide transportation economic benefit studies conducted in Kansas, Maryland, and Wisconsin. Each card contained a major finding or "sound bite" used by the states in their final presentation of study results. Participants were asked to rank the cards within each state from the most compelling to least compelling study result. Exhibit III-1 summarizes how participants ranked the cards within each state from most compelling to least compelling. The reactions to the different types of study results are discussed below.

Exhibit III-1.
Focus Group Ranking of Statewide Study
Results for Kansas, Maryland, and Wisconsin Studies

	Kansas	Maryland	Wisconsin
Most Compelling	10,000 fewer accidents and 2,000 fewer injuries in Kansas	23,400 new jobs in Maryland	$3 of returns to Wisconsin for every $1 of investment
Somewhat Compelling	$3 of returns to Kansas for every $1 of investment	17% return on investment for Maryland	$2.7 billion in increased personal income for Wisconsin residents
Less Compelling	15% reduction in travel time on state and federal roads in Kansas	$206 million in new tax revenues in Maryland	$8.5 billion in economic benefits to Wisconsin
Least Compelling	– –	$2.7 billion in new economic output in Maryland	4,800 new jobs in Wisconsin

Fewer accidents and injuries. "Fewer accidents and injuries" was most frequently ranked as the most compelling study result for Kansas among focus group participants. Very few participants ranked this study result as a last choice. In general, this result seemed more personal to people as it is something that might affect them directly. Participants often stated that this particular result was compelling to them because they had teenage drivers at home.

Many participants reported that the reason that this message was so compelling to them was because they were thinking in terms of saved lives. Secondary reasons given in support of this result include the amount of money saved in insurance, emergency response and medical bills, and time saved because of reduced traffic delays. Some of the more business-oriented participants viewed reduced accidents as an important benefit from a public relations standpoint.

Some felt that this was not a credible study result, stating that accidents may not be a good indicator of road condition. As an example, accidents related to weather can occur regardless of road conditions.

Return on investment ($3 to $1 or 17%). Participants received a card related to the return on transportation investment for each of the state studies. Reactions to this type of study result varied across focus groups as well as among individual focus group participants. Some participants identify more with a return on transportation investment presented in terms of an annual percentage (17% return in Maryland) rather than a concrete dollar amount ($3 return for $1 invested in Kansas and Wisconsin). In many cases, this was because a 17 percent return seemed more credible to people than a return as large as $3 for each dollar invested. When compared to more personal impacts such as reduced number of accidents and reduced travel time, the rate of return on investment was less compelling to most participants.

Those who ranked return on transportation investment as one of the more compelling study results gave the following reasons:

- In terms of the general public, a $3 return on each dollar invested is a simple message that is easy to understand and to remember;
- A high return on investment is associated with helping to create jobs;
- A $3 return feels more tangible than the large numbers such as the $8.5 billion in total economic benefits to Wisconsin. People can relate to what $3 feels like.
- 17 percent return on investment means that tax dollars are working for the public;
- A high return on investment shows good fiscal management.

Still, some found return on investment less compelling than some of the other study results. Many of these participants stated that return on investment is a difficult concept for most people to understand.

Several participants indicated that in order for a study to be credible to them, they would need more information on which benefits were factored into the rates of return and how these benefits were quantified. Most participants agreed that short-term construction jobs should not be factored into this amount.

There were mixed reactions concerning whether the value of time savings resulting from transportation improvements should be included in the rate of return on investment. Many participants felt comfortable with the inclusion of time savings as a dollar value, and were generally okay with valuing time at one-half of the average wage rate. Other participants recognized that the value of time saved is important, but a study on the economic benefits of transportation in Colorado should only put a monetary value on those things that are easily measured. Most participants stated that rather than putting a dollar value on time and including it in the rate of return, individuals should be left to value their own time.

Reduced travel time. There were mixed reactions to the importance of a 15 percent reduction in travel time as an economic benefit. Participants agreed that travel time savings would probably appeal more to people on the Front Range who are often stuck in traffic. Reduced travel time was compelling to many because it is an issue that affects them directly every day.

Even those in more rural areas found travel time savings to be an important economic benefit. This is because time saved can have implications for efficiency, businesses, and access to metropolitan areas. Other participants liked this result because of the implications for quality of life and reduced air pollution.

Many felt that they would need more information to evaluate the importance of a 15 percent reduction in travel time. If this applies to a 20-minute commute, it really does not mean much. If it reduces travel time by 15 percent across the state, it would be a more important figure. As discussed above, most participants felt that it would be necessary to present reduced travel time in terms of actual minutes/hours saved rather than only in terms of the dollar value associated with the amount of time saved.

Increased Jobs. Participant reactions to an increase in the number of jobs largely depended on the number of new jobs created. For example, Wisconsin study results indicated that 4,800 new jobs would be created

because of transportation investment. Maryland study results indicated that transportation investment would create 23,400 jobs. Participants most frequently ranked increased employment last among Wisconsin study results and first among Maryland study results for this reason. However, many stated that they would need to know the initial investment amount that was responsible for the number of jobs created.

Many participants stated that jobs are an important economic benefit because they provide a base measure of economic wellbeing. Participants also stated that increased employment results in many of the other economic benefits presented. Many feel that increased number of jobs speaks at a more personal level than large numbers such as $8.5 billion dollars in total economic benefits. Another view is that people cannot easily argue with job figures.

People in rural areas and in the agricultural industry stated that jobs are very important in their areas. However, they tended to rank return on investment, total economic benefits and increased personal incomes as more compelling results. Jobs also have a non-economic appeal for rural areas. Participants stated that in that in order for young people to stay in these areas, they have to have job opportunities. Without these opportunities, the economic vitality of the area is at risk.

Several participants stated that they were concerned with the type of jobs created. Many ranked jobs last because they think the jobs created are more than likely minimum wage jobs that do not create much economic activity. These participants stated that employment figures could be misleading for this reason. Others said that there might be better ways to create these jobs. For example, a similar investment in education may create even more jobs. They felt that this tradeoff should be evaluated in an economic benefit study.

Increased personal income. Many of the participants who found increased personal income particularly compelling were thinking in terms of increases in their own personal incomes, rather than increased personal incomes having resulted from increased employment. Participants did not find this result significantly more or less compelling when compared to total economic benefits and the rate of return on investment.

Some participants felt that more people can relate to increased income than can relate to an increase in number of jobs. People who have jobs do not receive a direct benefit from increased employment, while increased personal income can apply to both employed and unemployed residents. For others, increased personal income means that things are more efficient and people are more productive. This translates to a better economy.

Again, people generally agreed that increased personal income and long-term job growth are more compelling than jobs created for construction.

Total economic benefits. The Wisconsin study result presented in terms of "total economic benefits" was found to be more compelling to people than the Maryland study result termed in "increased total economic output." Many participants liked this type of result because of the sheer magnitude of the economic

impact. Other reasons for ranking total economic benefits as a top choice included that dollar amounts are easy to understand and they provide a steadier indicator of economic benefits.

Reactions to total economic benefits varied across focus group participants. Reasons given by those who did not rank total economic benefits as one of their top choices are as follows:

- Amounts like $8.5 billion do not carry much weight with voters. This does not impact most people on a personal level.
- People do not know what goes into this number. It is unclear where the money is going.
- Others did not like that it gave no reference to how much was invested to generate these benefits. These participants preferred a rate of return because it gave an idea of the benefits per dollar invested.

Tax revenues. Most participants did not rank increased tax revenues resulting from investment in transportation infrastructure as a compelling result. For the most part, people viewed increased tax revenues as money coming out of their pocket rather than having resulted from increased employment or business activity in the region.

Many also felt that increased tax revenues have a negative connotation for the public because they don't know how the taxes would be used. This impact is also less personal in that people do not see it directly benefiting them.

Some participants did find increased tax revenues important because they believe that they could result in large benefits through government programs. Many of these participants felt that in order for increased tax revenues to be seen as an important economic benefit by the public, they should have a specific program or use associated with them.

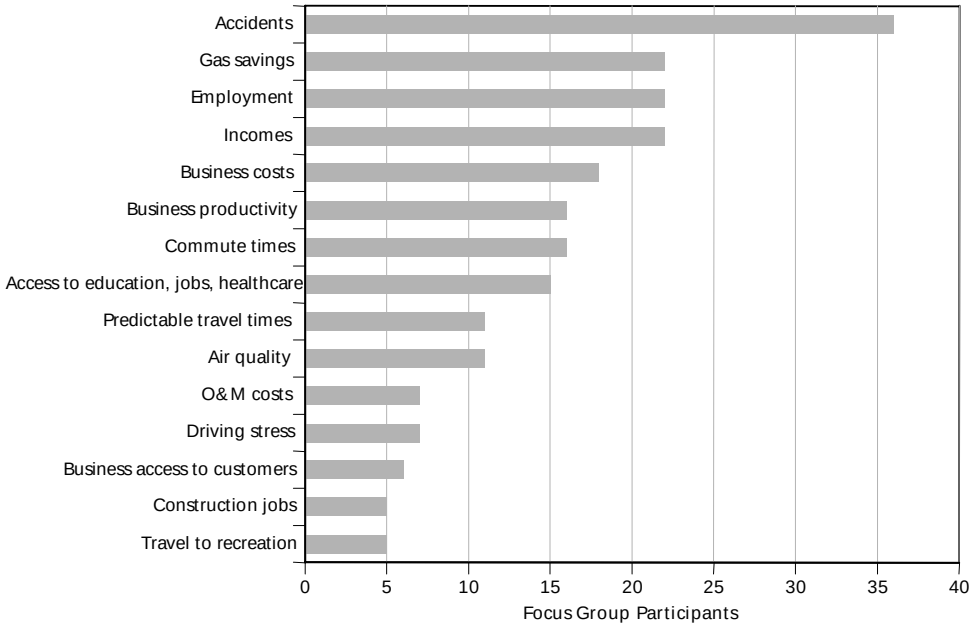
Reactions to Broad Set of Benefits

After ranking the results of individual state studies, the focus group participants were given 15 cards that each had a different potential economic benefit that may result from increased transportation investment. The participants were asked to categorize these potential benefits into the following three groups based on what they thought of their importance or relevance to a transportation economic benefit study in Colorado:

- Top three;
- Other important topics; and
- Less important topics.

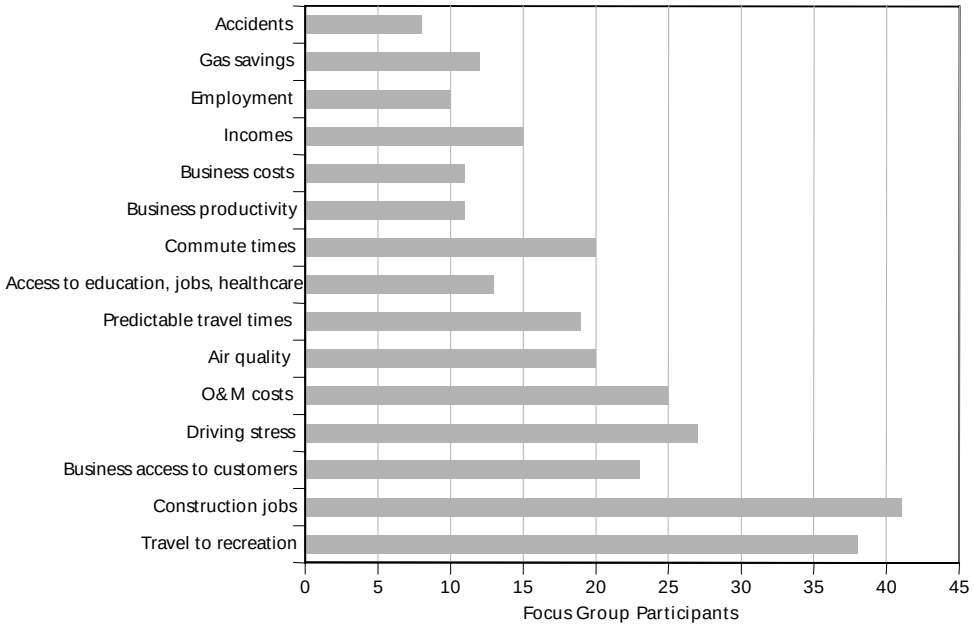
The results of these rankings are presented in Exhibits III-2 and III-3 on the following page and are further discussed in order of importance, as ranked by focus group participants.

Exhibit III-2.
Ranking of Transportation Benefits in the "Top Three" Category



Source: BBC focus group results, 2006

Exhibit III-3.
Ranking of Transportation Benefits in the "Less Important Topics" Category



Source: BBC focus group results, 2006.

The benefits most frequently placed in the "Top three" category include fewer accidents and injuries, gas savings, higher personal income, employment growth, faster commutes, business cost savings, and increased business productivity. Less important benefits include faster travel to recreation, impact of construction jobs, reduced stress from driving and reduced vehicle operation and maintenance costs.

Fewer accidents and injuries. Fewer accidents and injuries was the economic benefit most frequently placed in the "Top three" category across all focus groups. This is consistent with results of a National Cooperative Highway Research Program Report on communicating the economic impacts of transportation investment. This report found that reducing accidents was the number one transportation benefit message for the public, regardless of density. Participants reported that this result communicated on a more personal level because accidents are something that could affect them directly.

Many participants reported that the reason for choosing this benefit as among the most important was that they were thinking in terms of saved lives. When asked if their answer would change if transportation investment did reduce accidents but did not reduce fatalities, they indicated that it might. Secondary reasons given for choosing fewer accidents and injuries as an important economic benefit included the amount of money saved in insurance, emergency response and medical bills, and time saved because of reduced delays caused by accidents.

One reason given for categorizing "fewer accidents and injuries" as a less important topic is that people do not perceive the risk of accidents as directly affecting them. Therefore, this economic benefit would be less compelling to most individuals.

Gas savings. In most of the focus groups, participants consistently ranked gas savings as one of the three most important topics of an economic benefit study. Very few participants categorized gas savings as a less important topic.

Participants generally cited gas savings as an important economic benefit because of today's relatively high gas prices. Many stated that this would be a great sound bite given current prices. Participants agreed that money saved on gas due to transportation improvements is a credible economic measure.

Gas savings were found to be less important to people in rural areas who do not commute or travel long distances on a regular basis. Among those with experience in the transportation industry, gas savings were less important than the alternative benefits discussed.

Higher incomes. Participants in all focus groups consistently ranked higher personal incomes an important topic in a study of the economic benefits of transportation investment. More information on reaction to the higher personal incomes benefit can be found in the state study exercise topic.

Employment growth. Focus group participants consistently ranked employment growth as an important topic. Many stated that employment growth is a good indicator of economic well-being and that employment

growth generally carries several economic benefits with it. Again, people in rural areas stated that employment growth was particularly important in their regions.

Others felt that employment growth may be compelling for business people but not on a personal level. Employment growth may only appeal to people without jobs. For this reason, employment sustainability seemed more important than employment growth.

Faster commutes. Consistent with the state study exercise, focus group participants had mixed reactions to the importance of faster commutes as an economic benefit. In general, faster commutes appealed mostly to people on the Front Range who deal with congestion on a daily basis. This type of economic benefit is more direct in its impact on these participants. Participants in rural areas generally did not rank faster commute times as an important economic benefit. Several participants liked this result because of the implications for quality of life and reduced air pollution.

Business cost savings. In most of the focus groups, business cost savings was ranked outside the "Top Three." However, Farm Bureau participants and participants in rural area focus groups consistently ranked this economic benefit as one of the three most important. These groups were thinking of the reduced costs of moving agricultural products. Other reasons for including business cost savings as a top choice were that business cost savings lead to higher personal incomes and economic vitality by helping businesses remain profitable. This is especially important in rural areas that struggle to keep manufacturing jobs.

Some participants placed business cost savings last because they feel it is not the responsibility of transportation improvements to reduce business costs. Others simply stated that it is not as important as many of the other benefits.

Increased business productivity. Participants most frequently ranked increased business productivity as an important topic, with very few participants placing it in the less important category. Similar to business cost savings, participants in the Farm Bureau focus group consistently ranked increased business productivity as one of their three most important economic benefits. Business cost savings and increased business productivity were seen as contributing to long-term economic vitality in rural areas in the form of increased income and business sustainability.

Increased business productivity was also viewed as an increase in efficiency as a result of transportation investments. This was another reason cited for choosing this as an important topic.

Improved access to education, jobs and health care. Participants frequently cited improved access as an important, if not one of the most important economic benefits. Rural area participants indicated that access to education and health care is a particularly important issue for them. Many participants indicated that improved accessibility is the main objective of transportation improvements. Access to jobs, education and health care substantially improve quality of life. Still others were thinking in terms of voter approval for increased transportation funding. The benefits of access to education, jobs and health care are important aspects of voter approval.

More predictable travel times. More predictable travel times was most frequently placed in the "other important topics" category. Few participants chose this as one of the top three important economic benefits. The ability to better predict travel times did not seem credible to many of the participants, as many factors play into traffic congestion. A second reason for not choosing this as one the most important economic benefits is that even if travel times are more predictable, that does not necessarily mean they will be shorter.

One participant stated that as a mother, being able to stay at home an extra ten minutes in the morning would be a huge benefit to her. For this reason, she placed more predictable travel times at the top of her list. Another participant stated that more predictable travel times are related to reduced stress from driving.

Better air quality. Again, differences in geographic location seemed to play a role in the classification of better air quality as an important economic benefit. Better air quality appealed to those living on the Front Range much more than those in rural areas, where air quality is not an issue. Better air quality seemed to be particularly important to those with planning experience. Most participants felt that this was an important topic.

Reduced stress from driving. Reduced stress from driving also seemed to be most important to those having to deal with congestion on a daily basis. However, very few participants indicated that this was on the top three most important economic benefits. Although it was generally classified as important, reduced stress from driving was ranked as a less important topic more often than most other benefits. This was generally not a concern among those in rural areas.

Access to more customers for businesses. Very few participants feel that access to more customers for businesses is an important aspect of transportation investment. However, this benefit was particularly compelling to those in the agricultural and business sectors.

Lower vehicle maintenance costs. Reduced vehicle operation and maintenance costs was most frequently cited as an important or less important topic, and generally not included in the "Top three" category. This was consistent across each of the focus groups.

Faster travel to recreation. Most participants classified faster travel to recreation as a less important topic in a transportation economic benefit study. Those who did feel this was an important topic recognized that recreation/tourism is one of the most important industries in Colorado.

Transportation construction jobs. Increased transportation construction jobs was ranked as a less important topic more frequently than any other potential benefit of transportation investment. Very few participants felt that this was an important topic. A frequent reason for this is that transportation construction jobs are generally viewed as being temporary, and not contributing to the long-term economic vitality of the state. For most participants, these jobs do not seem relevant to a comprehensive statewide study. At the least, participants indicated that these types of jobs should be separated out from the longer term jobs created as a result of transportation investment.

Overall Findings and Guidance from the Focus Groups

Participants generally agreed that a study of the economic benefits of transportation investment in Colorado would be a useful tool in gaining public support for increased transportation funding and as a means to increase the efficiency of transportation investment decisions. Several other themes and study recommendations were consistently discussed.

Lead sponsor. A lead sponsor other than CDOT is necessary to enhance the credibility of study results.

Geographic detail. The study should examine transportation benefits by region within the state.

Transportation modes. It is necessary to evaluate multiple modes of transportation, including highway and mass transit. Preferences and transportation needs differ greatly from one geographic location to another. Several of the focus groups stressed the importance of evaluating transportation investment in all regions of the state, and not just in the most heavily traveled areas. Many are concerned that the majority of transportation spending is allocated to the Front Range, while rural areas are neglected.

Study period. The study should examine the benefits of possible future transportation investments, as opposed to past spending.

Types of benefits. Focus group participants identified the most important transportation benefits to be evaluated in a transportation benefit study as reduced accidents and injuries, gas savings, higher personal income, employment growth, faster commutes, and business cost savings. Less important benefits include faster travel to recreation, impact of construction jobs, reduced stress from driving, and reduced vehicle operation and maintenance costs.

Economic competitiveness. Study results should show how the transportation investment helps a region compete for jobs is of interest to the public.

Benefits message. Benefits must be expressed in ways that Colorado residents think about them, which may not be in terms of monetary value and may differ by region and target audience. Communication of study results should not focus on benefits quantified in billions of dollars, such as increased economic output and total economic benefits.

Most participants agree that the public does not relate to "large number" study results. Examples of these results from other state studies include "$2.7 billion in new economic output in Maryland" and "$8.5 billion in total economic benefits for Wisconsin."

Many participants are concerned that the only type of jobs created through transportation investment are low paying, secondary jobs. Some participants stated that studies lose credibility when coupled with ineffective or irrelevant messaging.

Long-range economic benefits vs. construction impacts. Do not mix impacts of short-term transportation construction with long-term benefits.

Differences in feedback between groups. Focus group respondents emphasized different types of benefits depending on where they live in Colorado. Transportation needs differ across the Front Range, the Western Slope, and the Eastern Plains. Participants living in rural areas are more concerned with access to major metropolitan areas, safety improvements and economic development, while people living on the Front Range identified more closely with reduced travel time and reduced number of accidents and injuries.

Respondents also identified different benefits when thinking about what would be meaningful to the public versus what would influence businesses and other interests. Exhibit III-4 presents a summary of the most important economic benefits identified by participants according to their location and target audience.

Exhibit III-4.
Importance of Transportation Benefits by Geographic Region and Area of Interest

	General Public	Business and Other Interests
Metropolitan Areas	Reduced accidents and Injuries Increased personal incomes Faster commutes High rate of return on investment Gas savings	Reduced accidents and injuries Increased personal incomes Faster commutes Increased business productivity Business cost savings
Rural Areas	Reduced accidents and injuries Increased personal incomes High rate of return on investment Employment growth	Increased business productivity Business cost savings State/region competitiveness Reduced O&M costs Access to markets Access to recreation

Focus group participants also differed depending on their knowledge and involvement in the political process and experience with transportation issues. Elected officials and other politically savvy participants seemed to think more in terms of gaining public support. More business-oriented participants thought in terms of increased productivity and improved infrastructure. Those with planning experience took on a more comprehensive view of transportation improvements.

IV. KEY PERSON INTERVIEWS

For select studies identified during the literature review, we interviewed the appropriate staff at state departments of transportation, lead sponsors of the studies and consultants that performed the analyses. We also spoke with several knowledgeable experts in the field of transportation economics. These interviews provided further insight into the different approaches and the relative success associated with different studies This section describes our findings.

State Study Interviews

For each study selected we obtained information on why the study was conducted, the sponsoring agency, the types of benefits evaluated, the intended target audience, the communication and use of study results, and other factors influencing study success.

Transportation Improvements Grow Wisconsin's Economy: The Economic Benefits of Transportation Investments. Cambridge Systematics prepared this report for the Transportation Development Association of Wisconsin (TDA) in February 2003. We spoke with TDA staff about this study.

TDA is a non-profit organization whose primary goal is to help Wisconsin expand its economy by building on the state's transportation strengths and addressing its transportation weaknesses. As part of this goal, TDA educates Wisconsins about the importance of transportation investment. TDA is not a lobbying organization, however many of its members do lobby state and federal legislators.

TDA completed this report in 2003 in order to provide documentation for the high rate of return on investment of transportation improvements. TDA continues to use this report to communicate the importance of transportation investment with the press and with legislators. From the perspective of TDA, the 3 to 1 return on investment in transportation is the most important message from the report. They believe that the rate of return provides an effective way to communicate the economic importance of transportation investment in a manner that is easy for most audiences, particularly legislators, to understand.

TDA stated that although the report has not led to increased transportation investment, it has been successful in educating legislators. TDA recognizes that transportation investment is a "hard sell." They believe that transportation investment is not a current priority of the Governor of Wisconsin. Pressure on the state budget has led to cuts in transportation spending.

The study was privately-funded, with costs amounting to approximately $100,000. The Wisconsin Department of Transportation provided necessary information for the report but was not a sponsor. Comments from TDA's staff indicate that because transportation investment is not currently the Governor's priority, the Wisconsin DOT will not conduct a study to provide justification for it.

TDA is currently thinking of spin-offs or possible follow-up reports. TDA recognizes that in order to be successful, economic benefit studies must address the specific needs and concerns of the public. Before

conducting a new study, TDA argues that the analyst must know what the "hot button" issues are in the study area. These issues may include economic development, congestion, rate of return on investment, safety and other issues.

The Economic Impact of Maryland State Highway Investment. The Research Institute of Towson University in Maryland prepared this report for the Maryland State Highway Administration (MSHA) in 1998. We spoke with an MSHA staff member about the study.

According to staff, MSHA became interested in measuring the economic benefits of highways in Maryland because:

- The Governor at the time placed a strong emphasis on economic development;
- The State Highway Administrator had a strong economics background; and
- A corresponding national effort aimed at measuring the economic benefits of highways.

The study took approximately one year to complete. MSHA funded the study, which cost about $100,000. The study focused on the direct impacts of highway expenditures and long run productivity effects including cost savings to industries, increased output and contribution to overall economic and productivity growth.

The target audiences included the Maryland Department of Transportation, public officials, and Maryland residents. The purpose of the report was to justify the state highway program as well as to demonstrate the importance of highways to the Maryland economy. MSHA presented the results of the study at a number of conferences and meetings. As far as the overall success of the report, MSHA believes that it generally served its purpose. MSHA still refers to the report. Cambridge Systematics is currently preparing an economic benefit study for the Maryland Department of Transportation, however it is multi-modal and is not being viewed as an exact update or match to this study.

New Jersey's Links to the 21st Century: Maximizing the Impact of Infrastructure Investment. Researchers at the City College of New York completed this report in 2002 in cooperation with the U.S. and New Jersey Department of Transportation. We spoke with the primary author of the study.

This study provided a comprehensive analysis of rail transit and highway improvements in New Jersey. Prior to the completion of this report, New Jersey had evaluated economic impacts on a project-by-project basis. The idea of this report was to evaluate the economic impact of a strategic transportation plan.

The study took three years to complete and cost approximately $650,000. The State of New Jersey paid $500,000 of this amount, with the remainder paid through matching funds leveraged by the City College of New York.

To complete the study, the New Jersey DOT put together a committee of different audiences from government agencies. These agencies were the primary target audience for the study. The goal of this study was to broaden the focus of agency staff. To garner support for transportation investment, the target audience was expanded to businesses within the region after the study was completed. The primary focus of

discussions with business groups was the high rate of return on transportation investment and changes in income. The targeted audience was not the public.

The Economic Impacts of Kansas Highways. The Kansas Department of Transportation (KDOT) sponsored two major studies on the economic impacts of transportation investment in Kansas highways. In 1999, research economists at the Institute for Public Policy and Business Research, University of Kansas, prepared a report for the KDOT on the Economic Impacts of the Kansas Comprehensive Highway Program (KCHP). In a subsequent study, researchers at Kansas State evaluated the economic impacts of the state's Comprehensive Transportation Program (CTP). The following is based on comments received from a phone conversation with KDOT staff.

The first study evaluates financial impacts, direct user benefits and other quality of life issues associated with the KCHP. This study was conducted under K-TRAN, a cooperative transportation research program between KDOT, University of Kansas, and Kansas State University. The second report, prepared in 2002, is much less complex and focuses on the immediate direct and secondary impacts of increased CTP transportation spending. The Governor of Kansas initiated the second report in 2002 when it became clear that the legislature was not going to fully fund transportation as promised.

The purpose of both studies was to target the Kansas legislature in order to increase transportation funding. The second report has been very popular and KDOT has completed subsequent updates. KDOT prefers the second report because it is easier to explain to decision makers and the public. Additionally, the first study found that increased speeds associated with transportation improvements led to an increased number of fatalities on Kansas highways. This result provides an easy target for project opponents. Because of these two factors, the first study has not received much press recognition and KDOT has not presented this report to a wide range of audiences.

Economic Benefits of the Michigan Department of Transportation's 2005-2009 Highway Program. The University of Michigan and the Economic Development Research Group recently completed a study for the Michigan Department of Transportation (MDOT) on the economic benefits of MDOT's 2005-2009 Highway Program. This study used REMI, a regional economic modeling program, to estimate the statewide economic impacts of the program from reduced vehicle hours traveled and other effects of transportation investment. We spoke with MDOT staff about this study.

MDOT's director initiated this study in 2005 in order to convey to the legislature and the public that Michigan's five-year highway program translates into economic benefits for Michigan residents and industries. Currently, 95 percent of MDOT's five-year program consists of repair and maintenance activities. Due to Michigan's high levels of unemployment and otherwise mediocre economy, MDOT received criticism for focusing on maintenance and not on expanding the state's transportation infrastructure. Critics argued that expansion would lead to economic growth. MDOT initiated this study in order to combat this argument.

According to MDOT, the report has been very successful and well received at the state level. MDOT used the results of the study to target the legislature and the public through press releases and media attention.

MDOT believes that the University of Michigan's involvement in the study led to increased credibility at the state policy level. The University of Michigan is heavily involved in the state budget process.

The report was so successful that MDOT plans to update it on an annual basis. The first report took four months to complete and cost approximately $50,000. The report was paid for by MDOT. A "spin off" report that would provide further guidance on the economic benefits of transportation beyond repair and maintenance is also planned.

Montana Highway Reconfiguration Study. The Montana Department of Transportation (MDT) developed an analytical tool to evaluate the economic benefits and costs of highway investments expected to generate significant economic benefits. This project was spurred by continued interest in widening two lane highways to four lanes in order to encourage development in areas of the state with declining populations and stagnating economies. We spoke with MDT staff about this study.

In 2001, the Montana state legislature and the Governor's Office directed MDT to conduct a study examining the economic impact of reconfiguring the state's major two-lane highways. The Governor formed a Reconfiguration Study Steering Committee (RSSC) to guide this study. The findings of this study led to the development of the Highway Economic Analysis Tool (HEAT). HEAT is unique in that it incorporates the regional economic development and business productivity impacts associated with highway improvement projects into project selection criteria. The model will play an important role in the allocation of transportation funding.

HEAT has been well received by policy makers at the state level, however MDT has not yet fully integrated HEAT into their project selection process. MDT recently hired a full-time staff member for this purpose.

This evaluation has initiated a regional study of a highway expansion project in northern Montana. This study will examine how transportation improvements might spur economic development by increasing traffic flow on a corridor of highway that connects Montana, North Dakota, South Dakota and Saskatchewan.

Exhibit IV-1 presents a summary of the information we learned about these transportation investment studies.

Exhibit IV-1.
Summary of State Transportation Benefit Studies

Study State	Lead Sponsor	Purpose and Target Audience	Benefits Evaluated	Details	Relative Success
Wisconsin	Wisconsin Transportation Development Association (TDA) NPO	Educate legislature on importance of transportation investment Leverage additional funding	ROI Reduced travel time Safety Reduced O&M Employment Personal income Construction impacts	$100,000 Prospective analysis Multimodal Statewide	Often quoted in press/media Successful in educating legislature
Maryland	Maryland State Highway Administration	Justify highway program to public officials, MD DOT, and MD residents	ROI Economic output Employment Cost savings to industries Productivity	$100,000 Retrospective analysis Highways Statewide	Successful in educating target audiences Widely presented
New Jersey	University Transportation Research Center at City College of New York	Educate NJ state agencies Increase support from business coalitions	Direct user benefits Employment Personal income Construction impacts Residential and industrial relocation	$650,000 Retrospective analysis Rail transit and highways Statewide with limited regional components	Very successful press coverage and recognition
Kansas I	University of Kansas, in cooperation with KDOT	Educate legislature on importance of transportation investment Leverage additional funding	Financial impacts Reduced travel time Safety Reduced O&M Reduced driving stress	$70,000 Retrospective and prospective analysis Highways Statewide	Viewed as too complicated to effectively communicate with Legislature and general public

Exhibit IV-1. (Continued)
Summary of State Transportation Benefit Studies

Study State	Lead Sponsor	Purpose and Target Audience	Benefits Evaluated	Details	Relative Success
Kansas II	Kansas State University	Educate legislature on importance of transportation investment Leverage additional funding	Economic output Personal Income Employment Construction Impacts	Update to Kansas I report Retrospective analysis Highways Statewide	Successful in educating legislature and general public
Michigan	University of Michigan, Michigan Department of Transportation	Convey economic benefits of MDOT's current 5 year highway program to legislature and public Initiated because MDOT had been criticized for focusing on repair and maintenance	Reduced travel time Employment Personal income	$50,000 Prospective Highways Statewide	Well received at state level MDOT is conducting annual updates Report has received a lot of press/media attention
Montana	Montana Department of Transportation	Develop model to examine economic impacts of highway improvement projects. Goal is to use this tool to foster economic development	Gross state product Employment Personal Income Reduced travel time Reduced O&M Access to markets Business cost savings	Prospective Highways Statewide with analysis of regional projects	Newly developed Limited use to date MDT recently hired new staff to work with model

National Researchers

The Study Team contacted several leading national experts in the field of transportation economics, including representatives from American Road and Transportation Builders Association, the US Department of Transportation and the Federal Highway Administration. Discussions with representatives from these agencies did not yield many relevant findings. Due to their relatively broad geographic scope, different goals, and consistent focus on highway improvements, national studies employ very different methodologies than statewide studies. National studies typically do not evaluate traditional user benefits as described in many of the state and regional level studies.

V. STUDY OPTIONS

As detailed in Section III of this report, focus group participants across the state agree that a study of the benefits from transportation investment is worthwhile. Participants also agree that a study should only quantify tangible benefits, benefits should be personalized to target audiences and CDOT should not serve as the lead sponsor of such a study.

However, participants had several different views about study approaches and how a study should be used by CDOT and others. In order to address these differences, the study team developed five study options. These options are based on our findings from the literature review, feedback obtained from focus groups and discussions with state DOTs and sponsors of other state studies. The appropriate study approach will depend on a number of factors including the primary study objective, target audience, and the availability of necessary data and funding.

Overview of Study Options

The different study options cover alternative methodologies, levels of geographic precision and uses:

- Statewide desktop study – economic benefit study of transportation investments in Colorado that applies results from studies conducted in other states to investment alternatives specific to Colorado.
- State competitive analysis – evaluation of how transportation investment increases Colorado's economic competitiveness relative to other states.
- Regional benefits analysis – economic benefit study of transportation investments for sub-state areas of Colorado, allowing the tracking of benefits and costs by region and development of personalized messages to target audiences.
- Regional impact analysis tool – a tool that different regions could use to analyze the economic impact of specific projects.
- CDOT project selection tool – a tool to help CDOT increase the efficiency of transportation investment decisions by evaluating economic benefits of specific proposals for transportation projects.

Exhibit V-1 on the following page summarizes the different study options and lists their advantages and disadvantages.

Exhibit V-1.
Summary of Study Options Developed by the Project Team

Study Option	Key Metric	Purpose and Target Audience	Advantages	Disadvantages
Statewide Desktop Study	Statewide benefits based on findings in other studies	Public education	Cost-effective Minimal data requirements Tailored to what is most compelling to Colorado residents	Ballpark estimates Credibility issues No evaluation of regional impacts
State Competitiveness Analysis	Statewide Employment and Income Growth	Public education	Cost-effective Minimal data requirements Successful in other states Competitiveness aspect compelling to Colorado residents	Evaluation of transportation construction impacts may not be meaningful to Colorado residents Evaluation of construction impacts only easily targeted by opponents of investment No evaluation of regional impacts
Regional Benefits Study	Personalized benefits to target audiences (i.e. reduced travel time, employment growth)	Public education	Results most compelling to Colorado residents Identifies to which region costs and benefits accrue Tailored to concerns of region	Data and time intensive Very expensive Results may show no benefit in many regions Many complexities in regional study methodology Additional information obtained may not be worth cost No studies have been conducted at this level
Regional Impact Analysis Tool	Regional economic impacts	Public education	Can be cost-effective Used on an as-needed basis Increased credibility at the local level Can be used to gain support for regional initiatives	Many complexities in regional study methodology Regional equity concerns
CDOT Project Selection Tool	Project by project analysis of economic benefits (i.e. employment and income growth)	Increase efficiency of transportation funding	Can be cost-effective Used on an as-needed basis Increased credibility to CDOT investment decisions Educate the legislature on transportation funding decisions Used by other state DOTs	Does not specifically target the public in gaining support for increased transportation investment

Selected Approach

After discussions with the Scoping Study Team, CDOT decided to immediately pursue the statewide desktop study, possibly followed by a regional benefits analysis. A suggested detailed work scope for the statewide study is provided in Section VI.

VI. WORK SCOPE FOR STATEWIDE STUDY

Background and Overview

After reviewing the findings of this scoping study and the study options presented in Section IV of this report, CDOT met with the study team to discuss a benefits study approach. Based on the information presented earlier in this report, CDOT decided to initiate a preliminary "desktop" study of the statewide economic benefits of transportation. CDOT's goal is to communicate the importance of transportation investment to Colorado residents while laying the groundwork for a larger, more in-depth region-by-region study of the economic benefits of transportation investment in Colorado.

This section outlines the specific objectives and tasks associated with the initial statewide study.

Objectives

The objectives of this study are as follows:

- From available data and benefits studies in other states, estimate the economic benefits from investing more in Colorado's transportation systems.
- Provide Colorado stakeholders with statewide study results consistent with their guidance in the initial Scoping Study.
- Identify gaps in the data and other information needed before an in-depth analysis of regional benefits from transportation investment could be performed. Outline the steps to obtain these data as part of future research.

Approach

Task 1. Establish steering committee. The Consultant will meet with the CDOT project manager and other key CDOT staff at the outset of the study to refine the proposed methodology, reporting relationships, schedule and desired deliverables. To ensure effective communications throughout the project, the Consultant will meet with CDOT at least once per month during the course of the study. The Consultant will submit quarterly progress reports.

In consultation with CDOT, the Consultant will ask different groups throughout the state to select a representative to serve on a study steering committee. The steering committee will provide input and help to guide CDOT and the Consultant throughout the course of the statewide study. The Consultant will meet or hold conference calls with the steering committee at least once every other month during the course of the study.

Metropolitan planning organizations (MPOs) and regional transportation groups will need to be involved in the statewide study as they will provide much of the data necessary for its completion. The Consultant will be responsible for working with these groups. Many of the groups involved in the initial Scoping Study will also be interested in the methodologies used and the results of the statewide benefits study. The Consultant will

involve these interested groups through representation on the steering committee and/or through presentations of final results.

Task 2. Select baseline and alternative investment scenarios. The Consultant will work with CDOT and the steering committee to select baseline and alternative investment scenarios. The statewide economic benefits study will assess the difference in economic benefits and costs between the baseline and the additional investment scenarios.

The baseline investment scenario may correspond to future transportation system investments given funding mechanisms now in place. The alternative investment scenario may represent investments that could be made if additional funds were available. Investment scenarios may be based on improvements identified in the 2030 Statewide Transportation Plan, 15 Regional Transportation Plans and corridor studies, priorities defined by Colorado's five Metropolitan Planning Organizations, fiscal constraints and other criteria.

As the investment scenarios are developed, the project team will also specify the appropriate future time period for analysis.

Task 3. Identify types of impacts associated with additional investments and collect analyses on the effects of those investments. The Consultant will create an inventory of analyses conducted to date on the economic effects of the components of the alternative investment scenarios. The benefits of additional investment in transportation may include:

- Travel time savings;
- Gas savings;
- Reduced accidents and injuries;
- Air quality changes;
- Improved access to jobs, recreation, health care;
- Increased personal income;
- Increased employment;
- Increased business productivity; and
- Business cost savings.

Metropolitan planning organizations and other regional transportation groups will need to be involved in this task. These groups will provide inputs on transportation investment scenarios, costs, and other implications from alternative transportation plans. This information is expected to include output from existing transportation models and other analyses related to travel time and other outcomes.

Once the inventory of past research is complete, the Consultant will be able to identify key data gaps. As a first step in filling these gaps, the Consultant will assess the ability of CDOT and the MPOs to conduct additional transportation modeling. It may be necessary for the MPOs and regional transportation groups to conduct new runs of existing models based on the alternative investment scenarios identified in Task 2.

Task 4. Identify data needs and conduct additional research. Upon completion of Task 3, the Consultant will conduct research necessary to address any remaining data gaps. As the timeline for the statewide economic benefits study will not allow for creation of new transportation models or extensive primary data collection, many of the information gaps will be filled based on estimates and secondary sources.

The Consultant will research similar studies and models from other states, as well as national data sources, in order to translate transportation improvements into economic benefits. For example, the Consultant may look to research from outside Colorado for how congestion-relief results in better air quality.

Task 5. Quantify personalized "non-economic" effects. The Consultant will first quantify the benefits associated with the alternative investment scenarios in non-economic terms. The Consultant will accomplish this task based on the research conducted in Tasks 3 and 4.

These benefits will include those that directly affect Coloradans on a daily basis. For example, benefits such as increased safety will be described in terms of fewer crashes and injuries. Reduced commuting times will be expressed as additional hours available for non-work activities. Faster travel to mountain communities will be linked to greater opportunities for recreation. The Consultant will quantify these results at the state level.

Task 6. Assign dollar values to benefits. The Consultant will assign a dollar value to the benefits identified in Task 5. In order to accomplish this task, the Consultant will draw upon current research and accepted valuation methodology. For example, the Consultant will apply accepted methodologies used by federal agencies and others to place a dollar value on benefits such as reduced travel time and fewer injuries from crashes.

Task 7. Quantify the short-term and long-term impacts on economic output and jobs. The consultant will evaluate the short-term and long-term economic development impacts associated with each investment scenario. These impacts include the effects of transportation investment on personal incomes, economic output and jobs.

As part of this task, the Consultant will select and apply a model of the Colorado economy that will estimate multiplier effects throughout the state. This economic analysis will use an existing model of the Colorado economy.

As much as possible given the scope of the statewide study, the Consultant will assess the implications of additional transportation investment for long-term competitiveness of the state economy. Effects will be expressed in qualitative terms when they cannot be accurately quantified.

Task 8. Calculate total return on investment. The Consultant will calculate different measures of return on investment from the additional spending on the statewide transportation system.

Task 9. Summarize study implications and document study results. The Consultant will prepare a report of study results, subject to CDOT's review and approval. The Consultant will follow the recommendations from the Scoping Study to design easily understood ways of communicating benefits. This

report will include an executive summary and a longer report discussing the quantified and non-quantified benefits to Coloradans that result from increased transportation investment.

The report will also identify limitations in the study results and assess the value of additional research, especially at the regional level.

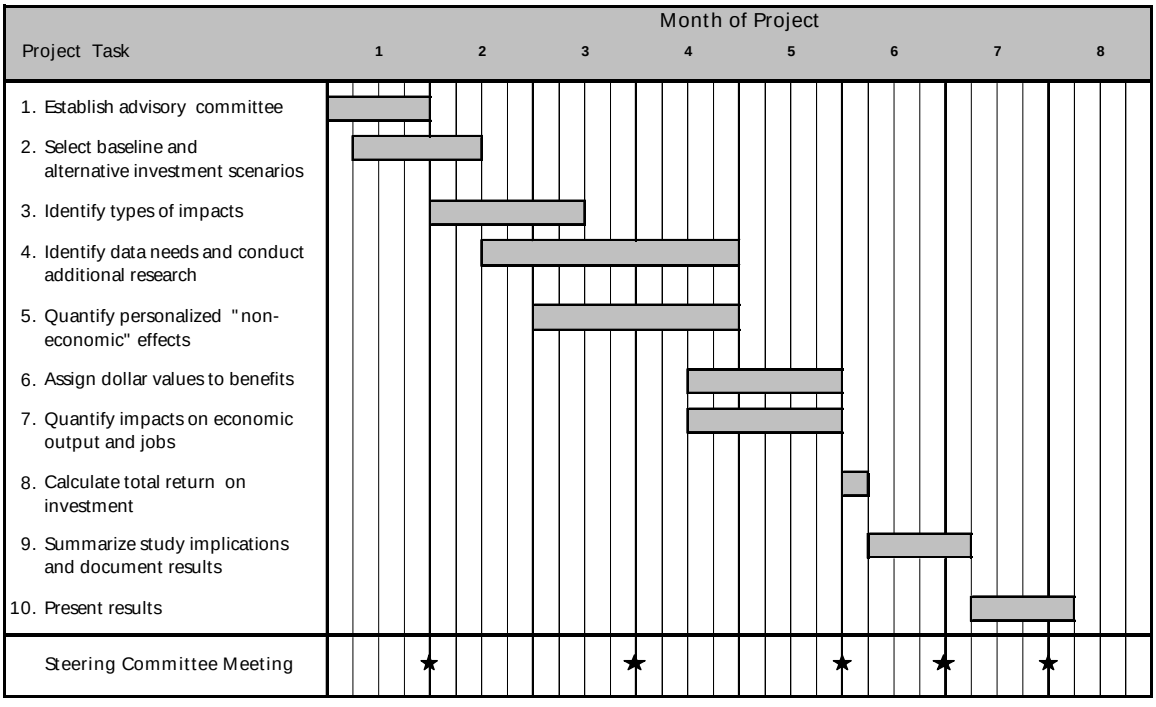
Task 10. Present results. The Consultant will prepare a PowerPoint presentation of study results, key findings and opportunities for further research. The Consultant will meet with the project steering committee to discuss study results.

A major part of this study effort is communicating results to stakeholders. Task 10 should include at least ten presentations of results to interested groups.

Schedule

This study will take approximately eight months to complete. Exhibit V-1 below provides an estimated timeline for completion of project tasks.

Exhibit VI-1.
Proposed Project Schedule



VII. RECOMMENDATIONS FOR SELECTING A CONTRACTOR

The study team developed recommendations for selecting a contractor to perform a study of the economic benefits of transportation in Colorado. We based our recommendations on feedback about what made past studies successful, past study team experience with large research studies, and our knowledge of the public procurement process.

Necessary Qualifications

A comprehensive study on the economic benefits of transportation in Colorado will require the utilization of a wide range of skills. The selected contractor should have knowledge and experience with:

- Transportation safety program evaluation;
- Transportation models;
- Transportation financing;
- Regional economics, including economic development;
- Benefit-cost analyses and economic impact studies;
- The diverse Colorado economy and populace; and
- Ability to work with a public relations firm to disseminate study results.

The contractor must also be respected in this area of research and viewed as impartial by the public and other transportation stakeholders.

List of Experienced Contractors

Firms with experience in this area of research include:

- Adams Group Inc., Colorado Springs, Colorado;
- BBC Research and Consulting, Denver, Colorado;
- Cambridge Systematics, Cambridge, Massachusetts;
- Economic Development Research Group, Boston, Massachusetts; and
- Wilbur Smith Associates, multiple U.S. locations.

In addition to these firms, many universities have completed economic benefit studies for stakeholder groups and state agencies. The number of universities and departments with experience in transportation economics is too broad to list. However, many universities have served as prime consultants or as partners in the completion of these types of studies. Feedback from focus groups and key person interviews has indicated that universities can add credibility to studies of the economic benefits of transportation.

Appendices

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APPENDIX B FOCUS GROUP METHODOLOGY

As part of the Scoping Study, the study team conducted seven focus groups with stakeholders and targeted audiences throughout the state. This section describes the focus group participants, discussion format and exercises used in the focus groups.

Focus Group Participants

BBC conducted seven focus groups with targeted audiences throughout the state. The focus groups were chosen in consultation with CDOT staff and were based on recommendations made in the scope of work for the project. These groups include:

Exhibit B-1.
Focus group participants

Target Audience	Focus Group Participant
Planners and public works directors who are knowledgeable of transportation related issues	■ American Planning Association, Colorado Chapter
Regional, multi-county associations of policy leaders	■ Progressive 15 ■ Action 22 ■ Statewide Transportation Advisory Committee
Business organizations	■ Colorado Association of Commerce and Industry ■ Colorado Farm Bureau ■ Move Colorado

Discussion Overview

The focus group discussions lasted anywhere from one to two hours, depending on the size and time available for the group. Each focus group began with a very general discussion on the benefits of transportation investment. This general discussion focused on whether a study on the economic benefits of transportation investment in Colorado would be useful and what type of questions this type of study should answer. These general questions were gauged participants' initial reactions to the topic at hand.

Throughout the course of the discussion, the focus group moderator provided participants with further information on the subject of transportation investment and discussed several different examples of transportation benefit studies conducted in other states. As the audience became more familiar with the subject matter, the questions asked of them became more specific.

The discussion guide for these focus groups follows.

Detailed Discussion Guide

I. Introduction and purpose of focus groups:

- Determine if a study of the outcomes of investing in transportation in Colorado would be valuable.
- Develop the correct set of questions CDOT should ask in any future study of transportation investments.
- Obtain feedback on the best way to communicate the economic benefits of transportation investment with different audiences.

II. General questions for groups (before example studies):

- If we're talking about "investments in transportation system," what does this mean to you? What types of transportation investments should CDOT be studying?
- In general, would an economic analysis of transportation investments be useful in Colorado? Why?
- What types of questions should a study like this answer?

III. Types of benefits and costs:

- What types of benefits would you expect to be included in a study of transportation investments? What does investing in transportation make better?
- When we talk about a certain dollar amount of investment, what types of costs would you expect to be included? Are there other costs that might be difficult to measure?

IV. Examples from other states:

- Pass out cards showing different benefits messages from Wisconsin, Kansas and Maryland studies.
- Have people rank the cards (do one state at a time, rank from highest to lowest, then discuss why).
- Would generating this type of information for Colorado be useful?

V. Types of benefits:

- What would be your list of things to measure when you think about benefits of transportation investments? For example, what goes into the "$3 of benefits for every $1 of investment"?
- Pass out cards showing different types of benefits, have people sort into three piles:
  - Top 3 sound bites,
  - Other important topics,
  - Less-important topics.

VI. Other issues:

- Should the study focus on benefits and costs for the U.S. as a whole, Colorado as a whole or by region within the state? If region, what are the regions?

- Does it make sense to project the future with and without the additional investment, and then compare the difference? Is there another way to do this?
- What about short-term versus lasting impacts? Is there a difference?
  Example: construction impacts versus long-term travel time benefits?

VII. Target audiences:

- Let's return to the purpose/use of these studies? How would you use this information?
- What types of groups would benefit from this information? What are the target audiences for the information?
- What affects the credibility of such a study? What would you need to know to evaluate credibility and whether the study is sound?

VII. Closing:

- Any final comments?

Focus Group Card Sorting Exercises

After the general discussion on the benefits of transportation investment, focus group members participated in two interactive exercises.

Exercise 1. Communicating study results. The first exercise was designed to obtain feedback on the most effective way to communicate study results with different audiences. Participants were given a score sheet and three sets of cards representing statewide transportation benefit studies conducted in Wisconsin, Maryland and Kansas. Each card contained a different "sound bite" used in the presentation of each state's study results. Participants were asked to rank the cards within each state according to the sound bites they found most compelling to those they found least compelling. This exercise was followed by a discussion on how each participant ranked the cards. The cards used in this discussion are presented in Exhibit 2B below.

Exhibit 2-B.
Focus group Exercise 1: study results used in Kansas, Maryland, and Wisconsin

Kansas	Maryland	Wisconsin
10,000 fewer accidents and 2,000 fewer injuries in Kansa	23,400 new jobs in Maryland	4,800 new jobs in Wisconsin
$3 of returns to Kansas for every $1 of investment	17% return on investment for Maryland	$3 of returns to Wisconsin for every $1 of investment
15% reduction in travel time on state and federal roads in Kansas	$206 million in new tax revenues in Maryland	$8.5 billion in economic benefits to Wisconsin
	$2.7 billion in new economic output in Maryland	$2.7 billion in increased personal income for Wisconsin residents

The score sheet used in this exercise is presented on the next page.

Name: _____

CDOT FOCUS GROUP
STATE STUDY "SCORE SHEET"
Three Study Ranking

Wisconsin card letter

1st _____

2nd _____

3rd _____

4th _____

Maryland card letter

1st _____

2nd _____

3rd _____

4th _____

Kansas card letter

1st _____

2nd _____

3rd _____

Exercise 2. Ranking types of benefits. The second exercise was conducted to obtain feedback on which transportation benefits should be evaluated in this type of study in Colorado. For this exercise participants were given a score sheet and 15 cards, each containing a different transportation benefit. Participants were asked to rank the cards into three different categories according to how they the importance of each benefit. The three different categories included "Top Three Topics," "Other Important Topics" and "Less Important Topics." This exercise was also followed by a brief discussion on the participant's rankings. The cards and score sheet used in this exercise are presented below. The results of both exercises were analyzed for each focus group. Results were also aggregated across focus groups for final presentation.

Exhibit 3-B.
Focus group Exercise 2: transportation benefits

Reduced Accidents and Injuries	Faster Commutes
Gas Savings	Better Air Quality
Reduced Vehicle O&M Costs	Reduced Stress From Driving
More Predictable Travel Times	Higher Incomes
Business Cost Savings	Faster Travel to Recreation
Improved Access to Jobs, Education and Healthcare	Access to More Customers for Businesses
Employment Growth	Transportation Construction Jobs
Increased Business Productivity	

CDOT Focus Group
Economic Benefits "Score Sheet"

Name: _____

Please write down card letters located in the upper left hand corner.

Top 3 topics

_____

_____

_____

Other important topics

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Less important topics

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____