Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

SAFER STREETS, STRONGER ECONOMIES

Complete Streets project outcomes from across the country

MARCH 2015

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The **National Complete Streets Coalition**, a program of Smart Growth America, seeks to fundamentally transform the look, feel and function of the roads and streets in our communities, by changing the way most roads are planned, designed and constructed. Complete Streets policies direct transportation planners and engineers to consistently design with all users in mind.

Smart Growth America is the only national organization dedicated to researching, advocating for and leading coalitions to bring better development to more communities nationwide. From providing more sidewalks to ensuring more homes are built near public transportation or that productive farms remain a part of our communities, smart growth helps make sure people across the nation can live in great neighborhoods.

PROJECT LEADS

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The original scope of this project benefited from the guidance of a diverse group of thought-leaders in the transportation and planning fields, who provided helpful feedback to narrow the research questions examined here. Throughout this project, Smart Growth America's coalition members and the National Complete Streets Coalition's Steering Committee and Partners provided valuable leads and connections to Complete Streets projects around the country.

Kaiser Permanente provided generous support for this project—in part to complement the growing evidence base on the health benefits of Complete Streets, with a better understanding of related economic, mobility, and equity benefits.

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Executive summary

What do communities get for their investments in Complete Streets?

In this study of 37 projects, Smart Growth America found that Complete Streets projects tended to improve safety for everyone, increased biking and walking, and showed a mix of increases and decreases in automobile traffic, depending in part on the project goal. Compared to conventional transportation projects, these projects were remarkably affordable, and were an inexpensive way to achieve transportation goals. In terms of economic returns, the limited data available suggests Complete Streets projects were related to broader economic gains like increased employment and higher property values.

These findings are based on data collected directly by local transportation and economic development agencies as reported to Smart Growth America's National Complete Streets Coalition. The Coalition surveyed Complete Streets projects from across the country, and found 37 with transportation and/or economic data available from both before and after the project.

Safer Streets, Stronger Economies analyzes that data and explores the outcomes communities get for their investments in Complete Streets. In this tight budget climate, transportation staff and elected leaders want to get the most out of every dollar. This research shows Complete Streets projects can help them do just that.

The data showed that streets were usually safer after Complete Streets improvements than before.

In the majority of cases collision rates declined after Complete Streets projects were built, and there were fewer injuries as well. *These safety improvements have real financial value:* Our analysis found that the safer conditions created by Complete Streets projects *avoided a total of $18.1 million in collision and injury costs in one year alone.* These savings start as soon as a project is complete, and continue long after. And this was just the amount saved by the projects included in our sample. The financial impact of automobile collisions and injuries nationwide is in the billions of dollars annually. Targeting the country's more dangerous roads and taken to any meaningful scale, a Complete Streets approach over time has the potential to avert hundreds of millions or billions of dollars in personal costs.

The data also showed that Complete Streets projects encouraged more multimodal travel.

Trips by foot, bicycle, and transit almost always increased after the Complete Streets projects. Taken along with the safer conditions mentioned above, this support for active transportation options adds to an already impressive case for the health benefits of a Complete Streets approach. In about

half the projects, automobile volume increased or remained unchanged after the redesigns.

Complete Streets projects were also remarkably affordable.

The projects surveyed include a wide range of costs, from projects with limited scopes that cost just a few thousand dollars to extensive corridor redesigns that cost several million. For the most part, however, Complete Streets projects cost significantly less than conventional transportation projects, *yet can still deliver transportation benefits* like better safety performance and more people using the facility.

This project also examined how Complete Streets projects related to economic goals.

Before-and-after data in this area are scarce for all kinds of transportation investments and Complete Streets projects are no exception. Of the 37 projects included in our survey, we were able to examine changes in employment in 11 places, and changes in business impacts, property values, and/or total private investment in 14 places. *We found that employment levels rose* after Complete Streets projects—in some cases, significantly. Communities reported *increased net new businesses* after Complete Streets improvements, suggesting that Complete Streets projects made the street more desirable for businesses. In eight of the ten communities with available data, *property values increased* after the Complete Streets improvements. And eight communities reported their Complete Streets projects at least partly responsible for *increased investment from the private sector.* These data support the economic outcomes reported anecdotally by many communities but more data are needed here (and for other transportation projects) to conclusively connect Complete Streets with economic success.

Communities interested in these kinds of benefits can get started on their own Complete Streets approach, and this report also includes ideas for policy changes, transportation design standards, project evaluation guidelines, and ways to measure project performance to help in that effort.

More than 700 towns, cities, counties, regions, and states have made official commitments to these practices by passing Complete Streets policies, with more being passed every year. Whether it's planting trees or adding crosswalks, making travel lanes narrower or creating space for people on bikes, hundreds of communities are changing how their streets look and work—and this study suggests they're getting a great return on their public investments in the process.

"Our analysis found that the safer conditions created by Complete Streets projects avoided a total of $18.1 million in collision and injury costs in one year alone."


EPA

Introduction

Dubuque, IA

WHEN DUBUQUE, IA, WAS PLANNING THE REDEVELOPMENT of its historic Millwork District, local leaders knew the project's success hinged on whether people would want to walk or bike there. So the city took a long look at the District's four main avenues—Jackson, Washington, 9th and 10th streets—and figured out how to make them work better for people walking and biking. They replaced sidewalks, made it easier to cross the street, added new street lights, painted "sharrows," and created a multi-use trail. Within a year, bicycling use increased by 273 percent—and that was just the beginning.

Since the project's completion, the neighborhood has experienced more than $34 million in new private investment, with another $150 million in the pipeline. The first warehouse to be redeveloped is leasing 72 residential units, 39,000 square feet of retail and commercial space, and 20,000 square feet for an incubator for arts and nonprofit organizations. The fact that the neighborhood's streets work for everyone who uses them is a key part of this success.

Dubuque isn't the only city using a Complete Streets approach. Hundreds of communities are using Complete Streets strategies to improve how their streets work and how they serve the local economy. What are communities getting for these investments? Are they achieving their transportation goals? How do costs compare to conventional transportation projects? And how do these projects relate to broader economic gains?

To answer these questions, Smart Growth America's National Complete Streets Coalition scoured the country for every Complete Streets project we could find. We asked local departments of transportation for before-and-after data on transportation and economic performance for those projects. Ultimately, 37 projects had enough data available to be included in our analysis.

Safer Streets, Stronger Economies examines these 37 projects, spread across 31 cities in 18 states. This study explores how well these Complete Streets projects achieved transportation goals like improving safety and throughput, as well as how their costs compare to other transportation projects. It also examines what happened to employment, businesses, and property values along a subset of these corridors.

To date, many studies of Complete Streets have focused on the health benefits these projects yield. These studies have clearly documented the connection between walking, biking, and transit ridership and more active lifestyles to reduce rates of chronic disease and the healthcare costs associated with them.[1] People who live in walkable neighborhoods get 35–45 more minutes of moderate physical activity each week, making them less likely to be overweight or obese. People who ride transit tend to move more, too, taking 30 percent more steps a day than people who drive.[2] Converting short automobile trips to walking or biking curbs air pollution, which can help reduce asthma and other respiratory diseases. Youth who walk or bike to school, among other physical activities, tend to focus more and perform better in the classroom.[3]

For the projects examined in this study, these benefits undoubtedly hold true. Rather than focus on these well-documented results, this study focuses on the value of Complete Streets projects as transportation investments and their link to local economies.

We hope the information in this study will be of particular use for transportation professionals and local elected officials, providing a clearer picture of how Complete Streets projects compare to their other transportation investment options.

A note about the data

Our research looked at 10 main data points: collisions; automobile, pedestrian, bicycle, and transit counts; project construction costs; employment; number of businesses; property values; and private investment. Data availability varied by project.

Readers will clearly see that the data are not ideal. A majority of communities we interviewed did not have before-and-after data and thus were not included here. Among those with data, localities collected it using different methodologies.

There is clearly a need for more standardized data measures, as well as more consistency in their collection. These issues are not unique to Complete Streets, but reflect broader issues in transportation data collection.

Nonetheless, these data are the best available for understanding the impact of Complete Streets projects and significantly advance our understanding of Complete Streets effectiveness as transportation and economic investments. We congratulate and thank the communities that have taken steps to collect the performance data discussed here. But for their efforts there would be no way to have any meaningful understanding of project performance.

"Since the project's completion, the Millwork District in Dubuque, IA, has experienced more than $34 million in new private investment, with another $150 million in the pipeline. The first warehouse to be redeveloped is leasing 72 residential units, 39,000 square feet of retail and commercial space, and 20,000 square feet for an incubator for arts and nonprofit organizations."


Gary Cziko

Meet the projects

Normal, IL


Lancaster, CA

Smart Growth America collected before-and-after data for 37 Complete Streets projects. Here is a brief description of all of them. Read more details of each project in **Appendix B** on page 29.

ARIZONA: TEMPE
College Avenue
Added dedicated bike lanes and streetscape improvements near Arizona State University.

CALIFORNIA: BERKELEY/ALBANY
Marin Avenue
Converted four travel lanes to three, and links a residential neighborhood in Berkeley to a commercial area in Albany.

CALIFORNIA: LANCASTER ▲
West Lancaster Boulevard
Created a tree-lined median, widened sidewalks, added landscaping, and created a community destination known as the BLVD.

CALIFORNIA: LONG BEACH
Broadway & Third avenues
Redesigned two one-way downtown streets to each carry two lanes of traffic, parking on both sides of the street, and a protected bike lane.

CALIFORNIA: NOVATO
Grant Avenue
Improved sidewalks, and added streetscaping, bulb-outs, and bicycle racks along 11 blocks of Novato's main commercial street.

DC: WASHINGTON
15th Street NW
Created 1.8 miles of a two-way bike lane separated from automobile traffic.

DC: WASHINGTON
16th Street/U Street/
New Hampshire Avenue NW
Simplified this complicated intersection to make it safer for cyclists, pedestrians, and drivers.

FLORIDA: ORLANDO
Edgewater Drive
Completed a road conversion to calm traffic and make biking and walking easier.

ILLINOIS: CHICAGO
Kinzie Street
Created the city's first bike lane by converting four travel lanes to two on each side of a two-way street.

ILLINOIS: URBANA
Philo Road
Resurfaced a street and enhanced two bus stops with real-time signage and streetscaping.


Uptown Normal

Normal, IL


Laurence Lui

Cambridge, MA

ILLINOIS: NORMAL ▲
Uptown District
Widened and repaired sidewalks, reconstructed Constitution Boulevard, created a new traffic circle, and built the new Uptown Station.

IOWA: DES MOINES
Ingersoll Avenue
Completed a two-phase streetscaping and road conversion project.

IOWA: DUBUQUE
Millwork District
Constructed an off-road multi-use trail, added streetscaping, and reconstructed the road along Jackson, Washington, 9th, and 10th streets.

LOUISIANA: NEW ORLEANS
South Carrollton Avenue
Added bike lanes, landscaping, improved crosswalks, and sidewalks to a section of New Orleans' historic streetcar route.

LOUISIANA: NEW ORLEANS
Esplanade Avenue
Completed a 4-to-2 lane conversion to increase pedestrian and bicycle use.

LOUISIANA: NEW ORLEANS
Decatur Street
Improved pedestrian intersections and added bike features for this busy route in New Orleans' historic center.

MASSACHUSETTS: CAMBRIDGE ▲
Porter Square
Simplified pedestrian and bicycle crossings, created a large pedestrian plaza, added bike lanes and a signalized bike crossing, coordinated auto signal timing, and widened the sidewalk in this historic retail center.

MINNESOTA: MINNEAPOLIS
Franklin Avenue
Reduced the number of travel lanes on the street for one half mile, including over the Franklin Avenue Bridge, from four to three lanes and added bicycle lanes.

MISSOURI: COLUMBIA
Providence & Stewart roads
Improved turn lanes, pedestrian crossing signals, new sidewalks, and trail access; added new lighting and drainage enhancements; and added striping and markings for bicycle and pedestrian safety.

MISSOURI: COLUMBIA
Windsor & Ash streets
Built a bicycle boulevard linking two residential neighborhoods and helping bicyclists safely access downtown Columbia.

MISSOURI: GRANDVIEW
Main Street
Improved pedestrian features along several blocks to help reinvigorate Main Street.

MISSOURI: LEE'S SUMMIT
Third Street
Improved sidewalks, new lighting, and street trees to calm traffic and encourage more people walking in the town's downtown district.

NEVADA: RENO ▲
Wells Avenue
Converted four travel lanes to two, added bike lanes and widened sidewalks along a key one-mile segment.

NEW MEXICO: ALBUQUERQUE
Central Avenue
Converted four travel lanes to three, and added two dedicated bike lanes and on-street parking to this historic tourist destination.

NEW YORK: HAMBURG ▲
Route 62
Added two roundabouts, narrower travel lanes, bicycle lanes, curb extensions, street trees, and marked pedestrian crossings.

NEW YORK: NEW YORK ▲
Columbus Avenue
Reduced lane widths and added street trees, pedestrian islands, and a bike lane.

NORTH CAROLINA: CHARLOTTE ▲
East Boulevard
Converted four travel lanes to three and added bike lanes on both sides of the street, pedestrian refuge medians, wheelchair ramps, and landscaping.

NORTH CAROLINA: CHARLOTTE
Selwyn Avenue
Converted four travel lanes to three, added a center turn lane and bicycle lanes in each direction.

NORTH CAROLINA: RALEIGH
Hillsborough Street
Widened sidewalks, built a median, reduced the four-lane road to two lanes with on-street parking, and constructed a roundabout at the corridor's entrance.


West Jefferson, NC


Seattle, WA

Cleveland, OH

NORTH CAROLINA: WEST JEFFERSON ▲
Downtown streetscape
Replaced two traffic lights with four-way stops, added diagonal parking, curb extensions, better crosswalks and streetscaping in the historic downtown.

OHIO: CLEVELAND ▲
Euclid Avenue
Created the city's first bike lane, repaired sidewalks, added streetlights and bus shelters, and planted 1,500 trees along the "HealthLine."

OREGON: EUGENE
Alder Street
Added a two-way buffered bike lane and bike signal, and widened sidewalks near the University of Oregon campus.

OREGON: PORTLAND
NE Multnomah Street
Converted four travel lanes to two, added protected bike lanes and made crossing the street safer for pedestrians in Portland's Lloyd District.

PENNSYLVANIA: PHILADELPHIA
Spruce & Pine streets
Created 3.7 miles of buffered bike lanes along these two one-way streets.

WASHINGTON: SEATTLE
Nickerson Street
Converted four travel lanes to two, added a two-way turning lane, bicycle lanes, and two new crosswalks.

WASHINGTON: SEATTLE ▲
NE 125th Street
Converted four travel lanes to two, with a center left turn lane and bicycle lanes.

WASHINGTON: SEATTLE
Stone Way N
Converted four lanes to two, added a two-way turning lane, bike lanes, sharrows, and updated crosswalks.

Project outcomes

WHAT WERE THE OUTCOMES associated with these 37 projects? How did the streets perform on safety, traffic, and economic measures before and after the projects? What did these communities get for their investment in Complete Streets?

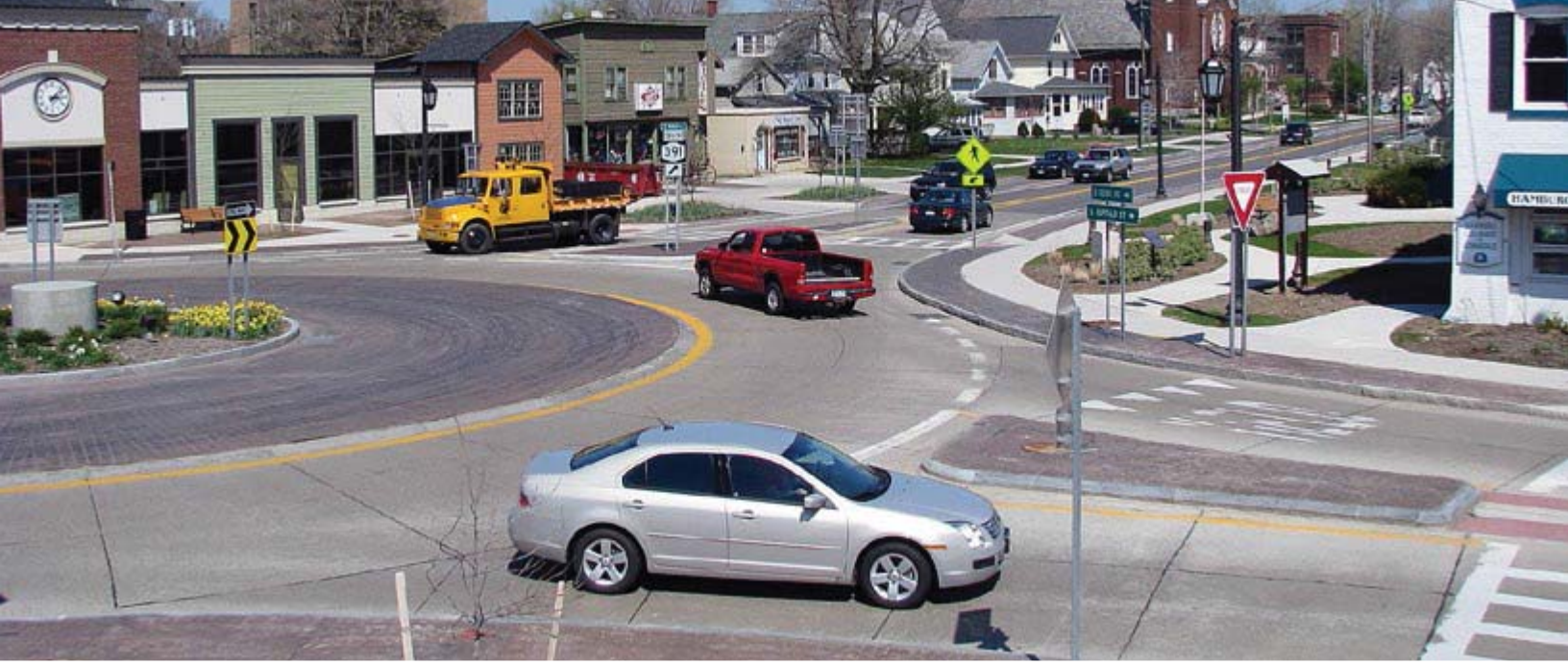
To answer these questions we asked local transportation and economic development agencies for before-and-after data on the street in question. We analyzed most of this data using a straightforward before-and-after comparison. In addition, where methodologically sound and where data were available, we also compared the Complete Streets project to an unimproved "control" corridor as well as citywide trends. Here is what the data show.

Safer streets

Complete Streets projects tended to make streets safer for everyone. Specifically, the majority of roads with Complete Streets features had fewer collisions and fewer injuries after their retrofits than before.

About 70 percent of projects experienced a reduction in collisions, and in many cases the reduction amount was significant (see Figure 1).[4] Approximately 56 percent of projects experienced a reduction in injuries.[5] In some projects where collisions and injuries went down, automobile volumes were essentially unchanged or increased, while pedestrian and bicycle traffic increased—meaning the rates of collision and injury dropped the same or more than the absolute change. Some communities also looked at speeding as an important metric related to reducing collisions and injuries.

In many of the projects where collisions or injuries increased, travel across modes also increased by a large percentage. In many instances, the rate (as opposed to the absolute number) of crashes or injuries (or both) fell. For example, in Porter Square in Cambridge, MA, bicycle collisions increased 150 percent after the Complete Streets improvements—but bicycle volumes increased 929 percent. The rate of collision among bicyclists decreased from 2.5 to 0.6 collisions per 100 bicycle trips after the Complete Streets changes.

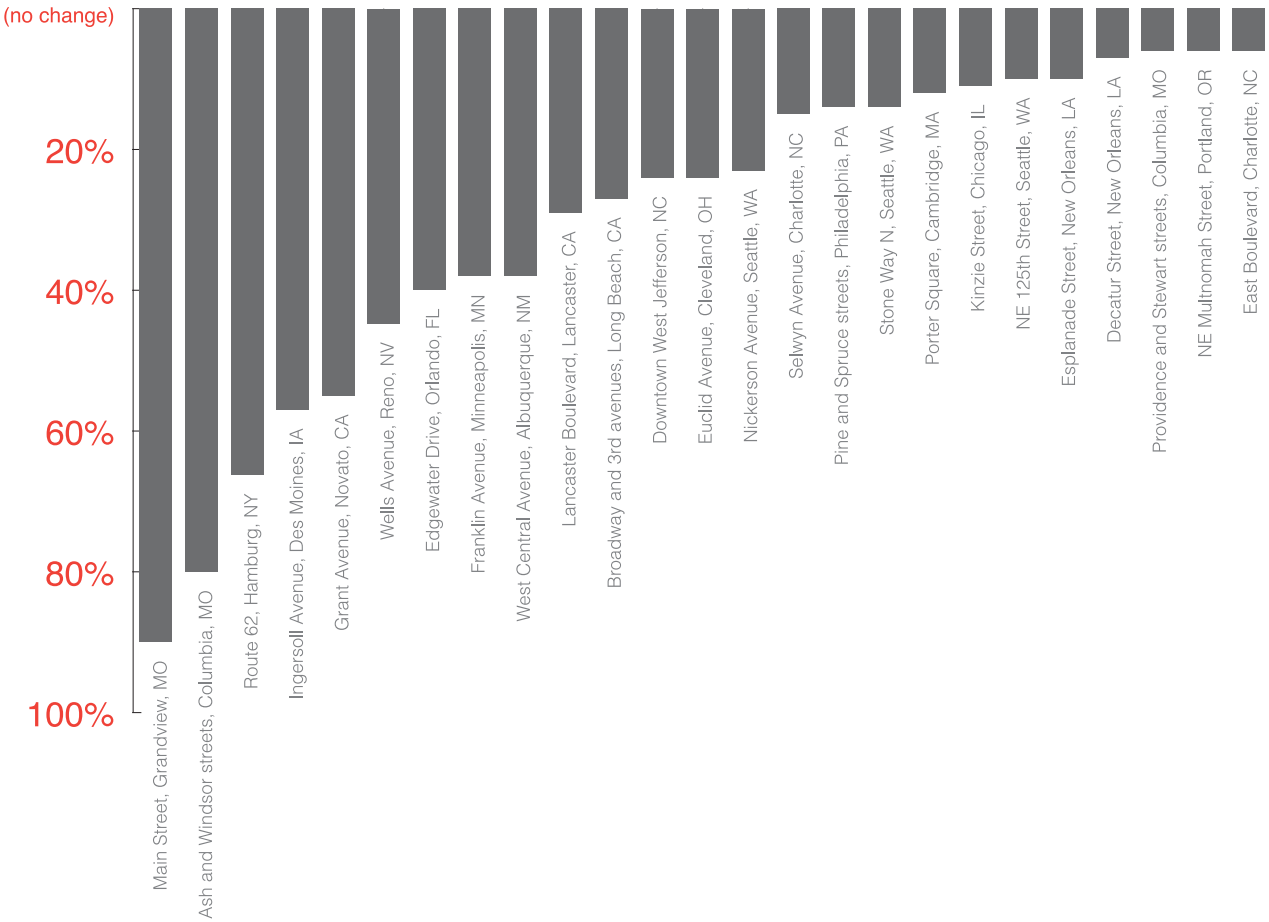


▲ Route 62, Hamburg, NY. **Collisions decreased 57 percent** after completion.

FIG. 1

Collisions went down.

About 70 percent of projects saw a reduction in the number of collisions after their Complete Streets improvements. Of those, many saw declines that were significant.



▲ NE 125th Street in Seattle, WA before (left) and after (right) Complete Streets improvements.

CASE STUDY

Fewer collisions and injuries in Seattle, WA

Three projects included in this study are located in Seattle, WA: Nickerson Street, NE 125th Street, and Stone Way N. All three projects aimed to reduce speeding and make the street more inviting for people walking or bicycling. All three projects used similar design changes to achieve these goals: reducing the number of travel lanes from four to two, adding a center turn lane, bike lanes, and new crosswalks.

In all three cases, speeding, collisions, and injuries decreased after the projects' completion.

▶ On Nickerson Street, speeding fell by **two-thirds** after the Complete Streets improvements and total collisions fell by **23 percent**.

▶ On NE 125th Street, the number of drivers "speeding excessively" decreased by **11 percent**, collisions fell by **10 percent**, and collisions resulting in injuries fell by **17 percent**.

▶ On Stone Way N, speeding drivers decreased **75 percent**, total collisions fell **14 percent** while collisions involving pedestrians declined by **80 percent**, and collisions resulting in injuries fell **33 percent**.

The Seattle Department of Transportation (SDOT) completed all three projects, which are part of a citywide effort to implement its 2007 Complete Streets ordinance. That policy vision, as well as a Complete Streets checklist within the Department, have helped SDOT remain focused on these goals. "Not only does redesigning our streets make them safer," SDOT explains, "it keeps people and goods moving."[6]

Saving money through safety

COMPLETE STREETS PROJECTS can make streets safer for everyone who uses them, and this yields tangible financial benefits for individuals and families.

Each collision that a safer street helps to avert represents potential costs from emergency room visits, hospital charges, rehabilitation, and doctor visits, as well as the cost of property damage. Within our sample, Complete Streets improvements collectively averted $18.1 million in total collision costs in just one year.[7] We rely on standard estimates and methodology from the U.S. Department of Transportation to calculate these costs. For more information see Appendix A on page 27.

Comparing total averted costs for one year to the total cost of 34 projects in this survey (excluding Euclid Avenue, which is an outlier in terms of cost), these projects would pay for themselves in less than 8 years. Every year after that, the savings are unencumbered as the Complete Streets improvements continue to keep travelers safe.

In some of these cases, the averted cost of collisions in the first year is much larger than the original project cost. Along Wells Avenue in Reno, NV, for example, 128 collisions occurred before the Complete Streets improvements, and 47 of those collisions involved injuries. After the city added bike lanes in each direction and widened sidewalks, collisions fell by about 45 percent—to 71 collisions following the improvements, with 18 of those involving injuries. The value of Reno's safer conditions within one year's time ($5.8 million) is more than its entire project cost ($4.5 million).

In West Jefferson, NC, the value of safer streets equaled more than $2.7 million in the first year, or 9 times the total cost of the town's Complete Streets improvements ($300,000).

The averted costs described here are enormously important to the individuals and families who avoid them. However, these numbers are dwarfed by the total cost of unsafe streets in the United States: Nationwide, the cost of automobile collisions and injuries is in the billions of dollars. The 37 projects in our sample represent just 44 miles of road; the entire U.S. paved roadway network is about 2.7 million miles.[8] If a Complete Streets approach was used strategically on even a small fraction of this total, the savings over time could run into the hundreds of millions or billions of dollars.

Encouraging multimodal travel

FROM A TRANSPORTATION PERSPECTIVE, a good way to understand a corridor's travel value is to look at the number of people it accommodates in cars, on bikes, on foot, and by transit. Unfortunately, very few places have all of these data points. This study found nine projects that had before-and-after data for pedestrians, bicycles, and automobiles (the number of places with transit data are sufficiently few that we treat them separately).

Of the nine projects with bicycle, walking, and automobile counts, three showed increases in trips by all three modes. In three projects the data showed a decrease in the total number of car trips, while the total number of bicycle and pedestrian trips increased. In the remaining three projects, the results were mixed: The Providence and Stewart project in Columbia, MO showed no change in automobiles trips while bike and pedestrian trips increased. Foot traffic went up in Albuquerque, while bicycling and automobile traffic fell. In the Millwork District, people on foot decreased. At the same time, the area experienced significant increases in cycling (273 percent) and automobiles (1,416 percent).

A greater number of projects, including the nine above, measured the change in travel by individual modes. Looking separately at the projects' modal outcomes, the data showed that the Complete Streets projects nearly always supported more biking and walking trips. In 12 of 13 projects with pedestrian counts, trips by foot increased after the Complete Streets improvements (see Figure 2). In 22 of 23 projects with bicycle counts, bicycle trips increased (see Figure 3). Of 33 projects with automobile counts, 13 projects carried more automobile trips than before, and in one instance automobile counts did not change (see Figure 4). The remaining 19 projects carried fewer cars, which was a design goal in some projects. For instance, the installation of a bicycle boulevard along Windsor and Ash streets in Columbia, MO aimed to move

The health benefits of multimodal travel

More people walking and bicycling can improve a street's throughput without increasing traffic, and that's a great outcome for transportation professionals.

These active options also come with big public health benefits. By making walking and biking safe and convenient, we can make it much easier for people to build routine physical activity into their daily lives.

vehicles to a parallel street. As a result, automobile traffic fell by nearly half, even as automobiles traveled along the street in less time. The neighborhood street became quieter, and bicycling increased 124 percent along this 1.5-mile connection between two neighborhoods.

As the following figures show, Complete Streets projects were associated with increases in the number of people bicycling and walking on the Complete Streets corridor, supporting travel by more modes than previously.

FIG. 2

More walking trips.

Thirteen projects collected pedestrian counts. Of those, pedestrian activity increased in 12 projects after their Complete Streets improvements. This figure shows the amount of change in walking trips in each place.

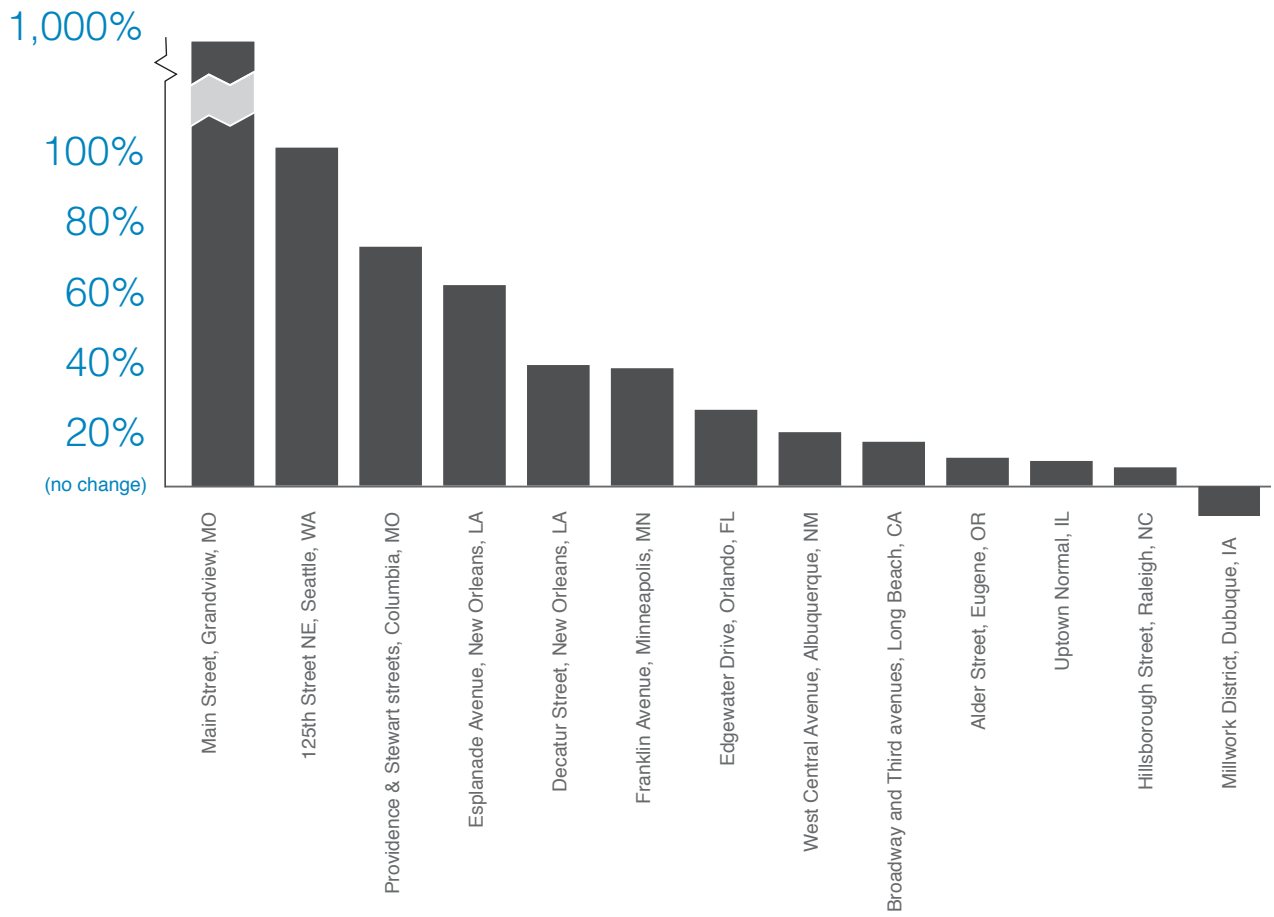


FIG. 3

More bicycle trips.

Twenty-three projects collected bicycle counts. Of those, bicycling increased in 22 projects after their Complete Streets improvements. This figure shows the amount of change in bicycle trips in each place.

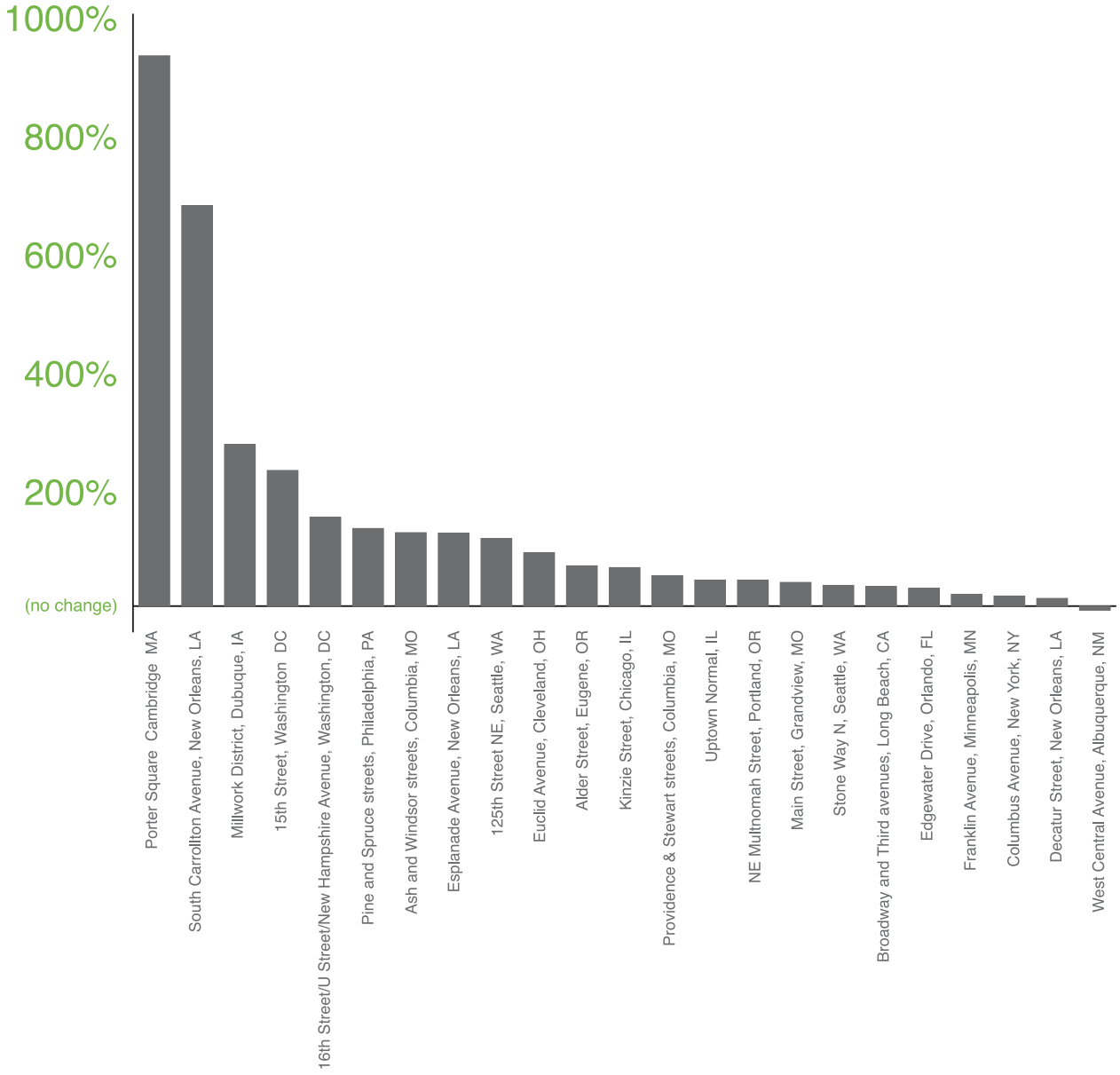
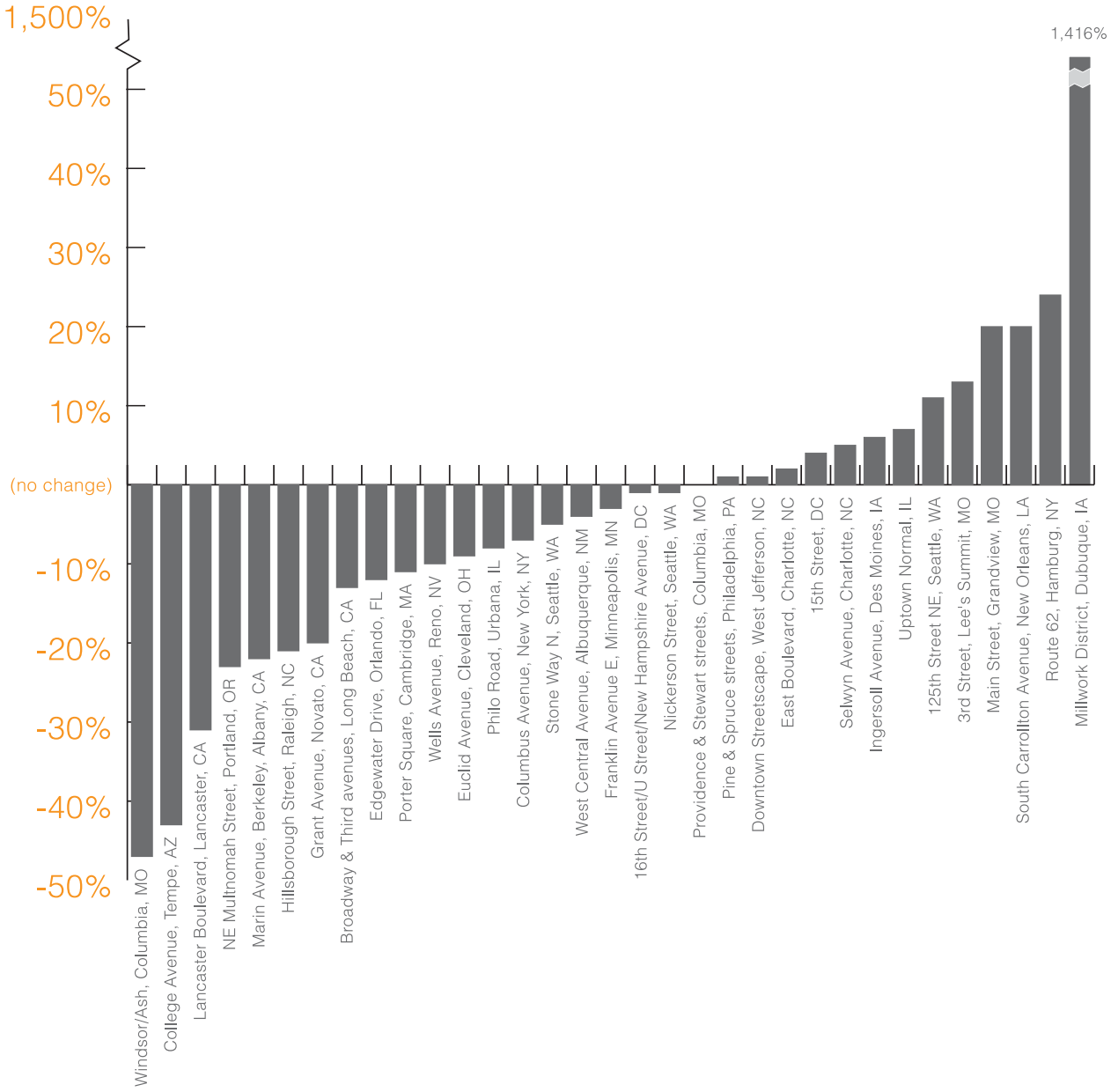


FIG. 4

Change in automobile trips after Complete Streets improvements.

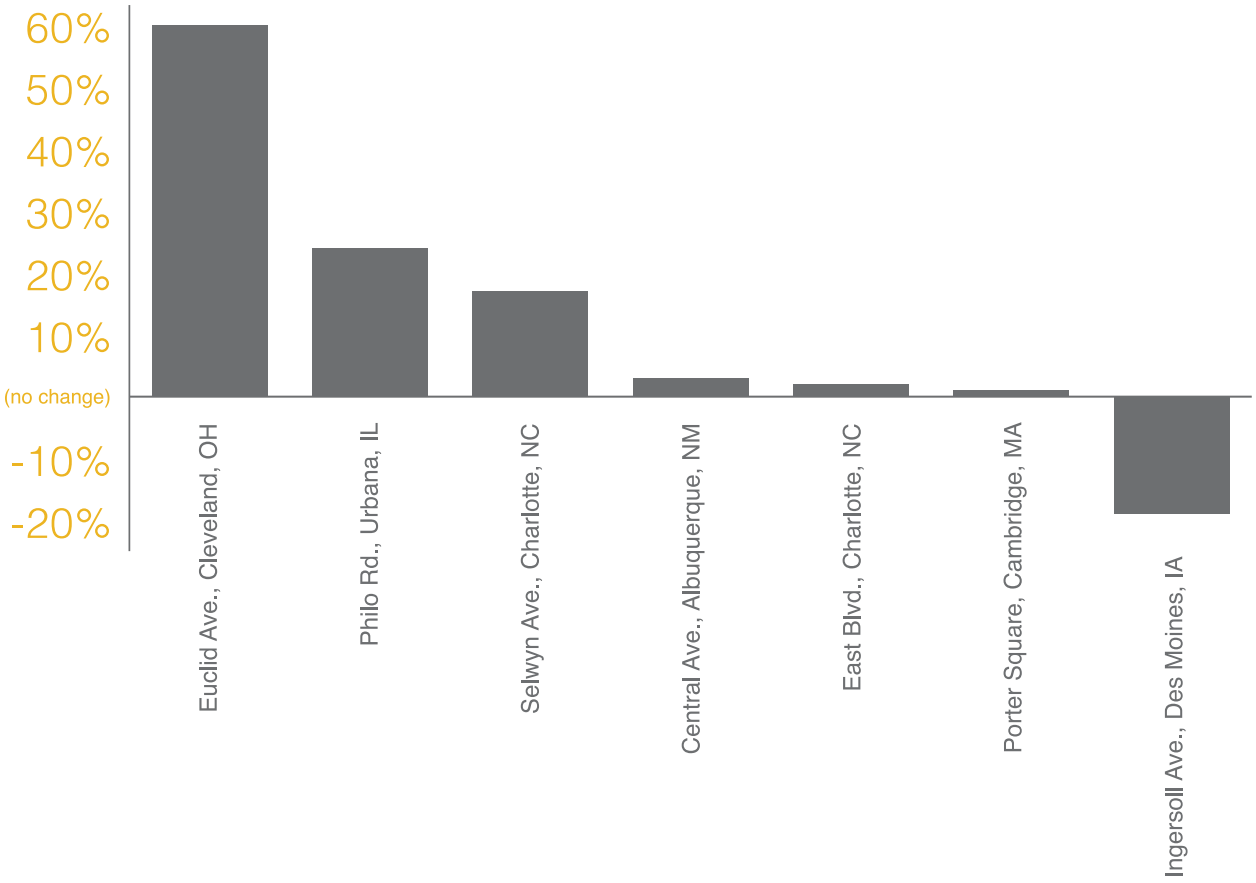


We also found that Complete Streets projects supported more trips on public transportation. Of the 37 projects we examined, 7 reported transit ridership information at stops along these corridors. Of those, ridership increased in six projects and decreased in one (see Figure 5).

FIG. 5

More trips by public transit.

Of the 37 projects we examined, seven reported transit ridership information. Of those, 6 measured increased ridership. This figure shows the amount of change in trips by transit in each place.



Completing “the last mile”

Walking is the most common way to access public transportation: 60 percent of people walk to transit stops.[9] Yet even if these stops are close by, walking to them can often be inconvenient or even dangerous.

A Complete Streets approach creates critical first- and last-mile connections to transit stops and improves the overall connectivity of a transportation network. This is especially vital for households without access to a car, who rely on public transportation to get to work, school, doctors’ offices, and more. Helping people complete the first or last part of their trip safely and conveniently makes these trips possible.

Low costs, big results

THIS STUDY ASKS fundamentally, are Complete Streets projects a good transportation investment? The answer depends on both the outcomes and costs of these projects.

Of the 37 projects in this survey, 31 had construction costs available.[10] This data was collected and supplied by departments of transportation and public works. And one thing was clear from their responses: Compared to most conventional transportation projects, Complete Streets projects are cheap.

The surveyed Complete Streets projects include a full spectrum of design elements, from simple striping to mark a new crosswalk, to complete reconstruction of a roadway to accommodate heavier transit vehicles. Because so many of the projects in our sample rely on inexpensive upgrades within the existing right-of-way, the average project cost was just $2.1 million—far less than the $9 million average cost of projects in state transportation improvement plans.[11]

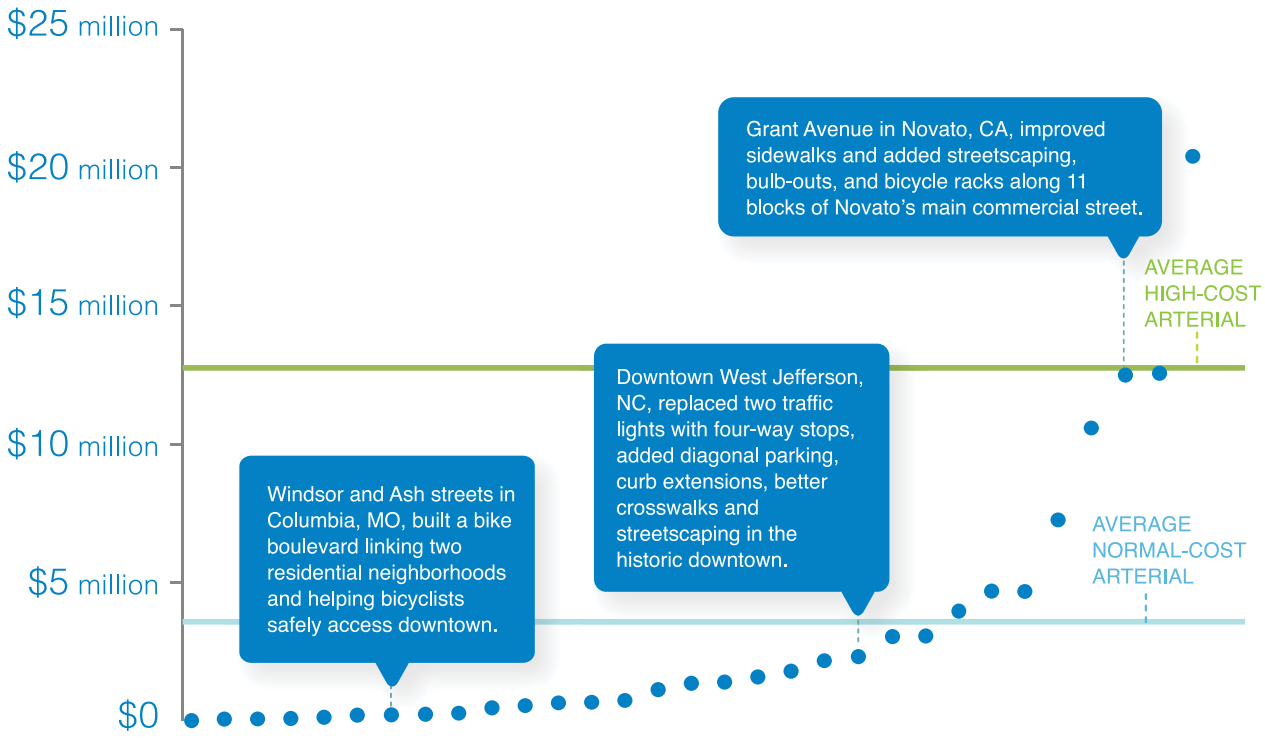
These projects also cost less per mile than average arterials. The Federal Highway Administration estimates that construction of an average "normal-cost" urban arterial costs $3.58 million per mile, and average "high-cost" arterials cost $12.75 million per mile. Seventy-four percent of the projects examined here cost less than an average normal-cost arterial, and 97 percent cost less than the average high-cost arterial (see Figure 6). The eight projects that cost more than an average arterial fall into one of two categories: 1) projects that close critical gaps in the existing pedestrian and bicycle networks, like Porter Square in Cambridge, MA (where changes to an intersection created better connectivity in the city's bicycle network); or 2) projects that were designed to achieve non-transportation benefits, such as supporting economic development or managing stormwater, and included construction of additional facilities, like in Normal, IL and Raleigh, NC.

Particularly striking are the projects achieved with a small public investment that yielded significant results. Portland, OR, for example, spent $95,000 to restripe and add plastic bollards and new signage to NE Multnomah Boulevard. The project created 34 new automobile and 12 bicycle parking spaces. Cycling along the corridor increased 44 percent, and the number of vehicles exceeding the speed limit fell by half. Washington, DC, spent $367,000 to add a two-way bike lane to 1.8 miles of 15th Street NW. The project used restriping, plastic bollards, signage, and signal timing to increase safety and convenience for cyclists. The result? Use by cyclists tripled and automobile volumes increased slightly.

FIG. 6

The cost per mile to build Complete Streets projects vs. an average arterial road

Complete Streets projects are remarkably affordable—some of the projects in our survey cost just a few thousand dollars. They cost less to build than an average urban arterial, yet, as explained earlier, can still increase bicycle, pedestrian, and automobile activity.



Per-mile comparison (all figures converted to 2013 dollars)

- Cost per mile, Complete Streets project construction
- Average arterial "normal cost" per new lane mile
- Average arterial "high cost" per new lane mile

A whole network for a bargain

THE REAL VALUE OF A TRANSPORTATION SYSTEM is in creating an interconnected network, whether designed for people in cars, on transit, walking, or bicycling. Building unconnected individual facilities without connecting them reduces their utility. What does an investment in a Complete Streets network achieve, and what are its costs?

Several local examples illustrate just how cost-effective Complete Streets networks can be. The City of Portland analyzed the benefits of its investment in a complete bicycle network.[12] In the mid-1990s, the City of Portland started building bicycle lanes, bike boulevards and off-street paths. For what the city called a "modest investment" of an estimated $60 million, it built a 300-mile bicycle network.[13]

From 1990 to 2008, bicycling commuting increased by 400 percent (or 14,912 daily trips) citywide, while driving alone declined by 4 percent. From 1990 to 2008, bicycle fatalities steadily declined and for five years over that time period, the city reported no bicycle fatalities. That happened again in 2010 and 2013.[14] Portland's investment in a connected bike network helped meet growing travel demand: The City accommodated a 12 percent increase in trips along four key roadways almost entirely by bicycle, keeping automobile volumes constant. For the same investment, Portland could have built just one mile of a four-lane urban freeway.

The results from Portland suggest a significant change in travel behavior for a small public investment, particularly over several years. It is interesting to think of another use of the $60 million that could produce the same impact on travel behavior and safety outcomes.

We can also look at projections of future costs and benefits to understand the value of a network of Complete Streets. Over the next 25 years, for example, the Washington, DC region plans to spend $2 billion on 643 bicycle and pedestrian projects. This amount represents less than 1 percent of the region's $243 billion budget for that time, but the region plans to accommodate one million new trips by foot or by bike—or 25 percent of all new trips in the region.[15]

Between 2015 and 2025, the Southern California region plans to spend $6.7 billion—again, 1 percent of its budget over that time—on active transportation projects. For that amount, the region will be able to build 5,800 miles of bikeways, improve sidewalks, as well as improve access to schools and parks, among other projects. The region projects bicycle mode share to rise as high as 4.4 percent in 2020 and 16 percent by 2035.[16]

Each of these projects will create entire networks of facilities that allow millions of people to get to their destinations safely and efficiently—for a fraction of a region's transportation budget.

"For an estimated $60 million, Portland built a 300-mile interconnected bicycle network. For that same amount, the City could have built just one mile of urban freeway."

A strategy for economic development

ECONOMIC GOALS OFTEN MOTIVATE communities' Complete Streets projects as much as transportation goals. Many communities report that a Complete Streets approach played an integral role in neighborhood or downtown economic revitalization efforts, but few have studied it comprehensively. Municipal transportation departments and agencies in New York and San Francisco studied the connection between project-level street improvements and retail sales, and in both cities found higher retail sales along improved corridors.[17] We sought to build on their work, and expand our understanding of the economic benefits of Complete Streets projects.[18]

Of the 37 projects examined in this study, our economic analysis focused on the 22 projects that occurred in commercial areas to assess business impacts, among other metrics.[19] Fourteen communities reported data about total private investment, property values, and net new businesses through primary and secondary sources. Data from the U.S. Census Bureau provided employment and earnings information for 11 projects.

We detail our findings below. However to provide context for them, we start with this conclusion: Taken together, these economic measures suggest that Complete Streets projects were supportive of employment, new businesses, and property values. However, the limited availability of project-level data and small sample size make these findings suggestive only for these projects. Additional data collection is needed in this area, and we encourage more cities to measure the economic impacts of their Complete Streets projects (and other transportation projects) to assess how Complete Streets relate to their economic goals.

The economic impact of healthier transportation options

Two-thirds of American adults and nearly one-third of children are now considered overweight or obese, with obesity-related health care costs now estimated at $160 billion per year.[20] Overweight adults spend $395 more each year on health-related expenses than adults at a healthy weight,[21] and physical inactivity costs the United States $75 billion per year.[22] Private businesses are also impacted, through reduced productivity, higher absenteeism, and higher insurance premiums. Complete Streets projects clearly supported biking and walking, which can help reduce and prevent obesity and its related costs.

Higher employment levels

We found that more people were employed along Complete Streets projects after a project was completed than before. More people were employed along Complete Streets projects than other unimproved comparison streets.

U.S. Census provided employment and earnings data for 11 projects. We looked at change in employment two years before and at least one year after the project's completion within 1–2 blocks of these projects. In 7 of the 11 Complete Streets projects, employment increased over that time.

In order to understand whether changes in employment were related to the Complete Streets project or the result of other factors, we compared employment growth to "control" groups: citywide trends in all 11 cases, and similar corridors that were not redesigned in 9 cases. Six of the 11 projects outperformed citywide employment growth during the same time period. Of the nine projects with similar corridors that were not redesigned, six outperformed their comparison corridors. Two showed mixed results with Urbana, IL outperforming citywide employment growth but not the comparison corridor, and Ingersoll Avenue in Des Moines, IA outperforming its comparison corridor but not the citywide average.

Four Complete Streets corridors outperformed growth both citywide and along their comparison corridors, and in some cases, this difference was significant. Along West Lancaster Boulevard, for example, employment grew by 64 percent between 2008 and 2011, while employment grew by less than 3 percent citywide. Its comparison corridor lost employment during that time. Since West Lancaster Boulevard's redesign, the city reports more than 802 permanent jobs were added within the BLVD district. Interestingly, the four projects that outperformed on employment are downtown or commercial main streets.[23] Wage levels for employment along these four corridors generally performed well compared to their unimproved "control" sites or citywide trends.

Net new businesses

Six communities reported data on net new businesses following their redesigns: Orlando, FL; Normal, IL; Lee's Summit, MO; West Jefferson, NC; Washington, DC; and Lancaster, CA. All six of these communities reported increases in businesses following their Complete Streets improvements.

In West Jefferson, NC, 10 new businesses opened along Jefferson Avenue following the small mountain town's Complete Streets improvements, adding 55 new jobs. The number of visitors to West Jefferson's downtown also increased an average of 14 percent since the Complete Streets work. "When we put in four-way stops, that's when we really started hearing positive feedback from businesspeople," said Dean Ledbetter, lead engineer on this project for the North Carolina Department of Transportation. "The streetscaping looks nice, but putting the stop signs up, putting in islands and crosswalks, it was quieter, it was friendlier, people felt like it was better for their customers."

Of these six communities, two also noted that retail sales increased at businesses after their redesigns. In Lancaster, CA, retail sales shot up 96 percent in the BLVD district, and in Normal, IL, retail sales rose 46 percent in the Uptown District. And although net business data was not available in these two additional projects, retail sales went up 42 percent along Hillsborough Street in Raleigh, NC, and 20 percent along Columbus Avenue in New York City.

While the Complete Streets projects are not alone responsible for these gains, these examples are encouraging. Indeed, taken as a whole and keeping in mind the small number of data points, the positive economic trends along most corridors in our survey suggest that Complete Streets made more desirable places to locate and operate businesses.

"'Putting the stop signs up, putting in islands and crosswalks—it was quieter, it was friendlier, people felt like it was better for their customers.'"

Roger Dupuis

▲ Private investment ranged from $500,000 in West Jefferson, NC (left) to $5.8 billion in Cleveland, OH (right).

Higher property values and private investment

Property values and private investment are other measures frequently used as benchmarks for economic progress. They are closely related but not the same. New private investment in buildings and projects along a corridor can raise property values, and vice versa. If a person buys a building and invests $1 million in it, for example, one could measure that as the change in property value or as the $1 million invested in the property. The investment would influence the property's value in most cases, but the measures might not be exact matches. Similarly, investment in one property might raise the values of surrounding properties, and these changes also would not be reflected in a private investment figure. In this study we report changes in both property value and private investment where data are available.

Ten projects reported before-and-after data for property values. Of those ten projects, eight reported increased property values, while the remaining two reported no change. In six of these ten projects, we were able to take an additional step and compare property values along the Complete Streets project to an unimproved corridor or to citywide trends (or both) before and after the project's completion. Of those six projects, four outpaced both the comparison and/or city. In the two remaining projects, the differences are negligible. Where property values did increase, the rate was sometimes striking: In Dubuque, IA, property values increased 111 percent.

Building two kinds of equity

Complete Streets projects are related to higher property values, and that can be a great thing for citywide growth. However, it can also create rent pressures for existing businesses and residents.

Public policies that support small businesses and entrepreneurs, encourage first-source hiring practices and living wages, keep housing affordable, and reinvest projects' value in the area can help make sure everyone in a neighborhoods reaps the benefits associated with Complete Streets improvements.

▲ Pedestrians, cars, and bicycles share Complete Streets improvements in Orlando, FL.

▶ CASE STUDY

Safer streets make for better business in Orlando, FL

Edgewater Drive acts as the main street for College Park, a neighborhood four miles north of downtown Orlando, FL. When the street was scheduled to be resurfaced in 2001, the community saw an opportunity "to reinvent Edgewater Drive into a vibrant, pedestrian-friendly commercial district with cafés and shops."

The City of Orlando proposed a 4-to-3 lane conversion for 1.6 miles between Par Street and Lakeview Street, adding bicycle lanes, a center turn lane, and wider on-street parking. With resident input, the City of Orlando devised an extensive series of performance measures to monitor the project's progress. These measures included travel times, traffic volumes for all modes, and safety-related crash and injury rates, and speeding data.

The newly improved street was clearly safer than before. Total collisions dropped **40 percent**, from 146 to 87 annually. The crash rate was nearly cut in half, from 1 crash every 2.5 days to 1 crash every 4.2 days. Injuries fell by **71 percent**, from 41 per year to 12 per year, and instead of 1 injury every 9 days, the reconfigured street saw 1 injury every 30 days. These safety findings are particularly impressive considering that automobile traffic only decreased **12 percent** within a year following the redesign, while bicycle counts surged by **30 percent** and pedestrian counts by **23 percent**.

As a result, more people want to be on Edgewater Drive. The corridor has seen **77 net new businesses** open and **560 new jobs** created since 2008. Average daily automobile traffic, which saw a slight dip following project completion, has returned to its original pre-project level and on-street parking use has gone up **41 percent**.

The most dramatic results, however, were in long-term real-estate and business investment. Since the project was first proposed, the value of property adjacent to Edgewater Drive has risen **80 percent**, and the value of property within half a mile of the road has risen **70 percent.**[24]

The street was resurfaced again in 2012. No one suggested it should go back to its original configuration.

PRIVATE INVESTMENT along many of the Complete Streets projects was also significant. In total, eight communities reported private investment data, primarily for investments made after the Complete Streets projects. Private investment figures ranged from $500,000 in West Jefferson, NC, to $5.8 billion in Cleveland, OH.

- Private companies invested $160 million in the Uptown District in **Normal, IL**, after that area's Complete Streets project was completed. The new roundabout that replaced a complicated intersection now serves as the heart of the Uptown District and is a place that residents of all ages can enjoy. "People love Uptown Normal," said Normal Mayor Chris Koos. "They ride the bus, they bike the trail, they shop, they socialize, and they recreate in a wonderful urban center."

- Gronen Properties, a local real-estate developer in **Dubuque, IA,** renovated a former window manufacturing plant building and added 72 residential units and 15,000 square feet of retail, restaurant, and office space to the Millwork District. Other historic properties including the Novelty Iron Works and Linseed Oil Paintworks are currently being renovated for a combined investment of $37 million, adding another 120 apartment units and 320,000 square feet of commercial space to the area.

- Both **Washington, DC,** and **Raleigh, NC,** saw new or renovated apartment buildings and hotels built along their Complete Streets projects, totaling $63.3 million and $25.5 million, respectively.[25]

- And in **Cleveland, OH**—a city recovering from population loss and widespread disinvestment—private companies invested an astonishing $5.8 billion along Euclid Avenue's HealthLine. Several Cleveland-based institutions, including the Cleveland Clinic and University Hospital, have built new projects in tandem with the new bus rapid transit line making Euclid Avenue a "front door" for people visiting the area. Cleveland's reconstruction of Euclid Avenue, along with investment in transit, also improved access to two employment hubs that together are home to more than 170,000 jobs.

Many of the Complete Streets projects with property values and private investment data were part of broader public or private economic development strategies that included additional infrastructure upgrades, business recruitment, branding and marketing, and event programming. In these cases it is difficult to tell how much of the private investment or property value gains were attributable to the Complete Street projects. However, it's clear that in all cases, the retrofits were considered a necessary component and catalyst for these economic strategies. In addition, the outperformance of the Complete Streets corridors compared to the city and comparison corridors suggests that Complete Streets projects were instrumental in drawing investment to them.

"'People love Uptown Normal,' said Normal Mayor Chris Koos. 'They ride the bus, they bike the trail, they shop, they socialize, and they recreate in a wonderful urban center.'"

What your community can do

THIS RESEARCH DETAILS how a Complete Streets approach can yield transportation and economic benefits. Here are some ways to get started on a Complete Streets approach in your community.

Adopt a Complete Streets policy and strong implementation plan

Complete Streets policies direct transportation planners and engineers to routinely design and operate the entire right-of-way to enable safe access for all users, regardless of age, ability, or mode of transportation. Passing a Complete Streets policy creates a vision for a street network that fully integrates the needs of people traveling by foot, bicycle, transit or automobile into a city or town's transportation project development and delivery. A strong implementation plan complements this policy: It directs a department of transportation (DOT) or public works to update their internal decisionmaking guidance, build staff buy-in for a Complete Streets approach, and measure the results of their projects.

Update design policies and standards

By reviewing and revising existing standards to support design flexibility, departments of transportation and public works can advance their community's Complete Streets vision and support the exploration of more cost-effective ways to achieve their transportation goals. The American Association of State Highway and Transportation Officials, Institute of Transportation Engineers, and National Association of City Transportation Officials have all produced guidelines for how to integrate context-sensitive, multimodal design into transportation projects.

Use existing data and information to evaluate projects

Many departments of transportation (DOTs) collect data and information that can be used to build public support for and inform future Complete Streets work. This data—mode counts, automobile travel time or delay, and collisions—can be used to set baselines at the beginning of projects and evaluate the conditions after the Complete Streets work is complete. DOTs interested in evaluating their Complete Streets work should start with data they already have or that they can request from other local, regional, or state agencies. Police departments, departments of environment, economic development agencies, county-level health organizations, metropolitan planning agencies, and state DOTs are all good places to start.

Measure performance in ways that account for all users and capture the multiple benefits of Complete Streets projects

In some cases, a transportation agency builds a project with a specific goal in mind and then measures only a limited set of outcomes to understand if the project has met that specific goal. Instead, use a broad range of metrics to assess how the roadway changes are affecting all people traveling on it. Consider whether auto-oriented measures like level-of-service will be most valuable, and consider additional factors like overall travel speed and time for automobiles, people walking, bicycling and riding transit, and overall comfort and ease of travel. Also consider metrics that account for changes beyond the right-of-way, connecting Complete Streets work to broader community goals like health, equity, and economic development. Tangible, local examples of this broader connection can help bolster community or political support for similar transportation projects.

Collaborate directly with residents and other stakeholders on measuring performance

Through public engagement during the planning and design phases of a project, ask residents and other stakeholders to define a successful transportation project. Use this information to set baselines and compare a project's results to the community's definition of success. Communicate the project's results in straightforward, concise ways, such as one-page summaries, that directly relate to the community's definition of success. Public engagement not only makes transportation decision-making more transparent to residents and responsive to their needs, but also builds a body of local evidence with tangible local examples and a base of support to advance future projects.

For more details and resources on all of these recommendations, visit **www.smartgrowthamerica.org/completestreets.**

Conclusion

WHETHER TO REDUCE COLLISIONS AND INJURIES, encourage multimodal travel, make the most of small investments, create a complete network for a bargain, or support economic development, communities have gotten impressive returns for their investments in Complete Streets.

Complete Streets projects usually made streets safer. Streets generally had fewer collisions and fewer injuries after their Complete Streets improvements than before. These safer conditions yield tangible financial benefits to individuals and families. Collectively, the projects included in this survey have averted $18.1 million in collision and injury costs. These cost savings can quickly outstrip the total cost of some projects, making them clearly worthwhile from a personal cost perspective.

Complete Streets projects encouraged more multimodal travel. More people walked, biked, and took transit on streets after their Complete Streets improvements than before. Automobile traffic increased in 13 cases and decreased in 19 cases—and sometimes a reduction was a goal of the project. Compared to conventional transportation projects, Complete Streets projects are cheap and can yield significant results. And transportation agencies can create a whole network of streets that work for people bicycling and walking for a small fraction of their budgets.

For transportation professionals the clear implication is that Complete Streets may be one of the best transportation investments they can make. These projects should be allowed to compete and be evaluated against other projects on the basis of their low costs and the benefits they provide.

The economic data available were more limited than the transportation data. Where data were available the results across different measures consistently suggested that the Complete Streets projects aided economic development efforts for the bulk of the projects. In some cases, the Complete Street project was an integral part of a larger economic redevelopment effort and some of these showed large-scale economic gains. These projects were supportive of higher employment rates, new businesses, and property values. And several of the projects have seen significant private investment since their completion. The data available suggest that Complete Streets projects can leverage private-sector investment, create conditions prime for economic development, and help to revitalize a neighborhood or corridor.

Local officials, transportation professionals, and economic development specialists can all learn from these findings. Other communities have reaped significant benefits from their investments in Complete Streets projects. These are strategies any community can use to improve streets, support local economies, and get an impressive return on their public investments.

Appendix A: Methods

Transportation benefits

This method tests that investments in Complete Streets achieve conventional transportation goals, such as improving safety and encouraging multimodal travel, with a smaller public investment. Working under the guidance of a diverse project advisory team and with the assistance of transportation professionals, the project team at Smart Growth America identified and surveyed 100 projects planned, designed, and constructed with specific Complete Streets goals. The project team developed a comprehensive survey to gather qualitative and quantitative data about transportation performance at each site, such as mode counts, LOS grades, travel time, and frequency and severity of crashes. Based on available data gathered through these surveys, the project sample was narrowed to 37 projects. Projects with inadequate or incomplete data were excluded from further analysis.

For the purposes of the transportation analysis, the sites in the project sample have traffic counts along the Complete Streets project corridor for one or more of the following modes: pedestrian, bicycle, or automobile. Selected sites also have data available on total number of crashes along the project corridor. Additional data such as transit ridership and injury statistics is also included in our analysis for sites when available.

The analytic method for the collected data was a straightforward before-and-after analysis, which calculates the difference between the relevant measures before and after project completion. While the timing of these assessments varies by project and is dependent on when individual agencies collected data, in most cases "before" represents at least one year before the project was built, and "after" represents at least one full year after its completion. For projects where more than one year of data was available, we used an average of those years.

To gather this information, researchers interviewed transportation agency professionals and consultants who worked on or had first-hand knowledge of the project. Local agencies, including departments of transportation, planning, police, and public works, provided almost all of the data in this report. Due to variations in the methods municipalities used to collect transportation and safety data, this study does not calculate the total change in each measure across the project sample. Instead, it calculates and summarizes the direction of change for all projects. The before-and-after analysis is conducted on a project-to-project basis to limit data collection inconsistencies. Appendix B provides an overview of individual transportation and economic results.

Economic analysis

The analysis tests the basic idea that Complete Streets investments create economic value and support local economic development goals. The analytical methods for economic activity draw on the Missouri Department of Transportation's jobs analysis, which uses U.S. Census data to study changes in employment and earnings in the vicinity of these projects.

This study uses the Center for Economic Studies at the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) OntheMap tool to analyze change in employment and earnings.[26] To capture localized effects, we used a 1–2 block buffer to assess change in employment on the Complete Streets corridor, and for ease of comparison, a one-block buffer for all projects when comparing the

Complete Streets corridor to its "control" site and citywide trends.

Transportation professionals familiar with the project and local context identified the comparison corridors—streets with similar conditions to the study corridor before its Complete Streets improvements.[27] Change in jobs and earnings were indexed to two years prior to project completion. We reported the change for all projects at least one year after, and where data was available, two years. Outperforming, in this study, means employment levels were higher along the Complete Streets corridor than its control site, citywide, or both, within one block of the project.

This study also reports primary and secondary data on private investment, property values, net new businesses, and retail sales, as available, to capture the value of corridor becoming a community destination. It examines the before-and-after change in property values in 10 projects. For 6 projects, it also compares property values for properties adjacent to the Complete Streets and "control" corridors and citywide. Change in property values was indexed at least one full year prior to project completion. In some cases, localities supplied this information for a district, where multiple Complete Streets projects were built at the same time.

Because LEHD data is available from 2002 to 2011, jobs and earnings analysis includes 11 projects in 11 communities in 11 states that were completed between 2002 and 2010. Primary and secondary data was collected for 14 projects in 14 communities in 10 states and reported throughout this study.

Monetizing safety benefits

To estimate the value of averted costs, we simply estimate the average costs for collisions (with and without injuries to persons), using widely accepted standards and practices in risk analysis and following federal guidance on economic values, and apply that value to the number of collisions avoided.[28]

Because fatalities rarely occurred along the projects in our sample before their Complete Streets improvements, this analysis focuses on the value of economic benefits accrued through fewer total collisions and collisions that result in fewer injuries. To calculate the total cost of a non-fatal collision, we use 2.1 percent of USDOT's "value of a statistical life," or $193,000.[29] To calculate the total cost of a non-fatal collision that results in property damage, but not injury, we use 3.5 percent of $193,000, or $6,755.

To assess the economic value of future averted collisions, we derive the present discounted value of benefits accrued in future years. Because Complete Streets improvements permanently change a roadway, we treat these benefits as permanent, like a "perpetuity" (a bond with permanent fixed payments and no principal redemption). We use the following formula to calculate present value: Present Value = Payment/i.

In this equation, "payment" represents annual averted cost, and "i" equals the discount rate (or interest rate). The discount rate accounts for the value of time (i.e., the difference in the value of a dollar today versus one paid at some point in the future). It can be seen as the opportunity cost of money (i.e., what it could earn if invested) at reasonable levels of risk. The values chosen for the discount rates (which incorporates the effects both of future inflation and time-value of money) affects the estimate's magnitude. For our analysis, we assumed 3 percent and 7 percent discount rates to generate a reasonable range for our estimated future cost-savings, and calculated the averted costs of all projects with a 5 percent discount rate.[30]

Appendix B: Project descriptions

ARIZONA: TEMPE

This 2-mile project along College Avenue added dedicated bike lanes in each direction, created a link between Arizona State University (ASU) and a pedestrian/bicycle bridge over US 60; 183 cyclists enter the bike lane near ASU each hour. It also installed streetscape improvements, including raised medians, raised intersections, shade trees, and desert landscaping, to improve pedestrians' experience. The corridor experienced higher crashes and injuries after the project was completed in absolute terms. Because before-and-after pedestrian and bicycle counts were unavailable, it is not possible to calculate the crash rate among these users and understand how this project affected safety results along the street.

CALIFORNIA: BERKELEY/ALBANY

Marin Avenue, a 4-to-3-lane road conversion, links a residential neighborhood in Berkeley to a commercial area in Albany. The project, aimed at encouraging bicycling and improved safety, experienced more crashes. At the same time, automobile traffic fell by 22 percent. Without bicycle and pedestrian counts and collision data for these modes, it's difficult to determine if Marin Avenue met its stated goals. The project, completed in 2005, cost $520,000.

CALIFORNIA: LANCASTER

Narrowing nine blocks of West Lancaster Boulevard from four to two travel lanes, installing a rambla (a tree-lined median for gathering and parking), widening sidewalks and landscaping created a retail and entertainment destination and a hub for community events, known as the BLVD. The City of Lancaster estimates its $11.6 million public investment in the project spurred $125 million in private investment and more than $273 million in total economic output, including 48 businesses and 1,902 new jobs (1,100 construction and 802 permanent jobs). In 2012, sales tax revenue was 96 percent greater than 2007 pre-construction revenue. By 2013, three years after project completion, total collisions fell by nearly one-third, and injuries among all users decreased by 67 percent. LOS went from D to E.

CALIFORNIA: LONG BEACH

In 2011, the City of Long Beach added mile-long cycle tracks along two one-way streets, Broadway & Third avenues, in its downtown. The project replaced one travel lane with a protected bike lane, and modified a total of 23 signals to add bike signals and left-turn signalization. Both streets now carry two lanes of traffic, parking on both sides of the street, and a bike lane. One year after construction, bicycle volumes increased 33 percent; the number of cyclists traveling on sidewalks fell; and bicycle crashes decreased (from 6 to 3). Pedestrian activity also increased by about 13 percent. Average daily traffic volumes fell by 13 percent. Collisions fell by 27 percent, with pedestrians and bicyclists involved in fewer collisions.

CALIFORNIA: NOVATO

The Grant Avenue project reconstructed 11 blocks of Novato's main commercial street, installing improved sidewalks, streetscaping, bulb-outs, and bicycle racks. Although automobile traffic fell by 20 percent, the street benefited from a 55 percent decrease in total collisions and 67 percent decrease in total injuries. The $7.2 million project included an overhaul of the street's pavement structure, irrigation, and drainage system, taking advantage of needed upgrades to create a more pedestrian-friendly corridor.

DISTRICT OF COLUMBIA: WASHINGTON

The cycle track on 15th Street NW, a project completed in 2010, provides 1.8 miles of two-way bike lanes separated from traffic by on-street parking or a 3-foot painted buffer and flex posts. Previously, bikes shared the road with automobiles. The improvements, which connect to the District's growing network of separated bikeways, included pavement markings, flex posts, signs, and signal timing changes. The total cost of the improvements was about $367,000.

After the cycle track was added, cycling volumes at two intersections in the corridor increased by 229 percent on average. Automobile volumes at three intersections increased by 4 percent on average. Overall, vehicle speeds increased slightly, with an average increase (during AM peak hours northbound, and mid-day peak hours in both directions) of 1.17 mph and an average decrease (during AM peak southbound, and PM peak in both directions) of 0.97 mph. Crashes increased by 10 percent overall, from 131.3 per year to 144 per year along the length of the corridor. Crashes involving pedestrians increased by 14 percent, while crashes involving cyclists decreased by 10 percent.

DISTRICT OF COLUMBIA: WASHINGTON

In 2010 the District Department of Transportation (DDOT) made improvements to the six-way intersection, which includes 16th Street, U Street, and New Hampshire Avenue to make bike traffic more visible to cyclists and drivers. The changes to the intersection included approximately two blocks of lane restriping, eight flex posts, instructional signs, and a new signal head. After the improvements were installed in 2012, bicycle volumes increased by 133 percent during AM peak hours and 187 percent during PM peak hours. Traffic volumes slightly decreased (by 1 percent), while the intersection's LOS grade did not change. Crashes at the intersection increased by 13 percent, with no crashes involving pedestrians (a reduction from 1.3 per year) and 1.6 per year involving cyclists (a slight increase from 1.3 per year).

FLORIDA: ORLANDO

Edgewater Drive, a 2001 road conversion completed by the City of Orlando, calmed traffic and encouraged pedestrian activity in the College Park neighborhood. The percentage of vehicles traveling at excessive speeds (over 36 miles per hour) fell by 19 percent. Slower speeds encouraged safer conditions and more activity among people traveling on foot and by bike (increases of 23 and 30 percent, respectively). The redesign also resulted in fewer crashes (40 percent) and injuries (71 percent), especially for pedestrians and cyclists. Immediately following the redesign, property values within the College Park neighborhood kept pace with property values in Orange County, where the annual growth rate among residential properties was 8–10 percent and 1–2 percent among commercial properties.

ILLINOIS: CHICAGO

Chicago's first protected bike lanes were installed along a one-half-mile stretch of Kinzie Street, providing cyclists with east–west access in and out of downtown. The 4-to-2 lane conversion created space for cyclists on each side of the two-way street and quickly proved popular. Morning rush hour bicycle traffic increased 65 percent. At the same time, automobiles experienced just a modest 11-second average travel time increase during peak hours. On safety, overall collisions fell by 11 percent, but injuries increased from 6 before to 15 after. Still, 49 percent of surveyed cyclists say that motorist behavior is improving and 41 percent claim that they are newcomers to the corridor. Protected lanes have made Kinzie Street a preferred choice for accessing downtown jobs, retail, and entertainment by bike.

ILLINOIS: URBANA

Philo Road, a $495,000 street resurfacing project that enhanced two bus stops with real-time signage and the streetscape in Urbana, IL, encouraged higher ridership on its local bus system, CUMTD. Ridership increased by 24 percent within two years of the changes. The project has improved the curb appeal of the area, too. The city's Director of Community Development called the beautification of the roadway "stunning." Fewer automobiles used the roadway after the redesign, where its LOS grade fell from B to C. Because before-and-after pedestrian and bicycle counts were unavailable, it is impossible to calculate the crash rate among these users and understand how this project affected safety outcomes along the street.

ILLINOIS: NORMAL

Normal upgraded its transportation system throughout the Uptown District, the heart of the 52,497 person–town in central Illinois, spending $47.4 million, including a $22 million 2010 TIGER grant. As the centerpiece of its 1999 Uptown Renewal Plan, these improvements included sidewalk widening and repairs; reconstruction of Constitution Boulevard; a new traffic circle; and Uptown Station, a multimodal transportation center. The city experienced an increase in all modes traveling in the district, with more than 40 percent of all trips by foot or bike. It also benefited from higher property values (16 percent increase over pre-construction values) and new private investment ($160 million). Increased activity in the Uptown District and newly configured traffic patterns caused crashes to peak after the initial changes.

IOWA: DES MOINES

Ingersoll Avenue, a two-phase streetscaping and road conversion project completed in 2007–2008 and 2010, functions as an important bus and commuter route in the capital city of Iowa. Even though Ingersoll Avenue's LOS grade fell from B to C, the roadway handled 6 percent more automobiles daily. After the Complete Streets changes, crashes fell by 57 percent (49 to 21) and injuries fell by 59 percent (22 to 9). The conversion accomplished in-house, with paint, cost $10,000, while the construction costs of the streetscaping project totaled $292,772. The corridor experienced significant redevelopment over past several years, including several renovations and the siting of a $15 million grocery store.

IOWA: DUBUQUE

The City of Dubuque used several Complete Streets projects to complement redevelopment of the Millwork District, home to former warehouses and industrial buildings that are being redeveloped as part of a reinvigoration of the downtown economy. Primary work included construction of an off-road, multi-use trail along two blocks of a highway viaduct, and streetscaping and reconstruction of 4,050 linear feet of roadway along four different streets: Jackson, Washington, 9th, and 10th streets. All of the streetscape projects included sidewalk replacement, pedestrian bulb-outs, mid-block crossings, new pedestrian lighting, and narrowed streets with sharrows. The city also replaced century-old water mains and storm and sanitary sewers at the same time.

Within a year, cycling increased 273 percent. Automobile volumes increased by 1,416 percent. City officials note that many of the repurposed warehouses and retail uses had not yet opened when these measurements were taken in 2013, and they expect foot traffic to increase.

Coupled with these public investments, early signs suggest the redevelopment efforts within the district have also been successful: More than $34 million in new private investment has been made, with another $150 million in real-estate investment in the pipeline. The first warehouse to be redeveloped now is leasing 72 residential units; 39,000 square feet of retail and commercial space; and 20,000 square feet for an incubator for arts and nonprofit organizations.

LOUISIANA: NEW ORLEANS

The major mixed-use corridor of South Carrollton Avenue, which includes a branch of New Orleans' historic streetcar system, underwent a 4-to-2 lane conversion in 2010. The project cost $3.4 million and added bicycle lanes, landscaping, and improved crosswalks and sidewalks. Following this investment, the street saw a dramatic 676 percent increase in bicycle traffic while accommodating 20 percent more automobiles. Although collisions increased 3 percent and injuries spiked 118 percent, the crash rate along the street improved. The rate of collision among bicyclists, for example, decreased slightly from 0.63 to 0.54 collisions per 100 bicycle trips following the project's completion.

LOUISIANA: NEW ORLEANS

Esplanade Avenue, a street comparable in scale to South Carrollton Avenue, saw a similar 4-to-2 lane conversion to increase pedestrian and bicycle use. This $1.9 million project resulted in 62 percent more pedestrians and 123 percent more bicyclists along the corridor. Total collisions decreased 10 percent; however, the increased severity of those collisions saw total injuries jump 300 percent.

LOUISIANA: NEW ORLEANS

Decatur Street, cutting through the French Quarter along the Mississippi River, is one of the busiest routes for both tourists and locals in the city's historic center. This $1.5 million project improved pedestrian intersections while adding sharrows in one direction and a bike lane in the other to accommodate bicyclists. Like Esplanade Avenue, the street saw improved pedestrian (37 percent) and bicycle (13 percent) counts but had mixed safety results—collisions fell 7 percent while injuries rose 212 percent.

MASSACHUSETTS: CAMBRIDGE

Porter Square is an historic retail center and home to a shopping center, commuter and subway rail station, and moderate-density retail and residential uses along one-quarter mile of Massachusetts Avenue. A citizen committee worked with the City of Cambridge to develop several project goals, including improving conditions for pedestrians, bicyclists and transit users; reducing cut-through and shopping center–related vehicular traffic on neighboring residential streets, improving the streetscape and creating a sense of place in Porter Square; and improving traffic safety. To achieve these goals, the project, completed in 2007, added marked crossings, reconfigured traffic lanes to simplify pedestrian and bicycle crossings and turn movements, combined pedestrian islands to create a single pedestrian plaza, added bike lanes and a signalized bike crossing, coordinated vehicular signal timing, and widened a portion of the sidewalk.

Cycling increased by 929 percent, automobile traffic decreased by 11 percent, and daily subway ridership increased slightly, mirroring similar citywide trends. After the project, crashes decreased 12 percent (from 34 to 30). Crashes involving pedestrians remained constant at 1.5 per year, while the average number of crashes involving cyclists increased from 2 to 5, although the rate of crashes involving cyclists fell.

MINNESOTA: MINNEAPOLIS

To improve bicycle access and safety, this $28 million Complete Streets project narrowed Franklin Avenue for one half mile, including over the Franklin Avenue Bridge, from four to three lanes and added bicycle lanes. While automobile traffic fell slightly (3 percent) after the redesign, bicyclist and pedestrian activity increased 20 and 36 percent respectively. The project made traveling safe for everyone using the roadway: Crashes decreased by 38 percent, and injuries decreased by 37 percent.

MISSOURI: COLUMBIA

The intersection at Providence and Stewart roads acts as a central crossroads, connecting the 8.5-mile multi-use MKT Nature and Fitness Trail, residential neighborhoods, the University of Missouri campus, and Columbia's downtown area. Improvements to this area included changing the geometry of turn lanes, installing pedestrian crossing signals, constructing new sidewalks, improving trail access and connections, adding lighting and drainage enhancements, modifying signals, and adding striping and markings for bicycle and pedestrian safety. The upgrades also created a plaza where the MKT Trail meets the Providence/Stewart intersection. Total project cost was $396,000.

On average, pedestrian volumes at the intersection increased by 74 percent while cycling volumes increased by 51 percent. There was no change in automobile volumes. Crashes were largely unaffected: Annual average crashes fell by 0.5 percent overall, with no change to pedestrian- or bicycle-involved crashes (1 and 0 per year, respectively). Injuries increased slightly, from 1 per year to 3.

MISSOURI: COLUMBIA

The Windsor & Ash bicycle boulevard links two residential neighborhoods for approximately one-half–mile. It provides a critical connection in an area without many safe east–west options, helping bicyclists to bypass two busy streets and access downtown Columbia, parks, and retail centers. Modifying an existing low-volume residential street created the bicycle boulevard. These modifications included diverting through vehicle traffic to a parallel street; creating six-foot "advisory" bicycle lanes in the center of street with a yellow center line and white dashed lines; adding shared lane markings in the bicycle lane; installing a new "safety island" for bicyclists and pedestrians at street crossings; and painting street murals at two intersections, signaling the start of the bike boulevard. The total project cost was about $37,000.

One year after project completion, cycling increased by 124 percent. While traffic decreased by 47 percent—an intentional outcome of this project—automobile travel time was 7 percent faster. Total crashes fell from 7.5 per year to 1.5 per year, with a slight increase in pedestrian-involved crashes (from 0.5 per year to 1) and a slight decrease in cyclist-involved crashes (0.5 to 0).

MISSOURI: GRANDVIEW

A three-phase, $3.1 million project to reinvigorate Main Street, improved capacity and the quality of environment for pedestrians along several blocks. The number of people traveling in the area by all modes increased: Pedestrians by 900 percent; bicyclists by 40 percent; automobiles by 20 percent, although its level-of-service grade (B) did not change. It was also safer, as evidenced by 90 percent fewer crashes after the changes. Residents responded positively to the new street design, with 85 percent of surveyed residents reported being satisfied or very satisfied with it.

MISSOURI: LEE'S SUMMIT

Lee's Summit reconstructed several streets within its downtown district, improving sidewalks and adding lighting and street trees, to calm traffic and encourage more pedestrian activity. The city improved sidewalks and added bump-outs, streetlights, benches, and planters. Along Lee's Summit main street, Third Street, automobile traffic increased (13 percent), as did crashes in absolute terms by 6 percent. Crashes involving injuries, however, fell by 33 percent. Acting a catalyst for redevelopment, Downtown Lee's Summit estimates 10 net new business, 58 net new jobs, and nearly $3.5 million in private investment has occurred since the changes. The total cost of the project was $10.5 million, which included utility upgrades.

NEVADA: RENO

A $4.5 million, 4-to-2 lane conversion of Wells Avenue improved safety and accessibility in downtown by adding bike lanes and wider sidewalks along a key one-mile segment. The project resulted in a much safer roadway—total collisions decreased 45 percent while total injuries decreased 62 percent. These safety benefits were realized across modes, with pedestrian collisions dropping from 6 to 0 and bicycle collisions remaining steady at 3 incidents. Pedestrian and bicycle counts were unavailable, while automobile traffic experienced a 10 percent drop.

NEW MEXICO: ALBUQUERQUE

Central Avenue, which connects Albuquerque's downtown business district to Old Town, the oldest area of the city and a tourist destination, became much safer after a road conversion. The conversion narrowed the roadway from 4 to 3 lanes with two dedicated bike lanes and on-street parking. After the redesign, crashes fell by 38 percent and injuries fell by 44 percent. Walking increased by 16 percent, whereas automobile traffic decreased by 4 percent. The project cost $67,792.

NEW YORK: HAMBURG

The reconstruction of Route 62 through downtown Hamburg, NY, involved significant changes to the streetscape and traffic controls—all with the goal of creating a more attractive place for people to linger and shop. Collaborating with the New York State Department of Transportation (NYSDOT), the village and its residents worked to develop design solutions to meet their goals, as well as accommodate truck traffic. The NYSDOT installed two roundabouts, along with narrower travel lanes, bicycle lanes, curb extensions, street trees, and marked pedestrian crossings. Route 62 became safer as a result of these changes: During the year after the project was completed, there were 33 crashes, 66 percent fewer than the two-year average prior to the project. The total cost of the 1.2-mile project was approximately $23 million.

The project also helped Route 62 act as a true gathering place for village residents, meeting one of the village's goals for the roadway. An additional $3 million of private funds were invested into the buildings lining the streets. Residents participate in civic activities along the street, including a soapbox derby and street-music festival.

NEW YORK: NEW YORK

Before 2010, New York City's Columbus Avenue between 96th and 77th streets carried three 12-foot travel lanes and two curbside parking lanes. In order to add a protected bike lane in the existing right-of-way, the city reduced lane widths and added street trees and pedestrian islands to buffer the bike lane and reduce pedestrian crossing distances. The total cost of the one-mile project was $625,000. In 2014, the city reported that bicycle volumes along the improved portion increased by 51 percent, with a 27 percent reduction in crashes with injuries.[31] There was a slight overall decrease in traffic volumes and travel time during morning peak hours.

NORTH CAROLINA: CHARLOTTE

To calm traffic and create a more pedestrian-friendly environment, Charlotte Department of Transportation (CDOT) implemented a three-phase project along East Boulevard. In the second phase, CDOT narrowed eight blocks of the thoroughfare from four to three lanes, added bike lanes on both sides of the street, and installed pedestrian refuge medians, wheelchair ramps, and landscaping. The project, which completed a nearly seamless on-street bicycle lane for 1.5 miles, created safer conditions for all users: Crashes decreased by 6 percent and crashes with injuries fell by 39 percent (23 to 14), even though automobile traffic along the corridor increased slightly by 2 percent. Phase II's construction costs were $550,000.

Charlotte experienced similar results after its road conversion of Selwyn Avenue from four to three lanes, with a center turn lane and bicycle lanes in each direction. Crashes fell by 15 percent, even as the roadway carried 5 percent more automobiles daily.

NORTH CAROLINA: RALEIGH

Hillsborough Street is a half-mile road diet and streetscape project meant to improve pedestrian safety and spur investment in the area around NC State University. Occurring in two phases, the project cost $7.5 million. Phase I of the project widened sidewalks, built a median, reduced the 4-lane roadway to 2 lanes with on-street parking, and constructed a roundabout at the corridor's entrance, and was completed in 2010. Despite a 5 percent increase in pedestrians, a Phase II became necessary to replace what proved to be a crash-prone roundabout. Prior to Phase II, collisions were up 269 percent and injuries up 38 percent, even while automobile traffic saw a 21 percent decrease. The redesigned roundabout, completed in 2012, addressed these issues with a simpler, single-lane roundabout that can better achieve the project's safety goals. This project has had a significant economic impact as well: Following this redesign, the street has added $25.5 million in real-estate projects, with several more in the works, and experienced a 42 percent increase in food and beverage tax.

NORTH CAROLINA: WEST JEFFERSON

In partnership with the North Carolina Department of Transportation (NCDOT), the town of West Jefferson improved the streetscape along 3 blocks of its historic downtown, with a bulk of the improvements along Jefferson Avenue. In order to calm traffic and make the area more welcoming to pedestrians, NCDOT replaced 2 signalized intersections with 4-way stops, added diagonal parking, curb extensions, high-visibility mid-block crossings, and street furniture.

The $300,000 reconfiguration dramatically changed the feeling of downtown, with a NCDOT engineer reporting that people perceive slower speeds but the roadway has maintained consistent travel times. No crashes have occurred at intersections in this area—once considered among the state's most dangerous—contributing to a 24 percent reduction in crashes and 53 percent reduction in injuries district-wide. At the same time, automobile volumes increased slightly (by 1 percent). Local leaders specifically credit the slower traffic and improved pedestrian environment with bringing 10 new businesses, 55 new jobs and $500,000 worth of investment to Jefferson Avenue.

OHIO: CLEVELAND

Cleveland transformed seven miles of Euclid Avenue from an uninviting street to a thriving cultural and employment center, striping the city's first bike lane, repairing sidewalks, installing streetlights and bus shelters, and planting 1,500 trees. A bus rapid transit project, christened the HealthLine, takes people from Public Square to University Circle in 20 minutes. Since the new transit service, ridership increased 61 percent, while crashes and injuries among users fell by 24 and 25 percent, respectively. The $200 million public investment, including a $82.2 million federal grant, attracted more than $5.8 billion in private investment through more than 110 projects.

OREGON: EUGENE

Alder Street, a $2.3 million project that installed a two-way buffered bike lane and bike signal and widened sidewalks near the University of Oregon campus, encouraged more cycling within the city of 156,000 people. Cyclists using the street increased by 68 percent, while people on foot increased by 8 percent after the Complete Streets project. Crashes in absolute terms increased by 53 percent, although accounting for the increase in cycling in particular, the crash rate decreased from 2.39 incidents per 100 cyclists to 1.77 per 100 cyclists. Transportation professionals in Eugene credit the changes to an uptick in "social riding" and more entrepreneurship along the street's sidewalks.

OREGON: PORTLAND

Northeast Multnomah Street runs through Portland's Lloyd District, an area anticipating new residential development and a streetcar extension in the next few years. Two of the four existing travel lanes were converted to bike lanes using a combination of paint, traffic wands, concrete planters, and on-street parking to delineate and buffer a curb-tight bike lane. The project added 34 new on-street parking spaces for automobile and 12 bicycle parking spaces in a bike corral. The reduction in travel lanes also decreased crossing distance for pedestrians. Since 2013, when the project was completed, bicycle volumes increased by 44 percent. Automobile traffic decreased by 23 percent and travel time fell by 33 percent—results that may be related to construction in the area. Total crashes fell by 6 percent, with pedestrian-involved and cyclist-involved crashes both increasing by 1 (from 1 to 2 and from 2 to 3, respectively) following the improvements.

PENNSYLVANIA: PHILADELPHIA

In 2009 Philadelphia created bike lanes along a pair of one-way streets—Spruce and Pine streets—in Center City Philadelphia. Pine and Spruce streets had constrained rights-of-way with mature trees and sidewalks abutting buildings (largely multifamily residences); these conditions created a need to consider how to use the existing space differently. The city painted 3.7 miles of buffered bike lanes along these streets, replacing a travel lane with bike lanes while maintaining one travel lane and on-street parking along one side of the street. Average hourly cycling volumes increased by an average of 131 percent, while daily automobile traffic was largely unaffected: It increased by less than 1 percent.

WASHINGTON: SEATTLE

In 2007, the Seattle Department of Transportation narrowed Stone Way N, a 1.2 mile stretch connecting the Fremont and Wallingford neighborhoods with several nearby schools and parks, from four lanes to two general travel lanes with a two-way left turn lane and added bike lanes, sharrows, and updated crosswalks. After the improvements, total collisions fell 14 percent (159 to 137); collisions resulting in injuries fell 33 percent (52 to 35); and collisions involving pedestrians declined by 80 percent (from 5 to 1). After its changes, speeding automobiles (i.e., traveling at 10 mph above the posted speed limit of 30 mph) fell by 75 percent (from 150 to 75 vehicles per day). This project, completed as part of routine repaving, cost approximately $300,000.

WASHINGTON: SEATTLE

To create safer pedestrian conditions, the Seattle Department of Transportation (SDOT) rechanneled 1.2 miles of Nickerson Street, turning its four lanes into two travel lanes, two-way left turn lane, and bicycle lanes. SDOT also installed two new crosswalks. After the redesign, speeding drivers fell by 90 percent, with drivers exceeding the street's 85th percentile speed declining by two-thirds. Average annual collisions fell by 23 percent, from 33.6 to 26 incidents. Average weekday traffic fell by 1 percent, even as freight vehicle use increased slightly. This project, funded through Seattle's Bridging the Gap levy, cost $241,973.

WASHINGTON: SEATTLE

To improve safety and access for pedestrian and cyclists, the Seattle Department of Transportation (SDOT) converted four travel lanes to two lanes, one center left turn lane, and bicycle lanes along 1 mile of NE 125th Street. After the improvements, speeding drivers decreased by 11 percent, with drivers exceeding the 125th Street's posted speed limit of 30 mph by 10 mph declining by 69 percent. The collision rate fell by 10 percent (5.83 per million vehicles to 5.24 per million vehicles), with fewer collisions resulting in injuries (2.41 per million vehicles to 1.99 per million vehicles, a change of 17 percent). Pedestrian activity along NE 125th Street increased 105 percent (from 330 to 676 persons on foot). This project cost approximately $60,000.

Endnotes

1. Brennan-Ramirez, Laura K. et al. (2006). "Indicators of Activity-Friendly Communities: An Evidence-Based Consensus Process." *American Journal of Preventive Medicine*, Volume 31, Issue 6. Powell, K.E., Martin, L., & Chowdhury, P.P. (2003). "Places to walk: convenience and regular physical activity." *American Journal of Public Health*, 93, 1519-1521. Giles-Corti, B., & Donovan, R.J. (2002). "The relative influence of individual, social, and physical environment determinants of physical activity." *Social Science & Medicine–54* 1793-1812. Sallis, James F., et al. (2009). "Neighborhood built environment and income: Examining multiple health outcomes." *Social Science and Medicine* 68:1285–1293.

2. Besser, L. M. and A. L. Dannenberg. (2005). "Walking to public transit steps to help meet physical activity recommendations." *American Journal Of Preventive Medicine* 29(4): 273–280.

3. Active Living Research. (2015, January). "Active Education: Growing Evidence on Physical Activity and Academic Performance."[Research brief]. Available at activelivingresearch.org/sites/default/files/ALR_Brief_ActiveEducation_Jan2015.pdf.

4. 37 projects included in the study had collision data available. Of those, 25 projects saw a reduction in collisions.

5. 34 projects had injury data available. Of those, 19 saw a reduction in injuries and 2 did not change.

6. Seattle Department of Transportation. "Designing Safer Streets." Available at www.seattle.gov/transportation/docs/SaferStreetsFlyer_FINAL.pdf.

7. Of the 37 projects included in this study, 34 reported both the number of collisions and injuries. Of those, 21 projects saw cost-savings after the Complete Streets improvements. For the most part, these averted costs are the result of fewer total collisions. In some instances, these averted costs are the result of less severe collisions, resulting in fewer injuries, rather than fewer total collisions.

8. U.S. Department of Transportation Bureau of Transportation Statistics. (2012). Full table available here: www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_01_04.html.

9. American Public Transportation Association. (2007, May). "A Profile of Public Transportation Passenger Demographics and Travel Characteristics Reported in On-Board Surveys." Available at www.apta.com/resources/statistics/Documents/transit_passenger_characteristics_text_5_29_2007.pdf.

10. We compared these per-mile costs with two per-lane-mile costs for urban arterial construction derived from the Federal Highway Administration's Highway Economic Requirements System (HERS) model. In the HERS model, adding a lane-mile to the average urban arterial is estimated to cost between $2.5 million and $19.4 million. The range used here, $3.58 million (normal-cost) and $12.75 million (high-cost), is the average of normal-cost and high-cost estimates of urban and other principal arterials and urban minor arterials and collectors, respectively. All figures are adjusted to 2013 dollars.

11. Advocacy Advance. (2014). *Lifting the Veil on Bicycle and Pedestrian Spending*, page 40. Available at www.advocacyadvance.org/docs/LiftingTheVeil_Report.pdf.

12. Gellar, R. (2011). "Build It and They Will Come: Portland Oregon's experience with modest investments in bicycle transportation." Retrieved October 30, 2014, from www.portlandoregon.gov/transportation/article/370893.

13. In 2008 dollars.

14. Andersen, M. (2013, December). *The Four Biggest Portland Bike Stories Nobody Wrote about in 2013.* [Blog post]. Available at http://bikeportland.org/2013/12/31/the-4-biggest-portland-bike-stories-nobody-wrote-in-2013-99291.

15. This $2 billion investment includes more than 2,000 miles of bike lane, 31 pedestrian intersection improvements, and 27 streetscaping projects in the District of Columbia, Maryland, and Virginia. It aims to accommodate one million daily trips by foot or bike by 2040, or about 25 percent of all new trips in the region. See National Capital Region Transportation Planning Board. (2014). *Bicycle and Pedestrian Plan for the National Capital Region.* Available at www.mwcog.org.

16. This $6.7 billion will buy the Southern California region more than 5,800 miles of bikeways (from 4,315 to 10,122 miles), bringing sidewalks into ADA-compliance, and improving access to schools and parks, among other community destinations. Through these improvements, Southern California Association of Governments (SCAG) posits it will improve access to bikeways by 50 percent, with bicycle mode share as high as 4.4 percent in 2020 and 16 percent by 2035. By converting two-thirds of all trips less than 3 miles to active transportation modes, SCAG estimates the region will save more than 7.8 million vehicle miles traveled (VMT) by 2020 and 20.4 million VMT by 2035. See Southern California Association of Governments. (2012, April). *2012–2025 Regional Transportation Plan/Sustainable Communities Strategy.* Available at http://rtpscs.scag.ca.gov. And Southern California Association of Governments. (2012, April). Active Transportation Appendix, 2012–2025 *Regional Transportation Plan/Sustainable Communities Strategy.* Available http://rtpscs.scag.ca.gov. This figure reflects regionally funded projects and does not include any locally funded projects; SCAG estimates regional spending that includes locally funded projects total $10 billion. Prior to adoption, the Los Angeles County Health Department further analyzed the cost necessary to build and maintain an active transportation network over 25 years, concluding the region would need to invest $40 billion. For more information, see http://saferoutescalifornia.org/2012/01/24/dph_regional_need_40b.

17. New York City Department of Transportation. (2013). *The Economic Benefits of Sustainable Streets.* Available at www.nyc.gov/html/dot/downloads/pdf/dot-economic-benefits-of-sustainable-streets.pdf. Latterman, D. and Anttila-Hughes, J. (2014). "Using retail tax revenue data and other business metrics to determine the effect of streetscape improvements on businesses and business corridors in San Francisco." Paper prepared for the San Francisco Municipal Transportation Agency.

18. This analysis builds on the lessons and methods of similar analyses for the San Francisco Municipal Transit Agency and New York City Department of Transportation, particularly in choosing timeframes and analogs for comparison. By comparing outcomes of Complete Streets projects to their unimproved analogs and citywide trends, this research aims to demonstrate that outcomes are related to the Complete Streets improvements more than other factors occurring across a locality. This analysis couples the economic analysis with before-and-after data on the transportation performance, creating a richer understanding of how Complete Streets investments affect private investment, employment, earnings, safety, and multimodal travel.

19. The initial economic analysis method tried to systematically assess how the real-estate market

responds to Complete Streets projects within one to two years of completion. Using national real-estate datasets, we analyzed 10 projects, examining changes in measures such as vacancy, rent per square foot, net absorption, and median sales. Using nationally available datasets, this analysis yielded no clear trends suggesting that the real-estate market quickly responds to Complete Streets improvements. As part of the revised methods, we eliminated 15 primarily residential streets and relied on local data sources to analyze property and business impacts.

20. Partnership for Active Transportation. "Making the Case." Available at: www.partnership4at.org/why/case.

21. Finkelstein, E. et al. (2003). "National Medical Spending Attributable To Overweight And Obesity: How Much, And Who's Paying." *Health Affairs*: doi: 10.1377/hlthaff.w3.219.

22. Centers for Disease Control and Prevention. (2011). "Nutrition and Physical Activity." www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2011/nutrition-and-phys-activity-aag_web_pdf.pdf

23. The terms and the definitions used to describe Complete Streets projects draws on the street types outlined in the City of Boston's *Complete Streets Guidelines*. According to the City of Boston's *Complete Streets Guidelines*, downtown commercial streets with dense commercial uses "play key roles in the regional movement of people and designs must support extremely high user volumes." Main Streets function as the heart of neighborhood or local economies, typically characterized by dense, single-floor commercial and retail uses. They need to accommodate both through traffic and support gatherings and community events.

24. Between 2000 and 2012.

25. The Washington DC Economic Partnership provided real-estate projects and their value for this figure.

26. This analysis uses LEHD data for "All jobs" for "All Workers," meaning data reflect characteristics of the workers with jobs in the Census blocks along each corridor and citywide. In other words, residents outside the municipality with the Complete Streets project could hold these jobs. Analyzing the complex interplay of commuting patterns between municipalities to determine this distinction goes beyond the scope of this report.

27. These transportation professionals were asked to consider the following factors in making this determination: presence of traffic control devices; functional classification; traffic volumes; surrounding land-use mix; levels of business activity; and demographic characteristics of residents in the area. The study and comparison corridors vary in length, although this variation is consistent with similar analyses.

28. For an example of this technique, see Cambridge Systematics. (2011). "Crashes versus Congestion: What's the Cost to Society?" Report prepared for AAA. Special thanks to Eric Tang of Cambridge Systematics for his guidance in replicating this technique as part of this study.

29. To estimate the cost of a crash, we use USDOT's "Value of a Statistical Life," which is $9.2 million in the most recent guidance. Focusing only on non-fatal crashes produces a conservative bias to our estimates. With a more robust data set over a greater period of time, it would be possible to incorporate an estimate of the economic values derived from fewer fatalities—where a small reduction in fatal collisions would yield large economic savings. For more information, see U.S. Department of

Transportation. (2014, June). "Guidance on Treatment of the Economic Value of a Statistical Life." Available at www.dot.gov/office-policy/transportation-policy/guidance-treatment-economic-value-statistical-life.

30. The U.S. Environmental Protection Agency (EPA) issued guidance to calculate net present value using a "bounding exercise," with the lower bound as the "private consumption rate of interest," about 3 percent, and the upper bound as the return on private capital, about 7 percent. For more information, please see U.S. EPA, National Center for Environmental Economics, Office of Policy (2014, May). "Guidelines for Preparing Economic Analyses." Available at http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/homepage.

31. New York City Department of Transportation. (September 2014)."Protected Bicycle Lanes in NYC." Available at www.nyc.gov/html/dot/downloads/pdf/2014-09-03-bicycle-path-data-analysis.pdf.

National Complete
Streets Coalition