



Complete Streets: A Local and Global Perspective

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Looking at Complete Street through Local and Global Perspectives

Abstract

Traffic congestion in cities has myriad negative implications on quality of life stemming from worsened air quality and loss of productivity. Many transportation and planning-related government agencies have recently adopted standards to encourage development of complete streets; that is, streets that are specifically designed to encourage use of bicycling, walking, and public transit by making these modes of transportation safer and more convenient. Complete streets planning originated in high-density cities; however, a variety of policies have been created to encourage all cities to adopt Active Transportation Plans and complete streets policies. Active Transportation planning poses unique challenges for suburbs, particularly in the Inland Empire of Southern California, where land use development is typically spread over large areas and residents are accustomed to an auto-centric transportation system out of convenience and safety. Focusing on two cities in Southern California, Irvine and Rancho Cucamonga, we find that some local communities have embraced active transportation plans as a means to promote healthy lifestyles as well as equity and safety in neighborhoods and communities. Additionally, other cities worldwide, particularly in Denmark and the Netherlands, have shown that if done well, active transportation can be a meaningful way of life. These regional and international case studies can serve as good models for cities in the Inland Empire when developing complete streets policies and these findings are particularly pertinent as all cities in the United States and our region plan for future infrastructure and growth in their communities.

Introduction

Although many nations have a strong culture of bicycling and well-developed multi-modal transportation systems, traditional traffic mitigation in America typically included increasing roadway capacity for automobiles. Federal and state transportation policy has historically sought to get as much “throughput” of cars and goods as possible, which was measured through attaining “Level of Service” standards in the world of traffic engineering. “Throughput” is a very technical term, which essentially boils down to how quickly automobiles get from point A to point B. The emphasis on these transportation projects was seen with project types, funding sources, and the

types of projects that were awarded both federal and state funds. A quick look at federal transportation bills from 2005, SAFETEA-LU to the most recent federal transportation bill shows a significant shift in funding traditional transportation projects to an increased focus on Complete Streets and Active Transportation. Thus prior to the 2015 federal transportation bill—the FAST Act—there was little focus on the need for multi-modal transportation. Traditional transportation spending occurred in this fashion at the federal and state level for decades and this has only begun to change within the last 10 years. For example, as a state that recognizes the impacts of health, quality of life, and the need for multi-modal transportation, the State of California has already committed to the need for Complete Streets as is seen through its passage of recent legislation (e.g., AB 1358), which will be discussed later in this paper.

Additionally, American planners nationwide are starting to recognize the importance of planning for multi-modal transportation systems as congestion continues to worsen and land area for expansion of transportation facilities is continually limited. In addition to decreasing traffic congestion, multi-modal transportation offers a variety of benefits including increased productivity and improved health and welfare. One such policy federal, state, and local transportation agencies are moving toward to develop multi-modal transportation facilities are the policies of Complete Streets and Active Transportation. The purpose of Complete Streets Action and Design has many facets. The National Complete Streets Coalition defines the use and need of complete streets as:

The power of the Complete Streets movement is that it redefines what a street is intended to do by breaking down the traditional separation of highways, transit, and biking/walking, and instead focuses on the desired outcome of a transportation system that supports safe use of the roadway for everyone. It also redefines what goals a transportation agency is going to meet and how communities will spend transportation money ¹.

¹ National Complete Streets Coalition, 2010. <http://www.completestreets.org/webdocs/resources/cs-policyanalysis.pdf>

Complete Streets and Active Transportation Plans have been proven to have a positive impact on health, air quality, and overall quality of life. However, as the Southern California case studies will show, there is little incentive for local jurisdictions to make these project types a priority; furthermore, local jurisdictions striving to enact some of these project types can be hampered by negative public opinion as well as lack of a consistent fund source.

Nonetheless, Complete Streets is a useful, if not critical, policy to address several issues in the realms of social justice, climate change, health, and the very tangible matter of balancing continued population growth and economic benefits. To illustrate the usefulness of Complete Streets and how such a program can be adopted successfully, this paper looks at these issues through the lens of transportation, and identifies global policy interventions that have worked in Europe as a means to identify the successes and the barriers that have also been encountered by two local jurisdictions in Southern California that have embraced the need for Complete Streets. These domestic policies and infrastructure construction can be compared internationally to efforts in Copenhagen, Denmark and the Netherlands because these two areas have successfully created bikeable and walkable cities as well as a strong culture of bicycling. Through this comparison, policymakers can identify policies that may be implemented domestically by local agencies based on success of the implemented policy in another country.

The comparative case study of two cities in Southern California, Irvine and Rancho Cucamonga, identifies which cities' policies provide for the implementation of these types of infrastructure improvements, and analyzes the mileage and funds budgeted annually to these types of infrastructure over a span of six years. An analysis was completed of the agencies' budgets and capital improvement programs to identify the mileage of bicycle-related infrastructure constructed and the cost per year. This cost was compared to the overall budget in the respective cities. In

completing the case studies for the two cities, we hope to shed light on both the policies that have facilitated successful adoption of Complete Streets and the potential barriers local jurisdictions may have or may encounter in the future as they seek to enact these policies.

The Purpose of Complete Streets

Interest in Complete Streets Policy ideas emerged in America when residents and policy makers began to realize the restrictions of incomplete streets in their local neighborhoods. Incomplete streets, or streets only designed for motorized vehicles, deny residents opportunities to choose more active alternatives to reach their destinations. Furthermore, speeding traffic and large intersections may also add to the perception that walking is unsafe even in communities where sidewalks already exist, thereby discouraging non-motorized transportation alternatives. Communities with Complete Streets Policies ensure streets are designed and operated to make it easy and safe for people to get to their intended destinations, whether local or long distances.

Bikeability

Safe and aesthetically pleasing bike paths, among other factors, can determine whether someone will ride a bike for particular trips because “the average bicyclist is willing to accept only a small degree of traffic stress”.² Complete Streets generally provide road barriers that are two times the protection allowing the bicyclists greater sense of security, which is very popular and supported by the biking community. These safer pathways provide more bicycle friendly environments that encourage usage for riders of all ages. In addition, as population continues to grow city staff must plan for an increase in urban expansion. Complete Streets offers amenities for future Bicycle Oriented Developments (BOD) to be built near transportation hubs, such as bus

² <http://www.completecommunitiesde.org/planning/complete-streets/low-stress-bike/>

terminals and train stations. BODs offer new mobility platforms to expand bicycle culture for millennials and future generations.

Walkability

Physical activity is important because it can help improve the health of residents. It is not surprising then that walkability has a direct positive correlation to the health of residents. Walking or moderate physical activity can help reduce the risks of diabetes, stroke, high blood pressure, cancer, depression and even death. Engaging in physical activities, such as walking, also helps reduce obesity, which has become a huge health concern in the United States. “Health experts agree that a big factor [in obesity] is inactivity – 55 percent of the U.S. adult population falls short of recommended activity guidelines, and approximately 25 percent report being completely inactive”.³ Complete Streets encourage walking in a safe and pleasant environment and therefore improve the quality of life for residents.

ADA Compliance

Complete Streets provide an opportunity for transportation facilities, such as sidewalks and transit, to be fully accessible to all including those with disabilities. Complete Streets policies offer cities the chance to incorporate, at an accelerated rate, federal ADA standards into projects and develop additional accessibility to current transportation systems, which will benefit everyone in the community. Complete Streets advocate organizations such as America Walks would agree, stating: “designing accessible street crossings and sidewalks benefits all users of transportation infrastructure, regardless of a person’s ability”.⁴

According to the Centers for Disease Control and Prevention’s Transportation Recommendations, “expanding the availability of, safety for and access to a variety of

³ <https://www.smartgrowthamerica.org/app/legacy/documents/cs/factsheets/cs-health.pdf>

⁴ <http://www.ssti.us/2014/09/access-for-all-knitting-together-ada-and-complete-streets>

transportation options and integrating health-enhancing choices into transportation policy has the potential to save lives by preventing chronic diseases, reducing, and preventing motor-vehicle-related injury and deaths, improving environmental health, while stimulating economic development and ensuring access for all people.⁵

In comparing potential streets improvements from Complete Streets Programs from an urban planning perspective, amenities from bicycle pathways, ADA ramps and walking paths can be recognized as valuable components to communities and increase the desire to live and work in these areas. For example, Transportation Research studies estimate that the benefits of investments in cycle networks are at least four to five times the costs of the infrastructure, which justifies the investments as more beneficial to society than other modes of transportation. With regard to the cost savings aspect, the League of American Bicyclists state “bicyclists in the United States save \$4.6 billion each year by bicycling instead of driving”.⁶

With an understanding of the components of Complete Streets, we can better understand the benefits of implementing such policies. Public policy seems to have been moving in this direction for several years, as can be seen through the several policy pieces written specifically to address the public needs in the 2015 Transportation Bill.⁷ As suburban sprawl was the norm for development in the late 20th century, the car-centric United States was born, and it was subsidized by policies put in place to allow for the car to be the center of transportation life such as the National Highway Bill of 1956, which paved the way for the Interstate System and for states to enact their own similar transportation systems. The bill allowed for the flourishing of the goods movement and laid the groundwork for suburbia. Neither one of these actions were necessarily

⁵ <https://www.tn.gov/health/article/healthy-places-bikeability>

⁶ <http://www.peopleforbikes.org/statistics/category/economic-statistics#economic-benefits-of-bicycling-facilities-and-transportation>

⁷ Policy Link, 2009: Healthy, Equitable Transportation Policy Recommendations and Research

intended to be a “bad” thing, but 60 years later, places like the Inland Empire are working to address challenges created by this heavily car-centric lifestyle. These challenges include reduced health, contribution to climate change, and the effects of continued low-density population growth on the economy.

Benefit of Complete Streets

Social Justice and Health Impacts of Complete Streets

Although the majority of the new multi-modal related policies are primarily intended to address air pollution and traffic congestion, there are also a variety of health benefits, which will be realized as a byproduct of increased utilization of active transportation and decreased automobile use. Direct health effects can primarily be seen through the impacts of automobile-produced pollution because “pollutants from cars, buses, and trucks are associated with impaired lung development and functioning infants, and children, and with lung cancer, heart disease, respiratory illness, and premature death. Long-term exposure to pollution from traffic may be as significant a threat for premature death as traffic crashes and obesity. In California alone, pollution is a factor in an estimated 8,800 premature deaths a year⁸ ...the health risks are exacerbated by transportation patterns that often embed heavy traffic and diesel-spewing facilities in poor and predominantly minority neighborhoods.” The American Lung Association has found that 61.3 percent of African American children and 67.7 percent of Latino children live in areas that exceed air-quality standards for ozone, compared with 50.8 percent of white children³. In addition to the negative effects of pollution, physical activity also has direct impact on one’s health and is

⁸ Bell, J., Cohen, L., Polan, S., Kolian, T., Malekafzali, S., Litman, T., . . . Mikkelsen, L. (2009). *Healthy, Equitable Transportation Policy Recommendations and Research*. PolicyLink.

impacted by transportation options by providing opportunities to either increase or decrease physical activity.

Sixty percent of adults in the United States do not meet recommended levels of physical activity, and twenty-five percent are completely sedentary. African American and Latinos are less likely than whites to get enough daily physical activity, in part because of cultural and built environment differences. Also, studies have shown that physical inactivity is an important factor in the rising rates of obesity and chronic disease – and transportation practices strongly influence physical activity habits. The more time a person spends in a car, the more likely he or she is to be overweight. Conversely, higher rates of walking and bicycling are associated with lower rates of obesity; for example, a 2004 study found that every additional hour spent in a car was associated with a six percent increase in the likelihood of obesity, and every additional kilometer walked is associated with a 4.8 percent reduction³.

Environmental Impacts

Driving cars and using mass transit creates impacts to the environment that must be reviewed by law in the State of California to determine those impacts, and this holds true at the federal level. The historic alternative most people have in lieu of individual car use is mass transit, which includes buses, trains, and light rail; however, the economic issue with use of either is as follows:

Mass transit, road expansion, and other traditional congestion relief programs are expensive, environmentally questionable, and ineffective in alleviating the problem, leaving transportation officials, legislators, and individual drivers to seek innovative solutions.¹¹

Major findings about the costs of congestion include:

- In 1994, drivers in California's five most congested urban areas lost nearly 4,000 hours due to congestion, and suffered an annual loss of over \$14 billion in wasted time and gasoline.

- In 1996, congestion cost the average San Bernardino driver \$1,090 (the highest in the nation), the average San Francisco Bay Area driver \$950 (third highest in the nation), the average Los Angeles driver \$920 (fourth highest in the nation), and the average San Jose driver \$750 (fifth highest in the nation).
- In 1995, 75 percent of San Francisco's rush hour traffic was congested, as was 66.5 percent of Los Angeles' rush hour traffic, 63.8 percent of San Bernardino and Riverside, and 60 percent of San Jose's.
- Vehicle emissions such as volatile organic compounds (VOCs) and carbon monoxide (the major precursors to urban smog) are 250 percent higher under congested conditions than during free-flowing traffic, directly tying congestion to air quality. (Schiller, 1998).⁹

In particular, traffic congestion degrades local air quality within cities and can be detrimental to environmental and human health. In response, within the last 10-15 years, the federal and state governments have begun to shift funding sources and moving the focus from car/transit-centered projects to more “active” or “non-motorized” projects. Local agencies should be pushed to design streets that support and encourage non-motorized transport, therefore decreasing vehicle mileage and ultimately leading to reductions in both air pollution and carbon emissions. Although, there is limited specific research on bicycling and environmental economics, studies on greenbelt impacts can provide some insight on the relationship between the economy and the environment. Greenbelts provide small natural areas within larger urban landscapes and create multiple environmental, health, recreational and social benefits to areas immediately surrounding them and therefore, are considered highly efficient from an economic standpoint. Research by the National Recreation and Park Association suggests that greenways positively affect properties' sales prices within near proximities, stating: “in the most positive case to the

⁹ <https://www.pacificresearch.org/article/the-road-ahead-the-economic-and-environmental-benefits-of-congestion-pricing/>

extent of one fifth of value, resulting in millions of dollars of increases in prices and subsequent enlargement of the property tax base”.¹⁰

It is also important to note how funding guidelines can affect local adoption of Complete Streets Projects, including but not limited to bike lanes. Construction and maintenance of multi-modal transportation systems can be costly; therefore, it is valuable for policymakers to look globally to other regions that have successfully implemented such programs, to ensure that infrastructure will be effective and functional. In particular, the countries of Denmark and the Netherlands have invested heavily in creation of bikeable cities and have dramatically increased the number of commuters who elect to use bicycles as their primary mode of transportation. These regions, discussed in more detail below, show that if cities are planned in a manner to facilitate bicycle travel, this mode of transportation becomes much more culturally accepted and utilized.

Population Growth

In reviewing population growth and active transportation planning, we looked specifically at the Inland Southern California Region. The current population of this area is approximately 16 million and is expected to grow to 18 million by 2030. The majority of this growth is expected to occur in San Bernardino and Riverside Counties¹¹. The continued growth of the region is expected to create additional air quality challenges due to an imbalance of jobs and affordable housing in the region, which will likely lead to additional strain on the existing transportation infrastructure. With this anticipated population growth, and the lack of jobs and likely increase in affordable housing, a dearth of multi-modal transportation and smart development will leave the public in a worse traffic scenario than the current state that exists on the inland freeways daily. For example,

¹⁰ Pg 339; http://agrifecdn.tamu.edu/cromptonrpts/files/2011/06/4_2_7.pdf

¹¹ South Coast Air Quality Management District. (2015). *Goods Movement 2016 AQMP White Paper*.

“California freeways logged nearly 85 billion miles in 2011, enough to complete 900 trips from the Earth to the Sun¹² (Scauzillo, 2013).” As the population continues to grow and motorized traffic continues to worsen, the opportunity costs of foregoing multi-modal transportation will certainly rise due to the negative environmental and human health effects of traffic congestion.

Economic Benefits of Complete Streets

In January 2016, the California DMV reported a population of 39,071,323 residents and 24,487,807 registered autos within the same time period¹³, showing that California has grown tremendously over the years both in population and motorized vehicles counts. However, the number of cyclists has also been on the rise, as communities are increasingly shifting traffic circulation plans to include more bike friendly pathways. Early and strong-willed bicycling communities are realizing that the combination of cycling facilities, biking residents, and the cycling industry itself can be significant drivers for their local economy.

Bicycling impacts several business sectors, which can increase business sales or need for services and that positively impacts the economy. Economic impacts of bicycling start with the dollars spent at the local businesses and expand to larger regional and state investments, which boost our overall economy. The bicycling industry yields dollars for jobs, sales, production, tourism, and tax revenue. According to research by the Initiative for Bicycle and Pedestrian Innovation, the economic benefits of bicycling can be analyzed by looking in depth at the following three categories:

- Bicycling as a sector or cluster
- Economic impact of a specific facility, such as a trail, in accordance to the local or state economy

¹² Scauzillo, 2013. <http://www.sgvtribune.com/general-news/20130819/california-freeways-busiest-in-nation>

¹³ https://www.dmv.ca.gov/portal/wcm/connect/fafd3447-8e14-4ff6-bb98-e85f3aa9a207/ca_dmv_stats.pdf?MOD=AJPERES

- Economic value for cost-benefit or return on investment analysis

As the Initiative for Bicycle and Pedestrian Innovation states, “measuring the economic impact of bicycling is not a common activity in most states and communities judging by the small number of studies located”¹⁴; however, there are a few studies that provide some key findings in this area.

Bicycling as a sector or cluster

The idea is very simple: bicycle riders buy bikes and bike accessories and this demand for biking essentials creates jobs not just for production, but also for local bicycle shops and apparel stores. Cities that wish to support and target these customers should invest in bike-accessible business districts to increase their opportunity to capture these dollars. In addition, “people who ride bikes on vacation buy food, have travel costs, and pay for lodging. Bicycling tourists bring millions of dollars to cities and towns across the country that wouldn’t otherwise end up there¹⁵”. Complete streets create a welcoming environment and changes residents’ perspectives on transportation to a more bicycle-friendly culture. This means that there is a positive net benefit and not just a transfer of benefits from one area to another.

Economic impact of facilities

As discussed above, trails can render an increase in revenue to the economy, since they attract numerous visitors to a specific area and these visitors are likely to spend their money on purchases near these trails or in the local neighboring areas. Trail use research dates to the 1990s, where economic reports were generated to track data for rails to trails. Current economic impact research claims that trails generate revenue from those who use them, which includes expenses such as food, lodging and additional incidentals. “The economic impacts of trails on the National

¹⁴ <https://www.pdx.edu/ibpi/sites/www.pdx.edu.ibpi/files/Economic%20Benefits%20of%20Bicycling.pdf>

¹⁵ http://bikeleague.org/sites/default/files/Bicycling_and_the_Economy-Econ_Impact_Studies_web.pdf

Trails Training Partnership website claims that trail-related expenditures range from \$1 per day to more than \$75 per day in the U.S.¹⁶ Other research conducted by the Ohio-Kentucky-Indiana Regional council of Governments found “an estimated 150,000 – 175,000 trail visits annually on a 27-mile portion of the trail, with 66% of the trail users on bicycles” and “trail users spent approximately \$3.1 - \$3.7 million annually on trip-related expenses and goods”¹⁷. There are numerous studies being conducted all over the world on the economic impacts of bicycling trails and although all conclusions range on the dollar amount, each study finds some positive economic impact for the region.

Economic value for cost-benefit

Cost-benefit analysis is used regularly to examine the use value of public facility or amenities, but are rarely used to track current valuation data for bicycle trails. Since it is vital that agencies demonstrate the return on investment for the use of public funds, generalizations on green pathways to support multi-modal transportation can offer some information to support the use of tax dollars for trail pathways. For example, “Nicholls and Crompton used the hedonic approach to study the impact of a greenbelt in Austin, Texas that included a 1,771-acre natural area and 7.5 miles of multi-use trails located west of the downtown area”. Their study found that in two of the three neighborhoods they analyzed, the adjacent properties had been significantly affected by an increase in sales price compared to the property value prior to the conservation efforts for the same area. Therefore, the research concluded that open spaces or preservation of trails has a tremendous positive impact on property values.

¹⁶ page 6;

<https://www.pdx.edu/ibpi/sites/www.pdx.edu/ibpi/files/Economic%20Benefits%20of%20Bicycling.pdf>

¹⁷ <https://www.pdx.edu/ibpi/sites/www.pdx.edu/ibpi/files/Economic%20Benefits%20of%20Bicycling.pdf>

To encourage development of multi-modal transportation systems so that these benefits can be realized, a variety of policies have been created at the state and local levels. For example, the California Complete Streets Act of 2008 (AB 1358) aimed to increase access to places to live, work and play in proximity to alternative means of transportation. Urban arterials do more than just move vehicle traffic quickly throughout cities. According to CalTrans public reports, as density increases in Southern California and demographics shift, traffic engineers are being faced with an increased demand and new community preference to serve the mobility needs of individuals using non-motorized modes of transportation such as walking and bicycling¹⁸. As discussed below, the improvement of public spaces, such as streets, enhance the quality of life for residents regardless of their race, ethnicity, nationality, gender, religion, sexual orientation, age, or ability¹⁹. Complete Streets means more equitable options for all residents within a city or area and yield myriad benefits for all citizens.

Federal and State Complete Street Policy

Fixing America's Surface Transportation Act or "FAST Act"

The federal FAST Act was written to encourage planning for and implementation of bicycle and pedestrian facilities. The FAST Act continues to require long-range statewide transportation plans and statewide transportation improvement programs (STIPs) to provide for the development and integrated management and operation of transportation systems and facilities that enable an intermodal transportation system, including pedestrian and bicycle facilities. It adds to this list other facilities that support intercity transportation (including intercity buses, intercity bus facilities, and commuter vanpool providers). [23 U.S.C. 135(a)(2)]²⁰. Additionally, there is an

¹⁸ <http://www.dot.ca.gov/transplanning/ocp/complete-streets.html>

¹⁹ <https://www.scgov.net/CompPlanUpdate/Documents/Complete%20Streets-equity.pdf>

²⁰ <https://www.fhwa.dot.gov/fastact/factsheets/statewideplanningfs.cfm>

annual set-aside, until the bill expires in 2020, of billions of dollars to address the Congestion Mitigation and Air Quality Improvement Program. These dollars are set aside for projects that decrease air pollution and include a myriad of projects including bicycle and pedestrian infrastructure²¹.

To address growing concerns of traffic congestion in California cities, not only has the state passed the Complete Streets Act of 2008, but many local jurisdictions are also attempting to increase bicycle access in areas throughout communities. The following discussion examines research on biking sustainability and best practices around the world including discussing smart growth particularly in sectors on walkability, transportation, alternative transportation, environmental impacts, and safety. Furthermore, the literature review and case studies presented in this paper will include a detailed analysis of two local agencies' approaches to meeting non-motorized policy goals.

California Complete Streets Act of 2008

The State of California faces issues associated with traffic congestion worsening every year, which poses a serious threat to the quality of life for all citizens. Because alternative transportation has numerous environmental and human health benefits, and because traffic congestion in urban areas is anticipated to worsen as population and development densities increase, all local governments should be encouraged to implement active transportation programs. To encourage development of active transportation infrastructure, the California State Assembly created Assembly Bill 1358: The Complete Streets Act of 2008 (AB 1358). AB 1358 requires all general plans within the state to specifically plan for active transportation in their circulation elements. Consequently, many cities have updated their roadway design standards to require

²¹ <https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm>

installation of sidewalks or bike lanes, where feasible, whenever roadways are being improved upon.

By increasing the availability of active transportation infrastructure, cities assume that the use of these facilities will also increase. This is particularly important because the state is required to meet certain greenhouse gas reductions and meeting these goals will require a decrease in automobile use. Additionally, there are several co-benefits to increased active transportation including, but not limited to, health and wellness.

AB 1358, California Complete Streets Act of 2008, text includes the following statistics in support of the necessity of active transportation infrastructure²²:

- The California Global Warming Solutions Act of 2006, enacted as Chapter 488 of the Statutes of 2006, sets targets for the reduction of greenhouse gas emissions in California to slow the onset of human-induced climate change.
- The State Energy Resources Conservation and Development Commission has determined that transportation represents 41 percent of total greenhouse gas emissions in California.
- According to the United States Department of Transportation's 2001 National Household Travel Survey, 41 percent of trips in urban areas nationwide are two miles or less in length, and 66 percent of urban trips that are one mile or less are made by automobile.
- Shifting the transportation mode share from single passenger cars to public transit, bicycling, and walking must be a significant part of short- and long-term planning goals if the state is to achieve the reduction in the number of vehicle miles traveled and in greenhouse gas emissions required by current law.
- Walking and bicycling provide the additional benefits of improving public health and reducing treatment costs for conditions associated with reduced physical activity including obesity, heart disease, lung disease, and diabetes. Medical costs associated with physical inactivity were estimated by the State Department of Health Care Services to be \$28 billion in 2005.

²² http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_1351-1400/ab_1358_bill_20080908_enrolled.html

- The California Blueprint for Bicycling and Walking, prepared pursuant to the Supplemental Report of the Budget Act of 2001, sets the goal of a 50 percent increase in bicycling and walking trips in California by 2010, and states that to achieve this goal, bicycling and walking must be considered in land use and community planning, and in all phases of transportation planning and project design.
- To fulfill the commitment to reduce greenhouse gas emissions, make the most efficient use of urban land and transportation infrastructure, and improve public health by encouraging physical activity, transportation planners must find innovative ways to reduce vehicle miles traveled and to shift from short trips in the automobile to biking, walking, and use of public transit.
- It is the intent of the Legislature to require in the development of the circulation element of a local government's general plan that the circulation of users of streets, roads, and highways be accommodated in a manner suitable for the respective setting in rural, suburban, and urban contexts, and that users of streets, roads, and highways include bicyclists, children, persons with disabilities, motorists, movers of commercial goods, pedestrians, public transportation, and seniors.

With a clear understanding of the need and benefit of Complete Streets, we turn to a global perspective to understand where these policies have been enacted successfully, and whether the policy transfer can be made to the United States, specifically Southern California.

Successful International Complete Streets Policies Enacted

Copenhagen, Denmark

Copenhagen, Denmark has a long, proud history of bicycling, which has been an important means of transportation within the city since the early 1900s. When this history was challenged in the 1960s, there was large public outcry and planners reversed course to ensure that bicycling infrastructure is provided in the city to make bicycle travel both safe and efficient.²³ This continued recognition of the importance of bicycling has made this city arguably one of the most successful

²³ Lotte Ruby, *How Denmark Became a Cycling Nation*, <http://denmark.dk/en/green-living/bicycle-culture/how-denmark-become-a-cycling-nation>

cities with regard to implementation of complete streets programs and the city has one of the highest rates of bicycling in the world.²⁴ As discussed below, this long-term provision of multi-modal transportation is responsible for creation of functional and efficient infrastructure, which fosters a culture of bicycling. Copenhagen is in the northern portion of the country and had a population of approximately 600,000 in 2016; however, the population of the entire Copenhagen metropolitan area, which consists of the city's urban core and suburb areas, was almost two million in 2016.²⁵ Because Denmark has a long history of transit oriented development and planning, many the citizens of Copenhagen live in close proximity to their workplace, or in close proximity to alternative transportation systems to commute from the suburbs to the city core for work without reliance on private automobiles. The Danish government estimates that as of 2015, approximately 50 percent of the population of the city uses a bicycle to get to work (NYT). This is in stark contrast to bicycle commute transportation in Riverside, San Bernardino, and Orange Counties which are only 0.41%, 0.36%, and 0.91% respectively²⁶.

Development in the greater Copenhagen area was governed by the Finger Plan as early as 1947, which restricted development to five linear areas along transit corridors.²⁷ Each of these corridors was connected by rail to the central Copenhagen business district; therefore, rail transit was convenient and easy. This same focus on transit-oriented development in the suburbs of Copenhagen continues to this day; for example, the government recently allocated funds to develop an additional "finger" called Orestad North, and policymakers planned to use a portion of the revenue from selling parcels adjacent to planned rail lines and ticket fees to offset construction

²⁴ NYT: <https://www.facebook.com/nytimes/posts/10150881904634999>

²⁵ <http://www.statbank.dk/BY1>

²⁶ <https://ucr.policymap.com/maps>

²⁷ Richard Knowles, *Transit Oriented Development in Copenhagen, Denmark: from the Finger Plan to Orestad*.

costs because they know that demand for development in close proximity to public transportation will be great (Knowles). This new area of development continues the tradition of bicycling and reduced automobile use by ensuring that residents of this new area will have convenient access to rail and bicycle infrastructure. Copenhagen and its suburbs are an important example to show that even when residents have the option to use automobiles, if multi-modal infrastructure is provided in a responsible manner then it can be more attractive than automobile transportation. The concept of transit oriented development around rail lines is particularly relevant to the Inland Empire because many citizens of the Inland Empire work in urban areas such as Los Angeles and San Diego; therefore, it would not be feasible to encourage solely bicycling to work. Rather, it would be more productive to see governments in this region design convenient multi-modal transportation systems. This could take many forms and would likely require a high degree of interagency cooperation; for example, providing bike lanes that connect to rail lines and then additional bike lanes and sidewalks between several jurisdictions. This type of development is generally challenging and requires a large degree of cooperation and compromise among policymakers to accept some cost for their own jurisdiction for the overall good of the region. For example, policymakers in the Inland Empire region have worked for approximately ten years to develop a trail along the Santa Ana River and efforts to extend a metro link rail line to the Inland Empire similarly took approximately a decade. Although both of these efforts have been successful and will likely improve the quality of multi-modal transportation in the region, they illustrate the diligence and compromise required to create quality large-scale infrastructure projects.²⁸ Also, there are already some cities working to develop “end of trip” infrastructure within their boundaries, such as Rancho Cucamonga, as discussed below.

²⁸ Class notes; *School of Public Policy UCR*.

Additionally, another major barrier to bicycling in the Inland Empire is the public's perception that bicycling and walking is not safe. One way that Denmark has overcome this issue is by building bicycling into the culture of the nation. For example, a majority of students in Denmark are not dropped off at school by automobile; rather, it is common for students as young as ten bicycle to school (NYT). By encouraging use of bicycling as a mode of transportation, not simply as a means of recreation, from such a young age bicycling has become engrained in the daily lives of these individuals.²⁹ Conversely, the majority of students in the Inland Empire region are dropped off at school by automobile. This will not likely create the generational shift necessary to meaningfully increase the amount of bicycling in Southern California. Additionally, studies have found that as the number of bicyclists increase there is a decrease in the number of collisions with automobiles (Pucher). Thus, it is important that government agencies in the Inland Empire region can develop effective messaging strategies to share accurate information on bicycling and to encourage responsible, safe bicycling practices with their constituents. This could include informational campaigns as well as public events. For example, the Southern California Association of Governments has adopted a "Go Human" campaign, wherein staff visit cities throughout their jurisdiction to demonstrate the benefits of complete streets and to promote community cohesion. The City of Rancho Cucamonga recently held an open streets event, wherein several blocks of the city were shut down to automobile traffic and several demonstration areas were set up to show people examples of complete streets.³⁰ These events build enthusiasm among the public about biking, and encourage people to think about the number of short-distance trips that they make that could potentially be made by bicycle or walking rather than by private

²⁹ John Pucher, *Infrastructure, Programs, and Policies to Increase Bicycling: An International Review*.

³⁰ Rancho Cucamonga, Complete Streets Event Flyer:

<https://www.cityofrc.us/news/displaynews.asp?NewsID=997&TargetID=2>

automobile. For example, the Federal Highway Transit Authority estimates that for the year 2008, “over half of all vehicle trips [were] between 1 and 10 miles”.³¹ Thus, if public awareness campaigns could increase the percentage of these trips made by bicycle rather than automobile, there would likely be a meaningful positive impact on air quality and health.

Another barrier to bicycling in America is the perception that it requires a lot of specialized gear; however, in Denmark very few people actually have specific clothes for bicycling and there is a relatively low helmet usage. This is an important distinction because if bicycling seems too complicated, people will not be likely to shift to this type of commute. Similar to the case of safety, one mitigating strategy to improve the convenience of bicycling could be increased strategies throughout the United States to ensure that bicycle commute facilities are provided. One positive example is the provision of bike lockers at many Orange County Transit Agency transit stations, which allow people to bike to rail lines and then leave their bicycles in a secure location during the workday.³² One barrier to implementation of these types of improvements is the low demand for these facilities, and the resistance of developers to include these facilities in their site designs due to cost considerations. However, one positive policy direction is increased requirements for commuter facilities in various green building codes; for example, all new developments are required to provide bicycle lockers and many jurisdictions allow developers to claim greenhouse gas reductions for provision of additional facilities.³³ This is particularly important as greenhouse gas reduction policies become increasingly stringent and potentially costly for developers to comply with in California.

³¹ Federal Highway Administration, https://www.fhwa.dot.gov/policyinformation/pubs/pl08021/fig4_5.cfm

³² <http://octa.net/Share-the-Ride/Bike/Riding-in-Orange-County/Bike-Lockers/>

³³ California Green Building Code, https://www.documents.dgs.ca.gov/bsc/CALGreen/MasterCALGreenNon-ResGuide2010_2012Suppl-3rdEd_1-12.pdf

Netherlands

Since the 1970s, the government of Netherlands has also undertaken a variety of policies to improve the safety of bicycling in the country, with the goal of increasing the share of trips made by bicycle and reducing automobile trips. In the 1990s, the government's efforts were largely focused on creating new bicycle infrastructure to ensure that citizens would have the option to bike safely and efficiently (Martens). For example, numerous streets have been designed to separate bicycle traffic from automobile traffic so that the potential for collisions is reduced.³⁴ Additionally, many streets have been designed with traffic calming measures to ensure that automobile traffic is slowed, particularly in residential areas. These measures are not widely implemented in the United States, partially as a consequence of limited space in areas which are already developed, but would improve public perception of the danger associated with bicycling and would likely successfully increase the use of bicycles. This type of design would be particularly valuable in areas, which are being newly developed because planners would have more flexibility. Additionally, because many people in the United States cite dangers associated with bicycling as one barrier to increased bicycling, these types of improvements to improve the safety would have a meaningful impact on the attractiveness of bicycling to Americans.

Attention is also provided to policies, which encourage bike-and-ride commuting in Netherlands. This includes programs to provide bicycle racks at train and bus stations as well as bike share programs as part of the country's national Bicycle Master Plan.³⁵ These measures have successfully increased the amount of bicycling in the Netherlands and have increased the share of bicycle trips to transit stations; plus, bicycle share programs make biking feasible because individuals are not permitted to bring bicycles on commuter trains during rush hour. This focus on

³⁴ John Pucher, *At the Frontiers of Cycling: Policy Innovations in Netherlands, Denmark, and Germany*.

³⁵ Karel Martens, *Promoting Bike-and-Ride: The Dutch Experience*.

commuting programs would be particularly relevant to the Inland Empire because of the large number of commuters to Los Angeles and San Diego. Accordingly, provision of bicycle infrastructure alone is not sufficient to substantially increase the number of bicyclists.

It is also important to note that the federal governments in both Netherlands and Denmark have taken an active role in the planning and provision of multi-modal transportation, which may increase the functionality of multi-modal transportation by providing a mechanism for cooperation between governments and regions. Although it is unlikely that the federal government would undertake an active role in multi-modal transportation system planning in the United States, it is encouraging to see the State of California taking a stance on active transportation, in part through creation of policies such as AB 1358.

Case Studies – Cities of Irvine and Rancho Cucamonga

We now turn to multi-modal transportation facilities and funding in two local cities. A comparative case study of two cities in Southern California, Irvine and Rancho Cucamonga, was conducted to identify which cities' policies provide for the implementation of these types of infrastructure, and analyzing the mileage and funds budgeted annually to these types of infrastructure. A quantitative analysis was completed of the agencies' budgets and capital improvement programs to identify the mileage of this type of infrastructure implemented and the cost per year. This cost was compared to the overall budget in the respective cities. This analysis examined several policies, policy documents, City of Irvine and City of Rancho Cucamonga budgets and Capital Improvement Projects, and studies which provide background and context for the need for such facilities, the benefits of the infrastructure, how they impact disadvantaged communities. Although there are many differences between these cities, a comparison of their characteristics provides an interesting perspective on what has made Complete Streets programs

successful in two Southern California jurisdictions, and can provide lessons learned for cities looking to develop their own programs.

City of Irvine

The City of Irvine is a master-planned community located in Orange County with a strong history of investment in active transportation. The Irvine Company has owned the land since the late 1800s, and elected to develop master plans and specific plans over the area which would eventually become Irvine, rather than selling land piecemeal to subsequent developers. Irvine is the sixteenth largest city in California, with an approximate population of 258,000 in 2016.³⁶ The climate is relatively mild and the topography of the city is relatively flat. The City is organized into sixteen villages, which are intended to each have their own distinct characteristics.

The City was an early advocate for active transportation planning, and has a well-established Bicycle Master Plan to encourage planned construction of connected bikeways throughout the community. There are approximately 300 miles of paved bike lanes throughout the city, as well as over 50 miles of bike trails that traverse the city.³⁷

City of Rancho Cucamonga

The City of Rancho Cucamonga is a city within San Bernardino County which has grown seemingly exponentially since the 1990s as an alternative to the more expensive coastal areas. There are approximately 50 miles of existing bike trails within the City, but the total mileage is anticipated to be close to 100 miles at full General Plan build-out.³⁸ According to a recent survey

³⁶ US Census Bureau: <https://www.census.gov/>.

³⁷ City of Irvine Bike Transportation Plan, updated 2011. Available at: <http://www.cityofirvine.org/transportation/city-irvine-bikeways>.

³⁸ City of Rancho Cucamonga General Plan, <https://www.cityofrc.us/cityhall/planning/genplan.asp>.

conducted by the City, these bike trails have a relatively high utilization rate, with just over 60 percent of the population reporting that they use the bike trails.³⁹

The City is one of a few statewide which have updated their General Plan pursuant to the new requirements for active transportation consideration in the Complete Streets Act of 2008. This means that as new roadways are built and repairs are made, there will be new bike lanes installed to ensure that the City's active transportation network will continually expand. These new measures will also ensure that the transportation network effectively spreads to all areas of the City.

The next portion of this paper focuses on describing how regional funding guidelines can affect local adoption of Complete Streets projects, which is particularly important because "local governments provide half of all transportation funding in California. Local funding sources include local sales taxes, transit fares, development impact fees, and property taxes⁴⁰". Local jurisdictions also receive funding from state and federal agencies that must be specifically allocated for Capital Improvement Projects (CIP) in effort to comply with Complete Streets (CS) policies. Although California's Complete Streets Act was passed in 2008, very few agencies have taken the necessary steps to either pass resolutions or to certify general plan circulation elements that are compliant with the act. This is largely due to the fact that general plan documents are long-term planning documents that do not need to be renewed on an annual basis and so many jurisdictions have not needed to update their general plans since 2008. Nonetheless, AB 1358 requires all jurisdictions to include multi-modal transportation once they do update their plans. The case studies below will provide a look into how Complete Streets/Active Transportation Projects are funded and prioritized in Rancho Cucamonga and Irvine.

³⁹ City of Rancho Cucamonga Public Survey, conducted 2016.

⁴⁰ <http://www.lao.ca.gov/handouts/transportation/2015/Transportation-Challenges-101615.pdf>

In addition to this, the San Bernardino County Transportation Authority conducted a survey of its 24 member jurisdictions which consists of every incorporated city in the county and the five County supervisor districts. The Authority was seeking insight in how its member agencies prioritize and fund projects as well as any impediments to project implementation they identify themselves. There are 24 local jurisdictions in the County of San Bernardino plus the County itself. Of these, 12 responded to most of the survey questions. The table below shows the number of jurisdictions that have adopted the listed plans and policies listed on the X-axis. According to the responses received from the survey conducted in 2014:

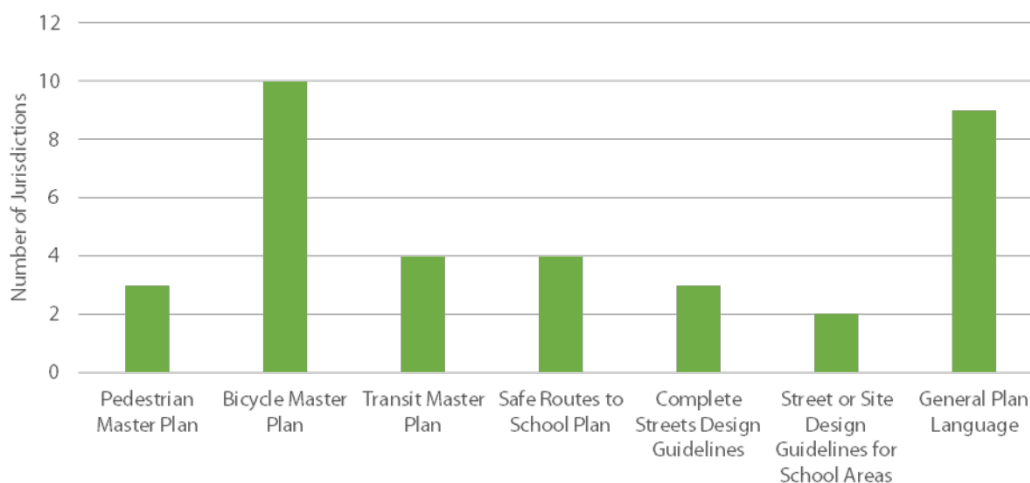


Figure 1: Number of Jurisdictions with enacted policy⁴¹

The question posed for the Figure 2 table below was intended to reveal the means by which the jurisdictions prioritize the infrastructure projects. The results illustrates that the number one priority for all responding jurisdictions is safety. The question then becomes what is defining safety?

⁴¹ San Bernardino County Non-Motorized Plan, Revised 2014: <http://www.gosbcta.com/plans-projects/plans/NMTP-RevisedMay2015.pdf>

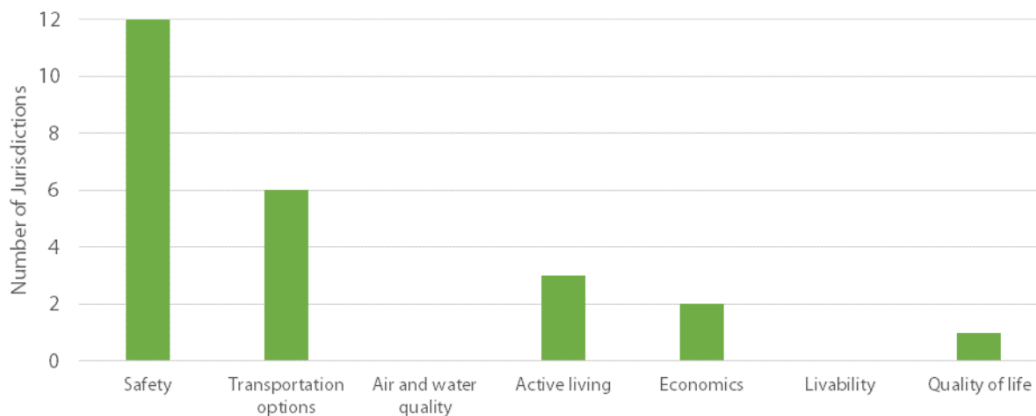


Figure 2: Prioritization of Projects Rationale⁴²

As Complete Streets designs and planning necessitates a paradigm shift, is safety being define in its traditional means, moving as many cars from point A to point B as quickly as possible with the least amount of potential for conflict? Or are the traffic engineers allowing for safety elements within Complete Streets designs to take effect with self-education of the public?

Additionally, one of the most telling figures depicting the barriers for enacting these projects is the lack of fund sources as shown in Figure 3.

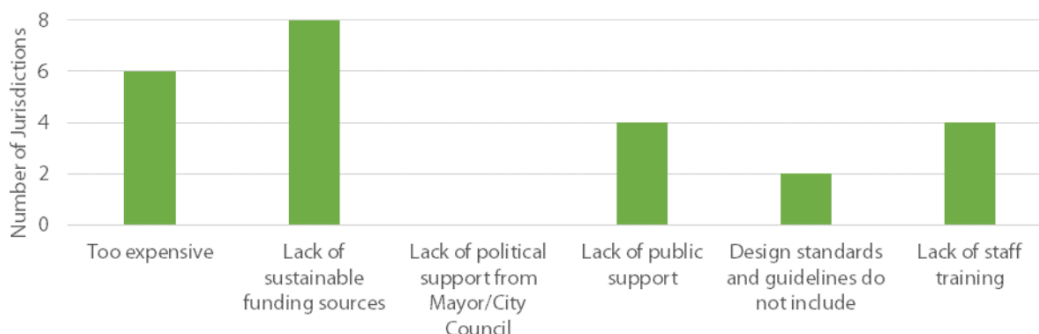


Figure 3: Barriers to Implementing non-motorized projects

⁴² San Bernardino County Non-Motorized Plan, Revised 2014: <http://www.gosbcta.com/plans-projects/plans/NMTP-RevisedMay2015.pdf>

Understanding how the jurisdictions in San Bernardino County responded to the survey conducted by SBCTA, we turn to a specialized analysis of two particular jurisdictions in Southern California.

Case Study Cities Policy Analysis

The Cities of Rancho Cucamonga and Irvine were chosen because they have similar demographics yet are located in vastly different settings in Southern California. While the locations differ, the community desire for similar quality of life amenities and interest in multi-modal transportation is quite similar.

Both cities have adopted policy documents identifying the implementation of both bike and pedestrian infrastructure as a priority. The City of Rancho Cucamonga has a robust Healthy Cities program which encompasses programming areas and infrastructure planning. This program was one of the driving forces to enact the Circulation Master Plan for Bicyclists and Pedestrians⁴³. The plan proposes over 30 miles of trails and over 110 miles of bicycle facilities. These facilities are designed to capture the residents who already bicycle or are interested in bicycling. However, in addition to the infrastructure improvement proposals, the plan also includes program recommendation to educate, encourage, and evaluate focus to capture additional users. These programs include:

- Multi-Modal Programs – encompassing driver education, media campaigns, Vision Zero, and Car Free Events.
- Bicycling Specific Program – encompassing bike rodeos, bike counts, bicycle-friendly business efforts, route mapping, social rides, and bike valet programs.
- Pedestrian-Specific Program – encompassing educational courses for students, walking school buses, and other Safe Routes to School Actives⁴⁴

⁴³https://www.cityofrc.us/cityhall/planning/current_projects/circulation_master_plan_for_bicyclists_and_pedestrians_/default.asp

⁴⁴ City of Rancho Cucamonga. (2015, May). City of Rancho Cucamonga CIRCULATION MASTER PLAN FOR BICYCLISTS AND PEDESTRIANS. Retrieved from City of Rancho Cucamonga: https://us/cityhall/planning/current_projects/circulation_master_plan_for_bicyclists_and_pedestrians_/default.asp

The City's General Plan also identified several policies which justify and create the platform for the completion of the Circulation Master Plan for Bicyclists and Pedestrians. These policies can be found in Appendix C. These policies led to the development and implementation of a Circulation Master Plan. The City of Rancho Cucamonga adopted the Circulation Master Plan for Bicyclists and Pedestrians in May of 2015. This was done in conjunction with the City's Healthy Living Initiative.

The City was successful in receiving a grant to create the Circulation Master Plan with multiple goals, including:

- Integration: Integrate bicycling and walking into community planning to enhance livability, health, transportation, the environment, and economic development.
- Network: Develop a safe, comfortable, and attractive bicycling and walking network that connects people of all ages, abilities, and neighborhoods to the places they want to go.
- Programs: Promote the safety and attractiveness of bicycling and walking through education, encouragement, and evaluation programs⁴⁵.

The completed plan provides a vision for improving the bicycling environment in Rancho Cucamonga by providing direction for the expansion of the existing bikeway network, connection of gaps, recommendations for bicycle support facilities, and education and awareness programs. It strives to accomplish this by connecting all of Rancho Cucamonga, but specifically the southwestern neighborhood, which has typically been more disadvantaged.

From the city's Community Survey, 87% of survey respondents said they were either a bicycle rider or were interested in taking up bicycling. Off-street paths and cycle tracks were the

⁴⁵ City of Rancho Cucamonga. (2015, May). *City of Rancho Cucamonga CIRCULATION MASTER PLAN FOR BICYCLISTS AND PEDESTRIANS*. Retrieved from City of Rancho Cucamonga: https://www.cityofrc.us/cityhall/planning/current_projects/circulation_master_plan_for_bicyclists_and_pedestrians_/default.asp

top two bicycle facilities that would encourage residents to bicycle more. As discussed above, The Rancho Cucamonga Circulation Master Plan for Bicyclists and Pedestrians is proposing over 30 miles of trails and over 110 miles of bicycle facilities, all of which are designed to capture the residents who are already bicycling or are interested in bicycling.

Additional robust improvements to the pedestrian network are recommended and this Plan identifies 97 intersections for such improvements. In addition, the City identified the “Southwest Cucamonga” area for specific attention since the area faces disproportionate challenges to active living. The city also identified the differences in the users of both pedestrians and bicyclists, and by doing so, identified the needs of each type of user. The plan therefore makes the distinction between the needs for people that commute by bicycle, versus bike enthusiasts, versus school children, and versus the casual or family user.

The plan also identified the multi-modal connections including the Metrolink, Omnitrans, and a potential future Bus Rapid Transit Line. These connections were based on the sites and places that generate trips and destinations where trips end. Examples of these sites include large commercial destinations, parks, schools, and a community college. These connections are key to implementing “first mile and last mile” connections. Southern California Associated Governments, the Metropolitan Planning Organization which encompasses Ventura, Los Angeles, Orange County, Riverside, and San Bernardino Counties, defines first mile/last mile connections as: “The goal for developing First Mile/Last Mile access to transit strategies is to increase the effective range of transit stations (currently about 1/4 mile) allowing more transit patrons, or increase the number of transit patrons within the effective range.” Essentially, it is the important connections to other modes of transportation for bicyclists and pedestrians, typically to transit

nodes or final destinations. This planning strategy is typically built into the circulation elements as they are updated in accordance with an Active Transportation Model.

To educate and gain support for the plan from the residents, the City of Rancho Cucamonga engaged in an extensive outreach process. As a part of the outreach for the plan, the City conducted a survey of residents. The results show 80% of residents typically drive alone with driving within the city. Additionally, 93% of the residents surveyed rarely or never use public transit. Regarding trips outside of Rancho Cucamonga, 80% always or often drive alone, 87% will rarely or never use public transit, 82% rarely or never walk, and 71% rarely or never bike⁴⁶.

The City's Circulation Master Plan for Bicyclists and Pedestrians, identifies existing conditions which are counter to the design, implementation, and construction of bicycle and pedestrian infrastructure. Unlike many other nearby cities, Rancho Cucamonga was not developed with a traditional downtown core. The City created areas such as Terra Vista Town Center and Victoria Gardens to act as centers of commerce and provide a city core. These areas surrounding the core mostly support multi-unit residential buildings, which may cultivate higher levels of bicycle and pedestrian activity.

Like most cities in the area, Rancho Cucamonga's land is largely built-out and residential areas are highly dependent on automobiles for getting around town. Commercial uses in Rancho Cucamonga are typically served by large parking lots that are rarely convenient for people who want to walk or bike. Improving accessibility and safety for bicyclists and pedestrians could reduce the number of vehicle trips required by residents²⁶.

⁴⁶ City of Rancho Cucamonga. (2015, April). *Rancho Cucamonga Circulation Master Plan for Bicyclists and Pedestrians*. Retrieved from <https://www.cityofrc.us/civicax/filebank/blobdload.aspx?blobid=20267>

City of Irvine

The City of Irvine has also taken significant steps to ensuring bicycle use in its city and has been steadily working toward creating a “bike friendly” city, and in the 2011 amendment to the Irvine Active Transportation Plan, they increased the on-street bikeway mileage from 282 to 301 miles. Additionally, the off-street bikeway mileage increased from 44.5 to 54 miles. (Irvine Bicycle Transportation Plan)

The adoption of the City’s Bicycle Plan is consistent with regional and other city policies. The Irvine Circulation Element of the General Plan expects that bikeways and pedestrian trails will continue to be developed concurrent with adjacent development and includes objectives and policies related to the bikeways network. This Plan implements and is consistent with the objectives and policies of the City General Plan Circulation Element as shown in Appendix C of this document. Due to the enactment of these policies, the City provides a system of bikeways that encourage the use of the bicycle as a safe and convenient means of transportation for both recreation and commuting purposes. The City was recognized by the League of American Bicyclists as a “Bicycle Friendly Community” in May 2009. This 3-year recognition is a reflection of the City’s commitment to advocate bicycling as a viable alternative transportation mode. The City is the first within the County of Orange and one of the 22 cities within the State of California to receive this recognition.

Irvine’s programming serves the same purpose as that of the City of Rancho Cucamonga. Bicycle safety enforcement and education are critical components in the promotion of bicycling and the safety of Irvine’s bikeway network users. According to the National Highway Traffic Safety Administration’s annual statistical analysis, bicyclists accounted for 2 percent of all traffic fatalities during 2009. In addition, approximately 17 percent of bicyclists who were injured were

age 14 and younger⁴⁷. In addition to the safety enforcement and education, the City also has implemented bicycle education programs for children.

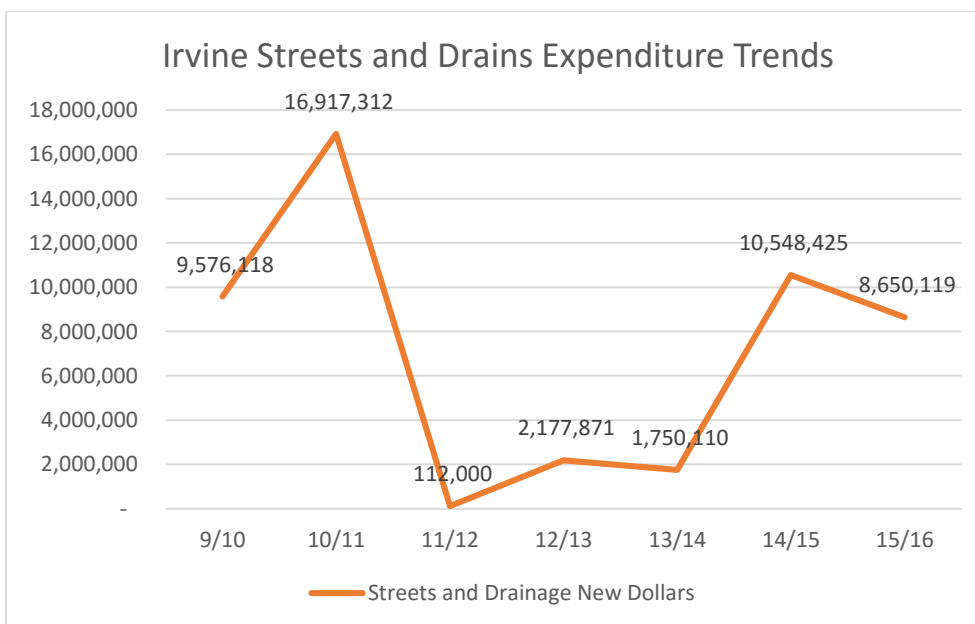
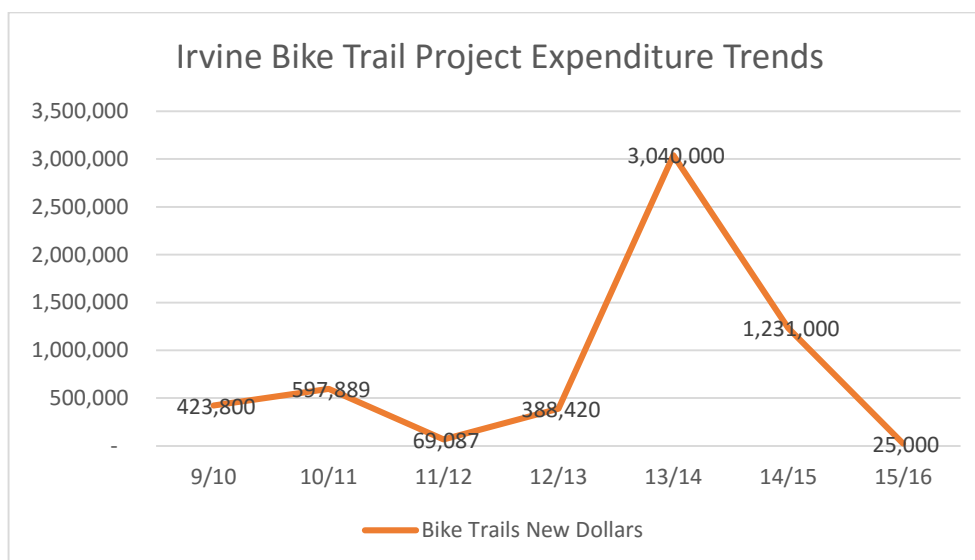
Analysis of the budgets and Capital Improvement Plans was essential and necessary to obtain an understanding of how many miles are planned and implemented as well as the dollars spent on an annual basis implementing these improvements to determine if the active transportation plans and policies are being implemented in a meaningful manner. Unfortunately, there is no metric for success established at the federal, state, or local level with respect to an agency's implementation of bicycle and pedestrian improvements. Due to this, the analysis below is a simple review of each city's planning and implementation based on the dollars spent and the mileage of pedestrian and bicycle improvements. Analysis of the budgets was limited to data available. The 2011-12 fiscal year budget and Capital Improvement plan for the City of Rancho Cucamonga was not available, and created a gap in information. However, all remaining years for the period of interest are available, and the trends were still easily identified.

In analyzing and summarizing the data, it is important to note that many CIP projects take more than one year to complete, and cities can change the way in which they show the budget for an individual project over time. So, a city can have the same project budgeted in multiple years as the project moves forward in its phases. That same project's budget can be identified in different years, and can be done either by the full cost of the project, or by the cost to be incurred that particular fiscal year. The latter gives a full sense and understanding of the project expenses in each fiscal year, but deeper analysis can be completed to understand specific expenditures versus projected budget with enough time to complete the public records information request process.

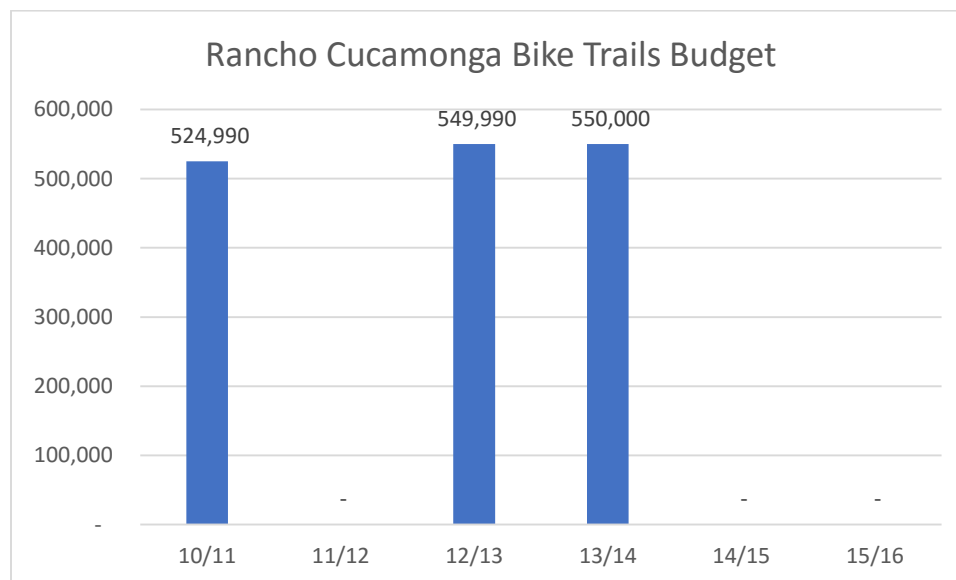
⁴⁷ Irvine Bicycle Transportation Plan, 2011:
<http://legacy.cityofirvine.org/civica/filebank/blobload.asp?BlobID=18746>

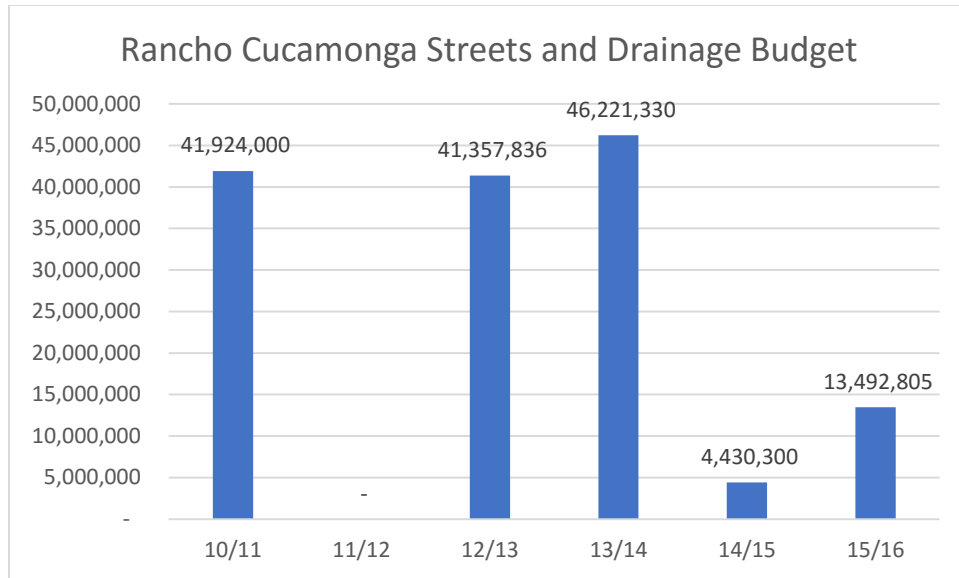
In addition to analyzing the budgets and the CIPs to break down the projected budget per year and the mileage added in total, we can also compare the expenditures for these types of improvement projects to the overall CIP expenditures in any given year and determine trends.

For the City of Irvine, the trend for budgeting and implementing bicycle trails has steadily increased based on averages. Additionally, the trend for streets and drainage has fluctuated over the six-year analysis.



Rancho Cucamonga’s spending trend from FY 2009-10 through 2015-16 has been a bit sporadic. There are a few reasons for this, in part because streets spending was uncharacteristically very high in several of the years measured. For example, the City was the lead in completing a \$45 Million+ interchange project on the I-15 and budgeting for this project was in the tens of millions of dollars over several years, which artificially inflated the data. Additionally, there was no specific “bike trail” projects called out in several of the years analyzed. However, Rancho Cucamonga has a policy of constructing and improving streets to their ultimate configurations, which may include bicycle and pedestrian route depending on the street project and its place in the overall circulation element. So, while bicycle trails may not be specifically budgeted, bicycle and pedestrian routes may have been a part of several of the streets projects budgeted. These improvements would not separately be captured in the data analyzed, thus, it is likely that the totals below represent a conservative estimate and the actual amount of bicycle infrastructure completed is likely higher.





Additionally, we are able to review the fund sources to determine the types of funds used for project implementation for bicycle and pedestrian improvements at the local level. The funds sources for the two cities are vastly different as is share of the “fund pie” for the use of local city funds versus all other fund types. For Fiscal Years (FYs) 2009-2010 through 2015-2016, the funding picture is below:

Rancho Cucamonga

Type	Fund Amount
City Funds	\$8,954,632
Non-City Funds	\$3,163,650
State Funds	\$20,174,455
Measure I -Regional Funds	\$731,000

Irvine

Fund Type	Fund Amount
Local Funds	\$37,331,551
Federal Funds	\$354,719
State Funds	\$45,000
Regional Funds	\$1,130,586
OCTA	\$26,764,026
NITM	\$993,000
UCI	\$47,934

Discussion

While the policies are in place and encourage bicycle and pedestrian improvements in both cities, it is easy to see, at least from these two examples that the local agencies have carte blanche to implement these projects as they can afford them in the budget when other priorities do not take precedent. There is no urgency in the federal, state, or local policies that require a certain quantifiable amount of mileage be constructed or funds be spent on planning or implementing types of infrastructure within a particular period. There is also no requirement for the city to implement these types of infrastructure in potentially underserved areas of the community. This means that essentially, the policies could allow for new privately funded development to

implement much of the needed infrastructure with little concern for complete projects or logical terminus of projects. In other words, cities may opt not to spend any dollars on these infrastructure projects if there are other priorities within the city to be completed or they are aware of new developments creating a piece of infrastructure, no matter how fractured connections may be. This has negative implications with regard to the provision of multi-modal transportation infrastructure in already developed and disadvantaged areas. Additionally, the funding scenario for each jurisdiction is vastly different, and for cities or local agencies that may not have access to the same funding sources as these two agencies, it may be that much more difficult for them to implement these types of improvements.

The question of whether this meets the intent of the policies driving the implementation of active transportation at the federal, state, and local level looms heavy. The need for these types of infrastructure improvement is obvious based on the discussion in the literature review. However, with no mechanism for measuring success or reporting requirements of the policy at any level, it is difficult to determine if any one jurisdiction is failing or is successful at implementing these infrastructure types short of completely ignoring the policy requirements at all.

Research Limitations

Additional research on this topic will provide important information to support bicycling activity and industry at the local, regional and state levels by demonstrating the value of bicycling in dollars and cents. Another major limitation to research on this topic is the availability of data from cities. In particular, many cities do not clearly track the number of bike lanes installed, and the funding sources used to construct these improvements. Improved tracking mechanisms will be important, particularly after these policies have been in place for longer, to determine if they are effective. Additionally, it would be beneficial for policymakers to have better information from

constituents when determining where improvements will be installed and which improvements to install. For example, different types of improvements may be warranted depending on the type of primary users in an area with regard to destinations and degree of safety measures.

Front runner cities, such as Irvine and Rancho Cucamonga are not only complying with Complete Streets through policy changes, but have the potential to influence Complete Streets implementation of other local agencies, inspire other planning agencies to increase investments in pedestrian and bicycle infrastructure and to ultimately serve as a best practice models for other states. Thus, it is important that more research is conducted on this topic.

Policy Recommendations

Based on the analysis and discussion presented herein, there are several logical policy recommendations for consideration which would facilitate funding and development of multi-modal transportation.

1. Establish a reliable source of funding at both the federal and the state level through the transportation bills or at the local level through self-help county measures.
2. Track performance measures for multi-modal facility implementations, such as tracking dollar amounts of funds used for each mode, air quality improvement (measure by greenhouse emissions) and/or economic impact (increases in revenue or number of jobs).
3. Establish universal benchmarks measures at the state or federal level for implementation of future Complete Street projects and seek appropriate baseline data, or a system of measurement for ensuring development and construction of Complete Street/Active Transportation infrastructure at the local or county level.

Conclusion

There are a variety of challenges for Inland Empire cities looking to implement Active Transportation Plans, particularly because many residents live far from their workplaces. Thus, it is important that policymakers can create solutions for commuters' first-mile and last-mile. A lot

can be learned from international examples, such as Denmark and the Netherlands, because these countries have a long, successful history of implementation of these types of improvements. Copenhagen and its suburbs show that planned, transit-oriented and bicycle-oriented development can make bicycling effective, efficient, and convenient for commuters, even over long distances. In addition to the lack of bicycle-oriented infrastructure in Southern California, another of the greatest barriers to bicycling in this region is the public perception that bicycling is dangerous. This can be mitigated through a combination of public outreach and increased provision of bicycle-oriented infrastructure. In particular, it is important to encourage younger generations to view bicycling as a means of transportation rather than simply for recreation.

Irvine and Rancho Cucamonga have actively undertaken a variety of projects to increase their bikeability; however, utilization of these facilities is not widespread and there is limited impetus for creation of additional infrastructure. It will be critical that infrastructure is provided in a logical manner in these regions to ensure that when bike lanes are available, they connect users to convenient locations. This is particularly challenging in these regions because a large amount of the new infrastructure is constructed as part of new development projects, and their location is not always under the full discretion of the city engineers and planners. In both Netherlands and Denmark, the federal government has taken an active stance on provision of multi-modal transportation programs, which provides more momentum to local agencies implementing these programs and ensures that infrastructure is provided in a logical manner. Although it is unlikely that the United States federal government would adopt a comprehensive active transportation program, it would likely be beneficial for more states to take an active stance to encourage multi-modal transportation.

For example, with passage of AB 1358, Californian policymakers have signaled to local planners that multi-modal transportation is important and it is likely that this policy will have significant long-term impacts on the effectiveness and extent of multi-modal transportation infrastructure within the state. As shown in Denmark, one of the most important factors to bicycling as a means of transportation is that infrastructure is safe and convenient. Therefore, as new cities are built and as existing cities grow, multi-modal transportation systems will slowly spread throughout the state. Active transportation has myriad positive benefits including, but not limited to, environmental sustainability and improved health; therefore, investing in multi-modal transportation will yield meaningful benefits much greater than can be easily quantified on paper. Creation of multi-modal transportation will secure a healthy future for all and is a policy which should be pursued in earnest.

Appendices

Appendix A

Below is a list of the policies, policy documents, and advocacy papers reviewed to conduct the analysis.

<u>Document/Policy</u>	<u>Description</u>	<u>Agency</u>	<u>Year</u>
Fixing America's Surface Transportation Act - FAST	Federal Transportation Reauthorization Law	Congress/Federal Highways	2015
California AB 1358	Complete Streets Act	CA Legislature/ Office of Planning	2008
Circulation Master Plan for Bicyclists and Pedestrians	Policy for implementation of bike and pedestrian infrastructure	City of Rancho Cucamonga	2015
Bicycle Transportation Plan	Policy for implementation of bicycle and pedestrian infrastructure	City of Irvine	Amended 2011
Healthy RC Strategic Plan	Plan for implementing Healthy Communities Plan	City of Rancho Cucamonga	2014
Budgets	Fiscal allocations for programs	City of Irvine	Fiscal Years 2010-2016

Capital Improvement Programs and Plans	Fiscal allocations for programs and plans, and project information	City of Irvine	Fiscal Years 2010-2016
Budgets	Fiscal allocations for programs	City of Rancho Cucamonga	Fiscal Years 2010-2016
Capital Improvement Programs and Plans	Fiscal allocations for programs and plans, and project information	City of Rancho Cucamonga	Fiscal Years 2010-2016
Healthy, Equitable Transportation Policy	Research advocating for the funding of non-motorized transportation options	PolicyLink	2009
The Road Ahead: The Economic and Environmental Benefits of Congestion Pricing	Research discussing the cost of pollution and benefits of transit	Pacific Research Institute	1998

Appendix B

Below is a table showing the bicycle and pedestrian project improvements from FY 09-10 through 16-17 as they are listed and shown in the annual CIPs and budgets for each city, Rancho Cucamonga and Irvine respectively.

City of Rancho Cucamonga

<i>Budget Year</i>	<i>Project</i>	<i>Miles</i>	<i>FY Expenditures</i>
09-10	PE Trail Enhancements	0	\$250,000.00
09-10	Deer Creek Channel, Baseline Road to Highland Bike Trail Improvement	1.68	\$274,990.00
	<i>FY 9-10 Total</i>	1.68	\$524,990.00
10-11	Foothill Blvd from Grove to Vineyard Widening	1.05	\$250,000.00
10-11	Wilson Ave East to Wardman Bullock	0.75	\$3,010,000.00
10-11	Youngs Canyon, Koch to Cherry Street Extension	0.25	\$500,000.00
	<i>FY 10-11 Total</i>	2.05	\$3,760,000.00
12-13	Archibald Ave from north of Norbrook Dr. to Carrari St. - Community Trail on the west side	0.21	\$10,000.00
12-13	Haven Ave from 4th St. to 19th St. - Meidan Island Retrofit (Concept and Design)	3.77	\$50,000.00
12-13	LMD 4R Improvements - Paseo Lighting Retrofits	0	\$143,000.00
12-13	LMD 4R Improvements - Water Conservation/Landscape Renovations	0	\$400,000.00
12-13	Hellman Ave from Cucamonga Creek Channel to north of Foothill Blvd.	1.67	\$100,000.00
12-13	Haven Ave from Wilson Ave to Vivienda St. - Community Trail on the west Beautification	1.07	\$274,990.00
12-13	Pacific Electric Trail at Day Creek Channel - Connection	0	\$275,000.00
12-13	9th Str north side from 100 feet west to 800 feet west of Vineyard Ave - Sidewalk	0.13	\$123,800.00
12-13	Foothill Blvd. across SCE Corridor West of Day Creek Channel - Sidewalk	1.27	\$145,000.00

12-13	Youngs Canyon from Koch Pl to Cherry Ave - Street Extension	0.44	\$50,000.00
	<i>FY 12-13 Total</i>	8.56	\$1,571,790.00
13-14	Archibald Ave from N/O Norbrook to Carrari St. - Community Trail West Side	0.21	\$500.00
13-14	Haven Ave. from Wilson Ave to Vivienda St. - Community Trail on the west side	0.35	\$500.00
13-14	PE Trail at Day Creek Channel Connection	0	\$275,000.00
13-14	9th Street from Railroad Spur to Hellman and Baker Ave from 8th to 9th Sidewalk Improvements	0.25	\$303,600.00
13-14	9th Street north side from 100' west to 800' west of Vineyard - Sidewalk Improvements	0.13	\$118,300.00
13-14	Banyan Street from Merlot to Cantabria - Sidewalk North Side	0.32	\$66,500.00
13-14	Beryl Street from Base Line to 19th - Sidewalk West Side	0.22	\$127,000.00
13-14	Etiwanda Ave from 6th to Arrow Route - Street Widening	0.88	\$50,000.00
13-14	Haven Ave from Banyan to Wilson - Sidewalk East Side	0.54	\$110,660.00
13-14	Madrone Ave North of 9th St. - Widening with Southwest Cucamonga Park	0.13	\$500.00
13-14	Victoria Street from Etiwanda to East City Limit - Widening and Pavement Rehab	0.51	\$50,000.00
13-14	Youngs Canyon Road from Koch Place to Cherry Ave - Street Extension	0.44	\$50,000.00
	<i>FY 13-14 Total</i>	3.98	\$1,152,560.00
14-15	9th Street West of Vineyard - Sidewalk Improvements	0.13	\$115,800.00
14-15	Etiwanda Ave from 6th St. to Arrow Route Widening	0.88	\$100,000.00
14-15	Foothill Blvd across SCE Corridor West of Day Creek Channel - Sidewalk Improvements	1.27	\$145,000.00
14-15	Madrone Ave North of 9th St. - Widening with Southwest Cucamonga Park	0.13	\$500.00
14-15	Victoria Street from Etiwanda to East City Limit - Widening and Pavement	0.51	\$500.00
14-15	Youngs Canyon Road from Koch Place to Cherry Ave - Street Extension	0.44	\$100,000.00
	<i>FY 14-15 Total</i>	3.36	\$461,800.00

15-16	Arrow Route south side 500' to 1300' east of I-15 widening	0.15	\$20,000.00
15-16	Etiwanda Ave Street Improvements from 6th St. to Arrow route	0.88	\$450,000.00
15-16	Foothill Blvd. across SCE Corridor West of Day Creek Channel - Sidewalk Improvements	1.27	\$145,000.00
15-16	Haven Ave from Banyan to Wilson along the East side - Sidewalk	0.54	\$220,000.00
15-16	Madrone Ave North of 9th St. - Widening with Southwest Cucamonga Park	0.13	\$125,000.00
15-16	Victoria Street from Etiwanda to East City Limit - Widening and Pavement Rehab	0.51	\$375,000.00
15-16	Youngs Canyon Road from Koch Place to Cherry Ave - Street Extension	0.44	\$100,000.00
<i>FY 15-16 Total</i>		3.92	\$1,435,000.00
16-17	Archibald Ave North of Sunflower - Widening	0.1	\$187,000.00
16-17	Archibald Ave North of Norbrook to Carrari St. - Community Trail	0.21	\$150,000.00
16-17	Arrow Route East of I-15 Freeway - Widening	0.15	\$5,000.00
16-17	Etiwanda Ave from 6th St. to Arrow Route - Widening	0.88	\$450,000.00
16-17	Foothill Blvd. across SCE Corridor West of Day Creek Channel - Sidewalk Improvements	1.27	\$145,000.00
16-17	Youngs Canyon Rd. from Koch Place to Cherry Ave - Street Extension	0.44	\$50,000.00
<i>FY 16-17 Total</i>		3.05	\$987,000.00

City of Irvine

<i>Budget Year</i>	<i>Project</i>	<i>Miles</i>	<i>FY Expenditures</i>
9	Jeffery off-Street Bikeway: Venta Spur	0.46	\$423,800.00
9	Culver Drive Widening	0.26	\$300,000.00
9	IBC Project Development		\$130,000.00
9	IBC Sidewalk Improvement		\$125,962.00
9	Project Development		\$200,000.00
9	Jamboree Road Corridor	1.16	\$200,000.00
9	Off-Street Bike Trails Rehabilitation	0.4	\$77,000.00

	<i>FY 9 - 10 Total</i>	2.28	\$1,456,762.00
10	Jeffery off-Street Bikeway	0.46	\$597,889.00
10	IBC Sidewalk Improvement	0.42	\$535,253.00
	<i>FY 10 - 11 Total</i>	0.88	\$1,133,142.00
11	Campus Drive Class I Off-Street Bikeway	0.33	\$49,087.00
11	Wayfinding Signage	0	\$20,000.00
11	Kelvin Ped Bridge	0.01	\$215,000.00
	<i>FY 11 - 12 Total</i>	0.34	\$284,087.00
12	Culver Drive Widening	1347.19 ft.	\$1,777,871.00
12	Wayfinding Signage	0	\$27,000.00
12	Campus Drive Class I Off-Street Bikeway	1732.44 ft.	\$361,420.00
	<i>FY 12 - 13 Total</i>		\$2,166,291.00
13	Freeway Trail Bikeway lighting	0	\$770,000.00
13	IBC Westpark Pedestrian Bridge	284.63 ft.	\$250,000.00
13	Jamboree/Main Intersection Improvements	0	\$5,018,110.00
13	Jeffrey Open Space Trail- Barranca to I-5	1.46 mls	\$1,500,000.00
13	Jeffrey Open Space Trail - Roosevelt Bridge	133.97 ft.	\$2,200,000.00
	<i>FY 13 - 14 Total</i>		\$9,738,110.00
14	Sand Canyon Ave Grade Separation	1860.53 ft.	\$22,603,664.00
14	San Diego Creek Bike Trail Lighting Improvement	0	\$181,000.00
	<i>FY 14 - 15 Total</i>		\$22,784,664.00
15	Sand Canyon Avenue Grade Separation	1860.53 ft.	\$29,803,664.00
15	Culver/University Intersection Improvements	0	\$304,000.00
15	IBC Sidewalk Improvements	7.53 mls	\$485,000.00
15	Jamboree/Barranca Intersection	0	\$568,000.00
15	Bikeway Wayfinding Signage & Parking	0	\$25,000.00
15	Jeffrey/Alton Intersection Improvements	0	\$312,000.00
15	Jeffrey/Irvine Center Drive Intersection Improvements	0	\$377,000.00
	<i>FY 15 - 16 Total</i>		\$31,874,664.00

To further break this down, we can look just at the cost of each project and mileage added by simplifying these tables. We can see the total miles added below for each city from FY 2009-10 to 15-16.

City of Rancho Cucamonga

Project Name	Miles
PE Trail Enhancements	0
Deer Creek Channel, Baseline Road to Highland Bike Trail Improvement	1.68
Foothill Blvd from Grove to Vineyard Widening	1.05
Wilson Ave East to Wardman Bullock	0.75
Youngs Canyon, Koch to Cherry Street Extension	0.25
Archibald Ave from north of Norbrook Dr. to Carrari St. - Community Trail on the west side	0.21
Haven Ave from 4th St. to 19th St. - Median Island Retrofit (Concept and Design)	3.77
LMD 4R Improvements - Paseo Lighting Retrofits	0
LMD 4R Improvements - Water Conservation/Landscape Renovations	0
Hellman Ave from Cucamonga Creek Channel to north of Foothill Blvd.	1.67

Haven Ave from Wilson Ave to Vivienda St. - Community Trail on the west Beautification	1.07
Pacific Electric Trail at Day Creek Channel - Connection	0
9th Str north side from 100 feet west to 800 feet west of Vineyard Ave - Sidewalk	0.13
Foothill Blvd. across SCE Corridor West of Day Creek Channel - Sidewalk	1.27
PE Trail at Day Creek Channel Connection	0
9th Street from Railroad Spur to Hellman and Baker Ave from 8th to 9th Sidewalk Improvements	0.25
Banyan Street from Merlot to Cantabria - Sidewalk North Side	0.32
Beryl Street from Base Line to 19th - Sidewalk West Side	0.22
Etiwanda Ave from 6th to Arrow Route - Street Widening	0.88
Haven Ave from Banyan to Wilson - Sidewalk East Side	0.54
Madrone Ave North of 9th St. - Widening with Southwest Cucamonga Park	0.13
Victoria Street from Etiwanda to East City Limit - Widening and Pavement Rehab	0.51

Victoria Street from Etiwanda to East City Limit - Widening and Pavement	0.51
Arrow Route south side 500' to 1300' east of I-15 widening	0.15
Archibald Ave North of Sunflower - Widening	0.1
Archibald Ave North of Norbrook to Carrari St. - Community Trail	0.21
Total Miles Added 2010-2016	15.67

City of Irvine

Project	Miles
Jeffery off-Street Bikeway: Venta Spur	0.46
Culver Drive Widening	0.26
IBC Project Development	
IBC Sidewalk Improvement	0.42
Jamboree Road Corridor	1.16
Off-Street Bike Trails Rehabilitation	0.4
IBC Sidewalk Improvement	0.42
Campus Drive Class I Off-Street Bikeway	0.33

Wayfinding Signage	0
Kelvin Ped Bridge	0.01
Campus Drive Class I Off-Street Bikeway	1732.44ft
Freeway Trail Bikeway lighting	0
IBC Westpark Pedestrian Bridge	284.63 ft.
Jamboree/Main Intersection Improvements	0
Jeffrey Open Space Trail- Barranca to I-5	1.46
Jeffrey Open Space Trail - Roosevelt Bridge	133.97 ft.
Sand Canyon Ave Grade Separation	1860.53 ft.
San Diego Creek Bike Trail Lighting Improvement	0
Culver/University Intersection Improvements	0
Jamboree/Barranca Intersection	0
Bikeway Wayfinding Signage & Parking	0
Jeffrey/Alton Intersection Improvements	0
Jeffrey/Irvine Center Drive Intersection Improvements	0
Total Miles Added 2010-2016	3.46

Appendix C

Policies and Resolutions of the City of Rancho Cucamonga allowing for Complete Streets projects and initiatives:

- Policy CM-1.1: Provide a safe and efficient street system in the City to support mobility goals, all transportation modes, and the goals of the Managing Land Use, Community Design, and Historic Resources Chapter.
- Policy CM-1.5: Implement street design standards. Modified standards may be applied where appropriate on arterial corridors relating to transit, bicycle facilities, sidewalks, and on-street parking to be context sensitive to adjacent land uses and districts, and to all roadway users, including transit, bicycles, and pedestrians.
- Policy CM-2.1: Facilitate bicycling and walking citywide.
- Policy CM-3.7: Continue to develop and maintain a citywide bicycle network of off-street bike paths, on-street bike lanes, and bike streets neighborhoods, schools, parks, civic center/facilities, and commercial centers. recreational to provide connections between facilities, and major
- Policy CM-3.10: Continue to complete the installation of sidewalks and require new development to provide sidewalks.
- Policy CM-3.11: Continue to require pedestrian amenities on sidewalks on major streets that are key pedestrian routes, including the provision of benches, shade trees, and trash cans.
- Policy CM-3.13: Establish a number of bike hubs in the City (centralized locations with convenient bike parking for trip destinations or transfer to other transportation modes) at key transit nodes and at commercial nodes.
- Policy CM-3.14: Enhance pedestrian and bicycle access to local and regional transit, including facilitating connections to transit.
- Policy CM-3.15: Coordinate the provision of the non-motorized networks (bicycle and pedestrian) with adjacent jurisdictions to maximize sub-regional connectivity.
- Policy CM-4.2: Continue to design and operate arterials and intersections for the safe operation of all modes of transportation, including transit, bicyclists, and pedestrians.

Policies and Resolutions of the City of Irvine allowing for Complete Streets projects and initiatives:

- Objective B-3: Establish a pedestrian circulation system to support and encourage walking as a mode of transportation.
 - Policy (a) of B-3: Link residences with schools, shopping centers, and other public facilities, both within a planning area and to adjacent planning areas, through an internal system of trails.
 - Policy (b) of B-3: Require development to provide safe, convenient, and direct pedestrian access to surrounding land uses and transit stops. Issues such as anticipated interaction between pedestrians and vehicles, proposed infrastructure improved and design standards shall be considered.
 - Policy (c) of B-3: Design and locate land uses to encourage access to them by non-automotive means.
- Objective B-4: Bicycle Circulation: Plan, provide and maintain a comprehensive bicycle trail network that together with the regional trail system, encourages increased use of bicycle trails for commuters and recreational purposes.
 - Policy (a) of B-4: Use the General Plan Trails Network diagram as a basis for detailed planning of the bicycle trail system.
 - Policy (b) of B-4: Require a system of bicycle trails, both on- and off-street, in each planning area. Such trail shall be linked to the system shown in the General Plan Trails Network diagram. The on-street trails shall be designed for the safety of the cyclist.
 - Policy (c) of B-4: The trail system shall be designed to accommodate cyclists of all levels of experience and shall provide for both recreation and transportation.
 - Policy (d) of B-4: Require bicycle trail linkages between residential areas, employment areas, schools, parks, community facilities, commercial centers, and transit facilities.

- Policy (e) of B-4: Require pedestrian and bicycle circulation plans detailing access to subject property and adjacent properties in conjunction with new development.
- Policy (f) of B-4: Require that bicycle trip destinations, including community facilities, commercial centers, and transit facilities be equipped with appropriate bicycle facilities including, but not limited to, the provision of showers and bike racks.
- Policy (g) of B-4: Require traffic control devices and traffic signal phasing for bicycle crossing, turning and through movements
- Policy (h) of B-4: Require grade-separated crossings for Class I bikeways at major intersections, wherever feasible, to increase safety and efficiency.
- Policy (i) of B-4: Provide off-street bicycle trails in areas with minimal cross traffic, such as open space spine, flood control and utility easements, where possible.
- Policy (j) of B-4: Support programs to increase public awareness of bicycle safety and bicycling as an alternative mode of transportation.
- Policy (k): Incorporate, where appropriate, school and park locations within the design of the bikeway system (IRVINE BIKE PLAN).