

I-805 BUS RAPID TRANSIT/ 47TH STREET TROLLEY STATION AREA PLANNING: A HEALTH BENEFITS AND IMPACTS ANALYSIS

APPENDICIES

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Prepared for:

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TABLE OF CONTENTS

Appendix A: Summary Overview	3
Appendix B: Glossary of Terms	4
Appendix C: 47th Street HIA Scope Research Questions.....	5
Appendix D: Health Assessment	12
Alternatives Analysis on Health Determinants Summary Chart.....	12
Summary of Benefit and Impact Analysis Findings Table	21
Appendix E: Key Data Descriptions	25
References.....	27

APPENDIX A: SUMMARY OVERVIEW

Communities Putting Prevention to Work (CPPW), also referred to as Healthy Works in San Diego, is a \$372 million nationwide grant program of the U.S. Centers for Disease Control and Prevention (CDC) to combat obesity and tobacco use. In March of 2010, the San Diego County Health and Human Services Agency (HHSA) was awarded a \$16 million grant through the CPPW Grant Program. HHSA then awarded \$3 million of the grant funds to SANDAG in order to carryout six different project initiatives aimed at integrating health in built environment and regional planning efforts to support healthier communities.

In July 2011, SANDAG and a consultant team from Human Impact Partners (HIP) and Safe and Healthy Communities Consulting endeavored upon San Diego's first Health Benefits and Impacts Analysis (HIA) Project on a regional transit project. The I-805 Bus Rapid Transit/47th Street Trolley Station Area Planning Project is identified in the SANDAG 2050 Regional Transportation Plan to provide high quality transit service in a corridor serving a predominantly transit-dependent population.

SANDAG and HIP identified the I-805 BRT Project for an HIA because it has the potential to improve health outcomes and mitigate disparities among residents and workers in low-income and minority communities. Furthermore, the HIA provides opportunity to maximize the potential health benefits of the I-805 BRT Project.

The information provided in the following appendices was developed as a supplemental document to the I-805 Bus Rapid Transit/47th Street Trolley Station Area Planning: A Health Benefits and Impacts Analysis Report.

APPENDIX B: GLOSSARY OF TERMS

Asthma is a chronic inflammatory lung condition in which the severity of symptoms can range from mild to life-threatening.¹ It also is a disease influenced by many factors, and in which genetic susceptibilities influence responses to environmental exposures.²

Bus Rapid Transit (BRT) is “a flexible, high performance rapid transit mode that combines a variety of physical, operating, and system elements into a permanently integrated system with a quality image and unique identity.”³

Chronic Obstructive Pulmonary Disease (COPD) is the third leading cause of death in the United States.⁴ It includes chronic bronchitis and emphysema and is often related to tobacco use; but also can be caused by air pollutants in the home and workplace, genetic factors, and respiratory infections.⁵

Coronary Heart Disease is the leading cause of death in the United States, and includes heart attack and chest pain.⁶ Risk factors for heart disease may include high cholesterol, high blood pressure, diabetes, cigarette smoking, being overweight and/or obese, poor diet, physical inactivity, and alcohol use.⁷

Diabetes can have a harmful effect on most organ systems in the human body. It is a frequent cause of renal disease and lower-extremity amputation, and a leading cause of blindness among working-age adults.⁸ Persons with diabetes also are at increased risk for ischemic heart disease, neuropathy, and stroke.⁹ Risk varies among populations. African Americans, Hispanic/Latino Americans, American Indians, and some Asian Americans and Native Hawaiians or other Pacific Islanders are at particularly high risk for type 2 diabetes, also known as adult-onset diabetes.¹⁰

Health Benefits and Impacts Analysis (HIA) is formally defined as “a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA provides recommendations on monitoring and managing those effects.”¹¹

Light Rail Transit (LRT) is comprised of rail vehicles that run on dedicated guideways, and are integrated with street traffic, signals, and pedestrian traffic. LRT is designed for medium-distance trips with station spacing about every mile on average. Examples in San Diego include the Trolley and the SPRINTER.

Local Bus services facilitates mid to short distance trip making within local communities. Buses operate in mixed traffic with automobiles, with typical station spacing of one to four blocks. Examples in San Diego include Metropolitan Transit System and North County Transit District buses.

Primary Care is defined as care that gives patients entry into the health care system, coordinates health care services for patients, provides care to the same patient over time, is comprehensive, and takes into account the patient’s societal context outside the health care system.¹²

Running Way is where the BRT operates and may range from mixed-flow arterials and freeways; dedicated arterial and shoulders lanes; or exclusive, at-grade busways, to fully grade-separated transitways above or below the surface.

APPENDIX C: 47TH STREET HIA SCOPE RESEARCH QUESTIONS

Primary and Secondary Benefits and Impacts

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
<u>Existing Conditions Research Questions</u>	<u>Benefit and Impact Research Questions</u>	<u>Indicators</u>	<u>Data Sources</u>	<u>Methods</u>	<u>Priority</u>
What is the current level of connectivity from the 47th Street station to major employment and retail centers?	How will the project impact levels of connectivity from the 47th Street area and new transit hub to major employment and retail centers?	Location, density and proximity to: job centers, parks, libraries, public schools, health clinics, day care centers, community centers, post offices, library, banks/credit unions, grocery stores, local retail (note: only prioritized indicators will be addressed)	Dunn and Bradstreet; Google; Administrative data	Quantitative; secondary data analysis	High
What are existing levels of safety, crime and violence at the 47th Street station?	How will the project affect levels of safety, crime and violence in the community at the new 47th Street transit hub?	Violent and non-violent crime counts and rates	San Diego Police Dept.; FBI; Uniform Crime Reporting Statistics, SANDAG ARJIS	Quantitative; secondary data analysis	High
What are perceived levels of safety, crime and violence at the 47th St	How will the project affect perceived levels of safety, crime and violence in the	Personal experience of crime or violence in the neighborhood; knowledge of residents impact by neighborhood crime or	Original	Quantitative and qualitative; community survey	Medium

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
station?	community at the transit hub?	violence; comfortability going outside in daytime and nighttime			
What is the current level of community access to public and private goods and services?	How will the project impact resident access to public and private goods and services overall?	Location, density and proximity to: parks, libraries, public schools, health clinics, day care centers, community centers, post offices, library, banks/credit unions, grocery stores/farmers markets, fast food/convenience stores, local retail (note: may want to prioritize)	Dunn and Bradstreet; Google; Administrative data	Quantitative; secondary data analysis	High
What are current injury levels from collisions with motor vehicles around the 47th Street station?	How will the project affect levels of injury from collisions between motor vehicles and peds, bicyclists, or other motor vehicles around the new 47th Street transit hub?	Counts and rates of injuries from crashes; predictions for changes in vehicle, pedestrian, bicycle traffic	City of San Diego; SWITRS; SANDAG, TASAS	Quantitative; secondary data analysis	Medium
What is current air quality around the 47th Street station?	How will the project impact air quality around the new 47th Street transit hub?	Proportion of households living within potential traffic-related air quality hazard area	CARB; For established standards use Healthy People 2020 and City of SD General Plan, San Diego Air Pollution Control District	Quantitative; secondary data analysis	Medium
What are	How will the	Average daytime and	FHA; For	Quantitative;	Medium

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
current noise levels around the 47th Street station?	project impact noise levels around the new 47th Street transit hub?	nighttime outdoor noise levels	established standards use City of SD General Plan	secondary data analysis	
Are there communities of concern (low mobility, low income and minority) around the 47th Street station?	How will the project impact Sensitive populations near the new 47th Street transit hub?	Counts and rates of population by sociodemographic characteristics	US Census	Quantitative; secondary data analysis	High

Health Outcomes

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
<u>Existing Conditions Research Questions</u>	<u>Benefit and Impact Research Questions</u>	<u>Indicators</u>	<u>Data Sources</u>	<u>Methods</u>	<u>Priority</u>
What are current levels of chronic disease in the community?	How will the project impact chronic disease levels in the community surrounding the 47th Street transit hub?	Counts and rates of asthma hospitalization and emergency department visits, diabetes hospitalization, chronic obstructive pulmonary disease (COPD) hospitalization, obesity	Office of Statewide Health Planning Inpatient Hospital Data; CHIS	Quantitative; secondary data analysis	High

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
What are current levels of respiratory disease, cancer, and premature mortality in the community?	How will the project impact respiratory disease, cancer, and premature mortality levels in the community surrounding the 47th Street transit hub?	Counts and rates of respiratory disease, cancer, premature mortality	CHIS, National Cancer Institute; California Center for Health Statistics	Quantitative; secondary data analysis	High
What are current levels of social cohesion in the community?	How will the project impact social cohesion levels in the community surrounding the 47th Street transit hub?	Voting rates; residential mobility; counts of community centers, spiritual and religious centers, block party permits; social support reported by population	San Diego Registrar or Voters; US Census; Google; Dunn and Bradstreet; San Diego Police Department; Google; Administrative data; CHIS	Quantitative; secondary data analysis	Medium
What are current levels of stress in the community?	How will the project impact stress levels in the community surrounding the 47th Street transit hub?	Subjective measures of stress using questions from Perceived Stress Scale or similar scale	Original	Quantitative and qualitative; community survey	Medium
What are current levels of sleep disturbance or annoyance in the	How will the project impact sleep disturbance	Count of days with sleep disturbance, hours of sleep per	Original	Quantitative and qualitative; community	Medium

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
community?	or annoyance levels in the community surrounding the 47th Street transit hub?	day/night		survey	
What are current levels of learning delays in the community?	How will the project impact learning delays in the community surrounding the 47th Street transit hub?	Counts and rates of learning disabilities	CDC, National Center for Learning Disabilities	Quantitative; secondary data analysis	Medium
What are current levels of hearing impairment in the community?	How will the project impact levels of hearing impairment in the community surrounding the 47th Street transit hub?	Counts and rates of hearing impairment	National Institute on Deafness and Other Communication Disorders	Quantitative; secondary data analysis	Medium
What are current levels of access to health care and medicine in the community?	How will the project impact access to health care and medicine in the community surrounding	Counts of public health facilities within 1/2 mile of a regional transit stop; Distribution of public health facilities relative to population density;	CA Office of Statewide Health Planning and Development; CHIS	Quantitative; secondary data analysis	High

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
	the 47th Street transit hub?	Proportion of hospital beds to population; Counts and rates of insurance coverage			
What are current levels of physical activity in the community?	How will the project impact levels of physical activity in the community surrounding the 47th Street transit hub?	Rates of moderate and vigorous physical activity: for recreation; for transportation to schools, job centers, healthy foods and health care.	CHIS	Quantitative; secondary data analysis	High
What are current levels of nutrition in the community?	How will the project impact nutrition levels in the community surrounding the 47th Street transit hub?	Rates of overweight and obese; Counts and rates of fruit and vegetable consumption	CHIS, California Department of Public Health (Network for a Healthy California);	Quantitative; secondary data analysis	High
Are there communities of concern (low mobility, low income and minority) currently near the project area are more likely to be disproportionately impacted?	How will the project impact sensitive populations surrounding the new 47th Street transit hub?	Counts and rates of population by sociodemographic characteristics	US Census (youth, senior, low-income, disabled)	Quantitative; secondary data analysis	High

Project:	I-805 BRT/47th Street Trolley Station Area Planning HIA				
Geographic Scope:	1-mile walkshed from the 47th Street Trolley Station				
What support is available for prenatal and infant care?	How will the project impact low birth weight and nutrition among women, infant, and children in the community surrounding the 47th Street transit hub?	Counts and rates of low birth weights and childhood illnesses, levels of preventable childhood disease	CDC, Black Infant Health Program	Quantitative; secondary data analysis	High

APPENDIX D: HEALTH ASSESSMENT

The chart below summarizes the impacts of the proposed I-805 BRT/47th Street Trolley Station Area Planning on health determinants prioritized in this HIA. Included is information on the direction, magnitude, and severity of impacts, as well as the strength of the evidence and any uncertainties regarding predictions. To reiterate, the alternatives assessed are as follows:

Alternative 1 = No change

Alternative 2 = Introduction of BRT to the 47th Street trolley station area

Alternative 3 = Introduction of BRT to the 47th Street trolley station area + Addition of pedestrian access over the I-805 freeway

One important caveat to note related to these findings is that the alternatives were created for the purpose of the HIA and based on preliminary project details. As the I-805 BRT/47th Street Trolley Station Area Planning project advances, it is possible that these alternatives could differ from the actual BRT project alternatives yet to be developed. Furthermore, with no information available regarding proposed community improvements (e.g., to streets and sidewalks, to address crime and safety), a number of assumptions were made regarding these potential improvements.

Overall, Alternative 3 indicates the greatest opportunities to promote health and well-being. Specifically, it is anticipated that pedestrian activity, bicyclist activity, public transit usage, connectivity to goods and services, and safety will improve to a greater degree if this Alternative were implemented. To a lesser extent, some of these health determinants would be positively impacted if Alternative 2 were implemented; however the magnitude would be smaller.

Alternatives Analysis on Health Determinants Summary Chart

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
Auto travel	<p>The automobile is the dominant travel mode in the project area, although larger proportions of residents walk or take transit than is typical in the greater San Diego region. This perhaps reflects the relatively large proportion of residents that do not have access to a motor vehicle.</p> <p><i>Alternative 1:</i> This Alternative would not change vehicle ownership levels or the proportion of residents who use an automobile for travel. However, given the predicted increases in population throughout the region, there would likely be a greater absolute number of people in the area who travel by auto.</p> <p><i>Alternative 2:</i> Under this Alternative, research strongly illustrates that the proportion of trips made by automobile would likely decline as a result of</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>BRT usage (though the size of the impact is dependent on numerous factors, for example parking accommodation at the station, which are not yet known).</p> <p><i>Alternative 3:</i> As with Alternative 2, the proportion of trips made by automobile is predicted to decline as a result of BRT usage, and other factors such as parking accommodations. Added pedestrian access connecting communities on the western and eastern sides of I-805 would further encourage residents to use the BRT, and reduce their reliance on traveling by car – making for the largest impact of the three alternatives on auto travel. Overall, this Alternative poses the most positive conditions for decreasing auto travel.</p>
<p>Pedestrian activity and conditions</p>	<p>Walking conditions in the project area are in critical need of improvement. According to the PEQI findings, the majority of intersections are unsuitable for pedestrians and most street segments have only basic facilities for walkers. Particularly challenging to pedestrians in the area are a lack of sidewalks on many streets, narrow sidewalks on others, high traffic volumes on arterials, lack of trees for shade, minimal number of signalized intersections, and a perception that many streets do not feel safe. Anticipated long-term increases in auto travel could further deteriorate pedestrian conditions. Compared to auto use, walking comprises a small proportion of trips (4 percent) in the project area. However, compared to the San Diego region overall, a greater proportion of trips in the project area are done by walking, and the average trip here takes more time and is a longer distance. In addition, walking accounts for more than 40 percent of time spent getting to school or college in the project area. It also is the primary way that riders on the entire Orange Line, which passes through the 47th Street station, access transit stations.</p> <p><i>Alternative 1:</i> This Alternative does not include any changes to pedestrian facilities, so the pedestrian environment is unlikely to improve, and overall pedestrian activity levels will likely remain the same. Anticipated increases in traffic volumes, if not substantial enough, could have a benign effect on the pedestrian environment; however, if large enough, additional traffic could negatively impact the walkability of the project area.</p> <p><i>Alternative 2:</i> Under this Alternative, no pedestrian amenities are proposed to support walking in the project area; which keeps the overall pedestrian environment unchanged. However, the new BRT service would likely encourage increased pedestrian travel to and from the station for the project area residents, leading to increases in daily physical activity. In addition, the proposed Direct Access Ramp (DAR) in the project design would avoid added bus congestion on the local streets and roads, thereby</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>having a positive impact on the pedestrian environment. Conversely, existing poor pedestrian environments could hinder the level of pedestrian travel to and from the station area.</p> <p><i>Alternative 3:</i> As with Alternative 2, the new BRT would likely become a pedestrian destination for residents living in walking proximity to the station. Research suggests that the addition of pedestrian amenities, such as a means to safely cross the I-805 freeway, would further encourage residents to walk. There are multiple factors to consider maximizing the benefit of added pedestrian access over the freeway, including promotion of the pedestrian path, residents' feelings that it is safe from crime or injury, an entrance that is easily accessible, a pedestrian environment that is visually appealing, and additional pedestrian improvements to the 47th Street project area. Overall, this Alternative poses the greatest opportunity for increased pedestrian activity and benefit to the pedestrian environment.</p>
<p>Bicycle activity and conditions</p>	<p>The project area has relatively few bike facilities compared to other parts of San Diego. Bike facilities are absent at 4 of 5 freeway crossings in the area, bike lanes and bike routes are scattered along segments of major arterials elsewhere in the project area, and the 47th Street trolley station lacks bike lockers. As noted in the PEQI, local street space that could serve bicyclists, but are not designated accordingly, are often used to park motor vehicles. Bicycle activity in the project area is low, comprising less than 1 percent each of trips made, person-miles traveled, and person-minutes spent traveling. Compared to the San Diego region overall, travelers in the project area make a greater proportion of trips by bike, though their average trip is of shorter length in time and distance. However, a smaller proportion of Orange Line riders (1.2 percent) who were surveyed said they biked to or from the station, compared to 2 percent of riders system-wide.</p> <p><i>Alternative 1:</i> This Alternative does not include any changes to bike facilities and amenities, so the bike environment and bicyclist activity is unlikely to change.</p> <p><i>Alternative 2:</i> Under this Alternative, no bike amenities are proposed to encourage more biking and the overall bicyclist environment remains unchanged. The addition of a BRT station would likely become a bicycle trip attractor, particularly if the buses could accommodate bicycles, or if bike lockers were provided at the station. However, a sparse bike network that limits safe and accessible routes to access the BRT may hamper bike access. Similar to the pedestrian environment, the use of a Direct Access Ramp (DAR) in the BRT design would avoid added bus congestion on the local streets and roads, thereby having a positive impact on the bike</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>environment.</p> <p><i>Alternative 3:</i> As with Alternative 2, the addition of a BRT station would likely become a bicycle trip attractor. Since this alternative focused on improving pedestrian access to and from the station specifically, the project design should also consider direct access across I-805 for bicyclists in addition to pedestrians, as well as other bike facilities, such as bike lockers, at the station to maximize the benefit to bicycle travel in the project area.</p>
<p>Public transit usage and access</p>	<p>Current transit service in the project area includes local bus routes and the Orange Line trolley. The 47th Street station is currently served by the Orange Line trolley only. Only 2 percent of trips in the project area are made by transit, although that is higher than the 1.3 percent regional average. Transit trips comprise a small proportion of distance traveled (1.8 percent of person-miles) by people in the project area, though a slightly larger proportion of time spent doing so (7.3 percent of person-minutes). Transit consists of a greater proportion of time spent for work trips among travelers in the project area, compared to travelers in the San Diego region overall (26.6 vs. 12.8 person-minutes). The majority of transit riders that access the Orange Line trolley do so by walking more commonly than by bike or car, though they do so less frequently compared to riders across the entire system.</p> <p><i>Alternative 1:</i> This Alternative does not propose changes to the existing transit service at the 47th Street trolley station, and is therefore unlikely to affect access to or usage of the transit service.</p> <p><i>Alternative 2:</i> This Alternative would add Bus Rapid Transit (BRT) service to the 47th Street station area, providing connections (via BRT) to regional job and retail centers, educational institutions, as well as health facilities. BRT usage would depend upon service frequencies and affordability, however overall transit usage is anticipated to increase. Of note, the BRT fare will likely be more expensive than most local bus fares however, will be more affordable than local bus service or traveling by car on a per-mile cost comparison. Usage of the BRT service and access to the station could be limited under this Alternative since no improvements to bicycles or pedestrians are provided.</p> <p><i>Alternative 3:</i> This Alternative would add BRT service to the 47th Street station area, providing connections to regional job and retail centers, as well as health facilities. BRT usage would depend upon service frequencies and affordability, however overall transit usage is anticipated to increase. Of note, the BRT fare will likely be more expensive than most local bus fares; however, it will be more affordable than local bus service or traveling</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>by car on a per-mile cost comparison. This Alternative also proposes to provide pedestrian access across the I-805 freeway, thereby improving access to transit for pedestrians, particularly those within the 1-mile walk shed of the 47th Street transit station.</p>
<p>Pedestrian/bicyclists/motor vehicle injuries</p>	<p>Pedestrian, bicyclist, and motor vehicle injury rates due to motor vehicle collisions are substantially higher than in the broader HHS defined sub-region. However, rates of injury and death from pedestrian and motor vehicle collisions are declining in the sub-region.</p> <p>In the project area, the majority of bicyclist injuries occur in intersections, and the majority of pedestrian injuries when a pedestrian is crossing the street. More than two-fifths of the total pedestrian injuries occurred when crossing an intersection in a legal crosswalk, which reflects the PEQI results that identified poor pedestrian conditions at intersections in the project area. A small, but notable number of injuries, and two deaths occurred on I-805. Of them, one was on a freeway ramp and three involved a pedestrian walking in the shoulder of the highway. The majority of both pedestrian and bicycle-related collisions occurred during daylight hours, and bicycle collisions happen more often on weekdays than on weekends. These temporal patterns may reflect a greater local reliance on walking and bicycling for “active transportation” uses – the trip to work, school, or transit – than for recreational purposes.</p> <p><i>Alternative 1:</i> This Alternative does not provide changes to the built environment. If traffic levels increase as a result of population growth, there could be more pedestrian or bicycle injuries. However, if traffic does not increase, this Alternative will likely not have an impact on pedestrian, bicycle, or overall motor vehicle-related collisions and injuries.</p> <p><i>Alternative 2:</i> Pedestrian and bicycle activity will likely increase under this Alternative, but in the absence of any changes or improvements to current non-motorized facilities, collisions and injuries to pedestrians and bicyclists may increase. However, use of Direct Access Ramps could avoid additional injuries, by keeping BRT buses from on- and off-ramps and off local streets and roads. Project design features that affect bike and pedestrian access to the station have not yet been addressed, but should be considered to minimize any potential increases in bike/pedestrian injuries.</p> <p><i>Alternative 3:</i> As with Alternative 2, the added BRT service to the 47th Street station would likely become a pedestrian and bicycle trip attractor. The proposed pedestrian access over I-805 would likely reduce pedestrian injuries but in the absence of pedestrian and bike facility improvements in</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>the broader area, collisions and injuries to pedestrians and bicycles may still increase. Project design features that affect bike and pedestrian access to the station have not yet been addressed, but should be considered to minimize any potential increases in bike/pedestrian injuries.</p>
<p>Safety from crime</p>	<p>Violent and non-violent crime in the area has decreased in the past decade; however, incidences remain high. Currently, violent crime in the project area is more concentrated in the initial ½-mile radius around the station, which is east of I-805, than between the ½-mile radius and the edge of the project area boundaries. In the project area on the west side of I-805, non-violent crimes in the past year clustered north of Market Street near residential housing, with some incidents also reported on part of Imperial Avenue. Residents of four neighborhoods east of I-805 perceive the neighborhood as safe, but not to the extent that most are comfortable walking alone at night.</p> <p>Known risk factors for crime in the project area include poor pedestrian and bicycle environments, freeway on- and off-ramps, high volume roadways and noise levels, and a relatively low population density. The population is likely to increase in the project area, given predictions for the region, which, if designed appropriately, would bring more “eyes on the street” and has the potential to reduce crime and improve perceptions of safety.</p> <p><i>Alternative 1:</i> Under this Alternative, in which no changes are made to risk factors for crime, safety and crime levels are unlikely to be impacted.</p> <p><i>Alternative 2:</i> Under this Alternative, added BRT service would increase the number of people accessing the station thereby increasing “eyes on the street.” However, this alternative does not affect other determinants of crime, such as pedestrian and bicycle environments, population density and other land uses, that could deter crime.</p> <p><i>Alternative 3:</i> As with Alternative 2, “eyes on the street” would be increased under this Alternative. Future consideration of safety features during the project development, such as pedestrian-scale lighting, could further improve the pedestrian environment. Overall, this Alternative poses the most positive conditions for limiting levels of crime and violence in the project area; however, literature illustrates that the impact and magnitude of any changes would be contingent upon the safety design measures incorporated at the BRT station, line, bike/pedestrian access bridge, and broader bike and pedestrian environment.</p>
<p>Housing stock and value</p>	<p>The San Diego region is projected to gain 400,000 new homes by 2050;</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>however, it is unclear how many new homes will be in the project area. Currently, nearly two-thirds of occupied homes on the east side of the freeway are renter occupied and approximately half of occupied homes on the west side of the freeway are renter occupied; however, there is a relatively high vacancy rate on the west side of the freeway compared to the east side. Homes closest to the 47th Street station include single-family homes and a 230-unit trailer plaza. A number of factors can influence the value of properties in relation to BRT, among them proximity to a transit stop.</p> <p><i>Alternative 1:</i> Under this Alternative, since no additional housing is proposed, the housing stock is anticipated to remain unchanged.</p> <p><i>Alternative 2:</i> As with Alternative 1, since no additional housing is proposed, the overall housing stock is anticipated to remain unchanged. However, the addition of the BRT may increase property values and attractiveness of future development in the project area.</p> <p><i>Alternative 3:</i> As with Alternatives 1 and 2, since no additional housing is proposed, the overall housing stock is anticipated to remain unchanged. The addition of pedestrian access across I-805 and BRT service in this Alternative may make the area more attractive to future development and increase property values. However, the proposed pedestrian access is not likely to impact the housing stock, but could marginally impact housing values. Literature suggests that the magnitude of impact on housing value depends on the extent to which safety mitigations are incorporated into the BRT planning process.</p>
Connectivity to community resources	<p>The majority of community goods and services in the project area are east of I-805. This includes most schools, markets, community centers, health clinics, and the single public library in the area. The west side has fewer schools and markets, but has a relatively large park and the YMCA. Connectivity to resources on the west side is constrained by the presence of large tracts of land devoted to cemeteries. Connectivity to resources on the east side is made by motor vehicle, bike, or on foot via highly-trafficked arterials, or by foot across the freeway lanes and the trolley tracks. The auto-oriented street system, land uses, and other manmade/topographical features on the east side may create barriers to accessing community resources by non-motorized travel.</p> <p><i>Alternative 1:</i> This Alternative proposed no changes; connectivity to community resources is anticipated to remain unchanged.</p> <p><i>Alternative 2:</i> Under this Alternative, the addition of BRT service will</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p>improve access to regional destinations, but, similar to alternative 1, is anticipated to have no impact on connectivity to community resources.</p> <p><i>Alternative 3:</i> Under this Alternative, the addition of BRT service will improve access to regional destinations, but, similar to alternative 1 and 2, is anticipated to have no impact on connectivity to community resources. However, the addition of pedestrian access over I-805 could substantially improve non-motor vehicle connections to community resources on either side of I-805. To maximize community connectivity through this alternative, factors such as promotion among residents to utilize the access path across I-805, community perception of its safety from injury and crime, ease of access, and design, as well as designated facilities for bicyclists will need to be addressed.</p>
<p>Connectivity to job and retail centers</p>	<p>Currently, the resident-to-job ratio in the project area is low, at approximately 2/5 that of the county overall. Outside the project area, major job centers are downtown San Diego, Kearny Mesa and Sorrento Valley.</p> <p>Retail trade is the largest employment industry in the project area, and is concentrated in one of three shopping centers east of I-805. However, residents currently spend money outside of the project area that could be spent within it, as indicated by an annual \$130 million leakage in retail sales.</p> <p><i>Alternative 1:</i> Under this Alternative, no new connections to job or retail centers would be made, and connectivity is anticipated to remain unchanged.</p> <p><i>Alternative 2:</i> This Alternative would provide BRT services that substantially improve regional connections to existing job centers in Kearny Mesa, and Sorrento Valley, and anticipated job centers including Chula Vista, Mission Valley, UTC, Sorrento Mesa, Mira Mesa, and area universities.¹³ Literature on BRT impacts strongly supports this finding. BRT service could also further facilitate resident spending outside the project area, but could also increase to the number of people accessing retail within the project area.</p> <p><i>Alternative 3:</i> In addition to the impacts under Alternative 2, including regional access to jobs and services, added pedestrian access across I-805 could help encourage greater resident access to jobs and retail on either side of the I-805. Overall, this Alternative poses the most positive conditions for connectivity to community and regional job and retail centers.</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
Air quality	<p>The current air quality, as measured by the monitoring station closest to the project area, meets all federal standards, and most state standards. Recent data has indicated that the site has on some days exceeded state standards for 8-hour ozone and PM10. West of I-805 there is 1 sensitive location – a community college – that is in close proximity to the I-805 project site, at approximately 1,900 feet away.¹⁴ East of the freeway there are 6 sensitive locations – including a park, elementary schools, and a senior high school – that are in close proximity to the freeway site, ranging from 300 to 2,200 feet away.¹⁵</p> <p><i>Alternative 1:</i> Under this Alternative no changes to air quality are proposed, however, given the predicted increases in population throughout the region, there would likely be a greater absolute number of people in the area who travel by auto, thereby increasing the long-term air quality impacts to the region and the project area.¹⁶</p> <p><i>Alternative 2:</i> BRT stations along the I-805 are expected to reduce individual vehicle trips without adverse air quality impacts immediately adjacent to the freeway. Specifically, the I-805 EIR predicts that new BRT stations alone will not contribute to new localized exceedences of CO or MSAT ambient air quality standards or increase the frequency or severity of any existing exceedence.¹⁷ The research suggests that BRT has the potential to positively impact air quality. The use of Direct Access Ramps could further contribute to positive impacts on air quality, if BRT buses are not required to travel through the neighborhood to reach the station.</p> <p><i>Alternative 3:</i> In addition to impacts predicted under Alternative 2, the addition of pedestrian access could encourage non-motor vehicle travel further reducing emissions and contributing to improved air quality.</p>
Noise	<p>Vehicle traffic is the greatest source of noise in the project area. Without proposed improvements, the I-805 is predicted to have increased traffic accompanied by more delays on freeways and local roads, but non-significant changes in noise levels along segments of the freeway.¹⁸ With a predicted population increase, local roads that already exceed the city's acceptable noise thresholds (i.e., Euclid Avenue, 47th Street, Imperial Avenue, I-805, Market Street, and SR 94) may see further increases in noise levels. Groundborne vibration from the trolley when in operation currently exceeds thresholds but is not significant.¹⁹</p> <p><i>Alternative 1:</i> Noise and vibration levels would experience no change under this Alternative.</p>

BENEFITS AND IMPACTS OF ALTERNATIVES ON HEALTH DETERMINANTS

Health Determinants	Benefits and Impacts
	<p><i>Alternative 2:</i> It is unlikely that a new BRT route on existing roadways, taken in its entirety, will increase traffic-related noise for places in immediate proximity to the route, to levels that exceed local standards, according to the Final EIR for the 2050 SANDAG plan.²⁰ Theoretically, if motor vehicle traffic on roadways is reduced, BRT could even decrease noise in some places. However, predictions in the Caltrans I-805 EIR suggest some locations along the BRT route would be impacted enough for noise levels to exceed city thresholds. For example, west of I-805 noise could increase by as much as 9 dBA in some residential areas and 7 dBA near the YMCA, depending on the design option chosen. Noise in one residential area is predicted to reach 78 dBA, which would exceed the city limit of 60 dBA for residential areas.^{21,22} Mitigations discussed in the EIR include construction of retaining walls and/or noise barriers along I-805.²³ However, cumulative noise from the BRT project combined with impacts of other proposed plans for the area could result in further exceeded thresholds. However, the use of Direct Access Ramps in the proposed project is one approach to manage noise in the community.</p> <p><i>Alternative 3:</i> Impacts identified in Alternative 2 are also expected under this Alternative. The addition of pedestrian access is not anticipated to have any further impacts on noise in the project area.</p>

Summary of Impact Analysis Findings

The table below is a summary of the analysis described above. Included is information on the direction, magnitude, and severity of impacts, as well as the strength of the evidence and any uncertainties regarding predictions.

ANTICIPATED MAGNITUDE & SEVERITY OF ALTERNATIVES ON HEALTH DETERMINANTS SUMMARY TABLE					
Health Determinant	Direction of Impact	Magnitude of Impact	Severity of Impact	Strength of Causal Evidence	Challenges and Opportunities
Auto travel					
Alternative 1	-	N/A	Moderate	◆◆◆	Magnitude of impact dependent on how many automobiles the presence of BRT will remove from roadways. Opportunity to assess this during alternative analysis.
Alternative 2	+	Moderate			
Alternative 3	+	Major			

Pedestrian activity and conditions					
Alternative 1	~	N/A	Moderate	◆◆	Added BRT service should attract increased pedestrian activity. The extent to which pedestrian activity increases should be further analyzed during project development.
Alternative 2	+	Minor			
Alternative 3	+	Moderate			
Bicycle activity and conditions					
Alternative 1	~	N/A	Low	◆	One challenge is that the HIA alternatives did not propose specific bike improvements although additional BRT service will likely attract bicycle trips. Opportunity to explore additional facilities that support both bike and ped to maximize benefits of project (increase physical activity, increase active transportation trips, increase transit ridership, etc.)
Alternative 2	+	Low			
Alternative 3	+	Moderate			
Public transit usage and access					
Alternative 1	~	N/A	High	◆◆◆	Opportunity to study existing local bus riders to determine which routes could benefit by providing access to 47th Street, and to conduct an assessment of where project area residents are employed to ensure the BRT route is maximizing connectivity to regional job centers.
Alternative 2	+	Moderate			
Alternative 3	+	Major			
Pedestrian/bicyclist/motor vehicle injuries					
Alternative 1	~	N/A	High	◆◆◆	Magnitude of injuries will vary depending on the extent to which safety mitigations will be incorporated into the planning process. Opportunity to assess design features that affect bike and pedestrian access to the station during alternative analysis.
Alternative 2	-	Low			
Alternative 3	+	Moderate			

Safety from crime					
Alternative 1	~	N/A	Moderate	◆◆	Extent to which safety mitigations will be incorporated into the planning process. Opportunity to explore impact and magnitude of safety design measures incorporated at the BRT station, line, and broader bike and pedestrian environment during alternative, design analysis.
Alternative 2	+	Minor			
Alternative 3	+	Moderate			

Housing stock and value					
Alternative 1	~	N/A	N/A	◆◆	One challenge is that the HIA alternatives did propose additional housing and the project itself, as a regional transportation project, does not propose additional housing. Magnitude of impact on housing value depends on multiple factors such as proximity to the station and safety mitigations.
Alternative 2	+	Minor			
Alternative 3	+	Minor			

Connectivity to community resources					
Alternative 1	~	N/A	Moderate	◆◆	BRT service will provide improved connections to regional goods and services. The impact BRT has on community connectivity will vary depending upon project area improvements related to safety, bike/ped facilities, etc.
Alternative 2	~	N/A			
Alternative 3	+	Moderate			

Connectivity to job and retail centers					
Alternative 1	~	N/A	High	◆◆◆	N/A
Alternative 2	+	Major			
Alternative 3	+	Major			

Air quality					
Alternative 1	-	Low	Moderate	◆◆◆	Size of impact dependent on how many automobiles the presence of BRT will remove from roadways and the amount of active transportation that can be encouraged, supported. Compressed natural gas vehicles will be used for the BRT route.
Alternative 2	+	Moderate			
Alternative 3	+	Moderate			
Noise					
Alternative 1	~	N/A	N/A	N/A	Opportunity to explore whether any additional noise mitigations will be proposed based upon how many cars may be removed from roadways as to have an impact on noise exposure.
Alternative 2	~	N/A			
Alternative 3	~	N/A			

Explanations:

- *Direction of Impact* refers to whether the alternative will positively impact health determinants (+), negatively impact health determinants (-), or have no impact on health determinants (~).
- *Magnitude of Impact* reflects a qualitative judgment of the size of the anticipated change in health determinant effect: Negligible, Minor, Moderate, Major.
- *Severity of Impact* reflects the nature of the effect on health determinants and its permanence: High = intense/severe; Mod = Moderate; Low = not intense or severe.
- *Strength of Causal Evidence* refers to the strength of the research/evidence showing causal relationship between the alternatives and the health determinants: • = plausible but insufficient evidence; •• = likely but more evidence needed; ••• = high degree of confidence in causal relationship. A causal effect means that the effect is likely to occur, irrespective of the magnitude and severity.

APPENDIX E: KEY DATA DESCRIPTIONS

Automated Regional Justice Information System (ARJIS): A system for San Diego and Imperial counties, ARJIS hosts a website that provides crime data and relevant information. For this HIA, data on crime type (violent, non-violent) and address were used.

California Health Interview Survey (CHIS): A random-dial telephone survey of more than 50,000 Californians conducted every two years, these data give a detailed picture of the health and health care needs of the state's population. For this HIA, data used was about Body Mass Index, fruit and vegetable consumption, physical activity, mental health, and insurance coverage.

California Healthy Kids Survey (CHKS): A local-level survey funded by the California Department of Education and its partners, it collects data at the schools-level for grades 5, 7, 9, and 11. The data are made publicly available at the level of the school district. Information used for this HIA included body image, physical activity, and mental health.

Euclid + Market Land Use and Mobility Plan: As part of the broader planning process for the Euclid and Market area, an existing conditions analysis completed in 2010 for the City of San Diego, provided information for this HIA about environmental conditions, land use policy, urban form, mobility, and market conditions.

Jacobs Center Quality of Life Survey: A report completed in 2008 for the Jacobs Center for Neighborhood Innovation provided information on the opinions of community members living in the Diamond Neighborhoods of southeastern San Diego, which includes four neighborhoods east of I-805, thus overlapped with but was not identical to the HIA project area.

Onboard Transit Passenger Survey: Administered most recently in 2009 by SANDAG, this survey of transit passengers onboard all fixed transit routes in the San Diego region provided information used in this HIA on rider demographics and trip behaviors. Data are unavailable at a statistically significant level for the 47th Street station; however, data for the entire Orange Line are available via this survey. In using the SANDAG on-board survey data, we've assumed that local Orange Line riders around the station behave the same as all Orange Line riders.

Pedestrian Environmental Quality Index (PEQI): This tool was developed in 2008 by the San Francisco Department of Public Health (SFDPH) to assess the quality and safety of physical pedestrian environments and to inform pedestrian planning needs. The process to generate a PEQI starts with a questionnaire that guides volunteers in collecting data about specific elements of the physical environment. The data then are used to determine the "walkability" score of a neighborhood, which is the PEQI.

Volunteers from SANDAG, HHSA and two residents from the 47th Street trolley station area attended a three-hour training about using the PEQI questionnaire, then collected data in the project area. They worked in teams of 2-3 people, and each team took 2-3 hours to complete their assigned street segments and intersections. Volunteers collected data using an application loaded onto Android phones, although the PEQI questionnaire was also available in print form.

The android phone tool prompts users to collect data for individual street segments and intersections in six categories: intersection safety, traffic, street design, land use, perceived safety and perceived walkability. A number of the survey measures invite data collectors to provide qualitative information about the pedestrian environment, in addition to quantitative information they provide. The information collected for each element of the survey is assigned a weighted numerical score, which is then aggregated to produce the PEQI index of walkability. After data collection in the BRT project, experts from the UCLA Center for Occupational and Environmental Health assisted with analyzing the data and generating maps with results. The maps show the weighted PEQI scores for each of the street segments and intersections surveyed in the study area. The weighting used in the PEQI initially was developed by SFDPH in consultation with national experts including city planners, independent planning consultants, and pedestrian advocates, using survey responses regarding the importance of various elements for pedestrian environmental quality. See Appendix 2 for the actual weights.

San Diego County Community Profiles: Data published by the San Diego Community Health Statistics unit, the profile provides the most recent demographic, economic, behavioral, and health data available for San Diego, by region and community. Data used for this HIA extended through 2008 for the relevant Central Region and Sub-region 5, and included a variety of health topics (e.g., asthma, low birthweight).

Statewide Integrated Traffic Records System (SWITRS): A database used by California Highway Patrol, it was used for this HIA to gather detailed information about injuries resulting from pedestrian, bicyclist, and motor vehicle collisions in the project area.

Travel Demand Model: A transportation model developed by SANDAG, it provides information on how changes in land use will impact transportation regionally. The type of information used for this HIA included the numbers of predicted trips by mode, time, distance, and purpose.

U.S. Census: Data pulled for this HIA included demographic information (e.g., age, race/ethnicity) from the decennial Census and American Community Survey.

Youth Risk Behavior Surveillance System (YRBSS): The system includes a national school-based survey conducted by CDC, and state, territorial, tribal, and local surveys conducted by the appropriate agencies and governments. It monitors six types of health-risk behaviors that contribute to the leading causes of death and disability among youth and adults, as well as prevalence of obesity and asthma. This HIA used information from YRBSS about obesity or overweight among high school students.

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¹⁶ Caltrans, *ibid.*, p.15.

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