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

JANUARY 2013

Prepared for:

San Diego Association of Governments
San Diego Health and Human Services Agency

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ABSTRACT

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Finally, we thank the numerous residents, community members, and business owners who attended our two Health Benefits and Impacts Analysis community meetings. The insight they provided enabled this project to consider the issues that are of pressing concern to the larger community.

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I. REPORT SUMMARY

Project Background and Initiation

Communities Putting Prevention to Work (CPPW), also referred to as Healthy Works in San Diego, is a $372 million nationwide grant program of the United States Centers for Disease Control and Prevention (U.S. CDC) to combat obesity and tobacco use. In March of 2010, the San Diego County (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 the San Diego Association of Governments (SANDAG) in order to carry out six different project initiatives aimed at integrating health in built environment and regional planning efforts to support healthier communities.

One component of the Healthy Works project was to implement a Health Benefits and Impacts Analysis project using an already defined methodology, Health Impact Assessment (HIA). A SANDAG transportation project was selected to test the HIA methodology for future integration in land use and transportation planning activities. The value in conducting a HIA is to provide information on transit and land use projects and plans from a health perspective to inform decision-making so that health is not negatively impacted.

In July 2011, SANDAG and a consultant team from Human Impact Partners (HIP) and Safe and Healthy Communities Consulting (SHCC) endeavored upon San Diego's first Health Benefits and Impacts Analysis Project on a regional transit project. The Interstate 805 (I-805) Bus Rapid Transit (BRT)/47th Street Trolley Station Area Planning Project (47th Street BRT Project) is identified in the SANDAG 2050 Regional Transportation Plan (2050 RTP) to provide high-quality transit service in a corridor serving a predominantly transit dependent population. The BRT service will run along the I-805 corridor to connect the South Bay region with Kearny Mesa, University Town Center, University of California San Diego, and Sorrento Mesa. By providing high-quality transit service along this corridor, the BRT service will offer a viable alternative to auto travel for residents and workers in these communities; improve access to homes, jobs, schools, commercial, and public services; and reduce auto travel and congestion.

Once implemented, the BRT also has the potential to improve health outcomes and mitigate disparities among residents and workers, especially in low-income and minority communities. To maximize the potential health benefits of the 47th Street BRT Project, SANDAG has conducted an assessment of the potential health benefits and impacts of the 47th Street BRT Project using the HIA methodology. This report is broken into three overarching sections, Report Summary, Detailed Health Analysis, and the Existing Conditions Analysis.

The Health Benefits and Impacts Analysis timeline for the 47th Street BRT Project was somewhat constrained in order to meet the Healthy Works Grant Program requirements, and was completed over an eight-month period (July 2011 – March 2012). The HIA was conducted parallel to the 47th Street BRT Project initiation. As a result, limited data was available for substantial quantitative

analysis. HIA project alternatives were therefore created for the purposes of the health analysis to demonstrate the relationship between a transportation project and the health of a community, and do not reflect the actual project alternatives still to be developed. The information provided in this report is based on an epidemiological framework.

What is Health Benefits and Impacts Analysis?

Increasingly, research and evidence suggests that transportation policies, plans, and projects affect health outcomes. For example, transportation decisions directly influence exposure to air pollution and noise; pedestrian and bike conditions; traffic safety; access to jobs, goods, and services; and social cohesion. Substantial evidence connects these "determinants of health" to health outcomes, such as asthma, cancer, cardiovascular disease, diabetes, injuries, adverse birth outcomes, and mental illness. Throughout the country, transportation and planning agencies are beginning to explore opportunities to comprehensively consider health in planning, project development, and decision-making processes.

SANDAG recognizes that understanding the wider implications of transportation-related decisions could yield plans and projects that result in better overall outcomes – both in terms of transportation and health – and respond to key resident, business, and community concerns.

What is Health Benefits and Impacts Analysis?

Health Benefits and Impacts Analysis is a public engagement and decision-support tool that can be used to assess the health effects of planning and policy proposals and make recommendations to improve health outcomes associated with those proposals.

The fundamental goal of Health Benefits and Impact Analysis is to ensure that health and health inequities are considered in the decision-making process using an objective and scientific approach, while engaging affected stakeholders in the process.

Historically, health outcomes and disparities have been thought to result from individual behaviors and access to health care. However, recent inter-disciplinary research shows that social, economic, and environmental factors, such as land use patterns, transportation systems, and community design ("built environment"), play a significant role in these outcomes and disparities. This evidence has begun to galvanize planners and public health practitioners around the country to work together to strategically address how built environment projects, plans, and policies might consider health impacts and incorporate health considerations into decision-making processes.

HIA is one approach to address health in relation to the built environment. 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. Health impact assessment provides recommendations on monitoring and managing those effects."[1]

The HIA process typically adheres to the following steps:

1. **Screening** involves determining whether or not an HIA is warranted and if it would be useful in the decision-making process

2. **Scoping** collaboratively determines which health impacts to evaluate, the methods for analysis, and the workplan for completing the assessment

3. **Assessment** includes gathering existing conditions data and predicting future health impacts using qualitative and quantitative research methods

4. **Developing recommendations** engages partners by prioritizing evidence-based proposals to mitigate negative and elevate positive health outcomes of the proposal

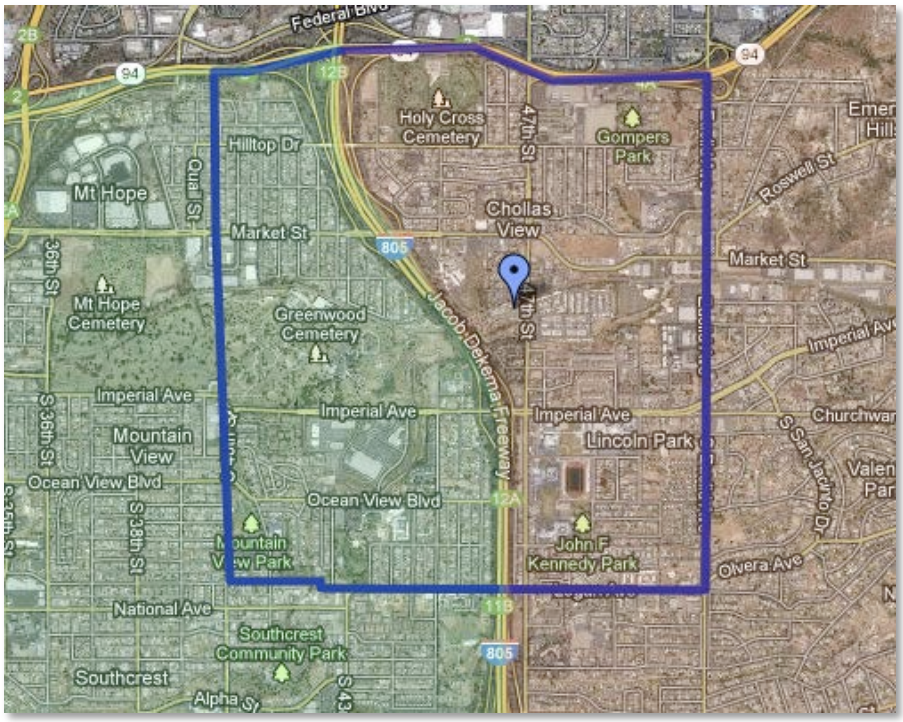
5. **Reporting** communicates findings

6. **Monitoring** evaluates the effects of an HIA on the decision and its implementation as well as on health determinants and health status

Project Area Boundaries

The approximate 47th Street BRT Project area is bounded on the west by 40th Street, to the north by State Route 94 (SR 94), to the east by Euclid Avenue, and to the south by Logan Avenue (See Map 1, "Project Area," below). It includes all or part of four neighborhoods – Chollas View, Lincoln Park, Mount Hope, and Mountain View – and is within two of San Diego's more than 50 community-planning areas.[2] The project area west of I-805 is in the Southeastern San Diego planning area; east of the freeway is in the Encanto planning area.

Map 1 - Project Area

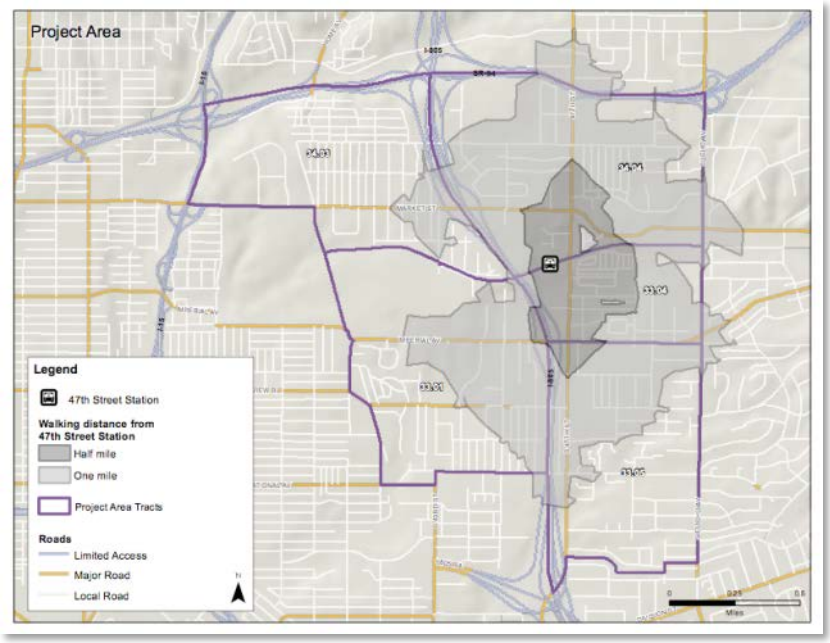


The current 47th Street Trolley Station, located on the Orange Line, serves a diverse section of San Diego where approximately 70 percent of residents are minority, about one-quarter live below

the poverty line, and more than one-quarter of residents are under the age of 15. On average, 14.1 percent of households in the project area are without a motor vehicle, a significantly higher percentage than the City and County overall. The station is close to residential areas and schools. Overall, the area is predominantly auto-oriented, bounded by two freeways and bisected by major arterials where daily traffic ranges from 10,000 to 25,000 vehicles.

The project area is served by the Orange Line Trolley (at 47th Street and Euclid Avenue) and multiple local bus lines. However, the 47th Street Trolley Station itself is not currently served by local bus lines. Despite the existing transportation options, disconnected local street patterns and narrow sidewalks on arterial roads restrict access to the 47th Street Trolley Station area. Safety issues, such as crime and pedestrian injuries from motor vehicle collisions, also are major concerns for area residents. This HIA focused as much as possible on the Census tracts in immediate proximity to the 47th Street Trolley Station, which incorporates a one-mile walkshed from the Trolley station, as indicated in Map 2. A typical "walkshed" for transit, meaning the distance a person generally is willing to walk to access transit, ranges from one-quarter to one-half of a mile. At a community meeting to discuss the project, attendees suggested that range was too short and that it be expanded to one mile. The resulting one-mile "walkshed" captures those areas in close proximity to the station on both the east and west sides of I-805.

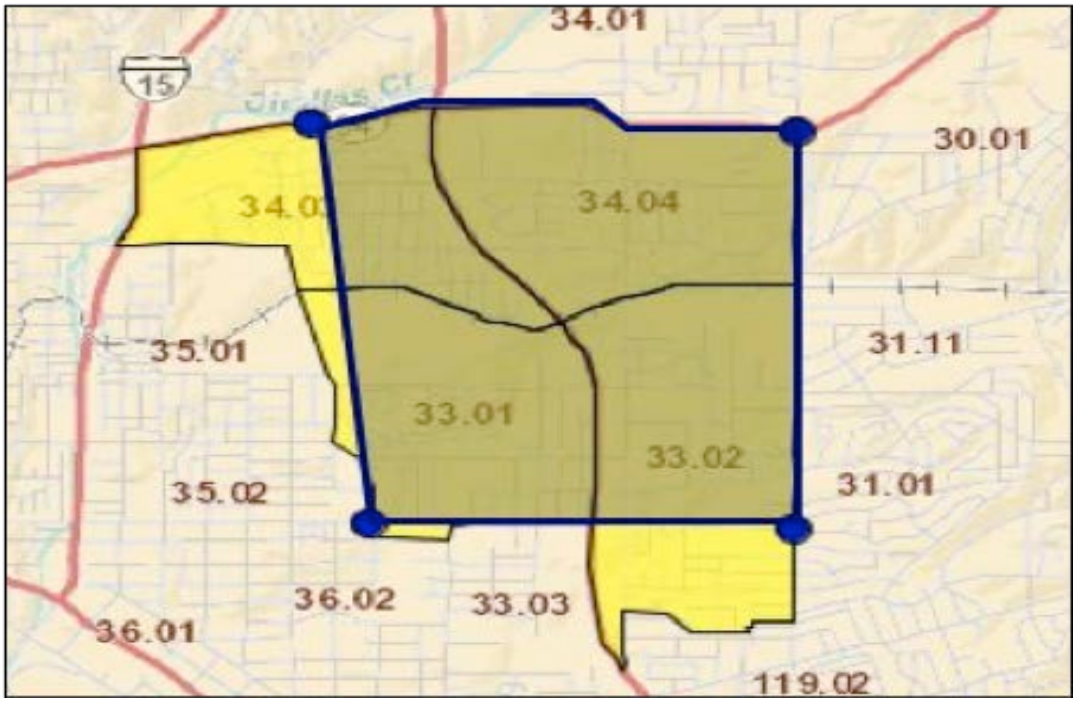
Map 2 - Walksheds near the 47th Street Station



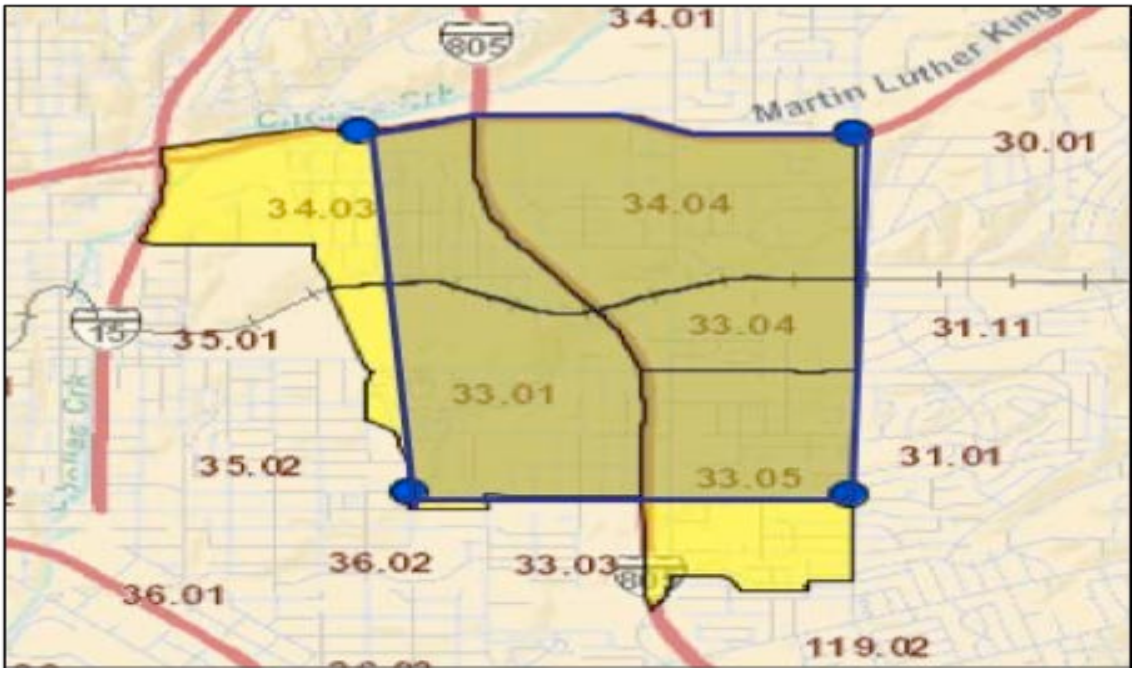
Using the 1-mile walkshed as a guide, the approximate project area is bounded on the west by 40th Street, to the north by SR 94, to the east by Euclid Avenue, and to the south by Logan Avenue. It includes all or part of four neighborhoods – Chollas View, Lincoln Park**,** Mount Hope**,** and Mountain View – and is within two of San Diego's more than 50 community planning areas.[3] The project area west of I-805 is in the Southeastern San Diego planning area, and east of the freeway it is in the Encanto planning area.

Lastly, as with most reports that present data, because of the numerous data sources utilized in this HIA the indicators are not assessed at a single geographic scale. The following differentiates the geographic areas encompassing the 47th Street Trolley Station area, based on the various data sources used. Several maps are provided below to illustrate how the geographies were defined (See Maps 3 -8, below). Generally, project area statistics are compared with statistics for the San Diego county as a whole, and, for transportation data, with the San Diego region served by SANDAG. A complete list of data sources are provided in Appendix E.

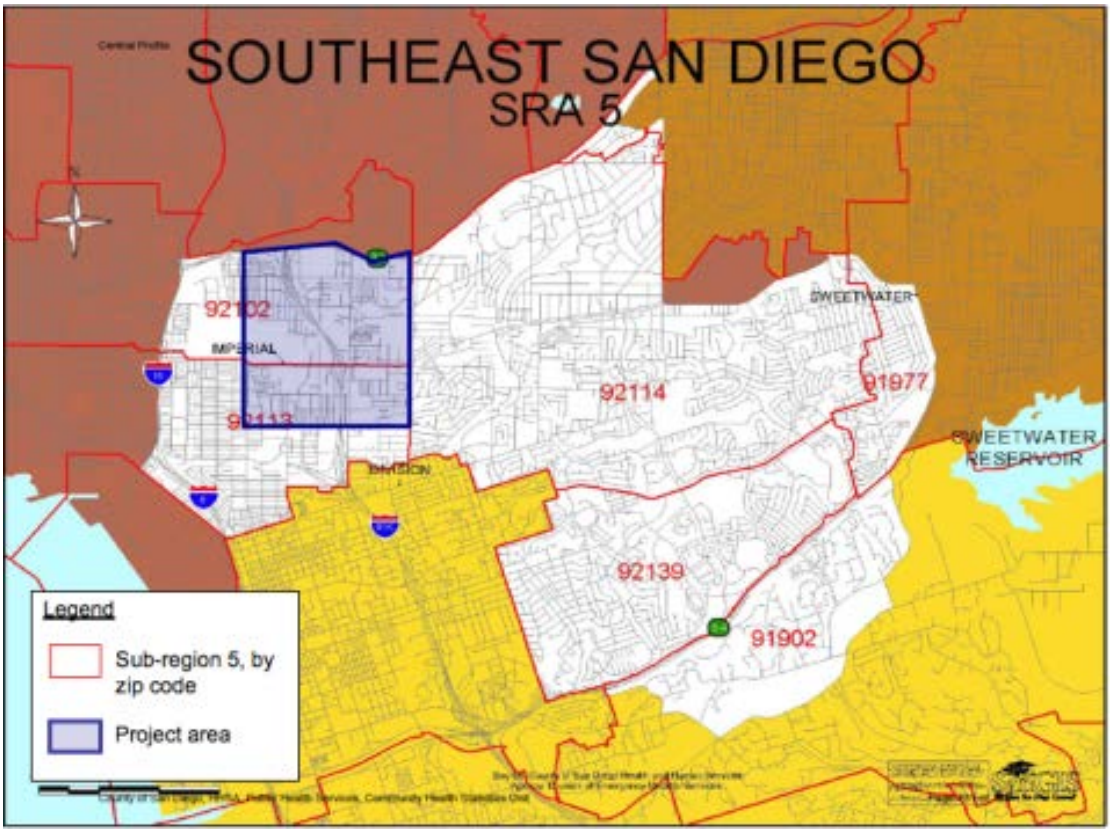
Map 3 - Census Tracts, 2000



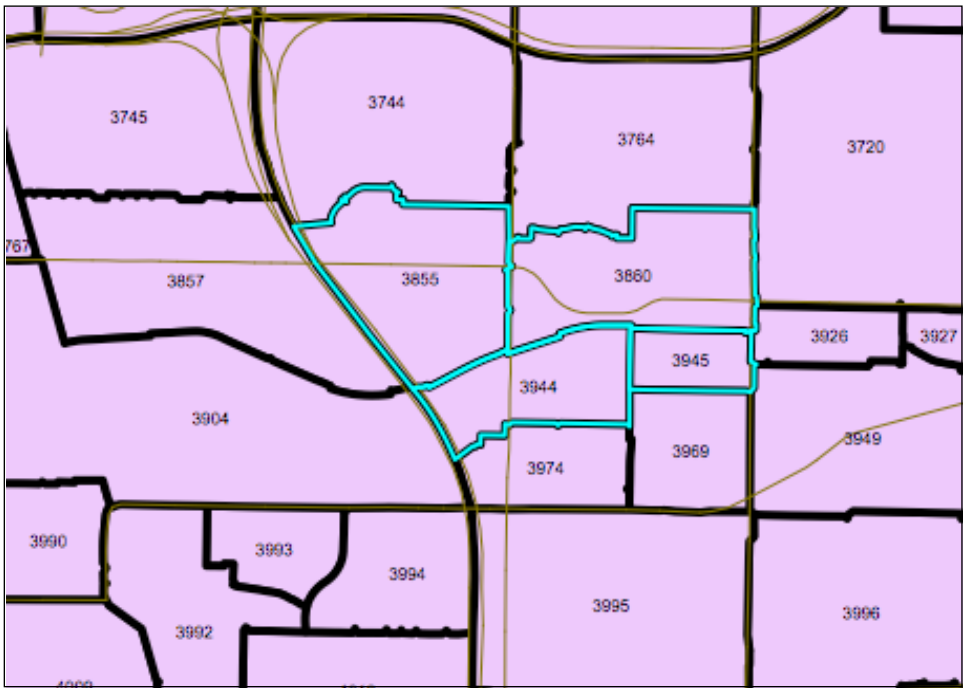
Map 4 - Census Tracts, 2010



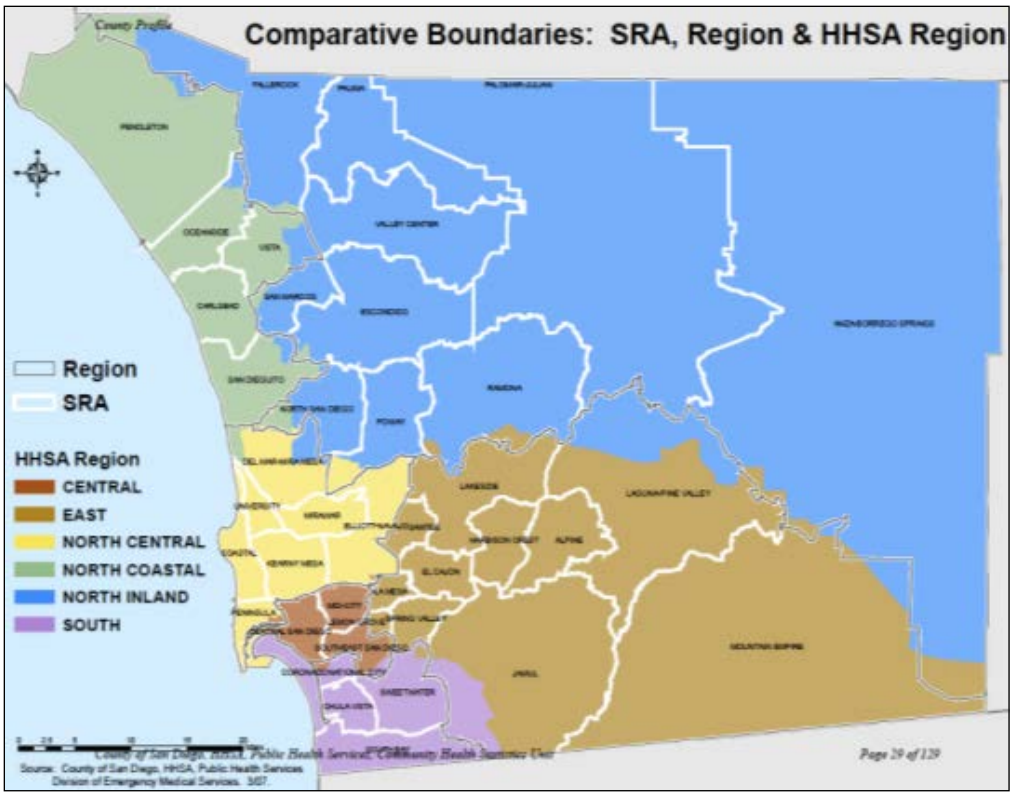
Map 5 - HHSA Central Region, Sub-Region 5



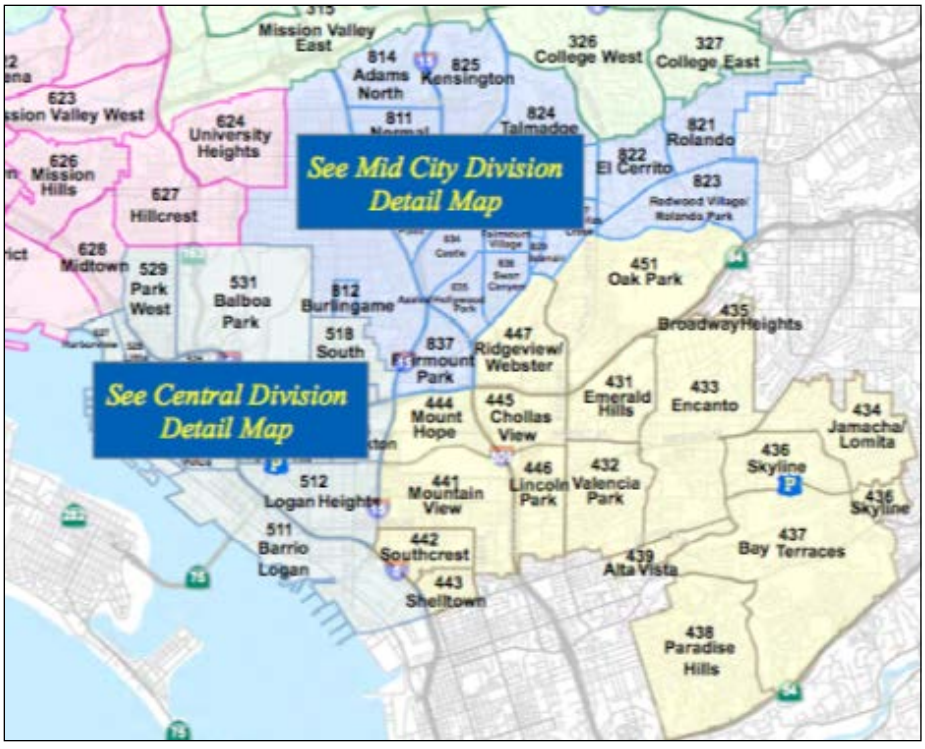
Map 6 - Transportation Analysis Zones (TAZs) in the Project Area



Map 7 - HHSA Regions



Map 8 - San Diego Police Department Beats



Summary of Analysis and Overarching Recommendations

The analysis component of the HIA process assesses the potential health benefits and impacts of a proposed project or plan. To do so, HIA considers a broad range of health determinants, including social, economic, and political factors, such as social cohesion and equity; living and working conditions, such as air quality, housing, and access to healthy foods; public services and infrastructure needs, such as transportation facilities; individual behaviors, such as diet and exercise; and individual factors, such as genetics. HIA uses evidence-based analysis to identify potential health outcomes and co-benefits of a proposed project that would not be addressed otherwise.

Based on an understanding of the 47th Street Trolley Project area and population demographics, the following "health determinants" were identified for assessment in the HIA: transportation (e.g., regional mobility, auto ownership, mode share, and walking and biking conditions), pedestrian and bicyclist injuries, crime and violence, housing, access to goods and services, employment, and environmental quality (e.g., air quality and noise). The geographic area of analysis included Census tracts within one mile of the 47th Street Trolley Station. The following summarizes the health analysis findings relevant to each of the aforementioned health determinant topic areas.

Transportation

There are a number of factors to consider when addressing transportation impacts on health. The 47th Street BRT project area is served by the Orange Line Trolley and local bus, however, the project area is predominately oriented toward a network of freeways, arterials and local roads. The extensive freeway and road network provides greater mobility and access to residents who own cars. This is a notable challenge to residents that live near the 47th Street station, since data indicates that the project area population consists of a higher proportion of low-income households and individuals with limited access to motor vehicles compared to the county and city. Additionally, residents that live near the trolley station use transit, walking, or biking for a larger proportion of trips compared to middle- and higher-income residents. Therefore, there is a need to improve non-motorized transportation facilities in addition to providing transit options such as the BRT, to support mobility and access to residents in the project area.

Improving mobility and access are important to community health. Regional mobility improves individual access to goods and services such as healthy food choices and employment opportunities. BRT systems have demonstrated success in improving passenger mobility both in the United States and internationally, although there are many factors that can attribute to this. Therefore, the addition of the 47th Street BRT can have a positive impact on the mobility of the project area residents, and consequentially improve community health. Additionally, as other non-motorized transportation facilities are augmented, greater opportunities to improve health arise. Additional discussion on the transportation analysis are discussed in section 2 of this report, "Detailed Health Analysis."

Pedestrian and Bicyclist Injuries

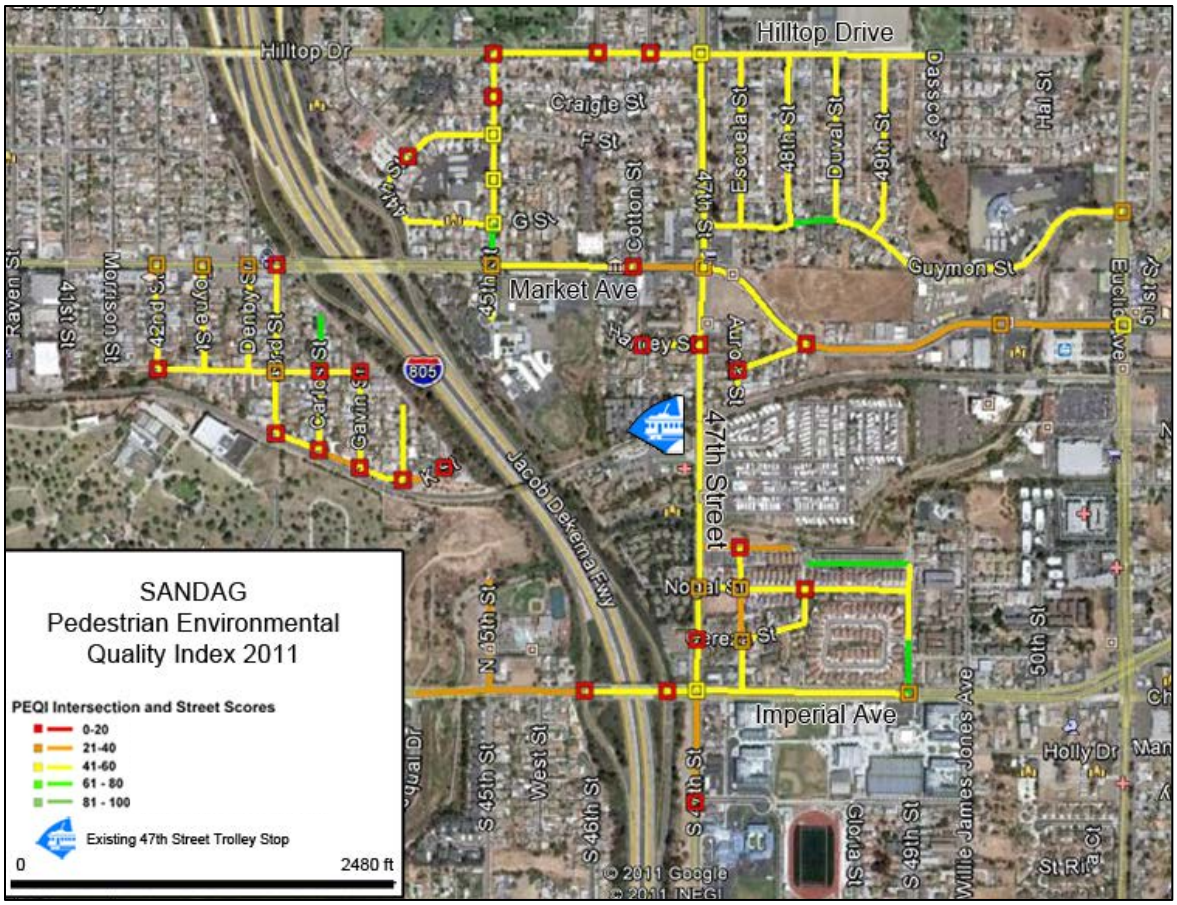
Project staffs conducted a Pedestrian Environmental Quality Index (PEQI) on street segments and intersections in the project area. The PEQI is a walkability survey tool developed in 2008 by the San Francisco Department of Public Health and later adapted in Los Angeles by the University of California, Los Angeles, Center for Occupational & Environmental Health based on published research. The UCLA team provided training to SANDAG and San Diego County Health and Human Services Agency (HHSA) staff and community members to use a smart phone application of the PEQI survey tool for the data collection. The group of staff and community volunteers then traveled to the project area to complete the survey.

There are two separate survey questionnaires for street segments and intersections. Each survey question is weighted and scored based on research. The cumulative scores are then illustrated by color categories (red, orange, yellow, light green, green). The purpose of these categories is to differentiate the rankings of each segment and intersection, and is not intended to denote final determination of infrastructure quality. It should also be noted that the language used in these categorical descriptions was not developed by those utilizing the tool for this project nor were surveyors allowed to change these categories. The use of a standard set of criteria, however, ultimately allowed the PEQI exercise to provide additional data and information in order to inform priority areas of concern for pedestrian and bicycle improvements.

The PEQI focuses primarily on the pedestrian environment; however, the survey tool does ask if bike lanes and bike racks are present along street segments and if bike lanes are present at intersections. The information provided on bike lanes is informative but is not intended to delineate quality of the bicycle environment.

Overall, a total of 97 street segments and 56 intersections were scored in the project area. No segments scored in the lowest category (red), but only 5 street segments scored in the second highest category (light green) and no street segments scored in the highest category (green). Generally, the street segments scored in the project area were found to have basic or conditions needing improvement (yellow, orange). Contrary to street segments, there were 25 intersections that scored in the lowest category (red), and no intersections scored in the top categories (light green or green). The remaining intersections scored were found to have basic or conditions needing improvement for pedestrians (yellow, orange). A total of 2 segments had bike lanes, 0 segments had bike racks, and 8 intersections had bike lanes.

MAP 9: Pedestrian Environmental Quality Index (PEQI) Results



According to bike and pedestrian injury data, from 2006 to 2010 a total of 80 pedestrian injuries occurred. Of these, more than two-fifths (42.7%) occurred when a pedestrian was in a crosswalk at an intersection. Furthermore, from 2006 to 2010 there were a total of 23 bicycle collisions. Of these, over half (60.9%) occurred in an intersection. The PEQI analysis compiled with this data indicates that improvements to some of the project area intersections could help decrease the number of pedestrian and bicyclist injuries in the project area and support active transportation to and from the BRT station area.

Built environment conditions of BRT systems that affect walking and bicycling vary, however, the physical design of the street or intersection is important to reducing pedestrian and bicyclist injuries. Additional analysis and data is provided in section 2 of this report, "Detailed Health Analysis."

Crime and Violence

Crime and violence can have both a mental and a physical impact on health. For example, physical impacts could include physical assaults, homicides, and rapes/sexual assaults. Separately, witnessing or experiencing some form of crime or violence can have long-term effects on an individual's mental wellbeing. Perceptions of crime and violence also effect community health. Furthermore,

exposure to crime has also been identified as a predictor of some health conditions such as coronary heart disease.

In the project area, crime has decreased overall in the last decade. The majority of crime in the project area is categorized as non-violent and occurs at relatively consistent levels throughout the project area. Although violent crime is reported less often in the project area than non-violent crime, data indicates that it is concentrated heavily within ¼ mile of the existing 47th street trolley station. Considerations of the collocated BRT and trolley station area design in terms of crime prevention could help further reduce the level of violent crime. Additional analysis and data is provided in section 2 of this report, "Detailed Health Analysis."

Housing

Housing was added to the HIA analysis based on community request. Housing or residential density is one indicator of community health, such as physical activity and obesity. Less dense communities often attribute to lower levels of physical activity and can also affect access to goods and services. More dense communities often benefit from more eyes on the street and ability to support neighborhood level retail.

In the project area, the community on the east side of the I-805 has a higher residential density than the west side. Housing is generally described as heavily renter-occupied and largely single-family. In addition, vacancy rates in the project area are consistent with the county overall, however, the west side of I-805 is experiencing greater vacancy rates than the east side. Lastly, some research has demonstrated that proximity to a BRT station/service can have a positive impact of property values. Additional analysis and data is provided in section 2 of this report, "Detailed Health Analysis."

Access to Goods and Services

As touched upon previously, accessibility of goods and services can have an effect on health. Providing greater pedestrian and bicycle facilities that improve neighborhood connectivity to goods and services can increase levels of physical activity. Furthermore, accessing destinations such as schools, open space, grocery stores, community clinics and community centers all contribute toward improved health.

There are a number of schools and childcare centers located within the project area, which is significant since the project area has a large proportion of children under age 15. Therefore, there are opportunities to enhance walking and bicycling to school to improve health in the project area. A concern in the project area is that there are no major hospitals and a high number of liquor stores and corner stores. Additional analysis and data is provided in section 2 of this report, "Detailed Health Analysis."

Employment

Employment contributes to the health of a community as the primary source of income and thereby the primary contributor to shelter, food, and overall mental and physical wellbeing. In the project area, there is a substantially higher rate of un-employment when compared to the county overall. However, a community study identified potential for substantial retail/restaurant and industrial industries development in the project area over the next 5 years. Additionally, implementation of BRT service at 47th Street could prompt both residential and commercial development, thereby

encouraging employment growth within the project area as well as providing access to job centers throughout the region. Additional analysis and data is provided in section 2 of this report, "Detailed Health Analysis."

Environmental Quality

Environmental Quality was addressed in terms of both air and noise pollution in the project area. Exposure to sources of pollution can impact the health of a community, for example affecting levels of asthma or sleep disturbance. Air quality in the project area overall is reported within air quality standards; however, data from the nearest air monitoring site is not localized in the project area. Current noise levels reported in the Euclid and Market Land Use and Mobility Plan: Existing Conditions Analysis Assessment indicated that two locations within the project area reported ambient noise levels exceeding City regulations. New BRT and local bus service to the 47th Street station area should consider impacts to environmental quality. Additional analysis and data is provided in section 2 of this report, "Detailed Health Analysis."

Overarching Recommendations

At the time the HIA was completed, project alternatives/design alternatives for the 47th Street BRT project had not been developed. Therefore, three alternatives were created for the analysis component of this HIA. The project alternatives used for the health analysis are below:

- 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, plus addition of pedestrian access over the I-805 freeway

Overall, the assessment results of the 47th Street BRT Project determined that Alternative 3 provides 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 would all 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 (See Appendix D) for the Magnitude and Severity of Alternatives Summary Table).

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 detail. 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.

Based on the results of the alternatives analysis, over 40 recommendations were developed. A complete list of the proposed recommendations is included in Section 2. The five overarching recommendations include:

1. Coordinate the BRT planning process with relevant regional and local planning processes to relay HIA findings into those processes.

2. Engage traditional groups in the BRT planning processes, including community members/residents, SEDC, business owners, and the Jacobs Family Foundation and Center for Neighborhood Innovation. Engage non-traditional groups in the planning process (such as public health coalitions).

3. Use HIA findings and recommendations to inform the development of I-805 BRT/47th Street Station Area Plan alternatives and to guide the assessment of the impacts of the selected alternatives on community health.

4. Conduct a limited, health-based review of the proposed BRT alternatives to identify those that would be most health promoting.

5. In order to assess changes over time, when full BRT implementation is complete, consider funding an update of the HIA existing conditions findings to see if and how these conditions may be changing.

Key Opportunities and Challenges

Virtually all HIAs experience challenges and limitations as they are being conducted. While there were several challenges faced in this HIA, none fundamentally restricted the ability to generate findings and recommendations regarding the I-805 BRT/47th Street Station Area Project. Through the HIA process, opportunities to conduct additional analysis and further the discussion of health were identified.

One primary challenge of this HIA was conducting it earlier in a project planning process than is traditionally done. As such, there was a lack of detail on the proposed BRT project including design and implementation alternatives. SANDAG chose to conduct the HIA in the initial phases of the project planning process, and prior to the development of design alternatives, to maximize the ability to engage the community and inform project development from start to finish. Therefore, three HIA-specific alternatives were developed in place of already defined project alternatives to guide the benefit and impact analysis.

It is possible that the HIA-specific alternatives could differ from the actual BRT project alternatives to be developed. As a result, this HIA does not assess how the actual project alternatives will impact health determinants of interest, but does provide relevant data and analysis on how components of the proposed project relate to and effect specific health determinants. In response to this challenge, it is recommended that a limited health-based review of the proposed BRT alternatives be undertaken in order to identify those that would be most health promoting. Furthermore, a number of assumptions were made regarding potential community improvements (e.g., streets and sidewalks, crime and safety). The HIA recommendations targeted many of these project components. In addition, because the HIA was initiated in the early stages of the BRT planning process, the open-ended nature of the project enabled the public to engage in the HIA experience. Without pre-determined alternatives, the community was able to utilize the HIA process as an opportunity to articulate and address specific community needs and concerns within the project area.

At the time the HIA was conducted, data had not been generated, for example, on projected demand, ridership, or auto and congestion relief impacts related to the proposed project. Therefore, the HIA was not able to utilize quantitative analyses to answer many of the research questions of interest, particularly questions regarding benefits and impacts on mode share, pedestrian injuries, air quality, and noise. While it is acceptable within HIA practice to make qualitative predictions in the absence of quantitative data, it is anticipated that such data will be available in the future and should be assessed in relation to HIA findings in order to examine the accuracy of the qualitative predictions. Additionally, research on the health outcomes resulting from BRT implementation nationally and internationally was limited. As a result, the analysis focused on the benefits and impacts of BRT on health determinants (e.g., mode share) as opposed to health outcomes (e.g., obesity). As is the reality in most HIAs, the data used for the analysis came from a variety of sources and indicators assessed the project area at different geographic scales. Therefore, findings were not always directly comparable. At times, data also were unavailable at a smaller geographic scale, which required utilizing, for example, regional health status data, to understand specific neighborhood characteristics.

Finally, the project team conducted two community meetings and received excellent feedback on HIA results and recommendations. However, due to project time constraints, staff was unable to employ additional community engagement strategies, such as conducting focus groups with residents or obtaining a review of the HIA document from community organizations. Future HIAs should consider opportunities to utilize focus groups or additional review to weave in community members' more nuanced perspectives on assessment indicators (e.g., access to goods and services, the quality of various community resources) and recommendations into the HIA report.

Monitoring

The purpose of health benefit and impact assessment is to use findings and recommendations to influence decisions under review and to have an impact on health determinants and health outcomes. To this end, HIA includes the step of monitoring to track: 1) the impact of the HIA on the decision in question; 2) the implementation of the decision; and 3) any determinants of health that may change as a result of decision implementation.

In the case of the I-805 BRT/47th Street Station Area Planning HIA, HIP proposes the following monitoring plan:

1. **Monitoring the impact of this HIA on the decision:** SANDAG and HHSA staff who worked on the HIA should coordinate with SANDAG BRT planning staff to ensure that HIA findings and recommendations are incorporated into the BRT planning and environmental review process as well as in the final I-805 BRT/47th Street Station Area Plan. For example, SANDAG and HHSA staff should monitor how HIA findings and recommendations are used in generating the draft project alternatives and in the final alternative selected. As necessary, HIP and SHCC will communicate with BRT planning staff and consultants to provide an overview of the findings and recommendations. HIP will communicate with SANDAG and HHSA staff periodically to assess how the HIA has impacted the planning process.

2. **Monitoring decision implementation:** As Plan implementation proceeds, SANDAG should coordinate with the I-805 BRT/47th Street station design team so that improvements in the 47th Street station area can be implemented in accordance with agreed-upon HIA

recommendations (as reflected in the Station Area Plan). This information should reported out in a formal way (to be determined) as implementation gets underway.

3. **Monitoring determinants of health:** SANDAG should work with HHSA to identify several health determinant indicators to track as part of the I-805 BRT/47th Street Station Area Plan implementation. Sample indicators could include motor vehicle/bicycle/pedestrian injuries and mode share. Furthermore, SANDAG staff could implement the PEQI after station area improvements are implemented in order to have a post-assessment available to compare to PEQI results conducted to inform the existing conditions of the HIA. SANDAG should consider funding an update of the existing conditions findings to see if and how these conditions may be changing. Findings should be reported out in a formal way (to be determined) as project implementation is complete.

Next Steps

SANDAG recognizes that understanding the wider implications of transportation-related decisions could yield plans and projects that result in better overall outcomes – both in terms of transportation and health – and respond to key resident, business, and community concerns. Throughout the country, transportation and planning agencies are beginning to explore opportunities to comprehensively consider health in planning, project development, and decision-making processes. Health Impact Assessment (HIA) is one approach to address potential health benefits and impacts of a proposed plan or project.

SANDAG has conducted the San Diego region's first assessment of the potential health benefits and impacts of the 47th Street BRT Project using the Health Impact Assessment (HIA) methodology to maximize the potential health benefits of the 47th Street BRT Project. The results of the HIA identified potential improvements and enhancements that would add value to the planning and decision-making process for the 47th Street BRT Project.

As the SANDAG I-805 BRT/47th Street Station Area Planning process advances, community stakeholders will be asked to formally participate in the visioning process, develop and review proposed project alternatives, and identify improvement opportunities for the station area. As stated earlier in this report, the goals for the 47th Street BRT Project HIA were to:

1. Identify the potential public health benefits and impacts of the introduction of regional bus service

2. Develop recommendations to maximize the health benefits of the 47th Street transit planning project

3. Increase awareness about HIA as a tool for identifying health benefits and impacts of decision-making

4. Conduct a pilot HIA to evaluate how SANDAG could integrate health considerations in planning and project development in future planning projects

Successful completion of goals 1 and 2 are reflected in the findings and recommendations of the HIA report. Through community meetings and independent HIA trainings within the San Diego region, this project has been successful in raising awareness of HIAs throughout the region. Lastly, the 47th Street BRT HIA Project provided SANDAG an opportunity to not only complete the region's first HIA, but also explore implementing an HIA in a non-traditional manner. Utilizing the HIA process and methods to initiate a transportation planning project was crucial to gaining early buy-in from staffs and community members as well as to better inform the project development. As a result, the findings of the HIA are being integrated into the I-805 BRT/47th Street Station Area Planning process from its inception.

The I-805 BRT/47th Street Trolley Station Planning Project will continue the discussion on health in transportation planning through project development and has the foundational knowledge to further health analysis as project design alternatives are developed and assessed. Ongoing evaluation of the planning project is needed to verify the impact the HIA has on the decision-making process. Furthermore, additional pilot HIAs are needed to further define the most effective process to implementing health benefit and impact analysis in the San Diego region and at SANDAG. SANDAG staff will be continuing health benefit and impact analysis related work under the Community Transformation Grant, or Healthy Works Phase II.

DETAILED HEALTH ANALYSIS

This section represents the health analysis process, outcomes and recommendations used for this project. Following this section, the existing conditions chapter is included to provide the complete demographic and health status data that informed this analysis.

HIA Process

As previously described, HIA traditionally consists of six steps: screening, scoping, assessment, recommendations, reporting, and monitoring. HIA also is an important community engagement tool to educate the public on community health concerns, build consensus, and optimize participation throughout project development.

SANDAG chose to conduct the HIA in the initial phases of the 47th Street BRT Project planning process, and prior to the development of design alternatives, to maximize the ability to engage the community and inform project development from start to finish. Therefore, three HIA-specific alternatives were developed, in place of already defined project alternatives, to guide the HIA. These alternatives are defined as follows:

- Alternative 1: No change (i.e., no build alternative)
- Alternative 2: Introduction of BRT to the 47th Street Trolley Station area
- Alternative 3: Introduction of BRT to the 47th Street Trolley Station area, plus addition of pedestrian access over the I-805 freeway

The HIA also included the following assumptions about the proposal: the BRT stop would be co-located with the 47th Street Trolley Station; there would be a Direct Access Ramp (DAR) to the new co-located stop BRT; vehicles would be restricted from the DAR; natural gas buses would be used; and pedestrian access over the I-805 would go in both east-west directions. Beyond these elements, very limited information related to the BRT proposal was available or developed to guide the HIA. SANDAG delineated the BRT planning timeline as follows:

- HIA complete: March 2012
- Initial Study of BRT Alternatives: 2012-2013
- Environmental Clearance of Preferred Alternative: 2014-2015

Given that the HIA was conducted early in the BRT planning process, SANDAG and HIP agreed that the HIA findings and recommendations would be integrated into the I-805/47th Street Station Planning process.

Screening

Screening, the first step in HIA, establishes the value and feasibility of an HIA for a particular decision-making context. Screening informs the decision to conduct an HIA by answering three related questions:

1. Is the proposal associated with potentially significant health effects that otherwise would not be considered or would be undervalued by decision makers?

2. Is it feasible to conduct a relevant and timely analysis of the health impacts of the proposal?

3. Are the proposal and decision-making processes potentially receptive to the findings and recommendations of a health impact analysis?

The screening step of this HIA was completed in the summer of 2011. HIP and SANDAG determined the following:

- The BRT proposal had the potential to affect the health of residents and workers in the San Diego region. The proposal also could significantly affect existing health inequities if part of the I-805 corridor did not have access to the BRT.

- Methods existed to document the breadth of potential health impacts associated with the BRT/47th Street Station Area Planning proposal.

- This HIA could be completed in a timely manner in accordance with the BRT planning timeline.

- The I-805 BRT/47th Street Station Area Planning Project was in the early phases of development, providing SANDAG staff an opportunity to test conducting a health analysis as a first step to project development.

- Numerous agencies were receptive to an analysis of the health benefits and impacts of the proposal and were willing to integrate findings into the decision-making process.

- Funding was made available through the Healthy Works Program.

Based on the findings of the screening process, HIP and SANDAG agreed that the I-805 BRT/47th Street Station Area Planning Project was a good subject for the HIA. The project team was comprised of the three core partners – SANDAG, HIP, and SHCC. Project team roles were as follows:

- **SANDAG**: Sponsored and funded the HIA; provided data; reviewed all aspects of the HIA and provided feedback; hosted HIA community meetings

- **HIP**: Coordinated HIA; conducted research for the HIA; developed recommendations; drafted report

- **SHCC**: Conducted outreach for HIA community meetings; conducted research for the HIA; reviewed recommendations and report

HIA Scope

The second step of HIA, scoping, determines the project workplan, priority health concerns, research questions, and methods. Engaging community members and relevant stakeholders in developing the project scope is an important component of this HIA step.

To begin the HIA scoping process, the project team identified the following agreed-upon goals to guide the HIA:

1. Identify the potential public health benefits and impacts of the introduction of regional bus service

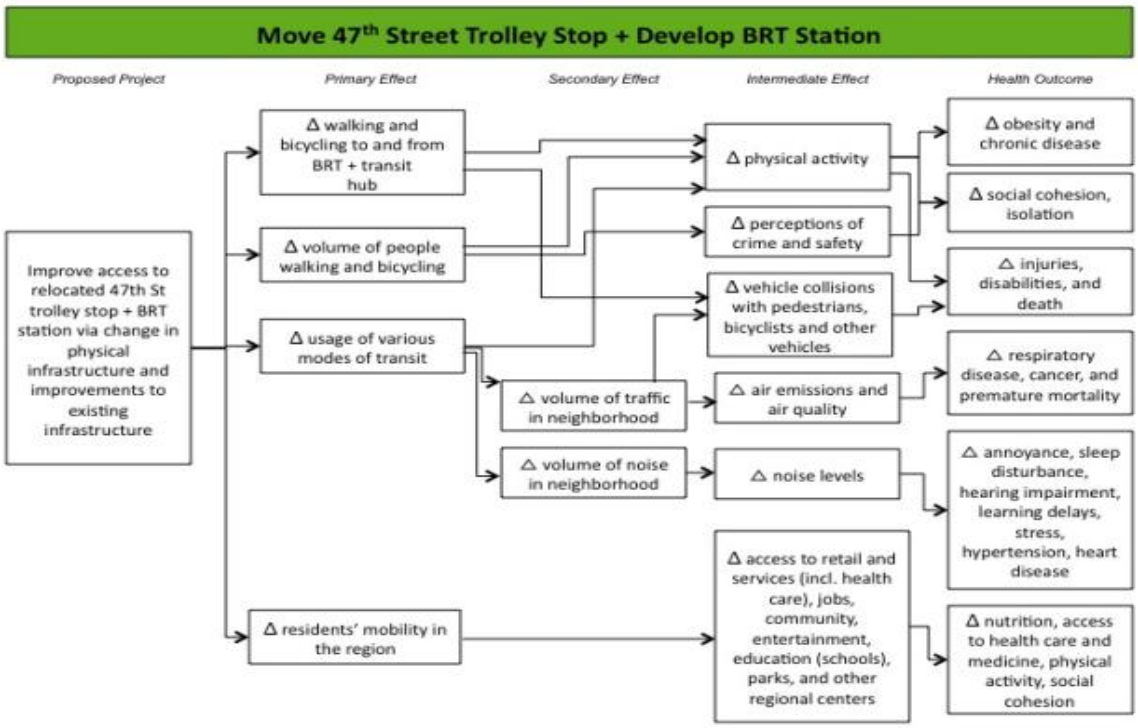
2. Develop recommendations to maximize health benefits of the 47th Street BRT Project

3. Increase awareness about HIA as a tool for identifying health benefits and impacts of decision making

4. Conduct the San Diego region's first HIA to evaluate how SANDAG could integrate health considerations in planning and project development in future planning efforts

The project team and community stakeholders collectively developed a "scope" to guide HIA research. The first step was to develop a pathway diagram that visually hypothesized the connections between the 47th Street BRT Project proposal and potential health outcomes (see figure 1, below). The 47th Street HIA project pathway diagram hypothesized the potential benefits and impacts of improving access to a relocated 47th Street Trolley stop and BRT station via changes in physical infrastructure and improvements to existing infrastructure. Primary benefits and impacts might include changes in walking and biking to/from the stop, volume of people walking and biking, usage of various modes of transit, and residents' mobility in the region. Secondary impacts might include changes in the volume of traffic and noise in the neighborhood. Additionally, changes in physical infrastructure and improvements to existing infrastructure might lead to changes in physical activity levels; perceptions of crime and safety; vehicle collisions with pedestrians and bicyclists; air emissions and quality; noise levels; and access to jobs, retail, and community facilities/services. Consequentially, potential health outcomes include chronic health conditions, premature mortality, injuries, and stress.

FIGURE 1: 47TH STREET HIA PATHWAY DIAGRAM



Based on the hypotheses and the potential impacts (illustrated above) that the I-805 BRT/47th Street Station Area proposal could have on health, the project team selected the following broad categories on which to focus the HIA assessment: walking and biking, transit use, access to jobs, access to goods and services, safety, air quality, and noise. Notably, housing was not initially included in the HIA scope, but based on feedback from the community meeting; the scope was broadened to include potential benefits and impacts on housing. The figure below depicts the final HIA scoping categories.

FIGURE 2 - 47TH STREET HIA SCOPING CATEGORIES

From the scoping categories, the project team developed a set of research questions to assess the impact of the I-805 BRT/47th Street Station Area proposal. Indicators, data sources, and analytical methods to answer research questions also were identified. The research questions were reviewed and prioritized by all HIA partners. The final scope is included as Appendix C. Prioritized research questions included:

- How will the project impact mode share in the communities surrounding the 47th Street Trolley Station area?

- How will the project impact public transit use at the 47th Street Trolley Station area after BRT service is added?

- How will the project impact pedestrian and bike environments at the new 47th Street Trolley Station area?

- How will the project impact levels of connectivity from the 47th Street Trolley Station area to major employment and retail centers?

- How will the project affect levels of safety, crime, and violence at the 47th Street Trolley Station area, and within the surrounding neighborhood, after BRT service is added?

- How will the project impact resident access to public and private goods and services overall?

- How will the project affect levels of injury from collisions between motor vehicles and pedestrian, bicyclists, or other motor vehicles around the new 47th Street Trolley Station area?

- How will the project impact air quality and noise levels around the 47th Street Trolley Station area?

Given baseline demographic knowledge about the community, it also was important to consider vulnerable subpopulations in the HIA. As a result, various indicators were assessed according to the following populations:

- Groups defined by age (e.g., children) (0–15), adolescents and adults (16–64), seniors (65+)

- Groups defined by race/ethnicity (e.g., African American, Hispanic descent, Asian)

- Groups defined by income (e.g., those living below the poverty line)

Research and Assessment Methods

Given the numerous data sources utilized in this HIA, the indicators are not assessed at a single geographic scale. The Report Summary section describes the different geographic areas encompassing the BRT project area. Generally, project area statistics are compared with statistics for San Diego County as a whole, and, for transportation data, with the San Diego region served by SANDAG.

Research relevant to this project was gathered from multiple sources, with a focus on information about how the various topics (e.g., transportation, injuries, crime and safety, air quality) related to health. Sources included recently completed HIAs that provided a wealth of literature about health impacts. Additionally, the HIA utilized databases, such as PubMed, the Institute of Scientific Information, conference proceedings, and grey literature[4] available online for information dated from 2000 to present related to: 1) pedestrian bridge features and 2) BRT in relation to the categories discussed in the Assessment Section. The BRT research included examples both in the U.S. and internationally, given the availability of information about systems in other countries that pre-date U.S. systems, but with a particular eye on geographies with demographics that were comparable to San Diego.

Secondary data provided the main source of data for the assessment. For demographics, the U.S. Census was used; travel data came from a model and survey by SANDAG; health outcomes and related data were pulled from the California Health Interview Survey (CHIS) and the San Diego County Community Profiles; information on crime was pulled from the Automated Regional Justice Information System (ARJIS) and the Jacobs Family Foundation and Center for Neighborhood Innovation Quality of Life Survey; injury data came from the Statewide Integrated Traffic Records System (SWITRS); and a wealth of relevant planning-related information was in an analysis of existing conditions for the Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments. The only primary data collected was through the Pedestrian Environmental Quality Index (PEQI). Descriptions of key data sources are provided in appendix E.

Community Engagement

Incorporating community input throughout the HIA process and soliciting feedback on HIA products are core components of the HIA practice. For the 47th Street BRT Project HIA, two community meetings were held. The first meeting, on November 16, 2011, focused on gathering input on the HIA scope. At the meeting, SANDAG introduced the HIA, and HIP presented information on the HIA process, draft scope, and timeline, as well as more broadly on why considering health in the BRT process added value. Over forty community residents, business-owners, non-profit organization staff, and government agency staff attended the meeting. After presenting the scoping categories and some of the research questions, HIP asked the following questions of the audience: Are we looking at the right issues in this HIA? What's missing from the research questions and draft pathway diagrams? How would you prioritize the issues included in the draft scope?

Overall, meeting participants confirmed that the HIA was examining the "right" issues. They prioritized the health issues they were particularly concerned with as follows: pedestrian walkability and safety, crime and violence, and access to employment centers. Based on feedback from the participants, HIP made a number of changes to the HIA scope, including:

- The walkability boundary for analysis was expanded from a half mile to an one mile buffer from the 47th Street Trolley Station
- Questions related to housing (e.g., property values, tenure) were added to the scope
- Air quality and noise were re-categorized into "environmental health"

As a result of this meeting, SANDAG staff also established an HIA project Web site (www.sandag.org/47thHIA) which includes materials and notes resulting from community meetings about the HIA.

The second community meeting, on January 24, 2012, focused on reporting HIA findings and presenting draft recommendations. Approximately 25 community residents, business-owners, non-

profit organization staff, and government agency staff attended the meeting. After presenting the HIA findings, HIP and SHCC posed the following questions to the audience: What information about the existing conditions in the project area sounded most/least true? Is there any relevant information you would add to our findings? What impacts identified in the HIA are most important to you? Which of the draft HIA recommendations are most important to you? Do you have ideas for other BRT-specific recommendations/mitigations that might address the health impacts that the HIA identified?

Based on the group discussion, most participants "agreed" with HIA findings and felt that the HIA reflected their experiences living and working in the community. Participants then broke out into two groups and discussed draft recommendations, suggested refinements, and proposed new recommendations altogether. A concern raised by a number of participants was that the HIA should coordinate with other ongoing planning processes (e.g., Market and Euclid) and that HIAs should be more routinely conducted by various San Diego County and City agencies.

As noted previously, the I-805 BRT/47th Street Trolley Station Area Planning Project is a multi-year planning and construction effort. To support the on-going development of this project, SANDAG transit staff created an ad-hoc Stakeholder Group. o ensure outcomes of the HIA are integrated in the project process, and to continue the dialogue on health a community participant and a member of the San Diego County Health and Human Services Agency were invited to serve as formal members of the Stakeholder Group. In addition, the recommendations created as part of this HIA were presented to the Stakeholder Group at its first meeting and are anticipated to continue to inform the project development.

Health Analysis Findings

As noted previously, because project design alternatives did not exist at the time of the HIA, project relevant alternatives were developed to aid the analysis process. Therefore, the following analysis findings are primarily qualitative in nature, but provide valuable information regarding the potential health benefits and impacts of project design elements. Therefore, it is recommended that the following analysis be considered during the project alternatives development and evaluation stages.

Transportation

Individual transportation behaviors are shaped by numerous factors; such as whether there are a mix of land uses providing access to jobs, goods, and services near residential development. Other factors include the area's public transit service; walking or biking environment; driving condition; and socio-demographic factors, such as population age, income, or household size.[5]

From a health perspective, improved regional mobility can enhance access to health promoting factors, such as healthy food, employment, and medical care. For example, a recent national-level

study reported that access to grocery stores and by extension healthy food options has a direct correlation to a family's access to automobile when the trip is more than one mile. In addition, grocery store access was linked to diabetes and obesity rates.[6] Furthermore, regional mobility is a priority to SANDAG, as demonstrated in the SANDAG 2050 RTP. The RTP identifies five policy objectives to improve mobility in the San Diego region and five related indicators to help assess changes in regional mobility (see Table 1, below).[7]

NOTE: The indicators in Table 1 (below) describe current conditions in terms of average travel time and speed for work trips, accessibility of work and non-work related trips within target timeframes, and trip cost. The "Revenue Constrained" column found in Table 1 refers to the set of transportation projects that were assumed to have identified funding available for that particular horizon year.

TABLE 1
2050 RTP COMPARISON OF REGIONAL PERFORMANCE MEASURES

MEASURE	EXISTING (2008)	NO BUILD (2050)	REVENUE CONSTRAINED (2050)
Average Work Trip Travel Time (Minutes)	26	28	28
Average Work Trip Travel Speed by Mode (In MPH)			
Drive Alone	34	28	31
Carpool	35	30	32
Transit	10	10	13
Percentage of Work and Higher Education Trips Accessible within 30 Minutes in Peak Periods, by Mode			
Drive Alone	73%	68%	70%
Carpool	74%	69%	72%
Transit	7%	8%	14%
Percentage of Non-Work Related Trips Accessible within 15 Minutes, by Mode			
Drive Alone	71%	67%	67%
Carpool	72%	68%	68%
Transit	4%	4%	8%
Out-of-Pocket User Costs Per Trip	$2.06	$2.24	$2.28
Source: SANDAG, 2011.			

Although the research is limited, studies internationally and in the U.S. have reported that BRT system implementation improves passenger mobility, thereby increasing access to employment, shopping, necessary community resources, and inevitably community health. In a 2009 report, the National Bus Rapid Transit Institute said that increased transit options allowed for expanded employment opportunities for the regional population. The report also points to potential benefits for surrounding businesses in light of an expanded pool of consumers and employment opportunities.[8] This is especially true for systems with busway stations that have been strategically placed in areas that provide access to retail and employment.[9]

The 47th Street BRT Project area is located several miles from downtown San Diego. Currently, the automobile is the dominant mode of travel for more than 90 percent of trips made by people in the

project area (determined by the four Transportation Analysis Zones adjacent to it - see Map 6 in Section 1). However, according to the SANDAG Travel Demand Model, travelers in the 47th Trolley Street Station area make fewer trips via automobile and a greater proportion of trips using transit, walking, or biking than those in the San Diego region overall. This data highlights an important characteristic of the community. Although auto ownership is low in the project area, the majority of trips made are by car. This indicates a disproportionate use of automobiles compared to the population in the project area.

Furthermore, proportionately the non-automobile mode trips are still greater than the San Diego region overall. Therefore, considering the low car-ownership rate of the community and the already higher proportion of non-motorized travel, there is a demand for transit and a need for improved non-motorized travel. The disproportionate use of automobiles is reflected in the proportion of person-miles traveled by auto, at 96 percent for the transit station area and 97.4 percent for the San Diego region overall. In addition, motor vehicle travel is directly proportional to air pollution and greenhouse gas emissions, thereby directly affecting health outcomes such as asthma. For example, air pollutants, such as ozone and particulate matter, are causal factors for cardiovascular mortality and respiratory disease and illness (see Tables 2 and 3, below). [10] Therefore, changes in vehicle travel can positively or negatively impact health through changes in air pollutants.

TABLE 2
PREDICTED TRIPS BY MODE, 2008

	47th Street transit station area		San Diego region	
Mode	Number	%	Number	%
Auto	16,522	91.5	16,378,681	95.1
Transit	368	2.0	219,669	1.3
School bus	337	1.9	119,476	0.7
Walk	755	4.2	449,824	2.6
Bike	84	0.5	58,136	0.3
TOTAL	18,066	100.0	17,225,786	100.0

Source: SANDAG Travel Demand Model, 2011.
Transit station area includes 4 TAZ's adjacent to the 47th St station: 3855, 3860, 3944, and 3945.

TABLE 3
PERSON-MILES BY MODE, 2008

	47th Street transit station area		San Diego region	
Mode	Number	%	Number	%
Auto	77,626	96.0	106,386,280	97.4
Transit	1,467	1.8	1,488,919	1.4
School bus	846	1.0	845,166	0.8
Walk	682	0.8	348,137	0.3
Bike	228	0.3	182,119	0.2
TOTAL	80,849	100.0	109,250,621	100.0
VEHICLE MILES TRAVELED	52,108	64.5	77,589,056	71.0

Source: SANDAG Travel Demand Model, 2011.
Transit station area includes 4 TAZ's adjacent to the 47th St station: 3855, 3860, 3944, and 3945.

The presence of the 47th Street Trolley Station and local bus service in the project area provide the community with non-automobile transportation options. However, the existing bicycle and pedestrian infrastructure is insufficient to support utilitarian transportation in the project area and access to transit. In the absence of sufficient pedestrian infrastructure, a number of informal walking paths have emerged. For example, residents in the community reported that some pedestrians use a concrete culvert that channels water under I-805 to cross under the freeway, although risking that it may flood during heavy rain (see images 1-4, below).[11]

IMAGE 1
INFORMAL PATHS NORTH OF MARKET STREET

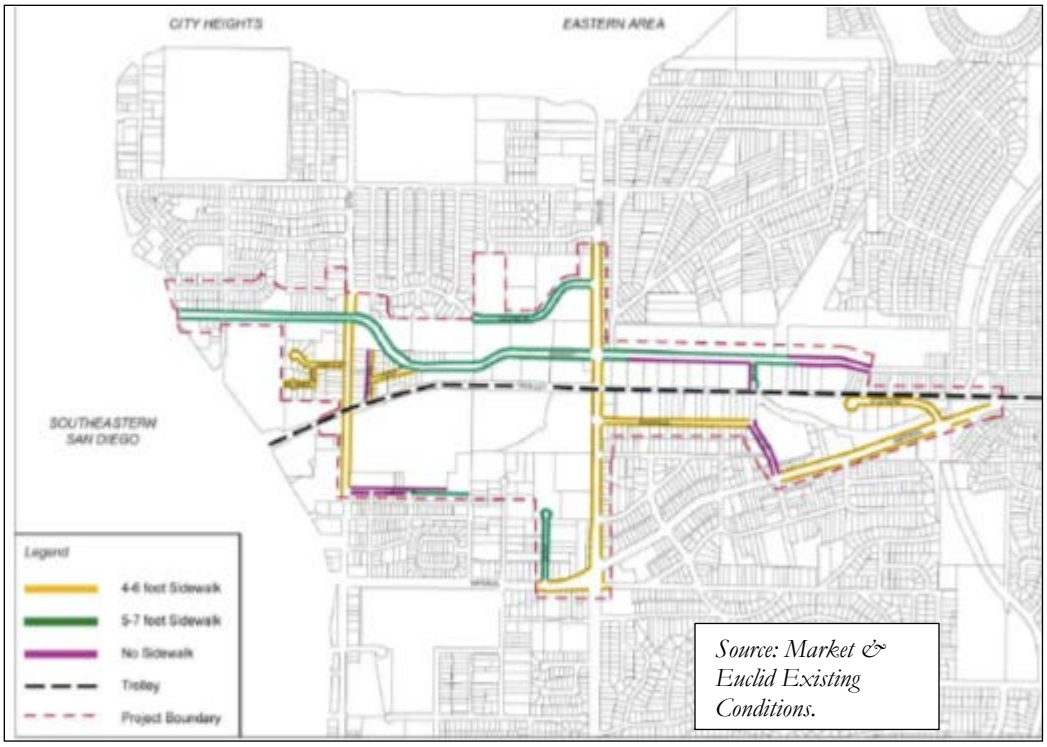
IMAGE 2
INFORMAL PATHS SOUTH OF MARKET STREET

IMAGE 3
INFORMAL PATHS NEAR GOMPERS MIDDLE AND HIGH SCHOOLS AND PARK

IMAGE 4
INFORMAL PATHS AROUND I-805, NEAR THE YMCA

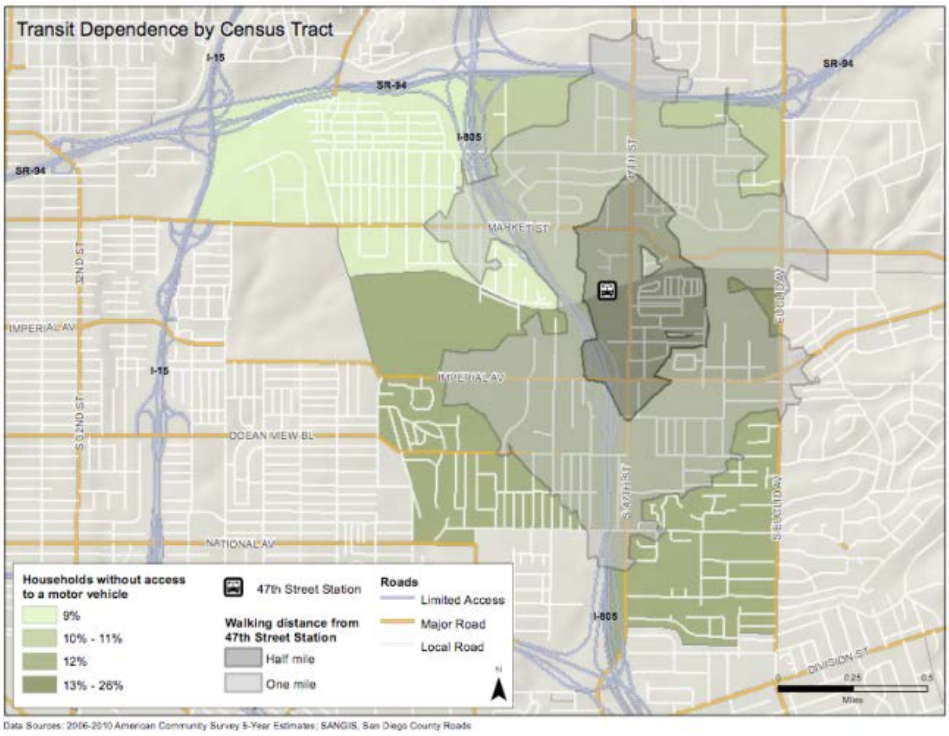
In addition, there is limited infrastructure for bicyclists to cross the freeway. For example, bicyclists accessing the west side of I-805 may need to cross ramps that receive up to 27,000 vehicles daily. Similarly, pedestrians in the project area may have to walk along arterial streets that are used by up to 39,600 vehicles daily (see map 10, below).

Map 10 Sidewalks in the Project Area East of I-805



Additionally, a high proportion of households in the Census tracts surrounding the 47th Street Trolley Station are without access to a motor vehicle, compared to the City and County overall (see Map 11, below). On average, 14.1 percent of households in the project area are without a motor vehicle, with the proportion as high as 25.7 percent in tract 33.04 east of I-805, which includes the highest proportion of renter-occupied housing in the project area, and borders the 47th Street Trolley Station.

Map 11 - Households without access to a motor vehicle (%), 2006-2010



In addition, riders from the transit station area, when compared to the San Diego region, spend a smaller percent of their travel time in automobiles. Time spent driving is important because it independently predicts obesity risk. A study on the driving habits of over 10,000 Atlanta residents found that each additional hour spent in the car was associated with a 6 percent increase in the likelihood of being obese (see Table 4, below).[12]

TABLE 4
PERSON-MINUTES BY MODE, 2008

	47th Street transit station area		San Diego region	
Mode	Number	%	Number	%
Auto	163,491	83.3	208,124,089	90.7
Transit	14,323	7.3	11,099,907	4.8
School bus	2,468	1.3	1,660,225	0.7
Walk	14,827	7.6	7,752,219	3.4
Bike	1,160	0.6	930,926	0.4
TOTAL	196,269	100.0	229,567,366	100.0

Source: SANDAG Travel Demand Model, 2011.
Transit station area includes 4 TAZ's adjacent to the 47th St station: 3855, 3860, 3944, and 3945.

Studies on the capacity to shift auto drivers to BRT are limited, but indicate that at least eight BRT systems in the U.S. report increase in mode shift ranging from 2 percent to almost 50 percent.[13] In Bogotá, Colombia, the BRT captured 15 percent of mode share from paratransit and 5 percent from automobile users.[14]

Decreased travel time is the most significant criteria for increasing BRT ridership and mode share rates when comparing it to other available transportation options. Data on BRT systems in the U.S. associate them with decreases in travel time ranging from 5 percent to 70 percent, with a median of 24 percent change.[15] A case study of BRT in the Bronx, New York, reported a 20 percent (11 minute) decrease in the time it takes a bus to run its route, since its inception in June 2008.[16] The Los Angeles Metro Rapid reports a 25 percent decrease in travel time compared to local service. In Bogotá, Colombia, BRT increased average travel speed during peak hours from 6 mph in 1999 to 17 mph in 2007.[17] Curitba, Brazil's express buses, decreased travel times during peak periods by as much as 34 minutes (see Table 5, below).[18]

TABLE 5
AVERAGE TRIP LENGTH, 2008

	47th Street transit station area		San Diego region	
Mode	Miles	Minutes	Miles	Minutes
Auto	4.7	9.90	6.5	12.71
Transit	3.99	38.93	6.78	50.53
School bus	2.51	7.33	7.07	13.90
Walk	0.9	19.64	0.77	17.23
Bike	2.7	13.77	3.13	16.01
TOTAL	4.48	10.86	6.34	13.33

Source: SANDAG Travel Demand Model, 2011.
Transit station area includes 4 TAZ's adjacent to the 47th St station: 3855, 3860, 3944, and 3945.

In comparison to the City and County, a smaller proportion of residents who live near the 47th Street Trolley Station commute to work by driving alone. However, on average, 9 in 10 residents living near the Trolley Station commuted to work by motor vehicle (including driving alone or carpooling), followed by public transportation (6.6 percent), walking (1.2 percent), and unspecified other means (1.3 percent) (See table 6 below). Therefore, despite the low car ownership in the project area, vehicle travel still dominates modal choice.

TABLE 6
MODE USED FOR COMMUTE TO WORK (%), 2006-2010

Journey to Work	**Tract 33.01**	**Tract 33.04**	**Tract 33.05**	**Tract 34.03**	**Tract 34.04**	**All 5 Tracts**	**City**	**County**
Car, truck, or van (drove alone)	67.4	65.6	58.2	71.3	70.4	66.6	75.1	75.3
Car, truck or van (carpooled)	25.0	21.8	32.2	15.1	14.7	21.8	9.4	10.6
Public transportation	3.6	5.8	5.1	6.8	11.7	6.6	4.1	3.3
Walked	2.5	0.0	0.2	2.6	0.6	1.2	3.1	2.9
Other means	0.8	2.3	0.0	1.5	1.9	1.3	2.0	1.8
Worked at home	0.8	4.4	4.3	2.8	0.7	2.6	6.3	6.1

Source: American Community Survey, 2006-2010.

Furthermore, on average, residents of the five project area Census tracts spend approximately 26 minutes commuting to work, which is longer than the average time in both the City (22.4 minutes) and the County (24.6 minutes), as depicted in Table 7, below.

TABLE 7
TIME SPENT COMMUTING TO WORK (MINUTES), 2006-2010

Journey to Work	Tract 33.01	Tract 33.04	Tract 33.05	Tract 34.03	Tract 34.04	All 5 Tracts	City	County
Mean travel time to work	24.5	23.6	31.5	22.4	28.5	**26.1**	22.4	24.6

Source: American Community Survey, 2006-2010.

Research is mixed on the factors that are most significant for increasing BRT ridership. An FTA study of BRT ridership in 17 U.S. cities suggests "running way" priority is key. The FTA conclusion is based on study results suggesting that half of the BRT systems with ridership increases of at least 43 percent had a dedicated busway.[19] However, a case study of Los Angeles County's Orange Line indicates that factors such as service frequency, high intermodal connectivity with feeder buses and rail transit, numerous intermodal options, and exclusive lane BRT services are connected with higher ridership gains.20 A study of Bogotá's system, which has multi-lane dedicated busways, high-capacity stations, and high frequency services, reports ridership numbers comparable to rail.[21] Though, some caution should be taken when applying conclusions from international examples with extremely high-density cities (Bogotá has an average population density of 230 persons per hectare) and high ridership numbers to San Diego.

Data from the SANDAG Travel Demand Model offer another depiction of the modes that people spend the largest proportions of time commuting to and from work. Among the 47th Street Trolley Station travelers, the largest proportion of home to work travel (70.2 percent) is made by automobiles, followed by transit (26.6 percent). The same pattern is consistent, although in different proportions (85.1 percent by auto and 12.8 percent by transit), for the San Diego region overall (see Table 8 below).

TABLE 8
PERCENTAGE OF TRAVEL BY MODE AND PURPOSE FOR THE 47TH STREET TRANSIT STATION AREA, 2008

	Home-Work	Home-School or College	Home-Other	Non-home	Serve Pass
Auto	70.2	34.4	80.0	98.4	100.0
Transit	26.6	11.3	11.0	0.7	0.0
School bus	0.0	9.4	0.1	0.2	0.0
Walk	1.6	43.5	8.0	0.6	0.0
Bike	1.6	1.4	0.9	0.1	0.0
TOTAL	100.0	100.0	100.0	100.0	100.0

SANDAG Travel Demand Model.
Transit station area includes 4 TAZ's adjacent to the 47th St station: 3855, 3860, 3944, 3945.

Among the 47th Street Trolley Station area travelers who travel from home to school/college, the largest proportion of time (43.5 percent) is spent walking. This differs from the San Diego region overall, where the proportion of time spent walking is only 22 percent for those traveling from home to school/college. Notably, two elementary schools in the 47th Street transit station area – Chollas/Mead and Horton – support Safe Routes to Schools programs that encourage walking and biking to school (see Table 9, below).[22]

TABLE 9
PROPORTION OF PERSON-MINUTES OF TRAVEL BY MODE AND PURPOSE
IN THE SAN DIEGO REGION, 2008

	HOME-WORK	HOME-SCHOOL OR COLLEGE	HOME-OTHER	NON-HOME	SERVE PASS
Auto	85.1	58.3	89.0	98.1	100.0
Transit	12.8	8.9	5.3	0.8	0.0
School Bus	0.0	9.5	0.2	0.2	0.0
Walk	1.3	22.0	5.0	0.9	0.0
Bike	0.8	1.3	0.5	0.0	0.0
TOTAL	100.0	100.0	100.0	100.0	100.0

SANDAG Travel Demand Model.
Transit station area includes 4 Transportation Analysis Zones adjacent to the 47th Street station: 3855, 3860, 3944, and 3945.

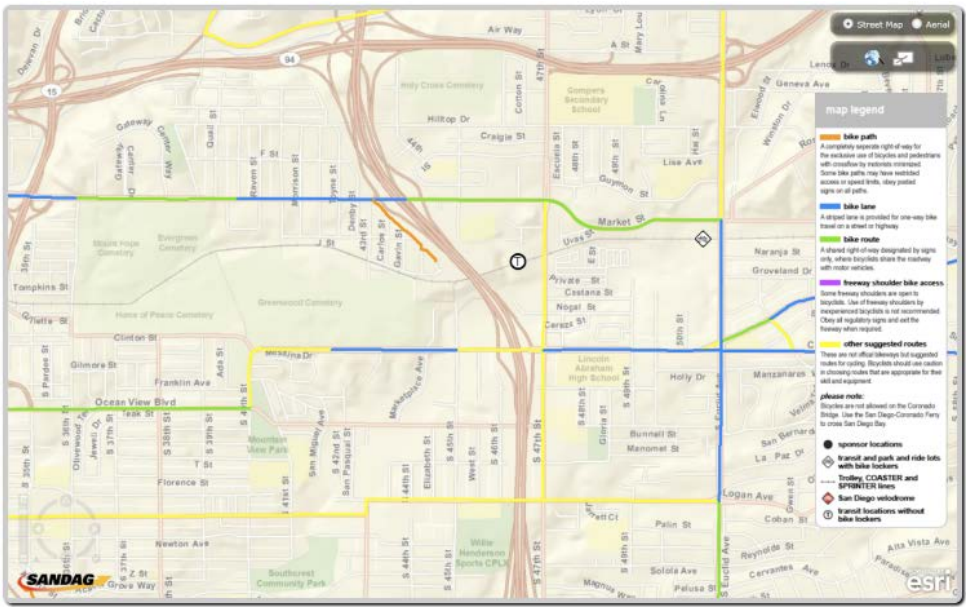
Walking, biking, or using public transit to get to work helps people meet minimum desired levels for physical activity.[23] Twenty-nine percent of people using transit to get to work meet their daily requirements for physical activity from walking to work.[24] Health benefits of physical activity include reduced risks of premature mortality, coronary heart disease, hypertension, colon cancer, and diabetes.[25] Research has found that proximity to public transit helps to determine travel choice.[26] For normal trips, only 10 percent of Americans will walk one-half mile.[27] A recent study in King County, Washington, demonstrated that for every quarter mile increase in distance to transit, the likelihood of using transit fell 16 percent.[28] Another study in the San Francisco Bay Area found that 33 percent of residents living within 0.67 miles of Bay Area Rapid Transit (BART) stations used BART to get to work, as compared to 5 percent of residents living in areas not served by BART.[29] This can indicate that proximity to transit systems, such as the BART, can increase ridership rates. Transit use also promotes environmental health by reducing air pollution and greenhouse gas emissions from automobiles.[30]

The number of people who walk in an area is affected by a number of factors, including the quality of the pedestrian environment (such as street and sidewalk design and connectivity), the presence of street seating, traffic volume, traffic calming features, pedestrian safety interventions (such as crosswalks or countdowns), and the aesthetics and safety of the surrounding environment (such as presence of pedestrian-scale street lighting). Other factors include the natural environment, for example, topography or landscaping.[31] Mixed, dense residential, and commercial development as well as close (i.e., less than a half mile) proximity of development to public transit, decreases the distance between residential, employment, and other activities (e.g., shopping, errands, social), thereby increasing walking as a means of transportation.[32] However, there is debate among urban planners about what is an acceptable walking distance to transit. Commonly, walking radii are

planned at a quarter mile to a half mile, or the equivalent of a five to ten minute walking trip, respectively.[33,34] Factors that impact walking to transit include an individual's dependence on transit, as well as the quality and frequency of the transit service.[35] Walking frequency is further effected by sociodemographic factors. For example, many low-income people walk regardless of environmental quality because it is their primary means of transportation.[36]

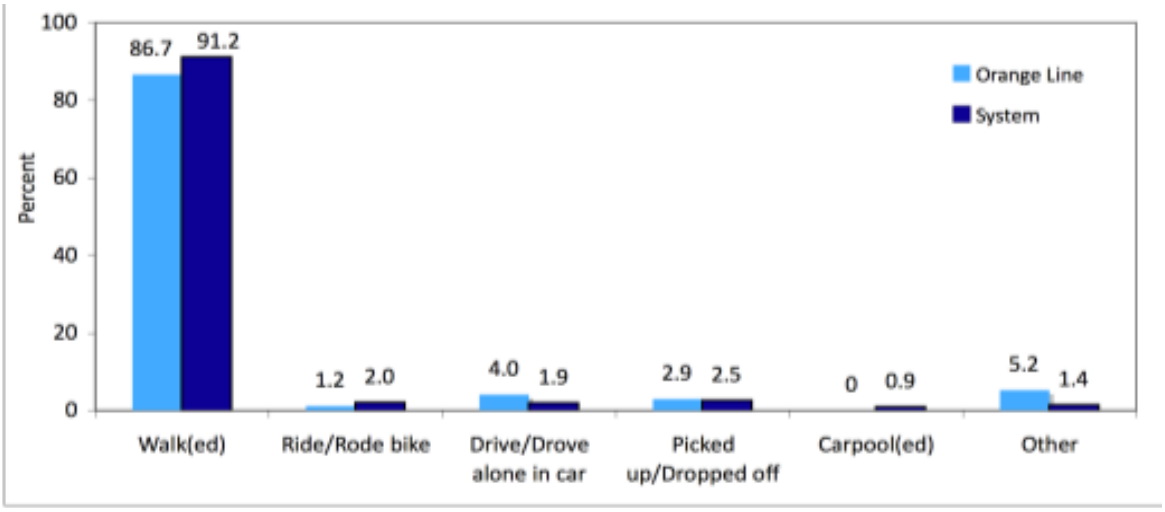
The number of people biking in an area is largely impacted by factors (including biking conditions) such as the presence and quality of bike lanes and bicycle network connectivity; proximity of development to public transit and other destinations; traffic volume and speed; and presence of bike storage, bike locks, and bike racks (including on public transit) (see Map 12, below).[37] Biking is further effected by population sociodemographic factors, including the ability to ride a bike and for what distance.[38] Similar to walking, there is variation among experts in estimating a standard distance that cyclists consider manageable, with conservative estimates of 1.25 miles for rides specifically to transit, or the equivalent of a 5-minute ride, up to five miles.[39] According to one study of six U.S. cities, shorter distances to destinations will encourage bicycling for transportation.[40]

Map 12 - Biking Conditions in the Project Area



Travelers who ride the Orange Line Trolley through the 47th Street Trolley Station access public transit more often via walking than any other form of travel. The SANDAG on-board travel survey asked respondents how they accessed the station and how they will reach their final destination. As shown in Chart 1 below, among those who answered, the majority of trips to or from the station involved walking (86.7 percent of eligible trips, respectively).[41] Survey respondents bicycle to and from stations on the Orange Line Trolley in substantially smaller percentages than they walk. Of those respondents who answered the relevant questions, only 1.2 percent of trips involved riding a bike to or from the station.

CHART 1
MODE OF TRAVEL TO AND FROM TRANSIT, 2009



CONDITIONS FOR WALKING AND BIKING

Starting from the 47th Street Trolley Station, a half mile walkshed includes key destinations, such as Lincoln High School and Diamond Family Health Center (under construction 2013), and serves a varied population, including residents of a trailer plaza. A one mile walkshed also reaches key destinations, such as Market Creek Plaza, Malcolm X Library, Tubman Chavez Center, parks, Chollas Creek and a YMCA. However, the freeway is a clear barrier to walking for residents living adjacent to it.

Volunteers and staff conducted a Pedestrian Environmental Quality Index (PEQI) questionnaire to assess pedestrian conditions in the 47th Street BRT Project area.[42] The data collected was used to calculate walkability scores from zero to 100, which were grouped into five categories represented by different colors.

Red Category = 0-20 points

Orange Category = 21-40 points

Yellow Category = 41-60 points

Light Green Category = 61-80 points

Green Category = 81-100 points

It is important to note that a final score is a weighted average of all the items assessed in the PEQI Survey. Therefore, the reason behind a low score can be complex and the result of a number of different factors. In addition, the purpose of these categories are to differentiate the rankings of each segment and intersection, and are not intended to denote final determination of infrastructure quality. Ultimately, the PEQI exercise provides additional data and information to inform priority areas of concern for pedestrian and bicycle improvements.

Overall, a total of 97 street segments and 56 intersections were scored. The results were as follows: no street segments received a score of 0-20 points; however, 25 intersections received a score of 0-20 points (red category). Therefore, 25 existing intersections in the project area were identified as priority areas in need of improvements to the pedestrian environment. Ten street segments and 12 intersections received scores between 21-40 points (orange category), indicating multiple street segments and intersections with pedestrian conditions needing improvement. Lastly, zero intersections and five street segments received scores between 61-80 points (light green category), demonstrating that reasonable pedestrian conditions exist. Ultimately, there is a need for pedestrian infrastructure improvements within the 47th Street BRT Project area to improve the pedestrian accessibility and walkability for those living or moving through this area.

IMAGE 5
POSSIBLE BIKING SPACE ON HILLTOP DRIVE (AT THE INTERSECTION OF COTTON)

IMAGE 6
POSSIBLE BIKING SPACE ON HILLTOP DRIVE (AT THE INTERSECTION OF 46TH STREET)

In addition, the PEQI assessed the presence of bike lanes, using two separate measures in the PEQI questionnaire. Volunteers observed that bike lanes were absent from all but three of the red intersections, four of the orange intersections, and one of the orange street segments. The results suggest that overall, the area is not currently conducive to bicycling and, similar to the pedestrian environment, is in need of infrastructure improvements. For example, at K and 43rd Streets, PEQI data collectors identified that space providing a buffer between vehicle traffic and the sidewalk could serve as a bike lane, although not officially marked as one. Parked motor vehicles can pose a hazard to bicyclists who are forced to weave in and out of motor vehicle traffic to avoid the parked cars. If the space is not designated as car parking, it could provide an opportunity to create needed bicycling infrastructure. Similar scenarios are on Hilltop Drive/Cotton Street and Hilltop Drive/46th Street (see map 9 above).

Bicycle, Pedestrian, and Motor Vehicle Injuries

Research is inconclusive about the impact of BRT implementation on pedestrian, bicycle, and motor vehicle injuries from collisions. However, the BRT system in Bogotá, Colombia, is credited with a 74.3 percent reduction in collisions. Primarily reductions in bus-related collisions are estimated to have decreased anywhere from 62 percent to 93 percent. [43, 44] Therefore, BRT systems could have a positive impact on reducing bicycle and pedestrian injuries. Additional research would be needed to provide any predictions of collision reductions applicable to this study area. Conversely, in the U.S., some researchers suggest that implementing BRT could increase the number of collisions if certain

design features are not utilized, while others caution against reaching strong conclusions based on the limited number of systems that have been in place for short periods of time.

A significant contributing factor to pedestrian safety is the physical design of the street or intersection.[45] The presence of crosswalks and the locations of bus stops, lighting, and medians all can affect pedestrian injuries.[46] In fact, the CDC recommendations suggest correcting existing hazards and enhancing infrastructure for pedestrians and bicyclists as a way to reduce injuries related to motor vehicle collisions.[47]

Motor vehicle traffic collisions are a leading cause of mortality and morbidity in the U.S. and the number one cause for mortality for those aged 5–34 years. According to the CDC, motor vehicle crashes are the third most common cause of years of life lost, behind only cancer and heart disease. [48,49] The U.S. Department of Transportation, which places the value of a statistical life at $6.2 million, estimates that the total societal economic cost of collisions exceeds $230 billion annually.[50, 51, 52] Pedestrians and bicyclists are disproportionately injured and killed in traffic collisions. About 14 percent of motor vehicle collisions involve pedestrians and bipedal vehicles (both bicycles and motorcycles). Improving road safety not only will save lives and money, but also will reduce one of the most significant barriers to active transportation.

Motor vehicle collisions are significant adverse health consequences of the operation of public roadways. Collisions can involve single or multiple motor vehicles, pedestrians, and pedal cyclists. However, other health consequences of the operation of roadways considered under the rubric of safety include potential releases of hazardous materials (from tanker trucks, for example). Roadways also may be sources of perceived dangers, contributing to worry and stress.

PEDESTRIAN INJURIES AND FATALITIES IN THE PROJECT AREA

From 2006 to 2010, there were 80 collisions involving pedestrians and motor vehicles that were reported in the project area, including on the freeway, as shown in Map 13, below. [53] The collisions caused two pedestrian deaths and 82 injuries.[54] From the 2006 and 2007 data, the most recent data available to make comparisons, pedestrian injury rates in the project area were substantially higher than the HHSA sub-region 5 (SRA 5) for Southeastern San Diego (see Table 10 below and Map 5 in Section 1).[55]

TABLE 10
PEDESTRIAN INJURY RATES, 2006-2007

	2006		2007	
	Project area	SRA 5	Project area	SRA 5
Count	22	46	16	52
Rate*	103.7	28.6	75.4	32.3

** rates per 100,000 population*
Source: California Highway Patrol. 2011. Statewide Integrated Traffic Records System. Available at: http://www.chp.ca.gov/switrs/.

Factors that have been linked to pedestrian accidents and injuries are traffic volumes, built environment characteristics, and perception. Research supports that pedestrian activity and traffic volumes are primary determinants of pedestrian collision frequency at signalized intersections. [56] Essentially, areas with high pedestrian activity experience greater pedestrian collisions the greater

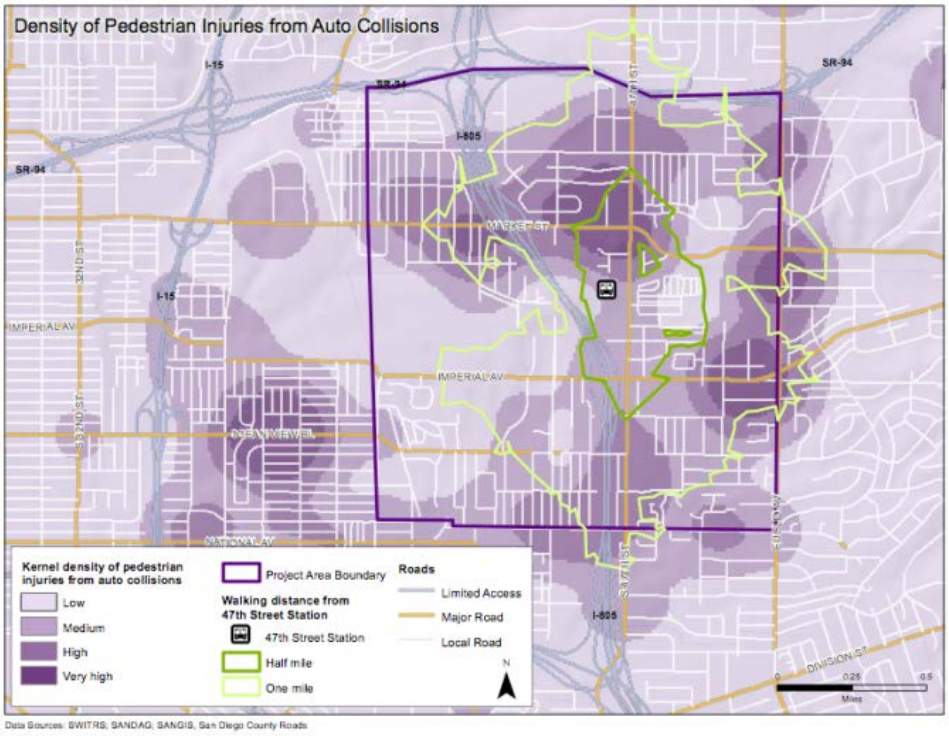
the traffic volumes are. Furthermore, research has indicated that vulnerability of pedestrians to collisions vary with age. For example, a Long Beach, CA study conducted between 2002 and 2005 found that children less than 5 years of age were more likely to be hit at mid-block locations while those aged 5–9 and 10–14 were more likely to be hit at an intersection. [57]

Additionally, the condition of streets influences the frequency and likelihood of pedestrian activity; however, research is not conclusive regarding the correlation to frequency of pedestrian activity to rate of accidents. Lastly, the perception of pedestrian and cyclist safety on neighborhood roads influences parent and children's decisions to walk or ride their bicycle to school. In one study, parental concerns about the lack of traffic lights and controlled crossings on their child's school route reduced the likelihood that their child would actively commute to school.[58]

Many strategies have been researched and implemented by planners to reduce pedestrian–motor vehicle conflicts. A review of engineering modifications designed to reduce motor vehicle–pedestrian collisions categorized the different measures into three groups according to what they try to accomplish: managing vehicle speeds, separating pedestrians and vehicles, and increasing pedestrian visibility.[59] Some strategies include more visible crosswalks (e.g., laddered or colored brick), traffic calming mitigations (e.g., chicanes, speed bumps, signage, curb extensions), and intersection alterations (e.g., roundabouts and diverters).

A meta-analysis of studies of area wide traffic calming schemes shows that they, on average, reduce the number of injury collisions by about 15 percent.[60] The largest reduction in the number of collisions is found for residential streets (about 25 percent), while a somewhat smaller reduction is found for main roads (about 10 percent). Similar reductions are found in the number of property damage–only collisions.[61] However, the effectiveness of these mitigations was mixed when used in isolation.[62] This finding highlights the need for comprehensive pedestrian planning that uses multiple synergistic traffic calming measures to provide the safest possible walking environment.[63]

Map 13 - Density of Pedestrian Injuries in the Project Area, 2006-2010



Furthermore, of the 80 collisions from 2006 to 2010 in the project area, three of the injuries and one death occurred on I-805. Among them, one of the injuries involved a pedestrian hit at a freeway ramp. The other two injuries and the one death involved pedestrians who were struck when walking in the shoulder of the road. The majority (73.4 percent) of the pedestrian injuries occurred when a pedestrian was crossing the street. More than two-fifths (42.7 percent) of injuries involved a pedestrian in a crosswalk at an intersection, with another nearly one-third (30.5 percent) that occurred when a pedestrian was crossing the street outside of a crosswalk. An additional 14.6 percent of injuries involved pedestrians not crossing the street who were hit while in the road or shoulder (see Table 11, below).

TABLE 11
ACTIONS OF PEDESTRIANS INJURED IN MOTOR VEHICLE COLLISIONS IN THE PROJECT AREA, 2006-2010

	SDPD	CHP	TOTAL	PERCENT OF ALL INJURIES
Crossing in Crosswalk at Intersection	34	1	35	42.7
Crossing in Crosswalk Not at Intersection	0	0	0	0.0
Crossing Not in Crosswalk	25	0	25	30.5
In Road, Including Shoulder	10	2	12	14.6
Not in Road	9	0	9	11.0
Approaching/Leaving School Bus	0	0	0	0.0
Not Stated	1	0	1	1.2
TOTAL	80	3	82	100.0

*Excludes fatalities in the project area.
Source: California Highway Patrol. 2011. SWITRS available at: http://www.chp.ca.gov/switrs/

Injury data for the project area mirrored the PEQI findings about the quality of the pedestrian environment. Of the injuries that occurred at intersections, all but one were places the PEQI scored red, meaning the environments were identified as in need of improvements. The density of pedestrian injuries at intersections in the project area where pedestrian facilities were deficient – particularly the intersections of Market Street and Toyne Street, Market Street and 42nd Street, Market Street and 47th Street, and Imperial Avenue and 50th Street – suggest areas for further investigation about improvements.

Data from the project area also suggests there is no clear temporal pattern to pedestrian collisions. They occurred as frequently on weekdays as weekends, and all days of the week. However, from 2006 to 2010, more collisions involving pedestrians (65.8 percent) occurred during daylight hours in the project area. Another nearly one-third of injuries occurred when it was dark or at night. Of the injuries when it was dark, 23.2 percent were in places with streetlights and 4.9 percent were in places without streetlights (see Table 12, below).

TABLE 12
LIGHTING FOR PEDESTRIANS INJURED IN MOTOR VEHICLES COLLISIONS IN THE PROJECT AREA, 2006-2010

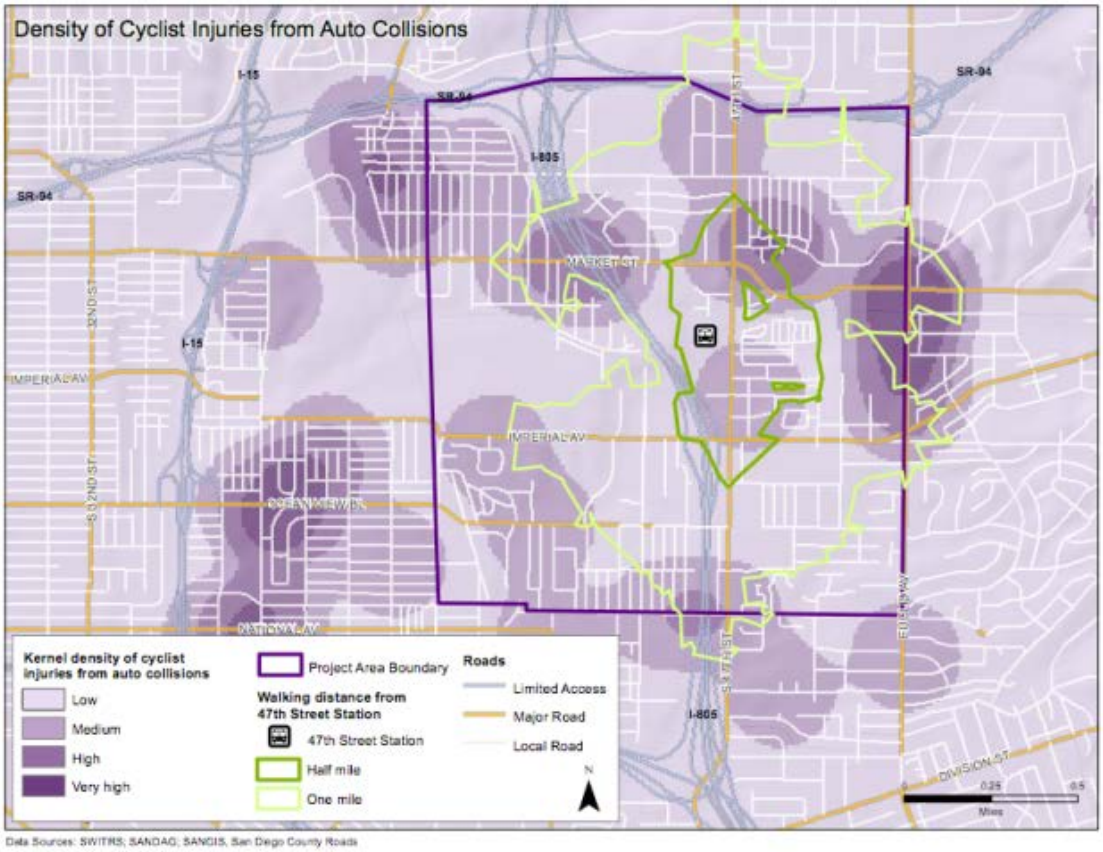
	SDPD	CHP	Total	Percent
Daylight	52	2	54	65.8
Dusk-Dawn	4	0	4	4.9
Dark-Street Lights	18	1	19	23.2
Dark-No Street Lights	4	0	4	4.9
Dark-Street Lights Not Functioning	0	0	0	0.0
Not Stated	1	0	1	1.2
Total	80	3	82	100

**Excludes fatalities in the project area.*
Source: California Highway Patrol. 2011. Statewide Integrated Traffic Records System. Available at: http://www.chp.ca.gov/switrs/.

BICYCLE INJURIES IN THE PROJECT AREA

From 2006 to 2010, there were 23 collisions involving bicyclists and motor vehicles reported in the project area, as shown in Map 14, below.

Map 14 - Density of Bicyclist Injuries in the Project Area, 2006-2010



None of the collisions resulted in a bicyclist death, although four resulted in injured bicyclists. All of the collisions occurred on streets and roads, with none on freeways. Over half (60.9 percent) of the bicycle-related collisions took place in an intersection. This indicates value in further assessing intersection improvements in the project area. A comparison is not available to bicycle injuries in the HHSA sub-region of Southeastern San Diego (see Table 13, below).

TABLE 13
ACTIONS OF BICYCLISTS INJURED IN MOTOR VEHICLE COLLISIONS IN THE PROJECT AREA, 2006-2010

	SDPD	CHP	Total	Percent
In an intersection	14	0	14	60.9
Not in an intersection	9	0	9	39.1
Not Stated	0	0	0	0.0
Total	23	0	23	100.0
Source: California Highway Patrol. 2011. Statewide Integrated Traffic Records System. Available at: http://www.chp.ca.gov/switrs/.				

As with pedestrian related collisions, intersections provide a different set of risk factors for bicyclists compared to mid-block sections. However, the 2007 report by the Seattle DOT mentioned above found that pedestrians were twice as likely to be hit at intersections versus mid-block locations, while bicyclists were equally likely to be struck in either location.[64] This may be because bicyclists share the road with vehicles (e.g., where they are also subject to "dooring" by parked vehicles) 100 percent of the time, unlike pedestrians. A 2004 study found different risk factors for bicycle–vehicle collisions at intersections, including whether the vehicle was traveling straight or turning.[65]

In addition to many of the same mitigation techniques that are used to reduce rates of vehicle–pedestrian collisions, some bicycle specific improvements include dedicated bike lanes, shared lane markings, and "bicycle boulevards."[66] Rider education to encourage the use of helmets, along with legislation to mandate their use, have been very successful at preventing or greatly decreasing the severity of traumatic head and brain injuries.[67]

In a separate study, about factors influencing the level of injuries for bicyclists, risk of serious injury for a bicyclist was 4.6 times more likely for collision with a motor vehicle, 1.2 times more likely for self-reported speeds greater than 15 mph, 2.1 times more likely if bicyclists were less than six years old and 2.2 times more likely if cyclists were more than 39 years old when compared to adults 20 to 39 years. Risk for serious injury was not affected by helmet use, nor was risk for neck injury. However, risk of neck injury was 4.0 more likely for those struck by motor vehicles.[68]

Between 2006 and 2010, bicyclist-related collisions that resulted in injuries in the project area occurred far more often on weekdays (82.6 percent) than on weekends (17.4 percent). This may reflect a greater use of bicycles on weekdays for work-related transportation and trips to school. Nearly all the collisions took place during daylight hours (82.6 percent) or at dusk/dawn (4.3 percent), which supports the possibility that within the project area collisions in which bicyclists have been injured were largely related to "active transportation." An additional 13.0 percent of injuries occurred in the dark where streetlights were not present.

According to the literature, bicyclists face unique risks on roadways given their speeds, their proximity to vehicle traffic, and the lack of occupant protections. A systematic review of the literature regarding transportation infrastructure effects on bicycle injuries and crashes found that

sidewalks and multiuse trails posed the greatest risks. However, major roads were more hazardous than minor roads, and the presence of bicycle facilities (e.g., on road bike routes, on road marked bike lanes, and off road bike paths) was associated with the lowest risk to cyclists. [69]

MOTOR VEHICLE INJURIES AND FATALITIES IN THE PROJECT AREA

From 2006 to 2010, there were 990 injuries and 5 fatalities in the 47th Street BRT Project area as a result of 691 motor vehicle, pedestrian, and bicyclist collisions. [70],[71] Based on the most recent data available to make comparisons, the motor vehicle injury rate for the project area was substantially higher than that of the HHSA SRA 5 for Southeastern San Diego in both 2006 and 2007 (see Table 14, below).[72]

TABLE 14
TOTAL INJURIES DUE TO MOTOR VEHICLES, 2006-2007

	2006		2007	
	Project area	SRA 5	Project area	SRA 5
Count	232	653	199	616
Rate*	1,093.3	406.7	937.8	382.5

** Rates per 100,000 population.*
Source: San Diego HHSA.

The 2007 SRA 5 data, and 2008 Central Region and County data are the most recent data on motor vehicles injuries at broader geographic levels. In 2007, SRA 5 reported the lowest injury rates in the Central Region by place of occurrence. [73,74] Annual data from 2004 to 2008 in the Central Region demonstrates that the rate of motor vehicle collision injuries has declined. However, rates are trending downward more slowly in SRA 5 than they are in the Central Region or County. From 2004 to 2007, the rate in SRA 5 declined by 18.9 percent, compared to 23.4 percent in the Central Region and 21.0 percent in the County (see Table 15, below).

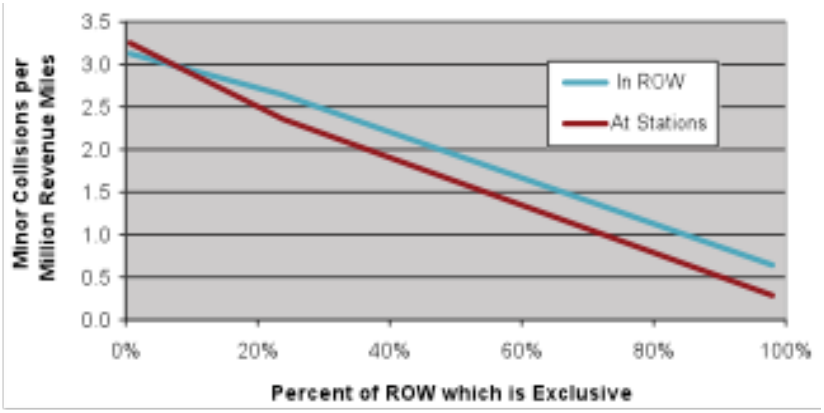
TABLE 15
INJURIES DUE TO MOTOR VEHICLE COLLISIONS BY PLACE OF OCCURRENCE, 2004-2008

	SUB-REGIONAL AREA 5 (SOUTHEASTERN SAN DIEGO)		CENTRAL REGION		COUNTY	
YEAR	COUNT	RATE*	COUNT	RATE*	COUNT	RATE*
2004	727	454.8	3,812	773.4	24,875	825.6
2005	763	479.0	3,580	723.2	23,503	773.3
2006	653	406.7	3,272	656.0	21,943	715.9
2007	616	382.5	3,157	626.8	21,159	682.5
2008	N/A	N/A	3,012	587.8	19,314	613.9

**Rates per 100,000 population.*
Source: San Diego HHSA.

To provide a clearer picture of potential BRT benefits and impacts on collision rates, the FTA suggests drawing on existing information related to conventional bus and light rapid transit (LRT). Research from these two modes demonstrates that vehicle collision rates decreased as the exclusivity of the running way increased (See Appendix B for a glossary of terms). [75] However, studies show increased collision rates and severities, both for BRT and LRT, at locations where bus paths have at-grade crossings, a result of cross traffic.[76] The FTA concludes that BRT collision safety is likely to depend on the level to which the bus right-of-way is removed from other traffic (see Chart 2, below).[77]

CHART 2
VEHICLE ACCIDENT RATES VERSUS SHARE OF EXCLUSIVE ROW



Source: National Transit Database (NTD), non-major bus and rail collisions, 2002 - 2005

Overall, counts of pedestrian injury in the project area due to motor vehicle collisions have decreased over time, from 22 in 2006 to 10 in 2010. Despite increasing counts from 2006 to 2008 of bicyclist injury in the project area, reported incidents have decreased more recently from eight injuries in 2008 to four injuries in 2010. However, rates in the project area of pedestrian, bicyclist, and motor vehicle injuries due to motor vehicle collisions are substantially higher than in the broader health sub-region. The majority of pedestrian and bicyclist injuries in the project area happen when walkers or cyclists are crossing the street. Intersections are particularly problematic, with one-third of pedestrian injuries involving a walker in a crosswalk, and more than half of bicycle injuries occurring at intersections.

Crime and Violence

The benefits and impacts of BRT on crime activity are unclear. Due to limited studies on the topic, the FTA recommends drawing on comparable security profiles from other transit modes to derive an estimate for BRT's potential effect on crime.[78] A national comparison of major and non-major crimes on buses, LRT, and heavy rail reported from 2002 to 2005 found the lowest rates on conventional bus service and the highest rates on LRT.[79] To address security on BRT, the FTA recommends using specific design features in combination with surveillance and enforcement.[80] International examples suggest one way to reduce crime rates is to introduce a BRT system in conjunction with improvements to the built environment.[81] Bogotá's BRT has been credited with an 86 percent reduction in crime rates for areas within walking distance of the studied BRT corridor

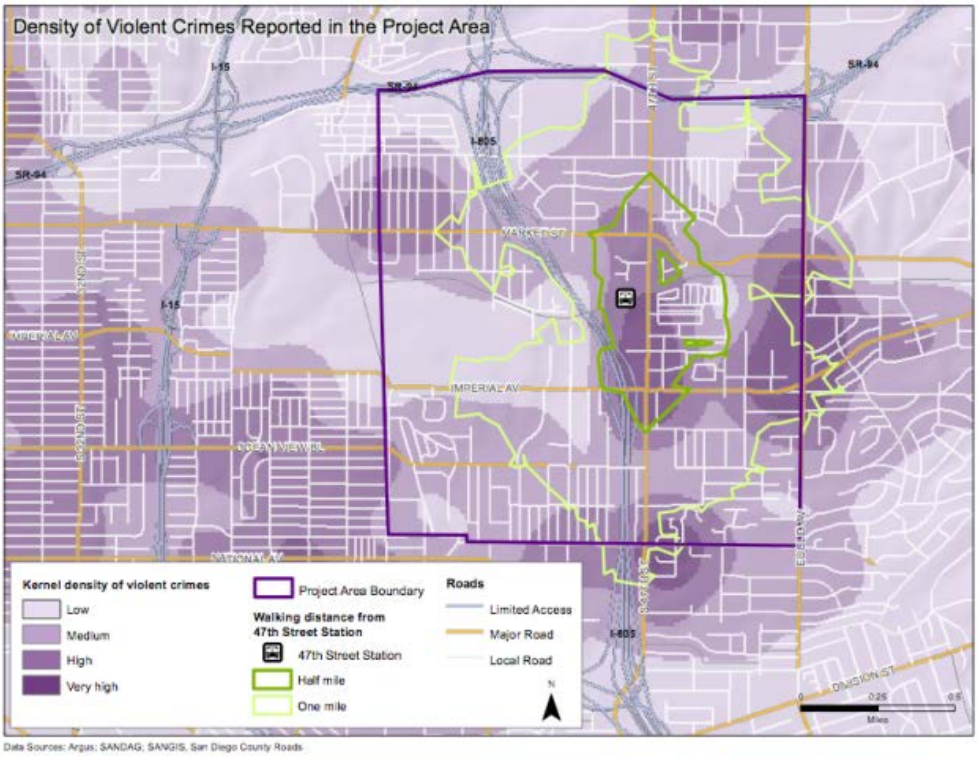
due to improvements in street order and cleanliness, renovations of public spaces, traffic improvements, and heightened policing.[82]

Crime influences health in a number of ways. Physical assaults, homicides, and rapes/sexual assaults are direct and adverse health outcomes for a community. In many low-income communities, homicides account to the largest number of years of potential life lost. Separately, witnessing and experiencing community violence has been shown to be associated with longer term behavioral and emotional problems in youth. [83],[84] Crime can be a predictor for risk of certain health conditions. In a large-scale study involving over 600,000 residents in Sweden, the rate of violent crime in an individual's neighborhood predicted their risk for coronary heart disease, regardless of individual demographic and socioeconomic measures.[85]

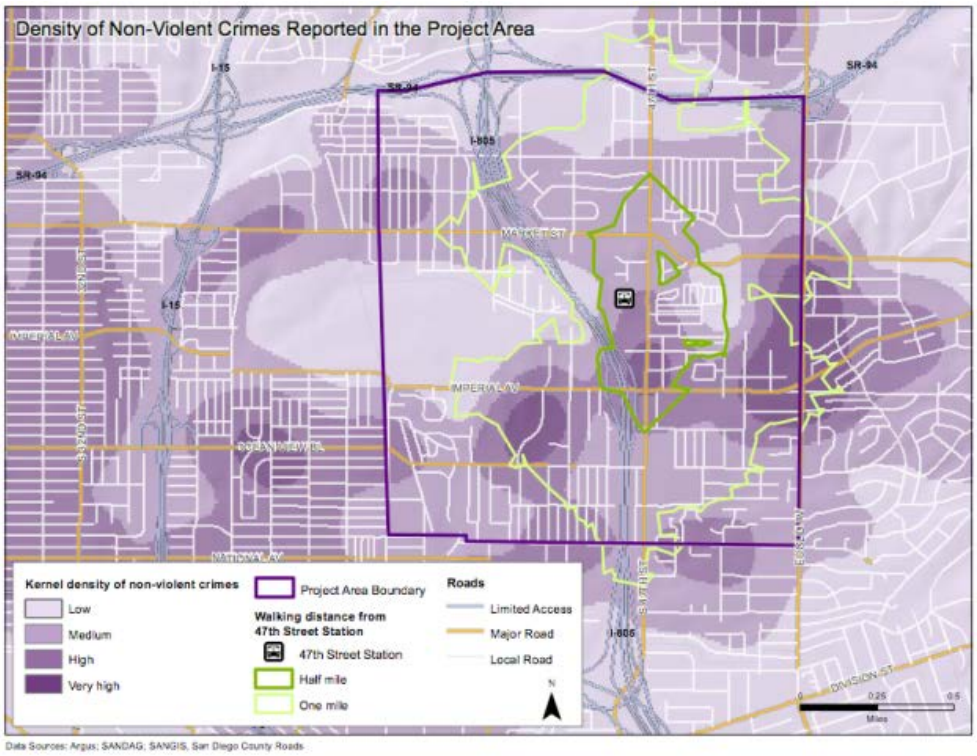
In the project area from 2010-2011, approximately one-fifth (119 of 538) of all reported crime was considered violent, including aggravated assault, simple assault, rape, robbery, or homicide. The remaining four-fifths (419 of 538) of reported crime were considered non-violent and included arson, commercial burglary, deadly weapons, being drunk in public, malicious mischief or vandalism, narcotics, prostitution, residential burglary, sex crimes, theft, vehicle break-in, or vehicle theft.[86]

With respect to the 47th Street Trolley Station Project area, reported crimes split evenly (50.1 percent) between the area from the station to half-mile radius and the half mile radius to the project area boundaries. However, unlike non-violent crimes, the majority of reported violent crimes occurred within the half mile radius from the station. Using the five-Census tract population of 21,555 in November 2011, the one-year violent crime rate was 5.5 crimes per 1,000 people and the non-violent crime rate was 19.5 crimes per 1,000 people (see Maps 15 and 16 below). By comparison, mid-year crime reports suggest the annual violent crime rate for the County as of June 2011 was 3.3 per 1,000.[87]

Map 15 - Density of Violent Crimes in the Project Area, 2010-2011



Map 16 - Density of Non-violent Crimes in the Project Area, 2010-2011



A Quality of Life Survey was administered in both 2001 and 2007 by the Jacobs Family Foundation and Center for Neighborhood Innovation. The survey included four neighborhoods east of I-805, two of which comprise the majority of the 47th Street station project area. According to the survey findings, respondents were more likely to identify illegal drug dealers and users in their neighborhoods, and significantly less likely to report police harassment as common in their neighborhoods in 2001 than in 2007. In 2007, two-thirds of respondents reported feeling safe in their neighborhoods. However, only one-third agreed that they felt safe to walk alone at night in their community. Overall, 16 percent of respondents in 2007 reported recent participation in a neighborhood watch or block meeting, compared to only 12 percent in 2001.

In the survey, the majority of respondents (80 percent) said violence in the neighborhood in the past five years (between 2001 and 2007) had either decreased or stayed the same.[88] For the same period, even more respondents (87 percent) said neighborhood safety either increased or stayed the same (see Table 16, below).[89]

TABLE 16
PERCEPTIONS OF NEIGHBORHOOD CHARACTERISTICS (%), 2007

	DECREASED	SAME	INCREASED
Neighborhood Violence in Past 5 Years	34	46	19
Neighborhood Safety in Past 5 Years	13	52	35
Source: Jacobs Family Foundation and Center for Neighborhood Innovation Quality of Life Survey, 2007.			

In addition to having direct, adverse health outcomes for victims, community violence can influence the perceived safety of a neighborhood, inhibiting social interactions and adversely impacting social cohesion and economic investment.[90] Research illustrates that residents' worries about safety in their neighborhoods can be a cause of chronic stress, and that a sense of vulnerability from fear of crime can decrease residents' sense of control over their lives and their life satisfaction.[91] One study found that residents of neighborhoods with greater safety (as reported by other residents of the neighborhood) had less hypertension than residents of neighborhoods with less safety.[92] Similarly, being part of the community – as measured by degree of connection, support, and belonging among the residents of a block – has been shown to result in less fear.[93] Land use patterns that encourage a sense of community and neighborhood interaction have been shown not only to reduce crime, but also to create a sense of community safety and security.[94]

Perception of neighborhood safety may impact the choices an individual makes to engage in health promoting behaviors. Fear of crime can affect transportation mode choice, and thus, mobility.[95] Mobility, in turn, alters use of resources and the ability to care for basic needs. Additional research reports that residents' feelings about safety in their neighborhoods also can be a disincentive to engage in physical activity outdoors, particularly among women and older persons.[96]

Overall, violent and non-violent crime in the area has decreased in the past decade. The majority of residents perceive the neighborhood as safe based on a survey of four neighborhoods east of I-805. However, the incidence of crime in the area remains high. Currently, violent crime in the planning area is more concentrated in the initial half mile radius around the station, which is east of I-805, than between the half mile radius and the edge of the planning area boundaries. Residents also do not perceive the area as safe such that they feel comfortable walking alone at night. Known risk factors for crime in the planning area include pedestrian and bicycle environments requiring improvements, such as pedestrian scale lighting, freeway on- and off-ramps, high volume roadways and noise levels, and a relatively low population density.

Housing

Housing or residential density is one measure of sprawl that has been associated with negative health implications. [97,98] Research has found that people living in counties with sprawling development are less likely to walk, weigh more, and are more likely to suffer from high blood pressure than those living in less sprawling counties.[99]

People in sprawling areas also drive more.[100] Vehicle miles traveled (VMT) are directly proportional to air pollution and greenhouse gas emissions. Air pollutants, including ozone and particulate matter, are causal factors for cardiovascular mortality and respiratory disease and illness.[101] Greenhouse gases contribute to climate change and may increase heat-related illness and death, health effects related to extreme weather events, health effects related to air pollution, water-borne and food-borne diseases, and vector-borne and rodent-borne disease.[102] Areas with high levels of VMT per capita also tend to have higher collision and injury rates. [103]

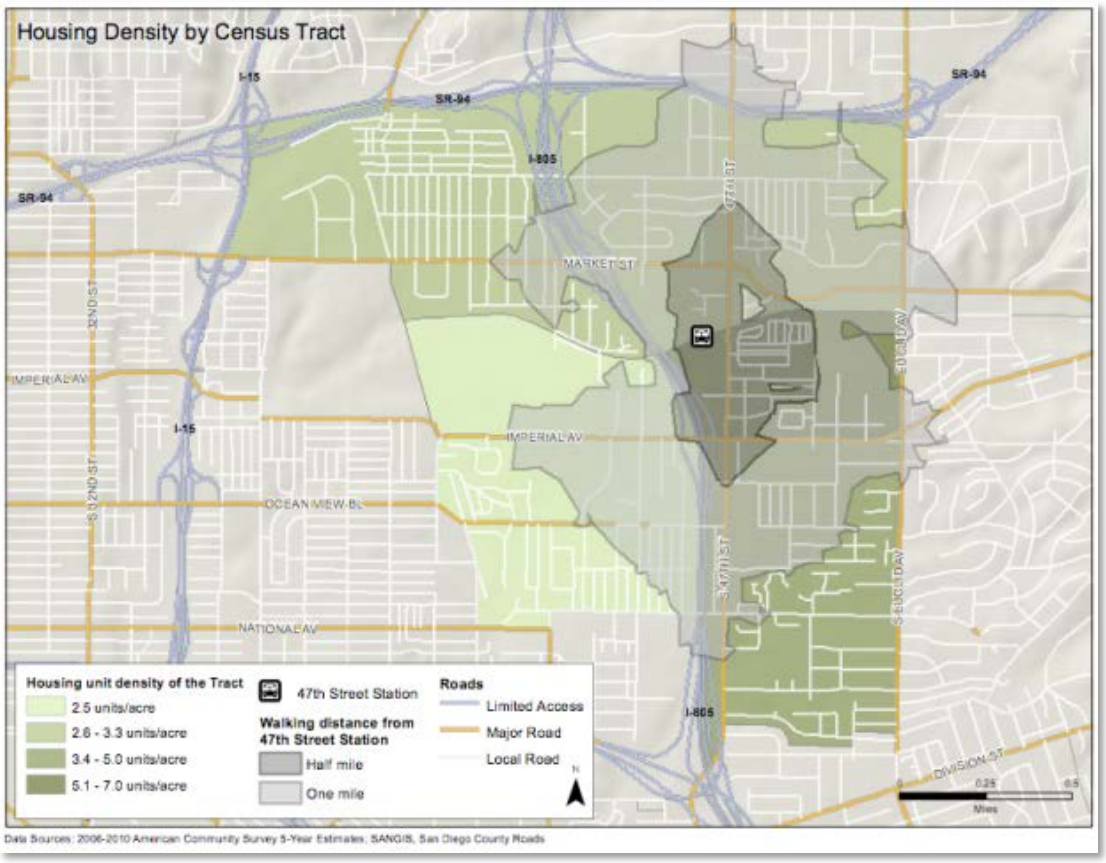
In the project area, housing density of all housing and occupied housing is higher on the east side of the freeway compared to the west side. Total housing density on the west side is on average 2.9 housing units per acre, compared to 4.9 units per acre on the east side (see Table 17, and Map 17, below).

TABLE 17
RESIDENTIAL DENSITY IN THE PROJECT AREA, 2010

	West of I-805		East of I-805			Comparison	
	Tract 33.01	Tract 34.03	Tract 33.04	Tract 33.05	Tract 34.04	City	County
Total housing density	2.5	3.3	7.0	5.0	2.8	2.5	0.4
Occupied housing density	2.3	3.0	6.5	4.8	2.6	2.3	0.4

** Residential density was calculated by dividing the total number of housing units by total acres within the census tract.*
Source: U.S. Census, 2010.

Map 17: Housing Density, 2010



Residential density can affect access to goods and services, success of neighborhood retail, walkability, public transit usage, amount of and access to parks and open space, and other determinants of health.[104] In one national study, higher density was one of four indicators related to level of walking. The other three indicators included greater land area devoted to retail uses, self-reported measures of proximity of destinations, and ease of walking.[105] Another study demonstrated that people living in higher density neighborhoods with a mix of shops/businesses within easy walking distance have a 35 percent lower risk of obesity.[106] Increasing residential density also advances the concept of "eyes of the street," which can increase perceived safety among residents.[107] Higher densities also can allow for more affordable housing, as land cost per unit is reduced and there are economies of scale in the construction.[108]

HOUSING TYPE

Housing in the project area is more heavily renter-occupied (57.8 percent) than owner-occupied (42.3 percent). On the east side of I-805 there is a greater proportion of renter-occupied housing (63.2 percent renter-occupied vs. 36.8 percent owner-occupied) compared to a more even division on the west side of the freeway (see Table 18, below).

TABLE 18
HOUSING TYPE IN THE PROJECT AREA, 2010

	West of I-805			East of I-805				Overall
	Tract 33.01	Tract 34.03	Average, west	Tract 33.04	Tract 33.05	Tract 34.04	Average, east	Overall average
Owner-occupied (%)	42.7	52.7	47.7	35.4	36.8	38.2	36.8	42.3
Renter-occupied (%)	57.3	47.3	52.3	64.6	63.2	61.8	63.2	57.8
Source: U.S. Census, 2010.								

The Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments found that half (51.4 percent) of the housing in closest proximity to the station is single-family homes, similar to the proportion in the County (51.8 percent), but greater than that of the City overall (46.3 percent) (see Table 19, below).[109] Also of note, the proportion of housing in the project area comprised of "Other" housing, which includes mobile homes, is greater than that of the City and County. Of the areas assessed, the one mile radius around Euclid Avenue and Market Street has the largest proportion of housing comprised of "Other." On the east side of I-805 there is a 230-unit mobile home plaza, the El Rey Trailer Plaza, located on the 300 block of 47th Street, which is in close proximity to the current 47th Street Trolley Station (see Image 7, below). [110]

IMAGE 7
PROXIMITY OF TRAILER PLAZA TO 47TH STREET TRANSIT STATION

TABLE 19
EXISTING HOUSING INVENTORY

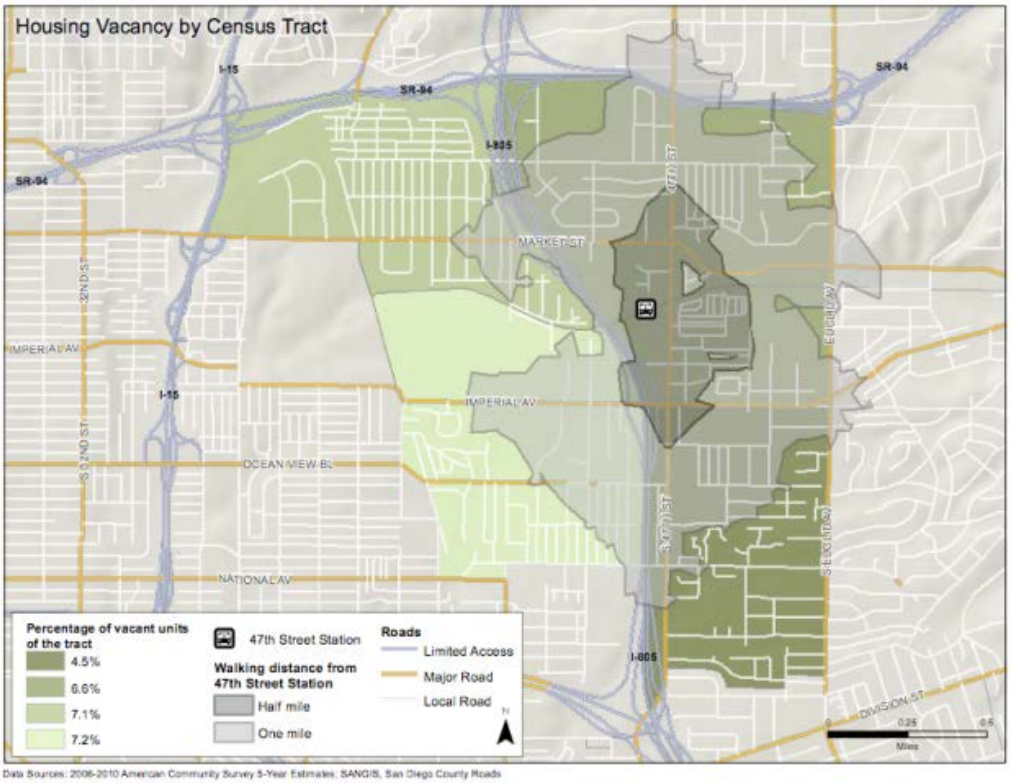
	1-mile radius (%)	2-mile radius (%)	3-mile radius (%)	City (%)	County (%)
Single-family	51.4	58.3	54.5	46,3	51,8
Multi-family	44.0	38.2	43.9	52.5	44.3
Other**	4.6	3.5	1.6	1.2	3.9

** The radii were measured from the intersection of Euclid Avenue and Market Street.*
*** Other includes mobile homes.*
Source: Euclid & Market Existing Conditions analysis, 2011.

VACANCY RATES

Vacant properties have been linked with lower property values and increased crime rates. In one report, poorer neighborhoods with more vacant housing units had significantly higher rates of assault-related injuries.[111] High vacancy also means fewer residents available to keep eyes on the street or clean up a space.[112] As depicted in Map 18 below, the average vacancy rate across Census tracts in the project area (6.4 percent vacancy) equals the City rate (6.4 percent), and is slightly lower than the County rate (6.7 percent). However, the average rate on the west side of I-805 (7.2 percent) is noticeably higher than that of the east side (5.9 percent).

Map 18 - Vacancy Rate in the Project Area, 2010



PROPERTY VALUES

Nearly two-fifths (39.5 percent) of owner-occupied properties in the project area are valued from $300,000 to $499,999. Another one-fifth (approximately 22.1 percent) range from $200,000 to $299,999, and 14.1 percent more range from $500,000 to $999,999. Overall, the area includes a mix of housing types, including single-family homes, multi-family homes, and a trailer plaza. A majority of these units are renter-occupied, which aligns with the low to moderate median household income in the project area. The majority of properties in the area are valued between $200,000 and $500,000. However, vacancy rates in the project area exceed those in the City and County, and are particularly high for rental units in the project area west of I-805.

Internationally, data on Bogotá's Transmilienio suggests that implementing BRT transit systems increases property values in the areas immediately surrounding the system. A literature review by the Lincoln Institute of Land Policy reported 6.8 - 9.3 percent increases in land values for every five minutes of walking time closer to a BRT station. Properties less than a five minute walk to feeder lines were valued more than those requiring a five to ten minute walk.[113] However, while middle-income properties are valued higher when located in close proximity to a BRT system, low-income houses are valued lower. In light of this, researchers warn of a potential for gentrification in low–income areas surrounding BRT systems as developers seek to take advantage of middle-income property development.[114]

In the U.S., a study in Pittsburgh, Pennsylvania, reported that a property further away from a BRT station – 1,000 feet away in the study – was valued approximately $9,745 less than a closer property just 100 feet from the station.[115] Researchers noted, "in attempting to assess the impact of transit on land use, efforts should be made to take scheduling and frequency, neighborhood, and potential negative impacts into consideration."[116]

Access to Goods and Services

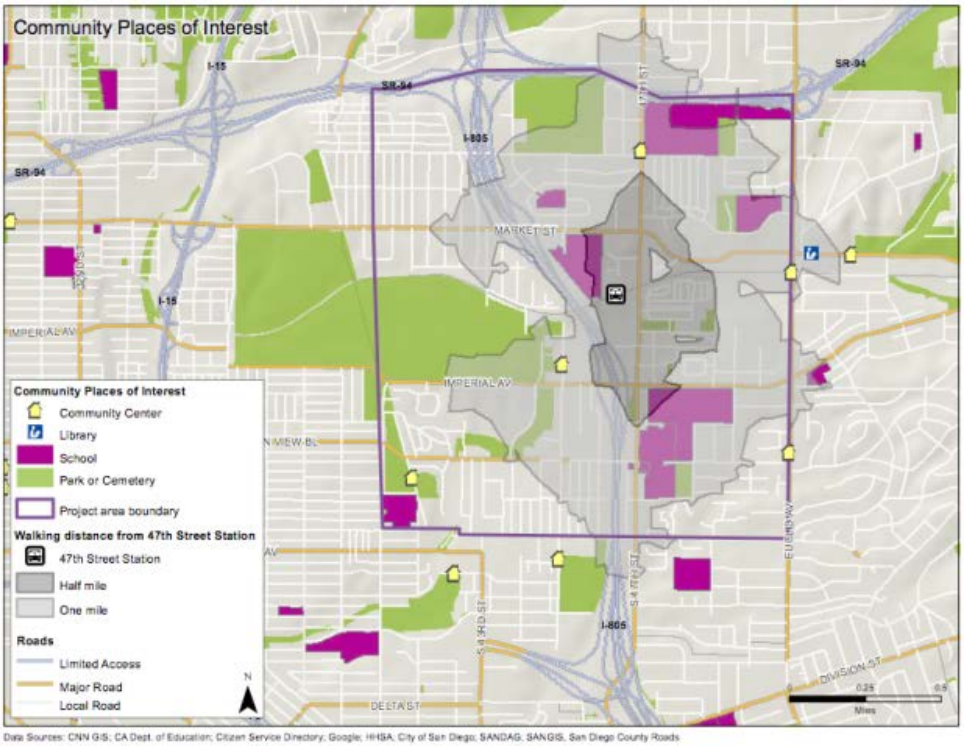
Overall, being within walking distance of neighborhood goods and services promotes physical activity, reduces vehicle trips and miles traveled, and increases neighborhood cohesion and safety.[117] By reducing vehicle trips and miles traveled, dense neighborhoods with diverse and mixed land uses also can reduce air and noise pollution, which subsequently affects associated respiratory and noise-related health conditions. [118] According to the U.S. Green Building Council, "living in a mixed-use environment within walking distance of shops and services results in increased walking and biking, which improve human cardiovascular and respiratory health and reduce the risk of hypertension and obesity. [119]

A San Francisco Bay Area study looking at non work-related trips (in four neighborhoods, controlled for socioeconomic status) found that the proximity and mix of retail, and having many quality destinations and modes of transport choices, are the most influential factors in people's decisions to walk.[120]

PUBLIC SCHOOLS

Looking at public and charter schools, the area around the 47th Street station includes five elementary schools (Baker, Knox, Chollas/Mead, Horton, Walter J. Porter), one middle school (Millennial Tech), and two high schools (Gompers Preparatory Academy, Lincoln), as shown on Map 19, below. In addition, there are 13 childcare centers in the project area.

Map 19 - Schools, Library, Recreational Facilities, and Community Centers in Project Area



Data Sources: CNN GIS; CA Dept. of Education; Citizen Service Directory; Google; HHSA; City of San Diego; SANDAG; SANGIS; San Diego County Roads

Neighborhood schools have been found to serve as social and community hubs that promote interaction between neighbors and community members, and if planned as multi-use facilities, schools can benefit the local community in a number of ways during afterschool hours.[121] A half-mile proximity was selected for this indicator to identify what proportion of households fall within a "walkable" distance of a public school.[122] Upon request from community members at a public meeting, this was expanded to include up to one mile as a walkable distance. Research on travel mode choice also shows that when schools are located closer to home, more children walk and/or bicycle to school and vehicle pollution emissions fall.[123]

OPEN SPACE AND PARKS

The project area includes three neighborhood parks – Gompers Park, Mountain View Park, and John F. Kennedy Park – the first two of which are located adjacent to schools, with which they have joint-use facility agreements.[124] Gompers Park is a 4.82 acre developed park adjoining Gompers Middle School.[125] Mountain View Park is a 13.96 acre developed park near Baker Elementary School and includes a community center with facilities such as outdoor basketball courts and tennis courts; a children's play area; and a community building with a gymnasium,

weight room, and computer lab. [126,127] John F. Kennedy Park is a 4.08 acre developed space adjoining Porter Elementary School.[128] At 200.17 acres of open space (including the 22.86 acres of parkland mentioned) for its 21,555 residents, the project area provides approximately 9.29 acres of open space per 1,000 residents. This is well within the National Recreation and Park Association's 1996 recommendations of anywhere from 6.25 to 10.5 acres of open space per every 1,000 resident, and exceeds the General Plan Recreation Element goal of 2.8 acres of community and neighborhood park per 1,000 population.

Though not a formal park, another source of outdoor space is the Jackie Robinson YMCA on 45th Street, which has four ball fields (one baseball field, two softball fields, and one youth ball field), three multi-purpose fields for soccer and football, two outdoor multi-purpose courts for basketball and volleyball, and two tot lots.[129] The project area also includes open spaces, i.e., around Chollas Creek, sections of the project area west of the freeway (to the north of Ocean View Boulevard), and on either side of Marketplace Avenue. In addition, the project area includes two memorial parks that reportedly provide the benefit of attractive landscaping to residents.

Parks and open space can affect health outcomes through several mechanisms, including physical activity, social interaction, environmental quality, and illness recovery. It is important to note that proximity to a park does not guarantee access, and is one element of many in assessing access to parks. [130] Other factors may include the presence of major roads, highways, buildings and gates, perceived and actual safety, hours of access, quality of park grounds and facilities, transportation, and cultural preferences.[131] For example, the number of neighborhood parks in proximity to one's residence and the types of amenities at the park has been associated with physical activity in children. [132]

However, once accessed, parks and open spaces, along with community centers and gyms, are important resources for physical activity by providing fields for play, scheduled and supervised activities, and destinations to which people can walk.[133] One review of studies reported that a combination of access to places for physical activity, outreach, and education produced a 48 percent increase in the frequency of physical activity. [134] Parks provide low-cost choices for recreation, which may be particularly important for populations without access to other means of physical activity.[135]

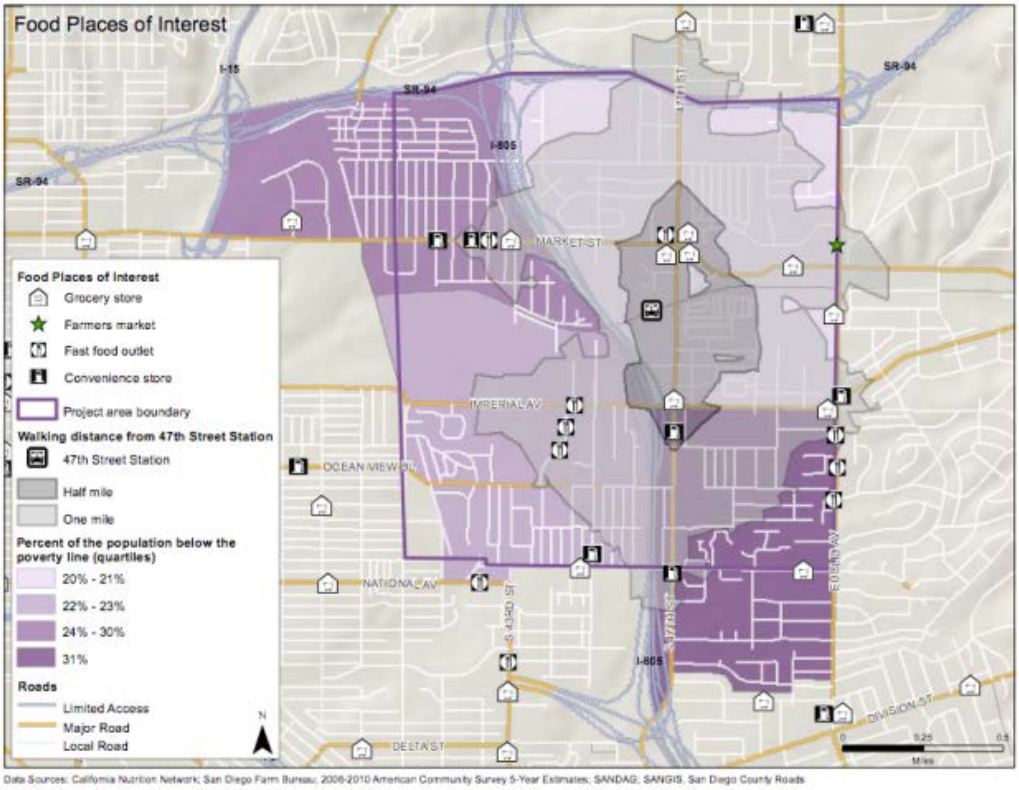
Trees and green space also improve the physical environment by removing pollution from the air and mitigating the urban heat island effect produced by concrete and glass. [136] Studies also show that the presence of trees and other vegetation improves adult recovery from mental fatigue, leading to a reduction in socially unacceptable behavior and crime as well as fewer behavior problems among children.[137]

GROCERY STORES/FARMERS MARKETS

In a survey for the Jacobs Family Foundation and Center for Neighborhood Innovation about quality of life in the surrounding area, respondents said the following about healthy food options in the neighborhood in the five-year period between 2001 and 2007: 14 percent reported options had decreased, 50 percent reported options had stayed the same, and 36 percent reported options had increased.[138] The project area includes nine grocery stores, four convenience stores, one farmers market, and nine fast food restaurants (see Map 20 below).[139] The project area also includes three liquor stores, including one that is located at Euclid Avenue and Imperial Avenue, which is only two blocks away from Lincoln High School. The area does not yet contain any stores that feature the

"Cilantro to Stores" Program (a program recently implemented in nearby Chula Vista). However, within the project area, the Mount Hope Community Garden on Market Street near I-805 broke ground in fall 2011.

Map 20 - Food and Retail Environment in Project Area



Data Sources: California Nutrition Network; San Diego Farm Bureau; 2006-2010 American Community Survey 5-Year Estimates; SANDAG; SANGIS, San Diego County Roads

Access to healthy food choices is directly correlated to obesity and diabetes rates, which occur in higher rates among people living in low-income communities.140 Supermarkets may provide access to a greater variety of cheaper and healthier foods, including fresh fruits and vegetables, thus helping to facilitate healthier dietary choices.141 Research reports that the presence of a supermarket in a neighborhood predicts higher fruit and vegetable consumption and a reduced prevalence of overweight and obese residents. 142,143 A study in Los Angeles County concluded that longer distances traveled to grocery stores were associated with an increased body mass index.144 For a person with a height of five feet and five inches, traveling 1.75 miles or more to get to a grocery store meant a weight difference of about five pounds.[145]

In low-income populations in urban areas, accessible and affordable, nutritious food remains a significant unmet need. Poorer households tend to buy less expensive, but more accessible food at fast food restaurants, or highly processed food at corner stores, which typically charge about 10 percent more for products than supermarkets.146 These types of foods are often higher in calories and lower in nutritional value. [147,148]

Liquor stores also have health consequences, often in the form of associations with crime and violence. Empirical data suggests a correlation between liquor stores and crime. Recent research in New Jersey offers that crimes tend to collect in areas that have a concentration of establishments

such as liquor stores and fast-food restaurants.149 The author of that research is clear to note that qualities of places alone do not create crime, rather, they point to locations where, if the conditions are right, the risk of crime or victimization will be high.150

COMMUNITY CENTERS

The project area includes five community centers to meet a range of interests and populations. They include recreational facilities; religious-based organizations; conflict resolution sites; multicultural centers; and places in support of various racial/ethnic groups, religious populations, gay/lesbian populations, the elderly, and those seeking help with domestic violence or abuse.

Community centers provide places for neighborhood residents to interact, and foster the development of social networks and social integrations that are beneficial to health. Research reports that social support can buffer people from the negative psychological effects of life stress.[151] For example, research on pregnant women concludes that social support improves fetal growth, and that women with social support have healthier babies, fewer complications in pregnancy and birth, and less postpartum depression compared to women without the support. [152,153] Independently, other studies have linked specific health conditions, such as stroke, death from cardiovascular disease, and the common cold, to having fewer social ties.[154,155]

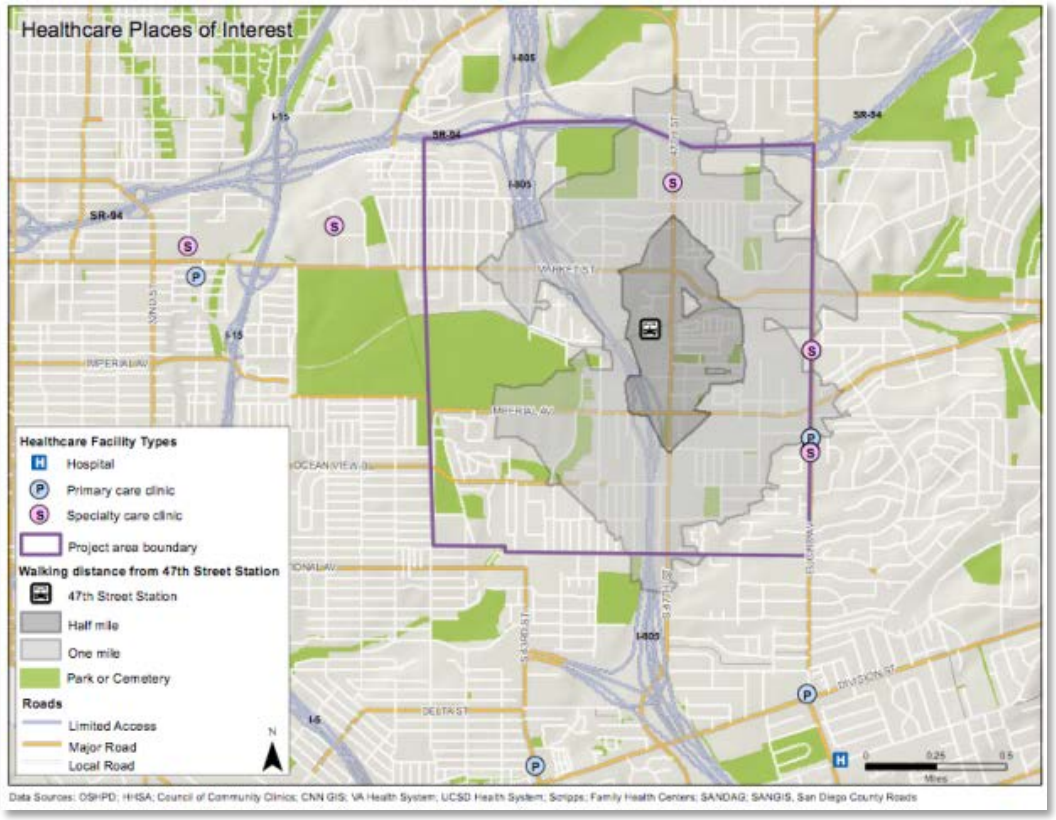
Seniors and persons with disabilities are particularly at risk of social isolation; this risk can be mitigated by the availability of day programs and other services in their communities.[156] For example, Facilitating Access to Coordinated Transportation in San Diego (FACT) is a Social Service Transportation organization that helps to connect seniors and people with disabilities with transportation services, which can be key in providing a sense of independence and access to activities that improve quality of life. Neighborhoods in which residents feel social cohesiveness toward their neighbors (through mutual trust and exchanges of aid) tend to have lower mortality rates compared to neighborhoods that do not have strong social bonds.[157]

Community centers also can contribute to the positive health of youth. A 2007 national study reported that children with low neighborhood amenities, or those lacking neighborhood access to sidewalks or walking paths, parks or playgrounds, or recreation or community centers had 20-60 percent higher odds of obesity and being overweight compared with children who had access to these amenities.[158]

HEALTH CLINICS

There are no hospitals within the project area. However, there are a handful of clinics, including three specialty care clinics and one primary care clinic, as shown on Map 21, below. In addition, there are three mobile bus clinics in the area.[159] The Diamond Family Health Clinic is scheduled to be constructed in 2013. The project will be in a ½ mile walking radius at the southeast corner of 47th Street and Market Street and the Euclid Family Health Center located at Euclid and Logan. Both health facilities will provide medical, dental and mental health services to the community.

Map 21: Health Clinics in the Project Area



The type of health services in a community can impact the health outcomes of local residents. The location of these resources and their proximity to where people live help determine whether people use them, how often, and how they are accessed (e.g., by walking or driving).[160] Similarly, changes in population density will likely have an impact on demands for health care at local facilities.[161]

Health care resources are not distributed equally among neighborhoods; areas of greater wealth have greater health care resources. [162,163] Individuals living in neighborhoods with greater health care resources may be more likely to use primary care due to shorter travel distances required to see a provider and greater provider choice.[164] According to research, living in a disadvantaged neighborhood reduces the likelihood of having a usual source of health care and of obtaining recommended preventive services, while it increases the likelihood of having unmet medical needs.[165] The types of industries in a community also affect the presence of health care resources, because certain types of employers are more likely to provide private health insurance coverage, which has higher reimbursement rates than public insurance.[166] Additionally, populations with a greater percentage of the very young or elderly may demand more health care because these demographics have greater health care needs, drawing more providers to an area.[167]

Research has found that access to primary care can help to mitigate the negative effects of lower socioeconomic status and income inequality on health.[168] Social capital, health care resources, and where one lives have been shown to be predictors of an individual's ability to access primary care.[169,170] The difference in ability to access primary care is one of the factors that explains individual level health disparities between neighborhoods.[171] The use of primary health care over

time improves individual and population health by helping patients prevent and control illnesses (for more information see Appendix B).[172]

Employment

Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments thoroughly described employment within a three mile radius of the Euclid and Market plan area, which overlaps substantially with the 47th Street station project area.[173] As of 2010, the three mile radius contained a jobs to resident ratio of 0.15, compared to a rate for the County overall that was 2.5 times higher (0.39 jobs/resident).[174] In other words, there was one job for every 6.7 residents in the project area, compared to one job for every 2.6 residents in the County overall. Retail trade industry comprised one-quarter of employment in the project area, the most of any industry. Most of this retail is located in one of three shopping centers: Market Creek Plaza, Euclid Plaza, and an untitled center at 47th and Market Streets.[175] The second and third largest industries in the area were professional and business services and educational services, both comprising one-sixth of the total employment.[176] By comparison, the County's largest employment sectors in 2010 were government, professional and business services, and leisure and hospitality, as shown in Table 20, below.[177]

TABLE 20
EMPLOYMENT PROFILE, 2010

	3-Mile Radius (2)		San Diego County		
	Total	% of Total	Total	% of Total	Average Annual 2000-2010
Transportation and Warehousing	2,341	5.5%	27,500	2.3%	-0.8%
Retail Trade	10,251	24.3%	130,000	10.7%	-0.3%
Wholesale Trade	1,429	3.4%	39,200	3.2%	0.0%
Professional and Business Services	7,086	16.8%	208,000	17.0%	0.5%
Manufacturing	1,892	4.5%	92,400	7.6%	-2.8%
Educational Services	6,862	16.2%	26,600	2.2%	3.9%
Healthcare and Social Services	6,040	14.3%	120,600	9.9%	2.2%
Finance, Insurance, and Real Estate	1,549	3.7%	92,300	7.6%	-1.5%
Government	1,609	3.8%	226,000	18.5%	0.9%
Construction	2,155	5.1%	55,500	4.5%	-2.3%
Other Services	505	1.2%	47,200	3.9%	1.1%
Leisure and Hospitality	530	1.3%	154,600	12.7%	1.8%
Natural Resources and Mining	2	0.0%	400	0.0%	2.9%
Total Employment	**42,251**	**100.0%**	**1,220,300**	**100.0%**	**0.2%**

Although retail trade dominated the economy of the project area, analysts estimated that there was a retail sales leakage (meaning residents are spending money outside the project area that could be spent within it) of approximately $130 million annually for the combined Southeastern San Diego and Encanto community planning areas.[178]

Based on demographics and market conditions, the Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments estimated that for the next five years, development of retail/restaurant and industrial industries will have the greatest market support in the project area. However, the analysis noted that the area is not recognized as an office or retail destination, and future efforts are constrained by limited current retail and entertainment as well as low household incomes that are a disincentive for many retail developers.[179]

For working age adults, employment is a fundamental resource for good health.[180] Employment is the primary source of income and is necessary for material needs, such as food, clothing, shelter, and leisure.[181] Of importance to this assessment, location of employment can guide transit use. Findings from a study of more than 200 transit stations in California reported that employment density is more strongly associated with transit ridership than is residential density.[182]

Focusing on anticipated employment opportunities in the area, the Southeastern Economic Development Corporation's (SEDC) 2010 strategic plan identified opportunities for area job development through 2015. Those that pertain to the 47th Street station project included, "areas along the Euclid corridor from SR 94 to the Village at Market Creek, Northwest Village (commercial/industrial properties) and other portions of the Jacob's holdings, Hilltop and Euclid, and the Imperial Avenue corridor, and along the transit corridors of Market Street and Imperial Avenue." Specific planned projects that the SEDC says "Can provide construction and permanent jobs over the next five-year period" include an apartment complex called Trolley Residential.[183,184]

The project area was not one of the regions identified in a 2009 SANDAG inventory on gross developable employment land, which reported that 60 percent of the available land was in five Planning Areas: Otay, Otay Mesa, Chula Vista, Lakeside, and Carlsbad.[185] However, specific elements of BRT systems, such as running ways, well-designed stations, aesthetically-pleasing, low-emission vehicles, and high-frequency service, all can positively affect land use development around BRT system areas. Implementation of BRT systems throughout the U.S. has influenced the development of both residential and commercial land uses. After implementation of Boston's Silver Line, developers invested in constructing Boston's first new transit-oriented development neighborhood. Literature has suggested that the inception of a BRT system in Las Vegas spurred casino owners to expand pedestrian connectivity to the station in order to attract passengers. In Orlando, the addition of a BRT system resulted in the construction of over five million square feet of office space and six new apartment properties in the downtown area. Oregon's EmX and Cleveland's Euclid Avenue Healthline have both invested heavily in improving the pedestrian environments and both bicycle and pedestrian connections to their BRT systems to further increase each area's development potential.[186]

Overall, analysts estimate that for the next five years development of retail/restaurant and industrial uses will have the greatest market support in the project area. Additionally, substantial economic growth is predicted in the region, and if connected by public transit, could offer employment opportunities. However, median household income in the project area is nearly half that of the City and County, and approximately double the number of individuals in the area are

living in poverty compared to the County. The job-to-resident ratio in the County is 2.5 times higher than in the project area.

Environmental Quality

Health effects from exposure to sources of pollution vary depending on the pollutant, distance from the sources, and how the emissions are released into the air and dispersed by the wind.[187] Extensive research demonstrates that living in proximity to a busy roadway is linked to negative health outcomes. Adverse health outcomes associated with proximity include exacerbation of respiratory diseases, such as asthma, cardiovascular disease, sleep disruption and cognitive disturbance, and unintentional (traffic) injuries. [188, 189] Children appear to be the most sensitive to adverse effects. California freeway studies show that exposure levels are strongest within 300 feet of freeways and that there is a 70 percent drop off in particulate pollution levels after 500 feet.[190] Researchers in San Diego reported increased medical visits in children living within 550 feet of heavy traffic.[191] A separate study reported increased asthma symptoms within proximity to roadways with the greatest risk within 300 feet.[192]

The health costs of living in a region with poor air quality can be great. A recent study estimated the financial and health costs of trips made by automobile.[193] The study suggested that the elimination of "short" trips of less than 5 miles would reduce car use in select Midwestern urban areas by 20 percent. The authors noted net savings could be $3.8 billion per year from avoided mortality and reduced health care costs if half of the eliminated "short" trips were replaced by bicycle trips. In addition, the authors estimated that changes in PM2.5 and ozone would result in net health benefits of $4.94 billion per year.[194]

Although research is limited, studies in the U.S. and abroad find that BRT reduces vehicle and greenhouse gas emissions thereby improving air quality. Three methods have been linked to reduction in the emissions: using alternative fuel vehicles (compressed natural gas and diesel-hybrid); shifting car drivers to transit, therefore decreasing VMT; and reducing overall traffic congestion.[195]

With respect to current air quality, there is no air-monitoring site within the 47th Street BRT Project area. The closest air-monitoring site is in downtown San Diego, six miles away and across the I-805 and I-5 freeways.[196] Annual 2010 data from this site, however, reports maximum and average levels of ozone, PM2.5 and PM10, nitrogen dioxide, carbon monoxide, and sulfur dioxide.[197] The site did not have any days in which the measured concentrations were above what is allowable by national standards.

The above data generally aligns with the air quality assessment in the Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments, which reported that from 2005-2008, the Beardsley Street downtown monitoring site was not out of attainment for federal air quality standards. However, it exceeded state ozone and PM10 level standards.[198]

The Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments identified intersections that during additional development could become hotspots for high concentrations of carbon monoxide after planned development occurs, thus, affecting sensitive populations. Five of the intersections identified were within the 47th Street BRT Project area (see Table 21, below).

Those intersections were projected to have future level of service grades of E or F. Level of service is a measure of the effectiveness of traffic flow and uses a system from A (best) to F (worst).

TABLE 21
POORLY OPERATING INTERSECTIONS IN THE PROJECT AREA

Intersections	Existing LOS (2008)	Projected LOS (Year 2030)
Euclid Avenue/SR 94 interchange	E/F	F
Euclid Avenue/Market Street	--	F
47th Street/Market Street	--	F
Imperial Avenue/47th Street	--	E
Imperial Avenue/I-805 southbound ramps	--	F
Source: Euclid and Market Land Use and Mobility Plan: Existing Conditions Analysis, 2010.		

Two studies outside the U.S. describe reductions in greenhouse gas emissions attributable to BRT. A 2005 study in Mexico City estimated $3 million per year from 2006 to 2010 in health benefits from a reduction in commuter exposure to greenhouse gas emissions, attributed to BRT.[199] Compared to riders on other buses, BRT riders had 20 to 70 percent less exposure to three major traffic-related pollutants, carbon monoxide, benzene, and PM2.5. Relative to minibus and bus riders, respectively, BRT riders, had an average of 45 percent and 25 percent less carbon monoxide exposure, 69 percent and 54 percent less benzene exposure and 30 percent and 20 percent less PM2.5 exposure.[200] Both characteristics of Metro buses and shorter commute times were attributed for the lower exposures.[201] Bus features included ventilation systems, height of intake points and distance from neighboring vehicular sources. Of note, the study only assessed the impact of BRT on commuters' exposure to traffic-related pollutants and did not include impacts on air quality to the broader area around the BRT system. However, a separate analysis, of Bogotá, Colombia's BRT system did, and reported a 40 percent decrease in air pollution around the system during the first five years of operation.[202]

In the U.S., there are no pre- and post-implementation studies of BRT, so conclusions from the research are limited. Predictions made include a 2005 Federal Transportation Administration report that anticipated significant reductions in vehicular carbon dioxide emissions by replacing private vehicle travel trips with BRT trips. Using the Los Angeles Metro Rapid design as a model, the report predicted that a 40-mile BRT corridor would provide a 70 percent to 74 percent reduction in annual carbon dioxide emissions depending on the BRT vehicle fuel utilized.[203] A 2006 journal article projects that in comparison to light rail transit, BRT has the greatest potential for reducing greenhouse gas emissions for most U.S. cities.[204]

NOISE LEVELS

The health benefits and impacts of environmental noise depend on the intensity of noise, the duration of exposure, and the context of exposure. The Environmental Protection Agency identifies a 24-hour exposure level of 70 decibels as the level of environmental noise that will prevent any measurable hearing loss over a lifetime.[205] Long-term exposure to moderate levels of environmental noise can adversely affect sleep, school, and work performance as well as cause cardiovascular disease.[206] Noise affects sleep both by waking people up and by reducing the quality of sleep. According to the World Health Organization, reductions of noise by 6-14 decibels results in

subjective and objective improvements in sleep. Chronic road noise can affect cognitive performance of children, including difficulty keeping attention, difficulty concentrating and remembering, poorer reading ability, and poorer discrimination between sounds.[207] The combination of noise and poor quality housing can have additive effects. In one study, a combination of these factors was associated with higher stress and stress hormone levels.[208]

The FTA advises that BRT systems can affect public health and the aesthetics of its host communities through potential noise and visual impacts. These impacts are derived from the system's service and infrastructure elements related to BRT vehicles, stations, and running ways. The impacts have been reported as both positive and negative. Auditory impacts from BRT vehicles vary depending on the engine powering the bus. Diesel engines produce the most noise pollution, while hybrid-diesel and compressed natural gas engines produce the least. The FTA recommends that BRT developers seek mechanisms to mitigate the possible negative auditory and visual impacts.[209] A separate 2003-2004 study of low-frequency noise effects in residential buildings along one of Boston's BRT lines found that idling Neoplan buses created low-frequency noise, audible at times, with a level high enough to cause vibrations and rattling in surrounding residences. To mitigate noise effects, the exhaust system for the buses were re-designed, resulting in a significant noise decrease of 8-10 decibels.[210]

According to the Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments, vehicular traffic, commercial and industrial uses, sand and gravel extraction activities, and operation of the San Diego Trolley all generate noise within the project area.[211] An additional source of noise comes from airplanes with a flight path over the project area, which although considered a bother, are not enough to trigger additional negative health impacts. Populations potentially experiencing all of this noise are those that live, work, and play in the project area, where a number of land uses are considered sensitive receptors, such as schools, residential uses, day care centers, community centers, parks, and homes for the elderly.[212]

Overall, air quality in the project area is generally within accepted standards. Although, the Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments measured ambient noise levels at a number of locations, six of which are relevant to the 47th Street Trolley Station Project area (see Table 22, below). Of the six locations, two exceeded the City's 65 decibel threshold for residential noise and were near places where children gather. These locations were near the YMCA and Gompers Park and school.

TABLE 22
MEASURED AMBIENT NOISE IN THE PROJECT AREA, 2006

MONITORING LOCATION	NEARBY SENSITIVE RECEPTOR	MEASURED NOISE LEVELS, LEQ (DB(A))
Adjacent to 1038 Euclid Avenue	Residential (?)	60.3
Adjacent to 1036 Euclid Avenue	Gompers Park, school	71.4
4822 Market Street	Residential (?)	64.3
Corner of Ocean View Boulevard and Willie James Jones Avenue	John F. Kennedy Park	52.1
420 45th Street	Chollas-Mead Elementary School	54.0
151 YMCA Way	YMCA	66.7
Source: Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments, 2010.		

Table 22 above, from the Euclid & Market analysis, indicates existing residential land uses where traffic noise levels exceed, and will continue to exceed the 65dB threshold, are identified. Those that pertain to the 47th Street station project area are listed in Table 23 below, along with community noise equivalent level (CNEL), which is a weighted measure of average sound over a 24-hour period.[213] Additionally, the Orange line trolley generates an estimated CNEL of 67dB at a distance of 50 feet from the tracks, meaning levels of noise for people adjacent to the station exceed city limits for residential areas.[214] The city's General Plan says that "although not generally considered compatible," it "conditionally allows multiple unit and mixed-use residential uses up to 75 dBA CNEL in areas affected primarily by motor vehicle traffic noise with existing residential uses."[215]

TABLE 23
EXISTING TRAFFIC NOISE LEVELS IN THE PROJECT AREA, 2006

Arterial/Reach	Unmitigated CNEL @ 50 ft. (dB)	Distance to CNEL Contour				
		60 dB (ft.)	65 dB (ft.)	70 dB (ft.)	75 dB (ft.)	80 dB (ft.)
Euclid Avenue						
SR 94 to Market	68.0	215	90	--	--	--
Market to Imperial	68.0	215	90	--	--	--
Imperial to Logan	65.5	143	56	--	--	--
47th Street						
SR 94 to Market	65.5	143	56	--	--	--
Market to Imperial	66.0	82	57	--	--	--
Imperial to Ocean View	66.0	82	57	--	--	--
Imperial Avenue						
West of I-805	69.0	255	110	--	--	--
I-805 to Euclid	69.0	255	110	--	--	--
I-805						
SR 94 to Market	84.5	890	530	203	98	76
Market to Imperial	85.0	930	560	235	100	78
South of Imperial	84.5	890	530	203	98	76
Market Street						
West of I-805	67.0	185	75	--	--	--
I-805 to 47th	65.5	143	56	--	--	--
47th to Euclid	64.0	110	--	--	--	--
SR 94 (south side)						
I-805 to 47th	83.0	1,400	860	460	--	--
47th to Euclid	83.0	1,400	860	460	--	--

Source: Euclid and Market Land Use and Mobility Plan: Existing Conditions Analysis, 2010.

Recommendations

Findings from the HIA illustrate numerous opportunities to promote health both through the addition of BRT at the 47th Street Trolley Station area and by improving conditions around the current or relocated 47th Street Trolley Station. For those opportunities to be realized, a number of recommendations are proposed related to the BRT planning process and should be considered by SANDAG and relevant agencies. The recommendations are provided in the following categories; the overarching process, BRT/Trolley Station, transit service, pedestrian environment, bicyclist environment, auto travel, crime and safety, housing, access to goods and services, and environmental quality.

It is important to note that not all the recommendations proposed are within purview of SANDAG to consider in the BRT planning and implementation process, and may be subject to the jurisdiction of other agencies and organizations. Furthermore, the following recommendations are provided based upon the findings of this health benefits and impacts analysis for consideration as the 47th Street BRT station project is developed and implemented. Therefore, additional analysis is anticipated in addition to this study as design alternatives are developed and evaluated. Recommendations that directly impact agencies other than SANDAG are included for consideration as other planning efforts commence (i.e. Community Plan Updates, Pedestrian Master Plans, etc.). Lastly, the community at large developed many of the recommendations provided below.

Recommendation	Lead Agencies	Support Agencies
OVERARCHING PROCESS:		
1. Coordinate the BRT planning process with relevant regional and local planning processes to relay HIA findings into those processes.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
2. Engage traditional groups in the BRT planning processes, including community members/residents, SEDC, business owners, and the Jacobs Family Foundation and Center for Neighborhood Innovation. Engage non-traditional groups in the planning process (such as public health coalitions).	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
3. Use HIA findings and recommendations to inform the development of I-805 BRT/47th Street Station Area Plan alternatives and to guide the assessment of the impacts of the selected alternatives on community health.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
4. Conduct a limited, health-based review of the proposed BRT alternatives to identify those that would be most health promoting.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders

Recommendation	Lead Agencies	Support Agencies
5. In order to assess changes over time, when full BRT implementation is complete, consider funding an update of the HIA existing conditions findings to see if and how these conditions may be changing.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
BRT/TROLLEY STATION:		
1. Pursue HIA Alternative 3 (including pedestrian access to the station across I-805) in order to increase safe pedestrian connectivity between the east and west sides of I-805, increase pedestrian access to community resources east of I-805, and increase access to the Trolley station and BRT.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
2. Position the BRT Trolley stop and pedestrian access to/from the station as close together as possible in order to ensure a more seamless transfers between transit modes.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
3. Ensure station entrance and exit is community-oriented and provides a welcoming, well lit gateway into the community.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
4. Develop a one-mile radius pedestrian network that includes Market Street and Imperial Avenue as community oriented, well designed, and welcoming gateway into the transit station and the community.	SANDAG and City of San Diego	Transit Operators, Caltrans, Community-based organizations, non-profits, and other community stakeholders
5. Provide sheltered, well-lit, publicly displayed real-time Trolley and BRT arrival information at regular intervals. Include dedicated space to display schedules and routes as well as information on alternative transportation options (e.g., bike lanes, carpooling).	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
6. Install and maintain attractive and effective signage to promote public safety, accessibility, and wayfinding.	SANDAG and City of San Diego	Transit Operators, Caltrans, Community-based organizations, non-profits, and other community stakeholders
7. Survey existing local bus riders to determine which routes also should provide access to the 47th Street BRT station.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders

	Recommendation	Lead Agencies	Support Agencies
	TRANSIT SERVICE:		
1.	As the BRT planning process continues, model travel demand numbers and make decisions related to BRT headways and frequencies such that riding the BRT is a viable alternative (in terms of commute times and costs) to auto travel.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
2.	Discuss options with community-based organizations in the area on how to further subsidize transit fares for low-income transit riders in the community, particularly for residents in current or future low-income housing near the station.	City of San Diego and Transit Operators	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
3.	Ensure that transit schedules (including BRT) are arranged to accommodate commuters and students going to and coming from local schools, including accommodating for capacity issues due to daily school start/end times.	City of San Diego and Transit Operators	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
	PEDESTRIAN ENVIRONMENT:		
1.	Improve the quality of the pedestrian access points to the Trolley and BRT and encourage transit ridership and connectivity by improving walking environments to and around the co-located stop. Potential approaches to achieve these improvements include: installing signalized and marked crosswalks, median islands, pedestrian-scale lighting, public art and seating in the streetscape, safe routes to schools, street trees and planters, street cleaning, signage for pedestrians, etc.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders
2.	Establish pedestrian routes that would safely connect residential communities to the Trolley station by improving access from across arterials and identifying improvements to walking routes within neighborhoods and to key destinations.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
3.	Utilize complete streets design principles to inform plans for redesigning streets, streetscapes, and bike and pedestrian facilities.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
4.	Establish clearly demarcated and safe pedestrian paths to the YMCA (only with Alternative 3), local schools, retail centers, healthcare facilities, neighborhood parks, and Chollas Creek. Consider a bridge over Chollas Creek or other north-south connection to the YMCA.	City of San Diego, YMCA and other community centers	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
5.	Identify and clearly demarcate safe pedestrian paths that connect Imperial Avenue to Market Creek Plaza.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders

Recommendation	Lead Agencies	Support Agencies
6. Ensure access to the transit station from east and west of the I-805. If streets must be crossed, provide signalized, marked crosswalks and/or narrowed intersection crossings.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
7. Narrow the width of Market and 47th Streets to enable an increase in the width of sidewalks on these thoroughfares.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
8. Improve pedestrian safety on adjacent streets through traffic calming treatments; traffic safety enforcement; intersection, roadway, and sidewalk design; design for pedestrians with disabilities; signals and signs; crime prevention techniques; and improved lighting.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
9. Work with community residents to ensure that aesthetics are considered in all new construction.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
10. Work with appropriate municipal departments to maintain all new facilities and improvements.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
11. Promote "Safe Routes to Schools" to decrease traffic and associated pollution, promote bike/pedestrian trips to school, encourage greater enforcement of traffic laws, and create safer streets to improve the health of children and the community.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
BIKE ENVIRONMENT:		
1. Where bike access is to be encouraged as a mixed use with pedestrians, employ techniques to ensure safe passage for both pedestrians and bicyclists – e.g., ensure bikes have designated paths so that they do not have to ride on walkways or sidewalks that are not designated for mixed use.	SANDAG	City of San Diego, Caltrans, Community-based organizations, non-profits, and other community stakeholders
2. Where appropriate, convert identified existing street parking "lanes" into bike lanes to improve neighborhood connectivity and the opportunity for active transit. If width does not allow parking and bike lanes, then study removal of parking or rerouting of bike lanes.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
3. Improve bicyclist safety through the implementation of design strategies, such as bike lane design, shared-use paths, improved signs and markings, bicycle parking, traffic calming and management treatments, on-street facilities, and intersection design.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders

Recommendation	Lead Agencies	Support Agencies
4. Provide secure, covered, long-term bicycle parking (i.e., bicycle lockers) at the co-located transit stop.	SANDAG	City of San Diego, Caltrans, Community-based organizations, non-profits, and other community stakeholders
5. Include bike racks or storage on BRT buses and related educational materials to promote its use.	SANDAG, Transit Operators	City of San Diego, Caltrans, Community-based organizations, non-profits, and other community stakeholders
6. Ensure bicycle access to the transit station from areas both east and west of I-805.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
AUTO TRAVEL:		
1. Implement traffic calming interventions to slow traffic speeds, reduce the risk of collisions, and increase pedestrian and bicycle walking and safety on prioritized street segments and intersections based on PEQI findings. Potential approaches include bollards, chicanes, gateway treatments, median islands, rumble strips, signal timing to reduce speeds, speed humps, speed limit signs, truck restrictions, and turn restrictions.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
2. Prioritize traffic calming on 47th Street.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
3. Assess and implement parking policies to maximize transit ridership.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
CRIME AND SAFETY:		
1. Use crime prevention design strategies, such as Crime Prevention Through Environmental Design, in the design of the co-located Trolley and BRT station and in future area development. Increase natural surveillance and "eyes on the street" through the following approaches: building doors/entrances and windows to look out on to streets and parking areas; pedestrian-friendly sidewalks and streets; front porches; and adequate nighttime lighting.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, MTS, and other community stakeholders
2. Based on crime density data, target consideration of improvements to high-crime areas (areas with higher density of crime). Improvements should be evaluated/determined based on context.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, MTS, and other community stakeholders

Recommendation	Lead Agencies	Support Agencies
3. Prioritize lighting near the station and on major routes leading to/from the station with minimum lighting standards for even levels of lighting.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, MTS, and other community stakeholders
4. Increase social connection and sense of community by providing appealing access to comfortable street environments, parks, and active open spaces for social networking, civic engagement, personal recreation, and other activities that create social bonds between individuals and groups.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, MTS, and other community stakeholders
5. Consider on-going discussions regarding level of police patrols with the appropriate agencies in accordance with standard police practice and allocation processes.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, MTS, and other community stakeholders
6. Prioritize addressing safety issues posed by the current informal use of the "tunnel" that is used to cross under the I-805 north of the YMCA.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, MTS, and other community stakeholders
ACCESS TO GOODS AND SERVICES:		
1. Conduct an assessment of where project area residents are employed to ensure that the BRT travels to employment locations that match the needs of local residents.	SANDAG	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
2. Identify and target pedestrian, bike, and traffic improvements on routes between key community resources (identify based on discussion) and residential areas.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
3. Coordinate with other project planning processes to promote transit access and compatible site design.	SANDAG, City of San Diego	Caltrans, Community-based organizations, non-profits, and other community stakeholders
4. Explore the opportunity to bring fresh food to residents who use transit that is located near convenience stores, using as an example the Cilantro to Stores Program, which is currently being tested in west Chula Vista.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
HOUSING:		
1. Participate in other planning processes to encourage new, low-income housing be built within the BRT/Trolley walkshed.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders

Recommendation	Lead Agencies	Support Agencies
2. Coordinate with other planning processes to mitigate any housing displacement from the project.	City of San Diego	SANDAG, Caltrans, Community-based organizations, non-profits, and other community stakeholders
ENVIRONMENTAL QUALITY:		
1. Coordinate with other planning processes to ensure that cumulative impacts from projects in the area do not lead to overall air or noise levels in excess of limits, particularly near sensitive receptors.	SANDAG, City of San Diego	Transit Operators, Caltrans, Community-based organizations, non-profits, and other community stakeholders
2. Utilize natural gas bus vehicles to minimize pollution and air quality impacts from the BRT.	SANDAG	City of San Diego, Caltrans, Transit Operators, Community-based organizations, non-profits, and other community stakeholders

EXISTING CONDITIONS ANALYSIS

While the previous section included the detailed health analysis for the project, this section includes the background conditions that were necessary to inform that analysis. This section provides the background data and documentation (including demographic and health status data) of the existing conditions present or available at the time of the health analysis.

Neighborhood Context

The 47th Street Trolley Station area is a historically auto-oriented space, bounded by two freeways and bisected by major arterials on which daily traffic reaches up to 39,600 vehicles, as shown in Table 24, below.[216]

TABLE 24
AVERAGE WEEKDAY TRAFFIC VOLUMES, 2010

STREET*	CROSS STREET 1	CROSS STREET 2	2010 AVERAGE WEEKDAY TRAFFIC VOLUME
SR 94	I-805	47th Street	186,800
SR 94	47th Street	Euclid Avenue	186,800
I-805	SR 94	Market Street	228,900
I-805	Market Street	Imperial Avenue	239,400
I-805	Imperial Avenue	Ocean View Boulevard	219,500
I-805	Ocean View Boulevard	Logan Avenue	219,500
Hilltop Drive	Boundary Street	47th Street	1,600
Market Street	Gateway Center Drive	I-805	22,000
Market Street	I-805	47th Street	9,800
Market Street	47th Street	Euclid Avenue	13,000
Imperial Avenue	38th Street	I-805	39,600
Imperial Avenue	I-805	47th Street	39,600
Ocean View Boulevard	38th Street	I-805	6,600
Ocean View Boulevard	I-805	47th Street	9,800
National Avenue	38th Street	43rd Street	6,100
Logan Avenue	43rd Street	I-805	8,000
Logan Avenue	I-805	47th Street	9,300
Logan Avenue	47th Street	Euclid Avenue	11,200
Euclid Avenue	SR 94	Market Street	26,700
Euclid Avenue	Market Street	Imperial Avenue	17,700
Euclid Avenue	Imperial Avenue	Logan Avenue	11,400
47th Street	Federal Boulevard	Hilltop Drive	11,200
47th Street	Hilltop Drive	Market Street	10,300
47th Street	Market Street	Imperial Avenue	11,100
47th Street	Imperial Avenue	Ocean View Boulevard	11,100
47th Street	Ocean View Boulevard	Logan Avenue	8,800

Source: SANDAG, 2011. Available at http://www.sandag.org/resources/demographics_and_other_data/transportation/adtv/sandiego_adt.pdf.

Bike and Pedestrian Infrastructure

IMAGE 8 - VALLEY WEST OF THE 47TH STREET TROLLEY STATION

The existing pedestrian and bicycle infrastructure is insufficient to support active transportation in the project area. Barriers to walking and bicycling in the area include topographical constraints such as hills and creeks. Built environment barriers include a freeway, Trolley lines, narrow sidewalks, infrastructure at intersections needing improvement, basic or infrastructure needing improvement on most street segments, and disconnected street patterns that funnel users to wide arterial streets with large daily traffic volumes. In addition, there is limited infrastructure for bicyclists.

These constraints are particularly significant since lower-income households and individuals that live near the 47th Street Trolley Station have limited access to motor vehicles compared to residents in the County and City of San Diego (City).

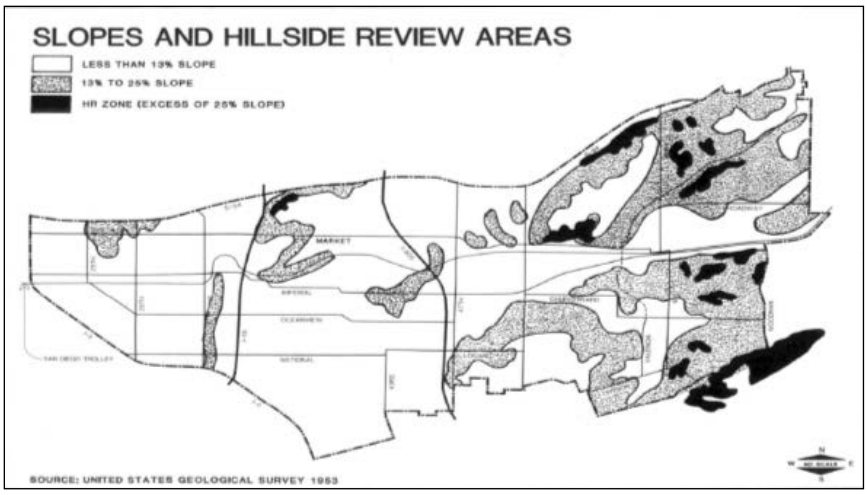
Topography and Project Boundaries

IMAGE 9 - STAIRWELL HEADING SOUTH OF TROLLEY STATION TO ADJACENT RESIDENTIAL HOUSING

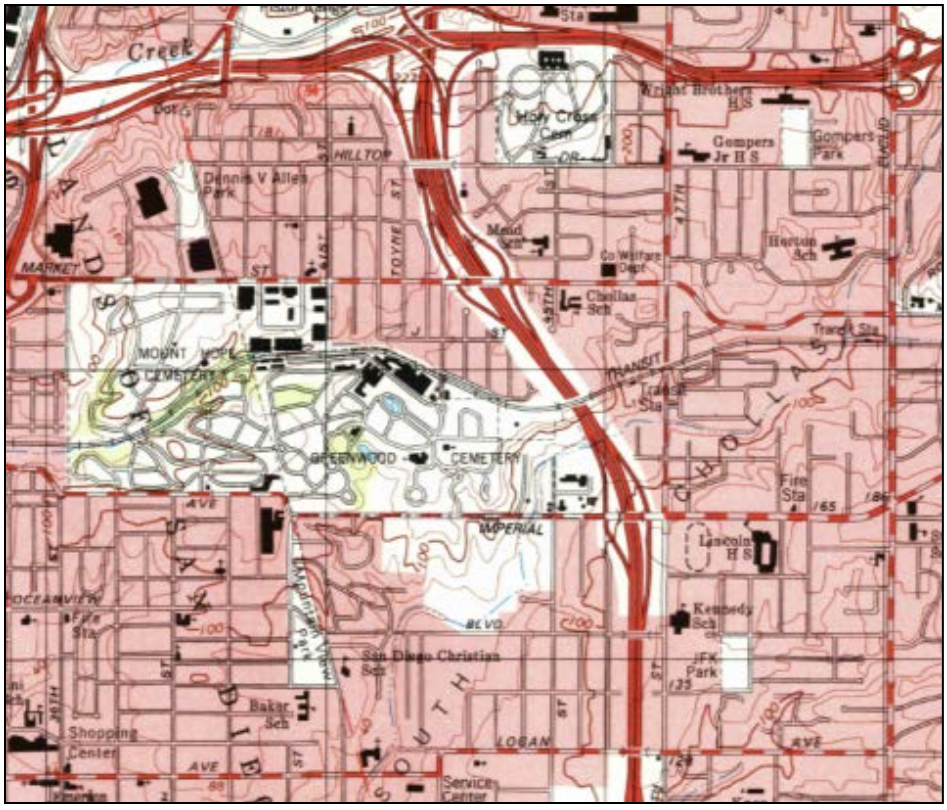
The topography of the area includes a noticeable slope starting west of I-805 and running northeast across the freeway toward Gompers Park (see Images 8-9 and Map 22 below).[217] Such topography can present a barrier to walking and bicycling in the area. The elevation is at 100 feet above sea level around the section of the Trolley tracks that runs through the project area (see Map 23 below). On the west side of the freeway, walking from the Trolley tracks to the north, the elevation increases to 181 feet, while walking to the south from the tracks, the elevation decreases to 40 feet. On the east side of the freeway, walking north away from the tracks toward Gompers Preparatory Academy and Gompers Park, the elevation eventually doubles at 200 feet. Walking south, away from the tracks toward Lincoln High School and John F. Kennedy Park, the elevations increases to 135 feet.

I-805 is a north-south freeway that divides the project area, creating the eastern boundaries of the Mount Hope and Mountain View neighborhoods and the western boundaries of the Chollas View and Lincoln Park neighborhoods. [218] On average, up to 239,400 vehicles travel this stretch of the highway during weekdays (according to SANDAG). [219,220]

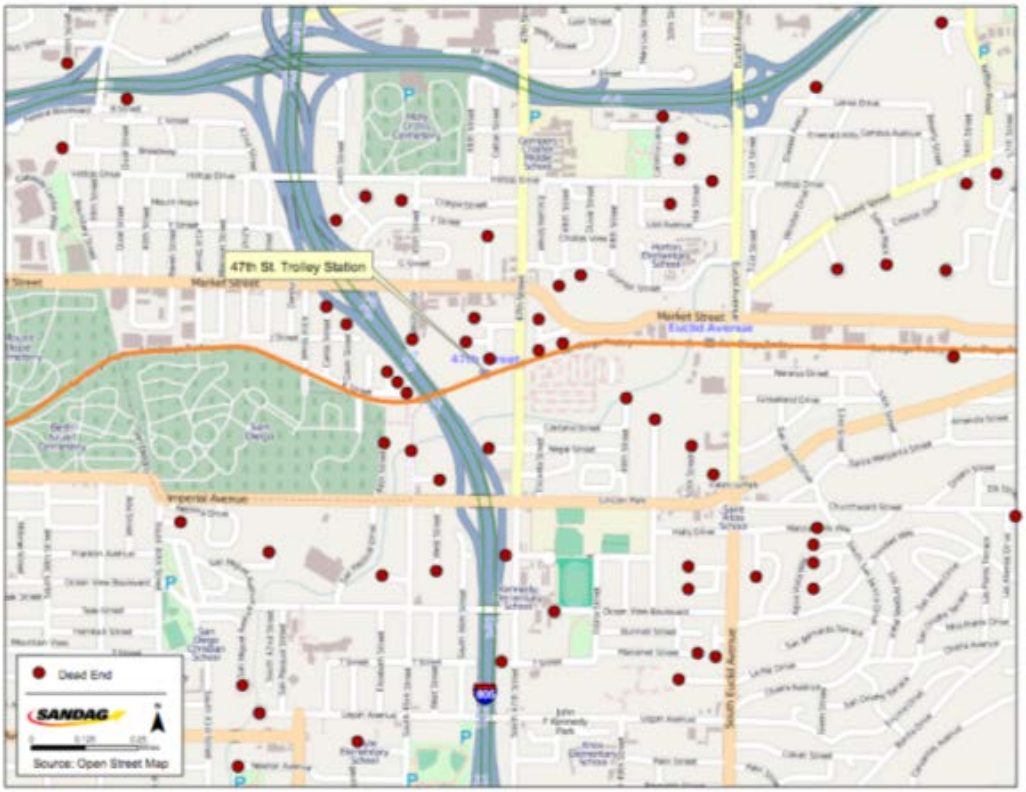
Map 22 - Slopes in the Project Area



Map 23 - Topography in the project area



Map 24 – Dead Ends in the Project Area



The San Diego Orange Line Trolley runs east-west through the project area, creating the northern boundaries of the Mountain View and Lincoln Park neighborhoods, and the southern boundaries of the Mount Hope and Chollas View neighborhoods.[221] While the Trolley helps to increase regional mobility by providing linkages to other parts of San Diego, the presence of the Trolley tracks also creates barriers to residents to access other areas in the neighborhood (see Image 10). Dead-end streets also create discontinuous patterns, which impact walking and biking by creating barriers to accessing trip destinations (see Map 24 above).

IMAGE 10 - 47TH STREET TROLLEY STATION

SOURCE: EUCLID & MARKET LAND USE AND MOBILITY PLAN: EXISTING CONDITIONS ANALYSIS ASSESSMENTS, 2010.

Parking

The Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments stated that there are 129 parking spaces available to the 47th Street Trolley Station, of which three spaces are reserved for disabled parking and five spaces are reserved for short-term (20 minute) parking. The Euclid & Market Land Use and Mobility Plan: Existing Conditions Analysis Assessments also suggests that parking spaces are often underutilized, indicating an opportunity to evaluate parking facilities as part of the BRT Station development. One count, conducted on May 4, 2011, from 10 to 11

a.m., reported that only 50 percent of parking spaces were occupied.[222]

Safety

Evidence also suggests that safety is a contributing factor to non-motorized transportation access and usage. Pedestrian injury counts in the project area due to motor vehicle collisions have decreased over time, from 22 in 2006 to 10 in 2010. Counts of bicyclist injury increased from between 2006 to 2008, but then decreased more recently, from eight injuries in 2008 to four injuries in 2010. In addition, rates of pedestrian, bicyclist, and motor vehicle injuries due to motor vehicle collisions are substantially higher in the project area than in the broader Health and Human Services Agency sub-region. The majority of pedestrian and bicyclist injuries in the project area occur when walkers or cyclists are crossing the street. There are several intersections that need improvement, with one-third of pedestrian injuries involving a walker in a crosswalk, and more than half of bicycle injuries occurring at intersections. It is important to note that injury data represents only collisions reported to law enforcement.

Crime

Crime and violence also have been a defining neighborhood challenge. Currently, violent crime in the project area is more concentrated in the half-mile radius around the 47th Street Trolley Station, which is east of I-805. Residents also do not perceive the area as safe for walking alone at night, although residents in four neighborhoods east of I-805 in the project area indicated in a recent survey that they do perceive the area overall as safe. In addition, data indicates that violent and non-violent crime in the area has decreased in the past decade. Nonetheless, the incidence of crime in the area still remains high compared to the rest of the City.

IMAGE 11: LOOKING WEST OVER I-805

Land Use

The 47th Street BRT Project area includes a mix of housing types, including single-family homes, multi-family homes, and a trailer plaza. The majority of these units are renter-occupied, which reflects the low to moderate median household incomes in the project area. The majority of properties in the area are valued between $200,000 and $500,000. Vacancy rates in the project area exceed those in the City and County, and are particularly high for rental units in the area west of I-805.

A large proportion of children under the age of 15 attend neighborhood schools, which provides an opportunity to increase physical activity by encouraging active travel to schools. In addition, the presence of parks, open space, community centers, and a YMCA in the project area offer opportunities to support health-promoting behaviors, such as physical activity and social interaction. While there are no hospitals in the project area, there are a number of health clinics that serve local residents, including three specialty care clinics and one primary care clinic. The project area has two supermarkets that provide healthy food options to residents. Clearly the largest of those two markets is the Food 4 Less, located at the intersection of Euclid Avenue and

Market Street. However, a number of convenience stores and fast food establishments are located in close proximity to the station area as well.

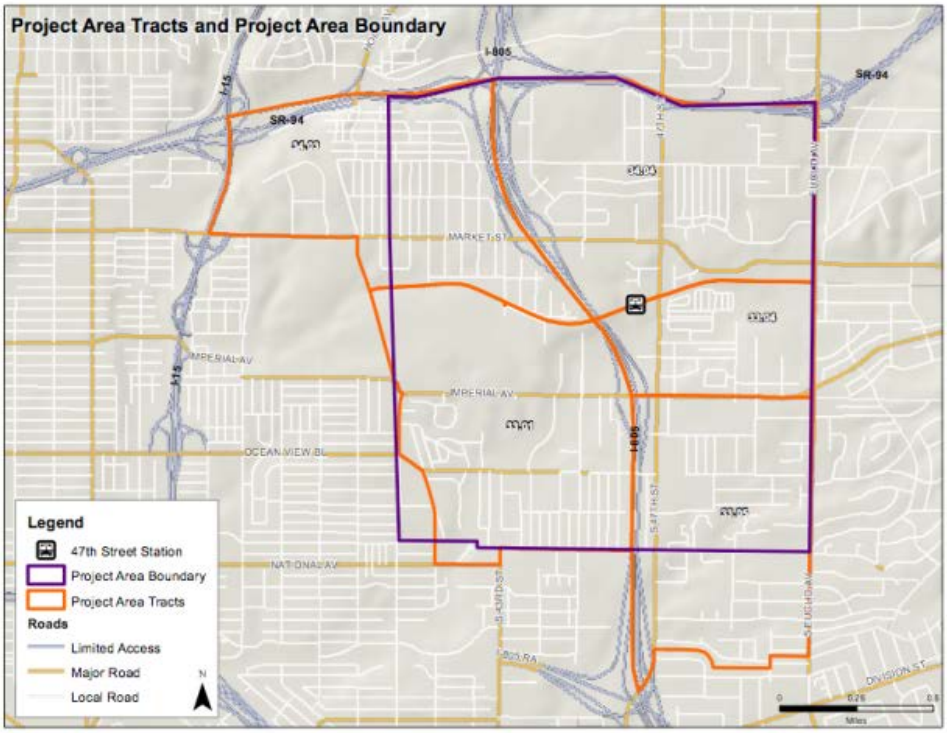
Market analysis suggests increased demand for retail/restaurant and industrial uses in the area in the next five years. Additionally, substantial economic growth is predicted in the region, and if connected by public transit, could offer employment opportunities to local residents. Median household income in the project area is nearly half that of the City and County, and approximately double the number of individuals in the project area live in poverty compared to the County. The job-to-resident ratio in the County is 2.5 times higher than in the project area.

Currently, noise pollution and air quality in the project area meet state and federal standards. Air and noise impacts of the proposed project are discussed further as part of the 47th Street BRT Project HIA.

Demographics

The five relevant Census tracts surrounding the 47th Street Trolley Station area have a total population of 21,555 people (See Map 25 below).

Map 25 - Census Tracts near 47th Street Trolley Station

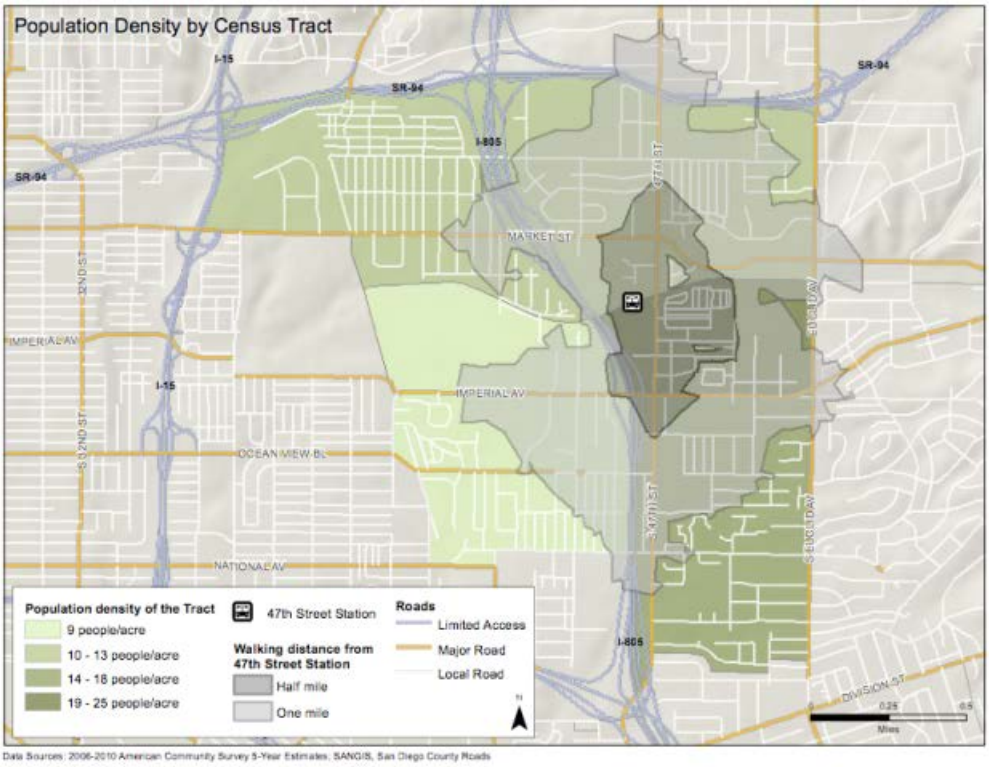


Within the area, nearly two-thirds (64.6 percent) of residents live on the east side of the I-805 freeway (see Table 25, below, and Map 26 below).

TABLE 25
POPULATION, 2010

	West of I-805			East of I-805				Overall
	Tract 33.01	Tract 34.03	Total, west	Tract 33.04	Tract 33.05	Tract 34.04	Total, east	Total of 5 tracts
Total Population	3,337	4,283	7,620	3,563	5,738	4,634	13,935	21,555
Source: U.S. Census, 2010.								

Map 26 - Population Density, 2010



In 2010, the median age of residents in the project area was less than 30 years, and at an average of 27.3 years, was lower than the City and County overall (33.6 and 34.6 years, respectively). Across the five census tracts, more than one-quarter of the population (27.7 percent) was under age 15, exceeding the proportions in the City and County (17.7 percent and 19.3 percent, respectively; see Table 26, below). The 47th Street station is in close proximity to residential areas and eight public schools, with elementary and high schools located closest to the station area. This is noteworthy given the age distribution of the population in the project area.

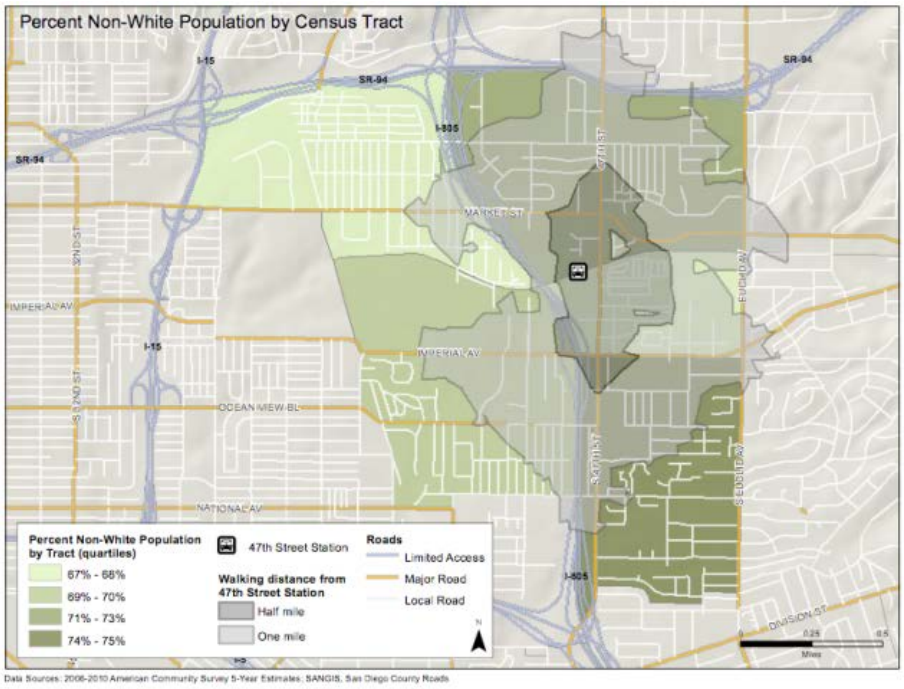
TABLE 26
AGE OF POPULATION (%), 2010

Age	Tract 33.01	Tract 33.04	Tract 33.05	Tract 34.03	Tract 34.04	All 5 Tracts	City	County
Under 5 years	8.5	9.5	8.9	9.5	8.9	9.1	6.2	6.6
5 to 9 years	8.6	10.5	9.1	8.2	9.1	9.1	5.7	6.3
10 to 14 years	9.3	10.6	9.6	9.1	9.0	9.5	5.8	6.4
Under 15 years	26.4	30.6	27.6	26.8	27.0	27.7	17.7	19.3
15 to 19 years	10.2	10.0	10.7	9.5	10.1	10.1	6.9	7.3
20 to 29 years	15.3	14.7	15.9	16.9	16.5	15.9	19.3	16.8
30 to 39 years	14.1	14.1	12.3	14.1	13.3	13.4	15.4	13.9
40 to 49 years	12.8	13.7	12.6	12.9	12.4	12.8	13.6	13.9
50 to 59 years	10.7	8.2	10.1	9.4	10.2	9.8	11.8	12.6
60 to 69 years	5.2	4.7	5.3	5.4	5.6	5.3	7.7	8.2
70 years and above	5.3	4.0	5.7	4.9	4.7	5.0	7.5	8.0
Median age	28.5	25.9	26.9	27.9	27.5	27.3	33.6	34.6

Source: U.S. Census, 2010.

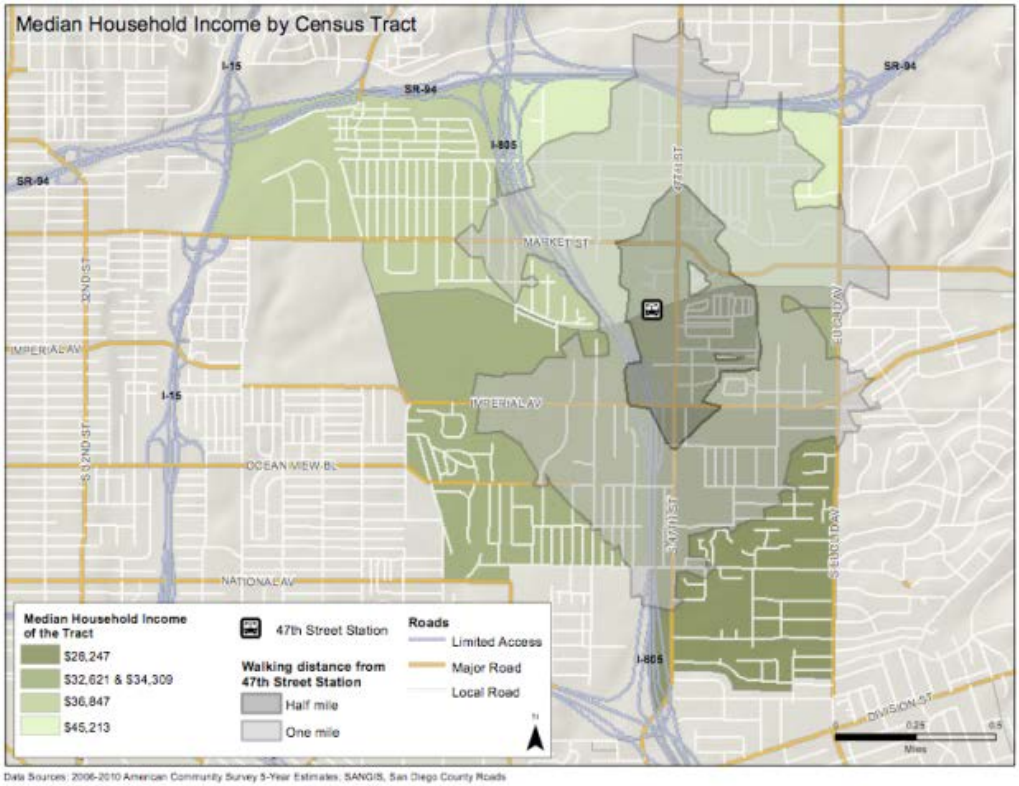
As of 2010, approximately 70 percent of residents were minority populations, as depicted in Map 27, below. That proportion was substantially higher than in the City overall (41.1 percent) and nearly double that in the County (36.0 percent). Across the five Census tracts that comprise the project area, nearly two-thirds (64.4 percent) of the population identified as of Hispanic descent, which the Census counts separately from race/ethnicity. Among the race/ethnicity categories available, more people identified as "some other race" (34.2 percent), followed by White (28.9 percent), Black or African American (21.2 percent), and Asian (9.7 percent).

Map 27 - Race/Ethnicity or Descent of Population (%), 2010



The median household income in the project area was approximately $35,000 in 2010 (see Map 28 below). This was nearly 45 percent lower than that of the City and County, both of which were estimated at around $63,000.

Map 28 - Estimated Median Household income (in $2010), 2006-2010



Similarly, an estimated 25.5 percent of residents in the project area were living below the poverty level, which was approximately three-quarters more than the City and more than two times that of the County (see Table 27, below). The Census determines an amount below which individuals, families, or households are considered to be in poverty. The amount varies by size of family and number of related children, and changes from year to year. For example, in 2010, a family of three with one related child under 18 years was considered below the poverty level if the household income was under $17,552.[223] Households are considered to be in poverty if the total income of the householder's family is below the respective threshold. Definitions of poverty are important in describing the characteristics of an area's population, and because many grant programs define funding eligibility as incomes that fall at or below 150 percent of the federal poverty level.

TABLE 27
INDIVIDUALS WITH INCOME IN THE PAST 12 MONTHS BELOW POVERTY LEVEL (%), 2006-2010

	Tract 33.01	Tract 33.04	Tract 33.05	Tract 34.03	Tract 34.04	All 5 Tracts	City	County
Individuals below poverty (%)	22.8	21.4	31.0	30.4	19.7	**25.1**	14.1	12.3
Source: American Community Survey, 2006-2010.								

Disability data are unavailable at the project area level for 2010. However, 2000 Census data indicates that a greater proportion of individuals in the project area (25.0 percent) have a disability compared to individuals in the City (17.7 percent) or County (17.9 percent).[224] The gap is pronounced when looking at data by age. With each age category, the differences between the project area and both the City and County got larger (see Table 28, below).

TABLE 28
INDIVIDUALS WITH A DISABILITY (%), 2000

Population with a disability by age	Tract 33.01	Tract 33.02	Tract 34.03	Tract 34.04	4-Tract Area**	City	County
5 to 15 years	4.5	5.7	5.6	6.0	5.6	4.5	4.7
16 to 64 years	24.0	30.9	27.5	30.2	29.0	17.0	17.3
65 years and above	75.4	53.3	53.1	58.5	58.3	41.3	40.8
Total	23.9	25.5	23.7	26.2	25.0	17.7	17.9

** Total civilian, non-institutionalized individuals.*
*** The project area corresponds to 4 tracts in the 2000 Census, compared to 5 tracts in the 2010 Census.*
Source: U.S. Census, 2000.

Health Status

The following will describe the health status data related to chronic conditions, including asthma, diabetes, coronary heart disease, chronic obstructive pulmonary disease, obesity, physical activity, fruit and vegetable consumption, premature mortality, low birth weight birth, mental health as well as information on insurance coverage. Increasingly, inter-disciplinary research indicates that the "built environment" (e.g., land use, transportation systems, and community design) is associated with chronic health conditions, in particular asthma, diabetes, and obesity (a risk factor for coronary heart disease) as well as these other health status indicators.[225] Due to limited data resources, the following health status data reflect outcomes for a larger geographic area than the project area.

Health statistics for the area depict high rates of potentially preventable chronic diseases. Rates of asthma, diabetes, and coronary heart disease are higher in the Health and Human Services Agency's Southeastern San Diego sub-region compared to the broader Central Region. A greater proportion of teens and adults, but a smaller proportion of children, in the Central Region is overweight or obese compared to the County at large. Rates of chronic obstructive pulmonary disease have decreased substantially in the Southeastern San Diego area, and most recently dipped below Central Region levels.

Additionally, moderate or vigorous physical activity and high fruit and vegetable consumptions are two behaviors that help prevent a number of chronic health conditions. Compared to the County, physical activity levels in the Central Region are lower among youth, higher among teens, and about equal among adults. Nearly half of children and adults in this region eat the recommended five or more servings of fruit and vegetables per day. However, only about one-fifth of teens in the region consume that amount. Low birth-weight births, which can impact health later in life, have held steady in recent years for both the Southeastern San Diego sub-region and broader Central Region, which have approximately similar prevalence. Recent data estimate that 14 percent to 24 percent of County residents under age 64 do not have health insurance.

Asthma

An estimated 40 million Americans have been diagnosed with asthma (see Appendix B for more information).[226] Rates of asthma hospitalizations and emergency department (ED) discharges in the Southeastern San Diego sub-region exceed rates for the larger Central Region overall, according to a recent Health and Human Services data report.[227] In 2008, sub-regional rates of both indicators were approximately one-third higher than for the Central Region overall (145.7 vs. 107.7 hospitalizations per 100,000 population, and 597.7 vs. 470.1 asthma ED discharges per 100,000 population) (see Tables 29 and 30, below).

TABLE 29
ASTHMA HOSPITALIZATION RATES, 2000-2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern San Diego)*	161.3	166.4	165.7	162.2	140.8	143.8	137.6	122.3	145.7
Rate, HHSA Central Region*	133.5	149.4	140.8	142.0	123.6	110.7	101.8	104.8	107.7

**rates per 100,000 population.*
Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.

TABLE 30
ASTHMA EMERGENCY DEPARTMENT DISCHARGE RATES, 2006-2008

	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern San Diego)*	663.9	506.7	597.7
Rate, HHSA Central Region*	491.2	462.8	470.1

**rates per 100,000 population.*
Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.

In California, minorities and low-income populations bear a disproportionate share of the asthma burden.[228] In San Diego County, rates of ED visits are 3.75 times higher among Blacks than non-Hispanic Whites, hospitalization rates are about 3.5 times higher, and death rates are about 3.3 times higher.[229] In 2009, total asthma prevalence was lower in the County than for the state overall. However, prevalence for children ages 0-4 was higher in the County than for the state overall, according to the California Department of Public Health's California Breathing Program (see Table 31, below).[230]

TABLE 31
AGE-ADJUSTED ASTHMA RATES IN SAN DIEGO COUNTY, BY RACE/ETHNICITY OR DESCENT

Race/ethnicity or descent	Asthma emergency department discharge rate (2008)	Asthma hospitalization rate (2008)	Asthma death rate (2007)
Black	867.7	217.0	3.0
Hispanic	310.2	74.5	0.7
White	230.8	61.3	0.9
API/Other*	224.0	61.5	1.1

**API/Other includes Asian, Pacific Islanders, those reporting 2 or more race/ethnicities, other, or had missing information.*
Source: HHSA, San Diego Community Profiles, 2010.

A study in San Diego and Los Angeles counties reported that children with asthma living in high ozone and particulate matter 10micrograms (PM10) areas experienced asthma symptoms more frequently than those living in less polluted neighborhoods.[231] Children with asthma living close to heavy traffic also report more ED visits and hospitalizations than those with less traffic near their home (see Table 32, below).[232]

TABLE 32
LIFETIME ASTHMA PREVALENCE IN SAN DIEGO COUNTY, 2009

Age	County	CA
Children, Ages 0-4	8.6 (3.6-13.7)	7.7 (6.2-9.2)
Children, Ages 5-17	16.1 (13.0-19.2)	16.2 (14.9-17.6)
Adults, Ages 18-64	12.2 (10.1-14.2)	13.8 (12.9-14.7)
Adults, Ages 65+	8.4 (6.9-10.0)	11.8 (11.0-12.7)
Total, Ages 0-17	14.2 (11.6-16.9)	14.2 (13.1-15.3)
Total, Ages 18+	11.6 (9.8-13.4)	13.5 (12.8-14.3)
Total, All ages	12.3 (10.8-13.8)	13.7 (13.1-14.3)
Source: California Breathing, May 2011.		

Diabetes

Diabetes is the seventh leading cause of death in the U.S. (see Appendix B for more information).[233] Both hospitalizations and ED discharge rates for diabetes are higher in the sub-regional Southeastern San Diego area than the larger Central Region. In 2008, diabetes hospitalization rates were approximately 27 percent higher and diabetes ED discharge rates were 17 percent higher. Notably, diabetes hospitalization rates in the sub-regional area have risen since 2004, with a particularly large increase of nearly 23 percent from 2006 to 2007. The rate the following year, in 2008, remained at approximately the same high level (see Tables 33 and 34, below).

TABLE 33
DIABETES HOSPITALIZATION RATES, 2000-2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern SD)*	193.3	155.0	178.4	183.2	169.5	183.3	186.8	229.1	227.5
Rate, HHSA Central Region*	163.9	141.0	151.9	154.9	145.5	160.8	168.4	185.4	179.9
**rates per 100,000 population.* *Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.*									

TABLE 34
DIABETES EMERGENCY DEPARTMENT DISCHARGE RATES, 2006-2008

	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern San Diego)*	229.8	199.3	243.5
Rate, HHSA Central Region*	208.3	183.9	207.8
**rates per 100,000 population.* *Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.*			

In San Diego County, age-adjusted diabetes rates are higher among Blacks than Whites – 3.5 times greater for ED discharges, more than 13 times greater for hospitalization, and nearly 3 times greater for death. Similarly, rates are higher among Hispanics compared to Whites – 2 times greater for ED discharges, nearly 2.5 greater times for hospitalization, and nearly 2 times greater for death (see Table 35, below).

TABLE 35
AGE-ADJUSTED DIABETES RATES IN SAN DIEGO COUNTY, BY RACE/ETHNICITY OR DESCENT

Race/ethnicity or descent	Diabetes emergency department discharge rate (2008)	Diabetes hospitalization rate (2008)	Diabetes death rate (2007)
Black	395.2	332.0	40.7
Hispanic	223.9	231.3	27.5
White	111.4	98.1	14.5
API/Other*	101.5	93.6	18.3

**API/Other: Asian, Pacific Islanders, those report 2 or more race/ethnicities, other, or had missing information.*
Source: HHSA, San Diego Community Profiles, 2010.

Coronary Heart Disease

Coronary heart disease is the leading cause of death in the U.S. (see Appendix B for more information).[234] In 2008, coronary heart disease rates were slightly higher in the Southeastern San Diego sub-region compared to the HHSA Central Region, 1.3 times higher for hospitalizations, and 1.1 times higher for ED discharges (see Tables 36 and 37, below).

TABLE 36
CORONARY HEART DISEASE HOSPITALIZATION RATES

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern SD)*	524.7	479.5	479.9	472.7	451.7	413.1	363.1	340.9	386.2
Rate, HHSA Central Region*	471.7	441.3	426.2	417.6	381.8	360.0	319.4	295.6	297.6

**rates per 100,000 population.*
Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.

TABLE 37
CORONARY HEART DISEASE EMERGENCY DEPARTMENT DISCHARGE RATES, 2006-2008

	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern San Diego)*	21.2	18.6	22.1
Rate, HHSA Central Region*	28.9	23.6	20.3

**rates per 100,000 population*
Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.

In San Diego County, age-adjusted coronary heart disease rates were higher among Blacks when compared to Whites – approximately 1.7 times higher for ED discharges, and nearly 1.5 times higher for both hospitalization and death. Compared to Whites, rates among Hispanics were approximately the same for ED discharges, 1.25 times higher for hospitalization, and were lower (0.8 times) for death (see Table 38, below).

TABLE 38
AGE-ADJUSTED CORONARY HEART DISEASE RATES IN SAN DIEGO COUNTY
BY RACE/ETHNICITY OR DESCENT

RACE/ETHNICITY OR DESCENT	CORONARY HEART DISEASE EMERGENCY DEPARTMENT DISCHARGE RATE (2008)	CORONARY HEART DISEASE HOSPITALIZATION RATE (2008)	CORONARY HEART DISEASE DEATH RATE (2007)
Black	44.2	447.8	179.0
Hispanic	27.5	382.3	94.1
White	26.7	308.2	118.8
API/Other*	21.8	338.7	68.4

*API/Other includes Asian, Pacific Islanders, those reporting two or more race/ethnicities, other, or had missing information.
Source: HHSA, San Diego Community Profiles, 2010.

Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the U.S. (see Appendix B for more information).[235] In the HHSA sub-region of Southeastern San Diego, hospitalization rates for COPD decreased by more than 35 percent between 2000 and 2008. Rates in the sub-region have fluctuated over the years compared to the broader Central Region. Most recently, in 2008, sub-regional rates were slightly lower than those of the broader region (109.5 vs. 111.2 hospitalizations per 100,000 populations). Similar to hospitalizations, COPD ED discharges in the sub-region have fluctuated compared to the broader Central Region. In 2007, sub-regional rates were lower than in the Central Region. However, in 2008, they were 4 percent higher than in the Central Region (see Tables 39 and 40, below).

TABLE 39
COPD HOSPITALIZATIONS RATES, 2000-2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern SD)*	150.4	148.7	133.3	136.2	105.7	118.0	112.7	100.0	109.5
Rate, HHSA Central Region*	157.8	150.8	137.9	130.9	108.7	98.2	99.8	107.4	111.2

**rates per 100,000 population.*
Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.

TABLE 40
COPD EMERGENCY DEPARTMENT DISCHARGE RATES, 2006-2008

	2006	2007	2008
Rate, HHSA Sub-regional area 5 (Southeastern San Diego)*	290.8	204.9	304.4
Rate, HHSA Central Region*	270.5	240.4	292.7
**rates per 100,000 population.* *Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.*			

Obesity

While obesity and physical activity are not ambulatory care sensitive conditions, they are related to a number of conditions, including coronary heart disease, type-II diabetes, as well as some cancers and high blood pressure.[236] For the 2007 Jacobs Family Foundation and Center for Neighborhood Innovation Quality of Life Survey, residents ranked obesity as their third greatest concern, followed by drugs and alcohol.[237] According to the 2009 California Health Interview Survey (CHIS) a greater proportion of teens and adults in the HHSA Central Region were overweight or obese compared to San Diego County. However, a smaller percentage of youth in the Central Region, compared to the County, were considered overweight for their age (see Tables 41-43, below).

TABLE 41
BODY MASS INDEX AMONG ADULTS (%), 2009

	Adults (ages 18 and over)	
	County	Central Region
Overweight (25.0-29.9)	33.4	34.6
Obese (30.0 or higher)	21.9	29.3
Source: CHIS 2009.		

TABLE 42
BODY MASS INDEX AMONG TEENS (%), 2009

	Teens (ages 12-17)	
	County	Central Region
At risk of overweight (85th up to 95th percentile)	9.8	10.4
Overweight/obese (top 5th percentile)	11.6	19.3
Source: CHIS 2009.		

TABLE 43
OVERWEIGHT FOR AGE AMONG CHILDREN (%), 2009

	Children (ages under 11)	
	County	Central Region
Overweight for age	9.8	7.6**
**Does not factor height Source: CHIS 2009.* ***Not statistically stable.*		

Data at a smaller geographic level are available from the 2010-2011 California Healthy Kids Survey (CHKS) and 2009 Youth Risk Behavior Surveillance System Survey (YRBSS), although are representative only of those who attended school and completed the surveys.[238] YRBSS reported that from 2001-2009, one-quarter of high school students in San Diego were overweight or obese. The 2010-2011 CHKS report provided information on body image among 5th grader survey participants in San Diego County schools. According to the report, 16 percent felt they were too fat and nearly half said they were doing something to try to lose weight (see Tables 44 and 45, below).

TABLE 44
OBESE OR OVERWEIGHT HIGH SCHOOL STUDENTS (%), 2001-2009

	Overweight	Obese
9th-12th graders in San Diego county	14	12
**Overweight or obesity status were based on body mass index calculated from self-reported weight and height* *Source: YRBSS, 2010.*		

TABLE 45
BODY IMAGE AMONG 5TH GRADERS (%), 2010-2011

	Feel too fat	Trying to lose weight
5th graders in San Diego county schools	15	47
Source: CHKS, 2012.		

Fruit and Vegetable Consumption

Adequate fruit and vegetable consumption can decrease risk of chronic diseases. Compared with people who consume a diet with only small amounts of fruits and vegetables, those who eat more generous amounts as part of a healthful diet are likely to have reduced risk of chronic diseases, including stroke and perhaps other cardiovascular diseases and certain cancers.[239] Recent data from CHIS (dated 2009 for children and teens and 2005 for adults) on fruit and vegetable consumption suggests that nearly half of children and adults both in the County and HHSA Central Region eat the recommended five or more servings of fruit and vegetables per day. However, only about one-fifth of teens in both the County and Central Region consume as much (see Table 46, below).

TABLE 46
FRUIT AND VEGETABLE CONSUMPTION (%), 2009

	Children (ages under 11)		Teens (ages 12-17)		Adults (ages 18 and over)	
	County	Central Region	County	Central Region	County	Central Region
Eat 5 or more servings of fruit and vegetables per day	47.1	46.7	22.4	21.8	46.5	48.3
Source: CHIS, 2009.						

Physical Activity

Physical activity may help to maintain weight; reduce high blood pressure; reduce risks for type-II diabetes, heart attack, stroke, and several forms of cancer; reduce arthritis pain and associated disability; reduce risk for osteoporosis and falls; and reduce symptoms of depression and anxiety.[240]

In 2007, 64 percent of respondents from the Jacobs Family Foundation and Center for Neighborhood Innovation Quality of Life Survey reported exercising regularly.[241] CHKS data from a 2010-2011 survey of students at San Diego County schools reports that 58 percent of 5th grade students said they engaged in exercise, dance, or sports five or more days each week.[242] However, the level of physical activity also is important. Among a representative sample of all children in the County and Central Region, CHIS data from 2007 reported that nearly three-quarters of children in the County, but less than two-thirds of children in the Central Region, engaged in vigorous physical activity at least three days per week. The reverse trend was found among teens, where two-thirds in the County and nearly three-quarters in the Central Region achieved that level. The same data reported that 37.3 percent of adults in the County and 38.5 percent of adults in the HHSA Central Region achieve moderate or vigorous physical activity levels (see Tables 47-49, below).

TABLE 47
PHYSICAL ACTIVITY AMONG 5TH GRADERS IN SAN DIEGO COUNTY SCHOOLS (%), 2010-2011

	Number of days per week						
	0 days	**1 day**	**2 days**	**3 days**	**4 days**	**5 days**	**6-7 days**
Percentage of students who exercise, dance, or play sports	3	4	8	14	14	19	39
Source: CHKS, 2012.							

TABLE 48
PHYSICAL ACTIVITY AMONG CHILDREN AND TEENS (%), 2007

	Children (ages under 11)		**Teens (ages 12-17)**	
	County	Central Region	County	Central Region
Vigorous physical activity at least 3 days/week	72.5	61.3	66.6	73.0
Source: CHIS, 2007.				

TABLE 49
PHYSICAL ACTIVITY AMONG ADULTS (%), 2007

	County	**Central Region**
No physical activity	13.6	10.0
Some physical activity	49.0	51.5
Moderate physical activity	17.2	16.8
Vigorous physical activity	20.1	21.7
Source: CHIS, 2007.		

Premature Mortality

People who die younger than the age of their life expectancy are considered to have died prematurely. For example, a person who is expected to live to 75 years of age, but dies at age 63, would be considered to have 12 years of potential life lost (YPLL), while a person who lives to age 80 will have exceeded life expectancy and not lose any years of potential life. Data are unavailable for the project area, but are available for YPLL before age 75 in the state of California, by race/ethnicity or descent, and for San Diego County. Rates of YPLL in San Diego County remained lower than for the state overall. By race/ethnicity or descent, state-level rates in 2007 were highest among Blacks and lowest among Asians (see Tables 51 and 51, below).

TABLE 50
YEARS OF POTENTIAL LIFE LOST-75, BY RACE/ETHNICITY OR DESCENT FOR CALIFORNIA, 2000-2007

Race/ethnicity or descent	2000	2001	2002	2003	2004	2005	2006	2007	Crude
Total	6,224.1	6,210.9	6,106.3	6,184.4	5,947.4	5,911.5	5,815.5	5,641.7	5,720.8
White	6,395.1	6,511.3	6,400.4	6,381.3	6,178.3	6,020.7	5,888.4	5,717.9	6,505.3
Black	12,407.7	12,567.9	12,629.3	12,551.3	12,419.9	12,546.8	11,750.6	11,334.6	11,340.2
American Indian	7,283.0	8,144.7	7,708.7	7,745.5	7,773.4	7,609.4	6,659.9	6,661.3	6,746.5
Asian	3,751.7	3,740.6	3,610.9	3,658.9	3,448.2	3,400.1	3,268.7	3,325.1	3,475.9
Pacific Islander	10,207.8	9,796.5	8,654.9	10,183.4	9,841.1	9,743.7	8,827.1	8,988.8	8,864.3
Two or more races	1,727.3	1,303.9	1,501.1	2,954.3	3,009.2	2,936.0	3,967.2	4,435.5	3,581.7
Hispanic	5,466.6	5,426.4	5,314.9	5,513.1	5,211.0	5,353.5	5,329.7	5,100.2	4,688.2

**Age-adjusted.*
Source: California Department of Public Health, Center for Health Statistics, 2009.

TABLE 51
YEARS OF POTENTIAL LIFE LOST-75 FOR SAN DIEGO COUNTY, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007	Crude
Total	5,974.1	5,861.5	5,539.8	5,585.5	5,558.8	5,311.0	5,159.2	5,253.0	5,327.2

**Age-adjusted.*
Source: California Department of Public Health, Center for Health Statistics, 2009.

Low Birth Weight Births

Babies born at a low birth weight can have 20 times the risk of dying as those born at weights above 5.5 lbs.;[243] being born at a low birth weight can lead to health problems, such as poor lung development, cerebral palsy, and learning disabilities.[244] Access to early and regular prenatal care is a key factor in preventing low birth weight. However, for low-income and high-risk pregnant women, this is often hindered by a number of economic and social barriers, including a lack of transportation to and from healthcare providers.[245] In 2007, greater than 7 percent of live births in the Southeastern San Diego sub-regional area were low birth weight births (defined as less than 2500 grams at birth). The proportion of births is approximately the same as for the Central Region overall, and in both the sub-region and broader region, percentages continue to hold (see Table 52, below).

TABLE 52
LOW BIRTHWEIGHT BIRTHS (%), 2000-2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008
HHSA Sub-region 5 (Southeastern San Diego)*	7.4	7.5	7.1	6.9	7.5	7.9	7.4	7.3	n/a
HHSA Central Region	6.8	6.9	6.5	7.2	6.9	7.4	7.0	7.5	7.0

** % is proportion of sub-regional area's births.*
Sources: San Diego HHSA, Subregional Profiles; San Diego HHSA, San Diego Community Profiles.

As across the U.S., African Americans in the HHSA Central Region bear a disproportionate burden of low birth weight births, with nearly double the rate as other racial/ethnic groups. In the Central Region in 2008, 11.4 percent of births to African-American mothers were low birth weight, compared to 6.1 percent among Whites and 5.7 percent among Hispanics (see Table 53, below).

TABLE 53
PERCENT OF LOW BIRTHWEIGHT BIRTHS, BY RACE/ETHNICITY/DESCENT IN HHSA CENTRAL REGION, 2000-2009

Race/ethnicity or descent	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
African-American	11.3	11.5	11.2	11.1	11.7	11.0	11.6	12.2	11.4	10.8
Asian	7.4	7.2	7.1	8.1	7.0	7.5	7.7	8.5	7.6	8.5
Hispanic	5.3	5.5	5.3	5.3	5.7	5.9	5.5	6.2	5.7	6.0
Native American/Alaskan	3.4	6.8	6.3	5.4	5.8	6.3	8.7	4.1	8.6	6.3
Pacific Islander	4.7	4.3	7.5	8.8	5.4	7.9	6.3	7.9	6.8	7.6
White	5.7	5.6	5.8	5.7	6.2	6.7	6.3	6.1	6.1	5.9
Other	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Two or more races	7.2	6.8	8.1	7.8	7.5	6.5	8.9	7.3	6.9	6.3
Unknown	13.0	9.5	8.8	9.5	7.9	8.7	9.2	9.8	9.9	9.1

** % is proportion of live births that were low birthweight.*
Source: San Diego HHSA, Public Health Services, Maternal, Child & Family Health Services.

Mental Health

Mental health disorders can be disabling conditions in terms of premature death and lost productivity. Individuals struggling with these disorders often experience barriers to care, such as income, insurance coverage, stigma, or lack of awareness of treatment.[246] Data from the 2009 CHIS reports that, among adults who experienced psychological distress, approximately 40 percent in the County and Central Region were unable to work for one week or more during the past year, due to mental health problems. Among teens both in the County and Central Region, proportions are very low for those who likely had psychological distress in the past month (see Tables 54 and 55, below).

TABLE 54
INABILITY TO WORK AMONG ADULTS EXPERIENCING PSYCHOLOGICAL DISTRESS (%), 2009

Number of days unable to work due to mental health	County	Central Region
Able to work all days	33.0	29.1
Unable to work 7 days or less	10.5	11.5**
Unable to work 8 to 30 days	21.7	20.3
Unable to work 31 days to 3 months	9.8	21.0
Unable to work more than 3 months	25.0	18.1

**Adults includes ages 18 and over Source: CHIS 2009.*
**Statistically unstable*

TABLE 55
PSYCHOLOGICAL DISTRESS AMONG TEENS (%), 2009

	County (%)	Central Region (%)
Likely had serious psychological distress during past month	2.2	2.0

**Teens includes ages 12-17.*
Source: CHIS 2009.

At a smaller geographic level, the 2010-2011 CHKS provided data on mental distress among students at San Diego County schools who completed the survey.[247] Results suggested that at some time during the past 12 months, approximately one-third of respondents in middle and high school felt sad or hopeless almost every day for two weeks or more and stopped doing their usual activities (see Table 56, below).

TABLE 56
SAD OR HOPELESS FEELINGS AMONG TEENS IN SAN DIEGO COUNTY SCHOOLS (%), 2010-2011

	GRADE 7	GRADE 9	GRADE 11	NT*
At some time during past 12 months, respondents felt sad or hopeless almost every day for two weeks or more and stopped doing some usual activities.	30	30	33	37

* NT includes continuation, community day, and other alternative school types.
Source: CHKS, 2012.

Insurance Coverage

Lack of health insurance is associated with reduced use of preventive services and medical treatment, particularly among racial/ethnic minorities.[248] Chronically ill patients without insurance are more likely than those with coverage not to have visited a health-care professional and either not have a standard site for care or identify their standard site of care as an emergency department. Recent CHIS data estimates that 13.9 percent of people under age 64 living in San Diego County are uninsured, although some sources estimate as much as 22.9 percent of the County's under-64 population is uninsured (see Table 57, below).[249]

TABLE 57
INSURANCE COVERAGE AMONG CHILDREN, TEENS, AND ADULTS (%), 2009

	Children (ages under 11)		Teens (ages 12-17)		Adults (ages 18 and over)		Ages 0-64
	County	Central Region	County	Central Region	County	Central Region	County
Currently covered by insurance	95.4	90.7	95.6	94.3	84.8	80.8	86.1
Source: CHIS, 2009.							

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