Pittsburg Railroad Avenue Specific Plan
Health Impact Assessment

Human Impact Partners
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HUMAN IMPACT PARTNERS

Contributors

Human Impact Partners (HIP) conducted the Pittsburg Railroad Avenue Specific Plan Health Impact Assessment (HIA) in collaboration with the Transportation and Land Use Coalition (TALC) and the Contra Costa Interfaith Supporting Community Organization (CCISCO). The Human Impact Partners' project team was led by Kim Gilhuly and Rajiv Bhatia and included research support from Celia Harris, Eunice Lee, and Terry Minjares. Edmund Seto, from the University of California School of Public Health, also contributed research to the air quality and noise sections. Ann Cheng, from TALC, provided an analysis of vehicle trip generations. Chris Schildt and Jeff Hobson, from TALC, contributed to the screening and scoping phases of the HIA and reviewed the assessment. Oliba Cardones, a CCISCO organizer, and Adam Kruggel, CCISCO's director, participated in the screening and scoping phases of the HIA and led the community mobilization.

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Pittsburg Railroad Avenue Specific Plan Health Impact Assessment

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PITTSBURG RAILROAD AVENUE SPECIFIC PLAN HEALTH IMPACT ASSESSMENT

OVERVIEW AND SUMMARY

Health Impact Assessment (HIA) describes a process to inform policy-makers about how policies, plans, programs, or projects can affect the health of populations. Incorporating diverse research methods and tools, HIA is increasingly used throughout the world to help inform and shape healthy public policy. HIA considers environmental, social and economic determinants of health comprehensively and also adds a focus on beneficial effects and environmental justice. In the United States the practice of HIA has focused on land use and transportation policy, in part because of the emerging evidence linking health to the built environment.

The Pittsburg Railroad Avenue Specific Plan is an example of Transit Oriented Design (TOD). Both environmentalists and transportation planners view TOD as a way to prevent worsening of the environmental impacts of urban sprawl and an automobile dependent society. However, TOD is also a strategy to address transportation-related public health issues such air pollution, noise, and traffic injuries, to establish neighborhood infrastructure and services conducive to healthy living, and to support health equity. Overall, TOD and land use planning in general, share a broad nexus with the interests of public health.

HIA can be integrated into a land use and transportation planning process at many levels, either through environmental impact assessment or as an independent assessment. Human Impact Partners (HIP) conducted this Health Impact Assessment on the Pittsburg Railroad Avenue Specific Plan in parallel with the specific plan process and in collaboration with both the Transportation and Land Use Coalition (TALC) and the Contra Costa Interfaith Supporting Community Organization (CCISCO). This executive summary provides a description of the context of the Specific Plan; a brief outline of the HIA process; and a synthesis of the key findings and recommendations that emerged from an analysis of the plan's impacts on housing, livelihood, transportation, air quality, noise, and retail services.

Elements of the Pittsburg Railroad Avenue Specific Plan

- BART station at Railroad Avenue
- 1,590 units of housing, of which at least 15% must be affordable housing
- 446,000 square feet of retail, commercial, and office space with street level retail below neighborhood residential as well as corridors of light industrial, office space only, and primarily retail
- 2,385 residential parking spaces and 3,986 commercial/office/retail parking spaces, of which approximately 350 will be dedicated for BART parking
- Approximately 5 acres of small public-serving spaces
- Pedestrian and biking improvements

CONTEXT AND PROJECT DESCRIPTION

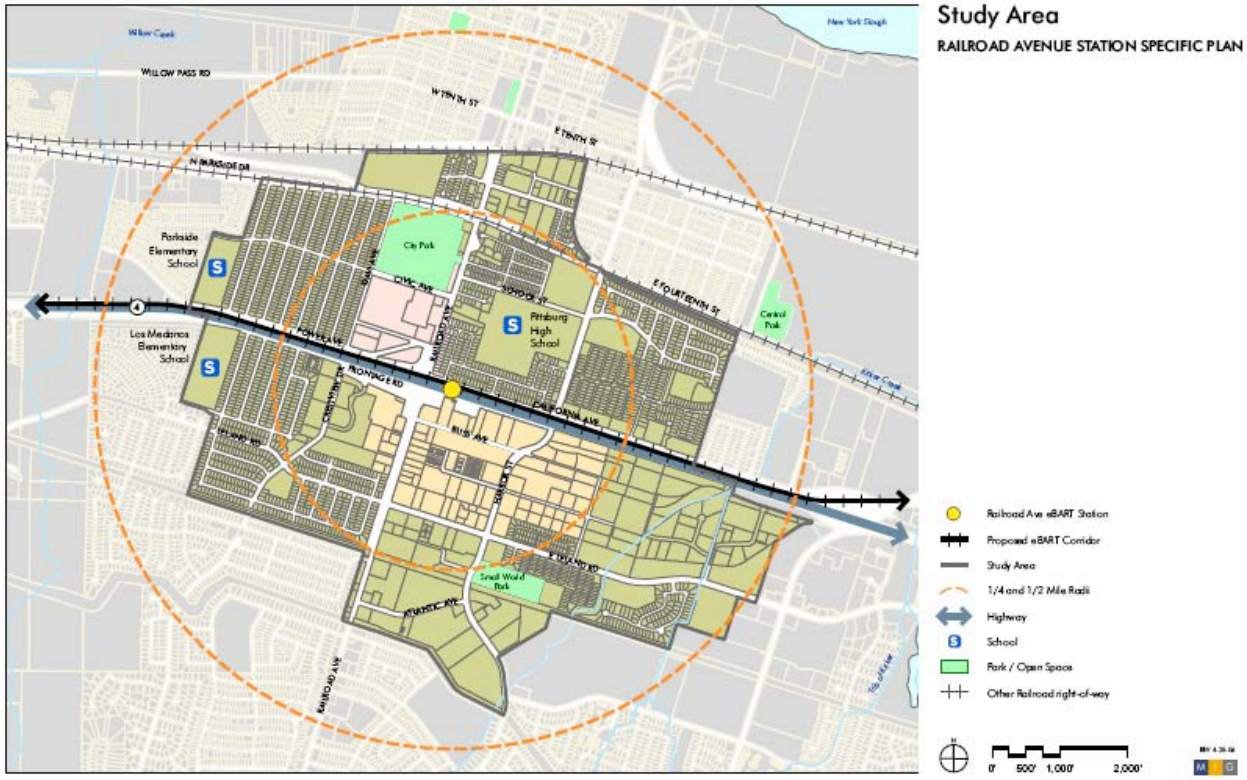
Pittsburg, California is a suburb in the San Francisco Bay Area. Pittsburg has a history of being a working class factory town, a mecca for fisherman, and a haven for new residents of the United States. The latter is still true; according to the US Census 2000, there are more Latinos in Pittsburg than any other ethnicity (32.2% Latino, 31.2% white, 19% Black, and 13% Asian).

In 2000, Pittsburg had a population of 56,859 (US Census 2000). Due to surging housing prices in San Francisco and beyond, this once small, semi-rural city is experiencing a growth in population and a demand for development for both commercial and residential uses. Over the next 20 years, Pittsburg is projected to grow by 15%, which is substantially higher than the regions growth rate overall. Pittsburg continues to attract manufacturing and industry, but as of late has also attracted a fair amount of white collar workers seeking affordable housing.

Eighty-one percent of the people who live in Pittsburg travel outside the city to work, with an average one-way commute time of 37 minutes. In 1999, the Bay Area Rapid Transit (BART) District adopted a System Expansion Policy, proposing an extension of BART through eastern Contra Costa County, parallel to State Route 4 freeway. The vision proposed six new stops including one at Railroad Avenue in Pittsburg. In its 2001 General Plan, the City of Pittsburg reinforced the goal of connecting its residents and businesses to the BART network. In early 2006, the City of Pittsburg started working in conjunction with the Metropolitan Transportation Authority on the Specific Plan.

The Pittsburg Railroad Avenue Specific Plan, analyzed in this Health Impact Assessment, proposes a new BART station that straddles State Route 4, new residential and commercial uses, public space, as well as pedestrian and bicycle improvements. The Study Area (shown in figure S.1) for the purpose of this analysis is ½ mile from the proposed BART station, directly at the intersection of Railroad Avenue and State Route 4. The Specific Plan is currently pending an Environmental Impact Report and City Council approval. The development is expected to be completed by 2014.

Figure S.1 The Study Area for the Railroad Avenue Specific Plan



THE HEALTH IMPACT ASSESSMENT PROCESS

The overarching goal of a Health Impact Assessment is to make the health impacts of social decisions more explicit. To do this, HIA uses diverse methods and tools and involves and engages health experts, decision-makers, community members, and other diverse stakeholders to identify and characterize health effects resulting from a proposal and its alternatives.

The definition of health within the context of HIA is holistic. The scope includes physical and mental health outcomes like mortality and disability, but it also includes behavioral, economic and political factors, as well as affects on family, neighborhood, public services, and environmental conditions. All of these collectively influence health. A broad definition of health is necessary for HIA because most planning decisions affect health indirectly through effects on social or environmental conditions. Table S.1 below identifies examples of factors linked via evidence to human health.

Table S.1. Factors Responsible For Population Health

Fixed Individual Factors	Individual Health Behaviors	Public Services and Infrastructure	Environmental Conditions	Social, Economic, and Political Factors
Genetic Makeup	Diet	Education	Housing	Poverty
Gender	Physical Activity	Public Transportation	Adequacy	Inequality
Age	Addictions	Health Care	Air, Soil and	Social Cohesion &
Existing Health	Coping	Parks	Water Quality	Inclusion
Conditions and	Transportation	Community Centers	Community Noise	Political
Disabilities		Economic	Disease vectors	Participation
		Development		

Like environmental impact assessment (EIA), HIA is concerned with the impacts of public decisions. In contrast to the typical EIA, HIA is focused on the ways pubic decisions can be shaped to promote and improve a population's health. HIA is also explicitly concerned with vulnerable populations and includes analysis of a proposal's impacts on health inequalities. HIA draws upon diverse sources of knowledge including lay and professional expertise and experience. HIA also offers recommendations for decision-makers for alternatives or improvements that enhance the positive health impacts and eliminate, reduce, or mitigate negative impacts.

THE PITTSBURG RAILROAD AVENUE SPECIFIC PLAN HIA BY STAGE

A typical HIA involves five stages: screening, scoping, assessment, communication, and monitoring. The summary that follows provides key activities and findings for each stage in the HIA process for the Pittsburg Railroad Avenue Specific Plan.

STAGE 1: SCREENING

Screening, the first step of HIA, involves establishing the feasibility and value of an HIA for a particular decision-making context.

As discussed above, a number of physical and mental illness and disease conditions have clear connection to community design. Table S.2 below provides a snapshot of the health profile of Pittsburg and Contra County residents. For each health outcome, the table provides data on health status and identifies potentially contributing environmental factors. Overall, the profile illustrates the potential of community planning in Pittsburg to influence the health of the population.

The understanding that development of TOD projects like this Specific Plan could affect community health led the Great Communities Collaborative (GCC) (http://www.greatcommunities.org/) to obtain funding from The California Endowment (http://www.calendow.org/) to provide HIA as a technical assistance tool for community planning efforts around TOD projects in the Bay Area. In August 2006, HIP met with TALC, a GCC partner, and the GCC site partner in Pittsburg, CCISCO, to discuss community health needs and the feasibility of conducting a HIA on the Railroad Avenue Specific Plan. These organizations subsequently determined that the Railroad Avenue Specific Plan was an appropriate subject for HIA.

STEPS IN THE HIA PROCESS

1. ***Screening*** involves determining the need and value of a HIA.
2. ***Scoping*** involves determining which health impacts to evaluate, the methods for analysis, and the workplan for completing the assessment.
3. ***Assessment*** of impacts involves using existing data, expertise, and experience along with qualitative and quantitative research methods to judge the magnitude and direction of potential health impacts.
4. ***Communication*** of the results of the HIA involves synthesizing the assessment and communicating the results. This can take many forms including written reports, comment letters, and public testimony.
5. ***Monitoring*** describes the process of tracking the effects of the HIA on the decision and the effects of the decision on health determinants and health status.

STAGE 2: SCOPING

Scoping, the second stage of HIA, involves creating a work plan and timeline for conducting an HIA that includes: priority issues; research questions and methods; and participants roles. The scoping phase for this HIA was coordinated by Human Impact Partners but involved assessments of priority health and planning issues with TALC and CCISCO, as well as a focus group of committed community leaders in Pittsburg. Through that process, HIP organized the HIA into six topical areas: Healthy Housing, Livelihood, Transportation Systems, Retail Goods and Public Services, Air Quality, and Community Noise. For each topic, HIP proposed specific questions and research methods to assess how the proposed land use plan might impact health. HIP and CCISCO also proposed conducting a community survey to assess community needs for health. Appendix I provides a detailed list of the research questions and methods for this HIA.

Table S.2. Selected Health Outcomes for Pittsburg and Contra Costa Residents and Their Relation to the Built Environment

Health Outcome	Health Status in Pittsburg and/or Contra Costa County	Contributing Social and Environmental Factors
Deaths Due to Heart Diseases:	220 deaths per 100,000 (Pittsburg) 180 deaths per 100,000 (Contra Costa)	Walkable neighborhoods; Access to nutritious food resources; Quality parks; Access to trails for walking or biking; Good air quality; Low levels of community noise; Social cohesion
Asthma Hospitalizations	17.5 hospitalization per 100,000 (Pittsburg)	Primary care services; Outdoor and indoor air quality; Community violence
Annual Rate of Death from Lung Cancer	49.6 per 100,000 (Pittsburg)	Cost and accessibility of tobacco; Exposure to diesel emissions
Prevalence of Obesity or Overweight in Adults **Prevalence of Overweight in Children**	60.1% (Contra Costa County) 51.2% (Bay Area) 57.2% (California) 43.7% (Pittsburg Unified 5th graders) 27.5% (Contra Costa County 5th graders)	Walkable neighborhoods; Quality parks; Access to trails for walking or biking
Participation in Moderate or Vigorous Physical Activity	76% (Contra Costa County adults)	Walkable neighborhoods; Quality parks; Access to trails for walking or biking
Prevalence of Diabetes	5.3% (Contra Costa County)	Walkable neighborhoods; Access to nutritious food resources; Quality parks; Access to trails for walking or biking
Prevalence of Depression in Teens	23.1% (Contra Costa County) 18% (Bay Area) 21% (California)	Neighborhood social cohesion; Community violence; Community centers and programs for youth
Unintentional Injury Deaths **Unintentional Injury Hospitalizations**	28.7 per 100,000 (Pittsburg) 26.4 per100,000 (Contra Costa County) 499.7 per 100,000 (Pittsburg) 546.7 per 100,000 (Contra Costa County)	Automobile use; Pedestrian environment; Design of housing

STAGE 3: ASSESSMENT

Assessment, the third stage in HIA, involves making judgments of a project or policy's health impacts based available information. Information sources include available statistics, qualitative and quantitative research, expert opinion, and community experiences. For the Pittsburg Railroad Avenue Specific Plan, the research and assessment phase of the HIA involved the following research methods:

- review of the health literature relating transit oriented development to health outcomes;
- collection and analysis of demographic, housing, and employment data;
- mapping of existing retail services;
- field visits and site observations of the Study Area;
- interviews of residents, city officials, and involved stakeholders;
- assessment of pedestrian quality;
- mathematical models of air quality and noise impacts;
- analysis of project trip generation.

The assessment stage also involves researching and proposing design changes or mitigations to promote or protect health, based on available best practices and case studies.

The key findings of this HIA include an assessment of health-related conditions existing in the project area and predictions of the positive and negative health impacts of the project along with recommendations for project improvement. Existing conditions in the project most important for health of the community are identified in Table S.3 below. The existing conditions suggest both opportunities that would improve health though the creation of a complete neighborhood around the BART station, as well as some potential modifiable health and environmental quality threats associated with the project's location adjacent to a freeway corridor.

The impact assessment findings and recommendations are summarized for each of six topics covered by this HIA: Housing, Livelihood, Transportation, Air Quality, Community Noise, and Retail Services. More detailed findings along with descriptions of methods are provided in the individual chapters of the HIA.

Table S.3. Health-relevant Community Conditions in the Railroad Avenue Specific Planning Area

Community Conditions	Existing Conditions For the Pittsburg Railroad Avenue Specific Plan
Housing	The City of Pittsburg has a deficit of affordable housing, having constructed only 46% of the very low-income allotment required by regional housing goals.
Livelihood	Employment sectors that employ large numbers of Pittsburg residents include manufacturing, education, retail, and government; however, 81% of Pittsburg residents work outside of the City of Pittsburg. The median income of Pittsburg residents is $55,000 (US Census 2000) and 5.4% of Pittsburg residents in the labor force are unemployed.
Transportation and streets	The project area borders a regional rail transit line (BART) but the nearest station is 3.3 miles away. Only 8.4% of Pittsburg residents commute to work via public transportation. Additionally, many parts of the site are adjacent to high traffic volume roadways and intersections creating hazards for pedestrians.
Community noise	Many parts of the project are affected by high levels of environmental noise, primarily due to the area's close proximity to SR 4.
Air quality	The project site is located greater than a one mile from most heavy industry in Pittsburg. The site is as close as 2,100 feet downwind of SR 4, a major urban roadway with significant vehicle related air pollution emissions.
Access to retail goods, public services, community space, parks, and schools.	Most parts of the site are within ½ mile of common retail and public services typically included in a "complete neighborhood." The site is also within approximately ½ mile of City Park. The Pittsburg Community Center is at Railroad Ave and Power, Buchanan Park has an active Community Center, and Pittsburg High School is in close proximity to the site.

Summary of Chapter 1: Health Impacts Mediated Through Housing

The housing analysis considers how the Plan addresses links between health and affordable housing, housing design, residential integration, and neighborhood infrastructure.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The plan provides only a modest contribution to unmet affordable housing needs (15% of units). In the recent past, the city has only provided 46% of the very low income allotment, vs. providing 251% of the allotment for above moderate income families. Affordable housing reduces the housing cost burdens for low and moderate income families, preventing situations where households risk hunger or need to forego medical services. Affordable housing also helps to reduce the high prevalence of overcrowding (17% of households) in Pittsburg. • The project's mixed income housing along with well integrated retail services and location near parks and schools is likely to contribute to ethnic and socioeconomic cohesion with potential indirect benefits on crime and safety.	• If housing units were offered only at market rate, it could increase current rents and displace the low income population that resides in the project area. Displacement carries the risk of mental health issues, poor school performance, and lowered incomes. • There are moderate health risks due to air quality, pedestrian safety, and noise from having housing located close to SR 4, where the average annual daily traffic count is 148,000 vehicles per day (see chapters on Transportation, Air Quality and Noise).

Recommendations to Promote Healthy Housing

1. To further contribute to unmet housing needs locally, designate at least 40% of the units as affordable with 16% for low income, 15% for very low income, and 9% for extremely low income.
2. Protect current federally subsidized units from conversion to market rate.
3. Unbundle parking from the sale of units to decrease the housing cost for families who do not own cars or do not want to own cars.
4. Offer a means-tested rental voucher program to allow more existing area residents to access new housing; this action could reduce the risk of displacement, and support integration and social cohesion.
5. Include adequate ventilation in residential design to discourage moisture condensation.
6. In construction, use materials free of chemical risks to workers or residents.
7. Within project developed green and open space, create community spaces that invite social cohesion, such as sitting spaces, spaces designed for music and performance, and public art. This creates opportunities for informal gathering.

Summary of Chapter 2: Health Impacts Mediated Through Livelihood

The livelihood analysis considered how the project will impact different aspects of healthy jobs: self-sufficiency wage, health benefits, occupational injury, and paid sick days. It also looked at growth industries, jobs that the project will bring, and impacts on day laborers.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The plan increases local opportunities for employment in Pittsburg. Construction of the Railroad Ave Specific Plan would provide employment opportunities for some low skill workers and often provide self-sufficiency wages. Employment in the manufacturing and retail industries, likely occupants of the Plans commercial uses, often provide health insurance, a benefit associated with lower mortality and better health outcomes. • New residential uses and new commuters working in Pittsburg may increase markets for retail goods and services in the project area, potentially providing further employment opportunities suitable for unemployed or underemployed area residents. • By locating employment opportunities on a regional transit line, the project is likely to reduce vehicle commute trips for future area employees, a significant health benefit for residents as less income will be spent on traveling to work versus spent on housing, food, and health care.	• Several employment opportunities enhanced by the project have mixed health characteristics. Construction jobs only have health insurance 62% of the time, paid sick days only 18% of the time, and a risk of occupational injury. Neither manufacturing or retail commonly provide sick days benefits. Retail does not usually provide a living wage. • The project may increase commercial property value and as a result may displace some of the current commercial activities in the area.

Recommendations to Promote Livelihood

1. Ensure that project approval requires employees working in short-term construction jobs and long term jobs in commercial, retail, and manufacturing be provided a self-sufficiency wage, health insurance, and paid sick days.
2. Ensure that a development agreement requires the project sponsor to maximize employment opportunities for Pittsburg residents, through prioritization of local contractors, unions, job centers, apprenticeship programs, and utilization of day labor worker centers.
3. Assess and prevent potential business displacement, taking steps to maintain property affordability for current vulnerable businesses or supporting re-location in the project area.
4. As City policy, where feasible, prioritize local recruitment and hiring for public administration/service jobs.

Summary of Chapter 3: Health Impacts Mediated through Transportation

The analysis of transportation considered the effects on traffic generation, pedestrian safety, and the pedestrian environment and identified feasible recommendations to reduce project-generated vehicle trips.

Potential Positive Health Impacts	Potential Negative Health Impacts
• By locating new residential uses in close proximity to a regional transit line, the plan helps constrain the growth of trips regionally and the regional growth of air pollution emissions. Below market rate housing and neighborhood serving retail are key elements of the project that would help to reduce personal vehicle use. • The plan would increase the use of BART locally and regionally, likely increasing physical activity for 3,883 current and future area residents.	• The plan would increase vehicle trips modestly in the project area. • Without traffic calming and other safety mitigations, the plan is likely to increase the rate of pedestrian-vehicle collisions in Pittsburg.

Recommendations to Improve Sustainable Transportation Systems

1. Provide frequent and widely available bus service to the new BART station.
2. Provide incentives for large employers in the region to provide shuttle services.
3. Increase the amount of affordable housing to 40% while ensuring the project remains mixed-income.
4. Conduct a retail diversity needs assessment to ensure retail serves the needs of the community and will promote local shopping, thus reducing vehicle trips.
5. Reduce structured parking for residential uses to a ratio of one space per unit; unbundle the cost of parking from housing; provide free structured parking for car sharing.
6. Implement a residential parking permit scheme, pricing parking permits for new residents as close to market rate as possible.
7. Name and implement the Class level of bike facility improvements in the Specific Plan. Add physical signage and labeling of bicycling facilities.
8. Ensure secured bike parking at the BART station; encourage local employers to offer secure bike parking.
9. Ensure that sidewalk widths published in the Specific Plan are minimum requirements.
10. Implement traffic calming measures at high traffic points to decrease risk of pedestrian injury.

Summary of Chapter 4: Health Impacts Mediated Through Retail and Public Services

The analysis of retail identified existing retail services accessible in the plan area as well as an assessment of opportunities for locating a new grocery store.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The residents of the new Transit Village at Harbor Street and Garcia Street would be within a half mile to over four-fifths of retail and public services typically included in a "complete neighborhood." Residents of the new Civic Center housing would be within a ½ mile of three-fifths of such services. • Depending on services offered, retail incorporated within the Railroad Avenue Specific Plan may increase neighborhood completeness for existing area residents, potentially supporting nutrition and physical activity. • Development of vibrant mixed-use commercial/retail has the potential to be a deterrent to crime. • New retail associated with the plan may provide new employment opportunities, some of which may be suitable for unemployed or underemployed residents.	• The project will likely increase commercial property value over the long term with potential for displacement of current retail businesses.

Recommendations for Plan Area Retail

1. Conduct a retail and public services needs assessment for the Railroad Avenue Specific Plan area in order to determine retail attraction plan priorities and allocation of funding for public services.
2. Require the project sponsors to provide community benefits, including increased programming and marketing for community centers, and an increase in child care subsidies.
3. Offer incentives for a large supermarket to locate in the former site of Albertson's Supermarket.
4. Ensure that retail is reflective of the community's wants and needs. This could be done by conducting a retail analysis including retailer and consumer surveys and by establishing a neighborhood council to include local retailers and residents in retail planning phases.
5. Leverage the economic impacts of the project to provide tax incentives or interest-free loans to stimulate local entrepreneurship.
6. Use community benefits agreements to ensure a minimum percentage of employment of local residents in new retail and commercial uses
7. Through zoning, prohibit a concentration of liquor stores and unhealthy food establishments in the project area.
8. Ensure that project design teams work with merchants and small business owners to incorporate crime prevention design elements into the project design.

Summary of Chapter 5: Health Impacts Mediated Though Air Quality

This analysis modeled roadway contributions to ambient air quality for future residents of the Railroad Avenue Specific Plan housing, making estimates of potential pollution related health effects.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The project helps to reduce the growth of regional vehicle trips and regional vehicle air pollutant emissions.	• Substantial air pollution exposures for the future plan area are attributed to the location of the project near existing traffic on SR 4. Expected exposure to traffic related pollutants are associated with a modest increased hazard of premature deaths, asthma hospitalizations, and lower respiratory symptoms.

Recommendations to Improve Project Air Quality

1. To reduce residential traffic sources of air pollution, increase the frequency of shuttle and bus services from communities who would use BART; use parking restrictions, pricing strategies and other Transportation Demand Management measures to promote greater use of alternative modes of transportation over personal car use; create a comprehensive pedestrian and bicycling plan away from busy roadways; provide comprehensive on-site services based on a retail- and service-needs assessment that would minimize the need for driving off site.
2. Locate residential uses and other sensitive land uses in the project area at a safe distance from roadways with heavy traffic as indicated by air quality modeling. Alternatively, if sensitive uses are placed where impacted by significant roadway pollutant concentrations: install central HVAC (heating, ventilation, and air conditioning) systems with high efficiency filters for particulates and a carbon filter to remove other chemical matter; maintain all condominium and apartments under positive pressure at all times; locate air intake systems for HVAC as far away from roadway air pollution sources as possible; and develop an ongoing HVAC maintenance plan.
3. During the construction phase of the project, implement best practices in demolition and construction dust mitigation including stabilization of soil piles, tarps on fences, fence line misting, and real time dust monitors.
4. Where residential uses are mixed with truck intensive commercial uses, provide 110 and 220 outlets at project loading docks so that trucks that service commercial uses of the site can connect to these outlets to power their auxiliary equipment; utilize electric forklifts and landscaping equipment in the project operations.
5. Develop further dialog between local public agencies and industry to better consider local residents' concerns over air pollution risks from area sources.

Summary of Chapter 6: Health Impacts Mediated Though Community Noise

This analysis modeled environmental noise exposure for area residents, employees, and visitors associated with the freeway and with the new BART station and estimated associated noise-related health impacts on residents and visitors to the project area.

Potential Positive Health Impacts	Potential Negative Health Impacts
• None	• The project site is located adjacent to California State Route 4 and the Pittsburg/Daly City BART line. Cumulatively, with the proposed project, expected noise levels at the project's residential and retail near the BART station are estimated to be over Ldn 75 dBA, a level well above international public health guidance for residential uses. • Even under indoor noise mitigation requirements, some project residents are likely to be exposed to environmental noise to an extent that can create annoyance, sleep disturbance and adversely effect school and work performance. • Existing project area outdoor noise levels proximate to BART and the freeway of greater than 70 dB will, without mitigation, prevent normal voice level communication at unprotected exterior locations and negatively affect community livability.

Recommendations to Reduce Community Noise Impacts

1. Locate residential uses and other sensitive land uses in the project area to minimize exposure to significant sources of environmental noise.
2. Where achievement of indoor noise standards requires windows to be closed, incorporate ventilation systems with filtration of ambient air for each unit; avoid the use of Z-ducts.
3. Implement a design that has interior courtyards and patios that open into acoustically protected and shielded areas.
4. Include performance testing of constructed units to ensure compliance with interior noise standards.
5. Notify all potential buyers that the property they are occupying has substantial ambient noise levels.
6. Consider construction of a sound barrier wall for SR 4.
7. Reduce the speeds of the traffic on SR-4 and on the project's residential streets through traffic calming measures.
8. Undertake necessary maintenance of BART tracks to minimize train-associated noise.
9. Limit nighttime truck traffic on SR 4.
10. Integrate below market and market rate units in the same buildings to prevent environmental justice impacts.
11. Require noise controls on indoor and outdoor commercial equipment.

STAGE 4: COMMUNICATION OF HIA FINDINGS AND RECOMMENDATIONS

Communication, the fourth stage of HIA, involves sharing the findings and recommendations from the assessment to inform and influence the project design and decision-making. This report provides documentation of the HIA research findings including background literature, existing conditions, research methods and findings, and recommendations for each of the six topics listed above. For the Pittsburg Railroad Avenue Specific Plan HIA, findings and recommendations have been shared by HIP through presentations to community partners. Community partners, in turn, have presented selected results to community residents. Future communication by CCISCO or other stakeholders regarding health and the Specific Plan may reference this report.

STAGE 5: MONITORING DECISION AND PROJECT OUTCOMES

In the context of HIA, monitoring refers to the process of evaluating the outcomes of decisions about projects or policies on health determinants, and, if possible, health status of a population. The long lead times between decisions and their implementation is a challenge to monitoring as are the complex relationships among environmental health and health outcomes. Monitoring may also entail "watchdog" duties, i.e., monitoring that the developer is instituting mitigations and recommendations to which they agreed. This HIA for the Pittsburg Railroad Avenue Specific Plan has not yet included a plan for monitoring long term development impacts on health.

Pittsburg Railroad Avenue Specific Plan Health Impact Assessment
Chapter One
Healthy Housing

Chapter Summary

The housing analysis considers how the Plan addresses links between health and affordable housing, housing design, residential integration, and neighborhood infrastructure.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The plan provides only a modest contribution to unmet affordable housing needs (15% of units). In the recent past, the city has only provided 46% of the very low income allotment, vs. providing 251% of the allotment for above moderate income families. Affordable housing reduces the housing cost burdens for low and moderate income families, preventing situations where households risk hunger or need to forego medical services. Affordable housing also helps to reduce the high prevalence of overcrowding (17% of households) in Pittsburg. • The project's mixed income housing along with well integrated retail services and location near parks and schools is likely to contribute to ethnic and socioeconomic cohesion with potential indirect benefits on crime and safety.	• If housing units were offered only at market rate, it could increase current rents and displace the low income population that resides in the project area. Displacement carries the risk of mental health issues, poor school performance, and lowered incomes. • There are moderate health risks due to air quality, pedestrian safety, and noise from having housing located close to SR 4, where the average annual daily traffic count is 148,000 vehicles per day (see chapters on Transportation, Air Quality and Noise).

Recommendations to Promote Healthy Housing

1. To further contribute to unmet housing needs locally, designate at least 40% of the units as affordable with 16% for low income, 15% for very low income, and 9% for extremely low income.
2. Protect current federally subsidized units from conversion to market rate.
3. Unbundle parking from the sale of units to decrease the housing cost for families who do not own cars or do not want to own cars.
4. Offer a means-tested rental voucher program to allow more existing area residents to access new housing; this action could reduce the risk of displacement, and support integration and social cohesion.
5. Include adequate ventilation in residential design to discourage moisture condensation.
6. In construction, use materials free of chemical risks to workers or residents.
7. Within project developed green and open space, create community spaces that invite social cohesion, such as sitting spaces, spaces designed for music and performance, and public art. This creates opportunities for informal gathering.

A. Introduction

Housing contributes to health not only by providing safe and affordable dwellings but also by creating access to jobs, schools, transportation and services, ensuring environmental quality, and facilitating social interaction. This chapter considers the relationships between housing and human health and how the proposed BART Transit Village affects these relationships. Questions related to Healthy Housing in the Pittsburg Railroad Avenue Specific Plan that were examined in this Health Impact Assessment are:

- *Will the BART transit village help to meet the housing needs of area residents with regard to size, quality, and affordability?*
- *Will Railroad Av.enue Specific Plan lead to displacement of people, either directly or indirectly?*
- *Does the design of the Railroad Avenue BART housing promote and protect health via materials choices, ventilation systems, and site location and orientation?*
- *Does the location of the housing provide a quality, safe environment for residents, neighbors and visitors, including seniors, children, and health sensitive populations?*

B. Background: Housing and Health Impacts

Housing can impact health in a wide variety of ways. In this Health Impact Assessment the discussion will focus on housing affordability, housing location, and housing materials. The cost of housing can leave a family with less money for other necessities such health care and nutritious and adequate food. High costs of housing can lead to residential displacement, homelessness, overcrowding, and segregation. Location of housing can expose families to sources of air pollution, community noise, and dangerous traffic. Location of housing can also impact access to goods and services, parks, public transportation, and schools. Finally, the materials used during construction can also impact health.

Effects of Housing Affordability

Impacts on household budgets. An increasing share of the population is subject to housing cost burdens in excess of their capacity. Spending a larger share of income on housing decreases the amount of money available for other basic living needs such as food, medication, clothing, and transportation to access jobs (Bhatia 2004). Low paying jobs and high housing costs are the most often cited reason for hunger (Sandel 1999). In fact, higher levels of food insecurity are associated with an increasing percentage of income spent on housing in US and Canadian studies (Scott 1998, Kirkpatrick 2007). The Canadian study specifies that in the lowest income quintile, 68% were unable to meet a food spending adequacy guideline. The USDA determined that median housing costs can predict food insecurity on a state-level; i.e., the higher the median cost of housing, the more likely a family is to not be able to consistently feed itself (Bartfeld 2005).

Residential displacement. Increased rents or mortgage costs can precipitate eviction and displacement. Displacement is a stressful life event (Guzman 2005) and relocation can have significant impacts on health and childhood development. Residential stability at childhood (moved 0-2 times) increases the odds that an individual will rate their health positively in midlife by 42% (Bures 2003). More specifically, increased mobility in childhood (moving 3 or more times by the age of 7) resulted in a 36% increased risk of developing depression and also correlated with academic delay in children, school suspensions, and emotional and behavioral problems (Gilman 2003, Cooper 2001). In adults, displacement can result in loss of job, difficult school transitions, and loss of health protective social networks (Bhatia 2004).

Overcrowding. Overcrowding is another common response to unaffordable housing. Overcrowding increases the risk of passing infectious diseases. A study in Sao Paolo, Brazil found that for every average increase of one additional dweller per bedroom in a household there was a 14% increase in tuberculosis mortality (Antunes 2001). There can also be increased risk of ear infection in children due to overcrowding (Bhatia 2004). Children in low-income families exposed to one or more environmental risks such as overcrowding and noise showed an increase in urinary cortisol and epinephrine, which are biomarkers of chronic stress (Evans 2006).

During the Welfare to Work program in the late 1990's, HUD issued 50,000 housing vouchers to ease the transition. A large scale evaluation found that access to vouchers essentially eliminated homelessness, greatly reduced crowding and doubling up, and somewhat improved the neighborhoods in which extremely low-income families lived (Feins 2006).

Residential Segregation and Health

Frequently, affordable housing is concentrated in ethnically or economically segregated neighborhoods which can impact environmental assets and exposures. Segregated neighborhoods have fewer institutional assets (e.g., schools, libraries, public transit) (Kawachi 2003), but have more environmentally burdensome infrastructure (e.g., highways, power plants, factories, waste sites) – compromising air, noise, water, and soil quality (Williams 2001). Additionally, more violent crime, more infectious disease and chronic disease all occur in segregated neighborhoods (Acevedo-Garcia 2000). Finally, residential segregation often affects minorities as well as low-income residents disproportionately, thus leading to inequities in health outcomes.

Housing Location, Environmental Quality, and Health

A number of effects on health and public safety are associated with the location of residential housing. These include:

- Children and adults living in proximity to freeways or busy roadways have poorer health outcomes including more symptoms of asthma and bronchitis symptoms (Kim 2004) and reduced growth in lung capacity (Gauderman 2004). (See chapter on Air Quality)
- There is an increase in the frequency of respiratory illness in residents living in close proximity to industry (Saha 2007, Bhopal 1998, Cara 2007).
- Pedestrian hazards are increased in housing proximate to busy roadways (Wier 2007).
- Proximity to full service supermarkets promotes quality nutritional choices. (See Chapter on Retail Services)
- Proximity to parks and recreational facilities increases physical activity (IOM 2005).
- Proximity to public transit reduces personal vehicle travel, resulting in regional benefits to air quality. (see Chapter on Transportation Systems)
- Neighborhood schools promote children's school outcomes.

Housing Materials, Construction Standards, & Maintenance

Proper housing design and careful selection of housing materials can help to prevent unnecessary health risks. Damp housing conditions can lead to insomnia, respiratory ailments, cough, headache, allergies, and asthma, so designing homes with proper ventilation is key to good health (Brunekreefe 1992, Janson 2005). Use of airflow control, moisture reduction, and temperature control in housing construction reduces the onset of respiratory diseases such as asthma and allergies (Eggleston 2005). Certain materials used for building can be hazardous: pesticide residues can cause neurological disorders, pressure-treated wood can contain arsenic (a known carcinogen), and carbon monoxide from improper heating devices in the home have caused respiratory ailments and even death (Landrigan 1999, Healthy Building Network).

C. Established Standards and Health Objectives

Department of Health and Human Services *Healthy People 2010*:

- Goal 8-16: Reduce indoor allergen levels.
- Goal 8-19: Increase the number of new homes constructed to be radon resistant.
- Goal 8-23: Reduce the proportion of occupied housing units that are substandard.

US Dept. of Housing and Urban Development Strategic Plan Objectives:

A. Increase home ownership opportunities
    - A1: Expand national home ownership opportunities.
    - A2: Increase minority home ownership.
    - A5: Help HUD-assisted renters become home owners.
    - A6: Keep existing home owners from losing their homes.

B. Promote decent affordable housing
    - B1: Expand access to and availability of decent, affordable rental housing.
    - B3: Improve housing opportunities for the elderly and persons with disabilities.

C. Strengthen communities
    - C2: Enhance sustainability of communities by expanding economic opportunities.
    - C3: Foster a suitable living environment in communities by expanding economic opportunities.
    - C4: End chronic homelessness and move homeless families and individuals to permanent housing.
    - C5: Address housing conditions that threaten health.

State of California Department of Housing and Community Development:

- Goal 1: Ensure local governments "take care of their own" by providing an adequate housing supply in an efficient land use pattern while minimizing impacts on valuable habitat and productive farmland.
- Goal 2: Remove barriers to increasing overall housing supply.
- Goal 4: Ensure the safety and health of residents in manufactured housing.
- Goal 5: Strengthen communities by attracting, expanding, and retaining business and jobs in California.

California General Plan Guidelines (2003):

- The 2003 State of California General Plan Guidelines call for ensuring environmental sustainability by matching employment potential, housing demand by income level and type and new housing production.

The Metropolitan Transportation Authority, Resolution 3434 *(2001)*:

The Metropolitan Transportation Authority oversees all Bay Area transportation planning for the 9-county Bay Area. In 2001, they adopted *Resolution 3434*, which advocates and sets standards for Transit-Oriented Design projects. *Resolution 3434* (MTC 2001) includes the following standards for housing in TOD projects:

a. Corridor-level thresholds to quantify appropriate minimum levels of development around transit stations along new corridors. For commuter rail projects, that level has been set at 2,200 households per station.
    a. To be counted toward the threshold, planned land uses must be adopted through general plans, and implementation processes must be put in place, such as zoning codes.
    b. New below-market rate housing receives 50% bonus toward meeting thresholds (i.e., 1 BMR unit = 1.5 MR. BMR = 60% of AMI for rental, 100% of AMI [area median income] for owner occupied)

General Plan Policy Matrix for Pittsburg's Housing Element in the General Plan 2020:

Housing Supply

- 13-P-1.1. Ensure there is an adequate supply of mixed use and residentially zoned land of appropriate densities to accommodate existing and anticipated housing needs through 2020.
- 13-P-1.4 Support the construction of multi-family housing in close proximity to transit, arterials, shopping, and public services.
- 13-P-1.7 Develop an adequate housing supply Downtown to support ground floor neighborhood serving retail and service establishments along Railroad Ave.
- 13-P-1.8 Meet the City's fair share regional housing needs: A. Endeavor to facilitate the production of at least 2,513 housing units between January 1, 1999 and June 30, 2006, including at least 534 units serving very low-income households, 296 units serving low-income households, and 696 serving moderate-income household through implementation of policies and actions identified in this element.[1]

Affordable Housing/Special Needs Housing

- 13-P-2.1 Provide incentives to developers who assist the City in meeting affordable housing needs, including units to accommodate special needs households: female-headed, seniors, disabled, large families and the homeless.
- 13-P-2.3 Support efforts to provide temporary, transitional and permanent housing in the City and surrounding areas for homeless people.
- 13-P-2.4 Increase home ownership opportunities for very low, low, and moderate income households.
- 13-P-2.5 Increase the supply of rental housing available and affordable to extremely low, very low, low, and moderate income households, and in particular large families.

Eliminating Discrimination

- 13-P-3.1 Promote fair housing opportunities.

Housing Stock Preservation

- 13-P-4.1 Support the conservation and rehabilitation of existing housing stock through a program of code enforcement and property improvements, when and where appropriate.
- 13-P-4.2 Utilize public funds to preserve rent restricted units at risk of conversion to market rate and conserve and rehabilitate the existing supply of housing affordable and made available to extremely low, very low, low, and moderate income households, when and where appropriate.

D. Existing Housing Conditions at the Project

Current residential units in Pittsburg. According to the US Census, there were 18,379 units in Pittsburg in 2000.

Current home values. From May 2006 – April 2006, median sales price for single-family homes in the Study Area was $465,000; for condos it was $345,000. These are lower than the Bay Area medians. Homes in the Study Area have lower median prices than homes in the rest of Pittsburg. Pittsburg has a majority of homeowner households (63%), although the Study Area has slightly more renters than owners.

Rental rates. Pittsburg has lower rental costs than Bay Area, and rental costs in the Study Area are lower than the rest of Pittsburg, making this project of great concern and making it a potentially great opportunity to impact rental unit availability and rental costs.

[1] Between Jan 1999 and June 2006, Pittsburg has approved 247 very low income units, 381 low income units, 470 moderate income units, and 2,482 above moderate income units for a total of 3,580 housing units. Pittsburg has also purchased covenants for 43 very low-income units and 380 moderate income units.

In May 2006, average rent in Pittsburg was $1,034. Most rentals are 1 – 2 bedroom units. Rents are relatively unchanged since 2004, with an occupancy rate of 95%. There has been limited construction of rental housing in recent years; most of rental housing was built before 1990. (MIG 2007)

Population growth. Population of Pittsburg as of Census 2000 is 56,769. The Railroad Avenue Study Area currently includes 15,000 people, and includes 5,000 of the city's 20,000 households. The Association of Bay Area Governments (ABAG) projects by 2020, Pittsburg will need to house 82,700 residents, which is a growth of 46% from 2000. (Austin 2007)

Special populations.
Homelessness: A one day count of homeless in Contra Costa County found that there were 4,157 homeless people countywide. Of those 1,086 were individuals in families and 321 were children (Shelter, Inc). According to Austin (Austin 2007), on any given night in Contra Costa County, more than 4,800 people are homeless.
Elderly: Over half the elderly renters in Pittsburg are housing cost-burdened. (Austin 2007)
Disabled: 16% of Pittsburg's adult population under the age of 64 is disabled; 36% of adults over age 65 are disabled. The poverty rate among those who are disabled is 7%. (Austin 2007)
Minorities: More African-American and Latino homeowners in Pittsburg are housing-burdened than the average for the city. African American renters also have higher rates of being housing-burdened. (Austin 2007)
Families: Pittsburg has more families living in homes (76%) than the Bay Area (65%), and there more homes in Pittsburg that have children in them (42%) than in the Bay Area (31%). 32% of Pittsburg's families make less than 50% of the area median income. (Austin 2007) The Center for Community Innovation states that "the single greatest housing need in Pittsburg is that of very low income families."

Housing Production. In California, construction of multifamily housing, typically a basis for rental housing, lagged far behind that of single unit housing. On average, developers built 50,000 units of multifamily housing statewide each year from 2000 to 2007; in the 1980's more than 90,000 units a year were built. In contrast, the average number of single family homes built from 2000 to 2007 exceeded the average number built during the 1980's.

In Pittsburg, between 2000 and 2006, there were permits issued for a total of 2,744 more new units, an increase of 15%. In comparison, in the Bay Area as a whole, the number of new permitted units increased by only 6% in the same period. Currently, Pittsburg has met the Regional Housing Need Assessment allocation at a greater rate than Contra Costa County or the Bay Area. As shown in the Table 1.1, with regard to very low income residents, however, Pittsburg still falls behind in meeting the current need.

Table 1.1: Percent of RHNA Allocation Permitted in Pittsburg and Contra Costa

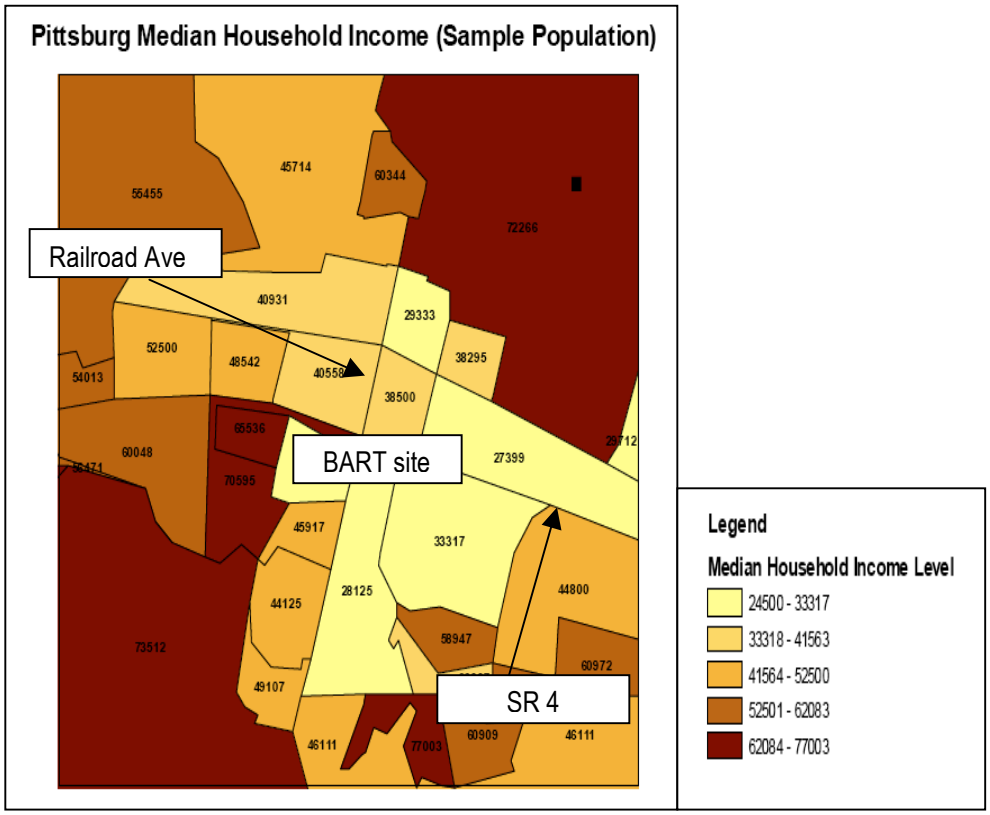
	Very Low Income	Low Income	Moderate Income	Above Moderate Income
Pittsburg	46%	129%	115%	251%
Contra Costa County	44%	93%	83%	217%
Bay Area	44%	75%	37%	153%

Source: Table adapted from Austin 2007. A Housing Needs Assessment for Pittsburg, California. Center for Community Innovation, University of California, Berkeley.

Housing size. According to the 2000 Census, the average household size in Pittsburg was 3.1 members per household. This is larger than the average U.S. size of 2.6 members per household. Seventy four percent of Pittsburg's housing units currently are single-family, and 81% of units permitted from 2000 to 2006 were for single-family dwellings. Multi-family units tend to be more affordable.

Overcrowding. According to the 2000 Census, in Pittsburg 10% of owner-occupied houses are overcrowded as are 23% of the renter-occupied houses. Overall, an average of 17% of the nearly 18,000 units are overcrowded. In Contra Costa County, only 4% of owner- and 15% of renter-occupied housing are overcrowded (Austin 2007). A larger percentage of Latinos (33%) and Asians (24%) in Pittsburg live in overcrowded housing. Pittsburg is home to a large Latino population.

Incomes in Pittsburg: In the Census 2000, area median income (AMI) in Pittsburg was about $52,000; in 2005, AMI in Pittsburg was about $55,000 (Austin 2007). Median income in Contra Costa County in 2006 was $74,241. In the Study Area, incomes are about half of the Bay Area median. 49% of all households in Pittsburg currently earn 80% or less of the Pittsburg AMI, thus fitting the definition of Low or Very Low income (CCISCO 2007). Qualifying income in order to purchase a median-priced home in 2006 was $110,720 in the County overall (CAR 2006).



Housing Cost Burdens. According to the California Budget Project, currently, in Contra Costa County, a minimum-wage worker would have to work 101 hours a week in order to afford the rental of a one-bedroom apartment at Fair Market Rent (CPB 2008).

Displacement. The population of Pittsburg has been growing. According to the 2000 Census, 51% of Pittsburg's population lived in the same house in 1995. Of the 49% who had moved between 1995 and 2000, 25% moved from one house to another in Pittsburg, while 64% had moved from a different city or town, and the rest had moved from a different state or country (US Census 2000).
Between 1995 and 2000, 13,758 people have moved into Pittsburg. By ethnic group, this was comprised of:

White:	5,941	(43%)
Latino:	3,678	(28%)
African American:	2,676	(19%)
Asian:	1,283	(9%)

American Indian/Alaskan Native:	81	(0.5%)
Native Hawaiian/Pacific Islander:	99	(0.7%)

Unfortunately, the Census does not have the data broken down by income level, so it is not possible to assess what income levels are moving in and out of Pittsburg. Conversations with residents have shown that people who might never have been able to afford to purchase a home in the Bay Area were able to become homeowners in Pittsburg, satisfying one of the goals of the Pittsburg Housing Element in allowing lower income residents to become homeowners. Becoming a home owner has come at a price, though, in increased commute times (see Transportation and Livelihood chapters).

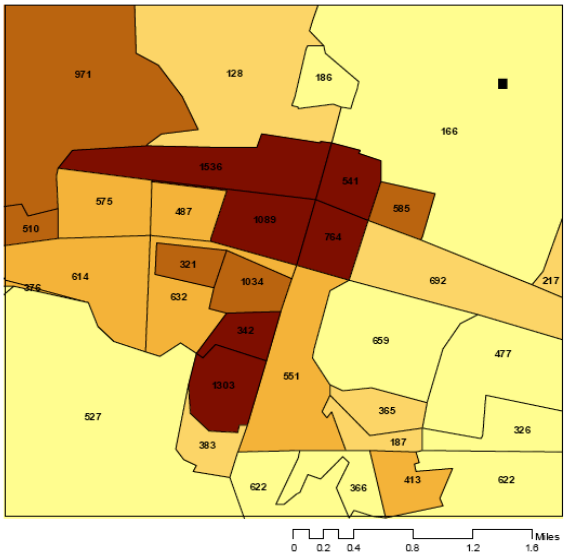
Residential segregation/ social cohesion. Father Ricardo Chavez, a community leader who was born and raised in Pittsburg, states (Chavez 2005):

> The split which the newly constructed Highway 4 in the late 1950's and early 1960's created an unusual situation. The new area (south of the freeway) was made up of young families residing in the southern section of the city along with the well-to-do moving into the area from their downtown homes. The old town of Pittsburg comprised all the area north of the freeway and consisted of established families with teenage children who would move away in a few years and the elderly. It was never anyone's intention, but what also now existed was a community of haves and have-nots.
>
> Something happened to the old town, the neighborhood close to the waterfront. The process of transformation started after WWII. New homes were built on the south side of the town (near Camp Stoneman), and families that had lived in the original Pittsburg began moving there, fleeing their aging and deteriorating homes – most of which became rentals. The area became blighted and seedy, and housed mainly African Americans and a few Hispanics, who were poor.

This split in housing location of low-income and minority communities in Pittsburg continues today, exposing these populations disproportionately to unhealthy environments. Both Latino and African American populations are concentrated somewhat on the North side of SR 4 – closer to health risks due to proximity to industry and ongoing construction, which contribute to air quality and noise concerns. Also, most retail goods and services have moved to the south side of SR 4 near Atlantic Avenue and Railroad Avenue, serving the newer higher income residents who have moved to areas south of the Study Area.

Demographic data from US Census 2000 is mapped below to provide a visual representation of location of Pittsburg residents of different ethnicities.

Pittsburg Hispanic/Latino Population

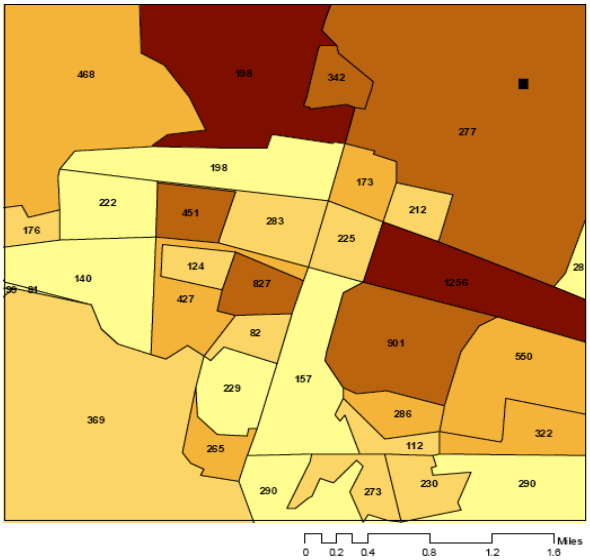


Legend

Percent Hispanic/Latino Population

- 15 - 23
- 24 - 27
- 28 - 35
- 36 - 47
- 48 - 67

Pittsburg Black Population

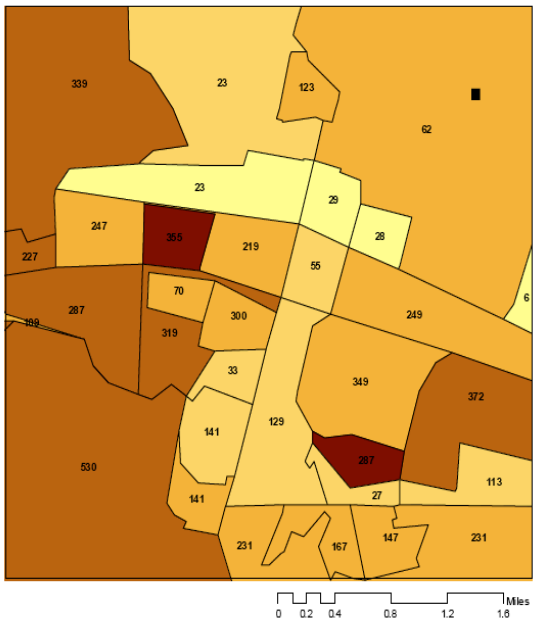


Legend

Percent Black Population

- 3 - 11
- 12 - 16
- 17 - 23
- 24 - 35
- 36 - 48

Pittsburg Asian Population

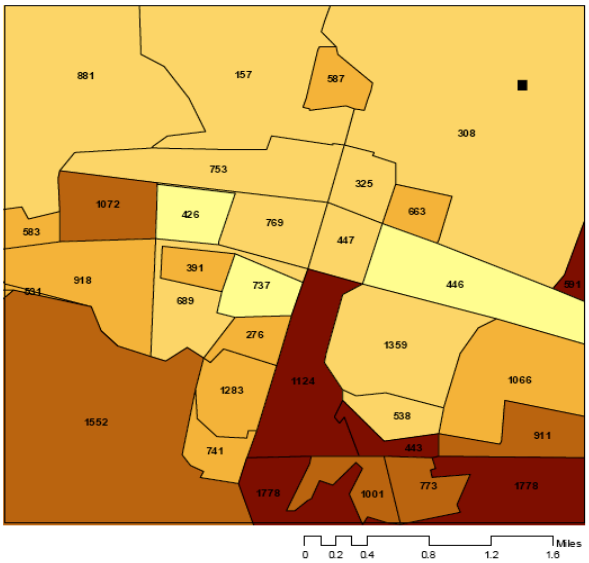


Legend

Percent Asian Population

- 1 - 3
- 4 - 7

Pittsburg White Population



Legend

Percent White Population

- 17 - 27
- 28 - 42
- 43 - 52
- 53 - 60
- 61 - 74

E. Assessment of the proposed project

The Railroad Avenue Specific Plan projects the construction of 1,590 new homes (MIG 2008), of which all will be within about ½ mile of new Railroad Avenue BART station. Most of the new housing will be located in the Transit Village District (830 high intensity mixed use residential units, 247 medium intensity mixed use units, and 259 units within community commercial, for a total of 1,336 residential units) and the Civic Center area (230 high intensity mixed use residential units and 24 medium intensity mixed use unit, for a total of 254 residential units). The BART station will be located at SR 4 and Railroad Avenue. The figure below shows land use plans for the Transit Village District and the Civic Center areas.

Specific Plan Program Buildout Summary

Land Use		*Area (acres)*	*Development*		*Parking Spaces*	
			Res. Units	*Com. Sq. Ft.*	*Residential*	*Commercial*
TOD Residential		6.58	230	--	345	--
High Intensity Mixed-Use		20.07	830	52,500	1,245	158
Medium Intensity Mixed-Use		12.36	271	50,204	407	141
Light Industrial		8.53	--	223,046	--	446
Community Commercial		10.37	259	270,949	--	814
Commercial/Office		6.83	--	144,400	--	620
Civic		9.50	--	139,000	--	400
Public Parking		3.77	--	--	--	1,407
Public Open Space, Parks and Plazas		4.98	--	--	--	--
Future Growth Area		3.48	--	--	--	--
Total		**82.98**	**1,590**	**880,098**	**1,997**	**3,986**

Affordability

In 2000, 44% of Pittsburg renters spent more than 30% of their income on housing, which is the typical definition of being "housing-burdened". Twenty eight percent of owners were similarly cost burdened (Austin 2007). By building homes in the Railroad Avenue BART area, this specific plan could have a large impact on health by reducing the number of residents who are cost burdened by housing, allowing them to spend more on health care, transportation to and from work, nutritious food, and education.

Since homes in the Study Area historically have cost less than homes in greater Pittsburg, it is possible that housing built in the Railroad Avenue Specific Plan could help meet the unmet need for affordable housing in Pittsburg, particularly if developers pledge to keep 40% of the units as affordable. That would mean that 636 units would be affordable, which may ease the burden of the current 6,118 people in Pittsburg making less than $50,000 annually and paying more than 30% of their income for housing (Austin 2007). Even though Pittsburg's inclusionary housing ordinance requires that 15% of the units be affordable to very-low, low and moderate income people, increasing that percentage to 40% could help the city house more people, increase the tax base, and provide ridership for BART.

Displacement

Changes in the neighborhood associated with both the BART extension and the current project have potential to trigger gentrification in Pittsburg. If there is a strong market for new homes in the project area, there is a potential that current property owners in the neighboring areas of the project who rent out their units may want to convert rentals to for-sale condominiums. Currently, there are 302 units of federally assisted affordable housing that are particularly vulnerable to being converted to market rate housing between 2011 and 2017. This represents 8% of the 3,849 units of federally assisted affordable housing in Contra Costa County. The increased housing costs that could be a side effect of the project have the potential to result in the displacement of lower income residents. The current state of the housing market locally as well as nationally in the Spring of 2008 makes this prediction seem unlikely; however it will take minimally 2 years for the approval and construction of these homes (and probably longer), and trends indicate that the population of Pittsburg will continue to increase. Indirect health impacts of displacement could include depression, academic delay in children, school suspensions, emotional and behavior problems, job loss, loss of health protective social networks, and poor self-rated health.

Overcrowding

The Railroad Avenue Specific Plan has the potential to reduce overcrowding in Pittsburg via its impact on affordability. Overcrowding is a direct result of families being unable to afford housing. A decrease in overcrowding, particularly among Pittsburg's Latino and Asian populations, could lead to a decrease in infectious diseases such as ear infections, colds, flu, and other air-borne disease.

Residential segregation/social cohesion

The Pittsburg Railroad Avenue Specific Plan offers the potential to mend some of the divide originally wrought by the construction of SR 4. Much of the housing built in Pittsburg in recent years has attracted moderate to above-moderate income families, and has located them on the outskirts of Pittsburg. If a mix of highly affordable and market rate housing is built at the Transit Village and Civic Center sites, different income levels and potentially different ethnicities could be centrally accommodated, thereby drawing these populations from the fairly segregated areas near downtown (Beacon Street, for example) and near Davi Avenue and Parkside. The retail that is a major part of the plan also has the potential to draw residents from all parts of Pittsburg to more central locations, creating opportunities for social interaction. This potential increased interaction may offer more social and economic activity, which would encourage "eyes on the street" and decrease crime, as well as increase social capital.

Table 1.2: Pittsburg Railroad Avenue Area Demographics

	Pittsburg	Census Tract 3110 Block Group 2	Census Tract 3131.01 Block Group 2	Characteristics of those living within ½ mile of a rail station
		Civic Center development	Transit Village development	Contra Costa County
Average Household Size	3.1	3.53	2.6	2.33
Percentage who owns	63%	67%	38%	67%
Race				
White	31%	45%	51%	46%
Black	19%	15%	26%	8%
Asian	13%	10%	8%	23%
Latino	32%	45%	16%	17%
Income				
Average Median Household Income	$55,000	$40,558	$33,317	$61,000

Sources: US Census 2000; Bay Area Transportation Survey 2000 (MTC)

As evidenced by Table 1.2, if the "typical" population who currently lives near transit stops in Contra Costa County moves into the housing in Pittsburg, there are two possible outcomes: integration of incomes, as more affluent homeowners attracted to commuting by public transit move in; or displacement of lower income families currently in the area. If recommendations to increase the amount of affordable housing are realized, the former potential beneficial health impact is possible.

Location, health resources and risks

Residential units in the Railroad Avenue Specific Plan are within a half mile of the BART station. Other location-related health assets and risks are identified in Table 1.3. Parks and open space resources in the Plan area and in Pittsburg are identified in Table 1.4.:

Choice of construction materials and design

As of the time of the time this report was written, the Railroad Avenue Specific Plan, was not released and none of the available documentation has specifically laid out what type of materials and design will be applied. Vision documents by the planners lay out goals of "Creating a high quality clean and safe environment" and "Encourage sustainable elements in site design and building." Without more specific information it is not possible to assess the impacts of materials choices, but only recommend that materials that will not harm health be used.

Table 1.3 Health Impacts Associated with the Proposed Location of BART Residential Uses

Health Impact of Concern	Health Risk Rating	Rationale
Air quality impacts from industry (See Air Quality chapter)	Low health risk	Housing will be located more than 1 mile from most heavy industry in Pittsburg. While air quality is still impacted by industry, project residents are not highly impacted.
Air quality impacts from mobile sources (See Air Quality chapter)	Moderate health risk	Housing will be located as close as 2,100 feet downwind of SR 4, a major urban roadway with 148,000 trips per day and expected increased future traffic.
Pedestrian injury (See Transportation chapter)	Moderate health risk	Housing will be located near the busiest traffic intersections in Pittsburg. An increase in BART ridership may increase traffic volume in the area, which endangers residents. However, with proper staffing and timing of shuttles, it is possible that people will drive less due to using SR 4 less, thus decreasing risk of pedestrian injury.
Walkability (See Transportation chapter)	Potential beneficial health impact	The Railroad Avenue Specific Plan plans for an increase in pedestrian facilities due to the increase in housing and retail services. Landscaping and pedestrian-level lighting will improve current walking conditions.
Noise impacts (See Noise chapter)	Moderate health risk	Housing will be located close to busy traffic. However, noise levels in courtyard areas of the transit village, with proper design, will be low. Additionally, sound walls along the freeway mitigate noise considerably.
Crime and Safety	Low health risk – potentially beneficial impact	Locating more residents in this currently low-density area would lead to more eyes on the street. With CPTED design mitigations, social interaction could be encouraged. Community benefits could include security mitigations.
Access to goods and services (See Retail chapter)	Potential beneficial health impact	Residences will be located near the Atlantic Avenue retail area and the project will include 446,000 square feet of new neighborhood serving retail and office space. With community oversight and proper planning, access to healthful retail such as grocery stores could improve.
Access to Parks (See Table 1.4 for list of Parks and amenities)	Potential beneficial health impact	Civic Center residential units will be within 1/8 mile of City Park. Transit Village residences will be within ½ mile of City Park. Proximity to parks encourages physical activity and social interaction. Project will add five acres of small public spaces, including green space.
Access to community serving spaces	Potential beneficial health impact	Pittsburg Community Center is at Railroad Avenue and Power, and Buchanan Park has an active Community Center. Both of these will be accessible to new residents.
Access to Schools	Potential beneficial health impact	Residences will be located near Pittsburg High School. Proximity to schools encourages walking to school, involvement of parents.

Table 1.4 Parks and Open Space in Pittsburg

Park Name	Within Project Area?	Location	Acreage	Facilities	Programming
City Park	Yes	**North** – bounded by Civic, Railroad, Davi, N. Parkside	~ 50 acres	Playing fields Baseball diamonds Astroturf Soccer field	Summer Playground Program Tots, youth & adults sports
Unprogrammed area	Yes	**North** – in front of City Hall	~5.5 acres	Footpath Benches	none
Small World Park	Yes	**South** – 2551 Harbor @ De Anza Trail	~8.5 acres		Tots, youth & adults sports
Delta De Anza Trail	Yes	**South** – across Pittsburg		Connects to regional trails in Oakley and Antioch	None – maintained by East Bay Regional Park District
Unnamed greenway	Yes	**North** - along 8th Street right-of-way	~1.75 acres		None
Buchanan Park	No	4150 Harbor Street @ Buchanan		Picnic shelters Community Center BBQ pits Bocce courts Swim Center	Summer Playground Program, Tots, youth & adults sports
Stoneman Park	No	790 W. Leland Rd.			Summer Playground Program, Tots, youth & adults sports
Marina Park	No	Herb White Way @ 8th St.	~ 25 acres		Summer Playground Program, Tots, youth & adults sports
Highlands Ranch Park	No	Buchanan Rd.			Summer Playground Program, Tots, youth & adults sports

F. References

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Pittsburg Railroad Avenue Specific Plan Health Impact Assessment
Chapter Two
Livelihood

Chapter Summary

The livelihood analysis considered how the project will impact different aspects of healthy jobs: self-sufficiency wage, health benefits, occupational injury, and paid sick days. It also looked at growth industries, jobs that the project will bring, and impacts on day laborers.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The plan increases local opportunities for employment in Pittsburg. Construction of the Railroad Avenue Specific Plan would provide employment opportunities for some low skill workers and often provide self-sufficiency wages. Employment in the manufacturing and retail industries, likely occupants of the Plans commercial uses, often provide health insurance, a benefit associated with lower mortality and better health outcomes. • New residential uses and new commuters working in Pittsburg may increase markets for retail goods and services in the project area, potentially providing further employment opportunities suitable for unemployed or underemployed area residents. • By locating employment opportunities on a regional transit line, the project is likely to reduce vehicle commute trips for future area employees, a significant health benefit for residents as less income will be spent on traveling to work versus spent on housing, food, and health care.	• Several employment opportunities enhanced by the project have mixed health characteristics. Construction jobs only have health insurance 62% of the time, paid sick days only 18% of the time, and a risk of occupational injury. Neither manufacturing or retail commonly provide sick days benefits. Retail does not usually provide a living wage. • The project may increase commercial property value and as a result may displace some of the current commercial activities in the area.

Recommendations to Promote Livelihood

1. Ensure that project approval requires employees working in short-term construction jobs and long term jobs in commercial, retail, and manufacturing be provided a self-sufficiency wage, health insurance, and paid sick days.
2. Ensure that a development agreement requires the project sponsor to maximize employment opportunities for Pittsburg residents, through prioritization of local contractors, unions, job centers, apprenticeship programs, and utilization of day labor worker centers.
3. Assess and prevent potential business displacement, taking steps to maintain property affordability for current vulnerable businesses or supporting re-location in the project area.
4. As City policy, where feasible, prioritize local recruitment and hiring for public administration/service jobs.

A. Introduction

The Pittsburg Railroad Avenue Specific Plan provides an opportunity for this community and its collaborators to plan for economic and employment opportunities that support the livelihood of Pittsburg residents. Attracting and maintaining employment opportunities that provide safe jobs with living wages, health insurance benefits, and employment with appropriate educational and training requirements can have significant effects on health, including impacts on mental health, chronic diseases, and longevity (Isaacs 2004, IOM 2004). For these reasons, the new employment opportunities that may arise through this specific plan are crucial in the sustained health of the labor force in Pittsburg. This assessment focuses on the following questions:

- *What types of jobs will be created and attracted by the construction Specific Plan projects?*
- *Do these jobs provide sufficient income, provide health insurance, and meet educational attainment of Pittsburg residents?*
- *Which of these jobs provide paid sick days and what occupational hazards are associated with them?*

B. Background: Livelihood and Health Impacts

Employment

Secure employment and sufficient income are fundamental determinants health. Unemployment leads to a shortened life expectancy and higher rates of cardiovascular disease, hypertension, depression and suicide (ACPHD 2008, Voss 2004, McKee-Ryan 2005, Jin 1995). Those experiencing precarious or unstable employment have worse self-rated health and higher rates of hypertension, longstanding illness, mild psychiatric morbidity and general illness symptoms (Ferrie 2005). In 1976, an estimated 6,000 excess deaths were reported as a result of a 1% increase in unemployment in the United States (Jin 1995).

Income

The strong relationship between income and health is not limited to a single illness or disease; people with lower incomes have higher risks than people with higher incomes for poor health and premature mortality, for giving birth to low birth weight babies, for suffering injuries or violence, for getting most cancers, and for getting chronic conditions (Yen 1999). With a decrease in income, risk of mortality increases. Individuals with an income of less than $20,000 for 4-5 years had a higher mortality risk than those who earned this income for fewer years (McDonough 1997). A separate study in the New England Journal of Medicine concluded that people who earned $15,000 annually were three times more likely to die prematurely than those earning $70,000 annually (Isaacs 2004).

Educational Attainment

Level of educational attainment is a variable linked with economic advancement and opportunities and accessibility to higher paying jobs. As income increases, funds can be used for amenities that contribute to good health including medical care (Isaacs 2004).

Health Insurance

Jobs that do not include health insurance contribute to poor health outcomes. Annually nationwide, 18,000 premature deaths are attributable to lack of health coverage (IOM 2004). Families with at least one full-time, full-year worker are more than twice as likely to have health insurance coverage, compared to families whose

wage earners work as part-time employees (less than 35 hours per week), as contingent labor (e.g., on a seasonal or temporary basis, as employees of contractors, self-employed), or in which there is no wage earner (IOM 2001). Individuals without health insurance frequently forego timely health care, suffer more severe illness, and are more likely to die a premature death than their insured counterparts (IOM 2004).

Employee Leave and Paid Sick Days

Paid sick days provided by employers to workers contribute not only to a healthy and productive workforce, but also reduces the spread of infectious diseases to co-workers and customers (IWPR 2006). Workers are able to care for themselves and for ill or recovering family members. The benefit also prevents hospitalizations and costs associated with those (Bhatia 2007).

Occupational Safety

Nationally, from 1995 through 1999, there were 30,824 fatal work injuries in the United States, including an estimated 17 fatal work injuries per day (BLS). Some employees are at higher risk of work related injury, but regardless of fatal or nonfatal injury, occupational safety and hazards found in the workplace are clearly related to health.

Commuting to work

Health impacts that arise from increased time spent commuting to work include stress and cardiovascular problems (White 1998, BBC 2000), musculoskeletal disorders (Skov 1996), and less time for family, friends, and civic engagement (Frumkin 2004).

C. Established Standards and Health Objectives

Minimum Wage

The Federal minimum wage is $5.85 per hour, but will increase to $7.25 per hour on July 24, 2009 (U.S. Dept. of Labor). The California minimum wage is $8.00 per hour. The City of Pittsburg does not have a separate local minimum wage.

Health Insurance

The Federal government, California, nor the City of Pittsburg provides universal health insurance.

Employee Leave

The Family and Medical Leave Act of 1993 allows an employee to take up to 12 weeks of unpaid leave due to a serious health condition that makes the employee unable to perform his job or to care for a sick family member or to care for a new son or daughter. The leave guaranteed by the act is unpaid and is available to those working for employers with 50 or more employees within a 75-mile radius.

Paid Sick Days

The Federal government, California, nor the City of Pittsburg provides a compulsory system of paid sick days.

D. Existing Economic Conditions in Pittsburg

Pittsburg Workforce Profile: The main source of employment information (i.e., entry level wage, occupation projections, hourly wage, and education/training) for this Health Impact Assessment came from the *California LaborMarketInfo*, an employment database provided by the State of California. Included in this analysis are occupations identified by the U.S. Census Bureau (2000) as significant industries employing Pittsburg residents. The *California LaborMarketInfo* information includes both Contra Costa and Alameda Counties and does not represent all occupations in each industry, but serves as a sample and what may be found in Pittsburg. Occupations were categorized based on the description as provided by *California LaborMarketInfo*. A compilation of all the industry workforce data is contained in Appendix II. Below is a summary of the data used here:

- Median income of Pittsburg residents: $55,000 (US Census 2000);
- Percent unemployed in Pittsburg: 5.4% (Table 2.2, below);
- Percent of Pittsburg residents who have an Associate's degree or higher: 22% (Table 2.7, below);
- Health insurance: Percent of people who did not have health insurance in 2007:
    - California: 18.8% (UHF 2008);
    - Contra Costa County: 14.7% (CCHS 2007);
    - Pittsburg: 12.3% (Table 2.3, below).
- Percent of Pittsburg residents who commute to work via public transportation: 8.4% (Table 2.8, below);
- Median income spent on transportation costs annually for households with private vehicle: $7,144 (16% of household budget) (PPIC 2004);
- Top industries that employ Pittsburg residents: manufacturing, education, retail, and government occupations (Table 2.9, below);
- Pittsburg jobs in the study area: ~1/3;
- Percent of jobs in the study area held by Pittsburg residents: 40%;
- Percent of Pittsburg residents who work outside of Pittsburg: 81% (MIG 2007);
- Percent of Pittsburg residents who drive to work, alone or in a carpool: 86% (Table 2.8, below).

Self-Sufficiency Wage: Self-sufficiency wage (living wage) calculations are based on a family scenario where one adult is the sole provider and working full-time (2080 hours per year or 40 hours per week). The poverty wage calculation is based on gross annual income and is converted to hourly wage for comparison. The living wage for a family of one adult and one child in Pittsburg ($20.82 per hour) will be used for comparison to hourly wage earned for each occupation defined. The wage is based on a Pittsburg-specific calculation involving average income and expenses in the area.

Table 2.1 Comparison of Living Wage for the City of Pittsburg for Different "Family" Scenarios ($20.82 per hour will be used as standard) (Glasmeier 2007)

	One Adult	One Adult, One Child	Two Adults	Two Adults, One Child	Two Adults, Two Children
Living Wage (per hour)	$11.59	**20.82**	15.99	22.78	27.63
Minimum Wage (per hour)	7.50	7.50	7.50	7.50	7.50
Poverty Wage (per hour)	4.73	6.38	6.03	7.43	9.39

Unemployment: Pittsburg's unemployment rate is slightly lower than the State of California (5.9%), but higher than that of San Francisco County (4.5%).

Table 2.2 Unemployment Rate as of January 2008 for the City of Pittsburg (CA EDD 2008)

Time Period	Labor Force	No. of Employed	No. of Unemployed	Unemployed Rate
January 2008	528,000	499,700	28,300	5.4

Percent of Residents without Health Insurance: Contra Costa County's uninsured percentages for all ages and person under age of 18 are below that of the entire State of California (18.8, 15.5) and San Francisco County (13.3, 10.6).

Table 2.3 Estimated Number of Insured and Uninsured Pittsburg Residents Categorized in Two Age Groups (US Census 2000)

All Ages			Under Age 18		
Number insured	Number uninsured	Percent uninsured	Number insured	Number uninsured	Percent uninsured
851,059	119,080	12.3	239,215	25,351	9.6

Living Wage Occupations: **The conclusions made below are only a sample provided by the *California LaborMarketInfo* database and are not meant to summarize all living wages by occupations in the entire industry**. A wide range of positions exists in each industry (including managerial and supervisors); therefore there are exceptions to industries providing a living wage. For more detail about starting wages for many different industries, see the additional data table in Appendix II.

Occupations in Contra Costa and Alameda Counties that can provide a living wage (i.e., an hourly mean wage that can support a family size of one adult and one child; $20.82 per hour) include:

- Professional.

Industries that almost never provide a living wage include:

- Healthcare Support;
- Retail;
- Finance;
- Transportation;
- Public Administration.

Industries that sometimes provide a living wage include:

- Education;
- Healthcare Practitioners;
- Social Services;
- Construction.

Significant Employment Providers in Pittsburg: The population employed in the industries mentioned above varies, but employment sectors providing the most jobs for Pittsburg residents (U.S. Census 2000) include:

- Educational institutions, health and social services (17.5%);
- Retail trade (12.4%);
- Professional, scientific, management, administrative, waste management services (11.8%);
- Finance, insurance, real estate, and rental and housing (9.7%);
- Construction (9%);

- Public Administration (4.2%).

All employees in the above industries, excluding professional, scientific, management, administrative, and waste management can earn wages below the living wage according to the *California LaborMarketInfo* database.

Projected Employment Growth (2004-2014): *California LaborMarketInfo* forecasts an increase in employment need in industries from 2004-2014. The occupations that frequently provide living wages and that are predicted to grow include:

- Reinforcing Iron and Rebar Workers (17.5%);
- Legal Secretaries (17.4%);
- Cement Masons and Concrete Finishers (16.1%);
- Sales Managers/Representatives (14-16%);
- Interpreters and Translators (13.8%);
- Crane and Tower Operators (12.5%).

The occupations that do not frequently provide living wages and that are predicted to grow include:

- Home Health Aides (47.2%);
- Tile and Marble Setters (24.2%);
- Medical Assistants (20.7%);
- Pharmacy Technicians (20%);
- Preschool Teachers (19.9%);
- Food Manufacturing (17.3%);
- Customer Service Representatives (16.6%);
- Eligibility Interviewers, Government Programs (16.6%);
- Retail Salespersons (15.2%);
- Taxi Drivers and Chauffeurs (14.4%).

Educational Attainment/Training: Approximately 78% of the population of Pittsburg 25 years and over have finished junior high and have some college education (US Census 2006). This level of education qualifies them for several industries, which sometimes can provide living wages, including:

- Manufacturing;
- Some Retail;
- Few Transportation.

Many of these industries do require additional on the job training ranging or work experience.

Occupations not often compensating employees with a living wage based on this level of educational attainment are (all excluding managerial and supervisor positions):

- Manufacturing;
- Retail;
- Finance;
- Transportation, warehousing, utilities;
- Healthcare support;
- Public Administration.

Health Insurance Benefits: Information on health insurance benefits for industries is limited and not sufficiently separated by city or county. Information used here is for the state of California and is not further categorized by occupation type. Industries with a significant insured workforce include:

- Professionals (91%);
- Protective (91%);
- Technicians (90%);
- Managers (88%);
- Clerical (83%).

All other industries types are between 55%-78% coverage for employees.

Paid Sick Days: For occupations of interest, the percentage of workers with employer-provided paid sick days are:

- Construction and Extraction (18%);
- Production- also referred to as "Manufacturing" (41%);
- Sales- also referred to as "Retail" (46%);
- Education and Training (62%);
- Healthcare Support (65%);
- Office and Administrative Support- also referred to as "Public Administration" (68%);
- Healthcare Practice and Technical (71%);
- Community and Social Services (77%).

Table 2.4 Worker Eligibility for Employer-Provided Paid Sick Days in the Private Sector by Job Characteristics, 2006 (IWPR 2006)

Occupation	Percent of workers with employer-provided paid sick days
Food Preparation and Services	15
Construction and Extraction	18
Protective Services	22
Personal Care and Service	37
Transportation and Material Moving	41
Production	41
Sales	46
Building services, Grounds Cleaning, and Maintenance	53
Installation, Maintenance, and Repair Services	58
Arts, Entertainment, Sports	62
Education and Training	62
Healthcare Support	65
Office and Administrative Support	68
Healthcare Practice and Technical	71
Life, Physical, and Social Sciences	75
Community and Social Services	77
Business and Financial	78
Architecture and Engineering	81
Computer and Math	81
Management	83
Legal	84
All	**52**
Work Schedule	
Full-time	62
Part-time	20
Full-year	53
Part-year	26
Full-year, full-time	63
Not full-year, full-time	21
All	52
Notes: Excludes agricultural, military, private household, and self-employed workers. Rows and columns may not sum to totals due to rounding. Cutoffs for wage quartiles: first (top), $21.66 or more; second, $13.50 to $21.65; third, $9.23 to $13.49; and fourth (bottom), less than $9.23.	

Occupational Health and Safety: Occupations of interest for this project with total number of fatal injuries in 2005 in parentheses first, followed by total number of nonfatal injuries include:

- Transportation and material moving occupations/warehousing (115, 18.6)
- Construction and Extraction (92, 29.9)
- Production/ Manufacturing (22, 45.3)
- Sales and related/ Retail Trade (34, 44.1)

Nonfatal occupational injury and illness totals are cases with days away from work, job transfer, or restriction.

Table 2.5 Fatal Occupational Injuries by Industry, California, 2005 (CA Dept Industrial Relations 2005a)

Occupation	Total (Number)
Community and Social Services	0
Education, Training, and library	0
Healthcare practitioners and technical	3
Healthcare support	0
Sales and related	34
Office and administrative support	5
Construction and Extraction	92
Production	22
Transportation and material moving occupations	115

Table 2.6 Number of Nonfatal Occupational Injuries and Illnesses by Industry, California, 2006 (CA Dept Industrial Relations 2005b, 2006)

Occupation	Incidence Rate (per 100 employees)
Construction	5.8
Manufacturing	4.4
Transportation and warehousing	6.8
Retail Trade	5.2
Educational services	2.6
Health care and social assistance	7.8
Administrative and support services	4.2

Day Laborers: A National Day Labor Survey (NDLS) collected statewide day labor workforce information. Statewide, day labor makes up a 3% of the workforce; 0.2% of the workforce is comprised of male undocumented workers. Infrequency of employment for many day laborers results in salaries below the living wage ($11.32 per hour, on average). A large number of these workers (84%) are seeking regular employment. Ninety two percent of this workforce has worked in construction, 86% in moving/hauling, 84% in painting and 84% in gardening/landscaping industries. Seventy percent of laborers reported work as unsafe, 40% reported abuses by business owners, 32% reported abuses by employer, and 43% reported being forced to leave a work site by police. Worker centers were reported to have lower percentages of all reported abuses but not hazards (Gonzalez 2007).

Table 2.7 Educational Attainment of Pittsburg Residents 25 years and Over (US Census 2000)

	Population	Percent
Population 25 years and over	**33,338**	**100**
Less than 9th grade	3,516	10.5
9 to 12th, no diploma	4,610	13.8
High School Graduate (Equivalency)	8,632	25.9
Some college, no degree	9,267	27.8
Associate's degree	2,449	7.3
Bachelor's degree	3,822	11.4
Graduate or professional degree	1,092	3.3
High School Graduate or higher	25,272	75.7
Bachelor's Degree or higher	4,908	14.7

Table 2.8. Pittsburg Residents' Method of Commuting to Work and Mean Travel Time to Work (US Census 2000)

COMMUTING TO WORK	Number	Percent
Workers 16 years and older	23,942	100
Car, truck, or van--drove alone	16,117	67
Car, truck, or van--carpooled	4,517	19
Public Transportation (including taxicab)	2,033	8
Walked	366	2
Other means	385	2
Worked at home	524	2
Mean travel time to work (minutes)	37.3	-

Table 2.9 City of Pittsburg Major Employers (Source: City of Pittsburg)

Employer	Number	Type
Pittsburgh Unified School District	1400	Education
USS-POSCO Industries	1000	Manufacturing
Los Medanos Community College	640	Education
City of Pittsburgh	400	Government
Dow Chemical Company	380	Manufacturing
Wal-Mart	220	Retail
Home Depot	180	Retail
Target	170	Retail
Loctite Aerospace	160	Manufacturing
Safeway	150	Retail
American Color Graphics	140	Manufacturing
Ramar International Corporation	120	Manufacturing

E. Assessment of proposed project

The projects may have several potential impacts on economic and employment conditions. These include:

- Short term construction jobs associated with the development phase;
- Facilitation of expected/planned economic growth through the provision of transit, housing, and other services;
- Inclusion of new commercial uses within the project;
- New markets for goods and services related to residential uses;
- Displacement of existing businesses associated with changes in demographics, changes in rents, or new residential-industrial conflicts.

Short-term construction jobs associated with the development phase

Growth of short-term jobs in construction is one expected result of the Specific Plan projects. The construction of the BART is estimated to being in 2010 and end in 2014, providing 4 years of construction employment (eBART, 2006). How many jobs there will be in the course of construction of the Railroad Avenue Specific Plan elements is currently unknown, but BART Human Resources estimates that numbers of future employment opportunities will be known before 2009 (BART 2008).

Inclusion of new commercial uses within the project

The Railroad Avenue Specific Plan could integrate new commercial uses and attract other industries, including manufacturing. As examples of the types of industries that are moving to Pittsburg, new industries and existing industries that have expanded in Pittsburg (Phillips 2007, St. Peter Martyr Organizing Committee/CCISCO 2007) include:

- Koch Carbon (expansion of petroleum coke handling);
- Raymar Foods (expansion of food processing plant) with new 80 new openings;
- United Spiral Pipe's $93 million steel pipe manufacturing mill, bringing as many as 200 high-paying jobs;
- Caviar wholesaler with a downtown shop that will sell Italian cooking products, infused olive oils and salts;
- Italian rail manufacturer AnsaldoBreda Inc. (new mass transit vehicle manufacturing plant), which has moved its U.S. headquarters to Pittsburg, with 40-50 new openings and a possible expansion of another 200 people in the 5 to 7 years;
- BioZone Laboratories (over-the-counter drugs, cosmetics, and supplements), which could add 50 employees to its current workforce of about 100.

Facilitation of expected/planned economic growth through the provision of transit, housing, and other services

The specific plan may aid in the growth of existing industries in the project area including retail, education, health, social services, and public administration, which are currently in the Study Area. Employers include Pittsburg High School and Civic Center and a shopping center (MIG 2006). Manufacturing plants confirmed to move to or start in Pittsburg are listed above. Land use types for the project consist of regional shopping center, office building, civic center expansion, and light industry (Table 2.10) (MIG 2006). From these land uses, projections could be used to determine what types of new employment opportunities will become available in the project area.

Job and industrial growth do not automatically result in the employment of the local workforce. A study conducted in Richmond, CA determined that, regardless of the growth of certain industries in the city, the local workforce was not eligible due to existing skills and educational levels. Additionally, jobs that residents are eligible for may not provide sufficient wages or provide health benefits (EBASE 2007).

Table 2.10 Summary of Land Uses for Project Site

Land Use Type	Unit Type (sq. ft.)	Primary Industries Associated with Use
Regional Shopping Center	446,000	Retail
General Office Building	72,200	Professional, health care, finance, social services
Government (Civic Center)	139,000	Public Administration, social services
General Light Industry	223,000	Manufacturing, wholesale

New markets for goods and services related to residential uses

The Railroad Avenue Specific Plan does not analyze new retail markets in the Study Area. An assessment of existing retail is available in Retail chapter of this Health Impact Assessment.

Displacement of existing businesses associated with changes in demographics, changes in rents, or new residential-industrial conflicts.

The project may increase commercial property value and, as a result, may eventually displace some of the current commercial activities in the area. Further analysis of this issue could occur based on real estate market information, identification of specific proposed uses, zoning, and potential and expected conflicts among proposed uses. The City of Pittsburg has not yet finalized the types of commercial activities that will be encouraged in the area and zoning maps are in review.

Health Impacts associated with Employment Effects

Health impacts are associated both with the number and type of employment opportunities and the wages and benefits in the associated industries. Key health-related characteristics of industries likely to be affected by the project include:

- **Construction**: can sometimes provide a living wage; 62% of employees are covered by health insurance; residents can often meet educational/training needed; is ranked 5th leading industry in employed civilians; leading industry for day labor jobs (92%); industry projected to grow by 16-17%; 18% of employees are provided paid sick days; 5.8 nonfatal injuries per 100 employment positions;
- **Manufacturing**: cannot often provide a living wage (excluding managers, power and chemical plant operators); 72-88% of employees are covered by health insurance; residents can often meet educational/training needed; ranked 6th industry in employed civilians; not a significant industry for day laborers; growth projections range from decreasing to increasing employment opportunities; 41% of employees are provided with paid sick days; 4.4 nonfatal injuries per 100 employment positions;
- **Education**: can sometimes provide a living wage; 91% of employees are covered by health insurance; residents do not frequently meet educational/training required; ranked 1st in number of employed civilians; industry projected to grow; 62% of employees are provided with paid sick days; extremely low rate of occupational injury; 2.6 nonfatal injuries per 100 employment positions;
- **Healthcare Practitioners:** can sometimes provide a living wage; 91% of employees are covered by health insurance; residents may not always meet educational/training needed; is tied at 1st in employing Pittsburg residents; industry projected to grow; 71% of employees are provided with paid sick days; healthcare and social services has 7.8 nonfatal injuries per 100 employment positions;
- **Healthcare Support:** does not always provide a living wage; 91% of employees are covered by health insurance; residents can often meet educational/training needed; is tied at 1st in employing Pittsburg residents; industry projected to grow; 65% of employees are provided sick days; healthcare and social services has 7.8 nonfatal injuries per 100 employment positions;
- **Social Services:** can sometimes provide a living wage; 91% of employees are covered by health insurance; residents do not always meet needed education/training requirements; tied at 1st in

employing Pittsburg residents; industry projected to grow; 77% of employees are provided paid sick days; healthcare and social services has 7.8 nonfatal injuries per 100 employment positions.

- **Public Administration:** does not always provide a living wage (except managerial, legal, and postal workers); 83% of employees are covered by health insurance; residents can often meet educational/training needed; ranked 10th in employing Pittsburg residents; 68% of employees are provided paid sick days; 4.2 nonfatal injuries per 100 employment positions;
- **Retail Goods and Services:** can usually pay living wage except salespersons/workers and cashiers with no degree; 78% of employees are covered by health insurance; residents can sometimes meet educational/training needed; is the second (12.4%) leading employment provider for Pittsburg residents; industry is projected to grow; 46% of employees are provided paid sick days; 5.2 nonfatal injuries per 100 employment positions.

Unemployment

While Pittsburg's unemployment rate is lower than the state overall, there is still cause for concern given the poor health outcomes that exist for those who are unemployed. The Pittsburg Railroad Avenue Specific Plan project could decrease the unemployment rate if policies to hire locally are implemented and monitored, even if those jobs may not provide benefits that are healthful (see below). Those who remain or become unemployed have poorer self-rated health, higher rates of hypertension and psychological distress, and more general illness symptoms.

This project may provide more local job opportunities to some of the approximately 81% Pittsburg residents who are commuting outside of the city to work. The labor workforce that would most benefit from this proposed project include those working in the construction, manufacturing, and education industries. Labor for the construction industry comes from both within and outside of Pittsburg. The local day laborer workforce can benefit from new construction opportunities, and if a Day Labor Center is instituted, the day labor workforce could be trained to qualify for other industries.

Other existing and growing occupations in Pittsburg, such as some in healthcare, education, and professional careers, may not be attainable to Pittsburg residents without further education or training.

Income

Given that construction, manufacturing and education are likely industries that would grow as a result of the Railroad Avenue Specific Plan, this plan has the potential benefit of providing a self-sustaining wage through these industries to a good proportion of Pittsburg residents, provided that local hiring policies are implemented and monitored. Wage benefits from construction jobs would be expected to be short term. Jobs with self-sustaining wages support healthier eating, increased ability to provide adequate shelter and utilities, and, in general, higher incomes are associated with better health.

Health insurance

For potential jobs that would result from the Specific Plan, between 55% and 91% of the associated industries provide health insurance. Construction (62%), manufacturing (72% - 88%), and retail (78%) are the main jobs that will be created. Those with health insurance are more likely to get treated in a timely manner for illness, decreasing risk of emergency treatment and premature mortality.

Paid sick days

This project is unlikely to increase significantly the amount of workers who have paid sick days given that construction workers have paid sick days only 18% of the time, manufacturing only 41% of the time, and

retail only 46% of the time. Those with paid sick days are better able to treat their own illness as well as care for their dependents.

Occupational injury

Work associated with the Railroad Avenue Specific Plan is likely to increase the number of occupational injuries in Pittsburg at least in the short term, given that construction trade has a high rate of injury.

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Pittsburg Railroad Avenue Specific Plan Health Impact Assessment
Chapter Three
Transportation Systems

Chapter Summary

The analysis of transportation considered the effects on traffic generation, pedestrian safety, and the pedestrian environment and identified feasible recommendations to reduce project-generated vehicle trips.

Potential Positive Health Impacts	Potential Negative Health Impacts
• By locating new residential uses in close proximity to a regional transit line, the plan helps constrain the growth of trips regionally and the regional growth of air pollution emissions. Below market rate housing and neighborhood serving retail are key elements of the project that would help to reduce personal vehicle use. • The plan would increase the use of BART locally and regionally, likely increasing physical activity for 3,883 current and future area residents.	• The plan would increase vehicle trips modestly in the project area. • Without traffic calming and other safety mitigations, the plan is likely to increase the rate of pedestrian-vehicle collisions in Pittsburg.

Recommendations to Improve Sustainable Transportation Systems

1. Provide frequent and widely available bus service to the new BART station.
2. Provide incentives for large employers in the region to provide shuttle services.
3. Increase the amount of affordable housing to 40% while ensuring the project remains mixed-income.
4. Conduct a retail diversity needs assessment to ensure retail serves the needs of the community and will promote local shopping, thus reducing vehicle trips.
5. Reduce structured parking for residential uses to a ratio of one space per unit; unbundle the cost of parking from housing; provide free structured parking for car sharing.
6. Implement a residential parking permit scheme, pricing parking permits for new residents as close to market rate as possible.
7. Name and implement the Class level of bike facility improvements in the Specific Plan. Add physical signage and labeling of bicycling facilities.
8. Ensure secured bike parking at the BART station; encourage local employers to offer secure bike parking.
9. Ensure that sidewalk widths published in the Specific Plan are minimum requirements.
10. Implement traffic calming measures at high traffic points to decrease risk of pedestrian injury.

A. Introduction

Transportation and land use systems can have powerful effects on social and individual travel behavior, which in turn impact health and the environment. A more dense mix of uses, well served by mass transportation systems can ensure access to essential needs and services while reducing vehicle miles traveled (VMT), thereby reducing environmental and health costs associated with personal vehicle trips (EPA 2001). At the same time, development needs to be attentive to locating sensitive uses near sources of environmental and safety hazards, such as busy roadways, and ensure a compatible mix of uses.

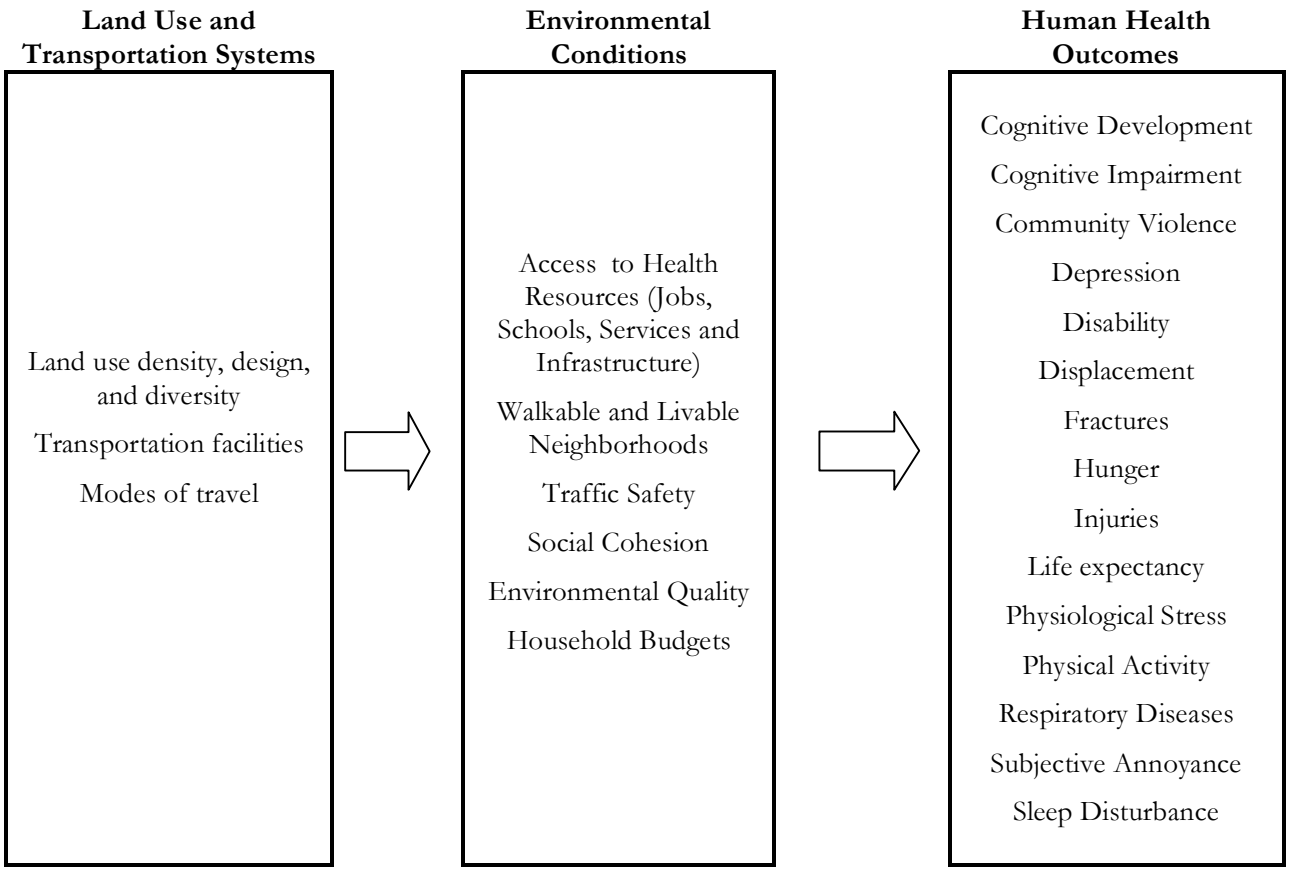
This chapter provides an assessment of several health effects, mediated through transportation systems, of the proposed project to extend BART and build transit-oriented housing. More specifically we review effects on driving, transit use, and the pedestrian environment and their indirect effects on regional air quality, physical activity, and pedestrian safety. The project's transportation related effects on local area noise and air quality, retail service access, and social cohesion are addressed in separate chapters of this HIA. This chapter explores the following five questions:

- *What are impacts of the Specific Plan projects on Vehicle Trip Generation and what are the distribution of those impacts?*
- *How does transit proximity, residential affordability, and structured parking affect travel behavior?*
- *What are the projects effects on regional environmental quality, mediated via changes in travel behavior?*
- *Will the project facilitate walking as a mode of travel for both new residents and current?*
- *What are the projects effects on pedestrian safety in the station area?*

B. Background: Transportation and Health Impacts

Land use patterns and transportation systems are closely related and have a profound impact on public health. For example, separate zoning for manufacturing, office, retail, and residential uses can increase commute travel and create demand for larger and faster highways; similarly, when we build highways this can speed up vehicle travel and enable the development of new suburbs further from jobs. This section explores specific pathways linking transportation systems, environmental conditions, and human health and enumerates several land use and transportation design strategies that can be positive for health. Comprehensive reviews of transportation-environment-health relationships are available from the WHO (Dora 1999), California EPA (1997), USEPA (2001), and the US Green Building Council (Ewing 2006).

Figure 3.1 Framework linking transportation systems to environmental conditions and health.



Impacts on Access to Essential Human Needs

Transportation facilities and services enable people to access daily needs and resources including employment, schools, and goods and services essential for health (See chapter on Retail). Dominant low-density land use patterns have resulted in the automobile becoming the primary means of accessing daily needs. More traditional urban areas have a diverse mix of uses and permit more non-motorized and public transportation options.

For many people, including low-income populations who don't own automobiles, accessible, affordable and convenient mass transportation is necessary for most daily activities: to get to work, to take children to school and child care, to shop for groceries and other retail services, and to obtain timely medical care. A study of fifteen low-income neighborhoods in the San Francisco Bay Area found that 66% of residents had no transit access to hospitals and 48% didn't have walking access to a supermarket (Transportation and Land Use Coalition, 2002). Residents often do not utilize available medical services if they are difficult to reach. Disconnected and lengthy transit routes make the experience of doing daily activities more time intensive, tiring, and stressful.

Impacts on Walkability, Physical Activity, and Obesity

Transportation and land use patterns can also have beneficial effects on health by encouraging physical activity and walking for leisure (Frank 2006). A "walkable" or "complete" or "livable" neighborhood, characterized by mixed residential and commercial uses with easy access to a variety of food and retail

options, parks and open space, and modes of transport, can lead to more exercise and less obesity by significantly reducing the need to drive (Handy 1996). Other traffic variables that encourage walking on streets include traffic calming measures, street connectivity, access to public spaces, well-maintained and well-lit sidewalks, traffic conditions that encourage maximum pedestrian visibility to drivers, safety from crime, and the presence of well-marked bike lanes (Li 2005; Ewing 2006; Frank 2004).). In turn, it is well established that physical activity can prevent obesity, diabetes, and heart disease, reduce stress, improve mental health, and promote longevity (PolicyLink 2002). Several studies have quantified the benefits of built environmental form on walking:

- Saelens has shown that people walk on average 70 minutes per week longer in pedestrian-oriented neighborhoods (Saelens 2003).
- A study in the US showed that each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity. Each additional hour walked per day was associated with a 4.8% reduction in the likelihood of obesity (Frank 2004).
- A study in Atlanta, Georgia looked at people living in walkable vs. car-dependent neighborhoods, and found that those living in car-dependent neighborhoods drove an average of 43 miles per day (vs. 26 in walkable neighborhoods), and walked much less (only 3% walked vs. 34% in the walkable areas).
- Urban areas where people use cars less show higher rates of walking and lower rates of obesity and hypertension (Ewing 2003).
- In a study in California assessing vehicle miles traveled and obesity, counties with the highest average amount of vehicle miles traveled were significantly associated with the highest average rank of obesity (Lopez-Zetina 2006).
- Americans who use public transit spend a median of 19 minutes daily walking to and from transit; 29% achieve more than or equal to 30 minutes of physical activity a day solely by walking to and from transit, enabling them to reach the CDC recommended amount of physical activity (30 minutes a day, five times a week) (Besser 2005).
- According to an analysis of US travel survey data, 16% of all recorded walking trips are part of transit trips, and these tend to be longer than average walking trips(Weinstein 2001).

Pedestrian safety is critical to converting urban form changes to an increase in walking. A neighborhood with significant obstacles to walking such as high traffic volumes and speeds, narrow sidewalks, poorly connected streets, unsafe intersections, and a lack of lighting, is likely to reduce walking on residential streets (CDC 2002; Li 2005; Transportation Alternatives 2006). The risk of pedestrian injuries may discourage pedestrian activity and negatively impact physical activity levels. One recent study found that three factors – traffic volume, traffic speed and the separation between pedestrians and traffic – explained 85% of the variation in perceived safety and comfort for pedestrians (Landis 2000).

Impacts on Social Networks and Social Cohesion

Transportation can also support or hinder social networks and community cohesion by affecting access and interactions among members within a community. For example, investments in pedestrian facilities or traffic calming not only encourage more short walking and bicycling trips within a community but also provide settings for social interaction. Taking public transportation aids in decreasing isolation and encourages what city planning advocate and critic Jane Jacobs referred to as casual contact from unplanned social interactions (Jaoobs 1961). Conversely, driving takes time away from other health positive activities, such as exercise, community involvement or time with family.

Support, perceived or provided, from neighbors, friends, and family can buffer stressful situations, prevent damaging feelings of isolation, and contribute to a sense of self-esteem and value. Socially isolated people die at two or three times the rate of people with a network of social relationships and sources of emotional and instrumental support (Brunner 1997). In the landmark Alameda County Study, those with fewer social

contacts had twice the risk of early death, even accounting for other factors including income, race, smoking, obesity, and exercise (Berkman 1979). For the elderly and the disabled, limited access to public transit creates barriers to participation in community and civic life, potentially, leading to feelings of depression and alienation (Surface Transportation Policy Project 2004).

Impacts on Unintentional Injuries and Fatalities

Over 42,000 people have died on US roads since 2002. Nationally, for people aged one to 40, traffic injuries are the single greatest cause of disability and death. Pedestrians account for 11% of all motor vehicle deaths, and in cities with populations exceeding 1 million, they account for about 35%. Each year, 80,000 to 120,000 pedestrians are injured and 4600 to 4900 die in motor vehicle crashes. Children aged 5 to 9 years have the highest population-based injury rate, and people older than 80 years have the highest population-based fatality rate.

Important environmental variables associated with pedestrian collisions include pedestrian volume (Agran 1996), vehicle volume (Lee 2005), vehicle type (Paulozzi 2005), vehicle speed (Taylor 2000), intersection design, pedestrian facilities, lighting, and weather (Eisenberg 2005).

Public health and transportation safety research consistently demonstrates that vehicle volumes are an independent environmental predictor of pedestrian injuries (LaScala 2000; Agran 1996; Roberts 1995; Stevenson 1998; Zeeger 2002). The magnitude of effect of vehicle volume on injuries is significant. For example, in a study of nine intersections in Boston's Chinatown, researchers calculated an increase in 3-5 injuries per year for each increase in 1000 vehicles (Brugge 2002).

Vehicle speeds predict both the frequency as well as the severity of pedestrian injuries. Below 20 mph the probability of serious injury or fatal injury is generally less than 20%; this proportion rapidly increases with increasing speed and above 35 mph, most injuries are fatal or incapacitating (NHTSA 1999).

The relationship of vehicle volume and pedestrian volume and pedestrian injury are not entirely linear. For instance, an analysis of pedestrian and bicycle volume found that with increasing numbers of walkers and bicyclists, injury rates decreased (Jacobsen 2003). Similarly, an analysis of pedestrian injuries in Oakland illustrated that the risk for pedestrian-vehicle collisions was smaller in areas with greater pedestrian flows and greater in areas with higher vehicle flows (Geyer 2005).

With regards to sensitive populations, the elderly and the very young populations are more vulnerable to vehicle injuries while walking because of slower walking speeds or slower reaction times. Pedestrian collisions are more common in low income areas, potentially reflecting a greater residential density, greater traffic volume, and lower automobile ownership among residents of these neighborhoods (La Scala 2001).

The frequency and severity of accidents are also affected by speed. On average, each 1 mph reduction in speed may reduce accident frequency by 5%, with effects greatest for urban main roads and low speed residential roads (Taylor, 2000). Furthermore, traffic calming in residential areas can reduce pedestrian accidents on average by 15% (Morrison, 2003).

Impacts on Environment Quality—Air Quality, Noise, and Climate

A number of well-recognized transportation system impacts on environmental health are directly proportional to the use of personal motor vehicles. Motor vehicles produce fine particulate matter, nitrogen oxides, carbon monoxide, and volatile organic compounds, contribute to tropospheric ozone, and emit air toxics, such as diesel exhaust. Vehicles also affect health through impacts on environmental noise, and greenhouse gas emissions.

- Particulate matter from roadway vehicles exacerbates cardiovascular disease and asthma leading to hospital visits and premature death (EPA 2001). Ozone is a respiratory irritant that exacerbates asthma and impairs lung development. Children living next to busy roadways have more respiratory disease symptoms and reduced lung function measures (Brunekreef 1997, Guaderman 2004, Lin 2002). Diesel exhaust is a potent carcinogen (CARB 2006).
- Road traffic noise is a function of vehicle volume, vehicle speed, vehicle type, and road conditions. Moderate levels of vehicle associated noise significantly affects sleep, school and work performance, temperament, hearing impairment, blood pressure, and heart disease (WHO 1999; Babish 2005; Stansfield 2005). Noise can also interfere with speech communication outdoors, in the workplace and in the schoolrooms, interfering with the ability of people to perform their work(WHO 1999)
- Motorized transportation accounts for a large and growing share of the country's greenhouse gas emissions. Climate change in turn threatens to have global and catastrophic effects on health through the environmental changes it creates - more frequent extreme weather events, flooding, species loss, changes in food production, increases in waterborne and food-borne illnesses, and increases in the vectors of infectious diseases.

Impacts on Physiologic Stress

The more time a person spends in a car, the less time a person has to engage in leisure time physical activity (Lopez-Zetina 2006). Traveling to and from work is the single biggest cause of stress for many people. In a study of nine hundred working women in Texas, respondents rated commuting as the activity that gave them the least amount of happiness (Kahneman 2004).

Impacts on Neuromuscular Systems

Time spent in a car driving is associated with 1.6 to 2.8 times higher odds of having shoulder pain when compared to those who spend less time in a car (Skov 1996).

Impacts on Household Budgets

Because money is a general resource for health, securing essential human needs like food, clothing, and shelter, transportation options can impact health through their effects on household budgets. A household with 2 adults that uses public transit saves an average of $6,251 per year compared to an equivalent household that owns 2 cars (Baily 2007). The savings associated with taking public transit can be used for other necessities including healthcare, food, housing and clothing, and thereby lead to improved health.

Land Use and Transportation—Effective Strategies for Health

A healthier and more sustainable transportation system makes alternatives to driving more convenient, increases access for everyone, and encourages more active forms of transport. Although specific relationships between the different factors vary, the built environment characteristics that increase livable, walkable neighborhoods and reduce driving include:

- Density of residential and commercial uses (e.g., increasing housing density and neighborhood convenience to access goods and services shortens trips and encourages the use of public transportation).
- Compact, mixed land use patterns and high levels of street connectivity (Frank et al 2006; Frank et al 2007).
- Parking supply, pricing and management, which may influence car ownership and therefore the number of vehicle trips and miles traveled.
- Quality of public transportation including frequency, pricing, reliability, perceived and actual safety, and coverage.

- Cost and convenience of motor vehicle transport (e.g., gas prices, car ownership, and parking supply) (Deakin 2006).
- Well-designed, mixed-use development around transit nodes, which can increase patronage as much as 5-6 times compared to development away from transit (Cervero 2005).
- A quality pedestrian environment which reflects factors including: street and sidewalk design and connectivity, presence of street furniture, pedestrian safety interventions such as crosswalks and countdowns, slope and the aesthetics and safety of the surrounding environment (Sallis).
- Roadway characteristics such as reduced vehicle volume, narrower roadway widths and slower traffic speeds (Weir et al 2007, Dumbaugh 2005).
- Presence of open or recreational spaces (LFC 2005, Troped 2001, Powell 2003).
- Mixed-use, dense residential and commercial development, as well as close (i.e., <.5 mile) proximity of development to public transit, which decreases the distance between people's residential, employment, and other (e.g., shopping, errands, social) activities and increases walking as a means of transportation (Ewing 2006).
- Presence and quality of bike lanes, bicycle network connectivity, proximity of development to public transit and other destinations, traffic volume and speed, slope and presence of bike storage, bike locks, and bike racks (including on public transit).
- Traffic calming, which can reduce injuries in residential areas by 15%. Traffic calming features include connected, dedicated sidewalks, lanes, and paths, and interventions (Morrison 2003).
- Congestion Pricing, which involves charging motorists directly for driving on a particular road or in a particular area during congested periods. One comprehensive traffic modeling study for several large California cities predicted that charging 8 to 19 cents per vehicle-mile as a congestion fee would reduce congestion by 5 to 10%, and emissions by 3 to 6% (Deakin 1006).

Data on the effectiveness of particular interventions for reducing pedestrian injuries is available but limited. The National Cooperative Highway Research Program recently published a State of the Knowledge Report on crash reduction factors for traffic engineering (NWHA 2005). The report summarizes the best evidence on the effectiveness of diverse interventions. While the report reviews the effectiveness of interventions on motor vehicle accidents overall, it includes a number of studies specifically focused on effects on pedestrian injuries.

Table 3.1 Effectiveness of Traffic Interventions

	Level of Predictive Certainty	Accident Modification Factor
Intersection Treatments		
Install a roundabout	High	0.12-0.95
Add exclusive left-turn lane	High	0.42-0.81
Add exclusive right-turn lane	High	0.83-0.96
Install a traffic signal	High	0.33-1.5
Remove a traffic signal	High	0.69-0.82
Modify signal change interval	Medium-High	0.63-1.12
Convert to all-way stop control	Medium-High	0.28-0.87
Convert stop-control to yield-control	Medium-High	2.37
Install red-light cameras	Medium-High	0.84-1.24
Roadway Segment Treatments		
Narrow lane widths to add lanes	Medium-High	1.03-1.11
Add passing lanes (two-lane roads)	Medium-High	0.65-0.75
Add two-way left-turn lane (TWLTL)	Medium-High	
Increase lane width	Medium-High	
Change shoulder width and/or type	Medium-High	See formula
Flatten horizontal curve	Medium-High	See formula
Improve curve super elevation	Medium-High	See formula
Add shoulder rumble strips	Medium-High	0.82-0.87
Add centerline rumble strips	Medium-High	0.75-0.86
Install/upgrade guardrail	Medium-High	0.53-0.56
Install raised medians at crosswalks	Medium-High	Marked Crosswalks= 0.54 Unmarked crosswalks = 0.61

C. Established Transportation Standard and Health Objectives

Federal Standards:
Healthy People 2010
The US Department of Health and Human Services (USDHHS) establishes National objectives for the rate of injuries (USDHHS). By 2010, the following objectives should be achieved:

Unintentional injury prevention
- A rate of non-fatal vehicle injuries to pedestrians no greater than 19 injuries per year per 100,000 people.
- A rate of fatal vehicle injuries to pedestrians no greater than 1 injury per year per 100,000 people.

Obesity and Overweight
- Objective 22-2 - Increase the number of adults who engage in regular, preferably daily, in moderate physical activity for 30 minutes per day.

Physical Activity
- Objective 22-14 - Increase the proportion of trips made by walking.
- Objective 22-15 - Increase the proportion of trips made by bicycling.

California State and Regional Policies and Standards

California General Plan Guidelines (2003)

The 2003 State of California General Plan Guidelines calls for ensuring environmental sustainability by matching employment potential, housing demand by income level and type and new housing production.

Governors Environmental Goals and Policy Report (2003)

- Encourage a balance between job and housing development, at the regional, sub-regional, and community level to reduce the negative impacts of long commutes and automobile dependency.
- Provide the public with a transportation network that increases mobility choices—including public transportation, walking, and biking—and allows equitable access to jobs, community services and amenities.
- Promote compact, higher density residential development patterns to maintain and enhance agricultural and natural resources.

Caltrans Strategic Plan 2007-2012 (2007)

- Goal 2: Maximize transportation system performance and accessibility.
    - Objective 2.3: By 2012, increase intercity-rail ridership by 28% on the state-supported routes.
    - Obj. 2.4: By 2012, reduce single occupancy vehicle commute trips by 5%.

Metropolitan Transportation Authority's 2025 Regional Transportation Plan (MTA 2001)

- Improve the ease and convenience of using the transportation system.
- Improve the safety of the transportation system for its users.
- Achieve fairness in the planning, funding, and operation of the region's transportation system.
- Plan and develop transportation facilities and services in a way that protects and enhances the environment.
- Support transportation investments that are essential to the economic well-being of the Bay Area.
- Support community-based efforts to improve quality of life by providing access to transportation funding.

The Metropolitan Transportation Authority (MTA) Resolution 3434

- Local station area plans must address future land use changes, station access needs, circulation improvements, pedestrian-friendly design, and other key features in a transit-oriented development.
- Station access and circulation plans in Railroad Avenue Specific Plan must plan for motorized, non-motorized, and transit access. Identify barriers for pedestrians, bikes, and wheelchair access to the station (like freeways, RR tracks, arterials w/ inadequate pedestrian crossings) and propose strategies to remove barriers and maximize people accessing station by these means.

Local Standards and Guidance

Contra Costa Countywide Bicycle and Pedestrian Plan

- Goal 1: Expand, Improve and Maintain Facilities for Bicycling and Walking.
- Goal 2: Improve Safety for Bicyclists and Pedestrians.
- Goal 3: Encourage More People to Bicycle and Walk.
- Goal 4: Support Local Efforts to Encourage Walking and Bicycling.
- Goal 5: Plan for the Needs of Bicyclists and Pedestrians.

The City of Pittsburg General Plan 2020 Transportation Element

- 7-P-2. Use the adopted Regional and Local Transportation Impact Fee ordinances to ensure that all new development pays an equitable pro-rata share of the cost of transportation improvements.

- 7-P-29. Preserve options for future transit use when designing improvements for roadways. Ensure that developers provide bus turnouts and/or shelters, where appropriate, as part of projects.

D. Existing Transportation Conditions in Pittsburg

In a recent survey of Contra Costa County residents, 45% felt that transportation issues are the most pressing issue in the County (McDonough 2005), more than concerns about education, the economy, growth, crime and violence, war and terrorism, and other issues. 75% of the people surveyed felt that "we all benefit by mass transit because even if I don't use it, it gets people out of their cars," and 42% said they would take transit more often if it were convenient.

Average Daily Traffic. At SR 4 and Railroad Avenue, the average annual daily trips (AADT) is 125,000. Peak hour traffic count at this intersection is 8,700 (Caltrans 2006). The Metropolitan Transportation Commission expects traffic to increase by 38% between 2000 and 2025 (MTC 2007).

Jobs and Commutes. There are 13,644 jobs in Pittsburg. There are 32,681 employed residents in Pittsburg, of whom 81% commute outside Pittsburg to work. For Pittsburg residents, the average travel time to work is 37 minutes, whereas the average commute time for Contra Costa County residents is 32.1 minutes - the tenth longest in the country. Nationally, the average travel time to work is 26 minutes (US Census 2000).

Sixty seven percent or 9,094 jobs in Pittsburg are filled by people who live outside of Pittsburg. Over 40% of the people working in the Study Area live in Pittsburg.

Table 3.2 Places of Work of Pittsburg Residents

Work Place	Number of People	% of Pittsburg Residents
Pittsburg	4,550	19.1%
Concord	3,470	14.5%
Alameda County	3,039	12.9%
Walnut Creek	2,050	8.6%
San Francisco	2,040	8.6%
Antioch	1,345	5.6%

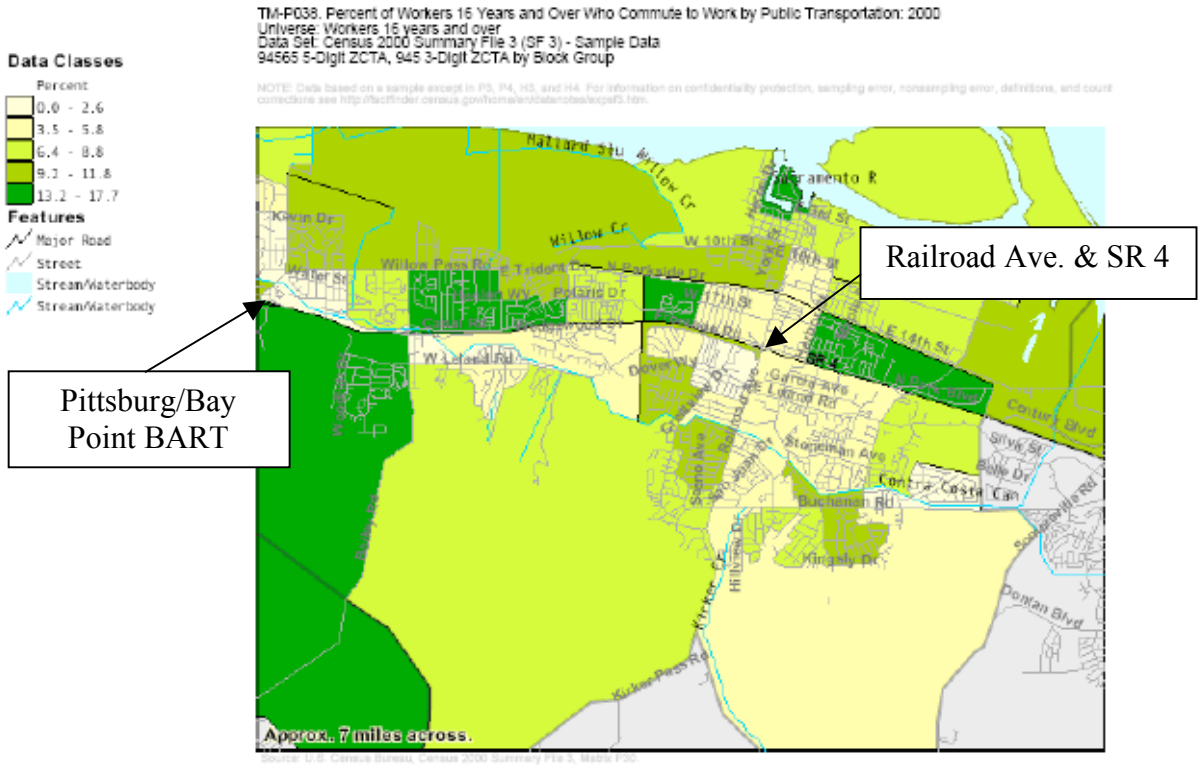
Source: 2000 Census Transportation Planning Package (from Existing Conditions Report)

Public transportation. According to the US Census 2000, 8.4% of Pittsburg's population takes public transportation. Specifically, 5% take the subway. There are 1,559 buses that stop within a ¼ mile radius of the proposed Railroad Avenue BART stop.

Pittsburg/Bay Point is the final stop of one BART line that links East Contra Costa County to the rest of the Bay Area. As such, it is a major point of embarkation and debarkation for commuters. The average ridership as measured by weekday average exits for fiscal year 2007 was 4,986 exits per day (BART 2006-7).

The Census map below shows that a larger proportion of residents of block groups that are close to the Pittsburg/Bay Point BART on the west side of town takes public transit (between 13.2 – 17.7%). Much of the Study Area, however, has a very low rate – between 0.0 – 2.6%.

Figure 3.2 Percent of People Taking Public Transit by Block Group



Current BART parking for people in the Study Area. A Park and Ride lot that has about 500 spaces on Bliss Ave. between Railroad and Harbor does not fill up regularly. It serves Pittsburg-Bay Point BART with 5 buses: TriDelta Transit Routes 387, 388, 391, 392 and Delta Express. Only one of those is a dedicated shuttle-type service, and all of them run every half hour only. Steve Pont at TriDelta Transit, the main bus service for Park and Ride, states that, "That parking lot is not an 'easy on, easy off' spot, it's a bad location for a Park and Ride. People usually just go to Hillcrest." The Park and Ride lot at Hillcrest Avenue fills up by 8 am every day (Pont 2007).

Current Pedestrian Quality. The Pedestrian Environmental Quality Index (PEQI) is used to quantitatively summarize street and intersection environmental factors known to affect people's travel behaviors. To assess existing pedestrian environmental quality in the vicinity of the Study Area, a limited PEQI analysis was conducted between February 15 and February 29, 2008. Forty-two intersections and 47 street segments were selected for analysis based on common pedestrian routes and locations of proposed project impacts to the pedestrian network.

Table 3.3 Indicators used to Judge the Pedestrian Quality.

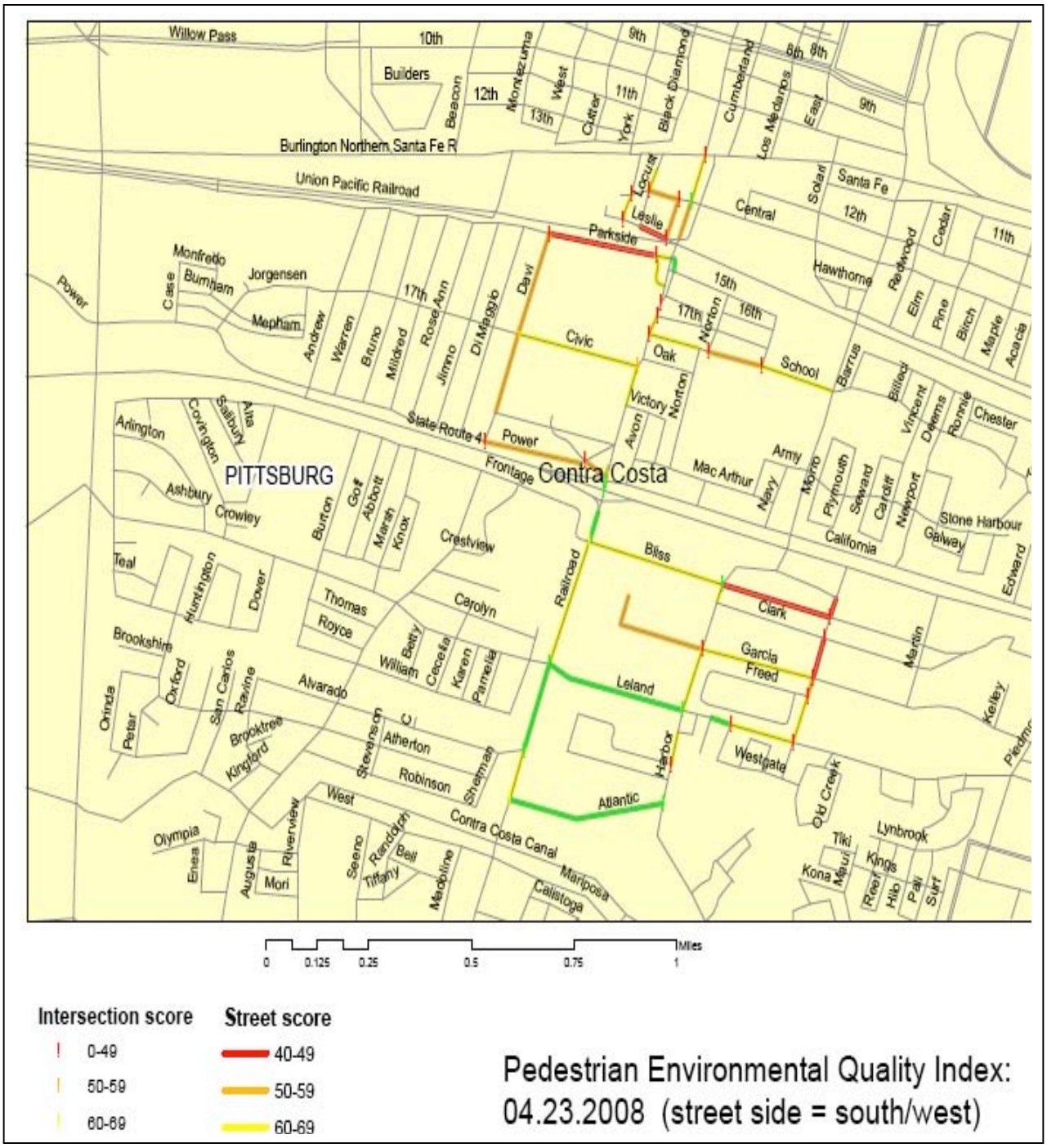
PEQI Indicator		
Crosswalks at each intersection	Presence of curb	Storefront/retail use
Pedestrian signals	Driveway cuts minimized	Public art/historical sites
Crossing speeds slower than 3.5 feet/second	Trees, planters and gardens	Absence of illegal graffitti
No turn on red signs for vehicles	Public seating	Absence of litter
Intersection traffic calming features	Presence of buffer between vehicle and pedestrian traffic	Pedestrian scale street lighting
Signs for pedestrians	Low number of vehicle lanes	Absence of construction sites
Wide sidewalks	Two way traffic	Absence of abandoned buildings
Good quality sidewalks free of impediments and obstructions	Posted speed limit	Low traffic volumes
	Street traffic calming features	

As revealed by PEQI analysis and portrayed in the Figure 3.3, the current pedestrian environment within the Study Area widely varies in quality depending on location. Individual intersection and street segment scores within the Study Area range from zero, which corresponds to an unsuitable environment for pedestrians, to 75, which corresponds to nearly ideal urban pedestrian conditions. The southern portion of the project area is characterized by a better pedestrian environment, likely due to large quantities of retail stores and restaurants in this area, as well as pedestrian amenities such as crosswalks and signals. The area in the vicinity of Clark Street received low PEQI scores because it is primarily industrial, with no pedestrian facilities. The other main area that was assigned low street segment scores is Parkside Street. This street has a relatively high speed limit of 40 miles per hour and no sidewalk on one side.

Intersections within the Study Area that received good scores have well marked crosswalks, pedestrian signals, and traffic calming features. Several of the intersections in the Study Area received low scores because they do not include crosswalks in all four directions, pedestrian signals, and/or traffic calming features.

This PEQI analysis was not comprehensive, and thus a thorough evaluation and recommendation cannot be made. That said, the portions of the Study Area that received low PEQI scores represent an environment that provides a disincentive to walking and other non-motorized transportation. The pedestrian environment in these areas could be improved by engineering measures (described below) that provide designated space on roadways for pedestrians (i.e., sidewalks), encourage pedestrian visibility, reduce vehicle volume and speed, as well as by the addition of public green space, retail and dining destinations, and other public gathering spaces.

Figure 3.3 Pedestrian Quality in Pittsburg, CA. Partial Street Study, 2008.



Current Pedestrian injury on Local Roads. From 2002 to 2005 (partial year of 2005), there were 24 pedestrian-vehicle collisions within the study area for an average of about 6 collisions per year (see Figure 3.4).

Pedestrian-vehicle collisions are typically assigned to intersections even if the collision did not occur at the intersection itself. Of the 15 intersections evaluated in the existing conditions report, the following

intersections had reported collisions in the 4-year period 2002-2005:

Intersection 4 (Railroad Ave. & Power Ave.):	1 collision
Intersection 5 (Railroad Ave. & SR 4 WB on ramp):	1 collision
Intersection 8 (Railroad Ave. & Leland Dr.):	2 collisions
Intersection 11 (Leland Rd. & Loveridge Ave.):	2 collisions
Intersection 14 (Harbor St. & California Ave.):	1 collisions

There were no pedestrian collisions at the other 10 studied intersections during this period.

Current bicycling environment. Bicycle facilities in the Study Area are a mixture of Class I bike lanes and Class II bike routes (E. Leland Rd., Harbor St., and Crestview Dr. – all on the outskirts of the Study Area). There are proposed improvements and additions to bicycling facilities in the City of Pittsburg 2020 General Plan, but those are not implemented (Railroad Ave. near W. 10th, N. Parkside, Power Ave., and Central Ave. – also mostly on the outskirts of the Study Area). From observation during the PEQI data collection phase, biking is dangerous due to freeway entrances and exits on the arterials and intersections closest to the point where the BART station will be. Biking becomes safer the farther one travels from that area.

Figure 3.4 Pedestrian Injury in Pittsburg, CA. 2002 – 2005 (partial 2005).

E. Assessment of Railroad Avenue Specific Plan

The impacts analysis in this chapter explores the following related questions:

- *What are impacts of the Specific Plan projects on Vehicle Trip Generation and what are the distribution of those impacts?*
- *How does transit proximity, residential affordability, and structured parking affect travel behavior?*
- *What are the projects effects on regional environmental quality, mediated via changes in travel behavior?*
- *Will the project facilitate walking as a mode of travel for both new residents and current?*
- *What are the projects effects on pedestrian safety in the station area?*

The plan's transportation related effects on local area noise and air quality, and retail service access are addressed in separate chapters of this HIA.

Project Impacts on Vehicle Trip Generation and Distribution

The California Air Resources Board (CARB) developed the "Urban Emissions Model" (URBEMIS) to assist local public agencies with estimating air quality impacts from proposed changes to land use projects when preparing CEQA environmental analysis. URBEMIS predicts vehicle trips generated and air pollutant emissions associated with these trips. Using the URBEMIS model, **the proposed Railroad Avenue Specific Plan projects will generate approximately 13,060 new additional daily trips, of which 4,143 are from the new residential units.**

All of the Pittsburg URBEMIS residential analyses are based on a baseline of 9.57 vehicle trips per day, which is the baseline rate for developments of "Single Family Detached Housing." Research nationally indicates a wide variance in number of vehicle trips even within land use types, as well as between land use types. Single family detached housing varies from 4.3 trips per unit per day to a high of 21.85, with an average of 9.57. Average trip rate for Residential Condominium/Townhouse is 5.86 (or 39% lower than average single-family detached house), however, the lowest trip rate for condos is 1.8 trips per day.

Distribution of project generated trips to area roads

It is difficult to specifically allocate new trips that the project generates to particular roads and intersections. Overall the Railroad Avenue Specific Plan housing, office space, and retail will result in an increase in local area traffic and congestion, thus increasing risk of pedestrian injury and potentially decreasing walkability (see below) if no traffic calming mitigations are implemented.

In terms of distribution of new residents:

- 1,336 units (84%) will be built at the Transit Village between Harbor and Railroad/E. Leland and Bliss;
- 254 units (16%) will be built at Civic Center area.

Impacts on Travel Behaviors mediated through transit proximity, affordability and parking

The URBEMIS analysis adjusts the number of trips the project will create based on research linking project design and trip generation (URBEMIS 2005). Table 3.4 shows that data.

Table 3.4 Mitigations to Trip Generation in the Railroad Avenue Specific Plan

Mitigation	Percentage Reduction	Trip reduction per Household
Transit service near residences	13%	1.25 trips
Mixed use (jobs/housing)	8.28%	.79 trips
Local serving retail	2%	.19 trips
Bike/Pedestrian Friendliness	6.75%	.65 trips
Affordable Housing	0.6% *	*see analysis below

Effects of Transit-Oriented location on vehicle trip generation

Residential development in proximity to regional transit can reduce the number of vehicle trips, particularly those associated with job commutes. Using the URBEMIS model, it was calculated that the Pittsburg Railroad Avenue Specific Plan housing would result in 13,060 daily car trips, 4,143 of which are from residential units specifically. An alternative project 4.5 miles from a BART station would generate an estimated 20,026 trips. The alternative project has 2,771 homes and no commercial, which is 74% more homes – and 383% more vehicle trips. The non-Transit-Oriented project would result in almost five times more trips from residential users.

Other design factors included in the analysis that reduce vehicle trips were mass transit services, local serving retail, pedestrian/bike improvements, and affordable housing (Cheng 2007). In all, the Railroad Avenue project would generate approximately 2.6 daily vehicle trips per household, whereas the non-transit-oriented project with similar characteristics would generate approximately 7.2 trips. This equals, respectively, 22.3 miles driven per day in a Railroad Avenue household versus 61.7 miles per day in a non-public transit oriented development household (Cheng 2008).

Effects of Below Market Rate (BMR) units on vehicle trip generation

Additional reductions in the number of vehicle trips may be expected from the inclusion of 15% BMR units. Based on regional travel survey data, the beneficial effect of affordability of housing on vehicle trip generation can be potentially significant. The Bay Area Metropolitan Transportation Commission has quantified the relationship between household income, travel behavior, and vehicle trips from the results of their Bay Area Travel Survey (MTC 2006). Based on this survey, households in the highest income quartile generate almost 4 more vehicle trips per day than those in the lowest quartile, and this does not take into account proximity to public transit.

Table 3.5 Bay Area Vehicle Trips per Income Quartile

Quartile of Household Income	Q1	Q2	Q3	Q4
Range of household income	<$30,000	$30,000 – 59,999	$60,000 – 99,999	$100,000 +
Weekday vehicle driver trips	2.4	4.1	5.3	6.3

URBEMIS estimates of vehicle trip generation account for BMR housing; however, the URBEMIS model assumes only a 0.6% reduction in vehicle trips for each deed-restricted below market rate housing unit (URBEMIS 2005), which is significantly less difference in vehicle trip generation between households in the lower and higher income quartiles than in the Bay Area regional travel survey data. The difference between URBEMIS parameter and MTC survey data may reflect differences in the income-vehicle trips relationship between the Bay Area and the rest of California.

Based on the MTC survey, and conservatively assigning households in the second quartile of income to BMR units, if there is 15% inclusion of affordability relative to market rate (Pittsburg Inclusionary Housing Ordinance), the affordability requirements would result in about 526 fewer weekday vehicle trips (see table 3.6). If the project included 25% BMR units, as proposed in this HIA, there would be 875 fewer vehicle trips per day, and with 40% BMR, there would be 1,401 fewer trips.

Table 3.6 Effect of the Percentage of BMR Units on Residential Unit Vehicle Trips Generated, Based on Regional Relationships between Income Quartile and Household Trip Generation

	Income Quartile					
	Q1	**Q2**	**Q3**	**Q4**	**Weekday Trips**	**Percent reduction in trips**
Weekday Trips	2.4	4.1	5.3	6.3		
Market Rate Units Only				1,590	10,017	
15% BMR Units		239		1,351	9,491	5.3%
25% BMR Units		398		1,192	9,142	8.7%
40% BMR Units		636		954	8,616	14%

Applying the Metropolitan Transportation Commission's information culled from their study of Bay Area Travel habits, ensuring 40% affordable housing at the Pittsburg Railroad Avenue Specific Plan area would equate to almost 14% fewer vehicle trips taken. Note that this model looks only at the effects of affordable housing on vehicle trips generated.

Effects on transit ridership

Currently 8.4% of Pittsburg's population takes public transit in order to commute to work. Five percent of the population takes the subway (Census 2000).

From a survey of transportation behavior, in Contra Costa County the following proportion of people living within different distances to a rail station will take it (MTC 2006):

- Of those living within ½ mile of a rail station, 27% take public transit;
- Of those living between ½ - 1 mile, 23% take public transit;
- Of those living > 1 mile away, 10.5% take public transit.

Using this information, we can forecast the potential new users of BART and the bus systems. The chart below adds in only new residents from the Railroad Avenue Specific Plan residential units, and does not take into effect any other increase in population. With 1,590 new units and an average of 3.1 people per household (Census 2000), there will be 4,929 new residents within ½ mile of the BART station. If the population were to remain entirely static, this would nearly double the amount of people who use public transit from 8.4% to 16%.

Table 3.7 New Users of Public Transportation

	Within ½ mile of *proposed* BART	½ - 1 mile from *proposed* BART	> 1 mile from proposed BART	Total population	# of people taking public transit	% taking public transit
Pittsburg Current	6,397	12,683	37,779	56,859	4,769	8.4%
Pittsburg with Railroad Ave. Project Housing	4,929* + 6,397 = 11,326	12,683	37,779	61,788	9,942	16%
% that take public transit	27%	23%	10.5%			
Totals	3,058	2,917	3,967	61,788	9,942	16%

Effects of BART parking on transit behavior

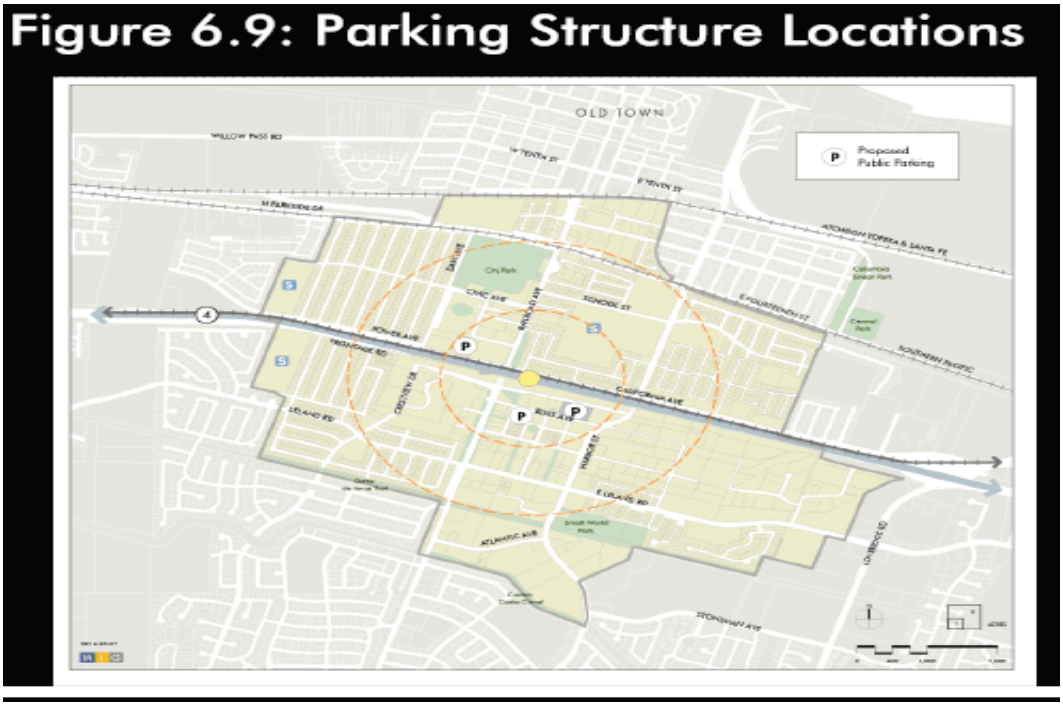
Ridership benefits of TOD accrue primarily from households with fewer than 2 vehicles, and parking supply is a critical factor in determining transit use. Developing suburban rail stations with ample parking and wide streets is not likely to affect alternative transportation mode use nearly as much as redeveloping an infill residential location with good bus service (Cervero 2005).

Nelson/Nygaard, transportation planning consultants, have analyzed the effects of providing parking near TOD projects. Comparing three alternatives (*maximized parking* of 1.5-2.1 parking spaces per unit, *lowered parking ratios* of 1.0-1.3 parking spaces/unit, and *maximized density of* 1 parking space/unit), they were able to systematically show that less parking increased transit ridership and revenue and cost the developer and city less. They considered riders lost from reduced parking and change in fare revenue as well as the cost of constructing and maintaining parking (Nelson/Nygaard 2006).

There will be 3,986 parking spots created for commercial, office and retail use in the Railroad Avenue Specific Plan. Because parking supply is generally lower than the ITE (Institute of Transportation Engineers) requires, the URBEMIS analysis described above (Table 3.2) decreased projected vehicle trips generated. There are also 2,385 residential parking spaces designed for the 1,590 units, at a parking rate of 1.5 spaces per unit.

BART has indicated that the requirement for structured parking at the site may be approximately 300 spaces (City of Pittsburg, 2006). There are currently 1,407 spaces allocated for "public parking", but not necessarily specifically for BART. By comparison, the Pittsburg/Bay Point station has 1,992 spots, and fills to capacity by 7:40 a.m (BART, 2008). Pittsburg/Bay Point is the end of the line and undoubtedly attracts regional riders. The Railroad Avenue station will not ultimately be the final station.

Figure 3.5 Location of Proposed Public Parking (indicated with a "P")



BART has well-developed TOD Guidelines (BART TOD guidelines) that clearly state that in BART's Access Hierarchy single-occupant vehicles are the lowest priority behind pedestrians, bicyclists, those taking buses and shuttles to BART, and car- and van-pool riders. However, they state that:

> Parking facilities should be sited so that automobile traffic does not impair pedestrian circulation between the station and the surrounding community. This could involve siting garages outside the immediate station area where pedestrian activity is most intense. In fact, foot traffic along the pedestrian link between the garage and the station should be used to stimulate economic activity in the TOD.

The Railroad Avenue Specific Plan appears to excel at locating new retail space between parking and the proposed BART station on the Bliss Avenue portion of the development. The impacts of parking on transit use, retail, and ultimately walking and physical activity are difficult to forecast, but by reducing residential parking to below the current 1.5 per unit appears feasible give the proximity of transit and services.

Impacts on Regional Transportation-related Air Emissions

The URBEMIS analysis provides air emission output generated from the traffic related to the project. In Table 3.8, the first row shows how much of the various types of emission would be created in a development project that did not include proximity to public transit, neighborhood-serving retail, bicycle/pedestrian friendliness, affordable housing, and parking for offices and retail. The second row shows the emissions resulting from this TOD project.

Table 3.8 Air Quality Emissions from Comparative Development Projects (Tons/Year)

	ROG	NOX	CO	SO2	PM10	PM2.5	CO2
Conventional Project	56.8	83.0	684.7	0.5	84.0	16.5	46,594.1
TOD and related design features	23.8	31.9	264.0	0.2	32.3	6.34	17,942.0

It is clear that the features of the Railroad Avenue Specific Plan provide significantly less increase in air emissions when compared to a more typically-designed suburban development project. Effects on local air quality, thus respiratory and cardiovascular disease provided in Air Quality chapter.

Impacts on Neighborhood Pedestrian Environment

At the April 12th, 2007 Specific Plan Community Workshop, participants identified a number of general pedestrian focused project objectives. These included:

- Prioritize pedestrians;
- Vibrant, walkable, and mixed-use area;
- Safe, efficient and accessible transportation network that embraces pedestrians, bicyclists, buses, autos and BART;
- Engaging and active street environment;
- Integrated network of parks, plazas and trails that connect different neighborhoods and districts to each other and to the BART station;
- A safe and inviting pedestrian environment;
- High quality, pedestrian-friendly design along street fronts and pathways;
- Public gathering spaces;
- Clearly defined and enjoyable routes for pedestrian and cyclists.

Table 3.9 contrasts PEQI indicators, which represent discrete physical attributes of pedestrian quality (See Existing Conditions section above), with specific project objectives presented in a Railroad Avenue Specific Plan Community Workshop on April 12, 2007.

Table 3.9 Evaluation of Railroad Avenue Specific Plan against PEQI Indicators

PEQI Indicator	Does the Railroad Avenue Specific Plan Provide Supporting Objectives or Actions?	Comments
Crosswalks at Each Intersection	No	--
Pedestrian Signals	No	--
Crossing Speeds slower than 3.5 feet/second	No	--
No Turn on Red signs for Vehicles	No	--
Intersection Traffic Calming Features	No	--
Signs for Pedestrians	Yes	--
Low Number of Vehicle Lanes	No	--
Two Way Traffic	No	--
Posted Speed Limit	No	--
Street Traffic Calming Features	No	--
Wide Sidewalks	Yes	Ensure that widths proposed in Visioning documents are *minimums*
Good quality sidewalks free of impediments and obstructions	No	--
Presence of curb	No	Most streets in Study Area already have a curb.
Driveway cuts minimized	No	--
Trees, Planters and Gardens	Yes	--
Public Seating	Yes	--
Presence of buffer between vehicle and pedestrian traffic	No	--
Storefront/Retail Use	Yes	--
Public Art/Historical Sites	No	--
Absence of Illegal Graffitti	No	--
Absence of Litter	No	--
Pedestrian Scale Street Lighting	Yes	--
Absence of Construction Sites	No	In initial project period, construction may be much worse.
Absence of Abandoned Buildings	No	
Low Traffic Volumes	No	By encouraging public transit, this project may indirectly minimize traffic volumes.

Note: Some of the above PEQI indicators may or may not already be included in draft design schematics for this project. This table considers only those goals outlined in the presentation referenced above.

Clearly, the preliminary objectives of the Railroad Avenue Specific Plan prioritize an enjoyable, safe, and aesthetically pleasing pedestrian environment; however, specific design details are lacking in this version of the plan. Many of the visions and goals stated in the workshop presentation can be accomplished by incorporating PEQI indicators (listed above) into design schematics of the Specific Plan. For example, safety from vehicle traffic can be provided by traffic calming features, pedestrian signs, and vehicle/pedestrian signals. An aesthetically pleasing environment can be achieved by including trees and public art, and by minimizing litter, abandoned buildings, and construction sites. If such pedestrian-focused designs (and ongoing maintenance) are truly implemented, the pedestrian environment in the Study Area is expected to significantly improve.

Impacts on Physical Activity

As discussed above, proximity to transit increases active transportation behaviors. A Bay Area transportation habits survey found that people within ½ mi of rail walk for about ½ of their short trips (up to one mile in length) as compared to residents outside this range who walk only for ¼ of similar trips (MTC 2006). Americans who use transit spend a median of 19 minutes per day walking to and from transit, and 29% achieve at least 30 minutes of physical activity per day solely by walking to and from transit. If 9,942 people use public transportation in Pittsburg in 2020, then it follows that this transit-oriented development would encourage approximately 3,883 (29%) to get at least 30 minutes of physical activity on a daily basis.

In addition, if implemented, the pedestrian improvements listed above are anticipated to increase physical activity for Pittsburg residents. A pleasant, active, and accessible pedestrian environment with amenities such as nearby public transportation, public seating, pedestrian-scale lighting, wide sidewalks, pedestrian-oriented signage, and ample routes is likely to motivate neighborhood residents to choose walking for transportation and recreation.

Impacts on Pedestrian Safety

There were 24 reported pedestrian-vehicle collisions in Pittsburg during the four-year period from 2002 to 2005, averaging 6 per year. The population of Pittsburg is 64,000, which makes the pedestrian injury rate approximately 9.4/100,000. In California in 2000, the rate of pedestrian injury was 42/100,000 (Caltrans 2005). Pittsburg's per capita collision rate is lower than the state average and the USDHHS objective cited above. One explanation for the low rate may be the current low rate of pedestrian activity for the population in the area.

Models exist that forecast pedestrian-vehicle collision rates based on changing vehicle volumes. Such a model would be useful for quantifying potential changes to pedestrian safety that may result from the Railroad Avenue project. Inputs for a commonly used model predicting pedestrian injury include current and future average annual daily vehicle trips and a current pedestrian-vehicle collision rate (collisions per year) (Lee & Abdel-Aty 2005). As of this writing, current and future vehicle trip data for the Study Area, which is routinely estimated in an environmental impact analysis (EIA/EIR), is unavailable. Thus, quantitative forecasting of pedestrian injuries was not completed as part of this analysis.

The Railroad Avenue Specific Plan project is expected to attract approximately 4,930 additional residents to the area by 2020, 1,331 of which are predicted to use public transportation (27% of 4,930, as laid out in analysis above based on MTC numbers). The project is anticipated to generate approximately 13,060 additional vehicle trips per day (Cheng 2007) from residential, office and retail uses. The increase in both vehicle and pedestrian traffic is likely to increase the number of pedestrian-vehicle collisions on an absolute level. While research also suggests that the risks to individual pedestrians may decline with increased pedestrian activity (Geyer 2005), the increased expected pedestrian activity suggests the need for design features in the pedestrian environment to protect safety.

As shown in Table 3.1, traffic calming mitigations can significantly decrease the risk for pedestrian injury in the Station Area, and visioning documents, as stated above, do include the desire to implement some of these measures. One benchmark of healthy circulation planning is if a project includes at least four of the recommended traffic calming measures listed in Table 3.1 (HDMT 2007).

Impacts on Bicycling Environment

The proposed Railroad Avenue Specific Plan allows for some bike improvements to address the prioritization of non-motorized transport. Improvements include providing wide travel lanes on internal roadways,

incorporating separate greenways, and striping dedicated bike lanes. However, the plan does not mention which new lanes would be Class I, II, or III bike lanes, nor does it specify adding to any existing bike facilities. Without specifics on plans for bicyclists, it is not possible to evaluate impacts on bike travel.

Impacts on Social Cohesion and Resident Connectedness

The placement of a new BART station directly in the middle of SR 4 offers the potential to draw Pittsburg residents together. The construction of the highway divided the community physically. It also encouraged people to drive and not walk, further isolating individuals from one another. By creating walkable, safe, pedestrian-friendly routes to a site that many will use, the BART station and the station area improvements offer the potential to bring individuals together.

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Pittsburg Railroad Avenue Specific Plan Health Impact Assessment
Chapter Four
Retail Goods and Services

Chapter Summary

The analysis of retail identified existing retail services accessible in the plan area as well as an assessment of opportunities for locating a new grocery store.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The residents of the new Transit Village at Harbor Street and Garcia Street would be within a half mile to over four-fifths of retail and public services typically included in a "complete neighborhood." Residents of the new Civic Center housing would be within a ½ mile of three-fifths of such services. • Depending on services offered, retail incorporated within the Railroad Avenue Specific Plan may increase neighborhood completeness for existing area residents, potentially supporting nutrition and physical activity. • Development of vibrant mixed-use commercial/retail has the potential to be a deterrent to crime. • New retail associated with the plan may provide new employment opportunities, some of which may be suitable for unemployed or underemployed residents.	• The project will likely increase commercial property value over the long term with potential for displacement of current retail businesses.

Recommendations for Plan Area Retail

1. Conduct a retail and public services needs assessment for the Railroad Avenue Specific Plan area in order to determine retail attraction plan priorities and allocation of funding for public services.
2. Require the project sponsors to provide community benefits, including increased programming and marketing for community centers, and an increase in child care subsidies.
3. Offer incentives for a large supermarket to locate in the former site of Albertson's Supermarket.
4. Ensure that retail is reflective of the community's wants and needs. This could be done by conducting a retail analysis including retailer and consumer surveys and by establishing a neighborhood council to include local retailers and residents in retail planning phases.
5. Leverage the economic impacts of the project to provide tax incentives or interest-free loans to stimulate local entrepreneurship.
6. Use community benefits agreements to ensure a minimum percentage of employment of local residents in new retail and commercial uses
7. Through zoning, prohibit a concentration of liquor stores and unhealthy food establishments in the project area.
8. Ensure that project design teams work with merchants and small business owners to incorporate crime prevention design elements into the project design.

A. Introduction

Retail and public services include resources and amenities that residents can use to make healthy choices in their lives – things like grocery stores, pharmacies, medical facilities, banks, and more. The location of these resources and their proximity to where people live help determine whether people use them, how often, and how they access them (e.g., by walking or driving). Additionally, some retail services are actually unhealthy – such as fast food and alcohol outlets. This assessment sought to answer the following questions about retail and public services:

- *Will the Railroad Avenue Specific Plan contribute in some way to an adequate mix of goods and services in the area, and will those resources be within walking distance of public transit?*

- *Will area residents have adequate access to quality food resources?*

B. Background: Health Impacts of Proximity to Retail/Public Services

Research shows that closer proximity to retail and certain public services can increase access and, in turn, health. **Improved nutritional health** is one example of a consequence of retail proximity, as a neighborhood supermarket can increase access to and consumption of affordable, quality food. **Physical activity** can also increase if residential uses and their retail service needs are closely integrated. Indirectly, retail can contribute to a **vibrant economy**, potentially increasing income and job security, both of which are well-established determinants of health (McDonough 1997; Lantz 1998).

Examples of retail and public services that impact health include food-related businesses (e.g., full-service supermarkets, small grocery stores, convenience stores, farmers markets, restaurants, cafes, fast food establishments, liquor stores, and bars), other retail (e.g., pharmacies, bookstores, specialty shops, hardware stores, and auto supply stores), and services (e.g., dry cleaners, laundromats, banks, credit unions, check cashers, beauty salons, hotels/motels, maintenance services, entertainment, and auto repair).

Retail Diversity and Proximity Increases Physical Activity

Complete neighborhoods with integrated public and retail services as well as quality pedestrian environments (see Transportation chapter) can increase physical activity by making every day retail destinations accessible by walking (Ewing 2005). A San Francisco Bay Area study looking at non-work related trips in four neighborhoods, controlled for socio-economic status, found that proximity and mix of retail as well as having many quality destinations and modes of transport choices are some of the most influential factors in people's decisions to walk (Handy 1996). A more recent study in Atlanta assessed resident obesity in relation to levels of density, mixed-use, and street connectivity (Frank 2004). A 12.2% reduction in the odds of being obese was found with each inter-quartile increase in these factors, providing evidence that living in a mixed use area with a variety of shops and services is a good predictor of obesity levels in urban areas. Several studies have shown that a majority of people get their groceries in distances that take 5-10 minutes to reach, and are 0.4 – 0.9 miles away. (Denkley 2004). Physical activity has been associated with various health benefits including reductions in premature mortality, the prevention of chronic diseases such as diabetes, obesity, and hypertension, and even improvements in psychological well-being (USDHHS 1999; Powell 2003). The chapter on Transportation provides additional evidence on the relationships among community design and active transportation.

Retail Food Access Supports Good Nutrition

Diet-related disease is one of the top sources of preventable deaths among Americans (USDHHS 2001), with the burden of overweight and obesity falling disproportionately on populations with the highest poverty rates (Carlson 1999). For low-income populations in urban areas, accessible and affordable nutritious food remains a significant unmet need in part because of the suburban business model of large grocery stores. A lack of supermarkets can lead to smaller stores as the main source of local groceries, or the need to drive to get groceries. Smaller retail food stores typically charge about 10% more for products than supermarkets (USDA 2002). Such stores usually have less or no fresh produce available, and offer more processed foods.

Using proximity to a full service supermarket as a proxy of food access, public health research has demonstrated that the retail environment affects individual health. One study conducted in Los Angeles County concluded that longer distances traveled to grocery stores were associated with an increased body mass index (BMI) (Ingami 2006). For a 5'5" tall person, traveling 1.75 miles or more to get to a grocery store meant a weight difference of about 5 pounds. Additionally, fast food restaurants tend to lead to low quality nutrition and are associated statistically to diet related disease rates, while full service restaurants are associated with better health outcomes (USDHHS 1999; Moreland 2002).

A lack of proximity results in low-income households having little choice about where to purchase food. Such households buy less expensive but more accessible food at fast food restaurants or highly processed food at corner stores. These types of foods are often higher in calories but usually lower in nutritional value (Basiotis 1992). The result of consuming these types of foods is higher obesity in low-income populations (Drewnoski 2004).

A Vibrant Local Retail Economy can Improve Individual and Community Health

Detrimental effects on health caused by unemployment and underemployment are examined in depth in this HIA in the chapter on Livelihood. Some forms of retail may provide higher quality jobs than others. A study in Chicago compared economic impacts of the neighborhood's locally owned businesses and national chains. Findings include a comparable generation of revenue per square foot, but the benefit to the local economy is 79% greater for locally owned businesses than for chains (Civic Economics 2004).

Integrating Residential and Retail Uses Can Improve Social Cohesion.

Well designed mixed-use retail environments may also have a deterrent effect on crime by creating opportunities for natural public surveillance (CPED). Opinions about crime are strongly related to feelings about community. A sense of being part of the community results in less fear (Schweitzer 1999). A vibrant neighborhood retail environment is one type of setting for social interaction, which can lead to more community and less crime.

Retail Accessible By Walking Improves Environmental Quality And Promotes Physical Activity

Relying on cars to access day to day retail needs has adverse consequences on health via air pollution and noise levels. (See chapters on Transportation, Noise, and Air Quality). As discussed above, ensuring complete neighborhoods with adequate retail goods and services in close proximity to residents' homes can reduce reliance on cars for every day needs.

Some Retail Uses Can Create Risks for Health

Some types of retail also have greater potential to actually have adverse effects on one's health. For example, the density of liquor stores in an area is strongly associated with assault rates. In one community, each 6 additional liquor outlets accounted for 1 additional violent assault that resulted in at least 1 overnight stay in a hospital (Gruenewald 2006). Crime and safety concerns create anxiety among businesses owners and create

reluctance among potential retailers, thereby limiting the ability for commercial revenue for low-income neighborhood economies.

C. Existing Standards and Guidelines for Retail Goods and Services

No available standards exist for access to local retail services. Promoting physical activity, reducing obesity, promoting mental health and well-being, and promoting healthy environments are all leading health objectives included in the US Department of Health and Human Services report Healthy People 2010 (USDHHS 1999). The 1999 Report of the Surgeon General on Physical Activity and Health recommends that adult get at least 30 minutes of moderate physical activity each day.

The San Francisco Department of Public Health recently created the "Healthy Development Measurement Tool" (HDMT) as a method of evaluating land-use development plans and projects for health considerations (Available at www.thehdmt.org). Several of the HDMT's voluntary guidance development targets are applicable to retail development:

- Is the development project within ½ mile of a grocery store, such that project residents will have access to fresh produce? (full/small, produce markets)
- Will the development result in "Neighborhood Completeness" for key retail services? (Benchmark: 9 out of 15 common retail services)
- Will the development results in "Neighborhood Completeness" for key public services? (Benchmark: 6 out of 10 common public services)

Under the HDMT definition of completeness, neighborhood serving retail includes: Restaurant, coffee shop/café, gym/fitness center, drug store/pharmacy, hardware store, bank or credit union, laundromat/dry cleaner, hair salon, auto repair/gas station, bike shop/repair, grocery store/supermarket, fruit/produce store, childcare, entertainment (i.e., video store, movie theater, performance theater, music venue), and nursing home. Neighborhood public services includes: school, park/playground/plaza, post office, library, place of worship, public hospital or clinic, recreation center, community garden, public art, community center with youth and/or senior programming.

D. Existing conditions in Pittsburg Railroad Avenue Specific Plan Area

Employment in the Retail Sector. 12.4% of Pittsburg's population is employed in the "retail trade" sector, according to the US Census. However, this data does not break down whether these residents are employed in retail within Pittsburg or outside of Pittsburg.

Retail Service Access and Proximity. Tables 4.1 and 4.2 show existing neighborhood retail and services available within a half-mile radius of the center of the two residential areas of the Specific Plan. Overall, the Railroad Avenue (Site 1) has 82% of retail and services, and the Civic Center (Site 2) has 61% of retail and services. In the Study Area, there are 8 grocery stores (only 1 "full service" grocery store), 18 automobile repair/supply shops, 1 hardware store, 7 banks/ATMs, 5 dry cleaning/laundromats, 1 motel, 2 cafes, 2 liquor stores, 4 pharmacies, 12 restaurants, 10 fast food stores, 2 convenient stores, and 2 bakeries. With regard to public services, the study area has 1 school, 1 post office, 2 libraries, and 2 health care facilities. Unmet retail and public service gaps include a fire station, a gas station, a nursing home, an additional post office, an additional hardware store, a day care facility and an additional dry clean/laundromat.

The majority of retail and public service are located south of Highway 4 along the Railroad Avenue and Atlantic Avenue. This is out of ½ mile access to neighborhoods on the north side, which is where Pittsburg's Latino and African American population live.

With regard to food resources, there is one farmer's market on Saturdays in Old Pittsburg (downtown at 10th and Railroad, just outside of the Study Area) and one full grocery supermarket (FoodsCo) specifically in the Study Area. As shown in Figure 4.2, over 67% of the grocery stores are located south of Highway 4, indicating inequalities in grocery retail access.

Table 4.1 Neighborhood Completeness at the Pittsburg Railroad Avenue Specific Plan Area

Railroad Avenue (Site 1)		**Civic Center (Site 1)**	
Retail/Service	**Present?**	**Retail/Service**	**Present?**
Automobile	YES	Automobile	YES
Bank	YES	Bank	YES
Convenience Store	YES	Convenience Store	YES
Day Care	YES	Day Care	NO
Dry Clean/Laundry	YES	Dry Clean/Laundry	NO
Fast Food	YES	Fast Food	YES
Fire Station	NO	Fire Station	NO
Gas Station	NO	Gas Station	NO
Hardware	YES	Hardware	NO
Library/bookstore	YES	Library/bookstore	YES
Health Care	YES	Health Care	YES
Motel	YES	Motel	YES
Nursing Home	NO	Nursing Home	NO
Pharmacy	YES	Pharmacy	YES
Post Office	YES	Post Office	NO
Restaurant	YES	Restaurant	YES
School	YES	School	YES
Supermarket	YES	Supermarket	YES
	82%		**61%**

Maps included at the end of this chapter provide a visual representation of existing availability of retail and services.

Overall the study area has 10 of 15 potential "neighborhood-serving retail services and 7 out of 10 public services, indicating a relative degree of completeness based on the HDMT neighborhood completeness target.

Table 4.2 Project Area Achievement of HDMT Development Targets for Neighborhood Completeness

Domain	Score	Benchmark
Neighborhood Serving Retail	10 out of 15 Services	9
Public Services	7 our of 10 Services	6

E. Assessment of the proposed project

As part of the retail health impact analysis this analysis aimed to answer the following questions through a review of existing planning documents for the project, interviews with local stakeholders and key informants, and use of secondary data to construct maps:

- *Will the Railroad Avenue Specific Plan contribute in some way to an adequate mix of goods and services in the area, and will those resources be within walking distance of public transit?*

- *Will area residents have adequate access to quality food resources?*

Analysis of existing conditions shows that the project area has a relatively complete mix of private retail and public services. The majority of these services exist in proximity to the proposed BART station. In addition, the Railroad Avenue Specific Plan allocates retail space for community needs and would result in approximately 446,000 square feet of retail/commercial space along both sides of Railroad Avenue, creating the potential to increase health-related retail and public services. Furthermore, the residential units in the Specific Plan will attract approximately 4,929 more people (1,590 units with 3.1 residents per unit). The increased population creates a market for new retail services that can also benefit existing area residents.

Community members and City representatives have decided they want smaller, "neighborhood-serving" retail, not "big-box" retail. Also, given the transit-oriented nature of the project, the City has expressed that they do not want auto-dependent businesses such as drive-throughs and car repair shops. In community workshops, Pittsburg residents stated that they wanted a full-service grocery store, specifically a Trader Joe's, at the space where Albertson's recently closed down (at Railroad and California Avenues). Community meetings also revealed a need for an all-night pharmacy. In addition, people made comments on locating retail between parking and BART station to enable BART riders to fully use the new retail. Visioning documents echo these goals:

- Provide services and amenities that meet the needs of local residents, employees, students and visitors;
- Retain and expand a variety of employment opportunities in the Specific Plan area;
- Create a more inviting pedestrian environment;
- Require pedestrian friendly design along street fronts and pathways;
- Promote improvements that…support crime prevention.

In general, while existing conditions provide an assessment of retail needs, project plans and available data do not exist to further analyze needs or the impacts of the plans. The Railroad Avenue Specific Plan designs space for retail but does not specify the exact retail purveyors they will be trying to attract. According to Pittsburg City Planner Leigha Schmidt, planners design the space and leave retail and industry attraction to the Economic Development department. Brad Nail, Director of Economic Development, stated that Pittsburg does not have a specific "retail attraction plan", but that the city has been growing at a good pace and retail "has been coming to us."

Selecting Optimal Locations for Potential New Retail and Public Services

Because a specific retail development plan for the Pittsburg Railroad Avenue Specific Plan has not been released, a site analysis technique using *Location Allocation* from ESRI's ArcInfo mapping software was applied to determine potential locations for retail. This analysis provides a model for location selection that optimizes proximity. The analysis was focused on grocery stores because there appears to be a demand for full service groceries in the area. In the analysis, the best locations of grocery stores, based on accessiblility to the most people within a walkable radius, were identified. Grocery stores in these locations would increase access of Pittsburg residents to nutritious produce.

The following principles were taken into account in the analysis:

- The walkable radius of a store is limited to half mile;
- The coverage areas served by the grocery retail should at least cover the project areas;
- An optimal balance should be found between maximizing the number of users to facilities, and minimizing the total distance traveled by individual.

Location Allocation is a site analysis technique that determines the best location for facilities so that the goods and services are accessible to the largest population in the most efficient way. The approach to determining the location of retail outlets in urban areas is based on the use of a Geographical Information System (GIS) (Trubint 2006). A study carried out in the Hong Kong fashion business district used a GIS tool to observe and model shoppers walking patterns, reflecting frequently visited routes. These findings were used in the decision making about store locations (Pun-Cheng 2004). Location Allocation has also been used in network models to determine the optimal sites for the trans-shipment terminals so trucks deliver goods as fast as possible from trains (Maat 2007). To the best of our knowledge the method of location-allocation has not been previously applied to locating retail services to maximize health promoting walkability and physical activity.

Thus, the *Location Allocation* model is used to determine the optimal sites for facilities so that they can supply the demand in the most efficient way. The main objective of this model is to determine a given number of grocery retail locations so that the total distance of population traveled is minimized. A second objective was to find out the best locations of grocer retails accessible to most population within radius of walkable distance.

There are different *Location Allocation* models designed to optimize the relationship between the potential services (candidate locations) and the users assigned to it (demand locations). For our study, the MINDISTANCE model was used. The main objective of this model is to determine a given number of grocery store locations so that the total distance that people travel is minimized. In addition, an extra constraint of a half-mile radius was applied so that everyone walks to their closest grocery store, as long as it is within the half mile distance.

Figure 4.1 shows candidate and demand locations. We first identified and mapped all existing grocery stores in Pittsburg in the Railroad Avenue project area. These geo-coded points were used as potential candidate locations for grocery stores. For the demand population, we extracted data from census block groups. The block-groups within a 2 mile buffer from the future extended BART station were included as possible demand locations. The center of the block groups was used as the demand location.

Figure 4.1. Candidate Locations and Demand Locations for Grocery Stores

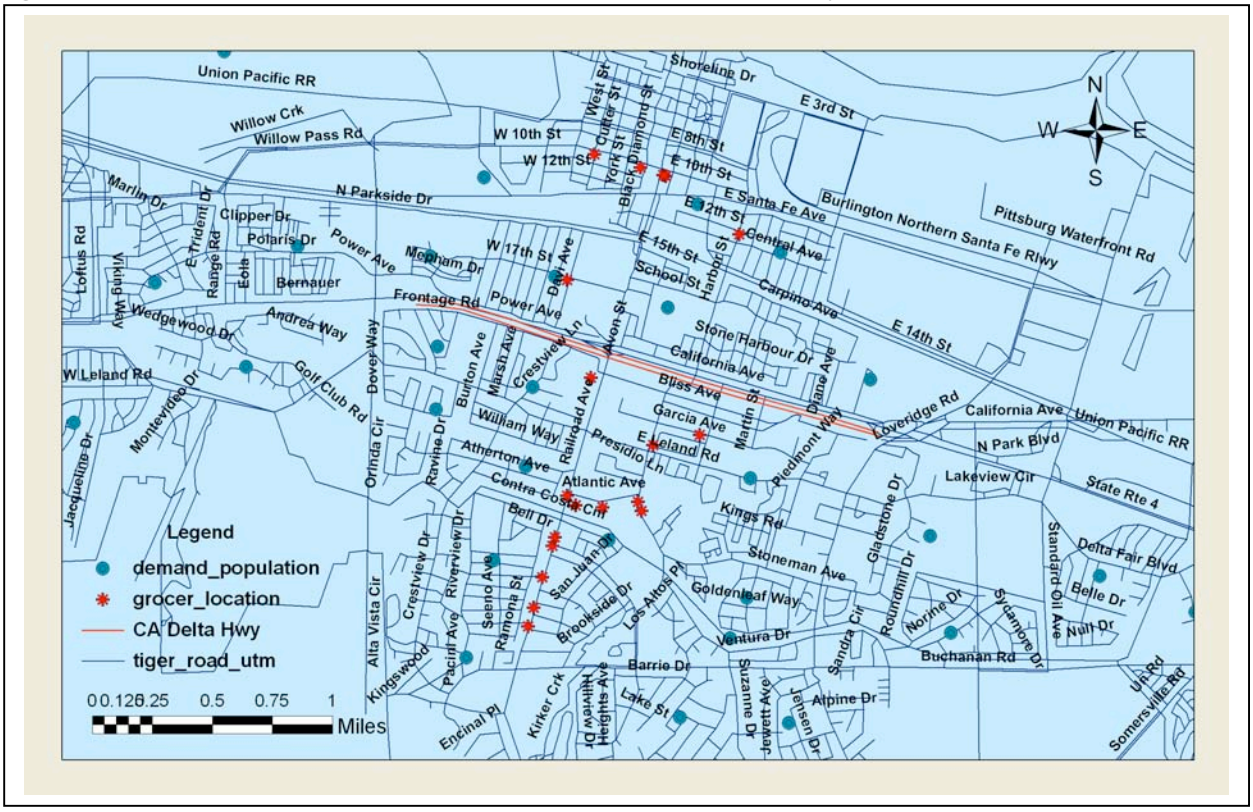


Figure 4.2 shows one result of the *Location Allocation* analysis, namely that as the number of grocery stores increase, the average distance traveled by individuals to their nearest grocery store decreases. The degree of distance reduction is very small each time another grocery stores is added, however, the analysis shows that the addition of a grocery store provides more access to the people and minimizes the travel distance between the demand and their closest retail. At approximately 10 stores, accessibility is optimized, with people on average walking about 400 meters or about ¼ mile. Improving walkability beyond this, would require considering other candidate locations.

The location-allocation method was run multiple times, each time increasing the number of allocated grocery stores (from 1-19 stores). In this way, the relationship between the number of stores in the neighborhood and block groups that can walk to a grocery store was determined.

Figure 4.2. Average Distance as a Function of the Number of Grocery Stores

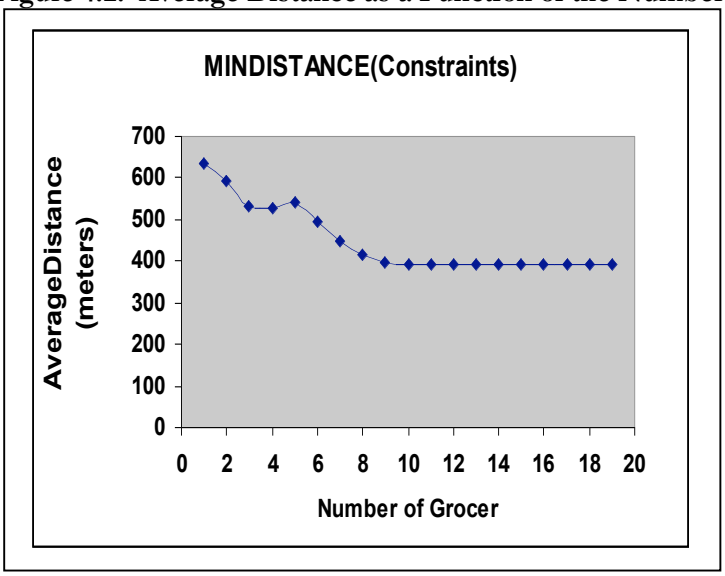


Figure 4.3 shows the percent of the demand population that would have a grocery store within a half mile. Most of the current grocery stores are concentrated on Railroad Avenue and a few of them are on 10th St. At the optimal number of grocery stores, only 31% (20,107) of the total Pittsburg population has the access to grocery stores within walking distance. Figure 4.33 suggests that 5 grocery stores optimizes the demand of the project area. Again, improving walking accessibility beyond 31% of the population would require other candidate locations. While 5 stores may be sufficient to provide 31% of the population with a grocery store within walking distance, Figure 4.2 suggests that increasing the number of grocery stores allocated (up to 10 stores) would further reduce distances that people need to walk.

Figure 4.3 Proportion of Population Who Would be Within a ½ Mile of Grocery Stores

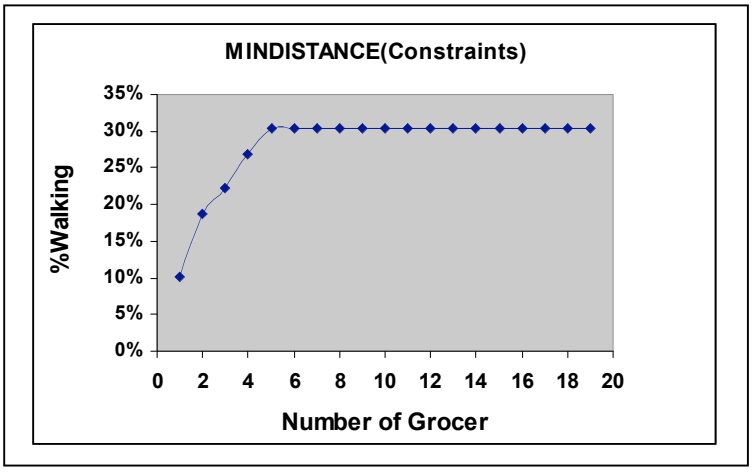
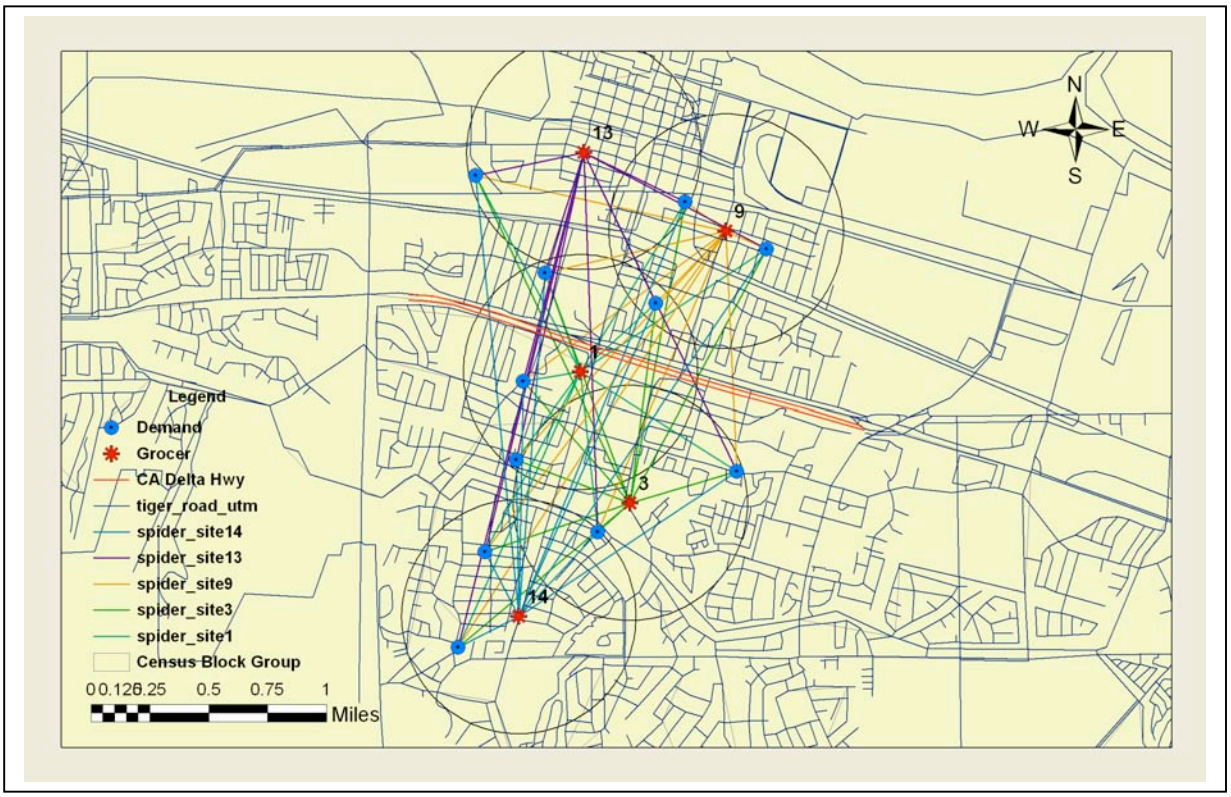


Figure 4.4 shows the sites recommended by the *Location Allocation* analysis for five grocery stores. The model includes the old Albertson's location at Railroad Avenue and California Street as one of the new candidate locations. The model selected the optimal grocery retail sites based on the assumption that 5 new stores would be added.

Figure 4.4 Five High-Quality Grocery Store Locations for the Railroad Avenue Specific Plan area.



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Pittsburg Railroad Avenue Specific Plan Health Impact Assessment
Chapter Five
Air Quality

Chapter Summary

This analysis modeled roadway contributions to ambient air quality for future residents of the Railroad Avenue Specific Plan housing, making estimates of potential pollution related health effects.

Potential Positive Health Impacts	Potential Negative Health Impacts
• The project helps to reduce the growth of regional vehicle trips and regional vehicle air pollutant emissions.	• Substantial air pollution exposures for the future plan area are attributed to the location of the project near existing traffic on SR 4. Expected exposure to traffic related pollutants are associated with a modest increased hazard of premature deaths, asthma hospitalizations, and lower respiratory symptoms.

Recommendations to Improve Project Air Quality

1. To reduce residential traffic sources of air pollution, increase the frequency of shuttle and bus services from communities who would use BART; use parking restrictions, pricing strategies and other Transportation Demand Management measures to promote greater use of alternative modes of transportation over personal car use; create a comprehensive pedestrian and bicycling plan away from busy roadways; provide comprehensive on-site services based on a retail- and service-needs assessment that would minimize the need for driving off site.
2. Locate residential uses and other sensitive land uses in the project area at a safe distance from roadways with heavy traffic as indicated by air quality modeling. Alternatively, if sensitive uses are placed where impacted by significant roadway pollutant concentrations: install central HVAC (heating, ventilation, and air conditioning) systems with high efficiency filters for particulates and a carbon filter to remove other chemical matter; maintain all condominium and apartments under positive pressure at all times; locate air intake systems for HVAC as far away from roadway air pollution sources as possible; and develop an ongoing HVAC maintenance plan.
3. During the construction phase of the project, implement best practices in demolition and construction dust mitigation including stabilization of soil piles, tarps on fences, fence line misting, and real time dust monitors.
4. Where residential uses are mixed with truck intensive commercial uses, provide 110 and 220 outlets at project loading docks so that trucks that service commercial uses of the site can connect to these outlets to power their auxiliary equipment; utilize electric forklifts and landscaping equipment in the project operations.
5. Develop further dialog between local public agencies and industry to better consider local residents' concerns over air pollution risks from area sources.

A. Introduction

Transit-oriented communities have the potential to reduce regional air quality-related health burdens because residents have alternatives to the use of personal motor vehicles. Transit-oriented communities may also reduce residents' reliance on personal automobiles by providing services within walking or bicycling distance. In some cases, sites suitable for transit-oriented development are located adjacent to busy freeways, creating the potential for residents of the new community to be exposed to pre-existing high levels of traffic-related pollution.

The impacts analysis in this chapter explores the following related questions:

- *What are the estimated cumulative concentrations of air pollutants from existing and proposed traffic sources in the Railroad Avenue Specific Plan?*
- *What health risks are associated traffic-related air pollution sources?*
- *How do exposure and health risks compare to an alternative development scenario?*
- *What other non-traffic air pollutants may affect future area residents?*

B. Background: Air Quality and Health Impacts

Health Impacts from Air Pollutants

There are many types of air pollution. Six criteria air pollutants are currently regulated by the USEPA, including ozone (O_3), carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. Table 5.1 shows some of the known health effects associated with these air pollutants. Heath-based standards for ambient air have been developed by EPA for each of these pollutants, as mandated by the Clean Air Act. The Clean Air Act also requires states to develop specific plans to achieve these standards. One way that these pollutants are regulated is through a national network of air quality monitors that provides information on ambient concentrations for each of the criteria air pollutants.

Despite promulgation of National Ambient Air Quality Standards (NAAQS) for criteria pollutants, implementation of air quality control plans, and nationwide monitoring, air pollutants continue to have significant impacts on human health. Adverse health outcomes associated with particulate matter include premature mortality, respiratory-related hospital admissions, emergency room visits, upper respiratory illness, lower respiratory illness, restricted activity days, asthma attacks and chronic disease.

While some of these effects are due to non-attainment of air quality standards, there is a potential that even low-level exposures – exposures at levels below existing standards – may still result in adverse health impacts (Johnson 2005). Air quality epidemiology has not established clear "no effects" thresholds for particulate matter. Epidemiological studies in diverse populations on five continents have documented relationships between ambient concentrations of particulate matter and health outcomes. Recent epidemiologic studies in California have found that fine particulate matter may cause health effects at levels below national standards (Ostro 2006). According to a cost-benefit analysis recently done by the USEPA, reducing the NAAQS for fine particulate matter by 1 μg per cubic meter from 15 to 14 would result in 1,900 fewer premature deaths, 3,700 fewer non-fatal heart attacks, and 2,000 fewer emergency room visits for asthma each year (EPA 2006). The 2002 State of California Air Resources Board Air Quality Standards Staff Report for Particulate Matter estimated that significant health benefits would accrue from reducing ambient PM 2.5 from current levels to natural background concentrations for every county in California (CARB 2002).

Particulate matter is unique among criteria air pollutants as it represents a heterogeneous group of physical entities (WHO 2003). Based on toxicological and epidemiological research, smaller particles and those

associated with traffic appear more closely related to health effects (Schlesinger 2006). Other particulate matter characteristics that may be important to human health effects include: mass concentration; number concentration; acidity; particle surface chemistry; metals; carbon composition; and origin.

Other pollutants, not regulated as "criteira air pollutants", are also a source of health concerns. The California Air Resources Board (CARB) has identified 10 air toxics of concern, five of which are emitted by on-road mobile sources: benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and diesel PM (California Air Resources Board 2001). Mobile source air toxics are known or suspected to cause cancer or other serious health or environmental effects. Benzene is of particular concern because it is a known carcinogen and most of the nation's benzene emissions come from mobile sources. Diesel exhaust particulate matter (DPM) is a toxic air contaminant and known lung carcinogen that is created by combustion of diesel fuel in heavy duty trucks and heavy equipment.

The Railroad Avenue Specific Plan will primarily affect air pollution through motor-vehicle emissions. A list of criteria and non-criteria air pollutants with important motor vehicle sources is listed in the Table 5.1.

Health Effects from Proximity to Roadway Sources

Existing regional air quality monitoring does not provide sufficient data to assess exposure to all people in the population. In particular, because of local variations in air quality, some populations within a community may be exposed to higher levels of air pollutants. Two particular sources of within-area variation in air pollution hazards are proximity to industrial sources and roadways.

New epidemiologic evidence may have a direct effect on community planning and development near sources of air pollution. For instance, epidemiologic studies have consistently demonstrated that children and adults living in proximity to freeways or busy roadways have poorer health outcomes. For example:

- A study of children in the Netherlands found that lung function declined with increasing truck traffic density especially for children living within 300 meters of motorways (Brunekreef 1997);
- Children in Erie County, New York hospitalized for asthma were more likely to live within 200 meters of heavily trafficked roads (Lin 2002);
- Among children living within 150 meters of a main road in Nottingham, United Kingdom, the risk of wheeze increased with increasing proximity to the road (Venn 2001);
- In Oakland California, children with higher exposure to traffic related pollutants had more asthma and bronchitis symptoms (Kim 2004);
- In a low income population of children in San Diego, children with asthma living with 550 feet of high traffic flows were more likely than those residing near lower traffic flows to have more medical care visits for asthma (English 1999);
- In a study of Southern California School Children, living within 75 meters of a major road was associated with an increased risk of lifetime asthma, prevalent asthma, and wheeze (McConnell 2006);
- In a study conducted in 12 southern California communities, children who lived with 500 meters of a freeway had reduced growth in lung capacity compared to those living greater than 1,500 meters from the freeway (Gauderman 2004).

Based on this evidence, new policies related to land use development are emerging. For example, the California Air Resource Board (CARB) has provided guidance on appropriate development near sensitive populations. In their Air Quality and Land Use Handbook: A Community Health Perspective (2005), CARB recommends not locating sensitive land uses, including residential developments, within specific distances to known sources of air pollution, such as not locating sensitive land uses within 500 feet of a highway with more than 100,000 vehicles per day (CARB 2005). This presents some challenges for infill development, when many potential sites are near sources of existing air pollution. It also presents challenges to transit-oriented development because many existing transit hubs are located alongside of busy roadways.

Table 5.1 Air Pollutants and Pollutant Mixtures with Important Motor Vehicle Sources

	Air Pollutant	Source	Health Effects
Criteria Pollutants	**Ozone**	Tropospheric ozone is formed in the atmosphere from chemical transformation of certain air pollutants in the presence of sunlight. Ozone precursors include vehicles, other combustion processes and the evaporation of solvents, paints, and fuels	Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema.
	Carbon Monoxide (CO)	Produced due to the incomplete combustion of fuels, particularly by motor vehicles	Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood resulting in fatigue, impaired central nervous system function, and induced angina.
	Particulate Matter (PM_{10} *and* $PM_{2.5}$)	Diverse sources including motor vehicles (tailpipe emissions as well as brake pad and tire wear, woodburning fireplaces and stoves, industrial facilities, and ground-disturbing activities	Impaired lung function, exacerbation of acute and chronic respiratory ailments, including bronchitis and asthma, excess emergency room visits and hospital admissions, pre-mature arteriosclerosis, and premature death.
	Nitrogen Dioxide (NO_2)	Combustion processes in vehicles and industrial operations	Increase the risk of acute and chronic respiratory disease and reduce visibility
	Sulfur Dioxide (SO_2)	Combustion of sulfur-containing fuels such as oil, coal, and diesel	Increased risk of acute and chronic respiratory
Non-criteria Pollutants	*Diesel exhaust*	Diesel engines	Probable human carcinogen (IARC Group 2A) Diesel engines also emit particulate matter criteria pollutants produced through combustion.
	Benzene	Gasoline engines	Known human carcinogen (IARC Group 1A)
	1,3 butadiene	Motor vehicle engines	Probable human carcinogen (IARC Group 2A)
	Benzo(a) pyrene	Motor vehicle engines	Probable human carcinogen (IARC Group 2A)

Community Health Effects From Construction Dust

Additionally, air quality can be affected by construction itself. A study of increased amount of "fugitive dust" from construction activities in Beijing showed that there was 2-10 times more fugitive dust emission measured from silt on roads, with the magnitude of the effect dependent on distance away from construction and time of day compared to construction activities. The study's researchers estimated that PM_{10} emissions from construction activities accounted for 59% of the fugitive dust on roads (Tian 2007).

In a study done in a Boston public housing community, researchers examined relationships between presence of a variety of environmental situations and respiratory health outcomes. They found that there was almost 10 times the risk of reporting wheezing and 4.4 times more risk of reporting cough when residents reported frequent renovations, and over 15 times more likelihood of reporting sneezing with frequent reports of construction dust (Brugge 2001).

Occupational Health Impacts from Construction Dust

The health of construction workers has been studied, and it has been found that any occupational particulate air pollution was associated with a 13% higher risk of ischemic heart disease in these workers (Toren 2007). Although the situation after September 11, 2001 is an extreme case of "demolition", health impacts from rescue workers can demonstrate that construction dust is not benign and needs to be regulated and monitored. In a study of over 1,400 responders, most of whom responded from 6 – 20 days after September 11, more than half reported lower or upper respiratory symptoms, despite the fact that over 2/3 of them used respiratory protection (Mauer 2007).

Health Impacts On Vulnerable Populations

Some populations may be more vulnerable to the impacts of air pollution exposures. The elderly and the young, as well as populations with higher rates of respiratory disease such as asthma and COPD, and populations with other environmental or occupational health exposures (e.g., indoor air quality) that impact cardiovascular or respiratory diseases are more sensitive to adverse health effects. Poorer residents may be more likely to live in poorer housing conditions with higher levels of indoor air pollutants, and may live closer to industry or busy roadways. These factors may result in variation in the estimates of air pollution-related health effects. For example, a recent study of mortality and air pollution in Los Angeles found that concentration response functions based on a within-city estimate were 2-3 times those based on regional studies (Jerret 2005).

C. Established Air Quality Standards and Health Guidelines

California and Federal Air Quality Standards are provided in Figure 5.1. CARB's, *Air Quality and Land Use Handbook: A Community Health Perspective* provides the recommends for locating sensitive receivers near sources of air pollution (CARB 2005) listed in Table 5.2.

Figure 5.1 California and Federal Air Quality Standards

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		Federal Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.08 ppm (157 µg/m^3)		
Respirable Particulate Matter (PM10)	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)	24 Hour	No Separate State Standard		35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	15 µg/m^3		
Carbon Monoxide (CO)	8 Hour	9.0 ppm (10mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	9 ppm (10 mg/m^3)	None	Non-Dispersive Infrared Photometry (NDIR)
	1 Hour	20 ppm (23 mg/m^3)		35 ppm (40 mg/m^3)		
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	—
Nitrogen Dioxide (NO_2) *	Annual Arithmetic Mean	0.030 ppm (56 µg/m3)	Gas Phase Chemiluminescence	0.053 ppm (100 µg/m^3)	Same as Primary Standard	Gas Phase Chemiluminescence
	1 Hour	0.18 ppm (338 µg/m^3)		—		
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	—	Ultraviolet Fluorescence	0.030 ppm (80 µg/m^3)	—	Spectrophotometry (Pararosaniline Method)
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (365 µg/m^3)	—	
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	1 Hour	0.25 ppm (655 µg/m^3)		—	—	—
Lead[8]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	—
	Calendar Quarter	—		1.5 µg/m^3	Same as Primary Standard	High Volume Sampler and Atomic Absorption
Visibility Reducing Particles	8 Hour	Extinction coefficient of 0.23 per kilometer — visibility of ten miles or more (0.07 — 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent. Method: Beta Attenuation and Transmittance through Filter Tape.		No Federal Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[8]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

* The Nitrogen Dioxide ambient air quality standard was amended on February 22, 2007, to lower the 1-hr standard to 0.18 ppm and establish a new annual standard of 0.030 ppm. These changes become effective after regulatory changes are submitted and approved by the Office of Administrative Law, expected later this year.

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (02/22/07)**

Source: CARB. 2007. California Ambient Air Quality Standards. California Air Resources Board. Available at http://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed on January 4, 2008.

Table 5.2 CARB 2005 Guidance on Preventing Air Quality—Land Use Conflicts

Source of Air Pollution	Air Resource's Board Recommendations
Freeways and High-Traffic Roads	Avoid siting sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day.
Distribution Centers	Avoid siting sensitive land uses within 1,000 feet of a distribution center (that accommodates more than 100 trucks per day, more than 40 trucks with operating TRUs per day, or where TRU unit operations exceed 300 hours per week). Take into account the configuration of existing distribution centers and avoid locating residences and other sensitive land uses near entry and exit points.
Rail Yards	Avoid siting sensitive land uses within 1,000 feet of a major service and maintenance rail yard. Within one mile of a rail yard, consider possible siting limitations and mitigation approaches.
Ports	Consider limitations on the siting of sensitive land uses immediately downwind of ports in the most heavily impacted zones. Consult with local air districts for the latest available data on health risks associated with port emissions.
Refineries	Avoid siting sensitive land uses immediately downwind of petroleum refineries. Work with local air districts to determine an appropriate separation.
Chrome Platers	Avoid siting sensitive land uses within 1,000 feet of a chrome plater.
Dry Cleaners Using Perchloro-ethylene	Avoid siting sensitive land uses within 300 feet of any dry cleaning operation. For large operations with two or more machines, provide 500 feet. Do not site sensitive land uses in the same building with perc dry cleaning operations.
Gasoline Dispensing Facilities	Avoid siting sensitive land uses within 300 feet of a large gas station (defined as a facility with a throughput of 3.6 million gallons per year or greater). A 50 foot separation is recommended for typical gas stations.

D. Existing Conditions

Monitoring Data on Air Quality in Pittsburg. Table 5.3 shows the concentrations of criteria air pollutants by month in 2007.

Table 5.3 2007 Monthly Maximum Criteria Air Pollutant Concentrations from BAAQMD Pittsburg Monitoring Data

	2007, Month												Annual	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Max**	**Min**
Carbon Monoxide (pptm)	28	19	15	9	7	5	6	8	13	22	27	20	28	0
Nitric Oxide (ppb)	197	187	127	56	15	25	15	22	105	177	163	218	218	0
Nitrogen Dioxide (ppb)	50	50	44	29	25	29	20	25	45	51	42	43	51	0
Ozone (ppb)	39	46	68	89	67	72	82	100	77	64	50	40	100	0
Sulfur Dioxide (ppb)	16	18		20	14	15	23	47	22	15	24	13	47	0

Known Industrial Point Sources of Air Pollution. It is estimated that 70% of the heavy industry in the Bay Area is located along the river corridor that forms the northern boundary of Contra Costa County. This region's oil refineries, chemical plants, water and wastewater treatment facilities, and power plants, include:

- Dow Chemical (901 Loveridge Road);
- PG & E Power Plant (696 West 10th Street);
- General Chemical Corporation Bay Point Works (501 Nichols Road);
- Us Steel Posco Industries (900 Loveridge Road);
- Calpine/Bechtel Pittsburg Llc Delta Energy Center (1200 Arcy Lane);
- Itw Signode Western Operations (1 Leslie Drive);
- Chemical & Pigment Co (600 Nichols Road);
- Los Medanos Energy Center (750 East 3rd Street);
- Roll Technology West (1000 E 3rd St);
- Union Carbide Industrial Gases Incorporated (2000 Loveridge Rd);
- Keller Canyon Landfill Company (901 Bailey Road).

Pittsburg's Dow Chemical is the largest of the six Dow Chemical sites in California (Dow Chemical 2006). It is located along the San Joaquin River, and is one of the largest integrated chemical manufacturing sites on the West Coast. It produces a variety of products, including pesticides and herbicides, as well as latex and anti-microbials that are used in consumer products. Its location in Pittsburg allows for transportation of its products in and out of the site via road, rail and water. The site operates 24-7 with hazardous materials, and in the past 5 years has had 3 accidental releases of regulated materials under the California Accidental Release Prevention (CalARP) Program (CCHS). According to the Contra Costa Health Services, none of these accidents resulted in offsite injury or environmental damage.

E. Assessment of Air Quality at Project Site

The impacts analysis in this chapter explores the following related questions:

- *What are the estimated cumulative concentrations of air pollutants from existing and proposed traffic sources in the Railroad Avenue Specific Plan?*
- *What health risks are associated traffic-related air pollution sources?*
- *How do exposure and health risks compare to an alternative development scenario?*
- *What other non-traffic air pollutants may affect future area residents?*

Analytic Approach

To answer the first 3 questions, PM 2.5 was used as a proxy for health-relevant traffic related air pollutant exposures. PM 2.5 was estimated for existing traffic sources as well project-generated traffic using available traffic volume data, State of California estimates of vehicles emissions factors (EMFAC 2007), and a line source dispersion model. Available concentration response functions were used to estimate changes in selected heath outcomes associated with PM 2.5. Exposure and health risks were compared for the Railroad Avenue Specific Plan and an alternative low-density residential development scenario. For question 4, community concerns were considered using BAAQMD complaint records and identified potential stationary sources of concern.

Emissions and Exposure from Project Generated Traffic

The proposed Railroad Avenue project is a transit-oriented mixed land use – residential and commercial – development project located at a new Bay Area Rapid Transit (BART) station in the city of Pittsburg, California. The project site straddles a major roadway, State Route Highway 4, and thus is potentially impacted by traffic-related air pollution. According to the specific plan for the project, the development will include approximately 1,590 homes, built as low and medium-rise apartments on approximately 45 acres, and 445,853 sq. ft. of commercial space. The project will be served by BART trains as well as bus service.

In evaluating the Railroad Avenue Specific Plan projects, the Transportation and Land Use Coalition (TALC) performed a land-use-transportation study comparing the project to a hypothetical alternative (Chang 2008). The alternative they chose was the San Marcos Hillside project, a suburban low-density residential-only development located approximately 4 miles to the west of the Railroad Avenue site, and slightly to the south of Highway 4 (Figure 5.2). It was assumed that the project would be purely residential with approximately 2,771 homes on 512 acres of land.

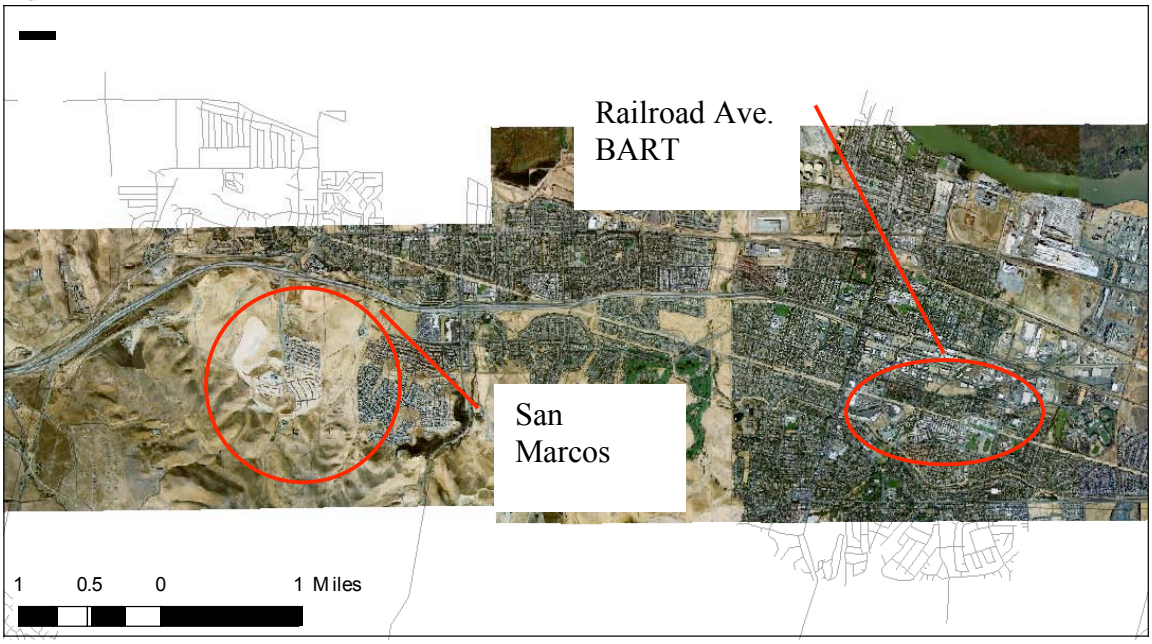
TALC's analysis compared the two projects on the basis of vehicle trip generation and total air pollution (greenhouse gas) emissions. They used the URBEMIS 2002 Version 9.1 model developed by Nelson/Nygaard and Jones & Stokes for the San Joaquin Air Pollution Control District. URBEMIS allows for the computation of vehicle trips based on ITE trip generation factors for different types of land use and mitigations (e.g., mixed-use) and availability of transportation alternatives. It also estimates total project air pollutant emissions based on the estimated vehicle trips and CARB's EMFAC mobile emissions database.

Table 5.4 Vehicle-related Environmental Impacts of Residential Development for Railroad Avenue Specific Plan vs. San Marcos Hillside Development:

	San Marcos Hillside Development	Railroad Avenue Specific Plan
Housing Units	2771	1590
Acres	512	45
Daily Car Trips	20,026	4,143
Miles of Driving Per Day	171,233	35,435
Tons of traffic generated CO_2 per year	30,200	6,250

Table 5.4 shows that, although the San Marcos scenario has only 75% more residential units, it results in 383% more trips, driving, and CO_2 emissions. While the differences are dramatic, and suggest that the San Marcos development would impact regional air pollution much more than Railroad Avenue Specific Plan area, the TALC analysis did not describe the air pollution exposures at these two developments attributable to these different land use patterns.

Figure 5.2 Railroad Avenue Specific Plan and San Marcos Hillside development alternative



This analysis aimed to compare the traffic-related air pollution attributable to new land uses for both development scenarios. The same two scenarios were modeled with CALINE3QHCR, a Gaussian dispersion model for traffic pollutants. The model uses annual meteorology (data from the San Francisco Airport for the year 1990 was used for the comparison) to compute the dispersion of the air pollutants. Since URBEMIS readily provides estimates of total $PM_{2.5}$ emissions, this air pollutant was used to assess health impacts. Furthermore, TALC's "apples-to-apples" comparison of impacts from residential land use only was followed, ignoring the trip generation from commercial mixed-use for the BART scenario.

First, $PM_{2.5}$ emissions factor was estimated from TALC's URBEMIS estimates of total $PM_{2.5}$ emissions per year and vehicle miles traveled (VMT) per day. This resulted in an emissions factor of 0.15 g of $PM_{2.5}$ per vehicle-mile.

The following assumptions regarding how TALC's estimated vehicle trips would be distributed throughout the project area were used:

San Marcos Assumptions	Vehicles per hour
90% of trips on the arterial from the freeway to the community	751
2/3 of traffic goes onto freeway (divided equally in either direction)	275
10% of trips on smaller streets	83

Railroad Ave Specific Plan Assumptions	Vehicles per hour
90% of trips on the arterial (Railroad Ave.)	155
2/3 of traffic goes onto freeway (divided equally in either direction)	57
10% of trips on smaller streets	17

The results of the dispersion modeling for both developments are shown in Figures 5.3 and 5.4. Note that these results do not include existing, or ambient concentrations. Hence, they are the "attributable" concentrations of $PM_{2.5}$ due to the new project generated traffic from the residential land use.

In the San Marcos scenario (Figure 5.3), a simple street layout for a residential community was assumed. The dispersion model estimated that residents living in the community would be exposed to 0.2 - 0.6 µg/m³ of $PM_{2.5}$ from their own traffic, with the exception that those living near to the main arterial would be exposed to higher levels ranging from 0.6 to as much as 2 µg/m³. Because wind directions were typically from the southwest direction, those living to the northeast of the arterial would be exposed to higher concentrations of $PM_{2.5}$.

In contrast to the San Marcos scenario, residents at the Railroad Avenue project (Figure 5.4) would have almost indiscernible exposure levels to their own traffic. Concentrations were estimated at 0.2 µg/m³ or lower. Again, concentrations were estimated to be highest alongside the arterial, Railroad Avenue.

The added contribution to air pollution from the commercial land use for the project was also considered (Figure 5.5). In this case, residents would be exposed to higher concentrations, however, still less than in the San Marcos scenario. This scenario, however, does show that there is reason to be concerned that residents living closest to the highway and Railroad Avenue may be exposed to higher levels of $PM_{2.5}$, particularly if existing traffic conditions and ambient pollution levels are factored into their cumulative exposures.

It is important to note that these analyses do not capture the total impact of vehicle trips. TALC's URBEMIS scenarios estimated that the average trip is 8 miles, which extends beyond the areas analyzed with the dispersion models. In the case of San Marcos, these trips would likely be on the freeway, which would impact not only regional air pollution, but exposures to those that live along the freeway. In contrast, while the BART scenario generally results in fewer trips, because it is located in an urban area, 8-mile trips may result in increased traffic in existing residential neighborhoods, which may require mitigations.

Figure 5.3 Attributable $PM_{2.5}$ Concentrations from New Residential Use at the San Marcos Hillside Development Area. Note that this map does not include pollution from existing traffic or background concentrations and that impacts extend beyond the immediate study area, particularly for longer vehicle trips. Assumptions were that 90% of vehicle trip traffic will occur on the main freeway road entrance into community, 10% on smaller streets, and a third of the traffic will go in either direction on Highway 4.

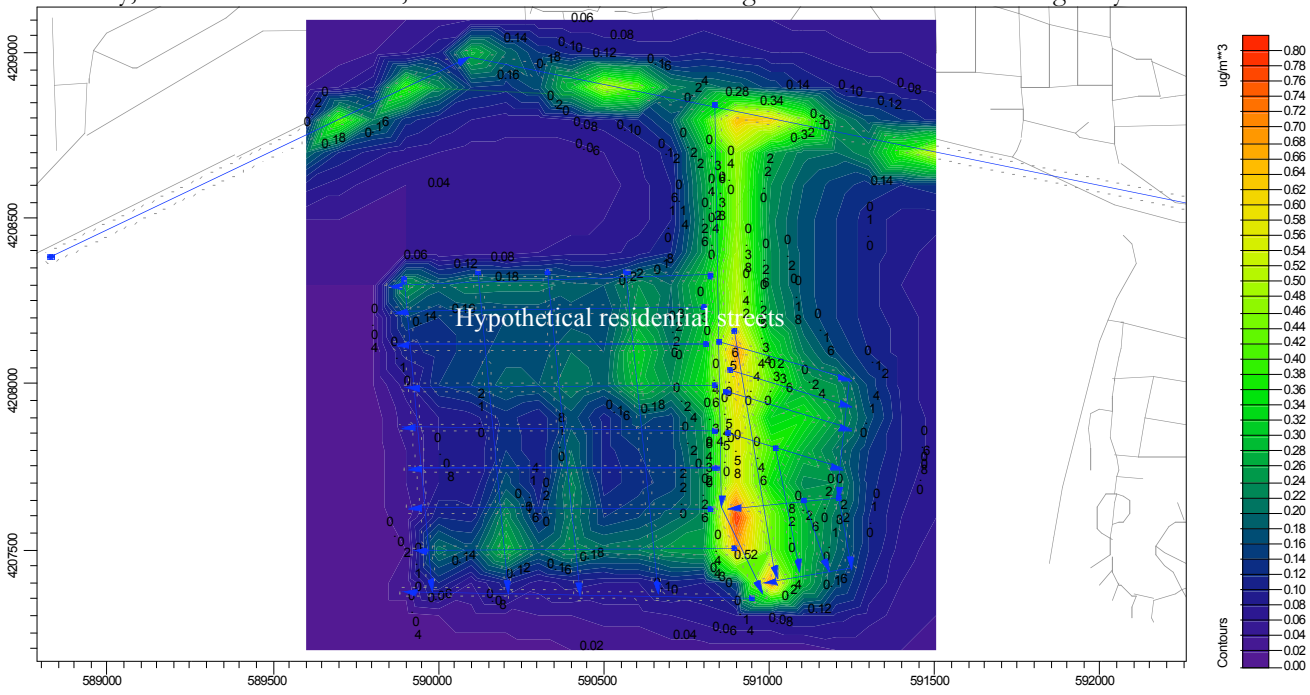


Figure 5.4 Attributable $PM_{2.5}$ concentrations from new residential use at the Railroad Avenue Specific Plan area scenario. Note that this map does not include pollution from existing traffic or background concentrations and that impacts extend beyond the immediate study area, particularly for longer vehicle trips. Assumptions were that 90% of vehicle trip traffic will occur on Railroad Avenue, 10% on smaller streets, and a third of the traffic will go in either direction on Highway 4.

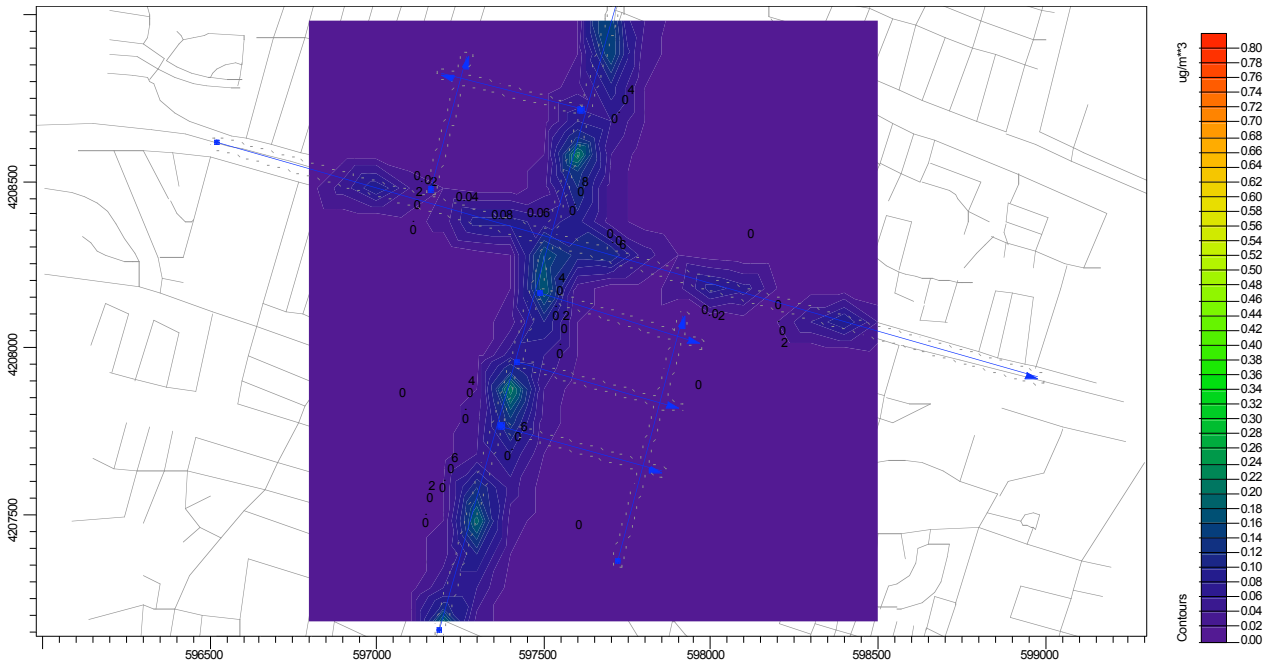
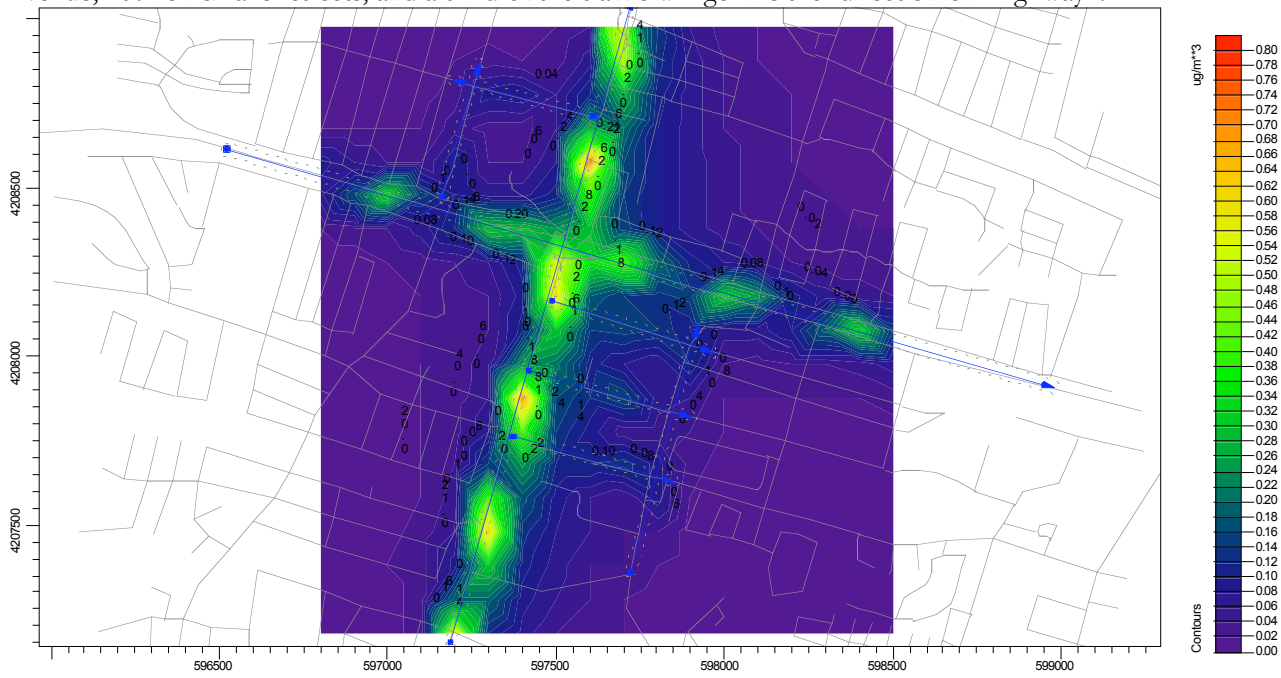


Figure 5.5 Attributable $PM_{2.5}$ concentrations from planned development (residential and commercial use) at the Railroad Avenue Specific Plan area scenario. Note that this map does not include pollution from existing traffic or background concentrations and that impacts extend beyond the immediate study area, particularly for longer vehicle trips. Assumptions were that 90% of vehicle trip traffic will occur on Railroad Avenue, 10% on smaller streets, and a third of the traffic will go in either direction on Highway 4.

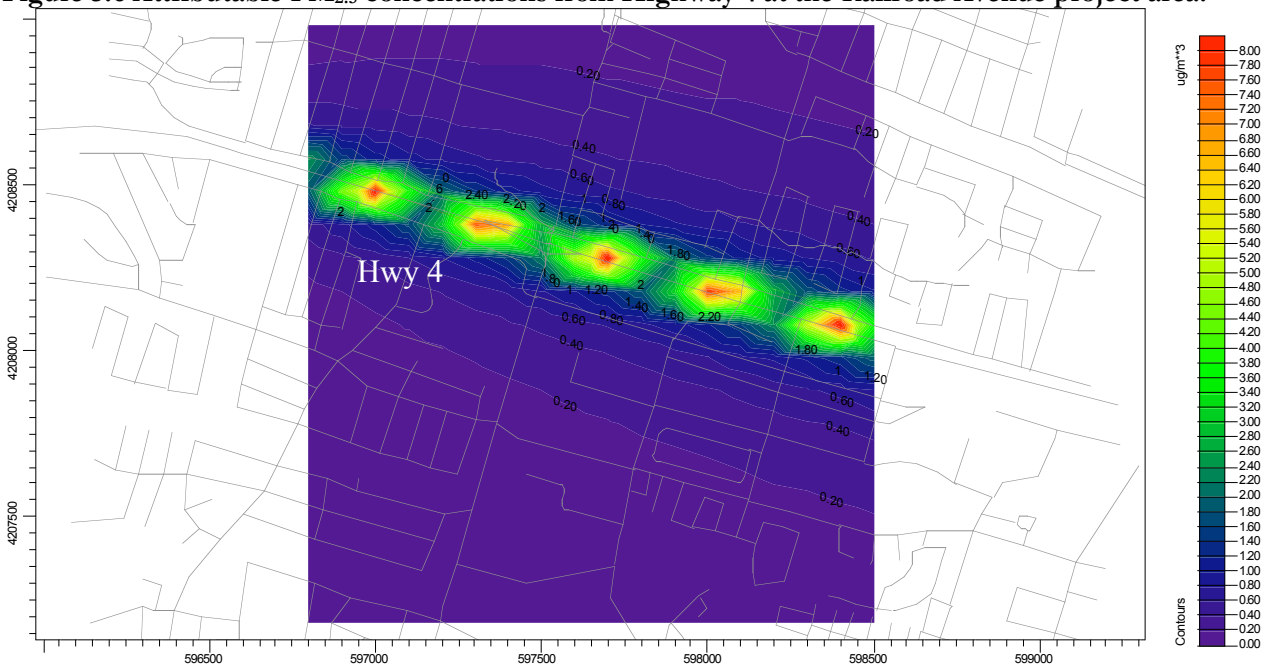


Contributions of Highway 4 to PM 2.5 Levels

Existing traffic, specifically from State Route 4, is a significant source of air pollution exposure at the proposed Specific Area site. Additional analysis using existing traffic counts from the highway allows estimation of concentrations of traffic related PM 2.5 using CALINE3QHCR. The estimated average annual traffic for Highway 4 in 2006 was 119,000 vehicles per day or 4958 per hour (Caltrans 2006). For the Railroad Avenue project, an additional 57 vehicles per hour was previously estimated. Using the same emissions factors as the previous analysis, estimated highway-attributable concentrations of PM 2.5 at the Specific Plan area are illustrated in Figure 5.6. The highway contribution to a sensitive receptor living closest to this pollutant source would be a concentration of approximately 2 μg/m^3, though the concentration diminishes with distance from the highway to approximately 0.2 μg/m^3.

Table 5.5 shows the cumulative levels of traffic generated $PM_{2.5}$ at the project sites.

Figure 5.6 Attributable $PM_{2.5}$ concentrations from Highway 4 at the Railroad Avenue project area.



Background Levels of PM 2.5

To account for ambient air pollution concentrations, we used the Bay Area Regional Air Quality Management District's air monitoring data from Benicia, the closest $PM_{2.5}$ monitor in the area (BAAQMD 2006). This monitor is located approximately 15 miles from Pittsburg. The annual average $PM_{2.5}$ concentration in 2006 was 11 μg/m^3, 8 μg/m^3 in 2007, and 8 μg/m^3 from April 2007 – April 2008. These levels are below the State standard.

Table 5.5 Cumulative Levels of Traffic Generated PM 2.5 at the Project Site

	Background $PM_{2.5}$ (ug/m^3) from Regional Monitoring Station	$PM_{2.5}$ (ug/m^3) Associated with Traffic on State Route 4	Project Generated Traffic $PM_{2.5}$ (ug/m^3)	Total (Background Plus Local Traffic) Estimated $PM_{2.5}$ (ug/m^3)
San Marcos				
Residential (non-arterial)	8	-	0.18	8.18
Residential (arterial)	8	-	0.8	8.8
Railroad Avenue, distant from SR 4				
Residential (non-arterial)	8	0.2	-	8.2
Residential (arterial)	8	0.2	0.08	8.28
Residential and Commercial (non-arterial)	8	0.2	0.08	8.28
Residential and Commercial (arterial)	8	0.2	0.7	8.9
Railroad Avenue, near to SR 4				
Residential (non-arterial)	8	2	-	10
Residential (arterial)	8	2	0.08	10.08
Residential and Commercial (non-arterial)	8	2	0.08	10.08
Residential and Commercial (arterial)	8	2	0.7	10.7

Estimated Health Impacts for residents at the Railroad Avenue Specific Plan

Established concentration-response functions may be used to evaluate the health impacts of changes in $PM_{2.5}$ concentrations. These functions are based on epidemiological evidence of the associations between air pollutant concentrations and various health outcomes, including premature mortality, as well as other health indicators such as asthma hospitalizations and lost work days. The functions take as input the estimated change in $PM_{2.5}$ concentration and produce as output an estimated change in health.

Concentration response functions were used to evaluate the risks and health impacts for the following changes:

- 0.18 $\mu g/m^3$ increase for residents not living near to arterials at the San Marcos site;
- 0.8 $\mu g/m^3$ increase for residents living near to arterials at the San Marcos site;
- Concentration increases for residents living under different conditions (non-arterial/arterial, and near/far to SR4) at the Railroad Avenue site.

As part of CARB's assessment of the PM standard for California, a review of the health effects literature for $PM_{2.5}$ was conducted in 2002 (CARB 2002). From this report, the concentration-responses for various health endpoints are presented in Table 5.6. The third column in the table shows the estimated changes in health effects for a 10 $\mu g/m^3$ change in $PM_{2.5}$ concentrations.

Table 5.6 Annual Health Benefits in California Associated with $PM_{2.5}$ Annual Average of 12 mg/m^3 (CARB 2002)

Health Endpoint	Reference	% change per 10 $\mu g/m^3$ (± 95% CI)	Expected Incidence (cases/year)		
			Low	Mean	High
Mortality					
Long-Term Exposures Mortality (Age 30+)	Krewski et al., 2000	4.62 (1.20)	3,200	6,500	9,700
Short-Term Exposures Mortality (all ages)#	Schwartz et al. (1996)	1.43 (0.13)	2,100	2,600	3,100
Hospitalization					
COPD (ICD codes 490-492, 494-496), Age 65+	Samet et al., 2000	2.88 (1.39)	30	600	1,200
Pneumonia (ICD codes 480-487), Age 65+	Samet et al., 2000	2.07 (0.58)	400	900	1,300
Cardiovascular (ICD codes 390-429), Age 65+	Samet et al., 2000	1.19 (0.11)	1,300	1,500	1,800
Asthma (ICD codes 493), Age ≤ 64	Sheppard et al., 1999	2.57 (0.77)	90	500	800
Alternative Estimates of Hospitalization					
Circulatory (ICD codes 410-459), All ages	Van Den Eeden et al., 1999	0.80 (0.39)	90	2,100	4,200
Chronic respiratory (ICD codes 490-496), All ages	Van Den Eeden et al., 1999	2.70 (0.77)	600	1,500	2,300
Acute respiratory (ICD codes 460-519), All ages	Van Den Eeden et al., 1999	1.24 (0.47)	200	700	1,200
Minor Illness					
Lower respiratory symptoms, Age 7-14	Schwartz et al., 1994	18.23 (5.86)	81,000	209,000	323,000

Should not be added to estimate of long-term mortality, which includes some of the short-term effects.

If a linear relationship between changing concentrations and health risks is assumed, then it is possible to use these factors to estimate the health impact for the scenarios above by simply multiplying the factor by the change in concentration:

$$Y = (x/10)\ f$$

where

Y is the percent change in health effect;
x is the concentration change in $\mu g/m^3$; and
f is the concentration response factor.

The risks for three health endpoints for the conditions at San Marcos and Railroad Avenue are shown in the Table 5.7.

Table 5.7 Air Quality Health Hazards for San Marcos and Railroad Avenue scenarios

		% change in health effect		
	Traffic attributable exposure to $PM_{2.5}$ (ug/m^3)	**Premature mortality (long-term exposure in ages 30+)**	**Asthma hospitalization (ages ≤ 64)**	**lower respiratory symptoms (ages 7-14)**
San Marcos				
Residential (non-arterial)	0.18	0.1	0.05	0.3
Residential (arterial)	0.8	0.4	0.2	1.5
Railroad Avenue, distant from SR 4				
Residential (non-arterial)	0.2	0.1	0.1	0.4
Residential (arterial)	0.28	0.1	0.1	0.5
Residential and Commercial (non-arterial)	0.28	0.1	0.1	0.5
Residential and Commercial (arterial)	0.9	0.4	0.2	1.6
Railroad Avenue, near to SR 4				
Residential (non-arterial)	2	0.9	0.5	3.6
Residential (arterial)	2.08	1.0	0.5	3.8
Residential and Commercial (non-arterial)	2.08	1.0	0.5	3.8
Residential and Commercial (arterial)	2.7	1.2	0.7	4.9

The increased health effect risks are proportional to changes in $PM_{2.5}$ concentrations. Hence, for both the Railroad Avenue and San Marcos scenarios the risks are greatest for those living near arterials and those living near the highway.

The wind in this area generally blows from the west-southwest. Despite blowing slightly from the south, the dispersion model estimates that there will be elevated concentrations of highway-attributable particulates on both north and south of the highway. **Risks are highest for new residential uses in the Railroad Avenue Specific Plan located near SR 4.** From Figure 5.6, it can be seen that living near to the highway can result in exposures as much as 10 times higher than those residents of the project who live farthest away from the highway. **Hazards for residential uses distant from SR 4 at the Specific Plan Area will be roughly equal to those for the San Marcos' Residential project.**

A more precise assessment of health impacts could consider the number of individuals who would be exposed to the different combinations of non-arterial, arterial, nearness to SR 4. If the population of future residents at both sites is assumed to be distributed uniformly across the project sites, approximately 10% of the population will live near to arterials and, for the Railroad Avenue site, approximately 5% of the population will live near to SR 4. If it is also assumed that on average 3 persons will live in each unit, then multiplying the risks in Table 5.5 by the population exposed results in the health impacts listed in Table 5.7.

While it would seem that the greatest risk is from living along arterials and the freeway for the Railroad Avenue scenario, this risk could be eliminated entirely if individuals were not allowed to live near these arterials. For this reason, moving residential buildings as far away from the freeway as feasible and/or providing appropriately filtered HVAC systems is recommended. This recommendation mirrors the CARB land use guidelines that are based on establishing safe buffers between roadways and sensitive populations.

Table 5.8 Air Quality Health Impacts for San Marcos and Railroad Avenue Scenarios Adjusted for Population

	Estimated persons living in these conditions	Premature mortality (long-term exposure in ages 30+)*	Asthma hospitalization (ages ≤ 64)	Lower respiratory symptoms (ages 7-14)**
San Marcos				
Residential (non-arterial)	7,482	4	3	8
Residential (arterial)	831	2	2	4
Railroad Avenue, distant from SR 4				
Residential (non-arterial)	4,078	3	2	5
Residential (arterial)	453	<1	<1	1
Residential and Commercial (non-arterial)	4,078	4	3	7
Residential and Commercial (arterial)	453	1	1	2
Railroad Avenue, near to SR 4				
Residential (non-arterial)	215	1	1	3
Residential (arterial)	24	<1	<1	<1
Residential and Commercial (non-arterial)	215	1	1	3
Residential and Commercial (arterial)	24	<1	<1	<1

* we assume 2/3 population aged 30+
** we assume 1/3 population aged 7-14

Considering the results in Table 5.6, we can first perform an "apples-to-apples" comparison between only residential land use impacts for San Marcos and Railroad Avenue. This compares: San Marcos Residential (non-arterial) + San Marcos Residential (arterial) to Railroad Avenue Residential (non-arterial) + Residential (arterial) both near and far from SR4. Residential use at San Marcos results in 41% higher health impacts for premature mortality, asthma, and lower respiratory symptoms than Railroad Avenue.

Comparing true operational conditions, in which San Marcos only has residential, but Railroad Avenue has both residential and commercial land use, is based on the following: San Marcos Residential (non-arterial) +

San Marcos Residential (arterial) to Railroad Aveneu Residential and Commercial (non-arterial) + and Commercial Residential (arterial) both near and far from SR4. Under operational conditions, even with the impacts of living near the freeway, the health impacts for premature mortality, asthma, and lower respiratory symptoms are roughly the same for Railroad Avenue and San Marcos.

Even one excess premature death is reason for concern. Based on the dispersion maps, it is clear that simply buffering residents away from the major arterials may be effective in reducing air quality impacts. **Buffering residents at Railroad Avenue away from the freeway would result in one fewer premature mortality. If this cannot be done, then filtered HVAC systems may offer an alternative mitigation to provide cleaner air to residents living close to the arterials.**

There are limitations to these analyses. The concentration response functions were developed from regional data, and hence have not been validated in small-area studies. Meteorology from San Francisco Airport is not an ideal source for local weather conditions. Recent evidence suggests that the effects within-region may vary considerably. Moreover, there is considerable uncertainty in these functions that have not been considered here. Also note that PM2.5 is only one component of air pollution. Other roadway-related pollutants, such as NO_2 have associated health effects, which have not been considered. Also, sensitive populations, such as those individuals who already have respiratory disease may be impacted to a greater degree than estimated by the concentration response functions.

Construction Dust

In focus groups, there was qualitative evidence of concern related to construction dust. Residents living near construction sites noted a precipitous increase in respiratory problems upon the start and over the duration of construction. A frequent guest near a construction area in Pittsburg stated that after having spent only a few hours at a friend's house (who lives directly near a major construction project), her throat became sore and raw such that she required medical care the next day. A tour of the many construction projects that are currently taking place in Pittsburg reveals streets that are torn up and dusty, and backhoes and construction equipment in operation a few feet from residences. When asked, residents listed many health effects that they felt were directly related to construction in their neighborhoods: an increase in asthma, sore throats, eyes burning, rashes on their arms, and persistent coughing.

The Bay Area Air Quality Management District was contacted to obtain information about complaints and violations of dust from construction and industry in Pittsburg from 2002 to 2007. Complaints were logged for four companies in the area, as shown in Table 5.9.

Table 5.9 Air Quality Complaints

3/16/2005	Garbage/compost odor, 6 confirmed complaints.	Keller Canyon Landfill Company
7/6/2005	Dust from loading operations	Antioch Building Materials Company
6/29/2006	Plume excessive > 9-1/2 minutes	Antioch Building Materials Company
4/26/2007	Excessive dust for 6-3/4 minutes	Contra Costa Waste Services

Dust includes $PM_{2.5}$, PM_{10} and larger particulate matter. Demolition of existing structures and construction may create dust in the area. Given past complaints of dust from waste and building processes, it would be prudent to recommend dust mitigation strategies. There are best practice guidelines from the Greater London Authority and London Councils for reducing dust and emissions from construction and demolition (London Councils 2006). These guidelines aim to control dust through prevention, suppression, and containment. Specific strategies include layout of dust-producing machinery away from sensitive receivers, erecting barriers, use of water as a dust suppressant, reducing dust-producing piles, and covering dusty loads entering and exiting the site.

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Pittsburg Railroad Avenue Specific Plan Health Impact Assessment
Chapter Six
Community Noise

Chapter Summary

This analysis modeled environmental noise exposure for area residents, employees, and visitors associated with the freeway and with the new BART station and estimated associated noise-related health impacts on residents and visitors to the project area.

Potential Positive Health Impacts	Potential Negative Health Impacts
• None	• The project site is located adjacent to California State Route 4 and the Pittsburg/Daly City BART line. Cumulatively, with the proposed project, expected noise levels at the project's residential and retail near the BART station are estimated to be over Ldn 75 dBA, a level well above international public health guidance for residential uses. • Even under indoor noise mitigation requirements, some project residents are likely to be exposed to environmental noise to an extent that can create annoyance, sleep disturbance and adversely effect school and work performance. • Existing project area outdoor noise levels proximate to BART and the freeway of greater than 70 dB will, without mitigation, prevent normal voice level communication at unprotected exterior locations and negatively affect community livability.

Recommendations to Reduce Community Noise Impacts

1. Locate residential uses and other sensitive land uses in the project area to minimize exposure to significant sources of environmental noise.
2. Where achievement of indoor noise standards requires windows to be closed, incorporate ventilation systems with filtration of ambient air for each unit; avoid the use of Z-ducts.
3. Implement a design that has interior courtyards and patios that open into acoustically protected and shielded areas.
4. Include performance testing of constructed units to ensure compliance with interior noise standards.
5. Notify all potential buyers that the property they are occupying has substantial ambient noise levels.
6. Consider construction of a sound barrier wall for SR 4.
7. Reduce the speeds of the traffic on SR-4 and on the project's residential streets through traffic calming measures.
8. Undertake necessary maintenance of BART tracks to minimize train-associated noise.
9. Limit nighttime truck traffic on SR 4.
10. Integrate below market and market rate units in the same buildings to prevent environmental justice impacts.
11. Require noise controls on indoor and outdoor commercial equipment.

A. Introduction

According to the World Health Organization's Guidelines for Community Noise (1999), long term exposure to moderate levels of environmental noise can aversely affect sleep, school and work performance, blood pressure and cardiovascular disease. The development of the Pittsburg Railroad Avenue Specific Plan projects has potential to expose future residents to high levels of community noise both from existing, such as California State Route 4, and proposed sources, such as the new Bay Area Rapid Transit (BART) station.

This analysis investigates the following questions related to the health effects of noise:

- *What are the estimated cumulative levels of noise expected at the project's proposed sensitive uses?*
- *How can mitigations like a sound wall adjacent to SR 4 reduce ambient noise?*
- *What are expected levels of annoyance in unprotected areas near the BART station?*
- *What are the predicted effects of expected noise levels on sleep disturbance?*
- *What are the predicted effects of expected noise levels on neighborhood livability?*

B. Background: Noise and Health Impacts

Noise is characterized as unwanted sound. Noise is measured as the pitch or frequency and loudness. Pitch refers the quality of the tone (high vs. low) and is measured by the frequency or length of sound waves.

Loudness refers to the intensity of a sound and is measured by the amplitude of the sound wave. Measurement of sound intensity corrects for the way the human ear de-emphasizes low and very high frequencies (called the A-weighted scale). A decibel (dB) is a unit of measurement based upon a logarithmic scale indicating the relative intensity of a sound. Audible changes in noise levels generally refer to changes of 3 dB or more. An increase of 10 dB represents a 10-fold increase in acoustic energy, while 20 dB is 100 times more intense, and 30 dB is 1,000 times more intense.

Noise levels are typically averaged over time. The community noise equivalent level (CNEL) is the A-weighted time varying equivalent sound level (Leq) over a 24-hour period, with a 5 dBA additional weighting factor applied to the hourly Leq for noises occurring from 7:00 p.m. to 10:00 p.m. and 10 dBA additional weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. The day-night average level (Ldn) is similar to the CNEL without the adjustment for noise occurring during the evening and night time hours.

Noise loses energy as it moves away from the source causing a reduction in measured and perceived sound intensity. Each doubling of distance from a single point source of noise results in a 6 dB reduction in the noise level.

Factors contributing to urban noise, noise-related health effects and a list of potential effect modifiers and mitigations are shown in Table 6.1. The health impacts of environmental noise depend on the intensity of noise, on the duration of exposure, and the context of exposure. For example, the World Health Organization (WHO) noise exposure thresholds are much lower for levels inside (30 dB) and outside (45 dB) homes than for commercial (70 dB) and other public areas.

Table 6.1 Factors Contributing To Urban Noise, Noise-Related Health Effects, And Noise Mitigation Strategies

Determinants of Urban Noise	Health Effects	Factors Modifying Effect of Noise	Noise Mitigations
Vehicle volume Vehicle type Vehicle speed Roadway conditions Mechanical equipment	Sleep Stress Cognitive function Hypertension Annoyance Speech intelligibility	Noise intensity Noise duration Perceived risk associated with noise	Building orientation Insulated windows, doors, and walls Ventilation systems Placement Buffers Sound walls Traffic calming

According to the World Health Organization's Guidelines for Community Noise, long term exposure to moderate levels of environmental noise can aversely affect sleep, school and work performance, blood pressure and cardiovascular disease (Bergland 1999). Furthermore, since that review, substantial research has established additional relationships between environmental noise and health. Several of the more established relationships between environmental noise and human health are:

- According to WHO, reductions of noise by 6-14 dBA result in subjective and objective improvements in sleep;
- Chronic road noise can affect cognitive performance of children including attention span, concentration and remembering, reading ability, and discrimination between sounds (LHC 2003);
- There is a dose response relationship between environmental noise from traffic and high blood pressure (Van kempen E 2002);
- Increasing community noise, including traffic noise, increases the risk of myocardial infarction at noise levels above 60dBA (Babish 2008);
- Noise can interfere with speech communication outdoors, in workplaces, and in schoolrooms, interfering with the ability of people to perform their work (WHO 1999);
- The combination of noise and poor quality housing has been associated with higher stress and stress hormone levels (Evans 2004).

C. Established Standards and Health Objectives

Tables 6.2 and 6.3 summarize WHO Guidelines and EPA standards regarding noise.

Table 6.2 WHO Community Noise Guidelines And Main Health Effects Of Concern (Bergland 1999)

Environment	Health effect	Sound level (dB (A)*)	Time (hours)
Outdoor dwellings	Annoyance	50-55	16
Indoor dwellings	Speech intelligibility	35	16
Bedrooms	Sleep disturbance	30	8
School classrooms	Disturbance of communication	35	School hours
Industrial, commercial and traffic areas	Hearing impairment	70	24
Music through earphones	Hearing impairment	85	1
Ceremonies and entertainment	Hearing impairment	100	4

Table 6.3 United States Environmental Protection Agency Noise Standards

Noise Source	Federal Regulation
Aircraft and Airports	Standard range from 65 dbA for residential areas to over 85 dbA for agricultural and transportation uses. **The Airport Improvement Act of 1982** (P.L. 97-248) established the Airport Improvement Program to provide federal assistance for airport construction and to award grant for noise mitigation.
Interstate Motor Carriers	**The Noise Control Act** required EPA to develop noise standards and it authorized the **Federal Highway Administration** to enforce them. The standards for all commercial vehicles over 10,000 pounds for highway travel, range from 81 to 93 dbA.
Interstate railroads	**The Noise Control Act** required EPA to develop noise standards and it authorized the **Federal Railroad Administration** to enforce them. At speeds of 45 miles per hours, the noise level from railway cars must not exceed 88 dbA and at speeds greater than 45 mph must not suppress noise level of 93 dbA.
Workplace Activities	**The Occupational Safety and Health Act of 1970** (P.L.91-596) required the **Occupational Safety and Health Administration** to develop and enforce the standards. Exposure of constant noise level of 90 dbA must not exceed 8 hours. The highest level of workers can constantly be exposed is 115 dbA and must not be exposed longer than 15 minutes within an 8-hour period.
Other Regulated Sources (transportation, construction, and electrical equipment and motors or engines, etc)	**The Noise Control Act** required EPA to develop and enforce the noise standards. Noise levels for motorcycles after 1982 range from 80-86 dbA. Mopeds are limited to 70 dbA and trucks over 10,000 pounds range from 80-83 dbA. **The Federal-Aid Highway Act of 1970** (P.L. 91-605) required the **Federal Highway Administration** to establish standards for highway noise levels. The law prohibits the approval of funding for highway projects if it does not meet the standard of 52-75 dbA noise levels depending on land use. **The Housing and Urban Development Act of 1968** (P.L. 90-448), developed the noise standards for federal housing projects located in noise exposed areas.

The Healthy People 2010 Objectives (1999)

- (28-17) Reduce noise-induced hearing loss in children and adolescents aged 17 years and under;
- (28-18) Reduce adult hearing loss in the noise-exposed public.

Title 24 of the California Code of Regulations

Title 24 provides for noise insulation standards for residential buildings. The code requires an acoustical study whenever a residential building is proposed near an exiting or planned freeway, major roadway, rail line, or industrial noise source and where those noise sources cumulatively produce an outdoor Ldn of 60 dB or higher. Residences must be designed to limit interior noise to no more than a Ldn of 45 dB.

The Pittsburg General Plan Noise Element

Table 6.4 summarizes guidelines for noise compatibility for residential uses in Pittsburg's General Plan.

Table 6.4 Pittsburg General Plan Compatibility Chart for Residential Uses and Community Noise

Exposure (Ldn, dB)	Guidance	Interpretation
< 60	Normally Acceptable	Development may occur without an analysis of potential noise impacts to the proposed development.
60 - 70	Conditionally Acceptable	Development should be undertaken only after an analysis of noise-reduction requirements is conducted, and if necessary noise-mitigating features are included in the design
70-75	Normally Unacceptable	Development should be discouraged; it may be undertaken only if a detailed analysis of noise reduction requirements is conducted, and if highly effective noise insulation, mitigation, or abatement features are included in the design.
> 75	Clearly Unacceptable	Development should not be undertaken.

D. Existing Noise Conditions at the Railroad Avenue Specific Plan Project Area

The 24-hour noise levels were estimated at the site based on BART, freeway, and surrounding local traffic using a model (Soundplan 6.4), using the Federal Highway Administration's standard for vehicular traffic noise, and the Schall 03 standard for railway noise. Figure 6.1 shows the project site with major buildings and noise features shown in colored symbols. The predicted noise for existing conditions is shown in Figure 6.2. Estimated noise levels of the current project site are between 72 and 76+ dBA Ldn, with increasing noise close to BART and the highway.

Figure 6.1 Project Site, With Major Buildings And Noise Features Shown In Colored Symbols.

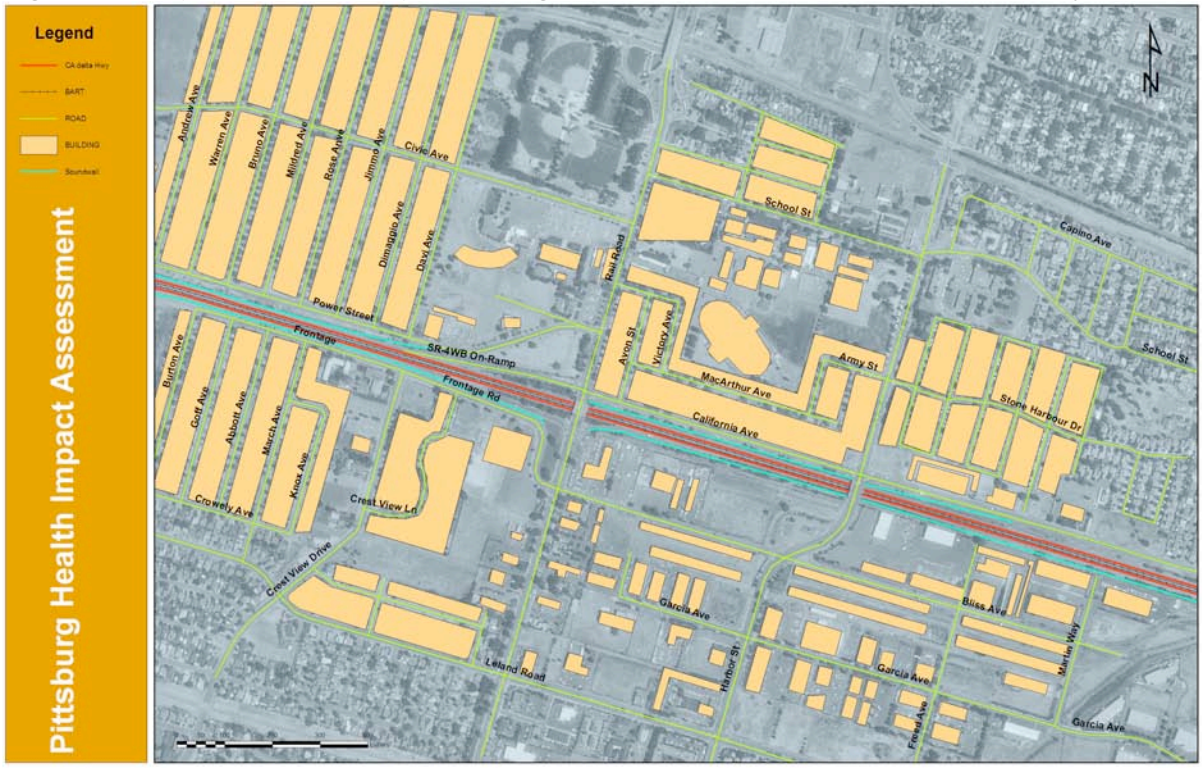
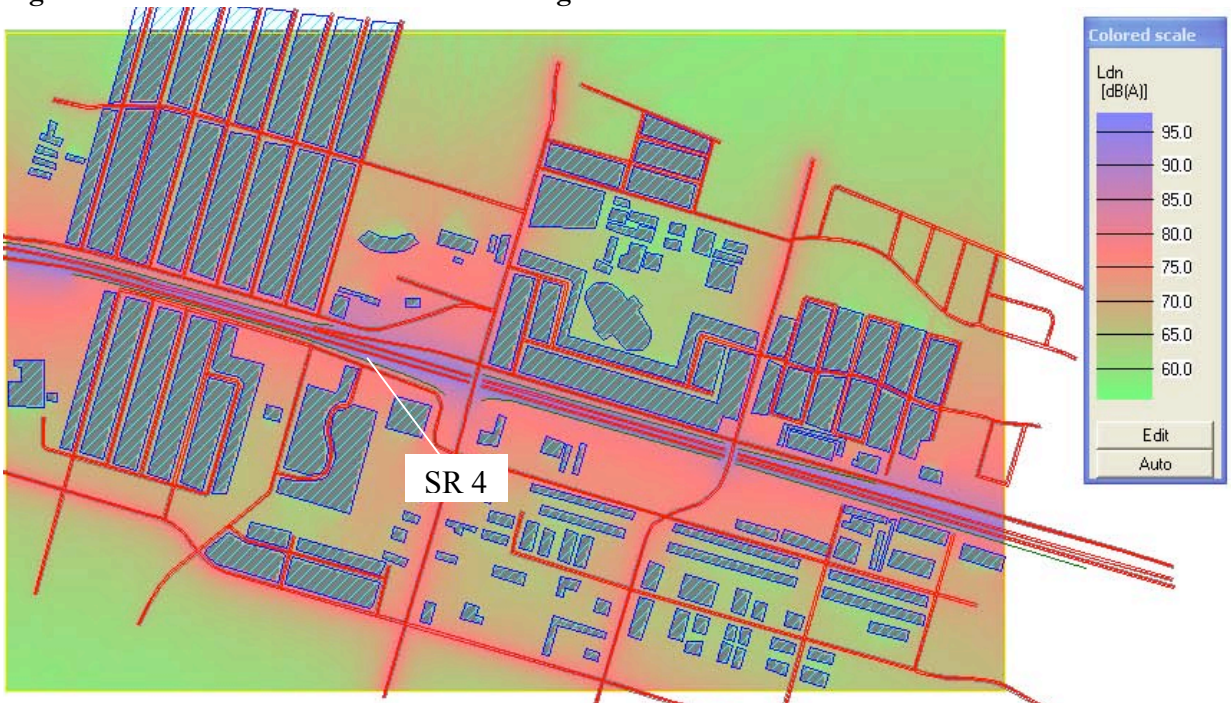


Figure 6.2 Modeled Noise Levels Of Existing Condition Of The Area.



E. Assessment of the proposed project

This analysis provides analysis on the following questions:

- *What are the estimated cumulative levels of noise expected at the project's proposed sensitive uses?*
- *What level of protection is offered by a sound wall adjacent to SR 4?*
- *What are expected levels of annoyance in unprotected areas near the BART station?*
- *What are the predicted effects of expected noise levels on sleep disturbance?*
- *What are the predicted effects of expected noise levels on neighborhood livability?*

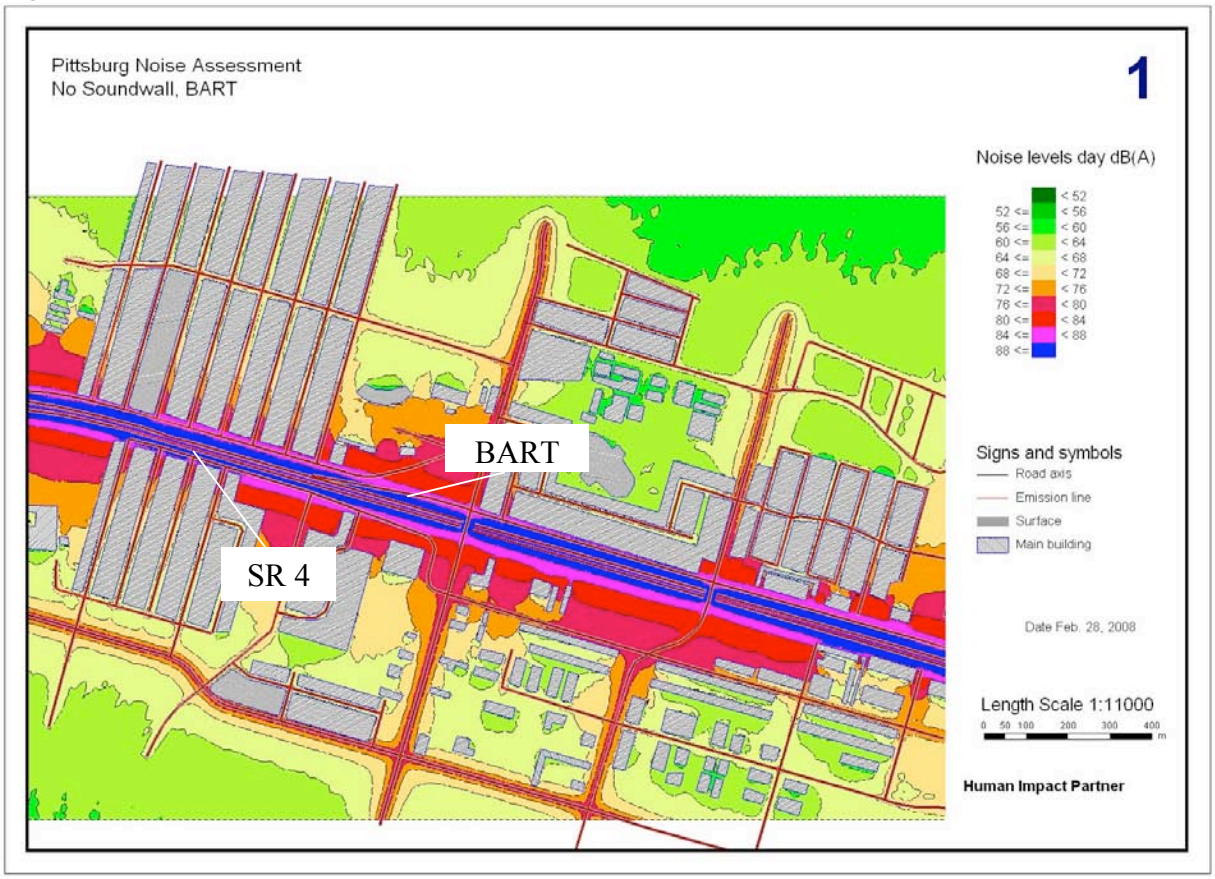
Estimated Noise Levels for the Projects Sensitive Uses[1]

SR 4 has nearby on-off ramps, which are the primary source of noise for the projects sensitive residential uses. A second important source of noise will be the BART train line and proposed new station. Associated noise from living next to the BART station potentially include: noise associated with train braking, acceleration, and wheel-track noise; noise associated with train announcements and horns; vehicular traffic for commuter drop-offs and parking; and public transport stops (buses, shuttles, etc.).

The modeled noise levels for the proposed station area are shown in Figure 6.3, including both roadway and BART sources. This model did not include a sound wall, so that we could later assess its efficacy. Estimated future noise levels of the project area vary between approximately 52-88 dBA. Building locations proximate to SR 4 and BART resulted in estimated noise levels of 77 dBA or above.

[1] "Sensitive uses" include: residences, hospitals, schools, and childcare facilities.

Figure 6.3 Modeled Noise Levels For Proposed Future Development Without A Sound-Wall.



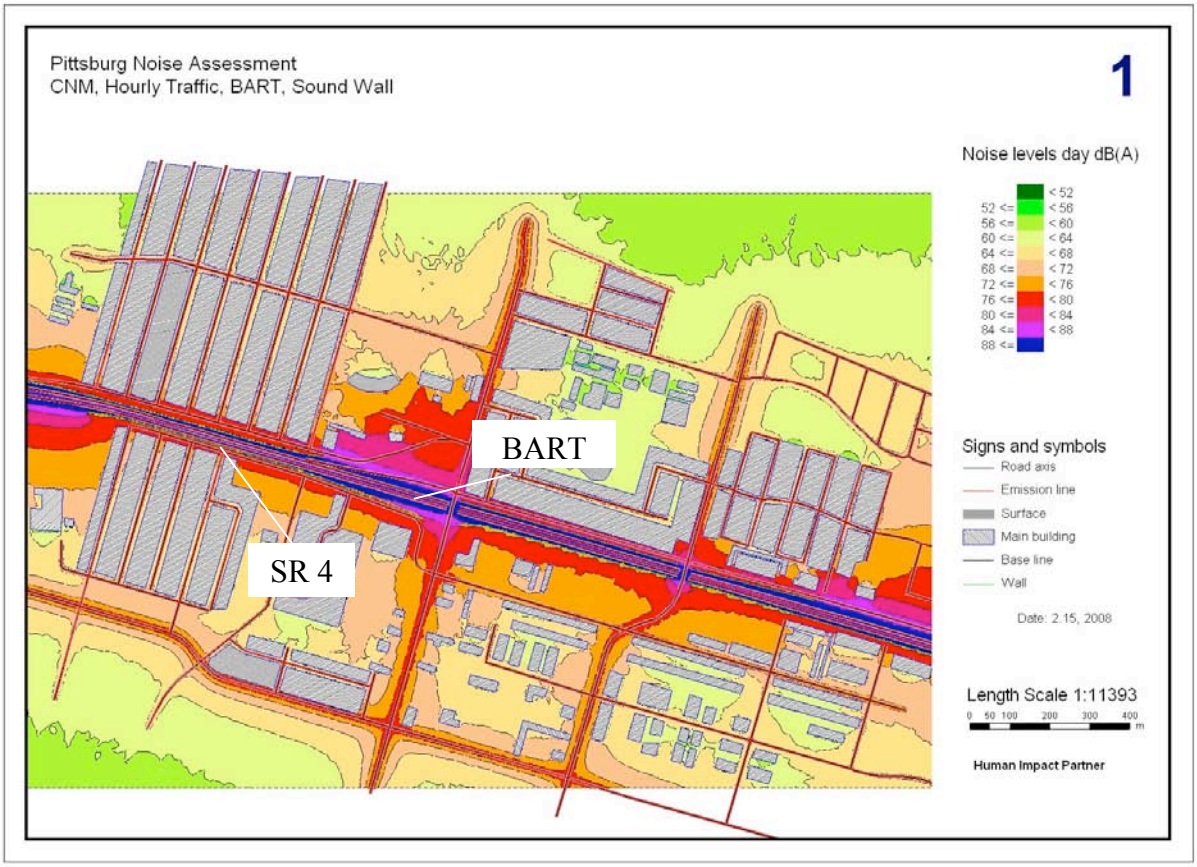
Due to the addition of new residents and retail space, increased local traffic can be expected at the new site. Based on the California Air Resources Board's URBEMIS model of vehicular emissions associated with land development projects (URBEMIS 2008), it is estimated that there will be approximately 13,069 additional trips associated with the project, which will increase noise to some extent, though probably not as much as noise levels coming from the highway. Nevertheless, since these additional trips were not included in the noise models, these estimates should be viewed as a low projection of future noise levels.

Chronic exposure to these levels are sufficient to cause adverse physiologic and health effects in humans. Regardless of the ultimate feasibility and effectiveness of indoor noise mitigations, based on evidence reviewed in the WHO guidance referenced above, some project residents are likely to be exposed to environmental noise to an extent that may aversely affect health, subjective well-being and cognitive performance.

Effects of a Sound Wall on Project Area Sound Levels

The model was used to assess the efficacy of the sound-wall heights in shielding the inner residential and commercial area from BART and highway noise (Figure 6.4). With this design, noise levels are reduced by 5-17 dBA within the sound-wall area. Perimeter areas, particularly those close to BART and the freeway, may need noise mitigation to bring indoor levels to healthy standards.

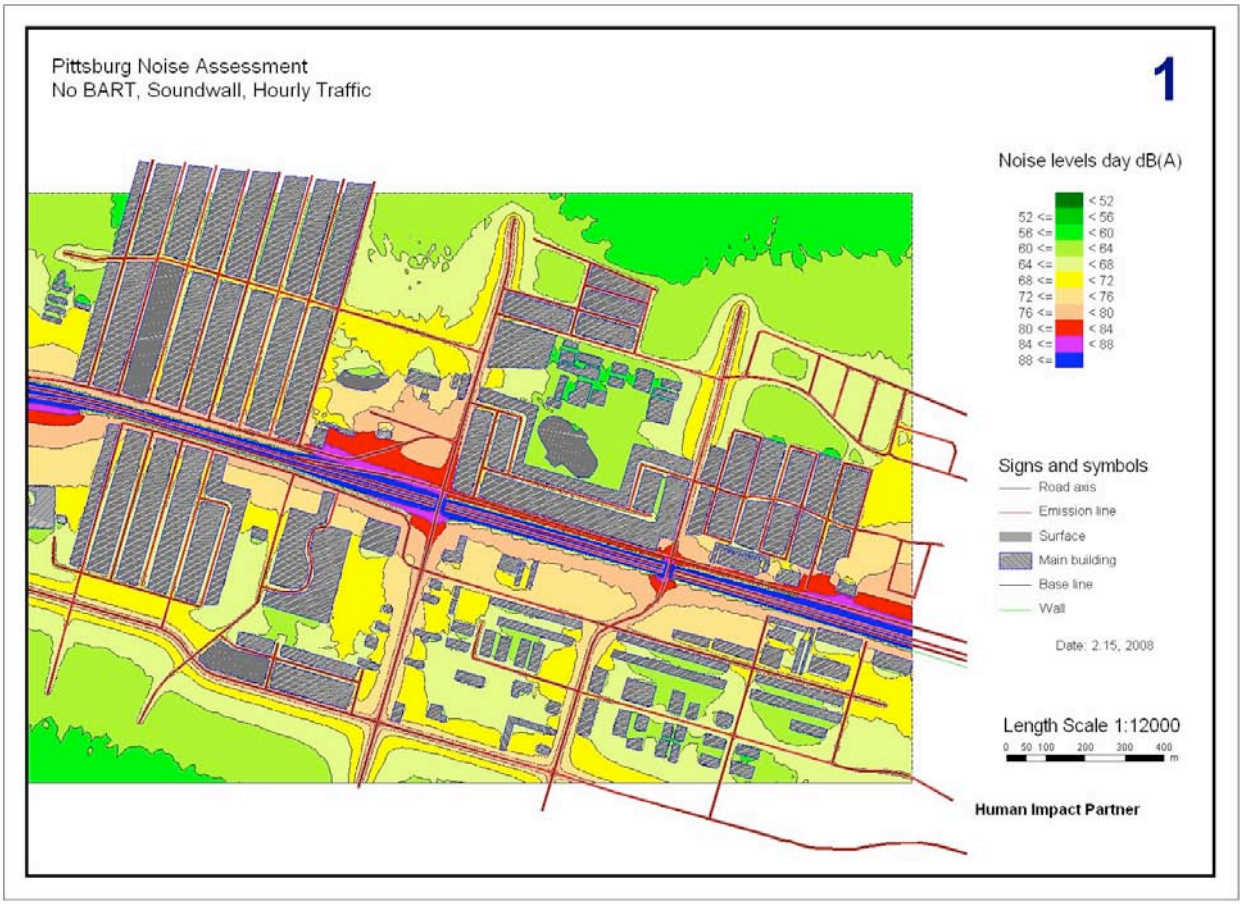
Figure 6.4 Modeled Noise Levels For Proposed Future Development With A Sound-Wall.



Effects of the proposed BART Station on Noise Levels

We considered the incremental noise contribution to the proposed site from being near the BART station. Figure 6.5 shows the estimated noise levels with the BART line removed from the model. Compared to Figure 6.3, which has BART included, it is clear that the incremental gain in noise at the transit village (i.e., near BART) is large (~8 dBA).

Figure 6.5 Modeled Noise Levels For Proposed Future Development Without BART.



Effects of Sound Levels on Community Annoyance

Annoyance is a well-established metric for evaluating the significance of community noise. Annoyance is related to several health effects associated with noise induced stress response, including: elevated blood pressure, circulatory disease, ulcer, and colitis. Based on a multi-country study of annoyance levels associated with measured outdoor road traffic noise levels the following relationship can be used to estimate the percentage of highly annoyed (%HA)(Miedema and Oudshoorn 2001):

$$\%HA = 9.994\times10^{-4}\left(L_{dn}-42\right)^3 - 1.523\times10^{-2}\left(L_{dn}-42\right)^2 + 0.538\left(L_{dn}-42\right)$$

Without noise mitigations, in residential locations near to BART and the freeway (80 dBA), an estimated 53% of the exposed population will be highly annoyed by noise (Table 6.6 and 6.7). Further mitigations including acoustical insulation and use of HVAC instead of open windows may further reduce awakenings.

Table 6.5 Noise Levels and Assumptions Used in Forecasting Health Impacts

Condition	Sound Level dB(A) or Sound Level Attenuation
Estimated Ambient Noise at Project Site	Varies from 72 (Garcia Ave.) to 80 (near HWY 4) dBA (Soundplan 6.5 Site Assessment)
Sound Wall	Between 5 to 17 dBA (Soundplan 6.5 Site Assessment)
Legally required indoor noise levels with windows closed	No more than DNL 45 dBA (California Building Code)
Indoor noise levels with windows open	10 dBA below ambient noise (Handbook of Noise Control, Second Edition, 1979)
Outdoor noise levels in protected courtyards	60 to 68 dBA (Soundplan 6.5 Site Assessment)

Table 6.6 Percentage Of People Highly Annoyed (%HA) Associated With Predicted Outdoor Ambient Noise Level At 100 Feet From The Affected Roadway Segments Under Specified Conditions

Condition	Affected Roadway Segments	Predicted Noise Level at 100ft (Ldn)	% HA (percentage of people highly annoyed)
Existing Conditions No BART Sound-wall	State Route 4 – Railroad Ave. to Harbor St.	+80 Ldn	53%
Existing Conditions No BART Sound-wall	Railroad Ave. – E Leland Rd. to Atlantic Ave.	76 Ldn	40%
Existing Conditions No BART Sound-wall	Garcia Ave. – Railroad Ave. to Harbor St.	68 Ldn	21%
Future Conditions BART Sound-Wall	State Route 4 – Railroad Ave. to Harbor St.	+84 Ldn	70%
Future Conditions BART Sound-Wall	Railroad Ave. – E Leland Rd. to Atlantic Ave.	76 Ldn	40%
Future Conditions BART Sound-Wall	Garcia Ave. – Railroad Ave. to Harbor St.	68 Ldn	21%
Future Conditions No Sound wall BART	State Route4	+88 Ldn	89%
Future Conditions Within Protected Courtyards, BART Sound-wall	State Route 4 – Railroad Avenue BART station development site	64 Ldn (4 dBA reduction)	15%
Future Conditions Reduction of speed limit On Highway 4 , BART Sound-wall	State Route 4 – Railroad Avenue BART station development site	72 to 80 Ldn	40%

Table 6.7 Percentage Of People Highly Annoyed (%HA) Associated With Predicted Indoor Ambient Noise Level At 100 Feet From The Affected Roadway Segments Under Specified Conditions

Condition	Affected Roadway Segments	Predicted Noise Level at 100ft (Ldn)	% HA (percentage of people highly annoyed)
Future Condition Indoors, Windows Open BART, No Sound Wall	State Route 4 – Railroad Avenue BART station development site	70 Ldn	25%
Future Condition Indoors, Windows Open BART, Sound Wall	State Route 4 – Railroad Avenue BART station development site	66 Ldn	18%

Effects on sleep disturbance

Surrogate measures of train noise were used to estimate single event level (SEL) noise measures associated with BART operations. Measurements taken at West Oakland BART show the average BART train coming and leaving a station results in noise SEL of approximately 77 dBA. The short-term 20 minutes ambient noise measured from MacArthur BART parking lot ranged from 61.1 to 66.8 dBA Leq (SEL of 91.89 to 97.69 dBA). (There are numerous studies carried out on the railway noise control testing with different railway track materials (wood, concrete, timber, rubber, etc.) and various bridge designs in order to reduce the noise level.)

With windows open, the exterior to interior building attenuation may be about 10 dBA, resulting in an interior SEL noise level of approximately 67 dBA (Handbook of Noise Control, 2nd Edition). The U.S. Federal Interagency Committee on Noise (http://www.fican.org/pdf/nai-8-92.pdf) has found that the relationship between sleep disturbance and noise is:

$$\% \textit{ Awakening} = (7.079 \times 10^{-6}) \times \text{SEL}^{3.496}$$

Without noise mitigations, an estimated 17% of the exposed population would be awakened. Further mitigations including acoustical insulation and use of HVAC to avoid the use of open windows may further reduce awakenings.

Effects on Neighborhood Livability

Ambient noise is an important element of neighborhood livability and traffic noise has been empirically linked measures of social cohesion (Appleyard 1981). Existing project area outdoor noise levels of greater than 70 dB will prevent normal voice level communication at unprotected exterior locations (USEPA 1981).

Potential Environmental Justice Impacts

Members of low income households may be more sensitive to the health and developmental impacts of high environmental noise levels given that they are likely to be facing additional environmental stressors (e.g., at work) and may have less ability to control their environments (Gee and Payne-Sturges 2004). Should the project include affordable housing, the location of this housing within the project site should considered carefully to ensure against potential environmental injustices. If such residences are separate from market rate housing and located closer to BART and the freeway, for instance, there could be adverse environmental justice impacts.

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Methodological Notes on Noise Modeling

We first calibrated the rail model to typical noise levels measured in the field for a BART train entering and leaving a station. This calibration was done at the West Oakland BART station, which was free of the confounding effects of the nearby freeway. Two measurements were taken 50m away from the West Oakland station, and perpendicular to the line of travel, for the noise of approaching and leaving cars. These measurements were used to calibrate the noise levels for a single train, and then extrapolated to the situation for the Pittsburg BART station based on its scheduled 62 (5:42a.m. – 9:53p.m.), 18 (10:23 p.m. – 12:11a.m.) daytime and nighttime trains, respectively. For the traffic model we used Caltrans traffic data for highway 4 (Table 5).The existing AM and PM traffic data available in Railroad Avenue Specific Plan was not adequate to predict and model the day and night noise level of the project area. Hence, the traffic model of the City of San Francisco was used to estimate hourly traffic volume for the Pittsburg (Graph 1). (Seto 2007) First, the ratio of hourly versus peak hour traffic volume of San Francisco was computed then multiplied by the average of AM/PM peak hour traffic of Pittsburg.

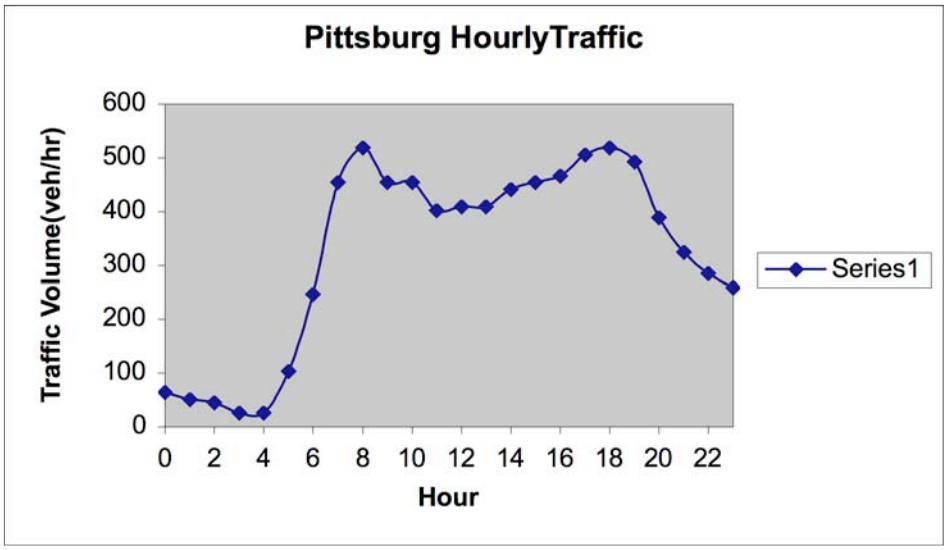
$T_{hour\ i}$ / $T_{peak\ hour}$ (San Francisco) × $T_{peak\ hour}$ (Pittsburg) = $T_{hour\ i}$ (Pittsburg)

The current site, with existing buildings and major noise sources are shown in Figure 1.

Caltrans Average Annual Daily Traffic (AADT) data for highway 4.

Route	Vehicle AADT Total	Light Truck AADT Total	Heavy Truck AADT Total
4	122000	3027	1374

Estimated local street traffic counts by hour.



Appendix I

Initial Scope for the Pittsburg Railroad Avenue Specific Plan HIA

October 2007

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
Transportation Access to jobs, goods, services, and educational resources Vehicle trips Trips made via walking and biking	eBART station built in middle of Hwy 4 @ intersection w/ RR Ave. Parking for TV residential: 2,004 spaces for 1,336 units = 1.5 per unit Parking for TV commercial: 2,934 (more than original 1300 planned), on site, on-street, and structured = one for every 199 sq. feet of commercial space. Residential Parking for Civic Center: 381 for 254 units = 1.5 spaces peer unit. 1,052 commercial spaces per 297,250 sq. feet of commercial use = 1:282 sq. feet (down from 1:232) What is eBART parking plan? What is current parking/driving pattern for different neighborhoods?	*What are the potential effects of the project on vehicle trips, vehicle miles traveled, and mode split? Locally and regionally?* *Will eBART parking positively or negatively affect transit use and active travel behaviors?* *How will housing development (parking & design) affect transit use and travel behavior (including utilitarian and leisure travel, biking & walking) for both new residents and current?*	*Estimate vehicle use reductions and increases in transit and walking trips* *Assess parking demand for project* *Bike facilities @ eBART, residences, and commercial areas* *Assess bike transport options* *Explore/identify feasible transportation demand management approaches potentially applied to the project* *Survey residents on what*	URBEMIS analysis MTC Parking Model RR Ave. Specific Plan – potentially end of Feb. Existing studies/ literature Bike Master Plan (part of General Plan transportation element, but they were supposed to have a bike plan by 2005) Check Safe Routes to schools plan TDM strategy Residents (survey)	TALC Current bike facilities in GP. Proposed bike facilities in it, too. CCC School districts Bicycle and Pedestrian Coordinator (designated in General Plan) TALC - Ann

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
	BART access priorities are: 1. pedestrian 2. bike, 3. transit (shuttle/bus) 4. auto/carpool 5. auto/single occupancy (eBART goals: improve pedestrian, bus, bicycle and other linkages between the potential BART station and the surrounding community) Specific Plan to include traffic study and circulation alternatives. Traffic is already overwhelming (Hwy 4 jammed from 3-7 pm; mess at drop off/pick ups at schools) What are current and possible public transit incentive programs (businesses, City, BART?) Adding several interior streets		*modes of travel they use and why*	Lit review Census MTC study of transportation near public transit	HIP / CCISCO
Pedestrian Environment	Facilitate vibrant pedestrian friendly neighborhood Pedestrian amenities – bike/ped path at Civic Center, 6-10 ft sidewalks on interior streets, ped Xings. RR Ave: ped-oriented entrances to	*Will eBART project areas contribute to or prevent pedestrian injuries* *--What safety precautions is BART employing for vulnerable populations (disabled, seniors)?*	*Map baseline injury rates in area; as related to SES/ ethnic populations* *Survey Pedestrian Environmental Quality, pedestrian volume; assess pedestrian improvements from*	SWITRS, hospital data field observations, Pedestrian Master Plan – CCC and also	Contra Costa Health Dept. / Ann Cheng might have it HIP & CCISCO

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
	retail, streetscape design, safe ped Xings.	*How will retail encourage walking?*	*Specific Plan* *Map popular origins and destinations and their routes*	Pitts GP transportation RR Ave Specific Plan Field observations, interviews, google earth maps	HIP HIP & CCISCO
Air Quality The level of contaminants / pollutants in outdoor air The level of contaminants / pollutants in indoor air Exposure to environmental tobacco smoke	Currently, SR 4 carries 122,000 vehicles per day in the vicinity of RR Ave. eBART. As a transit draw, idling buses and cars may increase diesel exhaust. Construction dust from current development projects a health hazard.	*Do vehicle emissions associated with Hwy 4 Interchange create hazard for respiratory diseases in project residents? In current residents?* *Will the eBART station or transit village cumulatively improve or compromise air quality?* *Will __ years of construction have an impact on air quality?*	*Assess air quality based on traffic counts, topography, and prevailing wind* *Forecast respiratory disease rate change* *Provide guidelines for mitigations for construction dust*	Review SFDPH and Oakland modeling efforts Review and predict based area modeling efforts empirical studies Review and adapt published guidelines from London, Chicago, SF	HIP HIP HIP
Noise The level of environmental noise	Traffic on SR 4 generates noise levels in excess of 60 dB 2,000 ft N & S of hwy. SR 4 has intermittent sound walls, which may reduce noise by 5 – 15 dB.	*Will area noise sources (e.g. freeway and Bart) create health hazards for new project residents? Current residents?* *Do sound walls lower noise*	*Measure ambient noise in area* *Measure SELs associated with BART trains* *Apply health outcomes*	Review Mac BART HIA / use data collection and model noise	HIP / HIP Consultant

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
	Hwy distance from schools?	*by amount stated? How many residents are not covered by the sound walls?* *Will noise and vibration from construction impact current residents?*	*forecasting equations (annoyance, sleep disturbance)* *Identify best practices in residential noise mitigations (company that does noise studies from Fruitvale project DEIR?)*	Literature review of currently validated methods Review DEIRs for other similar BART stations Dublin (Camelia Place) Castro Valley	HIP HIP / TALC Dave Kiddoo – Ecumenical Assoc for Housing
Livelihood Security of Employment Adequacy of wages, income, benefits, and leave Job Hazards Job Autonomy Economic diversity Locally owned businesses		*Will project-related jobs provide jobs with living wages and core benefits (e.g. paid sick leave)?* *What industries is Pittsburg courting? Will new companies hire local employees?* *Will the project contribute to area employment by hiring local residents for hiring for construction or operations jobs? What are the Community Benefits standards?* *Will the project strengthen or diversity the neighborhood economy?*	*Create existing job conditions chart based on area employment (how many jobs of what types, entry level vs. skilled, wages, benefits ,job injuries, how far people travel to work etc)* *Analyze employment conditions of area residents* *Compare area job conditions and resident employment* *Analyze Pittsburg business attraction plan/ retail plan.* *Compare education / skills to skills needed for employment opportunities provided by village* *Analyze jobs threatened by*	Bureau of Labor Statistics, CA occupational health data Pittsburg Enterprise Zone, Redevelopment Plan, Recycling Market Zone, Small Business Assistance *CA EDD, Redevelopment Agency, ?Labor Market Profile?*	HIP City of Pittsburg – HIP HIP

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
		-Will the project support locally owned businesses and entrepreneurship? *-What types of training and apprenticeship programs exist that the project can logically support?*	*displacement*		
Social Cohesion Supportive relationships with friends, families, and neighbors Participation in social organizations The degree and quality of participation in public decision-making The responsiveness of public agencies to peoples needs	MTC funded ($308,000) development of Specific plan involving community & stakeholder workshops (MIG) Civic Center portion: 115,000 sq ft of civic uses (City Hall & proposed County Courthouse).	*Will the village contribute to physical or social assets that contribute to social interaction? What are existing physical and social assets for social cohesion?* *Does the project add new parks? Do these have physical or programming elements that promote social interaction?* *Does the project create new public plazas? Do these have physical or programming elements that promote social interaction?* *Does the project provide new or enhanced community serving facilities (e.g. meeting spaces, etc)*	*Evaluate the current assets (physical and social) supporting social interaction and cohesion in the community: public plazas, parks, community centers, retail environment, involvement in community organizations.* *Survey residents adjacent to eBART to assess their perspectives, concerns, needs with regard to priority needs social assets* *Analyze design plans for housing and community space and evaluate how the project could achieve needs*	*City information, Parks websites, listings of churches, MIG maps, retail listings* *Observations* *Residents – Survey* *Literature / report review* *Use above asset mapping* *MIG? Developer*	*CCISCO, HIP, MIG, City of Pittsburg website, Econ Dev.* *HIP, CCISCO* *HIP, CCISCO* *TALC, HIP*

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
		Will eBART project contribute to displacement of existing area residents, either directly or indirectly? *Will the development provide a means to support cohesion between the west and east sides of SR 4?* *Has the project planning engaged the community in a way that increases area social cohesion or social capital?* *Do plans respond to community concerns (design changes, feasibility studies, etc)*	*Evaluate amenities on both sides of SR 4 – will either side draw the other?* *Analyze minutes from community workshops* " "	*Use above asset mapping, resident survey/interviews* *MIG, City of Pittsburg, BART*	*TALC* *HIP, CCISCO*
Community Violence Violent Crime Property Crime		*-What safety precautions is eBART, developer, city employing? What about for vulnerable populations (disabled, seniors)?* *-Will the project increase or decrease crime rates in the neighborhood surrounding eBART?*	*Map baseline crime rates in area* *Identify "dark zones", dangerous places. Ground truth with residents.* *Identify physical design strategies for crime prevention.* *Identify specific crime issues around BART stations*	*Pittsburg Police Dept, FIB Uniform Crime Statistics?* *Observations, focus group with residents.* *CPTED literature, other transit village strategies*	*CCISCO, TALC, HIP* *Residents, HIP* *HIP*

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
			Map current liquor store locations and crime. Identify liquor licensing plans of City.	*BART police?, lit review* *Pittsburg Alcohol & Beverage Control*	*HIP* *HIP*
Housing Housing size Housing affordability Housing quality Location quality Stable Housing tenure	Transit Village: 1,000 residential units. Civic Center: 370 residential units. Indust/Mixed District: unidentified amount of mixed use w/ emphasis on live/work lofts. Total: At least 1,370 new units. ??% of units will be affordable. ?? design of buildings Population expected to grow in East CCC by 40,000 additional households and 65,000 additional jobs by 2025.	*Does the design of the RR Ave eBART housing promote and protect health by via materials choices, ventilation systems, and site location and orientation?* *Are there clear guidelines/zoning for industrial/mixed use around housing? Are there clear guidelines for live/work lofts? Will locating uses closely impact health?* *Is the location of the housing safe for residents, neighbors and visitors, including seniors, children, and health sensitive populations?* *Will the eBART transit village help to meet the housing needs of area*	*Assess building materials and design as to ventilation systems and energy efficiency.* *Gather information about # of units, # affordable, size of units, on-site amenities.* *Map industrial & residential zoning codes* *Chart existing industrial uses and their impacts on health* *Gather specific disease rates (especially asthma and allergies, injuries)* *Map injuries and illnesses related to housing design* *AFFORDABLE*	*RR Ave. eBART development plans for housing, literature review, expert consultation* *" "* *Planning Dept* *Literature/ report review* *Hospitalization data* *Literature review*	*TALC, HIP* *City of Pittsburg, HIP* *HIP* *Contra Costa Health Services* *HIP*

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
		residents with regard to size, quality, and affordability? Will it meet these needs for Pittsburg residents? Regional area residents? *Will RR Ave. eBART lead to displacement of people, either directly or indirectly?* *Will housing design and capacity impact social cohesion in the area?* *Is the location of the housing accessible to resident needs, such as retail, parks, and schools?* *New question: is the development taking place in underutilized land (i.e., it's not taking land that could be used for parks, industrial uses, etc)?*	*HOUSING WAS NOT LISTED AS A HIGH PRIORITY IN THE PITTSBURG SCOPING SESSION – HIP has used methods to assess this in the past but best go with local and current knowledge* *Chart RR Ave eBART housing design (size of units, affordability) and typical unit size and cost for residents in the area* *Map routes from proposed housing to amenities for social sohesion.*	*But use data and conclusions from existing work to assess housing against demand for affordable housing* *TALC, MIG, MTC study*	*NPH, TALC, CCISCO, other affordable housing groups* *TALC, HIP*
Parks and Natural Space Quality, proximity, and capacity of parks	Two city parks currently in project area. Civic Center area would incorporate public plazas and street tress.	*Are existing and area park resources sufficient to enable minimal physical activity requirements of residents?* *Are there safe walking and*	*Interpret county health dept data profiles on physical activity in the project area* *Assess inequities in park access for the area relative to*	*County Health data profiles, CDC recommendations for physical activity* *Parks and Rec, General*	*Contra Costa Health Dept*

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
		biking routes to local parks? *Will trees, rooftop gardens or other natural elements be integrated into the different parts of the development?*	*the city* *Enumerate and evaluate park size, amenities, and programs. Assess quality of area parks* *Observe if parks are being used.* *Map "dark zones" or dangerous areas in parks, walking paths to parks from residential areas* *Survey residents to find out if parks are used.*	*Plan* *Field visits and interviews w/ park staff, users* *Observations* *Existing maps from MIG, Parks & Rec, Planning, Google maps* *Residents*	*HIP* *HIP, CCISCO, residents* *HIP* *HIP, TALC* *HIP*
Retail Goods and Public Services, including food resources Quality and proximity of financial institutions Quality and proximity of different food sources	Transit Village: 340,000 sq feet of new retail space along RR Ave; 260,000 sq ft of comm./indust flex. Civic Center: 150,000 sq ft of comm development. RR Ave Retail district: high intensity mixed use, community comm use. eBART Railroad Specific Plan supposed to have market analysis	*Will area residents have adequate access to quality food resources?* *Will RR Ave. eBART contribute in some way to the area's diversity of retail goods and services?* *Will an adequate mix of goods and services be accessible within walking distance or public transit?* *Will the transit village*	*Interpret county health dept data profiles the relative prevalence of nutrition related illness in the project area.* *Map area retail food resources – positive (grocery stores, banks) as well as negative (fast food, liquor).* *Map existing retail establishments, including banks.* *Map existing health care*	*Contra Costa Health Dept.* *Econ Dev., Food advocates in the area, Project LEAN, Prevention Institute?* *Econ Dev. – City of Pittsburg; field observations*	*TALC, HIP* *CCISCO, HIP* *HIP, residents*

Social and Environmental Health Determinants	Facts About the Decision at Hand	Candidate Questions for Health Impact Assessment	HIA Research Methods and Tasks	Source of data	Who
Quality and proximity of childcare services Quality and proximity of health services	In Civic Center area, there is 115,000 sq ft of civic uses including City Hall and new County Courthouse.	*provide or contribute to adequate access to public services (childcare, health care, other??)? Will these public services be within walking distance or have public transit access?*	*options.* *Assess area retail needs* *Assess adequacy of development's retail recruitment plan* *Research small business programs through Economic Development.*	*" "* *Maps, resident interviews* *MIG, TALC* *City of Pittsburg*	*HIP, residents* *TALC, HIP* *HIP*

Appendix II
Pittsburg Railroad Avenue Specific Plan Health Impact Assessment

Occupational Profile for Pittsburg, California
Estimated hourly living wage is $20.82/hour

Occupational Title	Hourly Wage	Estimated projection of employment change from 2004-2014 (%)	Education & Training Levels
MANUFACTURING			
First-Line Supervisors/Managers of Production and Operating Workers	$25.17	7.9	Work Experience
Electrical and Electronic Equipment Assemblers	$12.76	-1.3	30-Day OJT
Structural Metal Fabricators and Fitters	$19.39	11.3	1-12 Month OJT
Team Assemblers	$11.99	8.7	1-12 Month OJT
Meat, Poultry, and Fish Cutters and Trimmers	$12.82	17.3	30-Day OJT
Computer-Controlled Machine Tool Operators, Metal and Plastic	$14.89	8.3	1-12 Month OJT
Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	$18.12	-9.1	1-12 Month OJT
Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	$13.25	-4.3	1-12 Month OJT
Printing Machine Operators	$20.11	-4.3	1-12 Month OJT
Power Plant Operators	$30.14	0.0	12-Month OJT
Chemical Plant and System Operators	$23.13	-16.3	12-Month OJT
Inspectors, Testers, Sorters, Samplers, and Weighers	$16.57	2.8	1-12 Month OJT
Packaging and Filling Machine Operators and Tenders	$14.50	-6.3	30-Day OJT

Occupational Title	Hourly Wage	Employment Change (%)	Education & Training Levels
RETAIL			
Purchasing Agents, Except Wholesale, Retail, and Farm Products	$28.51	4.6	BA/BS Degree
Sales Managers	$48.25	14.3	BA/BS + Experience
First-Line Supervisors/Managers of Retail Sales Workers	$17.46	2.4	Work Experience
Cashiers	$9.48	2.5	30-Day OJT
Retail Salespersons	$10.35	15.2	30-Day OJT
Advertising Sales Agents	$23.68	10.0	1-12 Month OJT
Sales Representatives, Services, All Other	$25.75	16.4	1-12 Month OJT
Sales and Related Workers, All Other	$19.57	10.8	1-12 Month OJT
FINANCE, INSURANCE, REAL ESTATE			
Bill and Account Collectors	$18.02	8.3	30-Day OJT
Payroll and Timekeeping Clerks	$19.70	11.9	1-12 Month OJT
Tellers	$12.31	5.7	30-Day OJT
Brokerage Clerks	$20.47	1.9	1-12 Month OJT
Customer Service Representatives	$17.01	16.6	1-12 Month OJT
Insurance Claims and Policy Processing Clerks	$20.69	8.0	1-12 Month OJT

Occupational Title	Hourly Wage	Employment Change (%)	Education & Training Levels
TRANSPORTATION, WAREHOUSING, UTILITES			
First-Line Supervisors/Managers of Transportation and Material-Moving Machine and Vehicle Operators	$27.16	10.4	Work Experience
Bus Drivers, School	$15.13	9.3	30-Day OJT
Driver/Sales Workers	$8.75	12.4	30-Day OJT
Truck Drivers, Heavy and Tractor-Trailer	$19.71	8.3	1-12 Month OJT
Truck Drivers, Light or Delivery Services	$13.46	8.9	30-Day OJT
Taxi Drivers and Chauffeurs	$11.87	14.4	30-Day OJT
Motor Vehicle Operators, All Other	$12.66	11.2	30-Day OJT
Transportation Inspectors	$41.31	0.0	Work Experience
Conveyor Operators and Tenders	$14.91	5.7	30-Day OJT
Crane and Tower Operators	$22.37	12.5	1-12 Month OJT
Packers and Packagers, Hand	$8.85	7.4	30-Day OJT

EDUCATION			
Social Sciences Teachers, Postsecondary, All Other	$49.79	15.0	PhD Degree
Vocational Education Teachers, Postsecondary	$31.23	16.4	Post-Secondary Voc-Ed
Preschool Teachers, Except Special Education	$13.42	19.9	Post-Secondary Voc-Ed
Adult Literacy, Remedial Education, and GED Teachers and Instructors	$24.19	6.2	BA/BS Degree
Self-Enrichment Education Teachers	$18.66	11.5	Work Experience
Teachers and Instructors, All Other	$21.51	11.0	BA/BS Degree
Library Technicians	$16.48	3.8	30-Day OJT
Education, Training, and Library Workers, All Other	$21.63	12.2	BA/BS Degree

Occupational Title	Hourly Wage	Employment Change (%)	Education & Training Levels
HEALTHCARE PRACTIONERS			
Dietitians and Nutritionists	$29.26	11.8	BA/BS Degree
Pharmacists	$53.28	19.6	LLD/MD Degree
Physician Assistants	$41.76	24.8	BA/BS Degree
Registered Nurses	$39.85	20.4	AA Degree
Occupational Therapists	$36.10	16.2	BA/BS Degree
Physical Therapists	$39.52	17.4	MA/MS Degree
Dental Hygienists	$43.63	12.1	AA Degree
Emergency Medical Technicians and Paramedics	$10.66	4.9	Post-Secondary Voc-Ed
Pharmacy Technicians	$17.42	20.0	1-12 Month OJT
Surgical Technologists	$22.95	17.5	Post-Secondary Voc-Ed
Veterinary Technologists and Technicians	$15.82	39.2	AA Degree
Licensed Practical and Licensed Vocational Nurses	$24.76	8.9	Post-Secondary Voc-Ed
Health Technologists and Technicians, All Other	$18.80	9.3	Post-Secondary Voc-Ed
HEALTH CARE SUPPORT			
Home Health Aides	$9.54	47.2	30-Day OJT
Nursing Aides, Orderlies, and Attendants	$13.06	16.4	30-Day OJT
Physical Therapist Assistants	$25.04	25.0	AA Degree
Physical Therapist Aides	$14.56	15.4	30-Day OJT
Massage Therapists	$23.19	14.7	Post-Secondary Voc-Ed
Dental Assistants	$19.58	10.9	1-12 Month OJT
Medical Assistants	$15.02	20.7	1-12 Month OJT
Medical Equipment Preparers	$18.79	11.5	30-Day OJT
Medical Transcriptionists	$18.45	8.7	Post-Secondary Voc-Ed
Pharmacy Aides	$14.04	12.0	30-Day OJT

Occupational Title	Hourly Wage	Employment Change (%)	Education & Training Levels
PROFESSIONAL			
Biochemists and Biophysicists	$34.94	14.0	PhD Degree
Zoologists and Wildlife Biologists	$33.47	18.2	MA/MS Degree
Biological Scientists, All Other	$32.81	20.6	BA/BS Degree
Environmental Scientists and Specialists, Including Health	$31.29	9.8	BA/BS Degree
Hydrologists	$34.38	40.0	MA/MS Degree
Physical Scientists, All Other	$36.99	12.0	BA/BS Degree
Market Research Analysts	$34.12	15.4	MA/MS Degree
Survey Researchers	$21.14	27.3	MA/MS Degree
SOCIAL SERVICES			
Substance Abuse and Behavioral Disorder Counselors	$16.67	21.1	MA/MS Degree
Educational, Vocational, and School Counselors	$29.84	8.1	MA/MS Degree
Marriage and Family Therapists	$17.66	8.7	MA/MS Degree
Mental Health Counselors	$21.41	13.5	MA/MS Degree
Rehabilitation Counselors	$14.52	9.1	MA/MS Degree
Child, Family, and School Social Workers	$18.52	14.8	BA/BS Degree
Medical and Public Health Social Workers	$26.95	12.3	BA/BS Degree
Health Educators	$21.74	11.5	MA/MS Degree
Probation Officers and Correctional Treatment Specialists	$38.74	6.4	BA/BS Degree
Social and Human Service Assistants	$14.74	21.3	1-12 Month OJT

Occupational Title	Hourly Wage	Employment Change (%)	Education & Training Levels
CONSTRUCTION			
First-Line Supervisors/Managers of Construction Trades and Extraction Workers	$34.51	9.4	Work Experience
Boilermakers	$31.97	8.3	12-Month OJT
Stonemasons	$22.07	11.8	12-Month OJT
Carpenters	$25.99	15.4	12-Month OJT
Carpet Installers	$20.15	8.4	1-12 Month OJT
Floor Sanders and Finishers	$15.52	10.0	1-12 Month OJT
Tile and Marble Setters	$16.28	24.2	12-Month OJT
Cement Masons and Concrete Finishers	$23.17	16.1	12-Month OJT
Construction Laborers	$20.81	2.7	1-12 Month OJT
Painters, Construction and Maintenance	$18.34	11.7	1-12 Month OJT
Pipelayers	$25.05	10.6	1-12 Month OJT
Plasterers and Stucco Masons	$25.76	7.5	12-Month OJT
Reinforcing Iron and Rebar Workers	$22.07	17.5	12-Month OJT
Helpers--Carpenters	$12.11	14.7	30-Day OJT
Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons	$17.23	17.6	30-Day OJT
Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	$15.85	5.6	30-Day OJT
Helpers--Roofers	$10.35	20.0	30-Day OJT

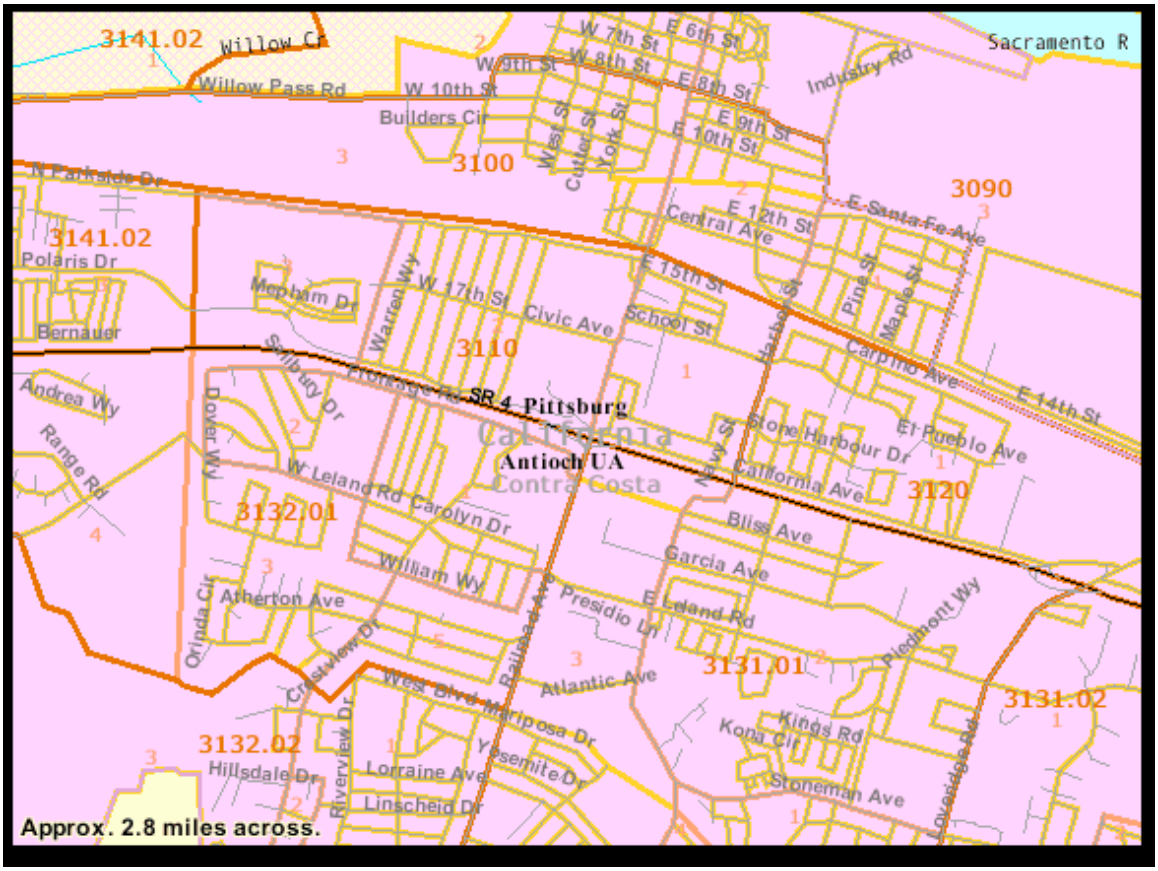
Occupational Title	Hourly Wage	Employment Change (%)	Education & Training Levels
PUBLIC ADMINISTRATION			
First-Line Supervisors/Managers of Office and Administrative Support Workers	$24.36	1.1	Work Experience
Bill and Account Collectors	$18.02	8.3	30-Day OJT
Payroll and Timekeeping Clerks	$19.70	11.9	1-12 Month OJT
Tellers	$12.31	5.7	30-Day OJT
Brokerage Clerks	$20.47	1.9	1-12 Month OJT
Credit Authorizers, Checkers, and Clerks	$21.81	-43.5	30-Day OJT
Customer Service Representatives	$17.01	16.6	1-12 Month OJT
Eligibility Interviewers, Government Programs	$18.26	-16.7	1-12 Month OJT
Interviewers, Except Eligibility and Loan	$19.27	12.2	30-Day OJT
Order Clerks	$15.27	-27.3	30-Day OJT
Human Resources Assistants, Except Payroll and Timekeeping	$19.99	8.6	30-Day OJT
Office and Administrative Support Workers, All Other	$13.43	4.3	1-12 Month OJT
Insurance Claims and Policy Processing Clerks	$20.69	8.0	1-12 Month OJT
Mail Clerks and Mail Machine Operators, Except Postal Service	$13.50	-42.0	30-Day OJT
Office Clerks, General	$14.09	0.1	30-Day OJT
Computer Operators	$18.84	-37.6	1-12 Month OJT
Data Entry Keyers	$13.74	-8.1	1-12 Month OJT
Word Processors and Typists	$16.07	-23.2	1-12 Month OJT
Executive Secretaries and Administrative Assistants	$21.00	6.5	1-12 Month OJT
Legal Secretaries	$23.39	17.4	Post-Secondary
Cargo and Freight Agents	$21.29	-14.4	1-12 Month OJT
Police, Fire, and Ambulance Dispatchers	$28.14	2.7	1-12 Month OJT
Postal Service Clerks	$23.36	-3.4	30-Day OJT
Postal Service Mail Sorters, Processors, and Processing Machine Operators	$21.13	-4.4	30-Day OJT
Production, Planning, and Expediting Clerks	$22.04	5.4	30-Day OJT

Abbreviations For Education & Training Levels:

(1) LLD/MD Degree=First Professional Degree
(2) PhD Degree=Doctoral Degree
(3) MA/MS Degree=Master's Degree
(4) BA/BS + Experience=Bachelor's Degree or Higher and Some Work Experience
(5) BA/BS Degree=Bachelor's Degree
(6) AA Degree=Associate Degree
(7) Post-Secondary Voc-Ed=Post-Secondary Vocational Education
(8) Work Experience=Work Experience in a Related Occupation
(9) 12-Month OJT=Long-Term On-the-Job Training
(10) 1-12 Month OJT=Moderate-Term On-the-Job Training
(11) 30-Day OJT=Short-Term On-the-Job Training

Appendix III
Pittsburg Railroad Avenue Specific Plan HIA

Pittsburg Demographic Analysis by Block Group



Pittsburg Map including Census Tracts and Block Groups

Census Tracts to the North of SR 4

Census Tract 3090				
Block Groups	1	2	3	Average for Census Tract
Average Household size	2.14	3.02	2.97	
% Owner occupied	56%	61%	81%	63%
Race				
White	55%	24%	47%	49%
Black	26%	54%	31%	31%
Asian	7%	6%	6%	7%
Latino	11%	21%	18%	14%
Income				
Avg. Median Household Income	$60,344	$45,714	$72,266	$60,615

Census Tract 3100				
Block Groups	1	2	3	Average for Census Tract
Average Household size	2.97	3.46	3.94	
% Owner occupied	62%	34%	34%	44%
Race				
White	58%	38%	36%	44%
Black	17%	22%	19%	19%
Asian	2%	4%	2%	2%
Latino	33%	49%	55%	46%
Income				
Avg. Median Household Income	$38,300	$29,300	$40,931	$37,401

Census Tract 3110				
Block Groups	1	2	3	Average for Census Tract
Average Household size	3.56	3.53	3.4	
% Owner occupied	51%	67%	49%	%
Race				
White	41%	45%	27%	43%
Black	18%	15%	33%	22%
Asian	3%	10%	21%	21%
Latino	43%	45%	24%	24%

Income				
Avg. Median Household Income	$38,500	$40,558	$48,542	$41,681

Census Tracts South of SR 4

Census Tract 3131.01					
Block Groups	1	2	3	4	Average for Census Tract
Average Household size	3.37	2.6	2.3	2.94	
% Owner occupied	79%	38%	57%	81%	54%
Race					
White	44%	51%	73%	70%	58%
Black	24%	26%	9%	16%	20%
Asian	17%	8%	6%	4%	9%
Latino	21%	16%	21%	18%	19%
Income					
Avg. Median Household Income	$58,947	$33,317	$28,125	$36,667	$36,466

Census Tract 3110						
Block Groups	1	2	3	4	5	Average for Census Tract
Average Household size	3.6	3.8	3.9	3.6	3.4	
% Owner occupied	47%	78%	84%	88%	77%	71%
Race						
White	30%	51%	42%	57%	59%	44%
Black	35%	17%	22%	8%	10%	22%
Asian	10%	9%	15%	14%	5%	12%
Latino	32%	34%	25%	28%	40%	30%
Income						
Avg. Median Household Income	$30,469	$65,536	$70,600	$60,000	$45,917	$54,656