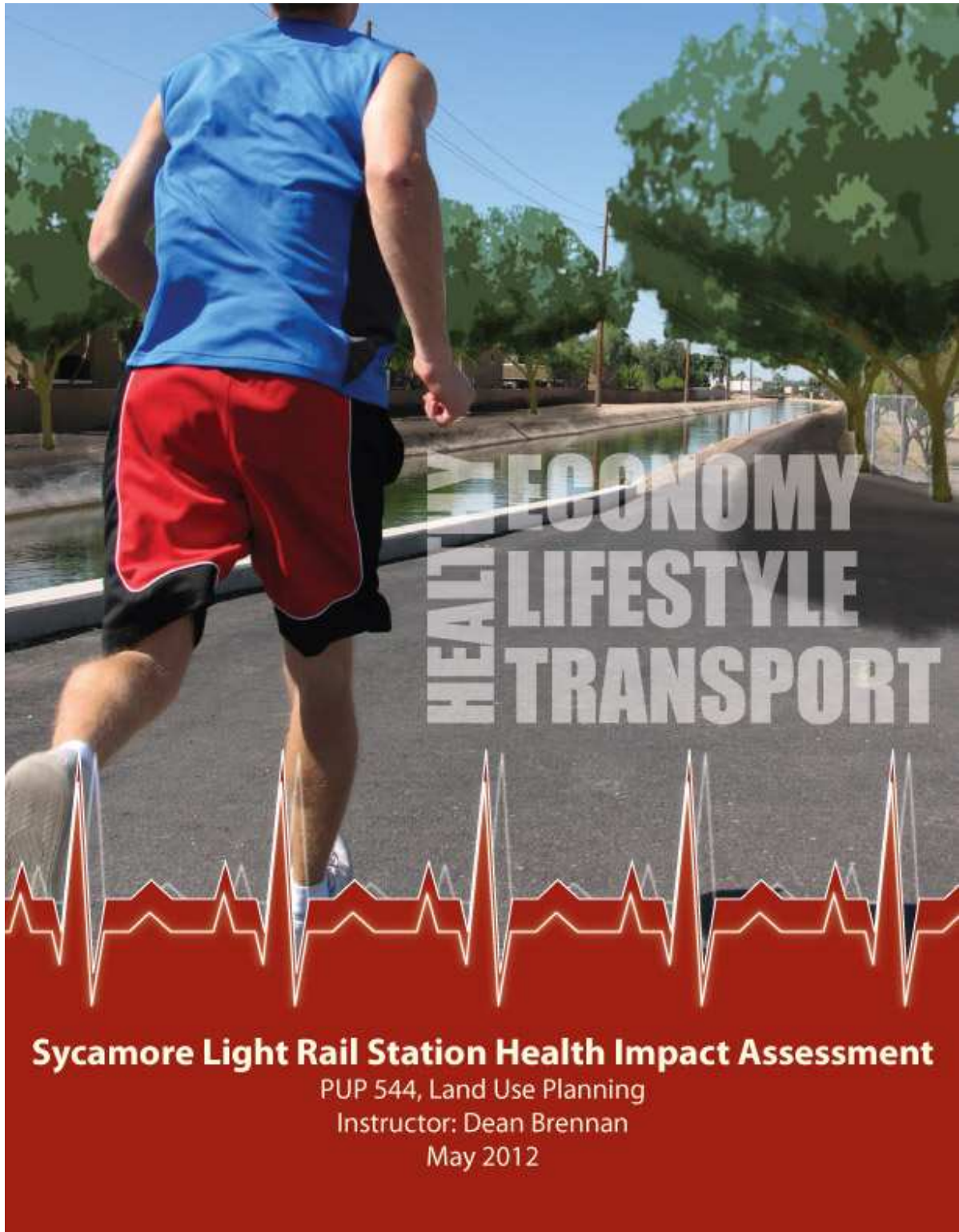

Sycamore Light Rail Station HIA



Sycamore Light Rail Station Health Impact Assessment

PUP 544, Land Use Planning

Instructor: Dean Brennan

May 2012

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EXECUTIVE SUMMARY

This Health Impact Assessment (HIA) is an important step forward in the process of introducing HIAs as an essential tool for addressing the healthy community components of policies, projects and programs in Arizona. Although HIAs can be used for a variety of projects, programs, and policies, it is most frequently used for land planning and transportation projects. The Sycamore Light Rail Station HIA is a combination of both land use and transportation planning and examines how future development projects in the light rail corridor can positively impact current and future residents of the adjacent neighborhoods. This HIA is unique for several reasons.

Report Structure – Although the preparation of the HIA followed the “Six Steps” , the structure of the report focused on specific topic areas that were identified as being critical for the Sycamore Station Study Area. The topic areas are: Healthy Economy; Healthy Lifestyle; Healthy Transportation.

Social Equity – Although it was not initially identified as a critical issue when the process of preparing the HIA was started, it rapidly became clear that the major issue impacting the Sycamore Station Study Area were the negative characteristics of the physical environment and the economic status of area residents.

In the process of identifying potential health issues, the student teams consistently identified the root cause for the issues as social equity. Social equity is often defined in the context of community sustainability as equal opportunity, in a safe and healthy environment. Whether it is access to health care, access to healthy lifestyle facilities, access to healthy food, or dealing with issues relating to the Urban Heat Island Effect, the basic issues are most impacted by lack of adequate income.

This is a unique HIA because it is not based on a specific project, but based on the recognition that there will be future projects. The HIA grew out of the efforts by the Sustainable Communities Group to provide incentives for the construction of Transit Oriented Development (TOD) in the light rail corridor. The HIA serves as a model for HIAs to be conducted along other portions of the light rail corridor.

Chapter 1-Introduction

What is a HIA?

A Health Impact Assessment (HIA) is an analytical approach to determine how a proposal (project, program, policy) will impact public health. A HIA is any combination of qualitative and quantitative methods used to assess the population health consequences of a policy, project or program that does not have health as its primary objective (APA 2008). At the end of the assessment recommendations to increase the positive and decrease the negative impacts of the proposal are produced to inform decision makers.

HIAs have been used in other countries in Europe for many years and are becoming more recognized in the United States. In recognition that many policies, plans, and projects outside of the health arena have important health implications, groups in the United States have started to conduct HIAs in the last ten years to evaluate and support the consideration of health in decision-making processes. A health impact assessment may be defined as “a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program or project on the health of a population and the distribution of those effects within the population. An HIA identifies appropriate actions to manage those effects” (CDC 2010).

A HIA provides a common-sense and evidence-based approach, to ensure that potential impacts of policies and plans are appropriately addressed before final decisions are made. HIAs, such as this one conducted for the Sycamore Station Study Area (SSSA) focuses on the social determinants of health. These have been defined by the World Health Organization as the conditions in which people are born, grow, live, work and age, including the health system. These circumstances are shaped by the distribution of money and resources at global, national and local levels, which are themselves influenced by policy choices. A wide variety of evidence is collected, using the best possible methods.

Preparation of a HIA is comprised of the following six steps:

1-Screening - Determines the need for, and value of, a HIA.

2-Scoping - Determines the project partners; health and social determinants requiring assessment; methodology for the analysis; and a research and work plan.

3-Assessment - Provides an analysis of existing conditions; an assessment of the policy, project, or program under study; and an evaluation of the potential impacts of the policy, project, or program on existing conditions.

4-Recommendations - Develops a set of recommendations for protecting and promoting specific health outcomes.

5-Reporting - Develops a report for communicating findings and recommendations.

Sycamore Light Rail Station HIA

6-Monitoring- Tracks the impact of the HIA on the proposed policy, program, or project, and the impacts of the final policy, program, or project on existing and future conditions.

The role of Health Impact Assessments goes beyond collecting and analyzing data on existing health disparities and impacts on health. The HIA process can be an instrument to engage and empower communities, provide opportunities for community engagement, ideas and leadership, with the end goal of achieving a participatory research process that reflects and resonates with resident concerns and aspirations.

Sycamore Light Rail Station Study Area



Sycamore Light Rail Station

Sycamore Station Study Area HIA Project – Value and Need

The Sycamore Station Study Area HIA follows the normative steps of Screening, Scoping, Assessment, Recommendations, Reporting, and Monitoring. It provides the City of Mesa with a new health-oriented “template” that can be utilized to supplement planning efforts at the levels of the General Plan and sub-area plans. The SSSA HIA Project answers the need for City of Mesa planning work to be expanded to consider the impact of projects, codes and guidelines on the health of the community. The SSSA HIA plan provides a socially-oriented set of assessments and planning recommendations that can “fill-in” the health-related gaps that exist in related plans.

Sycamore Light Rail Station HIA

Sycamore Station Study Area (SSSA) Overview

The SSSA is located west of Downtown Mesa and is bound on the north by University Drive, on the south by Broadway Road, on the east by Alma School and on the west by the Tempe Canal (Figure 1.1.1). Early history of this area was created by the Hohokam people who were able to farm this area through irrigation provided by the canal systems they built by hand. Today, many of the highly engineered canal systems in Mesa and the broader metro area follow the paths of many of these early Hohokam waterways, with protected archeological resources found at the Mesa Grande site that is close to the Sycamore Station Study area. Other early settlers originated from the Church of Jesus Christ of Latter-day Saints and sought the same things that brought the Hohokam to the area, arable land and water.

The Standage Farm, located along Main Street between Alma School and Dobson Road, represented early settlement efforts of the Pew, Rogers and Standage families that started in 1880 (West Main Street Plan, 2007) and was called Stringtown. The Standage Farm is now occupied by the EVIT campus, with few remaining buildings or resources from this era and the Stringtown settlement remaining, other than the current Landmark Church that was Stringtown's fourth ward church.

The SSSA began to change in the 1940's to 1950's from an agricultural base to a primary residential base, with the Main Street corridor developing into a pedestrian-oriented, small town street. After WWII, Main Street experienced faster growth due to designation as part of historic Route 60 and due to the increased traffic from travelers to the West. This traffic led to further development of Main Street as a primarily commercial route marked by development of a large percentage of lodges, motels and RV parks that serviced the Route 60 tourist traffic. Several of these post WWII motels and trailer parks still exist along Main Street and within the SSSA. As stated in the West Main Street Area Plan (2007), "West Main Street still has the rich history of the adventurous American family traveling across the country looking, admiring, and occasionally making it home".

The SSSA HIA work is set within a cascading group of City of Mesa plans and planning efforts that range from the 2005 Mesa General Plan to the West Main Street Area Plan (2007), with cross correlations with the Mesa Central Main Plan that includes a recent Form-Based Zoning component. The 2005 Mesa General Plan called for sub-area plans to be developed that would allow for context specific analysis and planning work to meet the unique needs of specific areas. The West Mesa Area Plan provides one answer to that need, with the SSSA HIA plan providing another more socially-oriented set of assessment work and planning recommendations that can fill-in the health-related gaps found in the other plans.

The West Main Street Area Plan boundaries include a portion of the Mesa Grande Sub-Area and the Central Broadway Sub-Area identified within the 2005 General Plan. The West Main Street Area Plan boundaries extend from University Drive on the north, Broadway Road on the south, Country Club Drive on the east and the Mesa/Tempe City limits on the west formed by the Tempe Canal. The SSSA boundaries match the West Main Street boundaries on the north, south and west, with a more restrictive boundary on the east defined by Alma School Road versus the Country Club Road boundary as used in the West Main Study Area Plan. See Figure 1.1.1 for the Study Area boundaries and commercial land use coverage.

Sycamore Light Rail Station HIA

Commercial Land Uses

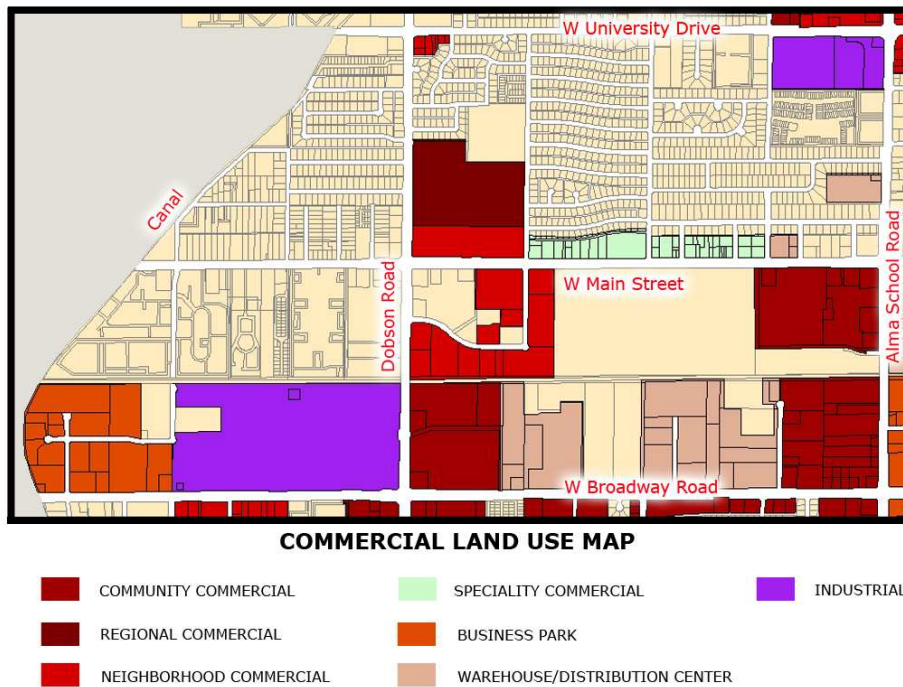


Figure 1.1.1 Commercial Land Use Map

The SSSA is a roughly rectangular 2 square mile area supporting an inner-urban community that includes predominant land use areas of single family and multi-family residential, a broad range and percentage of commercial and industrial uses, limited areas of institutional land use, and a marked lack of open space within the Study Area. The SSSA is divided roughly into north and south sections by Main Street that provides the border between the northern single family neighborhoods and the south of Main multifamily and commercial zones. See Figure 1.1.2 for the northern single family residential zone.

South of the rail line lies halfway between Main Street and Broadway Road, includes industrial and commercial zoned parcels spanning from east to west. The marked separation of land uses within the SSSA contributes to fragmentation of the area and disadvantages walkability, bikeability and the community's social and economic cohesion. The fragmentation and separation of land use areas create barriers and uneven conditions for many issues addressed under the HIA study including ready access to health care services, food outlets, open space, vegetation level benefits and recreation.

Sycamore Light Rail Station HIA

Residential Land Uses

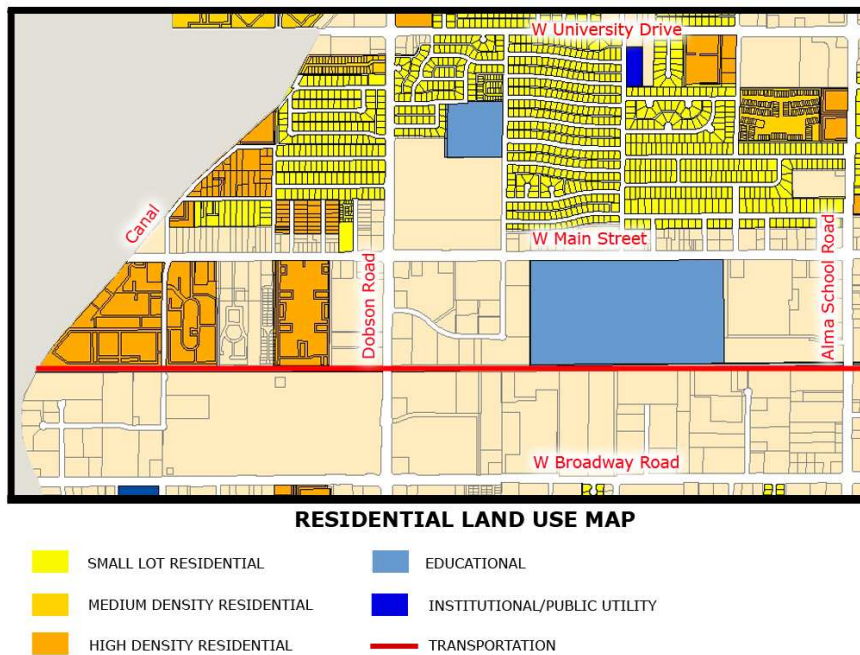


Figure 1.1.2 Residential Land Use Map

The West Main Street Area Plan identified a vision for the West Main Street area that can be applied and extended to help define the planning vision for the SSSA under this HIA study effort. The West Main Street Area Plan vision includes the following development goals relating to further development of a “close knit” community:

- Capture the community’s vision for area to reflect impact of light rail
- Support moderate density and small town feel
- Create vibrant residential neighborhoods, and diverse, high quality housing stock
- Support economic diversity
- Provide pedestrian and transit friendly multi-modal systems
- Develop open space and recreational facilities

The vision and goals can be directly applied to the SSSA planning work and visioning, with the broader HIA goals of this study calling for support of a Healthy Economy, Healthy Transportation system and Healthy Lifestyles for area residents as important overlays for the West Main Street planning efforts. The West Main Street Area Plan development strategies are defined in relationship to Transit Oriented Development, TOD Station Areas, TOD Corridor Areas, Neighborhood Opportunity Areas and the Industrial Corridor, all of which are directly applicable to the Sycamore Station Study Area. Development strategies focus on transportation design, historic preservation, open space and recreation, public infrastructure, placemaking and urban design. Development standards cited throughout the document address issues relating strongly to HIA planning:

- People and Values

Sycamore Light Rail Station HIA

- Integrated Land Uses
- Venues and Common Places
- Street Life
- Integrating Old and New
- Community Involvement

The Sycamore Station Study Area HIA plan focuses on the assessment categories of Healthy Economy, Healthy Lifestyle and Healthy Transportation in order to address the health related gaps in earlier studies. The HIA Study asks questions about the health of the Sycamore Station Study Area community in relationship to the health-related issues of:

- Access to Employment
- Access to Healthy Lifestyle Facilities
- Access to Healthcare Services
- Access to Healthy Foods
- Mitigation of Urban Heat Island Effects
- Mitigation of Transportation Related Noise and Light
- Support for Walkable and Bikeable Environments

Why Mesa Should Focus on Health

As this report will show, the effects of poor health are numerous and include chronic diseases from obesity and diabetes to cancer and cardiovascular disease. It is vital to the future of Mesa that the city and residents work together to create neighborhoods that give people every opportunity to lead healthy and productive lives. There are many different ways to promote health within a community. Wider sidewalks with more parks and open spaces promote physical activity, which helps to stem the issues associated with a sedentary lifestyle. In conjunction with increased physical activity, the availability of healthy food options such as community gardens, farmers markets and urban agriculture are important in combating the rising rates of obesity and diabetes. Community centers are also needed to give residents a place to be active, to socialize and coordinate local events.

Health is an issue that affects every community and every individual within that community, and Mesa is no exception. The ability of a person to fully experience and enjoy life is dependent on their physical and mental health. It is imperative that the residents of Mesa encourage neighborhood development that puts a premium on the health of its residents. The Sycamore Light Rail Station presents an opportunity for the residents of, not only the surrounding neighborhood, but also the entire West Mesa region to re-evaluate the area with an emphasis on the health of the community.

Social Equity

All of the issues addressed in this report relate back to the main theme of social equity. Social equity is the idea that all people, regardless of culture, background, or socioeconomic standing, be afforded the same access to amenities and a high quality of life. The SSSA is currently lacking in basic amenities such as healthy food options, open spaces, and safe walkable and bikeable pathways. As a community, it is our responsibility to promote social equity across all of our neighborhoods.

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Components of the Report

This HIA is a detailed report of the current state of the health and welfare of residents around the Sycamore Light Rail Station in Mesa, AZ and provides recommendations for improving health indicators. Chapter two will discuss screening and scoping procedures as well as how an HIA can add value to a community. The scoping portion will analyze the framework associated with this HIA.

This HIA was generated with the intent of creating a holistic approach to health in the study area by analyzing three main categories that address health related concerns. The three categories discussed are Healthy Economy, Healthy Lifestyle, and Healthy Transportation. Each section will review several health indicators related to the category, as well as provide recommendations based on a detailed analysis.

Chapter Three focuses on Healthy Economy and it begins with an overview of demographic data and then reviews access to employment and property ownership. Chapter Four focuses on Healthy Lifestyle issues and describes current health conditions, access to healthcare services, food deserts and the Urban Heat Island Effects. Chapter Five focuses on Healthy Transportation and reviews environmental factors such as noise and light, as well as walkability and bikeability.

The conclusion of this report will include a Recommendations Matrix that includes all recommendations set forth in chapters Three, Four and Five for easy reference by the reader, as well as an Implementation Matrix providing examples of how Mesa can achieve these goals. Monitoring and Evaluation are important steps to every planning process and will be reviewed in the conclusion.

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Sycamore Light Rail Station



Beverly Park



Community Garden

Chapter 2 - HIA Process

Health Impact Assessment (HIA) is commonly defined as “a combination of procedures, methods, and tools by which a policy, program, or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population” (1999 Gothenburg consensus statement).

The purpose of Health Impact Analysis(HIA) is to inform decision-makers before they make a decision and HIAs are most often carried out before a decision is made or a proposal is implemented.

A HIA assesses how proposed projects, plans, and policies affect issues – such as housing, employment, transportation, access to public and retail services, social cohesion, education, and incarceration – and how those impacts affect health outcomes and health inequities. Health is a value we all share. We experience health personally and collectively. Health is one of the few indicators of quality of life and well-being and disparities in health outcomes can lead to moral outrage.

A HIA can be used to evaluate objectively the potential health effects of a project or policy before it is built or implemented. It can provide recommendations to increase positive health outcomes and minimize adverse health outcomes. A major benefit of the HIA process is that it brings public health issues to the attention of persons who make decisions about areas that fall outside of traditional public health arenas, such as transportation or land use. Ensure that health and health disparities are considered in decision-making using an objective and scientific approach, and engage stakeholders in the process.

HEALTH IMPACT ASSESSMENT SIX STEPS

There are Six Steps in the process of preparing a HIA:

Step 1 SCREENING: Determines the need and value of an HIA

The Sycamore light rail station is the first light rail stop in the city of Mesa. The current extension of this route will bring the light rail further into the city, including a stop in downtown Mesa. An HIA provides the city of Mesa with a useful tool for assessment as additional stations are established along the existing line. The plans for the area also include the development of a TOD at the Sycamore station which will increase ridership and pedestrian traffic around the light rail. Determining the health benefits and detriments in the study area can provide guidance to mitigate future light rail stations. It also can assist in the development around future stations as the line continues deeper into Mesa. After reviewing of the study area it becomes apparent that an HIA is justified.

Step 2 SCOPING: Determines which health impacts to evaluate, analysis methods, and a workplan

Following is a combination of public input received during the preparation of the West Main Street Area Plan and research performed during the preparation of this HIA.

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Public Outreach

Early discussions about redeveloping the West Main Street corridor and its surrounding neighborhoods occurred during the Mesa 2025 General Plan update process. Due to the opportunity for Transit Oriented Development (TOD) projects in West Mesa, similar to what has already started in Phoenix and Tempe; City Council gave directions in 2005 to the planning staff to prepare an area plan for the West Main Street Area. The West Main Street Area Plan was adopted on December 3, 2007.

After consulting with community leaders and representatives of Mesa Grande Community Alliance and West Mesa Community Development Corporation the study area was established. Throughout this planning process, Staff has worked with the community representatives who formed the Planning Advisory Committee (PAC).

Besides regular meetings with PAC, Planning Staff held two community wide meetings, one Expert Panel Discussion and three public deliberation forums to request input from the area residents, local businesses, and property owners. All agendas, minutes, documents and related information including various presentation materials were also posted on the Planning Division's web site (City of Mesa, 2007).

West Main Street Area Plan Planning Process



West Main Street is a place where history is respected and embraced along with excitement for changes that will occur in the future. New and old examples of structures such as the classic neon-deco signs peacefully co-mingle with examples of original, contemporary architecture and other architectural styles. During community-wide forums, residents of this area identified their vision of what they want the West Main Street Area to be. This vision is of a close-knit community:

- With moderate density and with a small town feel;
- With unique and eclectic components;
- With vibrant and active community life;
- That celebrates, embraces, and cherishes its diversity;

Sycamore Light Rail Station HIA

- Rich in mature, stable, and vibrant residential neighborhoods;
- With diverse and high quality housing stock;
- That is economically balanced;
- That is friendly to developers and businesses;
- That is pedestrian-friendly;
- That is transit-friendly;
- Rich in open space and recreational facilities

- **Stakeholders**

City of Mesa

Property Owners

Notable land owners (15 or more parcels)

City of Tempe 29 parcels

Eldorado Arms Inc 72 parcels

Mulberry Business Park L P 54 parcels

Residents

Business Owners

West Main Street's community and neighborhood businesses

Broadway Road's industrial businesses

Banner Desert Medical Center

East Valley Institute of Technology

Metro Light Rail

- **HIA Team**

City of Mesa

Jeff McVay, AICP, Senior Planner

Mike James, AICP, Transit Services Director

Gordon Sheffield, AICP, Zoning Administrator

Baseline Conditions and Health Determinants for Sycamore Station

Based on feedback collected during the preparation and feedback from the current stakeholders, the following baseline conditions were identified.

- **Air Quality**

- **Asthma:** An estimated 22.9 million people (7.7 percent) of the population have current asthma. Current asthma prevalence is higher among females (8.9 percent) than males (6.5 percent). Current asthma prevalence is highest among Blacks (10.2 percent), followed by Whites (7.6 percent), and Hispanics (6.8 percent) including Puerto Ricans (14.1 percent) and Mexican/Mexican-American (5.8 percent) (Centers for Disease Control and Prevention, 2007). Highest estimates among men were in Wisconsin (8.2 percent) and Arizona (8.8 percent) (Current Asthma Prevalence 2008).

Sycamore Light Rail Station HIA

- **Lung Cancer:** In 2007 Arizona had 426.5 deaths out of 100,000 persons compared to 543.2 in United States. (United States Cancer Statistics, 2007)
- **Healthy Eating/Active Lifestyle**
 - Community Food Assessments
 - Nutrition
 - Food Deserts
 - Lack of Access to Healthy Food
 - Lack of Local Food Production
 - Lack of knowledge of Good Nutrition
- **Chronic Disease**
 - **Obesity:** More than one-third of U.S. adults (35.7%) are obese. Approximately 17% (or 12.5 million) of children and adolescents aged 2—19 years are obese. In 2010, no state had a prevalence of obesity less than 20%, with Arizona 24.3% (Centers for Disease Control and Prevention, 2010).
 - **Diabetes:** Among U.S. residents aged 65 years and older, 10.9 million, or 26.9%, had diabetes in 2010. About 215,000 people younger than 20 years had diabetes (type 1 or type 2) in the United States in 2010. In 2005–2008, 35% of U.S. adults aged 20 years or older had prediabetes (50% of adults aged 65 years or older). Applying this percentage to the entire U.S. population in 2010 yields an estimated 79 million American adults aged 20 years or older with prediabetes. (Centers for Disease Control and Prevention, 2011)
 - **Heart Disease:** In 2008, over 616,000 people died of heart disease. Heart disease caused almost 25% of deaths—almost one in every four—in the United States (Centers for Disease Control and Prevention: National Center for Chronic Disease Prevention and Health Promotion, Division for Heart Disease and Stroke Prevention, 2008). From 2000-2006, the Arizona state rate for deaths due to heart disease was 338 out of 100,000 persons and the National rate was 428 deaths (Centers for Disease Control and Prevention, 2006)
 - **Hypertension:** During 2005-2008, 30.9% people among 20 years of age and over suffered from hypertension in United States.
 - **Stroke:** From 2000-2006, the Arizona state rate for deaths due to stroke was 76 out of 100,000 persons and the National rate was 98 deaths (Centers for Disease Control and Prevention, 2006)
 - **Depression:** The current depression rate from 2006-2008 in U.S. is 9.1% (en estimated 1 in 10 U.S. adults report depression). Arizona has a higher current depression percentage (10.7%) than the national baseline figures (Centers for Disease Control and Prevention, 2010).
- **Transportation**
 - Lack of Multi-modal system
 - Auto dependent
 - Safety
 - Lack of connectivity
- **Healthy Neighborhoods**
 - Asbestos

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- Noise: NIOSH ([The National Institute for Occupational Safety and Health](#)) recommends that all worker exposures to noise should be controlled below a level equivalent to 85 dB for eight hours to minimize occupational noise induced hearing loss. (Centers for Disease Control and Prevention, 2011) Four million workers go to work each day in damaging noise. Ten million people in the U.S. have a noise-related hearing loss. Twenty-two million workers are exposed to potentially damaging noise each year.
 - Allergies
 - Light pollution
 - Lack of Active Lifestyle Choices
 - Lack of Social Cohesion
 - Crime
 - Safety
 - Nuances
 - Heat Related Impacts (Heat Exhaustion)
 - Access to Public Services & Health Services
 - Access to Appropriate Housing
- **Livelihood**
 - Local Businesses
 - Employment Opportunities

Step 3 ASSESSMENT: Provides: 1) a profile of existing health conditions; 2) evaluation of potential health impacts

The issues discovered in the scoping process were divided into three main categories: healthy economy, healthy lifestyles, and healthy transportation. A series of investigations were conducted comparing the study area to the larger City of Mesa, the region, state, and nation. These comparisons help to establish baseline conditions and the level of mitigation needed in the neighborhood. The individual issues were then reviewed to discern the most prominent areas of concern. The assessments were then compared to each other to determine overlapping concerns and mutual beneficial solutions.

Step 4 RECOMMENDATIONS: Identifies strategies to address health impacts identified

A series of recommendations were generated to address the most prominent problems discovered in the assessment process. These recommendations focused on the process of mitigating the existing health problems. Each recommendation is followed by a rationale explaining the recommendation. The most significant recommendations were then selected by the students and compiled into the implementation list. This list highlights the interrelated nature of the health problems in the study area. A series of policies were then developed to help generate potential projects. The presented projects helped to address many of the problems discovered by the HIA team.

Step 5 REPORT: Includes the development of the HIA report and communication of findings and recommendations

The process of producing an HIA report provides the opportunity to consider all the health issues both in existing conditions and future developments. This report can act as a guide for the development of future light rail station, by providing new perspectives for consideration. The report is a comprehensive

Sycamore Light Rail Station HIA

review of relevant health issues concerning light rail stations in the city of Mesa. It also acts as a point of comparison for future investigation in the study area.

Step 6 MONITORING: Tracks impacts of the HIA on decision-making processes and the decision, as well as impacts of the decision on health determinants

The process of monitoring should begin once recommendations are implemented. This report can be used as a baseline to judge the suggested projects. After a project has begun it can be reviewed on an annual or semiannual basis to determine level of impact. To have a measurable effect on the residences of the study area the proposed policies and projects need to be revisited after each review to determine areas of potential improvement.

DRAFT

Chapter 3: Healthy Economy

Physical Conditions: Existing Land Uses

The Sycamore Station study area's land uses are split north and south by Main Street. South of Main Street, land uses are dominated with industry, retail, and secondary education; while north of Main Street is primarily comprised of residential land uses with retail along the arterial corridors. As typical of post-WWII suburban development, the commercial properties offer generous surface parking with large setbacks, thus promoting automotive use and motorist accessibility that impedes pedestrian accessibility. The Park-and-Ride lot that serves the end-of-the-line Light Rail station at Sycamore and Main Street only adds to the area's ubiquity of surface parking.

As it exists currently, public amenities are minimal within the study area. Public amenities are viewed as vital to promote social interaction and economic development. Future amenities may be best located near the arterial streets, along the Tempe Canal or within recreational open space. The blend of commercial properties and public amenities has been shown in literature to yield positive quality-of-life outcomes (A. Gordon, 1997; Chapin, 2002; Fainstein, 1991). Improving the current public spaces of the study area include street furniture, prominent street trees, and canal oriented design – all these improvements double as opportunities for encouraging economic development.

Images of the existing streets near the Sycamore and Main Street Light Rail station:



Panoramic 1: 270 degree panoramic – Sycamore & Main (Going left to right: north, east, and southwest)



Panoramic 2: 180 degree panoramic – Sycamore & Main (Going left to right: west, north, and east)



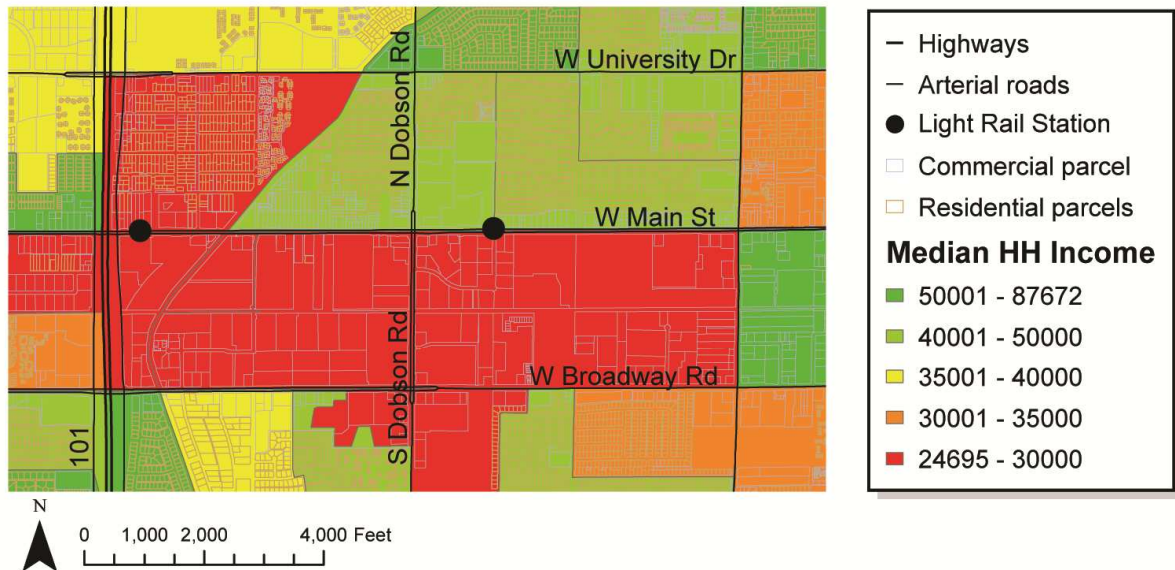
Panoramic 3: 360 degree panoramic – Main, near Dobson (Going left to right: west, north, east, and south)

Land uses are isolated with light industrial, commercial and residential land uses clustered in typical Euclidian fashion. This isolation of uses promotes automobile dependence and obstructs local cohesion for both economic and social benefits. In contrast, mixed-use development is noted for promoting these benefits. Most notably, Jane Jacobs upheld the ideal of fine-grained mixing of land uses as

Sycamore Light Rail Station HIA

essential to the success and vibrancy of a neighborhood (Jacobs, 1961; Rabianski, Clements, III, Gibler, & Tidwell, 2009).

Area Map: Household Income and Parcel Types



Area Maps 1: Median Household Incomes and Aerial Photo

Note that poverty rates are higher south of Main Street where residential property is not prevalent.

North of Main Street is where residential land use is concentrated, predominantly as detached single family housing. Retail is prominent at the intersection of Main Street and Dobson Road with Safeway and Mekong Plaza acting as large grocer anchors. Main Street Plaza at the Southwest corner of Main and Alma School also provides some retail uses. The north and south running corridors offer little retail within the study area itself. Dobson Road connects to retail a half mile north of the study area at Mesa Riverview shopping complex with a variety of retail options including Home Depot, Walmart, Bed Bath & Beyond, Bass Pro Shop and more. Along with retail there are also services, restaurants, bars, and a movie theater. The variety of businesses provides a number of employment opportunities. The Tempe Canal serves as a bike route for cyclist and pedestrian connectivity to offer a multimodal accessibility. However, adjacent neighbors lack direct connectivity to the canal, as is typical for most canals in the

Sycamore Light Rail Station HIA

Phoenix-Mesa metropolitan area with walled lots and too few breaks for open space. Breaks in sequential lots to provide open space would also improve pedestrian connectivity to the canals.

More retail and restaurants can be found a mile south of the study area in the Fiesta District. Stores such as Macy's, Dick's Sporting Goods, and Dillard's are located there. Cyclist connectivity suffers due to Longmore Street's interruption by the EVIT campus and lacks connectivity between Main Street and Broadway Road. Therefore access to the Fiesta District transportation could improve by incorporating dedicated bicycle lanes (which a nonexistent on Dobson and Alma School).

Active transport modes generally suffer in neighborhoods with the existing conditions mentioned prior, such as poor pedestrian connectivity, few parks and public amenities, as well as the dominance of the automotive infrastructure. Meager opportunities for active transport has negative health externalities such as higher Body Mass Indexes (BMI) of residents, higher rates of diabetes, depression, and many other health deficits found in Chapters 4 and 5.

Property Ownership

Taking stock of land owners throughout the Sycamore Station study area reveals strong local ownership rates. Local owners are more likely to be involved in the community development process than owners from outside the area or state. Distanced owners are likely to be disconnected with a less vested long-term interest in social cohesion of the community. Local ownership also makes for easier consensus building for planning issues that shape policy around desirable outcomes. Community outreach and owner interaction ought to be favorable in the study area, thus offering hope for collective efficacy and political feasibility.

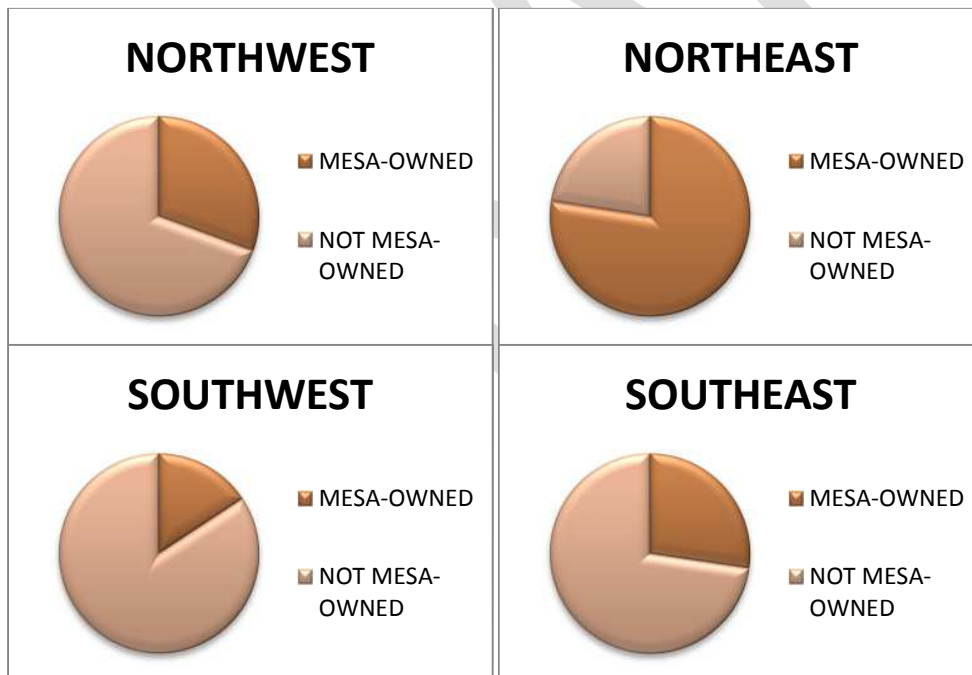
West Main Street Area Plan identifies these communities as identifying with a "pride of ownership, low vacancy, good neighbors, and long tenure as factors making these neighborhoods and homes asset[s]" (June 2006). The community has voiced an interest in encouraging ownership over rentals.

Considering the stated goals from June 2006, the northeastern portion of our study area has indications of meeting this objective. The pie charts on the next page show the portion of properties that are owned by Arizona (AZ-OWNED) and Mesa (MESA-OWNED) residents. Note this data comes from Maricopa County Assessor's office (2012). Maricopa County Assessor's disclaimer does not guarantee the accuracy of this data, nor does it indicate a margin of error.



Sub-Area Map 2: Area's defined for Property Ownership Analysis

Sycamore Light Rail Station HIA



Notable land owners (15 or more parcels)

| | |
|----------------------------|------------|
| City of Tempe | 29 parcels |
| Eldorado Arms Inc | 72 parcels |
| Mulberry Business Park L P | 54 parcels |

Sycamore Light Rail Station HIA

Demographics

Within the two square miles of our study area, there is a total population of 10,111 people (5,006 per square mile).

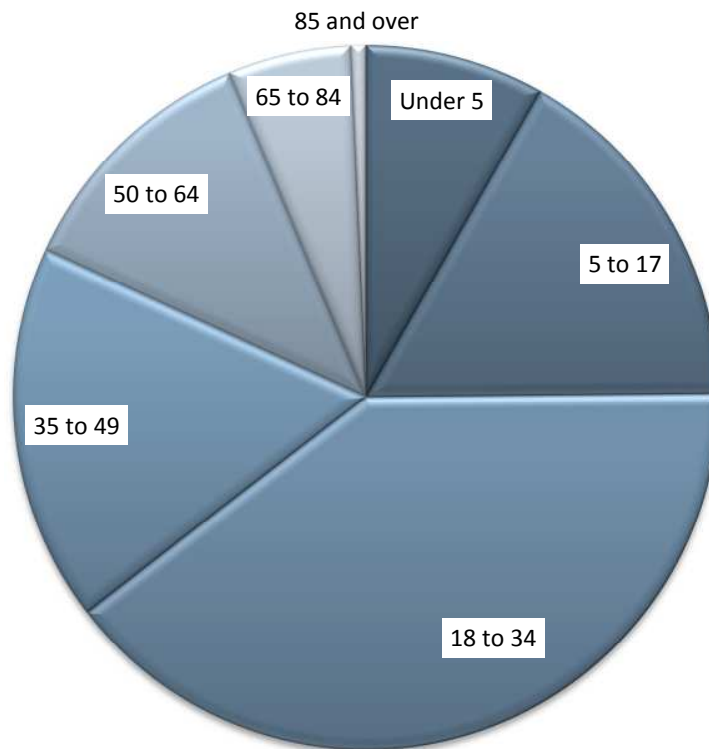
| Age: | | |
|--------------------|-------|-------|
| Under 5 | 833 | 8.2% |
| 5 to 17 | 1,679 | 16.6% |
| 18 to 34 | 4,010 | 39.7% |
| 35 to 49 | 1,758 | 17.4% |
| 50 to 64 | 1,190 | 11.8% |
| 65 to 84 | 572 | 5.7% |
| 85 and over | 69 | 0.7% |

Age distribution for the area suggests that there is a large demand for jobs. Working-aged individuals between the 18 and 64 total to 13,916 residents (68.9%).

Lower demand on health care services may be required due to the low number of elderly population. However, for the 641 (6.4%) elderly residents over the age of 65, as well as for the general population, health care access is important. Banner Desert Medical is conveniently located a mile south of Broadway at Southern Avenue and Dobson Road. It also has access from I-60 offering regional accessibility.

All data from MAG Databases

Age Distribution



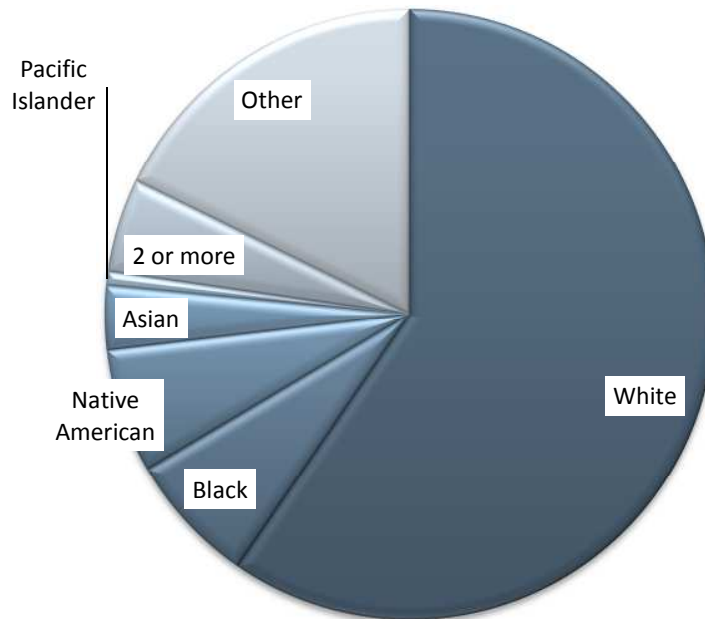
Sycamore Light Rail Station HIA

Ethnicity impacts the character of a neighborhood and plays a role in the food choices available. Culture has an influence on family size, and family dynamics, and even the housing demands for the elderly.

| <i>Ethnicity:</i> | <i>N</i> | <i>%</i> |
|---------------------|----------|----------|
| Hispanic | 4,144 | 41% |
| Non-Hispanic | 5,967 | 59% |

| <i>Race:</i> | <i>N</i> | <i>%</i> |
|-------------------------|----------|----------|
| White | 6022 | 59.6% |
| Black | 702 | 6.9% |
| Native American | 669 | 6.6% |
| Asian | 345 | 3.4% |
| Pacific Islander | 74 | 0.7% |
| Two or More | 501 | 5% |
| Other Race | 1,798 | 17.8% |

Racial Distribution



DRY

Sycamore Light Rail Station HIA

Poverty rates and income statistics offer a sense of healthcare affordability, risk assessment to health risks (like heat stroke), and demand for public transit. Public health experts note that low-income populations are vulnerable to environmental inequity and often lack access to affordable healthcare (and less likely to have preventative healthcare) which is especially concerning during heat waves. In areas like our study area, excess impervious surface also causes higher temperatures in the local microclimate putting the entire population at risk for heat-related health events, especially the vulnerable populations, such as the elderly, non-white, those in poverty and without college education (White-Newsome et al., 2009). Extreme summer temperatures also create spikes in energy costs from frequent air conditioning use.

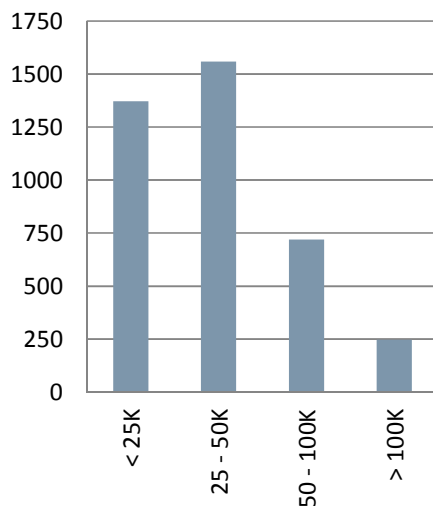
Not having access to affordable healthcare is costly. Lower socio-economic families are also hit hardest by illness when it causes time off without pay in jobs that often lack benefits such as paid time off. Encouraging low-cost medical services can play a critical role in improving people's quality of life.

| Poverty: | N | % |
|----------------------------|-------|-------|
| Families | 1,975 | |
| Families in Poverty | 363 | 18.4% |
| AZ Poverty Rate | | 15.3% |
| US Poverty Rate | | 13.8% |

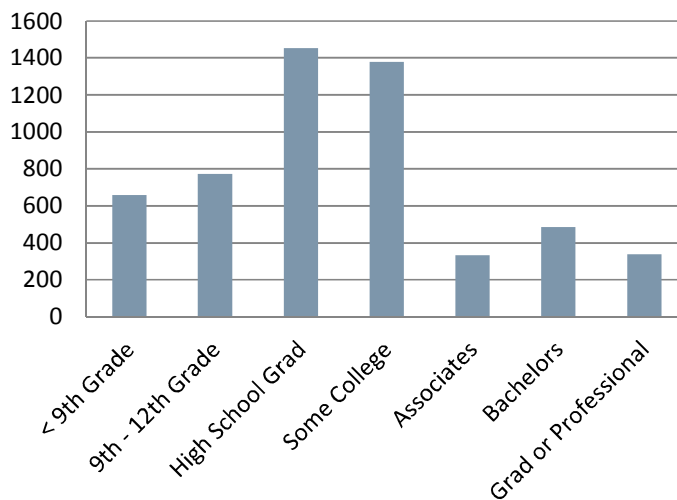
| Household Income: | N | % |
|-------------------------------|-------|-------|
| Households | 3,896 | |
| Less than \$25,000 | 1,372 | 35.2% |
| \$25,000 to \$50,000 | 1,558 | 40% |
| \$50,000 to \$100,000 | 719 | 18.5% |
| Greater than \$100,000 | 247 | 6.3% |



Household Income



Educational Attainment



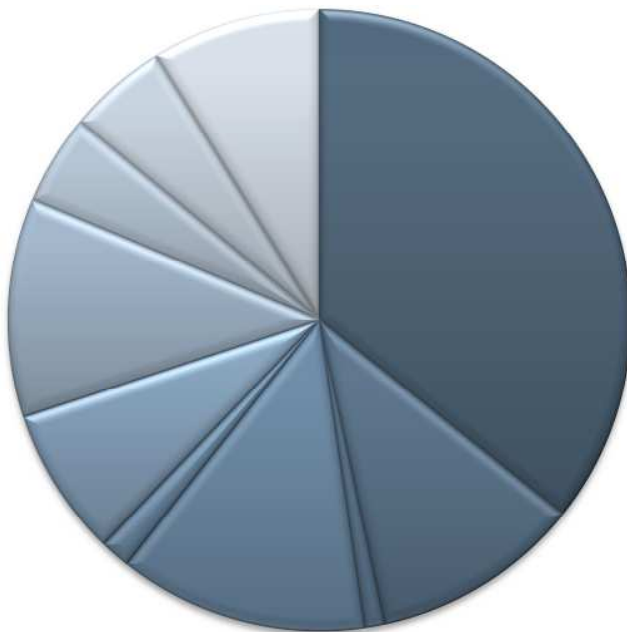
Sycamore Light Rail Station HIA

Access to Employment

With 6,958 adults between the ages of 18 and 64 residing in the West Mesa study area, we find there are 4,632 total employed workers in the area. After adjusting for unemployment and disability, we still find the local population likely exports workers to employment centers outside the study area for employment (2010 MAG Employer Database).

| <i>Business by Sector:</i> | <i>Study Area</i> |
|---|-------------------|
| Trade, Transportation, and Utilities | 35.751 % |
| Construction | 10.881 % |
| Government | 1.036 % |
| Manufacturing | 12.953 % |
| Information | 1.554 % |
| Financial Activities | 7.772 % |
| Professional & Business Services | 11.399 % |
| Education & Health Services | 4.663 % |
| Leisure & Hospitality | 5.181 % |
| Other Services | 8.808 % |
| Total number of businesses | 176 |

Source: 2010 MAG Employer Database



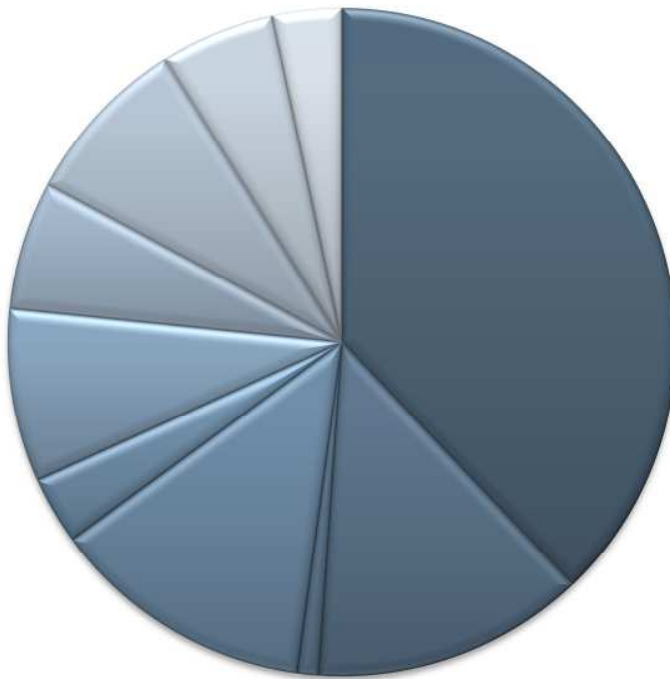
Businesses by Sector

- Trade, Transportation, and Utilities
- Construction
- Government
- Manufacturing
- Information
- Financial Activities
- Professional & Business Services
- Education & Health Services
- Leisure & Hospitality
- Other Services

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| <i>Employees by Sector:</i> | <i>Study Area</i> |
|---|-------------------|
| Trade, Transportation, and Utilities | 37.889 % |
| Construction | 13.212 % |
| Government | 1.036 % |
| Manufacturing | 12.802 % |
| Information | 3.303 % |
| Financial Activities | 8.355 % |
| Professional & Business Services | 6.218 % |
| Education & Health Services | 8.269 % |
| Leisure & Hospitality | 5.548 % |
| Other Services | 3.358 % |

Source: 2010 MAG Employer Database



Employees by Sector

- Trade, Transportation, and Utilities
- Construction
- Government
- Manufacturing
- Information
- Financial Activities
- Professional & Business Services
- Education & Health Services
- Leisure & Hospitality
- Other Services

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Employment Opportunities

Retail and restaurant employment comes in many forms along many corridors within and around the study area at sites already mentioned. Other employment opportunities are at many notable employment nodes:

- Broadway Road's industrial businesses
- Banner Desert Medical Center
- EVIT education campus
- Employment centers west of the study area accessible by Light Rail
 - Arizona State University, Tempe
 - Mill Avenue, Tempe
 - Sky Harbor International Airport
 - Downtown Phoenix
 - City, County and State government
- Future Light Rail accessibility east of the study area
 - Downtown Mesa
 - Mesa's municipal government

Near-future development impacts

One significant impact that the area will experience is the extension of the Light Rail line and the Sycamore and Main Street station no longer the end-of-the-line destination for Park-and-Ride commuters. City-generated considerations might be made for the local businesses that will suffer from reduced consumer traffic during the construction period. Perhaps sponsor a special event in the area, offer waived rider fees for the new extension of the line, or other creative gestures to local businesses for their sacrifice.

The proposed Transit-Oriented Development (TOD) with mixed uses including affordable housing slated for the parcel east of the Safeway and adjacent stores. Early submittal documents suggest the development will consist of first-floor retail (at 12,443 SF) and four stories of apartment homes above with a proposed 335 dwelling units at 100 dwelling units per acre (DUA). Local Initiatives Support Corporation (LISC) as a partnering organization involved in the development as an advocate for the lower socioeconomic population that will reside there, with target rents proposed at 43.7% of the Area's Median Income (AMI).

Sycamore Light Rail Station HIA



Area Maps 3: LISC Housing Project, Sycamore Station Apartment Homes

Concerns regarding the proposed TOD project are numerous in terms of economics, to quality of life for residents, to concerns for urban form and parking availability. The proposed first floor retail raises questions for the market demand for more retail space near a concentration of existing retail space with high vacancy rates. An increased concentration of density may also be troubling to the character of the neighborhood and has potential for congestion at the site. To achieve the proposed density, the developer has preliminarily submitted a five story structure that exceeds the building height standards set for the West Main Street area plan. Finally, the area is burdened from an overabundance of parking spaces (over 800 at the Park-and-Ride lot) and the proposed design for Sycamore Station calls for another 24,120 square feet of surface parking.

There's a great opportunity to seize the proposed TOD project as an important landmark for the future of TOD success in the area and along the Light Rail. Finding the best strategy to ensure sustainable success can help to spur more investment and promote TOD along the length of the Light Rail. Other developments may look to this project as a case study. If the TOD project fails, similar investment in development could suffer for years and surrounding property owners suffer and other affordable housing projects face even tougher scrutiny.

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Positive impacts could come in nearby development plans under way. The start of Wrigleyville West's construction a half-mile north of the study area will offer seasonal or, potentially, year-round employment opportunities and prospects for the expansion of leisure and hospitality businesses. To best capitalize on this development, considerations should be made to:

- Optimize connectivity between West Main and the site of Wrigleyville West.
 - Shuttle busses
 - Streetscape improvements
 - Bike lane improvements
- Public shuttle buses for neighborhood circulation would promote connection to recreational open space, a cultural attraction, and employment. The corridor of activity along Dobson also offers potential for economic development.



Figure 1: Concept for Wrigleyville West's adjoining Signature Park (at 8th Street and Dobson).
Source: City of Mesa, AZ.

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Recommendations & Rationales

Recommendation

Improve public space that connects commercial land uses and residential neighborhoods. Prioritize projects that improve walkability and pedestrian comfort.

Rationale

Research shows economic development can be generated by public investments (Chapin, 2002). Walkability is an active form of transportation that will encourage healthier lifestyles and reduce automobile dependence while cutting air pollution from car exhaust.

Recommendation

Promote Transit Oriented Development (TOD) with urban design elements to promote pedestrian friendliness and exploration. Utilize more form-based coding during infill development and site retrofitting.

Rationale

The extension of the Light Rail will only give local residents more transit access. To morph into a TOD destination, pedestrian activity will have to be prioritized. Vacant land serves to impede the pedestrian network without interesting amenities along the route.

Recommendation

Build off of the current strengths in the area like Mekong Plaza.

Rationale

Improving the land economics of the area has to start where the demand is greatest with optimal chance to build synergy between commercial and public destinations. Mekong Plaza has fewer land owners to cooperate with to generate retrofit strategies. Such goals and conditions offer a feasible opportunity for a public-private partnership.

Recommendation

Encourage mixed use development by providing incentives that facilitate the development process.

Rationale

Mixing uses bring destinations and amenities into closer proximity and avoids large swaths of land dedicated to only one use. This recommendation goes beyond the current TOD housing project that is slated to be developed near the Sycamore Light Rail station. Mixed use development often requires sophisticated financing. The city should seek policies to reduce financial risk and operation costs for favorable development described by this and other recommendations found in the HIA report.

Recommendation

Adopt a Complete Streets Policy.

Rationale

Complete streets claim economic benefits and improved overall quality-of-life for local residents and business owners by encouraging activity by offering safe pedestrian environments with ample connectivity to optimize land use synergy. Strategies include, but are not limited to: tree-lined streets, wide sidewalks, street furniture, bike lanes, prioritized public transit, and perceivably safe crosswalks.

Recommendation

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Reduce quantity for parking space requirements and encourage improved parking lot design.

Rationale

Shaded parking lots are more attractive and more desirable for users while helping to mitigate the UHI effect that is critical to the Phoenix-Mesa area. Shade comes in a variety of forms, from trees to built shade structures. Vegetation requires planters that can double as water runoff collectors. Pervious parking surfaces with vegetation will reduce the UHI effect, thus cooling the microclimate and mitigating the risk of adverse health effects from heat waves while recharging groundwater.

Recommendation

Encourage low-cost healthcare providers through aid programs or alternative business models.

Rationale

The poverty rate of the study area indicates that healthcare will be out of the reach of many working poor in the area. Lower socio-economic populations are hit the hardest by having to take time off of work due to illness, oftentimes in employment that lacks the benefit of paid time off.

Recommendation

Special attention should be given to the thermal comfort of the transit stops.

Rationale

Lower socio-economic populations use public transit more often than the general public. Investment in thermal comfort in the transit stations will have a positive impact to the rider's quality of life in Mesa's unforgiving summer heat, encouraging an active public presence.

Recommendation

Encourage more entertainment and nightlife amenities in the area by setting development guidelines (or making flexible regulations) to facilitate locations and operational conditions sought by such entrepreneurs. Development scale, signage, and business licensing are all potential avenues for reform.

Rationale

Community identified long term goals for nightlife in the West Main Street Area Plan adopted in June 2006. No noticeable progress has been made in this respect. Entertainment amenities also score well in Walkscore methodology under the theory that it promotes a more walkable urban network with an attractive mix of amenities (walkscore.com).

Chapter 4: Healthy Lifestyle

Chapter 4 reviews and analyzes indicators associated with living a healthy lifestyle and relates them to the subject area of the HIA. Five key analysis points have been identified that summarize existing health conditions for the Sycamore Station Study Area. Each section provides recommendations for ways to improve the health of residents by creating a healthier physical environment. Lifestyle relates to how people live their lives and being active is important to living a healthy lifestyle. The built environment has a profound effect on people's choices and that includes lifestyle choices relating to food, recreation and access to health care services.

This chapter reviews the main aspects of being able to live a healthy lifestyle as it relates to the environment of the Sycamore Station Study Area. The chapter begins with Key Analysis Point 1, which identifies current health conditions in the study area. Key Analysis Point 2 focuses on accessibility to healthcare services and Key Analysis Point 3 reviews locations of parks and recreation facilities. Key Analysis Point 4 analyzes access to healthy food in the Study Area and surrounding context. Key Analysis Point 5 reviews Urban Heat Island Effects in the Sycamore Station Study Area.

Key Analysis Point 1: Current Health Conditions

A. Overview of Health Conditions

This analysis is imbedded in how land use regulations and a new transit oriented development impact the social determinants of health in the area of the Sycamore light-rail station. There is a priority in this report of examining and understanding the broad social determinants of economy, housing, and transportation. While none of the indicators in the three social determinants directly measure an illness or disease, collectively they help us to frame a picture of the community's collective health.

To better understand how new Transit Oriented Development (TOD) may impact current health conditions in the study area, this HIA includes a set of public health indicators compiled by other agencies. Table 4.1.1 below illustrates this issue. The rating for Healthy People (HP) 2010 is used for national comparison purposes of health indicators including obesity rates and the number of insured people in the study area. The Centers for Disease Control (CDC) issued goals for the year 2010 and these goals are also used in the table. Similarly, statistics for certain health indicators are provided from the Department of Health Statistics for Maricopa County, Arizona.

When asked to describe the significant factors that affect their health, either positively or negatively, most people would list their family health history or genetics, their diet, or their level of physical activity. For most people, dealing with a particular health problem means seeking a medical diagnosis from a doctor and following his or her orders or recommendations on prescription drugs, surgery, physical therapy, and lifestyle changes (quit smoking, cut back on high cholesterol foods, find time for exercise). In the medical profession this approach to health is regarded as the medical model, which holds that an underlying disease or condition is organic and treatment should be guided by physicians (Morris 2004).

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On the other hand, a social model of health considers a person's health as an outcome of the effects of all the factors affecting his or her life, including the built environment, the natural environment, living conditions and overall community conditions (Morris 2004). Humans interact with the environment constantly. These interactions affect quality of life, years of healthy life lived, and health disparities. The World Health Organization (WHO) defines environment, as it relates to health, as all the physical, chemical, and biological factors external to a person, and all the related behaviors (WHO 2006).

Environmental health consists of preventing or controlling disease, injury, and disability related to the interactions between people and their environment. The emphasis in public health practice is turning toward the social model as health practitioners have grown to recognize the limited effectiveness that years and years of encouraging individuals to modify their nutritional and exercise behaviors has had on improving public health. Furthermore, new and ongoing research continues to reveal the wide spectrum of health problems and diseases related to the built environment including obesity, cardiovascular disease, asthma and mental health (Table 4.1.1). The built environment's land use can cause health issues that are related to proximity to healthcare facilities, access to healthy food, and the overall effects of urban heat islands.

B. Existing Conditions Analysis; Relationship of Built Environment to Health

| | |
|------------------------------------|--|
| Issues Related to Land Use | <ul style="list-style-type: none">• Obesity• Cardiovascular disease• Asthma• Heat Associated Deaths |
| Issues Related to Transportation | <ul style="list-style-type: none">• Asthma• Air Pollution• Car Crashes• Pedestrian Injuries |
| Issues Related to Social Processes | <ul style="list-style-type: none">• Mental Health• Suicide• Uninsured Population |

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C. Existing Conditions Analysis; Current Health Statistics

Figure 4.1.2 Current Health Statistics Table

| Indicator | Existing Conditions |
|---|---|
| Infant Mortality Rates ^{1,2} | 5.7 deaths per 1,000 live births in Maricopa County, compared to 6.3 in the city of Mesa and a goal of 4.5 by Healthy People in 2010 |
| Heat Associated Deaths ¹ | There has been 82 Heat associated deaths in 2010 in Maricopa county up from 74 deaths in 2009 |
| Babies Born with Low Birth Weight ¹ | In 2009 the city of Mesa had 6.9% of low weight Births and Maricopa county had a rate of 7.1% with a goal of just 5% in mind by Healthy People in 2010 |
| Cancer Rates ¹ | In 2009 the City of Mesa had 153.5 deaths compared to just 134.7 in Maricopa County in 2010 |
| Suicide Rates ¹ | There is a rate of 16.2 per 100,000 persons compared to the national rate of 11.9 and Maricopa County's rate of 13.1 in 2010 |
| Uninsured Population ^{1,2} | The rate of adults with Health Insurance in the State of Arizona is 81.9% and is only 77.6% in Maricopa County in 2010 |
| Chronic Diseases | |
| Asthma Rates ^{1,3} | Over 6.5% of residents in the Sycamore study area have asthma which is at the highest categorical level in the Maricopa County area |
| Children Obesity Rates ^{1,2} | In Arizona 12% of children are overweight and another 14% being at risk for becoming overweight |
| Adult Obesity Rates ² | Data from the 2009 Behavior Risk Factor Surveillance System (BRFSS) show that 58% of Maricopa County adults are overweight or obese, and within the target area rates of being overweight or obese have risen from slightly more than half the population in 2010 (54.1%) to more than two-thirds of adults (67.2%) |
| Adult and Child Type II Diabetes Death Rates ¹ | 19 out 100,000 deaths in the City of Mesa compared to 13.6 in Maricopa County in 2010 |
| Cardiovascular Disease Death Rates ¹ | Major cardio vascular disease death rate was at 226.6 rate per 100,00 persons; In Maricopa County 174.4 out of 100,000 in 2010 |

¹ Department of Health Statistics for Maricopa County, Arizona

² 2011 statistics from Trust for America's Health

³ The Centers for Disease Control and Prevention issued goals for the year 2010

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The built environment relates to public health directly, largely through individual transportation choices and environmental exposures (Urban Heat Island, proximity to healthcare, access to healthy foods, and access to healthy lifestyle opportunities) that result from differentials in built environment and land use patterns. These choices (for example, whether to use a car or walk between destinations) and exposures (such as proximity to traffic noise or fast food outlets) impact our health as a population and as individuals. Variations in built environment characteristics including where we live, work and play, from high density and walkable places serviced by efficient transit to dispersed and auto-oriented, help to shape the travel choices we make and environments to which we are exposed. Of course, there are many other important factors that converge to determine individual genetics, socioeconomic status, personal attitudes and preferences, and others. These factors moderate the built environment and health relationship.

Key Analysis Point 2: Health Services

Existing Conditions Analysis of Healthcare Access

Access to healthcare facilities is vital when assessing the overall health of a neighborhood. As is illustrated in table 4.2.2 below, there are several health care facilities near the SSSA. An urgent care center and a dentist's office are located on the south side of the Safeway shopping center. In addition, there are several other providers located a short distance from the station. Banner Desert, a large regional medical center, is located two miles south of the site. Access to medical healthcare at the proposed site could be considered above average, due primarily to the proximity of the urgent care center. At the same time, the site is lacking in other forms of care such as mental health, emotional health and chemical dependency. These types of mental and emotional healthcare are an important part of overall well being. The Pie Chart in Figure 4.2.3 shows the distribution of health care services available near the Sycamore Station Study Area.



Figure 4.2.1 – photo of Children's Center at Banner Desert

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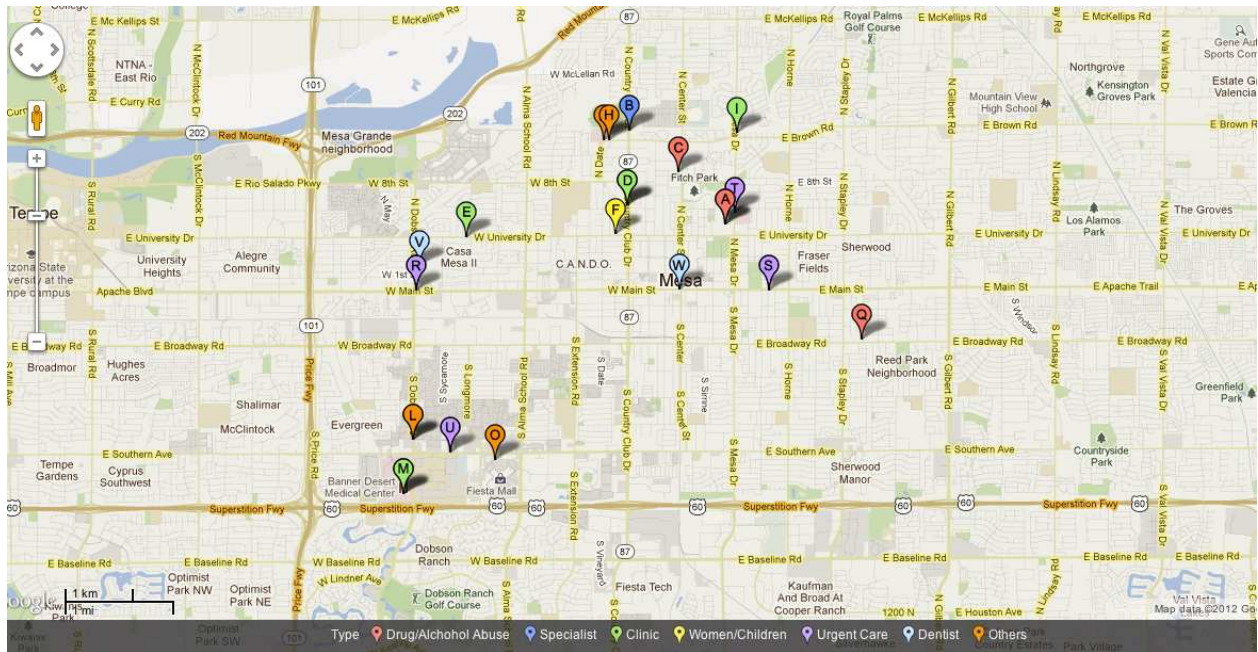


Figure 4.2.2– Map showing nearest health services

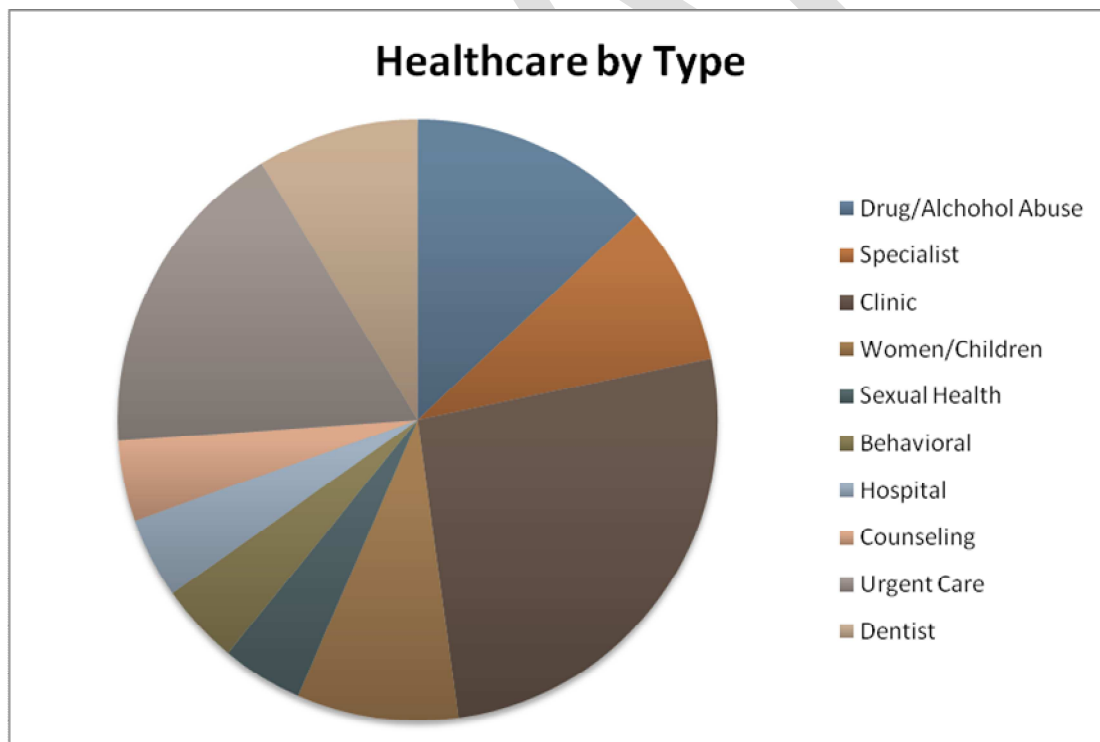


Figure 4.2.3 – Pie Chart with Distribution of Health Services

Key Analysis Point 3: Parks and Recreation



Figure 4.3.1 - Photo of Webster Gym and Recreation Center



Figure 4.3.2 – Photo of Beverly Park

Existing Conditions Analysis of Parks and Recreation Access

Another important aspect to consider when addressing the issue of healthy lifestyle is access to parks and recreation centers. The rates of obesity and type 2 diabetes are growing at epidemic proportions, and as a result exercise and physical activity are more important than ever. Parks and recreation centers are vital to the overall health of neighborhood residents because they provide places for people of all ages to socialize and be physically active.

In this regard, the SSSA does a fair job of accomplishing this goal. Figure 4.3.3 below shows the location and types of recreation facilities near the Sycamore light rail study area. The study area benefits from the presence of the Webster Gym and Recreation Center located behind Webster Elementary. The recreation center hosts many activities and events for people of all ages at little to no cost to the public. However, where the study area is lacking overall is in the availability of public parks. There is only one park in the Sycamore light rail study area and it is a small park located in Tempe. In order to provide the residents with better access to open space and recreation, there should be a park located within a ¼ mile of the SSSA.

Sycamore Light Rail Station HIA

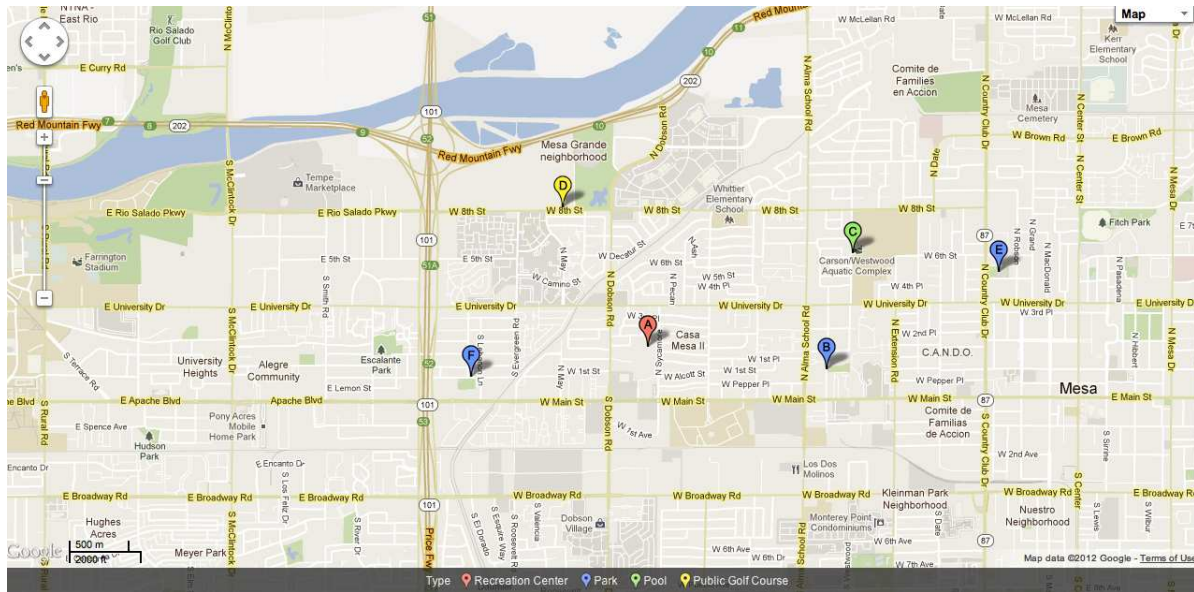


Figure 4.3.3 – Map with Location of Parks and Recreation Facilities

Recommendations: Improving Access to Healthcare Facilities and Expanding Recreation

Recommendation – Encourage organizations that provide healthcare services to the community to locate in either the ground level retail of proposed developments near the Station or in the vacant retail of sites near the Station.

Rationale – By fostering health services in public spaces, the residents of the study area will have better access to the types of healthcare that are not currently available in the area such as substance abuse and counseling services.

Recommendation – Allow greater access to the Webster Gym and Recreation Center to a more diverse group of groups and organizations.

Rationale – The Webster Gym and Recreation Center is a tremendous asset to the study area. The City should consider making it more available to a diverse group of community organizations; this would help to build a greater sense of community in the area.

Recommendation – Consider converting part of the Valley Metro parking lot into a small park for the neighborhood.

Rationale – The study area is lacking in parks and open spaces. With light rail being extended farther into Mesa, there will no longer be a need for an 800-space park and ride parking lot, and this can provide a prime location for a neighborhood park.

Recommendation – Identify sites that can potentially be used for recreation facilities to provide a park within $\frac{1}{4}$ mile of every resident.

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Rationale – The Webster Gym and Recreation Center is a valuable resource for the neighborhood. However, additional recreation facilities in the SSSA would promote increased physical activity, which would result in increased overall health for the residents of the area.

Recommendation – Study the feasibility of converting the alley system into a network of urban trails.

Rationale – Another way to generate open spaces would be to convert the existing alley network, which is currently unused, into a network of urban trails. This could be a unique feature for the area and one that would generate increased socialization within the neighborhood.

DRAFT

Key Analysis Point 4: Access to Healthy Food

A. Overview of Access to Healthy Food and Food Deserts

Every city and town needs to be aware of food issues that affect residents in their community and identify where people are lacking accessibility to healthy, nutritious food such as fresh fruits and vegetables. There are challenges associated with grocery stores being unwilling to locate in some low-income areas based on the expectation of high crime or low sales profit. This is something that needs to be resisted in our society because everyone deserves access to healthy food. The Healthy Food Financing Initiative (HFFI) defines a food desert as “a low-income census tract where a substantial number of residents has low access to a supermarket or large grocery store” (About the Food Deserts Locator). The HFFI is part of First Lady Michelle Obama’s *Let’s Move!* initiative and a partnership among the Treasury Department, Health and Human Services Department, and the Department of Agriculture.

In order to qualify as low-income a census tract must, “have either 1) a poverty rate of 20 percent or higher; OR 2) a median family income at or below 80 percent of the area’s median family income”. In order to qualify as low-access, “at least 500 people and/or at least 33 percent of the census tract’s population must reside more than one mile from a supermarket or large grocery store (for rural census tracts, the distance is more than 10 miles)”

Figure 4.4.1 shows an overview of where food desert areas are located in Metropolitan Phoenix. The red dot on the map is the location of the Sycamore Light Rail Station in Mesa. Although Figure 4.4.1 shows most of food desert areas to be located in Phoenix, there are a few sections in Mesa that are considered to be food deserts. The main food desert described in this report will focus on a food desert area in Mesa that is located to the southwest of the Sycamore Station Study Area and can be seen in Figure 4.4.3.

Areas that are not considered food deserts by USDA statistical standards may still have residents that have a hard time accessing healthy food. Corner stores and local farmers markets serve important roles in the community by providing access to fresh fruits and vegetables. The urban environment can impact access to healthy food because comfortable pedestrian and bicycle thoroughfares help to promote a healthy lifestyle by providing people with a way to access food in a sustainable way.

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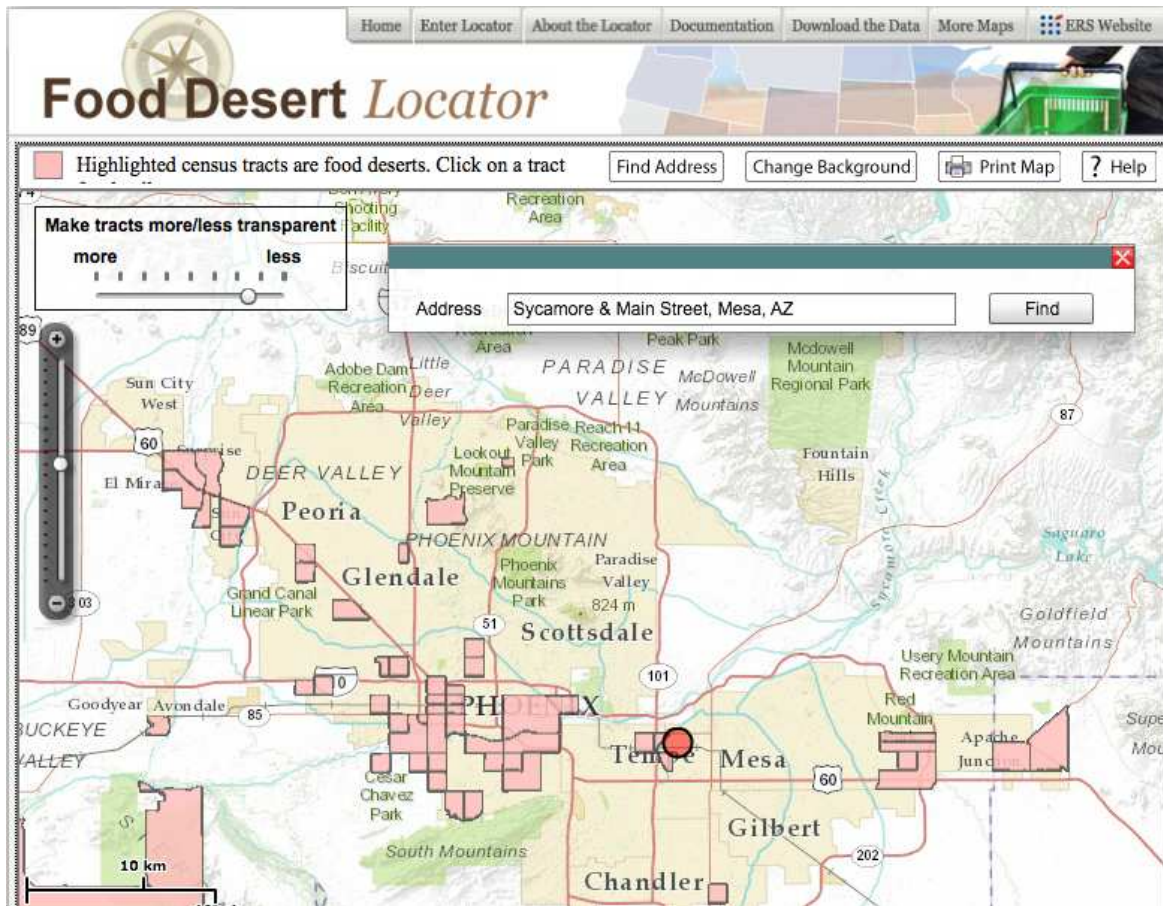


Figure 4.4.1 - Map of Food Deserts in Metropolitan Phoenix

Food Desert Locator

The Food Desert Locator was created by the U.S. Department of Agriculture Economic Research Service to help communities identify where food deserts are located in their communities. Specifically, the spatial database shows where low-income neighborhoods are located with low proximity to a grocery store. Proximity here relates to the distance a person needs to travel to acquire fresh food. Optimal proximity for the pedestrian is $\frac{1}{2}$ a mile to a mile, however in Arizona that distance generally tends to be $\frac{1}{4}$ mile. The food desert database does not address accessibility or mobility issues in detail except for automobile ownership of households. Accessibility is another issue to be considered and also relates to how well a person is able to access fresh and healthy food by using other forms of transportation besides a car. Physical barriers such as walls or highway overpasses can decrease accessibility in the community and efforts should be made to improve connectivity within and adjacent to the Sycamore Station Study Area.

Sycamore Light Rail Station HIA

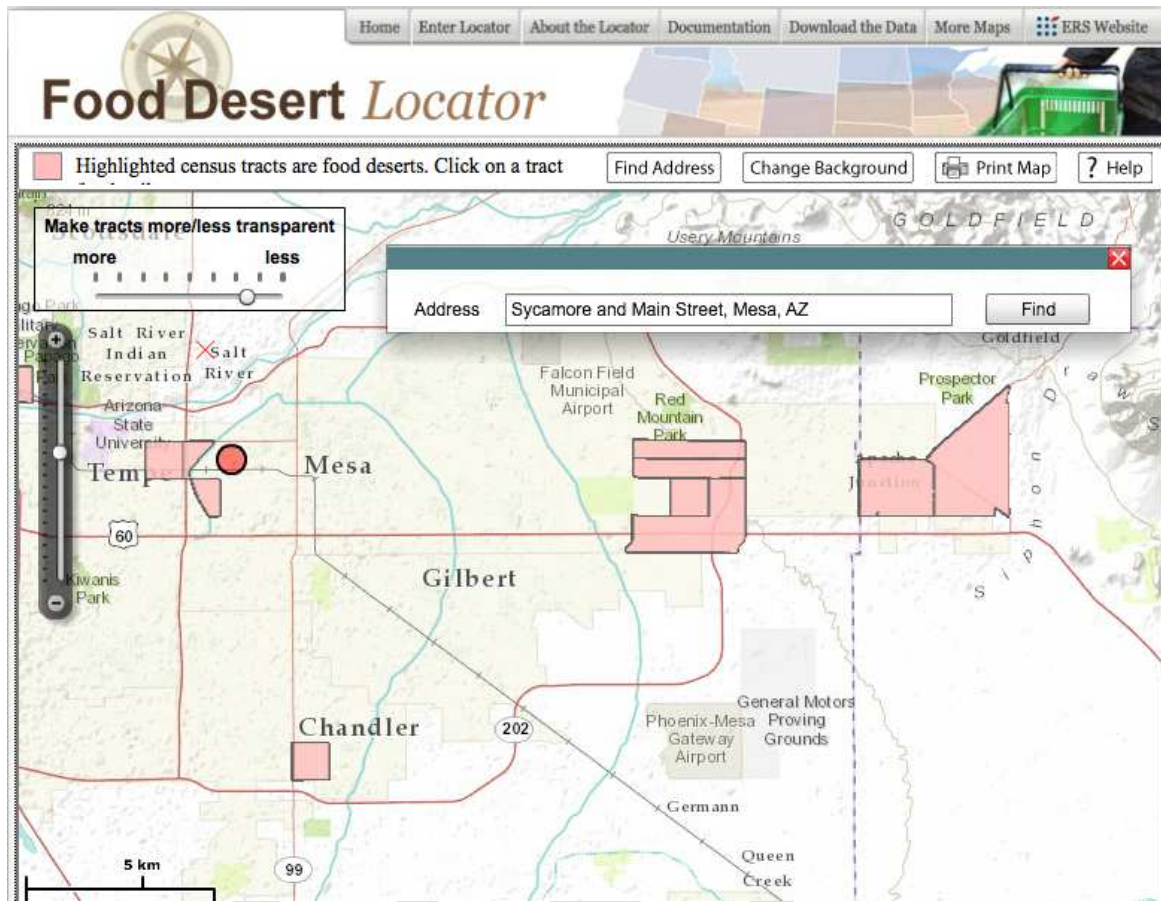


Figure 4.4.2 - Map of Food Deserts in Mesa and Surrounding Areas

B. Existing Conditions Analysis - Food Desert Locator

The food desert described here is located south of Broadway Road to Southern Avenue and east of the Tempe Canal until Dobson Road (See Figure 4.4.3.). There is another food desert located north of the one in Mesa, but that area is Tempe. After reviewing both areas, the area in Mesa appears to have more significant food desert challenges. Below in Figure 4.4.4 is a table that shows all of the data given by the Food Desert Locator website for those two areas. According to the website, the section in Mesa has a population of 6,317 and 100% have low access to food. Also, 346 housing units do not have a vehicle, which equals 13.2% of all housing units. There are no food deserts in the study area of this HIA, but the food desert in Mesa described here is located directly southwest of the Sycamore Station Study Area.

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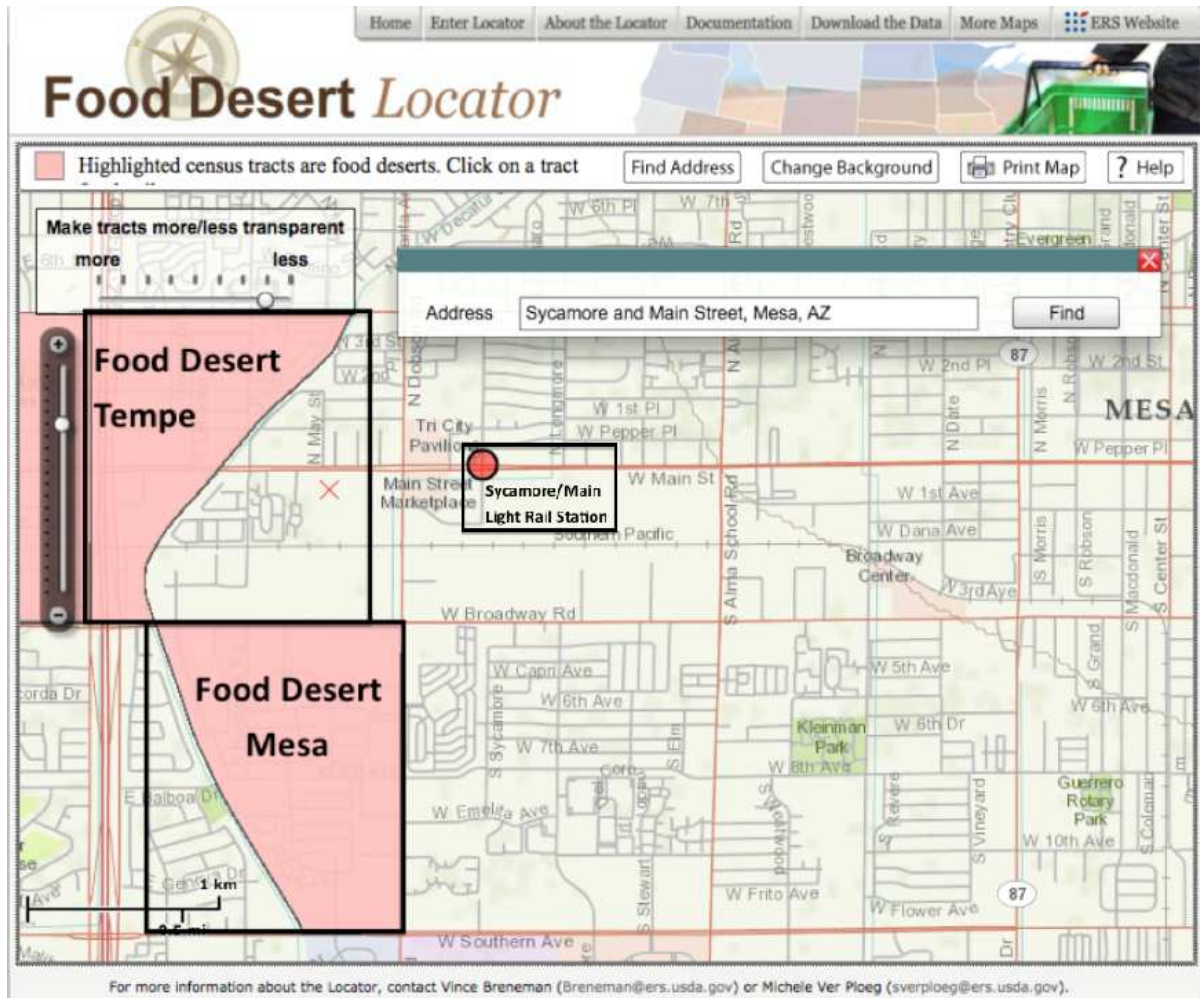


Figure 4.4.3 – Map of Food Desert Sections near the Sycamore Station Study Area

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| Figure 4.4.4 – Table Comparing Nearby Food Deserts Data in Mesa and Tempe, Arizona (Connects to Map in Figure 4.4.3) | Food Desert Tempe | Food Desert Mesa |
|---|--------------------------|-------------------------|
| State | AZ | AZ |
| County Name | Maricopa | Maricopa |
| Tract FIPS Code | 4013319300 | 4013422104 |
| Number of people | 1,902 | 6,317 |
| Census Urbanized Area Tract | Yes | Yes |
| Number of people with low access | 1,024 | 6,317 |
| Percentage of people with low access | 53.9% | 100% |
| Number of low-income people with low access | 118 | 618 |
| Percentage of total population that is low-income and has low access | 6.2% | 9.8% |
| Number of children age 0-17 with low access | 303 | 1,653 |
| Percentage of children ages 0-17 with low access | 15.9% | 26.2% |
| Number of people age 65+ with low access | 86 | 280 |
| Percentage of people age 65+ with low access | 4.5% | 4.4% |
| Number of housing units without a vehicle with low access | 23 | 346 |
| Percentage of housing units without a vehicle with low access | 3.3% | 13.2% |

C. Existing Conditions Analysis - Food Service Distribution



Figure 4.4.5 – Photo of Mekong Plaza

In order to provide a localized analysis of food choices available in the study area, research was conducted regarding food options around the Sycamore Station Study Area. All types of food choices were analyzed including grocery stores and restaurants. By far, the greatest amount of sit down restaurant choices included Asian restaurants. This is mainly because of the Mekong Plaza located at the southwest corner of Main Street and Dobson Road.

There are four grocery stores that serve the area including the Safeway at the Sycamore and Main Light Rail Station, the Mekong Plaza .4 miles away, a Fry's Food .8 miles away, and Fresh and Easy Market 1.4 miles from the light rail station at Alma School Road and University Drive. There are nine Asian restaurants; five fast food restaurants and four chain sit down restaurants. Figure 4.4.6 shows the distribution of type of food options provided in the study area. Figure 4.4.7 goes into further detail about where those food choices are located in the study area.

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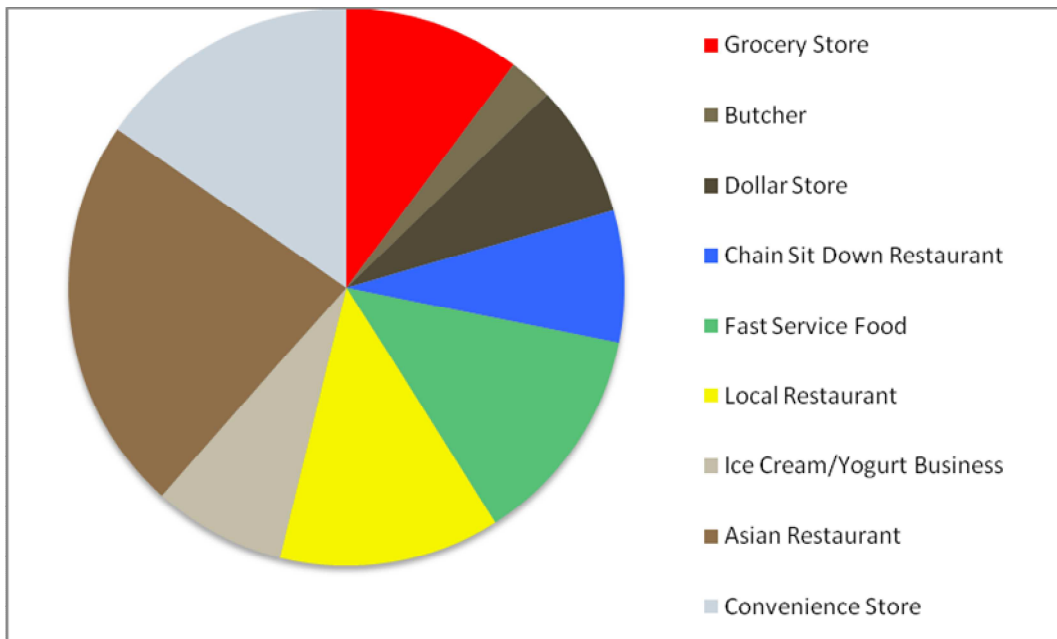


Figure 4.4.6 Pie Chart of Food Services in the Sycamore Study Area



Figure 4.4.7 Distribution of Food Services in the Sycamore Study Area

The map in Figure 4.4.7 made on www.batchgeo.com shows the spatial distribution of food choices in the Study Area (Create a Map/Batchgeo). This map demonstrates that there are not many food options available in the western portion of the study area, coinciding with the issues associated with food deserts in that area. A detailed list of the food providers used for Figure 4.4.6 and Figure 4.4.7 can be found in Appendix ____.

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Farmers' Markets

The most popular farmers' markets in Mesa are the Mesa Community Farmers' Market and the Power Road Farmers' Market. The Mesa Community Farmers' Market is 3 miles from the Sycamore Light Rail Station and the Power Road Farmers Market is 15 miles. The Mesa Community Farmers Market is held every Friday from 9am to 1pm on Center Street just south of University at Rendezvous Green. However, the hours of operation do not accommodate people working during the week. If a farmers' market were held near the light rail station during peak hours, more people would be able to stop there on their way home from work. There is also the Power Road Farmers Market at Vertuccio Farms in southeastern Mesa near South Power Road and between Elliott and Warner that had many great reviews on www.yelp.com. Many people mentioned that living in southeast Mesa means great access to local foods and fresh produce. The Power Road market is open daily Monday through Saturday 9am to 6pm and Sunday 9am to 4pm.



Figure 4.4.8 – Photo of Power Road Farmer's Market

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Community Gardens

There are currently five community gardens in Mesa (Community Garden). The only community garden located in the Sycamore Station Study Area is at Mesa Community College. Anyone can sign up for a plot of land but must follow certain rules and regulations.

According to the iMesa Community Garden Initiative, the City of Mesa has recently initiated a community gardening project in response to increased interest from residents on its interactive website. The iMesa website allows for residents to vote for different issues to be addressed, and community gardens is an issue that has become more popular on the website.

The City of Mesa is looking into ideas such as renting plots of land to the community, however the specific areas were not listed in detail on the website. The website does make it easy for someone who is interested to contact the City of Mesa to find more information. There may be opportunities in Mesa to use vacant land in areas south of Main Street and along Broadway Road as temporary locations for community gardens or farmers' markets.



Figure 4.4.9 – Photo of Community Gardener

D. Impact Analysis of Healthy, Nutritious and Local Affordable Food

Nutritious, healthy, and local foods are important components for addressing food deserts. Although a person may have access to food choices, the food provided may not be healthy or affordable. There were no fresh food markets or local food markets in the study area. Although there were many unique Asian restaurants connected to the Mekong Plaza, there is a lack of diversity in restaurant choice. Mixed-use establishments and diversity of food choices helps to keep people who live close stay nearby because of the availability of a variety of food types. Figure 4.4.6 shows that many of the current options include fast food or chain restaurants, and not a wide availability of diverse and accessible food options.



Figure 4.4.10 – Photo of Filiberto's on Sycamore and Main St.

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Recommendations: Access to Healthy Food

Recommendation – Identify potential sites for community that should provide access to fresh produce within a mile of every resident.

Rationale – Mesa should help provide its residents with access to healthy food by expanding community gardens and locating them within walking distance so that all income levels have greater mobility choices when it comes to accessing food. Every municipality needs to be concerned with the welfare of its residents and that includes providing accessibility to nutritious and healthy food.

Recommendation – Identify locations for farmer’s markets.

Rationale – The SSSA is lacking in access to healthy food options. Farmer’s markets promote healthy eating habits as well as local business incubation.

Recommendation – Establish a farmers’ market during afternoon peak hours in the parking lot space near the Sycamore Light Rail Station.

Rationale – Mesa needs more farmers markets available throughout the city and hours of operation should be adapted to encourage the working individual to shop there. A location that is transit oriented and available during peak hours should do well with commuters who are able to pick up daily grocery items on the way home from work.

Recommendation – Provide incentives for locally owned businesses that sell healthy food to locate in vacant retail space in the study area.

Rationale – Local businesses can do much more than stimulate the local economy. Local businesses also help to create a unique, individual place that is appealing for the citizen and the tourist. Diversified, local food services also help to keep people in the area, as well as attract others to it.

Recommendation – Initiate a “Convenience Store” healthy food program.

Rationale – Oftentimes, the only access people have to food is the corner convenience store, and the food available at these establishments is seldom healthy. Incentives for convenience stores to provide healthy food options would benefit residents that only have access to these types of stores.

Recommendation – Partner with the Mesa School District to provide school curriculum addressing access to healthy food.

Rationale – Educating future generations on the importance of a healthy diet is vital to increasing the overall health of the SSSA.

Recommendation – Initiate a school community garden program.

Rationale – A community garden program through the school would help the students to gain the knowledge necessary to start and maintain their own gardens.

Key Analysis Point 5: Urban Heat Island

A. Overview of Urban Heat Island Effects

Heat Islands are understood to be urbanized places exhibiting higher air and ambient temperatures due to urban conditions including radiant heat from buildings, non reflective and absorptive paving and roofing surfaces, and the effects of human activities including automobile use that creates emissions that induce atmospheric heat capture. As rapid urbanization continues across American cities and the world, more heat islands are created. This should be of great concern for civic leaders and citizens alike because current research points to urban environments and inhabitants that will be subjected in the future to increasingly hot weather and extreme heat events. As urban temperatures increase, impacts from urban heat island effects increase. Understanding why urban heat island conditions should be addressed by public policy, and heat island impacts should be mitigated, is contingent upon decision-makers being able to understand the connections between urban heat island (UHI) impacts and citizen health.

The relationship between urban heat island impacts and citizen health is well documented. Human exposure to increasingly warmer weather in urban centers is understood to be a growing public health problem (Harlan et al. 2006). Health data exists on negative health impacts from human exposure to high air temperatures that result in dehydration, heat sickness and heat stroke. With rising global temperatures comes increased risk for heat island exposure and related health threats. With rising global temperatures comes increasing risk for heat island impacts for dense urban settlements in all settings, especially desert cities like Mesa, Arizona.

Phoenix Metro Context

The Phoenix region provides an excellent context for asking hard questions about urban heat island conditions for growing metropolitan and desert centers. This is not only in relationship to existing conditions that can be variously analyzed, but also in relationship to recent research data that provides solid data and context for the Sycamore Station Study Area's HIA Project. During a 2005 Phoenix study that examined extreme heat as a urban hazard during the summer, Ruddell et al (2010) found that while temperature conditions were variability distributed across people and places in Phoenix, constants emerged around higher temperatures correlating positively with at risk minority, elderly and low income populations. This study focused on a four-day summer heat wave with data collected across 40 different Phoenix neighborhoods. Study results also confirm that landscaped neighborhoods are cooler than urban and xeric neighborhoods.

Jenrette, Harlan, Stefanov and Martin's work in 2011 backs up the Ruddell et al study by suggesting that the past 30-year "trajectory" of increasing income inequality in Phoenix puts residents on the path of increasing disparity in living environments, setting the stage for heightened risk for UHI impacts for lower income populations living in poorer quality neighborhoods and living environments. Principles for UHI mitigation cited in this study include the improvement of landscape management practices, improvement of social support services, housing quality, heat watch/warning systems and emergency response systems.

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An important urban heat island study during the summer of 2003 by Harlan, Brazel, Prashad, Stevanov and Larsen focused on eight different Phoenix neighborhoods and asked three primary questions that drove quantitative and qualitative research work. The research hypothesis were whether “socially and economically marginalized” populations tend to live in heat challenged neighborhoods, whether the “environmental properties” of neighborhoods have a bearing on inequity in exposure to heat risks, and whether the people that live in more at risk (hotter) neighborhoods have less coping ability due to lack of coping resources. Research work across the eight neighborhoods generated data supporting each hypothesis. Data was gathered and organized according to three study categories of Population characteristics, Thermal Environment characteristics and access to Coping Resources.

Data from the 2003 Harlan et al study indicated that while there were significant differences in temperatures and exposure to heat stress among the neighborhoods, only one of the eight study neighborhoods enjoyed safe HTCI (human thermal comfort index) values and a cooling advantage during the July heat wave due to abundance of vegetation and other factors. This neighborhood was the historic El Encanto neighborhood in downtown Phoenix. Data from all neighborhoods was analyzed according to the three study categories and human thermal comfort was simulated with data from the sites.

The human thermal comfort index (HTCI) for each neighborhood was developed, with 200 on the HTCI table corresponding to severe heat stress conditions calibrated for the Phoenix area. Of the eight neighborhoods, only the El Encanto neighborhood exhibited a HTCI value that wasn't nearing the dangerous 200 HTCI threshold, with all other neighborhoods falling squarely into heat stress danger categories. The study found that neighborhoods with lower income and minority populations were exposed to higher temperatures and risks, and residents in most heat stressed neighborhoods lacked adequate coping resources.

The following existing conditions analysis and assessment of the Sycamore Station Study area is based on physical site survey and photographic analysis work. It also includes comparative correlations with data and findings from the 2003 Harlan et al. study, and use of the three general study categories of Population, Thermal Environment and Coping Resources for the assessment work.

B. Existing Conditions Analysis of Urban Heat Islands (UHI)

The Sycamore Station Study Area includes land use areas of single-family residential, medium density multi-family residential pockets, strip and block commercial, a solid percentage of light industrial land use and a limited amount of institutional land use. While differences in the land use areas and their distribution within the study area give rise to varying base conditions for heat island impacts across the Study Area, the entire area is located within challenged urban landscape of metro Phoenix. The differences span across the analysis categories of population, thermal environment and coping resources.

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Figure 4.5.1 – Photo of UHI And Vegetation Challenged North Residential Zone

Population

According to MAG online demographic statistics (accessed March 2012), Sycamore Study Area's population is understood to be of lower median income levels with a poverty rate of 18.4%. The Ethnic landscape is roughly split between Hispanic and White groups, with 41% minority population and a median age between 18 and 34. Less than a quarter of the population graduates from college, resulting in a workforce challenged by lower paying jobs and access to poorer quality housing than desirable. A comparison between the population demographics of the Sycamore Station Study Area and neighborhoods analyzed in the 2003 Harlan et al study (see table, Figure 4.5.2) creates a strong correlation between the Sycamore study area and the two most UHI challenged neighborhoods analyzed in the 2003 study, specifically the "Black Canyon" and "Historic Mexican" neighborhoods.

The Sycamore Study areas' values for median income level, ethnicity and settlement density have positive correlation with similar values for the Black Canyon and Historic Mexican neighborhoods, with negative correlation to the cooler and much less dangerous (during heat waves) Historic Anglo, El Encanto neighborhood. The Black Canyon and Historic Mexican neighborhoods exhibit HTCI values just below the dangerous 200 HTCI threshold. It is assumed that the Sycamore Study area would deliver a similar dangerous value under similar research conditions.

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Figure 4.5.2 - Sources: Table 2, Harlan, Brazel, Prashad, Stefanov, Larsen 2006, *Neighborhood Microclimates and Vulnerability to Heat Stress*

| Figure 4.5.1 Sycamore Study UHI indicator demographic comparisons to UHI challenged Phoenix Neighborhoods | | | | |
|--|---------------------|--------------|------------------|----------------------------|
| Population Demographics | Sycamore Study Area | Black Canyon | Historic Mexican | Historic Anglo; El Encanto |
| Mean HTCI (<i>200 danger threshold</i>) | -- | 197 | 196 | 158 |
| Median Income | 25,000 to 50,000 | 25,785 | 32,625 | 77,404 |
| Poverty Rate % | 18.40 | 43.80 | 27.30 | 9.80 |
| Educational Attainment; <i>college grad</i> | 21.4 | 0 | 1.3 | 41.7 |
| Ethnicity; % <i>minority</i> | 41 | 90.9 | 88.6 | 25.8 |
| Median Age | 18 to 34 | 23 | 25 | 38 |
| Settlement Density: <i>pop per KM sq</i> | 8000 | 8687 | 3083 | 1575 |
| Land Use Open Space: % <i>open space</i> | -- | 0 | 0 | 10 |
| % Air Conditioned | -- | 6 | 28 | 98 |
| % swimming pools | -- | 4 | 4 | 48 |

Thermal Environment

Primary Thermal Environment indicators analyzed during the 2003 Harlan et al study included location in the metro area, settlement density, land use and percentage of open space, and land cover in relationship to abundance of vegetation. The study found that location within itself is not a significant indicator, with suburban locations supporting high temperatures as readily as urban core locations. What the study did support was findings that neighborhoods that are less densely settled with access to open space and higher levels of vegetation were more comfortable places during the summer and safer places during heat waves.

The Sycamore Study area's settlement density value is consistent the UHI challenged Black Canyon neighborhood from the Harlan study, and significant lack of open space is also consistent with the Black Canyon neighborhood (0% documented for Black Canyon and 0% assumed for Sycamore). Another striking comparison resides in comparing levels of vegetative cover, with the understanding that highly vegetated neighborhoods enjoy cooler summer temperatures. Figure 4.5.3 below compares vegetation levels between the Historic Anglo, El Encanto neighborhood and the vegetation challenged Black Canyon Freeway neighborhood from the Harlan et al study. Figure 4.5.4 shows similar vegetation challenges in the Sycamore Station Study area, consistent with the Black Canyon neighborhood, with the higher density multi-family areas and the EVIT campus having much higher levels of vegetative cover than the northern single-family neighborhoods. The greater abundance of vegetation at well-funded multi-family developments and the EVIT campus, compared to lack of vegetation within the aging commercial and single family areas, speaks to inequity in vegetation levels across the Study Area.

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Significant lack of public open space in the Sycamore Study area is of concern, compounded by adequate vegetative cover being found in only a few zones of the study area. The northern single family areas represent a severely challenged zone from the perspectives of lack of open space, lack of vegetative cover and aging housing stock that reduces the ability of families to mitigate heat island conditions.

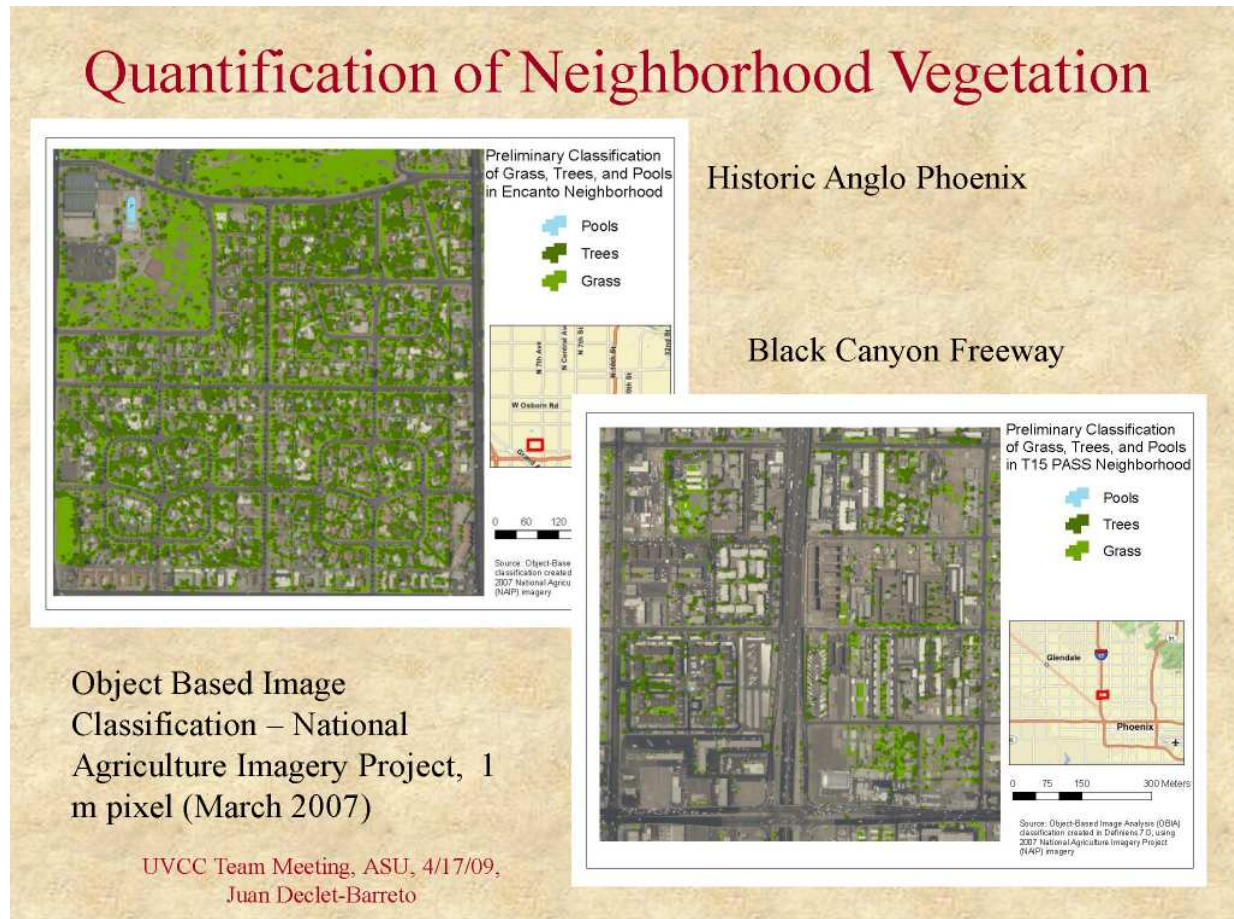


Figure 4.5.3 – OBI Image From The 2003 Harlan Et Al Study (2006)

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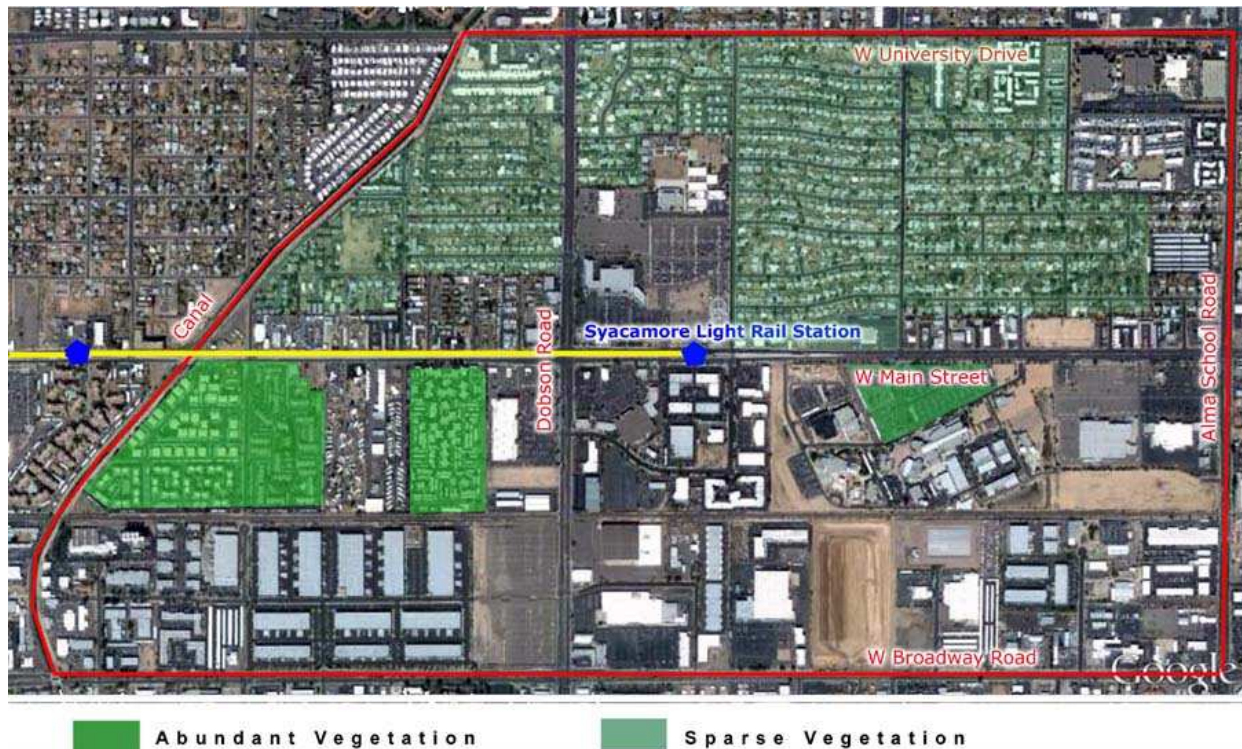


Figure 4.5.4 – Sycamore Station Study Area Vegetation Zones (L. Pollari 2012)

Thermal Environment Quality Issues

Another set of thermal environment indicators relate to the condition of housing product and building stock. The 2003 Harlan study took a hard look at roof reflectivity levels, with findings supporting use of light colored roofing materials to increase reflectivity. Most of the challenged neighborhoods in the study had high percentages of low reflectance asphalt roofing, different from the cooler El Encanto neighborhood that was identified as having 48% asphalt roofing and 25% tile roofing. The majority of residential structures in the Sycamore Study area have low reflectance level asphalt roofs, with little or no tile or metal roofs. Other architectural indicators not covered by the study, but related to potentially higher heat stress values in the SSSA, are general lack of shade features and sun screening systems on building stock. This includes lack of porches, overhangs, sunscreens, and recessed openings in building envelopes for the majority of building types within the Study Area.

The West Main Street Area Plan states that the West Main Street area is underserved by parks (pg. 91), a problem that exacerbates UHI conditions for residents in addition to impacting healthy lifestyle activities. Lack of landscaped parks and open space systems throughout the Sycamore Station Study Area is complicated by a high percentage of impervious and bituminous asphalt paving with the Study Area that act as a heat sinks. See Figure 4.5.5 for the percentage of bituminous asphalt paving areas and dirt lots within the Study Area that contribute to heat island conditions. These two types of ground surface constitute almost half of the Study Area's ground surface.

This preponderance of paving in the Study Area is a serious UHI issue and challenge facing the Sycamore Station Study area; how to reduce the amount of impervious and bituminous asphalt paving in the area

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and how to develop vacant dirt lots. Both types of areas should be targeted for improved development, along with the potential for implementation of temporary solutions to mitigate heat island conditions before re-development. Farmers markets and community gardens both provide ready solutions for temporary use and heat island reduction efforts. Use of special coatings for paving surfaces can reduce surface temperatures for both existing (rehabilitated) parking lots and new parking lots.



Figure 4.5.5 – Sycamore Study Area Bituminous Paving And Dirt Lot Zones (L. Pollari, 2012)

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Figure 4.5.6 – Photo of 50's Era Commercial Building Stock With Excessive Asphalt Paving

Coping Resources

In the Harlan study work on coping resources, the percentage of homes with central air conditioning and swimming pools were found to be negatively correlated with the heat index. Without access to detailed data on these indicators for the Sycamore Station Study Area, the HIA assessment effort focuses on analyzing the general appearance and typology of buildings in the area. Where it may be safe to assume that the newer multi-family housing product, light industrial and commercial buildings, and the EVIT institutional campus structures are fully air conditioned, low density housing product in the north of Main neighborhoods may be challenged by dated air conditioning systems due to the 50's era housing stock. Correlation with AC percentage data from the 2003 study of neighborhoods leads to a hypothetical projection of less than 100% air conditioning for the Sycamore study area due to less than satisfactory AC systems in the dated single family residential homes and similarly dated commercial properties. This results in a lack of equity for coping resources in the Sycamore Station Study Area.

Another significant coping resource for heat island conditions is access to swimming pools, whether they be private or public. Based on aerial photography, it appears that the Sycamore Study area is similar to the Black Canyon and Historic Mexican neighborhoods that had a low 4% swimming pool value, as compared to highly vegetated El Encanto neighborhood with a 48% value. A public swimming center should be a first strategy for improving coping resource access in the Sycamore Study area.

C. Impact Analysis of Urban Heat Islands

Future TOD development focused on the Sycamore Light Rail Station has the potential to positively impact the urban environment within the Sycamore LR District through positive changes in the economic base of the community. Higher wages for residents may be expected due to greater access to

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employment locations via the existing light rail transit line, and future expansion of the light rail line to the east. With higher wages and reduction in poverty levels comes the ability for Study Area residents and property owners to invest in their properties to improve thermal envelop conditions, air conditioning systems and for installation of shaded porch and sunscreen features. With higher wage potentials, Study Area residents may be able to add new landscape and vegetative systems to their properties to combat heat island conditions and improve the livability of their properties during the summer months. Reduction in poverty levels and increase in education levels remain foundational strategies for urban heat island reduction.



Figure 4.5.7 – Tempe Canalscape North Of Broadway; Perfect Setting For Green Open Space Development

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Recommendations: Mitigating Urban Heat Island Effect

Urban Heat Island assessment data for the Sycamore Study Area suggests that a healthier Sycamore Station neighborhood can be accomplished by reduced exposure of citizens to high temperatures and heat wave events, and suggests policies should be put in place to reduce residents' exposure to high temperatures during the summer. Mesa planners and leaders can focus on reducing urban heat island conditions in the Sycamore Station Study Area by focusing on recommendations for improving economic, thermal environment and coping resource conditions.

The heat absorptive conditions of buildings and man made ground surfaces can be reduced. Urban heat island conditions can also be tempered by increasing vegetation levels, increasing open space conditions and reducing greenhouse gas emissions. The health effects of urban heat island conditions can be mitigated through access to coping resources in the form of strengthened social networks and social systems. Policies should be put in place for the Sycamore District that will reduce citizens' exposure to high temperatures and heat wave events during the summer months.

Thermal Environment Recommendations

Recommendation – Identify opportunities for creating public open space(s) in the Sycamore Study area consistent with this goal as identified in the West Main Street Area Plan (pg. 51)

Rationale – With the lack of open space and low level of vegetation in the Study Area, development of new public open space amenities can improve heat island conditions through reduction in densities and increase in vegetative levels (within the open spaces). Canal frontage on the Mesa side can be developed into a continuous, green open space amenity that can link with a general “greening up” of the Main Street “open space” corridor as it is redeveloped. This is consistent with the West Main Street Area plan that calls for Main Street to provide a pedestrian friendly environment with shade, landscaping and open spaces (pg. 73 and 76). Development of pocket parks should be pursued for the Study area, with the West Main Street Area plan calling for “publicly accessible pocket parks and plazas with quality amenities” to be encouraged in light rail station areas.

Recommendation – Increase vegetative levels within public space and within private property.

Rationale – Recent Phoenix research studies on urban heat island show that abundance of vegetation provides mitigation for urban heat island conditions. The lush character of the EVIT and multi-family campuses within the Study area provide local examples for heat reduction. A serious effort should be mounted by the City to assist single family home owners with improvement of their yards to include introduction of new trees and shrubs, with a focus on drought-tolerant species that can reduce water use. Commercial and industrial property owners should be required by zoning codes to provide appropriate UHI mitigating landscape systems for their properties.

Recommendation – Increase use of reflective roofing and paving materials with the Study Area.

Rationale – Increase of reflectance levels within the Study area, both through strategic use of reflective roofing materials on buildings and light colored paving systems within parking lots, will do much to reduce urban heat island conditions within the Study Area. With the large percentage of impervious and bituminous paving and dirt lot areas (+ / - 50% of study area), the Study area is highly challenged and

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subject to heat risks during summer months. A potential policy could look to property owners within the Study area receiving incentives for the installation of reflective roofing and paving materials.

Recommendation – Prepare standards that reduce the amount of impervious, paved surfaces within the Study Area.

Rationale – Fifty percent of the Study is paved with impervious materials or is unpaved, dirt lots. The extremely high percentage of heat trapping bituminous paving material within the area is leading to heat island risks and threats. The City of Mesa should consider amendments to current zoning standards for parking standards that can be applied to the Sycamore Station Study Area and address this critical problem through restrictions on impervious and bituminous asphalt paving areas and requirements for more reflective paving systems. Parking standards documented in the West Mesa Area Plan call for creation of alternative parking arrangements to support pedestrian friendly environments (podium parking, parking garages, underground garages; pg. 68); these standards should be applied to the Study Area.

Recommendation – Incorporate building standards that include shade layers and shade systems, both architectural and landscape in nature.

Rationale – City of Mesa codes and guidelines should further enforce development of shade layers as a critical design language for the community, with standards reinforced through documentation in the Form Based Code. Current shade standards documented in the City’s “Desert Uplands Guidelines” and West Main Street Area Plan should be expanded for application to the Sycamore Station Study Area. The development of shade layers for all types of properties reduces exposure of buildings and interiors to hot summer sun and heat loads. Installation of porch covers, roof overhangs, sun screen systems for glazed areas, and development of recessed openings within building skins should be supported by City zoning and form based codes. The first Study Area group that should be assisted with development of shade layers is the northern, single family residential property owners.

According to the West Main Street Area Plan, only 37% of housing units are owner occupied. This creates a challenge for investments in residential properties to meet the “shade layer” development goal; the City of Mesa should explore tax credit financing programs that can assist property owners with shade layer investments. Design guideline and code policies should also stress the need for creating comfort for pedestrians through provision of shaded sidewalks and public areas along streets and walkways within private developments. Increase in shade layers and systems throughout the Study Area not only mitigates UHI conditions, but also results in energy savings to building owners, a nice “win win” scenario.

Coping Resource Recommendations

Recommendation – Develop a program to encourage use of energy efficient air conditioning systems by all property owners in the Study Area.

Rationale – Access to central air conditioning is a must for all City of Mesa Residents, with lack of AC systems and reliance on old AC systems creating unhealthy population conditions that lead to increased community costs for medical services.

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Recommendation – Develop more public swimming facilities in the Study area.

Rationale –Based on aerial photography, it appears that the Sycamore Study has a total lack of swimming pools. Development of a public swimming center should be a first strategy for improving coping resource access in the Sycamore Study area, with this new amenity providing opportunities for strengthening of social ties, another risk reduction strategy for urban heat island conditions.

Recommendation – Develop a heat watch/warning system.

Rationale – The City of Mesa provides emergency preparedness information and access to an Emergency Alert system, but does not appear to have a detailed heat watch/warning plan for the City. With the predominance of heat risk conditions in the Sycamore Study area, residents should be provided with access to the most critical coping resources including heat watch / warning systems and ready access to medical care.

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Appendix 4.1 - Indicator Explanation in Sycamore Station Study Area

Total Number of U.S. Uninsured, All Ages estimates come from the U.S. Census Bureau, Current Population Survey, Table HI06. Health Insurance Coverage Status and Type of Coverage by State for All People: 2010. (accessed March, 2012).

Total Number of Uninsured, under 18 estimates come from the U.S. Census Bureau. Current Population Survey, Table HI05: Health Insurance Coverage Status and Type of Coverage by State and Age for All People: 2010 (accessed March, 2012).

Asthma data come from the Youth Risk Behavior Surveillance System, Comprehensive Results 2009, percent responding "ever been told" they have asthma. National Center for Chronic Disease Prevention & Health Promotion, Centers for Disease Control and Prevention. Available at:<http://www.cdc.gov/mmwr/pdf/ss/ss5905.pdf> (accessed March, 2012).

Infant Mortality per 1,000 Live Births Maricopa County Department of Public Health (accessed March, 2012).

Cancer Estimated New Cases 2011 data come from the American Cancer Society's Cancer Facts and Figures 2011 (accessed March, 2012).

Diabetes Year Average data come from the BRFSS Prevalence Data 2008-2010, percent responding "ever been told" they have diabetes. National Center for Chronic Disease Prevention & Health Promotion, Centers for Disease Control and Prevention. Available at BRFSS Data.(accessed March, 2012).

Obesity Year Average data were calculated by contractors using self-reported height and weight measure from the BRFSS Prevalence Data 2008-2010. National Center for Chronic Disease Prevention & Health Promotion, Centers for Disease Control and Prevention. Available at BRFSS Data. Obesity was defined as having a BMI greater than or equal to 30.(accessed March, 2012)

Heat associated Deaths- were documented by the Department of Health Statistics for Maricopa County, Arizona Environmental heat is heat generated by the climate (sun, humidity, etc.) rather than heat from man-made sources such as ovens or manufacturing equipment. Heat-associated deaths are categorized based on the classification criteria listed below:
Heat-caused (HC) deaths are those in which environmental heat was directly involved in the sequence of conditions causing deaths. Heat-related (HR) deaths are those in which environmental heat contributed to the deaths but was not in the sequence of conditions causing these deaths.

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Appendix 4.2 Table of Food Providers in Sycamore Station Study Area

| Name of Food Provider | Type of Food Provider | Address |
|----------------------------------|---------------------------|--------------------------------------|
| Fresh & Easy Neighborhood Market | Grocery Store | 1202 West University Drive, Mesa, AZ |
| Safeway | Grocery Store | 1960 West Main Street, Mesa, AZ |
| Fry's Food | Grocery Store | 1245 West Main Street, Mesa, AZ |
| Mekong Plaza | Grocery Store | 66 South Dobson Road, Mesa, AZ |
| Murrieta's Carniceria | Butcher | 1911 West Broadway Road, Mesa, AZ |
| Denny's | Chain Restaurant | 2009 West Main Street, Mesa, AZ |
| Pizza Hut | Chain Restaurant | 1901 West Main Street, Mesa, AZ |
| Rubio's Fresh Mexican Grill | Chain Restaurant | 937 N Dobson Rd # 106, Mesa, AZ |
| Quiznos Subs | Fast Service Food | 67 North Dobson Road #101, Mesa, AZ |
| Filibertos | Fast Service Food | 1755 West Main Street, Mesa, AZ |
| Jack in the Box | Fast Service Food | 1945 West Main Street, Mesa, AZ |
| Subway | Fast Service Food | 1911 West Main Street, Mesa, AZ |
| Subway | Fast Service Food | 937 N Dobson Rd # 105, Mesa, AZ |
| Paradise Restaurant and Bar | Local Restaurant | 1749 West Main Street, Mesa, AZ |
| Wholly Grill | Local Restaurant | 66 S Dobson Rd # 125, Mesa, AZ |
| Los Dos Molinos | Local Restaurant | 260 S Alma School Rd. Mesa, AZ |
| Grill El Quetzal | Local Restaurant | 1933 West Main Street, Mesa, AZ |
| I Twist Frozen Yogurt | Ice Cream/Yogurt Business | 66 South Dobson Road, Mesa, AZ |
| Angel Sweet (Gelato) | Ice Cream/Yogurt Business | 937 N Dobson Rd # 103, Mesa, AZ |
| Cold Stone Creamery | Ice Cream/Yogurt Business | 1933 West Main Street, Mesa, AZ |
| Asian Café Express | Asian Food Restaurant | 1911 West Main Street, Mesa, AZ |
| Blue Moon Vietnamese Restaurant | Asian Food Restaurant | 1933 West Main Street #8, Mesa, AZ |

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| | | |
|---|-----------------------|--------------------------------------|
| Thai Spices | Asian Food Restaurant | 66 South Dobson Road, Mesa, AZ |
| Mekong Palace (Chinese food restaurant) | Asian Food Restaurant | 66 South Dobson Road, Mesa, AZ |
| My Tho Restaurant | Asian Food Restaurant | 66 S Dobson Rd # 124, Mesa, AZ |
| Taiwan Food Express | Asian Food Restaurant | 66 S Dobson Rd, Mesa, AZ |
| Unphogettable | Asian Food Restaurant | 66 S Dobson Rd # 138, Mesa, AZ |
| Panda Kings Buffet | Asian Food Restaurant | 1744 West Main Street, Mesa, AZ |
| Chicken Noodle House (Vietnamese) | Asian Food Restaurant | 66 S Dobson Rd # 106, Mesa, AZ |
| Family Dollar Store | Dollar Store | 1832 West Broadway Road, Mesa, AZ |
| 99 Cent Plus Dollar Store | Dollar Store | 1933 West Main Street, Mesa, AZ |
| One Dollar Selections | Dollar Store | 1932 West Main Street, Mesa, AZ |
| Circle K | Convenience Store | 1560 West Main Street, Mesa, AZ |
| QuikTrip | Convenience Store | 2311 W Broadway Rd, Mesa, AZ |
| Circle K | Convenience Store | 417 South Dobson Road, Mesa, AZ |
| Circle K | Convenience Store | 1955 West University Drive, Mesa, AZ |
| KOOL STOP | Convenience Store | 2114 West Main Street, Mesa, AZ |
| One Stop Food Mart | Convenience Store | 1620 W University Drive, Mesa, AZ |

Note: The colors in this chart correspond to the pie chart in Figure 3.8, which describes the distribution of food options in the study area of the Sycamore Station.

Chapter 5: Healthy Transportation

Key Analysis Point 1: Environmental Factors

Overview of Environmental factors

The systems of transportation have many environmental side effects which can cause potential serious safety hazards as well as physical and mental health problems for the local population. Before these issues can be addressed they need to be understood. The most applicable environmental considerations for the Sycamore Light Rail Station would be noise level, light, and air quality.

Noise

The noise level of an area can affect the ability of individuals to communicate which detracts from the social cohesion of a share experience as passengers develop relationship with their fellow commuters. It can also cause temporary as well as permanent hearing loss. The noise level for a normal conversation at 3'-5' is 60 -70 dB (Decibels). The normal noise levels for city traffic 85dB which is below the 90dB-95dB that can cause hearing loss through sustain exposure (Chasin, 2012). A calculation on noise level based on road width and traffic counts indicated that the daytime traffic noise level along West Main is 82 dB and the night level is 76 dB, indicating that traffic noise level would have to increase by 10dB or grow twice as loud to cause hearing loss, this would require an increase to four times the level of a normal conversation (Noise & Traffic, 2012).

The physical health effects from exposure to elevated noise levels can include cardiovascular problems, hypertension, elevated blood pressure, and increased heart rate. If the ambient noise level remain above 30 dB it can cause sleep disturbances, difficulty waking and falling back to sleep, which is connected with increased blood pressure, heart rate and cardio arrhythmias. (Goines & Hagler, March 2007)

The mental health effects of noise pollution are often related to annoyance and other negative social behaviors, leading to a private disaffection and publicly expressed complaints to authorities. The exposure to noise can also affect school performance with decreased cognitive and reading achievement in children. (Goines & Hagler, March 2007)

Reducing noise at the station

Recommendation - Construct a noise barrier between the light rail station and the street to block direct line of sight, diffusing the noise pollution.

Rationale - This could be accomplished through the use of an acoustic curtain often used on construction sites and in underground rail stations to minimize the effects of noise. The creation of a noise barrier around the station fosters an atmosphere of communication between commuters. The creation of a noise reduced environment would help to alleviate the negative social behaviors from increased



Figure 5.1.1

Sycamore Light Rail Station HIA

noise levels. It will also reduce exposure to the high volume of noise experienced by commuters which can over time cause hearing loss. Such a barrier must also take security concerns into consideration by making the station platform less visible from the sidewalk and the street.

Recommendation - Increase the amount of vegetation and foliage around the residential neighborhoods to reduce noise levels.

Rationale - Decreased the ambient level noise experienced by the resident reduced sleep disturbances and the negative health effects associated with it. Every 30 feet of foliage equal a decrease of 5dB in ambient noise. It also supports a better learning environment for children.

Light

Light pollution is often considered only on a larger scale at a regional level with such initiatives as IDA (International Dark Skies Association). These initiatives focus on the affects of light pollution that “threatens astronomy, disrupts ecosystems, affects human circadian rhythms, and wastes energy” (IDA, 2012).

The exposure to ambient light at night or light pollution can cause a decrease in the production of melatonin which has been connect to elevated risk of breast cancer in women. (Stevens, 2009)

The study area proximity to Phoenix has placed in the highest category concerning light pollution which is 8 or 9 on the Bortle Dark-Sky Scale indicating that the sky is primarily grey or white with only the moon, planets, and the brightest stars visible. The study area is indicated by the cross hairs in figure 5.12. To change this level of light pollution is beyond the scope of this assessment put it provides the opportunity to consider how energy savings and human health can go hand in hand.

The level of light pollution is also related to street safety. This issue is very complicated in that research has shown that the presence of street level lighting increase the individual sense of security, it has also been shown in increase the level of daytime accidents while decreasing the

level of nighttime accident. Though the benefit has been a reduction in accidents overall. The research indicates that the presence of street light provide a benefit primarily at the intersection. (Isebrands, Hallmark, Hans, & McDonald, 2006)



Figure 5.1.2

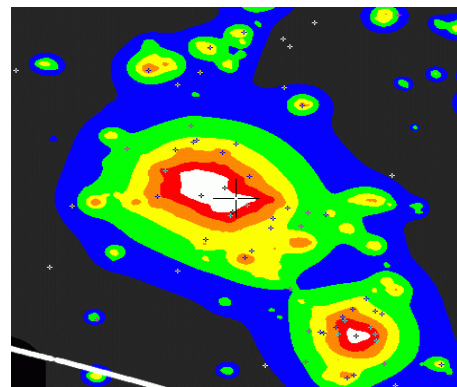


Figure 5.1.3

Sycamore Light Rail Station HIA

Decrease and focus lighting around the station

Recommendation - Incorporate additional lighting at the intersections and crosswalks and reduce lighting leading up to the station area and along adjoining streets.

Rationale - The existing and new lighting should have a more focused area of illumination. Shielded lighting prevents the creation of deep shadows by providing more crisp illumination adding in security concerns. While lighting is needed to provide a safe environment at night it can severely affect the circadian rhythms. So the restriction of street lighting to intersection may provide an alternative to blanket lighting throughout the street network. Shielding the light source helps to bring the intersection and the pedestrian into focus compared to the current more diffused lighting scheme.

Air quality

The air quality data for the study area was retrieved from a monitoring station at Broadway Rd. & Alma School Rd. The four pollutants measured were carbon monoxide, ozone, and particulate matter at 2.5 and 10. Carbon monoxide is a common form of fatal air pollution causing such symptoms as headache, nausea, dizziness, etc. Ozone has been linked to “developmental, inflammatory, carcinogenic/mutagenic, and cellular outcomes” through short and long term exposure. Particulate matter is measured in two sizes fine particles 2.5 micrometers and inhalable coarse particles at 10 micrometers. The particulate matter is connected to a series of ailments from asthma to premature death through lung and heart disease, it is also the primary cause of visual impairment in cities. (U.S. Environmental Protection Agency, 2009)

The data for these four pollutants is illustrated in Figures 5.1.5-5.1.8 comparing to the national level and metro Phoenix. The available data shows that there has been a relatively consistent decrease in the level of pollution over the monitoring period. The study area has remained predominately below the Phoenix metro and national levels. The main outliers to this is the O3 levels from 1993-1997. The large ups and downs of the PM 10 can be attributed to localized event when compared with the metro average that stays more consistent throughout. (U.S. Environmental Protection Agency, 2012) (Maricopa County Air Quality Department, 2012) (Maricopa County Air Quality Department, 2012)



Figure 5.1.4

Reduce vehicle pollution

Recommendation - Restrict heavy vehicle traffic particularly diesel (trucks, construction vehicles, buses) to help to reduce the particulate matter and overall air pollution along the light rail route.

Rationale - The presence of diesel exhaust contributes to the airborne particulate matter. Though the daily commute represents only 6 percent of the day it is the time at which people receive half of their exposure to fine particulate matter. So a reduction of the particulate pollution along the light rail path would significantly contribute to reduced exposure. (Schneider & Hill, 2007)

Recommendation - Provide priority parking area for low emission vehicles at the Metro Park and Ride.

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Rationale - By prioritizing low emission vehicles will reduce carbon monoxide and the health risk associated with exposure.

Recommendation - Provide a charging station for electric vehicles to further reduce air pollution in the study area.

Rationale - By prioritizing electric vehicles the exposure to particulate matter and carbon monoxide is reduced.

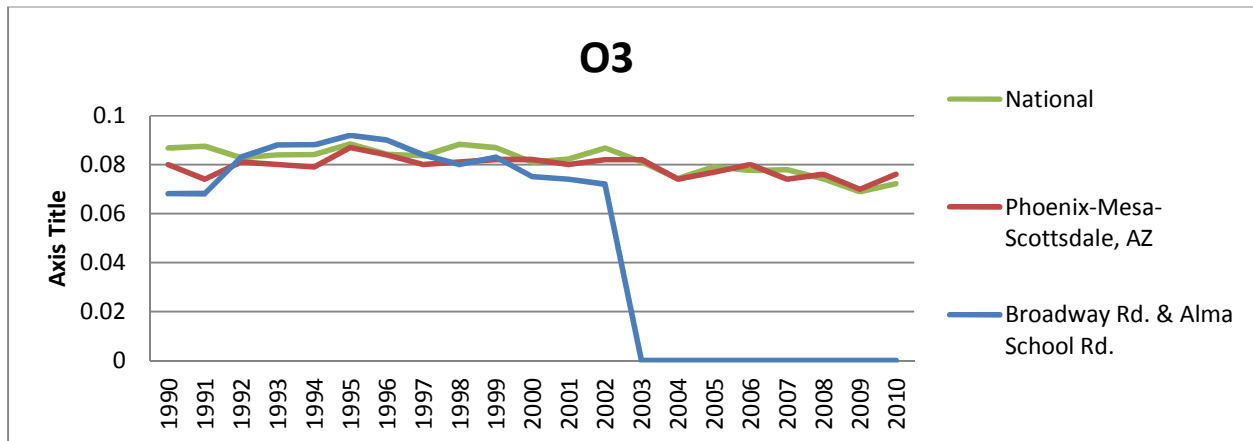


Figure 5.1.5

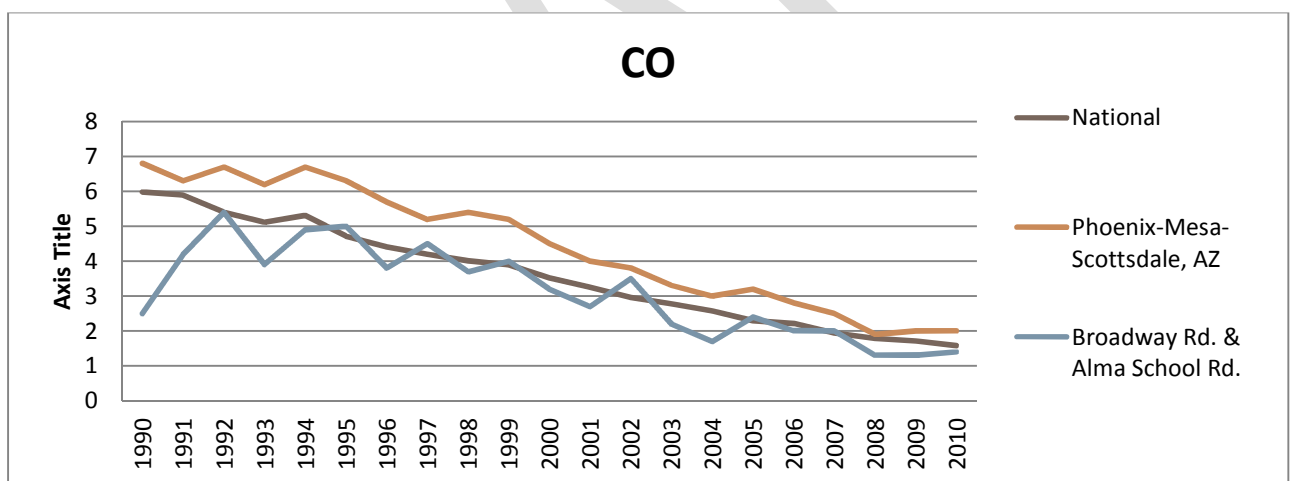


Figure 5.1.6

Sycamore Light Rail Station HIA

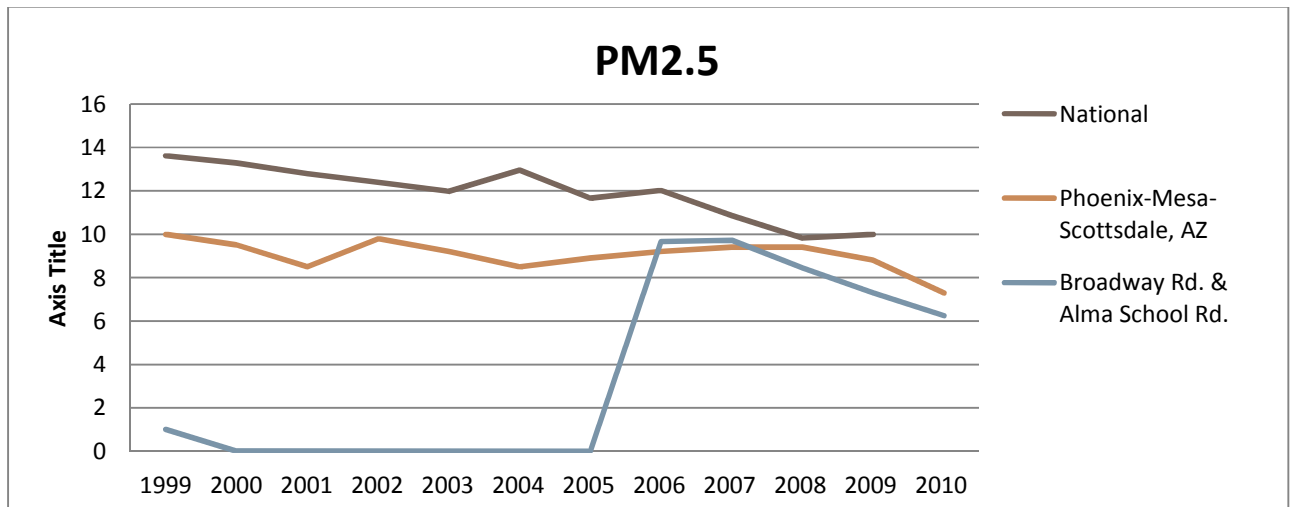


Figure 5.1.7

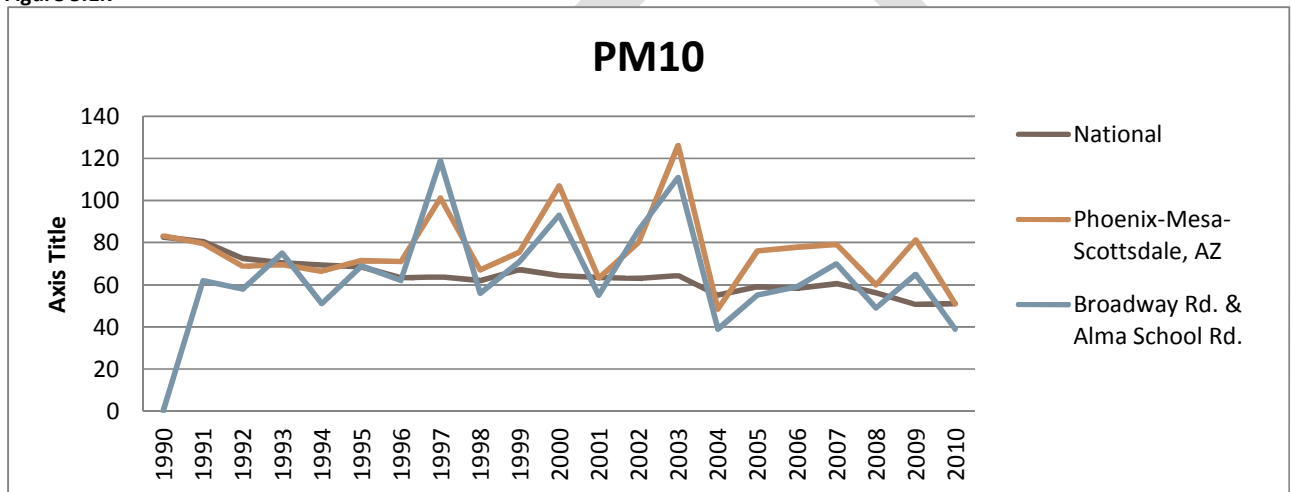


Figure 5.1.8

Key Analysis Point 2: Physical Environment

Overview Physical Environment Assessment

The physical environment of the study area is composed of a combination of residential, retail, commercial, educational, and manufacturing areas. The main arterial street is West Main which is the location of the light rail station. The Walkability and Bikeability of this area will be assessed through several methods.

Land use

Residential and commercial are the primary land uses in the SSSA. These uses are generally divided north and south of Main St. respectively. Figure 5.2.3 shows the concentration of small lot single family residential north of West Main. The large parcel in the southeast of the study area is East Valley Institute of Technology. There is also an elementary school located in the in the north of the Metro Park

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and Ride on the west side of Sycamore St, Webster Elementary School which includes a recreation center *Webster Gym & Recreation Center*.

Figure 5.2.4 shows a combination of industrial, warehouse, business park and multiple commercial zones. The majority of which are located south of West Main. The regional commercial zone located along the north side of West Main between Sycamore St. and N Dobson is an area of primary concern as a connection element between the residential neighborhoods located to the east and west. The permeability of this section could help to create a more cohesive neighborhood.

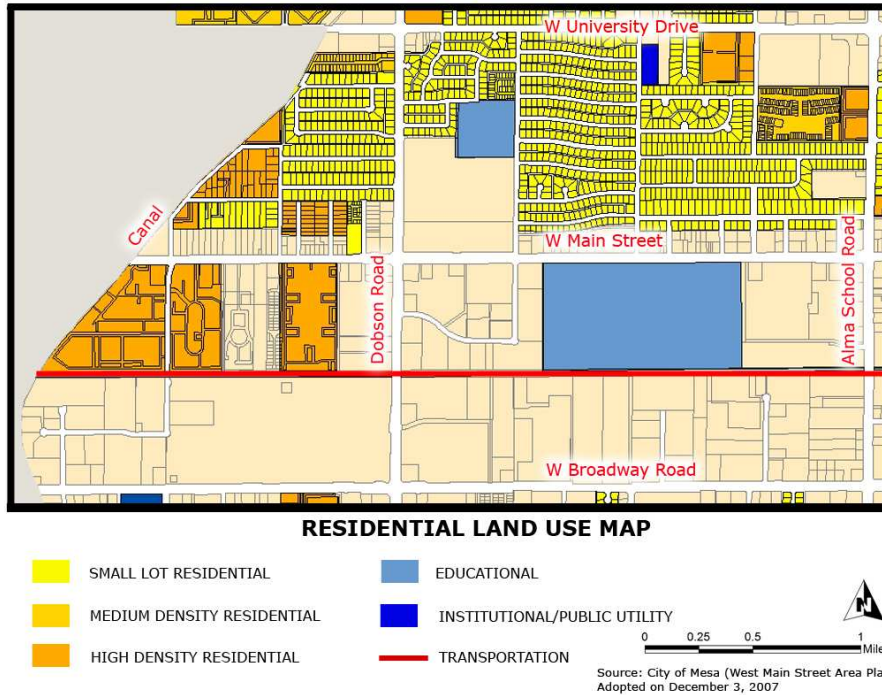


Figure 5.2.1

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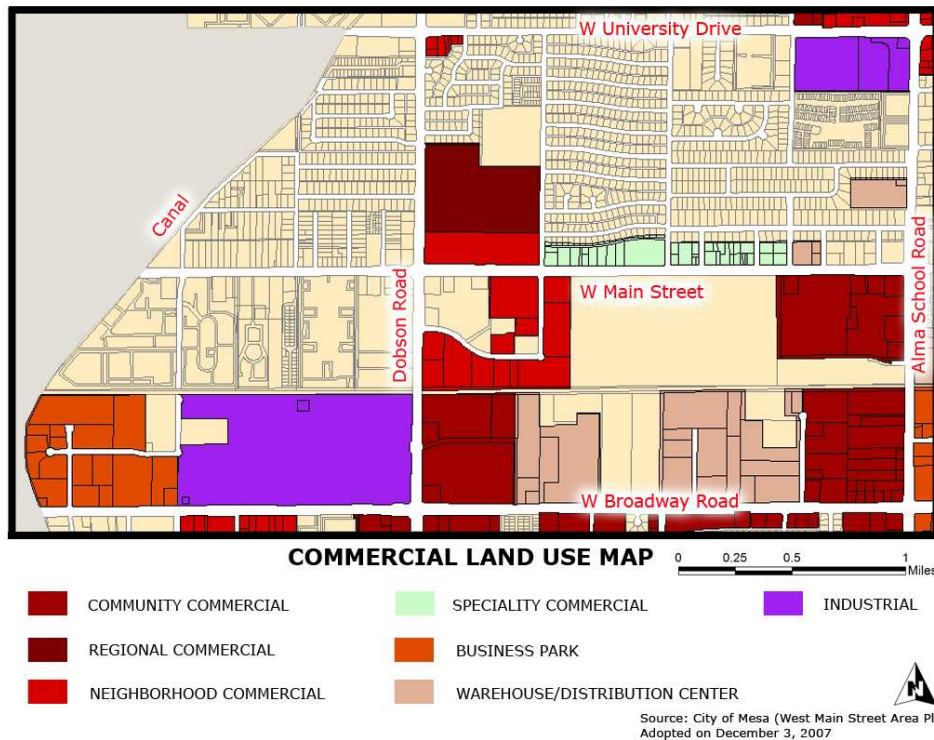


Figure 5.2.2

Parks and Open Space

While there are no formally designated parks in the study area, several are located just outside of the study area. The playground at Webster elementary is also used as a recreation center. This center has several programs in the evening and the facility is available for rent in the evenings and weekends.

There are also several vacant parcels located in the study area that could be used for recreational purposes. However, the area concentrated below West Main is mostly commercial and industrial space and public spaces may not be needed in that area.

Recommendation - Make the Webster Elementary School playground available to the surrounding neighborhood during non-school hours.

Rationale - The limited amount of open space available in the study area can be maximized by providing public access to school facilities after hours. This provides the neighborhood with a playground in the study area.

Recommendation - Identify vacant parcels in the study area, such as the parcel adjacent to Mekong Plaza, that can be developed as a park.

Rationale - The transformation of the vacant parcel adjacent to Mekong Plaza into a park will provide open space for the surrounding commercial site and the residential neighborhoods to the west. The placement of a park adjacent to the shopping center would also increase pedestrian activity at the plaza.

Sycamore Light Rail Station HIA

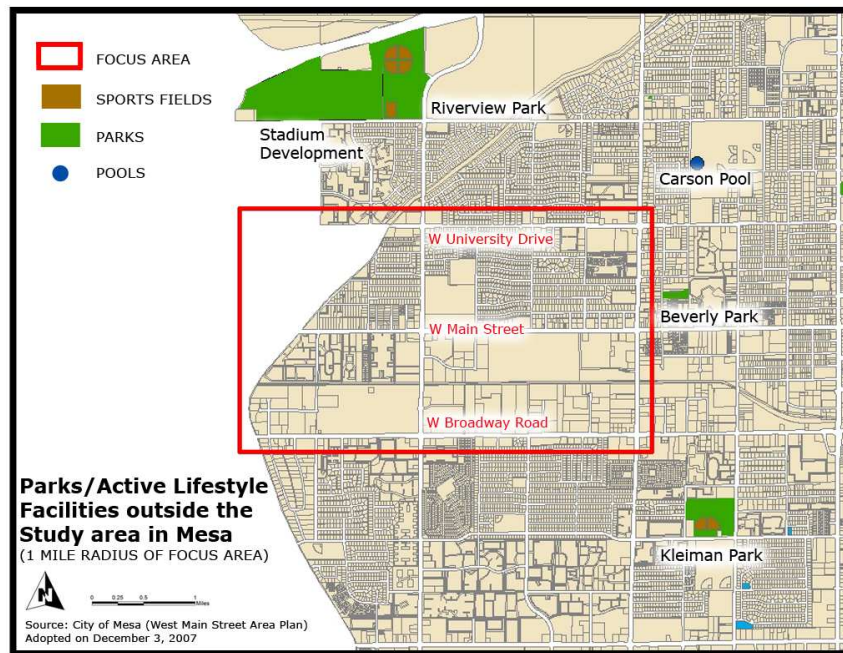


Figure 5.2.3

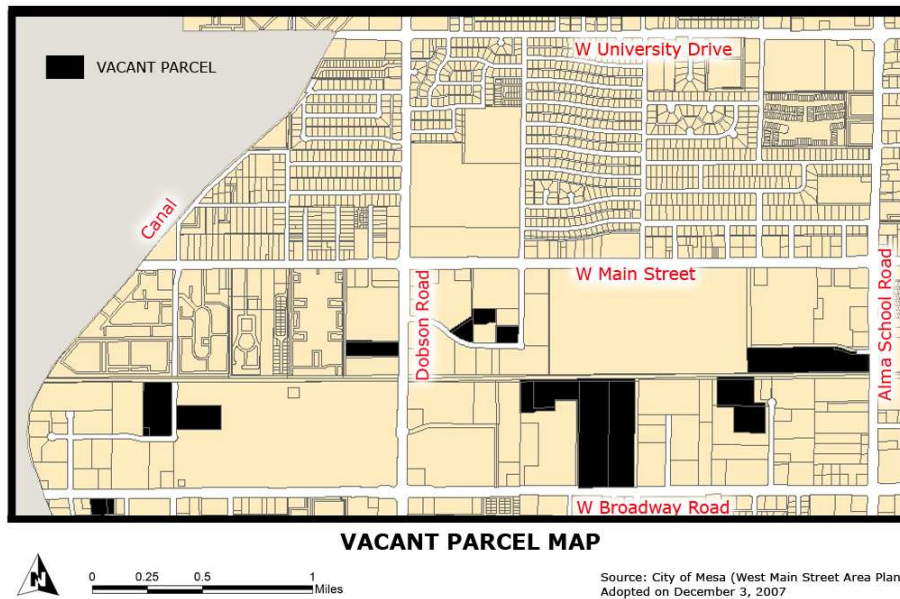


Figure 5.2.4

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Walkability

Walkability is determined ability of individuals to access basic services within $\frac{1}{4}$ to $\frac{1}{2}$ a mile of their home. These basic services include grocery stores (access to healthy Food), schools, parks, restaurants, and public transportation. Walking provides many health benefits from reducing blood pressure, managing weight, and staying fit. A common service used to determine this is walkscore.com. This service uses an algorithm to assign a given address a walkscore from 1 to 100 with 1 being total *car dependent* and 100 begin a *walker's paradise*. The walkscore for the Sycamore Light Rail Station was 71 or *very walkable*. The lowest score for Mesa is 53 and the highest is 79 which indicate that only 14% of Mesa has a higher walk score then the light rail station.

The list of amenities with the $\frac{1}{4}$ mile includes banking, schools, shopping, grocery, and restaurants. While this score does not consider the physical environment that the walker must traverse to reach these services it does indicate availability. The availability of services is the first step toward vehicle trip reduction and a healthier life style. A caveat to this analysis is that walkscore dropped significantly when calculated from the surrounding residential neighborhoods. The walkscores for the residences on 1st Street dropped to 57 *somewhat walkable*, while those on West Pepper Place dropped even more to 49 *car dependent*. (Walk Score, 2012)

Physical inactivity and a sedentary life style can be connected to such ailments as obesity and asthma. Walking provides daily exercise that can reduce these possibilities, yet Americans choose to use their car 66% of the time for all trips less than a mile and 89% of the time for trips from 1 to 2 miles. (Pucher & Dijkstra, Promoting Safe Walking and Cycling to Improve Public Health: Lessons From The Netherlands and Germany, September 2003) This choice can be connected to the perception of the environment, aesthetics of neighborhood and social influences.

An Australian study from 2001, reported that respondents were 40% less likely to walk if the environmental aesthetics was reported as low vs. those who gave high ratings to aesthetics. It also showed that individuals were 31% less likely to walk when walking for exercise without company or a pet. (Ball, Bauman, Leslie, & Owen, September 13, 2001) In a similar study men were in the highest category for walking if they perceived the neighborhood aesthetics as positive. Men and Women who did not perceive the weather as an inhibitor to walking tended to be *exercise walkers* and *high neighborhood walkers* respectively. (Humpel, Owen, Iverson, Leslie, & Bauman, 2004)

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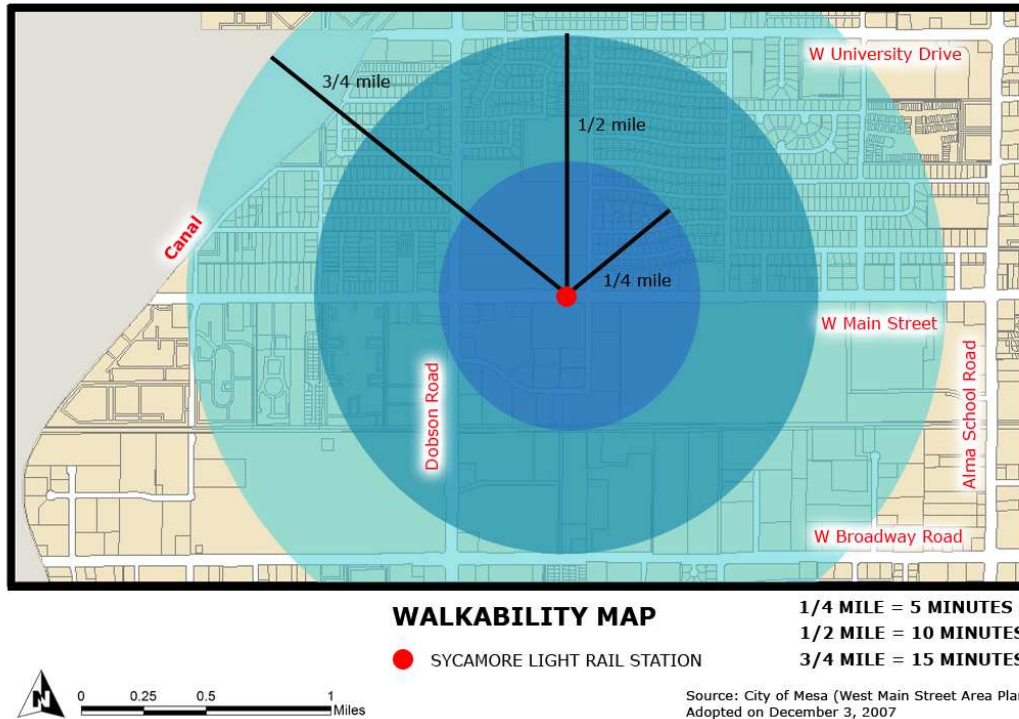


Figure 5.2.5

The use of a Walkability assessment was the second tool used to evaluate the study area. The selected tool was developed by the University of Delaware Institute for Public Administration. This tool uses 16 questions to aid in the assessment of a study area. The survey respondents indicated that the primary issues concerning walkability in the study area are the width of the streets in the area, the disconnected sidewalks, and insufficient curb ramps for pedestrians.

One of the key issues is the large commercial and educational (East Valley Institute of Technology) blocks that are surrounded by a sea of parking lots. There is a lack of a clear pedestrian path across the asphalt parking lot, which can achieve record temperature in the summer months, and is a deterrent to connectivity on the pedestrian scale. While the residential area provides sidewalks on either side of the street for use neither side is well shaded. Though the side walk is primarily in good repair throughout the study area there is a lack of street connectivity especially apparent as the residential streets intersect with the large commercial blocks.

Sycamore Light Rail Station HIA



Source: Google Maps

AREAS OF CONCERN

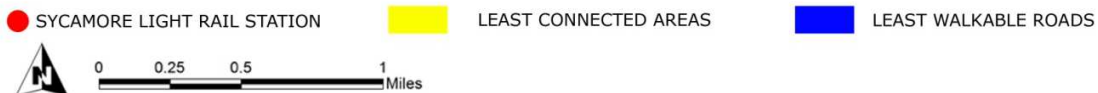


Figure 5.2.6

Enhance Existing Pedestrian Environment

Recommendation - Establish raised crosswalks/speed bumps where the residential street morphology intersects with the commercial morphology could act as a traffic calming measure as well as increase pedestrian activity in the commercial areas.

Rationale - The strengthening of the intersection between commercial and residential morphology can help to facilitate more walking trips by neighborhood resident. The increase in walking helps to reduce the effects of a sedentary lifestyle. The raised crosswalks help to slow traffic and ease the crossing for those with special needs.

Recommendation - Establishing clear pathways through the commercial site and connecting to the system of sidewalks.

Rationale - The integration of pathways through the commercial site would facilitate more foot traffic for the commercial tenants.

Recommendation - Provide shade through development of “areas of refuge” which are locations along the pedestrian path.

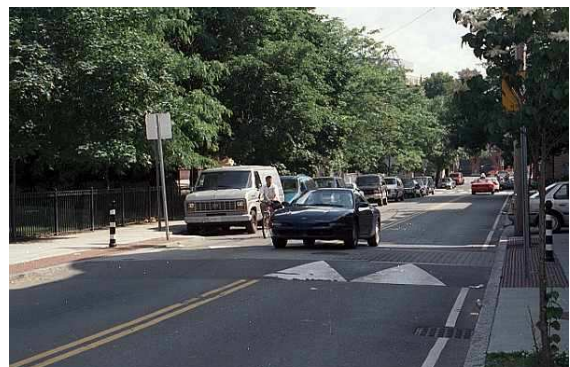


Figure 5.2.7 Raised Crosswalk

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Figure 5.2.8 Living Bench



Figure 5.2.9 "area of refuge"

Rationale - That provides a place to sit and rest out of the sun. These way stations would encourage more walking trips. The primary way station would be located at corners or midway in a block. These "areas of refuge" would provide relief from the effects of the heat exhaustion providing a place to rest. Locating these areas at corners adjacent to the commercial area may encourage more walking trips from the residential neighborhood. It also provides a greater sense of place for the community by through gathering nodes.

Recommendation - Remove obstacles that prevent pedestrian site access.

Rationale - Such as the guard rails on the south side of West Main opposite the light rail or the wall the separating East Valley Institute of Technology from the adjacent commercial area. Facilitating cross connection through the study area provides a pedestrian pathway and a potential increase in patronage by local residents and students from East Valley Tech.

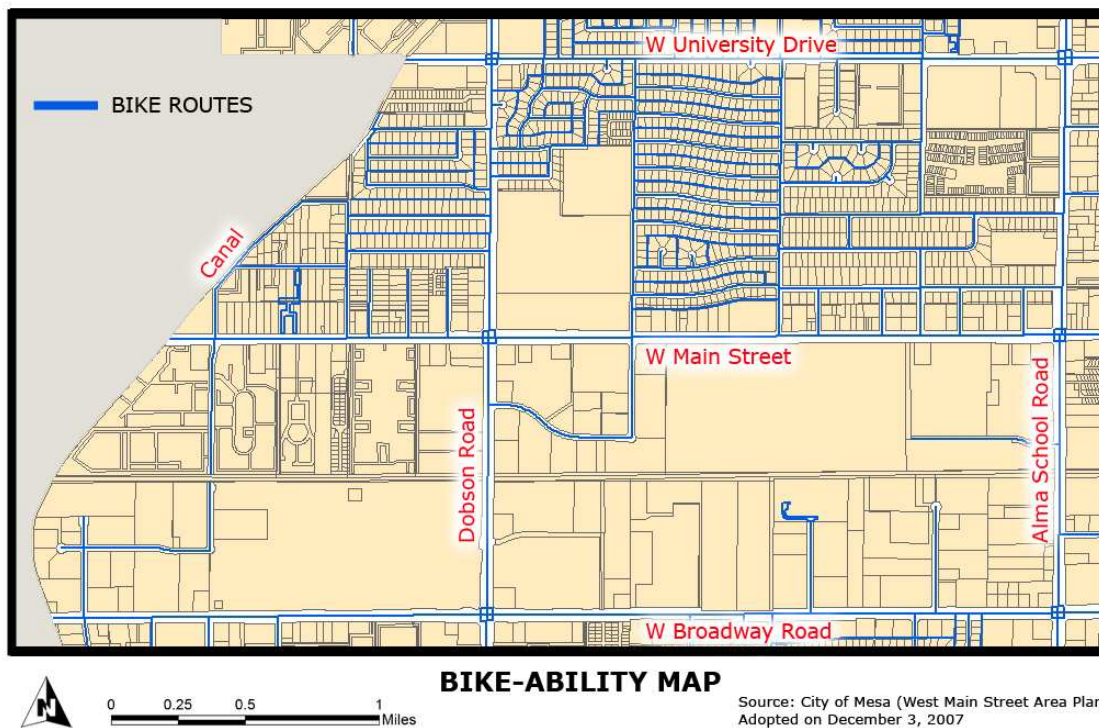
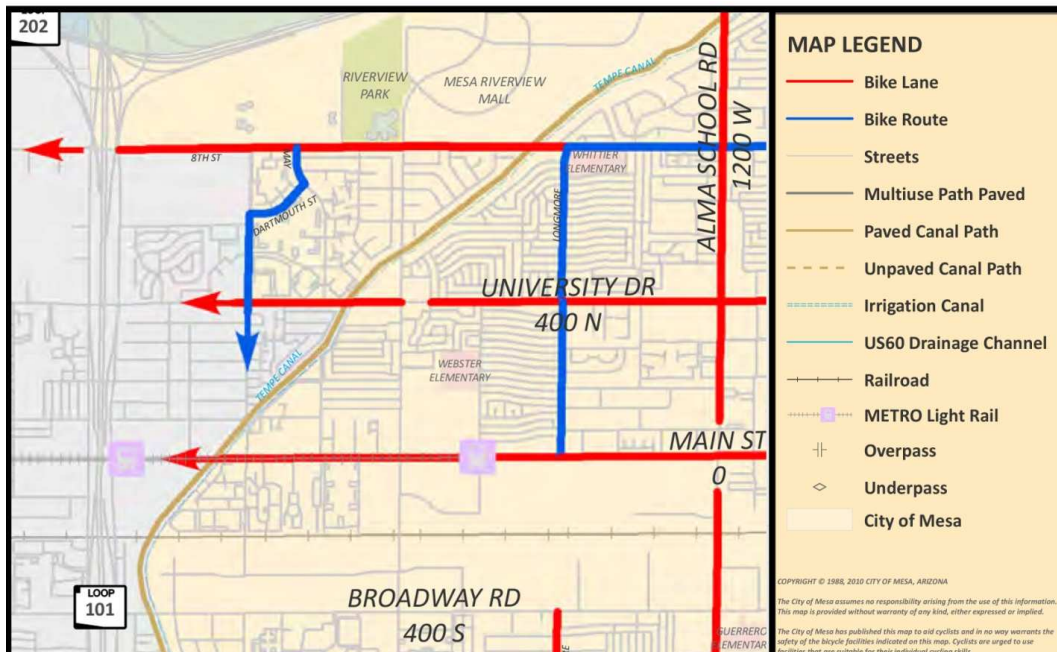
Bikeability

The Bikeability of the study area appears restricted to West Main Street which has a designated bike lane along the street which is a white line separating the cyclist from traffic. The area is lacking in any bike paths, bikeways, or multi-use paths. Will the inclusion of cyclist increase the availability of amenities located beyond the ½ mile range but with the

3 mile area but not located on a public transit route. The ability to take your bike on the light rail greatly increases the options of individual travelers. The maps below indicated both the proposed and existing bike routes for the city of Mesa.

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The health effects of cycling have a strong correlation with reduction in diabetes and obesity. The number of bicycle and foot trips can be directly connected to this reduction. (Pucher, Buehler, Bassett, & Dannenberg, October 2010) Yet we have seen a precipitous decline in cycling since 1949 at 37% to 2000 at 2%. (Carnall, 2000)



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Increasing Bikeability and Safety

Recommendation - Clearly designate bike lanes throughout the neighborhood to encourage cyclists.

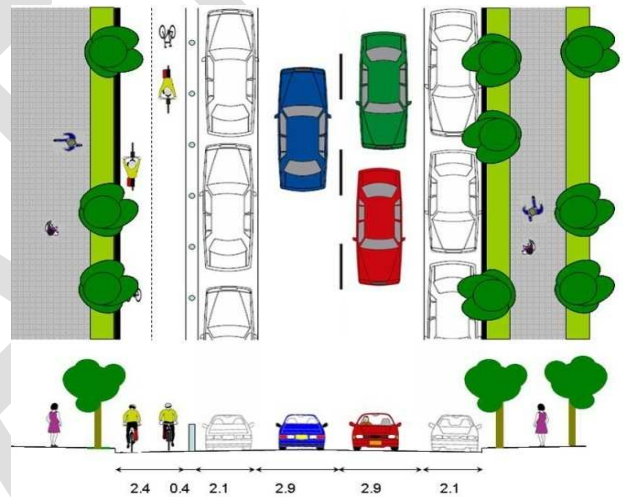
Rationale - Encouraging cycling provides alternative modes of transportation which helps to reduced pollution and increases the residents' physical activity. The creation of designated bike lanes also provides additional safety to cyclist by separating the rider from vehicular traffic.

Recommendation - Work with Webster Elementary School to put in place safe routes to school program to include the development of bikeways or paths to the school.

Rationale - This could be facilitated the eastern side by the inclusion of a bike way along Sycamore Avenue in the residential area. The creation of a bikeway in the eastern side of the street would not interfere with the movement of vehicles along the residential street but would provide a buffer route for children and cyclists.

Recommendation - Create bikeways by extending the current street grid from the residential areas west of North Dobson and east of Sycamore into the commercial site along West Main.

Rationale - The extension to the residential street grid into the super block creates a right way path for cyclist and pedestrians. This connection encourages more movement through the site reinforcing the connectivity of the study area.



Key Analysis Point 3: Crime and Accidents

Overview of Crime and Accidents

Crime in Mesa

The main types of crime that happens in Mesa are thefts, burglaries, assaults, and auto thefts all which are higher than the US average from the year 1999-2010. These are listed as less serious crimes rather than violent crimes such as murder, rape, robberies, and arson which are categorized under "other" in Figure 2 and only counts for 1% of crime in Mesa in 2010. Mesa also falls under having an average amount of crime compared to neighboring or near cities throughout the Phoenix metropolitan area.

Mesa has lower general crime statistics than Tempe, Phoenix, Casa Grande, and Glendale but is averaged around the same as Chandler, Gilbert, and Apache Junction as illustrated in Figure 5.3.2. Figure 5.3.1 shows the entire crime amount data of Mesa per 100,000 people for the year 1999-2010

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compared to the US average city population and explain that Mesa is above the US average crime rate every year but has been declining. The crime rate seems to be declining faster in Mesa than the US average crime rate even though both are falling.

| | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|--------|
| Murder | 9 | 15 | 17 | 22 | 14 | 22 | 29 | 26 | 22 | 16 | 14 | 15 |
| per 100,000 | 2.4 | 3.8 | 4.1 | 5.2 | 3.2 | 4.9 | 6.4 | 5.7 | 4.8 | 3.5 | 3 | 3.3 |
| Rape | 134 | 120 | 106 | 129 | 116 | 124 | 194 | 203 | 175 | 161 | 123 | 124 |
| per 100,000 | 36.4 | 30.3 | 25.9 | 30.6 | 26.6 | 27.9 | 42.9 | 44.2 | 38.5 | 35.2 | 26.1 | 27.4 |
| Robberies | 370 | 433 | 452 | 590 | 431 | 421 | 460 | 508 | 620 | 656 | 611 | 511 |
| per 100,000 | 100.4 | 109.3 | 110.2 | 140 | 98.7 | 94.6 | 101.7 | 110.5 | 136.4 | 143.6 | 129.8 | 112.9 |
| Assaults | 1619 | 1825 | 1941 | 2146 | 1785 | 1933 | 1597 | 1266 | 1407 | 1456 | 1252 | 1140 |
| per 100,000 | 439.3 | 460.9 | 473.4 | 509.1 | 408.9 | 434.4 | 353.1 | 275.4 | 309.5 | 318.7 | 265.9 | 251.8 |
| Burglaries | 3916 | 3720 | 4313 | 4957 | 4112 | 3682 | 2560 | 3283 | 2922 | 2866 | 3076 | 2711 |
| per 100,000 | 1062.6 | 939.4 | 1051.9 | 1175.9 | 941.9 | 827.4 | 787 | 714.2 | 642.8 | 627.4 | 653.3 | 598.8 |
| Thefts | 13833 | 15982 | 16121 | 20405 | 17452 | 15937 | 16263 | 14367 | 14063 | 12603 | 11700 | 11158 |
| per 100,000 | 3753.5 | 4035.8 | 3931.7 | 4840.5 | 3997.5 | 3581.3 | 3595.3 | 3125.3 | 3093.7 | 2758.8 | 2485 | 2464.6 |
| Auto Thefts | 2851 | 3430 | 4558 | 5086 | 4563 | 3745 | 4248 | 3654 | 2960 | 2047 | 1303 | 1007 |
| per 100,000 | 773.6 | 866.2 | 1111.6 | 1206.5 | 1045.2 | 841.6 | 939.1 | 794.9 | 651.2 | 448.1 | 276.7 | 222.4 |
| Arson | 49 | 62 | 35 | 67 | 45 | 52 | 52 | 38 | 54 | 73 | 85 | 59 |
| per 100,000 | 13.3 | 15.7 | 8.5 | 15.9 | 10.3 | 11.7 | 11.5 | 8.3 | 11.9 | 16 | 18.1 | 13 |
| | 462.5 | 478.2 | 502.8 | 581.5 | 473.2 | 438.8 | 445.5 | 394 | 384.2 | 350.4 | 302 | 286 |

Figure 5.3.1

Mesa, AZ City-data.com crime index compared to nearest cities:

(Note: Higher means more crime)

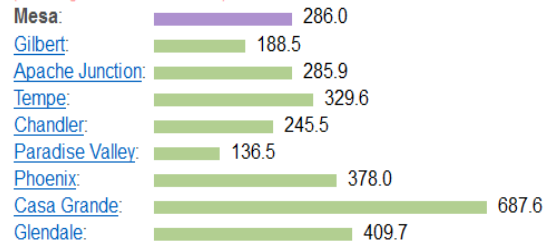


Figure 5.3.2

Accident Statistics of Mesa

The amount of fatal accident per 100,000 population of Mesa is lower than the Arizona average for all of the years 1992-2009 except for 2005 and 2006. Figure 5.3.3 shows that the amount of fatal accidents that were caused by drunken drivers per 100,000 people was also lower than the Arizona average from 1992-2009 except for 2005 and with the 2007 data missing. The trend of 2005 and 2006 being a particular bad year for Mesa accidents is again represented in Figure 5.3.5 which illustrates that while Mesa was still under the Arizona average of pedestrian fatalities involved in motor vehicle accidents the amount increased in those two years. It is unknown if there was an underlying cause for this statistic or if it is just an unfortunate anomaly but ever since 2005 the amount of fatal accidents of all types have

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fallen steadily. The closest accident to the study area happened at the intersection of South Extension Road and Broadway Road with no accidents occurring inside of the Study area.

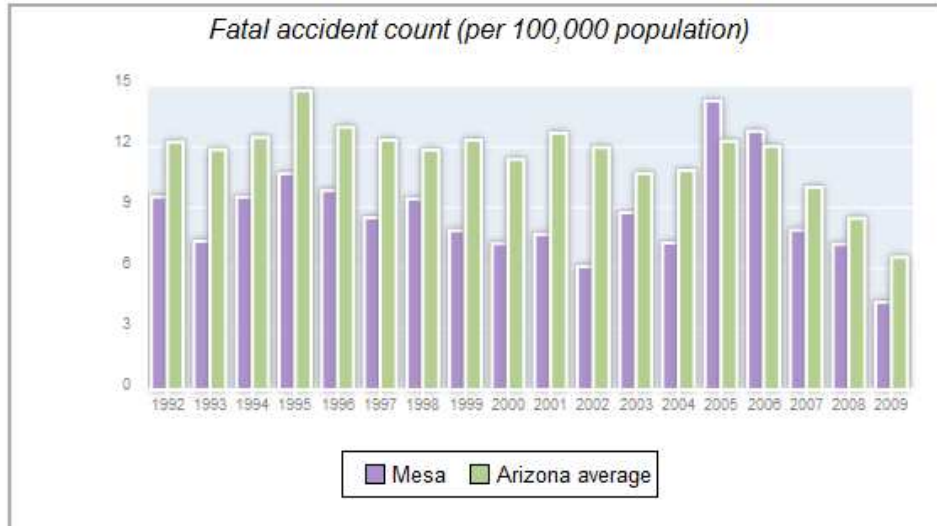


Figure 5.3.3

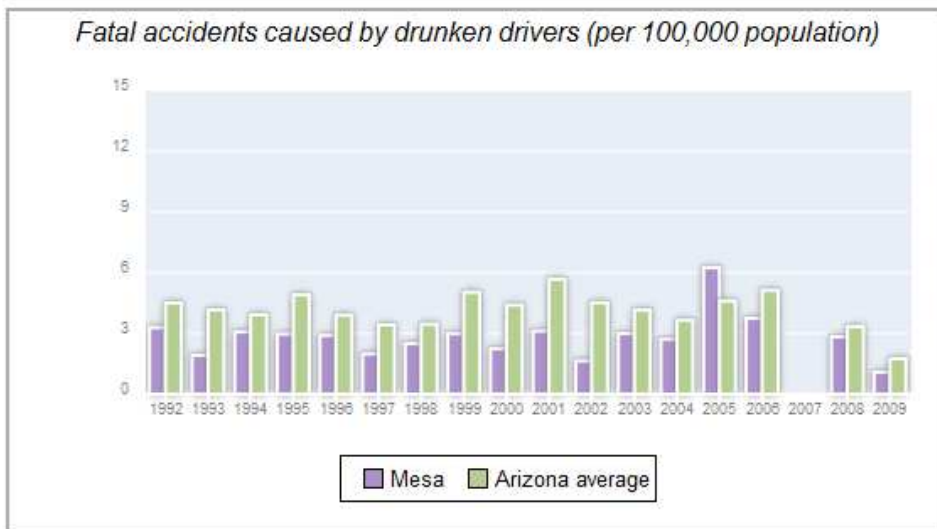


Figure 5.3.4

Sycamore Light Rail Station HIA

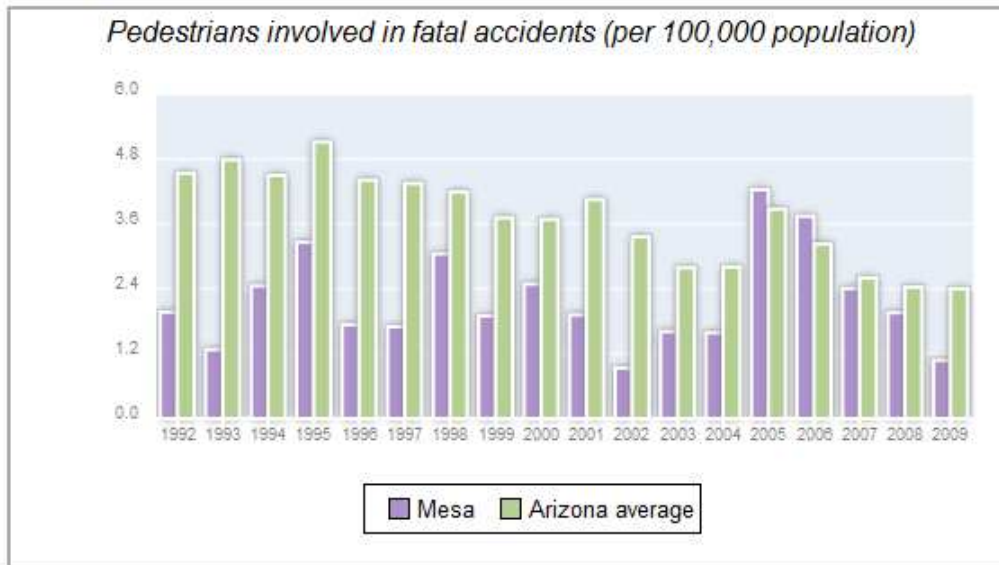


Figure 5.3.5

Recommendations - To reduce this number it is recommended that better lighting and crosswalk amenities, such as countdown timers, be installed at crosswalk intersections.

Rationale - While there have not been any fatal accidents in the study area for the past several years there are still fatal accidents in and around Mesa, around half of them involving pedestrians. Although recently all types of fatal accidents have fallen in number since 2005 to now less than 10 accident related deaths a year, that number can still be lowered with practical safety features.

Mesa Traffic Data

The traffic volume in the study area is approximately the same as the traffic volume average of Mesa. There are three main traffic areas indicated on Figure 5.3.6 starting from the left; 1) Dobson between Broadway & Main, 2) Main between Dobson & Alma School, and 3) Alma School between Broadway and Main. Dobson and Alma School are both major arterial streets which bring people from and to Mesa with additional use coming from the 101 Price Freeway and the 60 Superstition Freeway.

The traffic counts that are shown along Dobson Road for the entire day is 29,063 with the peak hour traffic for the AM time is 1,999 and the peak hour traffic for the PM time being 2,474. The amount of traffic along Alma School is 30,562 and the peak hour traffic for both the AM and PM times are similar to Dobson's peak hour traffic. The Main Street data between Dobson and Alma School is the closest to the Sycamore Light Rail station with almost half the amount of the previous traffic counts at 17,345 for the entire day. The peak hour traffic for the AM time was 1,169 and the PM time count was 1,430. These traffic counts were taken from 2010 and 2011 data.

Sycamore Light Rail Station HIA

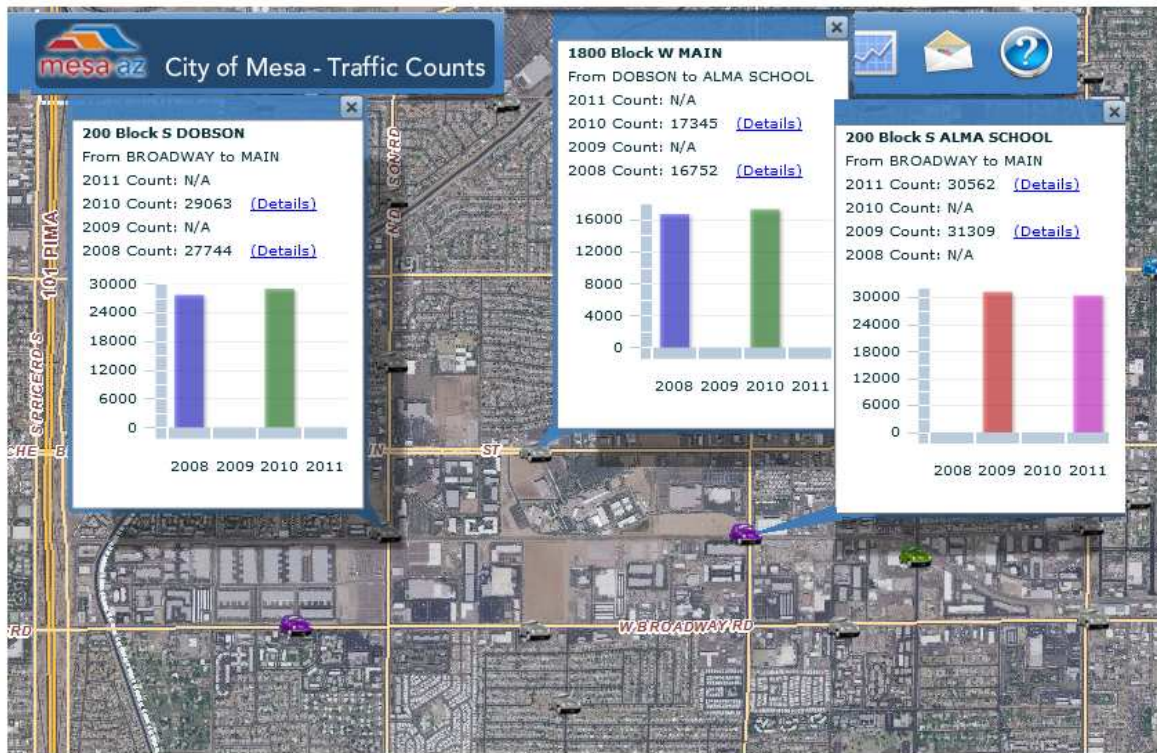


Figure 5.3.6

Figure 5.3.7
Mesa Volumes for: Tuesday, March 30, 2010
Location: Dobson between Broadway & Main

| AM Period | | | |
|--------------------|--------------|--------------|--------------|
| | NB | SB | Total Volume |
| Total | 6491 | 4455 | 10946 |
| Split % | 59.30% | 40.70% | 37.70% |
| Peak Hour | 7:30 | 11:30 | 7:30 |
| Volume | 1305 | 833 | 1999 |
| P.H.F. | 0.96 | 0.93 | 0.96 |
| PM Period | | | |
| | NB | SB | Total Volume |
| Total | 7902 | 10215 | 18117 |
| Split % | 43.60% | 56.40% | 62.30% |
| Peak Hour | 13:00 | 16:30 | 16:45 |
| Volume | 971 | 1592 | 2474 |
| P.H.F. | 0.95 | 0.94 | 0.98 |
| Daily Total | 14393 | 14670 | 29063 |

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Figure 5.3.8
Mesa Volumes for: Tuesday, April 20, 2010
Location: Main between Dobson & Alma School

AM Period

| | NB | SB | EB | WB | Total Volume |
|--------------------|----|----|--------|--------|--------------|
| Total | | | 2716 | 3572 | 6288 |
| Split % | | | 43.20% | 56.80% | 36.30% |
| Peak Hour | | | 11:30 | 7:45 | 11:30 |
| Volume | | | 596 | 668 | 1169 |
| P.H.F. | | | 0.98 | 0.96 | 0.96 |
| PM Period | | | | | |
| | NB | SB | EB | WB | Total Volume |
| Total | | | 6261 | 4796 | 11057 |
| Split % | | | 56.60% | 43.40% | 63.70% |
| Peak Hour | | | 16:45 | 14:15 | 14:30 |
| Volume | | | 854 | 665 | 1430 |
| P.H.F. | | | 0.96 | 0.91 | 0.97 |
| Daily Total | | | 8977 | 8368 | 17345 |

Figure 5.3.9
Mesa Volumes for: Wednesday, March 23, 2011
Location: Alma School between Broadway and Main

AM Period

| | NB | SB | EB | WB | Total Volume |
|--------------------|--------|--------|----|----|--------------|
| Total | 5595 | 5534 | | | 11129 |
| Split % | 50.00% | 50.00% | | | |
| Peak Hour | 6:45 | 11:45 | | | 11:15 |
| Volume | 1042 | 1112 | | | 2071 |
| P.H.F. | 0.8 | 0.93 | | | 0.93 |
| PM Period | | | | | |
| | NB | SB | EB | WB | Total Volume |
| Total | 8302 | 11131 | | | 19433 |
| Split % | 43.00% | 57.00% | | | |
| Peak Hour | 15:30 | 15:15 | | | 15:30 |
| Volume | 1101 | 1571 | | | 2647 |
| P.H.F. | 0.96 | 0.94 | | | 0.98 |
| Daily Total | 13897 | 16665 | | | 30562 |

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Recommendation - Supplement the extension of the light rail as it is extended with additional bikeways, bike lanes, and bike paths.

Rationale - Developing the bikeability and walkability of the study area further will encourage more people to walk and bike instead of drive which will relieve some traffic congestion. Improving the use of current modes such as biking or walking would decrease the traffic congestion on the arterial streets.

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Chapter 6: Conclusion and Recommendations

Health Impact Assessment for Sycamore Light Rail Station has been prepared to provide an evidence-based approach to ensure that potential impacts of new development plans are appropriately addressed before final decisions are made. Preparation of this HIA is comprised of Screening, Scoping, Assessing, Recommending, Reporting, and Monitoring the proposed Sycamore Station Study Area (SSSA). This SSSA is located west of Downtown Mesa and bounded on the north by University Drive, on the south by Broadway Road, on the east by Alma School Road and on the west by the Tempe Canal.

The Sycamore Station Study Area HIA has taken a unique approach and focused on three primary components that incorporate the assessment categories of Healthy Economy, Healthy Lifestyle, and Healthy Transportation. Through these categories, the HIA examines the health of the Sycamore Station Study Area in relationship to access to employment, healthy lifestyle facilities, healthcare services, and healthy food. Furthermore, the report includes the approach to mitigate urban heat island effects and transportation related noise, and illustrates support for walkable and bikeable environments.

HEALTHY ECONOMY

Chapter Three focuses on Healthy Economy within the Sycamore Light Rail Station Study area to address the existing economic conditions, access to employment, and potential for future development. The current physical conditions for the land uses are dominated with industry, retail, and secondary education in the area south of Main Street, while the north of Main Street is primarily residential with retail along corridors. Public spaces lack street furniture, prominent street trees, and canal oriented design. Within two square miles of the Sycamore Light Rail Station HIA study area, there is a total population of 10,111 people (5,006 per square mile). The largest cohort is found in the 18 to 34 year old demographic, which comprises 39.7% of the population

Land uses are isolated; light industrial, commercial and residential land uses are clustered in typical Euclidian zoning fashion. Currently, the isolation of uses promotes more automobile use and results in less interest in local connectivity for both economic and social benefits that mixed-used development is not noted for promoting. North Main Street is where residential land use is concentrated, predominately as detached single family. Retail is prominent at the intersection of Main Street and Dobson Road with Safeway and Mekong Plaza acting as large grocer anchors. A variety of businesses provide a number of employment opportunities. However, adjacent neighborhoods lack direct connectivity to the canal, as is typical for most canals in the Phoenix-Mesa metropolitan area.

With 6,958 adults between the age of 18 and 64 residing within the study area; there are 4,632 people who have access to the employment opportunities within the area. Along with retail services, there are neighborhood services such as restaurants, bars, and grocery stores. The north and south street corridors offer little retail within the study area itself. Dobson Road offers access to retail ½ mile north of the study area at Mesa Riverview shopping center with a variety of retail options including Home Depot, Wal-Mart, Bed Bath & Beyond, Bass Pro Shop and more.

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The last portion of Chapter Three addresses the near-future development within the Sycamore Light Rail HIA Study Area. One significant impact that the area will experience is the extension of the light rail. The main concern might arise is the negative economic impacts that local business may suffer during the construction period. Concerns regarding the proposed light rail are numerous from economic, quality of life for residents, to concerns for urban form and parking.

The proposed first floor retail development raises questions for the market demand for more retail space at the intersection that already has a concentration of retail space with high vacancy rates. The concentration of density may also be troubling to the character of the neighborhood and has potential for congestion at the site. However, positive impacts could come in nearby development plans that start of Wrinleyville West's construction a half-mile north of the study area that might offer seasonal or year-around employment opportunities and potential for expanding leisure and hospitality business.

Recommendations

Recommendation

Improve public space that connects commercial land uses and residential neighborhoods. Prioritize projects that improve walkability and pedestrian comfort.

Rationale

Research shows economic development can be generated by public investments (Chapin, 2002). Walkability is an active form of transportation that will encourage healthier lifestyles and reduce automobile dependence while cutting air pollution from car exhaust.

Recommendation

Promote Transit Oriented Development (TOD) with urban design elements to promote pedestrian friendliness and exploration. Utilize more form-based coding during infill development and site retrofitting.

Rationale

The extension of the Light Rail will only give local residents more transit access. To morph into a TOD destination, pedestrian activity will have to be prioritized. Vacant land serves to impede the pedestrian network without interesting amenities along the route.

Recommendation

Build off of the current strengths in the area like Mekong Plaza.

Rationale

Improving the land economics of the area has to start where the demand is greatest with optimal chance to build synergy between commercial and public destinations. Mekong Plaza has fewer land owners to cooperate with to generate retrofit strategies. Such goals and conditions offer a feasible opportunity for a public-private partnership.

Recommendation

Encourage mixed use development by providing incentives that facilitate the development process.

Rationale

Mixing uses bring destinations and amenities into closer proximity and avoids large swaths of land dedicated to only one use. This recommendation goes beyond the current TOD housing project that is slated to be developed near the Sycamore Light Rail station. Mixed use development often requires

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sophisticated financing. The city should seek policies to reduce financial risk and operation costs for favorable development described by this and other recommendations found in the HIA report.

Recommendation

Adopt a Complete Streets Policy.

Rationale

Complete streets claim economic benefits and improved overall quality-of-life for local residents and business owners by encouraging activity by offering safe pedestrian environments with ample connectivity to optimize land use synergy. Strategies include, but are not limited to: tree-lined streets, wide sidewalks, street furniture, bike lanes, prioritized public transit, and perceivably safe crosswalks.

Recommendation

Reduce quantity for parking space requirements and encourage improved parking lot design.

Rationale

Shaded parking lots are more attractive and more desirable for users while helping to mitigate the UHI effect that is critical to the Phoenix-Mesa area. Shade comes in a variety of forms, from trees to built shade structures. Vegetation requires planters that can double as water runoff collectors. Pervious parking surfaces with vegetation will reduce the UHI effect, thus cooling the microclimate and mitigating the risk of adverse health effects from heat waves while recharging groundwater.

Recommendation

Encourage low-cost healthcare providers through aid programs or alternative business models.

Rationale

The poverty rate of the study area indicates that healthcare will be out of the reach of many working poor in the area. Lower socio-economic populations are hit the hardest by having to take time off of work due to illness, oftentimes in employment that lacks the benefit of paid time off.

Recommendation

Special attention should be given to the thermal comfort of the transit stops.

Rationale

Lower socio-economic populations use public transit more often than the general public. Investment in thermal comfort in the transit stations will have a positive impact to the rider's quality of life in Mesa's unforgiving summer heat, encouraging an active public presence.

Recommendation

Encourage more entertainment and nightlife amenities in the area by setting development guidelines (or making flexible regulations) to facilitate locations and operational conditions sought by such entrepreneurs. Development scale, signage, and business licensing are all potential avenues for reform.

Rationale

Community identified long term goals for nightlife in the West Main Street Area Plan adopted in June 2006. No noticeable progress has been made in this respect. Entertainment amenities also score well in Walkscore methodology under the theory that it promotes a more walkable urban network with an attractive mix of amenities (walkscore.com).

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HEALTHY LIFESTYLE

As with many neighborhoods and areas in the City of Mesa and Maricopa County, health conditions for the Sycamore Station Study Area population leave much to be desired in relationship to rates of childhood and adult obesity. Rates of heat deaths appear to be increasing from year to year, along with 6.5% percent of Sycamore Station Study Area residents having asthma, one of the highest categorical levels in the County. The case presented in this Chapter is that health conditions for the Study Area support the call for improvements in access to health services, access to places for recreation and healthy foods, and reduction in urban thermal environment conditions that lead to urban heat island risks.

Of the five key analysis points examined in this chapter, access to basic health care services is considered above average due to the Study Area's close proximity to Banner Desert and an urgent care center located on the south side of the Safeway Shopping Center. At the same time, the site is lacking in other forms of care such as mental health, emotional health and chemical dependency, with these types of mental and emotional healthcare playing a critical role in residents' overall well being. While the Study Area benefits from the presence of the Webster Gym and Recreation Center, the lack of public open space and parks in the Study Area creates severe limitations on access to recreation for residents.

This lack of open space and public parks also contributes the Urban Heat Island Effect which presents a serious risk to residents through exposure to higher temperatures that induce dehydration, heatstroke and sometimes death. Urban heat island conditions in the Study Area are exacerbated by the high percentage of impervious paving in the area (shown as almost half of the land area), lack of adequate vegetation levels throughout most neighborhoods (other than the multifamily areas and EVIT campus), and the aging condition of the 50's era single family neighborhoods and older commercial properties along Main Street. All indicators cited above are made more serious through lack of coping resources for residents that come in the form of access to public swimming pools, energy efficient air conditioning systems and advanced heat watch/warning systems.

The issue of access to health foods is complicated for the Study Area due to the perception that the area is well served by the "node" of food stores in the area of the Safeway Plaza and Mekong Plaza. The reality is that the Study Area is lacking in diversity of food choices, with a preponderance of fast food outlets and lack of fresh food and local food markets. Another critical problem compounding the lack of diversity issue is the lack of access to transportation, with the "node" of food stores not falling within the ¼ mile walkability radius for the majority of Study Area residents.

Recommendations: Improving Access to Healthcare Facilities and Expanding Recreation

Recommendation – Encourage organizations that provide healthcare services to the community to locate in either the ground level retail of proposed developments near the Station or in the vacant retail of sites near the Station.

Rationale – By fostering health services in public spaces, the residents of the study area will have better access to the types of healthcare that are not currently available in the area such as substance abuse and counseling services.

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Recommendation – Allow greater access to the Webster Gym and Recreation Center to a more diverse group of groups and organizations.

Rationale – The Webster Gym and Recreation Center is a tremendous asset to the study area. The City should consider making it more available to a diverse group of community organizations; this would help to build a greater sense of community in the area.

Recommendation – Consider converting part of the Valley Metro parking lot into a small park for the neighborhood.

Rationale – The study area is lacking in parks and open spaces. With light rail being extended farther into Mesa, there will no longer be a need for an 800-space park and ride parking lot, and this can provide a prime location for a neighborhood park.

Recommendation – Identify sites that can potentially be used for recreation facilities to provide a park within ¼ mile of every resident.

Rationale – The Webster Gym and Recreation Center is a valuable resource for the neighborhood. However, additional recreation facilities in the SSSA would promote increased physical activity, which would result in increased overall health for the residents of the area.

Recommendation – Study the feasibility of converting the alley system into a network of urban trails.

Rationale – Another way to generate open spaces would be to convert the existing alley network, which is currently unused, into a network of urban trails. This could be a unique feature for the area and one that would generate increased socialization within the neighborhood.

Recommendations: Mitigating Urban Heat Island Effect

Urban Heat Island assessment data for the Sycamore Study Area suggests that a healthier Sycamore Station neighborhood can be accomplished by reduced exposure of citizens to high temperatures and heat wave events, and suggests policies should be put in place to reduce residents' exposure to high temperatures during the summer. Mesa planners and leaders can focus on reducing urban heat island conditions in the Sycamore Station Study Area by focusing on recommendations for improving economic, thermal environment and coping resource conditions.

The heat absorptive conditions of buildings and man-made ground surfaces can be reduced. Urban heat island conditions can also be tempered by increasing vegetation levels, increasing open space conditions and reducing greenhouse gas emissions. The health effects of urban heat island conditions can be mitigated through access to coping resources in the form of strengthened social networks and social systems. Policies should be put in place for the Sycamore District that will reduce citizens' exposure to high temperatures and heat wave events during the summer months.

Thermal Environment Recommendations

Recommendation – Identify opportunities for creating public open space(s) in the Sycamore Study area consistent with this goal as identified in the West Main Street Area Plan (pg. 51)

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Rationale – With the lack of open space and low level of vegetation in the Study Area, development of new public open space amenities can improve heat island conditions through reduction in densities and increase in vegetative levels (within the open spaces). Canal frontage on the Mesa side can be developed into a continuous, green open space amenity that can link with a general “greening up” of the Main Street “open space” corridor as it is redeveloped. This is consistent with the West Main Street Area plan that calls for Main Street to provide a pedestrian friendly environment with shade, landscaping and open spaces (pg. 73 and 76). Development of pocket parks should be pursued for the Study area, with the West Main Street Area plan calling for “publicly accessible pocket parks and plazas with quality amenities” to be encouraged in light rail station areas.

Recommendation – Increase vegetative levels within public space and within private property.

Rationale – Recent Phoenix research studies on urban heat island show that abundance of vegetation provides mitigation for urban heat island conditions. The lush character of the EVIT and multi-family campuses within the Study area provide local examples for heat reduction. A serious effort should be mounted by the City to assist single family home owners with improvement of their yards to include introduction of new trees and shrubs, with a focus on drought-tolerant species that can reduce water use. Commercial and industrial property owners should be required by zoning codes to provide appropriate UHI mitigating landscape systems for their properties.

Recommendation – Increase use of reflective roofing and paving materials with the Study Area.

Rationale – Increase of reflectance levels within the Study area, both through strategic use of reflective roofing materials on buildings and light colored paving systems within parking lots, will do much to reduce urban heat island conditions within the Study Area. With the large percentage of impervious and bituminous paving and dirt lot areas (+ / - 50% of study area), the Study area is highly challenged and subject to heat risks during summer months. A potential policy could look to property owners within the Study area receiving incentives for the installation of reflective roofing and paving materials.

Recommendation – Prepare standards that reduce the amount of impervious, paved surfaces within the Study Area.

Rationale – Fifty percent of the Study is paved with impervious materials or is unpaved, dirt lots. The extremely high percentage of heat trapping bituminous paving material within the area is leading to heat island risks and threats. The City of Mesa should consider amendments to current zoning standards for parking standards that can be applied to the Sycamore Station Study Area and address this critical problem through restrictions on impervious and bituminous asphalt paving areas and requirements for more reflective paving systems. Parking standards documented in the West Mesa Area Plan call for creation of alternative parking arrangements to support pedestrian friendly environments (podium parking, parking garages, underground garages; pg. 68); these standards should be applied to the Study Area.

Recommendation – Incorporate building standards that include shade layers and shade systems, both architectural and landscape in nature.

Rationale – City of Mesa codes and guidelines should further enforce development of shade layers as a critical design language for the community, with standards reinforced through documentation in the

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Form Based Code. Current shade standards documented in the City's "Desert Uplands Guidelines" and West Main Street Area Plan should be expanded for application to the Sycamore Station Study Area. The development of shade layers for all types of properties reduces exposure of buildings and interiors to hot summer sun and heat loads. Installation of porch covers, roof overhangs, sun screen systems for glazed areas, and development of recessed openings within building skins should be supported by City zoning and form based codes. The first Study Area group that should be assisted with development of shade layers is the northern, single family residential property owners.

According to the West Main Street Area Plan, only 37% of housing units are owner occupied. This creates a challenge for investments in residential properties to meet the "shade layer" development goal; the City of Mesa should explore tax credit financing programs that can assist property owners with shade layer investments. Design guideline and code policies should also stress the need for creating comfort for pedestrians through provision of shaded sidewalks and public areas along streets and walkways within private developments. Increase in shade layers and systems throughout the Study Area not only mitigates UHI conditions, but also results in energy savings to building owners, a nice "win win" scenario.

Coping Resource Recommendations

Recommendation – Develop a program to encourage use of energy efficient air conditioning systems by all property owners in the Study Area.

Rationale – Access to central air conditioning is a must for all City of Mesa Residents, with lack of AC systems and reliance on old AC systems creating unhealthy population conditions that lead to increased community costs for medical services.

Recommendation – Develop more public swimming facilities in the Study area.

Rationale –Based on aerial photography, it appears that the Sycamore Study has a total lack of swimming pools. Development of a public swimming center should be a first strategy for improving coping resource access in the Sycamore Study area, with this new amenity providing opportunities for strengthening of social ties, another risk reduction strategy for urban heat island conditions.

Recommendation – Develop a heat watch/warning system.

Rationale – The City of Mesa provides emergency preparedness information and access to an Emergency Alert system, but does not appear to have a detailed heat watch/warning plan for the City. With the predominance of heat risk conditions in the Sycamore Study area, residents should be provided with access to the most critical coping resources including heat watch / warning systems and ready access to medical care.

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HEALTHY TRANSPORTATION

This last chapter covers three Key Analysis Point factors to include Environmental, Physical Environment Assessment, and Crime and Accidents. The system of transportation poses many environmental side effects which can cause serious safety hazardous as well as physical and mental problems for the local population. The most applicable environmental considerations for the Sycamore Light Rail HIA study area are noise level, light, and air quality. The noise level can affect the ability of individuals to communicate which detracts from social cohesion of a share experience as passengers develop relationship with their fellow commuters. The noise level for a normal conversation at 3'-5' is 60-70 dB (Decibels). Currently, the measured noise level along the corridor of the study area is reported to be 82 during the day time and 76 dB at night time. The normal noise levels for city traffic is below the 90 dB-95 dB. Based on these measurement, the current noise level would have to increase by 10dB or grow twice as loud to cause hearing loss. The physical health effects from exposure to elevated noise levels can include cardiovascular problems, high blood pressure, and increase heart rate.

Light pollution is often considered only on a larger scale at a regional level with the initiatives focus on the effects of disruption of ecosystems and affects on human circadian rhythms. The study area proximity to Phoenix has been placed in the highest category concerning light pollution which is 8 or 9 on the Bortle Dark-Sky Scale indicating that the sky is primarily grey or white with only the moon, planets, and the brightest stars visible. The level of high light pollution is also related to street safety to suggest the presence of street level lighting increase the individual sense of security and also, increase the level of daytime accidents while decrease the level of nighttime accidents. The research concludes that the presence of street light has the benefit of reduction of accident overall and provides a benefit primarily at the intersection.

The air quality data monitoring Sycamore Light Rail Station at Broadway Road and Alma School Road provides measurement of four pollutants that include carbon monoxide, ozone, and particulate matter at 2.5 and 10. Carbon monoxide is a common form of fatal air pollution causing such symptoms as headache, nausea, and dizziness. Ozone has been linked to "developmental , inflammatory, carcinogenic/mutagenic, and cellular outcomes" through short and long term exposure. Particulate, on the other hand, is measured in two sizes fine particles 2.5 micrometers and inhalable course particles at 10 micro meters. The particulate matter is connected to a series of ailments from asthma to premature death through lung and heart disease.

The other key point covered under this last chapter is a physical environment of the study area which is composed of residential, retail, commercial, educational, and manufacturing areas. The Walkability and Bikeability of the Sycamore Station Study Area have been assessed through Land Use and Parks and Open Space. The Walkability is determined ability of individuals to access basic services within 1/4 to 1/2 a mile of their home. The measurement of Walkability utilizes an algorithm to assign given address walkscore from 1 to 100 with 1 being total car dependent and 100 begin a walker's paradise. The walkscore for the Sycamore Light Rail Station was 71 or very walkable. The lowest score for Mesa is 53 and he highest is 79 which indicates that only 14% of Mesa has a higher walk score than the Light Rail Station. Physical inactivity and sedentary life style can be connected to such ailments as obesity and asthma. Walking provides daily exercise that can reduce these possibilities and hence, it is the first step towards vehicle trip reduction that helps to improve our environment.

Residential and Commercial are the primary Land use for in the Sycamore Station study area. These uses generally divided north and south of Main Street. Also, other land use include combination of industrial,

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warehouse, business park, and multiple commercial zones; majority of which are located south of West Mesa. The regional commercial zone located north of west Main Street is an area of primary concern as a connection element between the residential neighborhoods located to the east and west.

While there no formally designated parks and open spaces within the study area, several are located just outside of the study area. The playground at Webster Elementary is also used a recreation center. There are also several vacant parcels located in the study area that could be used for recreational purposes. However, the area concentrated below West Main Street is mostly commercial and industrial space and public space may not be needed in that area. The permeability of this section could help to create a more cohesive neighborhood.

Crime and Accidents is the last key analysis point from this chapter. The main types of crime that happens in Mesa are thefts, burglaries, assaults, and auto thefts all which are higher than the US average from the year 1999 to 2010. In general, Mesa falls under having an average amount of crime compared to neighboring or near cities throughout the Phoenix Metropolitan Area. Mesa has lower general crime statistics than Tempe, Phoenix, Casa Grande, and Glendale but is averaged around the same as Chandler, Gilbert , and Apache Junction. The entire crime rate of Mesa per 100,000 people for the year 1999 - 2010 compared to the US average city population, shows that Mesa is above the US average crime rate every year but has been declining. The rate declining faster in Mesa than the US average crime rate even though both rates are falling.

Accident Statistics of Mesa suggests the amount of fatal accident per 100,000 population is lower than the Arizona average for all of the years 1992-2009 except for 2005 and 2006. The amount of fatal accidents that were caused by drunken drivers per 100,000 people was also lower than the Arizona average from 1992-2009 except for 2005 and with the 2007 data missing. The closest accidents to the study area happened at the intersection of South Extension Road and Broadway Road with no accidents occurring inside of the study zone.

The traffic volume in the study area is approximately the same as the traffic volume average of Mesa. There are three main areas that include Dobson and Alma School arterial streets which bring people from and to Mesa with additional use coming from the 101 Agua Fria freeway and the 60 Superstition freeway. Also, Main Street between Dobson and Alma School is another arterial that is closest to Sycamore Light Rail Station with almost half the amount of the previous traffic counts.

The recommendations for each Key Analysis Point are presented for review by the City of Mesa, in hopes that new programs, policies and projects can emerge to move towards creating conditions in the Sycamore Station Area that will lead to healthier lifestyles for area residents.

At the end of this conclusion page, the report includes six primary recommendations that are posited for immediate action by the City of Mesa.

REDUCING NOISE AT THE STATION

Recommendation - Construct a noise barrier between the light rail station and the street to block direct line of sight, diffusing the noise pollution.

Rationale - This could be accomplished through the use of an acoustic curtain often used on construction sites and in underground rail stations to minimize the effects of noise. The creation of a noise barrier around the station fosters an atmosphere of communication between commuters. The creation of a noise reduced environment would help to alleviate the negative social behaviors from

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increased noise levels. It will also reduce exposure to the high volume of noise experienced by commuters which can over time cause hearing loss. Such a barrier must also take security concerns into consideration by making the station platform less visible from the sidewalk and the street.

Recommendation - Increase the amount of vegetation and foliage around the residential neighborhoods to reduce noise levels.

Rationale - Decreased the ambient level noise experienced by the resident reduced sleep disturbances and the negative health effects associated with it. Every 30 feet of foliage equal a decrease of 5dB in ambient noise. It also supports a better learning environment for children.

DECREASE AND FOCUS LIGHTING AROUND THE STATION

Recommendation - Incorporate additional lighting at the intersections and crosswalks and reduce lighting leading up to the station area and along adjoining streets.

Rationale - The existing and new lighting should have a more focused area of illumination. Shielded lighting prevents the creation of deep shadows by providing more crisp illumination adding in security concerns. While lighting is needed to provide a safe environment at night it can severely affect the circadian rhythms. So the restriction of street lighting to intersection may provide an alternative to blanket lighting throughout the street network. Shielding the light source helps to bring the intersection and the pedestrian into focus compared to the current more diffused lighting scheme.

REDUCE VEHICLE POLLUTION

Recommendation - Restrict heavy vehicle traffic particularly diesel (trucks, construction vehicles, buses) to help to reduce the particulate matter and over all air pollution along the light rail route.

Rationale - The presence of diesel exhaust contributes to the airborne particulate matter. Though the daily commute represents only 6 percent of the day it is the time at which people receive half of their exposure to fine particulate matter. So a reduction of the particulate pollution along the light rail path would significantly contribute to reduced exposure. (Schneider & Hill, 2007)

Recommendation - Provide priority parking area for low emission vehicles at the Metro Park and ride.

Rationale - By prioritizing low emission vehicles will reduce carbon monoxide and the health risk associated with exposure.

Recommendation - Provide a charging station for electric vehicles to further reduce air pollution in the study area.

Rationale - By prioritizing electric vehicles the exposure to particulate matter and carbon monoxide is reduced.

Enhance Existing Pedestrian Environment

Recommendation - Establish raised crosswalks/speed bumps were the residential street morphology intersects with the commercial morphology could act as a traffic calming measure as well as increase pedestrian activity in the commercial areas.

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Rationale - The strengthening of the intersection between commercial and residential morphology can help to facilitate more walking trips by neighborhood resident. The increase in walking helps to reduce the effects of a sedentary lifestyle. The raised crosswalks help to slow traffic and ease the crossing for those with special needs.

Recommendation - Establishing clear pathways through the commercial site and connecting to the system of sidewalks.

Rationale - The integration of pathways through the commercial site would facilitate more foot traffic for the commercial tenants.

Recommendation - Provide shade through development of “areas of refuge” which are locations along the pedestrian path.

Rationale - That provides a place to sit and rest out of the sun. These way stations would encourage more walking trips. The primary way station would be located at corners or midway in a block. These “areas of refuge” would provide relief from the effects of the heat exhaustion providing a place to rest. Locating these areas at corners adjacent to the commercial area may encourage more walking trips from the residential neighborhood. It also provides a greater sense of place for the community by through gathering nodes.

Recommendation - Remove obstacles that prevent pedestrian site access.

Rationale - Such as the guard rails on the south side of West Main opposite the light rail or the wall the separating East Valley Institute of Technology from the adjacent commercial area. Facilitating cross connection through the study area provides a pedestrian pathway and a potential increase in patronage by local residents and students from East Valley Tech.

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RECOMMENDED ACTION STEPS

| ISSUE | RECOMMENDATIONS | RATIONALE | ACTION STEPS | |
|---|--|--|---|--|
| | | | POLICIES | PROJECTS |
| Access to Healthy Food | Identify sites within the study area that have the potential to serve as farmers' markets and community gardens, providing access to healthy food for residents. | There are significant areas of impervious pavement and dirt lots (approx. 50% of land area) that can be considered for temporary uses such as farmer's market or community gardens. | Establish policies that encourage temporary use of parking lots and unpaved vacant lots for farmers' markets and community gardens. | Initiate pilot projects with owner(s) of the Safeway Plaza and the Mekong Plaza to establish farmers' markets in their parking lots and identify excess land areas that might be suitable for community gardens as Temporary Development Opportunities (TDO). Consider providing incentives to encourage TDOs. |
| | Support initiatives in local educational institutions to incorporate nutrition into the curriculum with a focus on gardening and healthy eating. | Educational institutions provide a learning environment that provides the opportunity for outreach to local residents. | Establish policies that support cooperative efforts with educational institutions to educate residents regarding healthy eating. | Work with the East Valley Institute of Technology and the Mesa School District to identify possible school site community garden locations in conjunction with nutrition education programs. |
| Walkability and Bikeability | Enhance the physical environment to encourage walking and biking. | The physical environment in the study area is not conducive to walking or bicycling. Modifications are needed to encourage more walking and bike riding. This would facilitate residents walking or biking for services as well as providing the opportunity to get physical exercise. | Establish policies that focus | Develop areas of refuge at key locations in identified pedestrian corridors with a focus on connectivity within neighborhoods and with neighborhood serving retail areas. The areas of refuge should be located at intersections and mid-block providing relief from the effects of the heat. They will include amenities such as shade and seating and drinking fountains where possible. |
| Vegetation Levels and Shade Layers | Require the increased use of vegetation and shade systems to reduce the effects of Urban Heat Island Effect on residents. | The single family neighborhoods north of Main Street are in dire need of | | Initiate a pilot project to assist homeowners with funding for improvements to their yards to increase |

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| | Focus on increasing vegetation levels in the single family neighborhoods north of Main Street and increase the use of shading strategies as other areas are developed and/or redeveloped. | additional vegetation that will protect property owners and their children from health risks, and increase property values and reduce energy costs at the same time. | | vegetative levels. Work with local businesses for donations of landscape materials to area homeowners. Provide educational programs for residents regarding the care of landscape materials. |
| | Prepare new development guidelines with shade layers as the new design "language", including porch covers, roof overhangs, sunscreen systems, and recessed openings in building facades. | Much of the building stock within the study area is older (50's era) and in need of rehabilitation. With this need comes the opportunity for introducing new shade layer systems across the building stock. | Develop policies to address specific "shade" strategies for building types, within the West Main Street Area Plan. The shading strategies should be a key component of regulations such as a Form-Based Code when prepared for the West Main Street area. | Initiate a pilot project to assist homeowners with development of porches; City to approach Stardust Center for access to recycled building materials that can be used for porch construction, along with construction training and assistance. |
| | | | | |
| Promote Local Businesses | Encourage new and expansion of existing local businesses, such as retail and entertainment uses, in the area by establishing more flexible development guidelines and regulations. | Long term goals identified in the West Main Street Area Plan included additional entertainment and neighborhood serving businesses. | Develop policies responding to locational and operational conditions sought by small businesses. Focus on issues such as development scale, signage, and business licensing. | Initiate a pilot project facilitating the development of local businesses through identification of codes and regulations that impede new businesses or expansion of existing businesses. Work with business groups to alleviate those obstacles when possible. |
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| Access to Open Space and Recreation Facilities | Provide greater community access to the Webster Gym and Recreation Center to allow use by more diverse groups and organizations. | The Webster Gym and Recreation Center is an asset for area residents. Expanding hours of operation and making it available to a diverse group of community organizations, will contribute to a sense of community. | Develop policies regarding the use of recreational facilities to encourage residents to lead a healthy lifestyle. | Collaborate with the Mesa School District to extend hours of operation of the Webster Gym in the evenings and on weekends and offer additional healthy lifestyle programs. |

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| | Consider the conversion of a portion of the Valley Metro Park & Ride parking lot into a small park – 2-3 acres- for the neighborhood. | The study area is lacking parks and open spaces. With the extension of light rail to the east, parking demand in the Park & Ride will be reduced. A portion of the parking lot adjacent to Webster School could be reused for a neighborhood playground. | Establish a policy of minimum parks/open space standards for neighborhoods within the light rail corridor. This is particularly critical for neighborhoods that will experience new residential development. | Convert the section of the park and ride closest to the recreation center into a neighborhood park. |
| | | | | |
| Prioritize Mixed-Use Development and Housing Diversity | Promote Transit Oriented Development (TOD) with urban design elements that encourage pedestrian friendliness and exploration. Utilize Form-Based Codes during infill development and site retrofitting. | | | Prepare TOD regulations and development guidelines that focus on creating a user friendly pedestrian and bicycle physical environment. |
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APPENDIX A – REFERENCES

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