





# **MOBILITY**

*The Mobility Element focuses on the movement of people and goods, including the availability of quality multi-modal transportation options.*



## Overview

Street configurations can provide effective multi-modal transportation access to a significant portion of a population, thereby making developments more livable and sustainable in the future. Public transit works in tandem with walking, bicycling, and personal automobiles providing multiple, equally convenient transportation choices. Street network layout that improve connectivity simultaneously generate benefits, such as encouraging bicycle and pedestrian trips, and decreasing vehicle miles traveled. Currently the average vehicle miles traveled per household in the South Central Corridor is 27.07 miles.

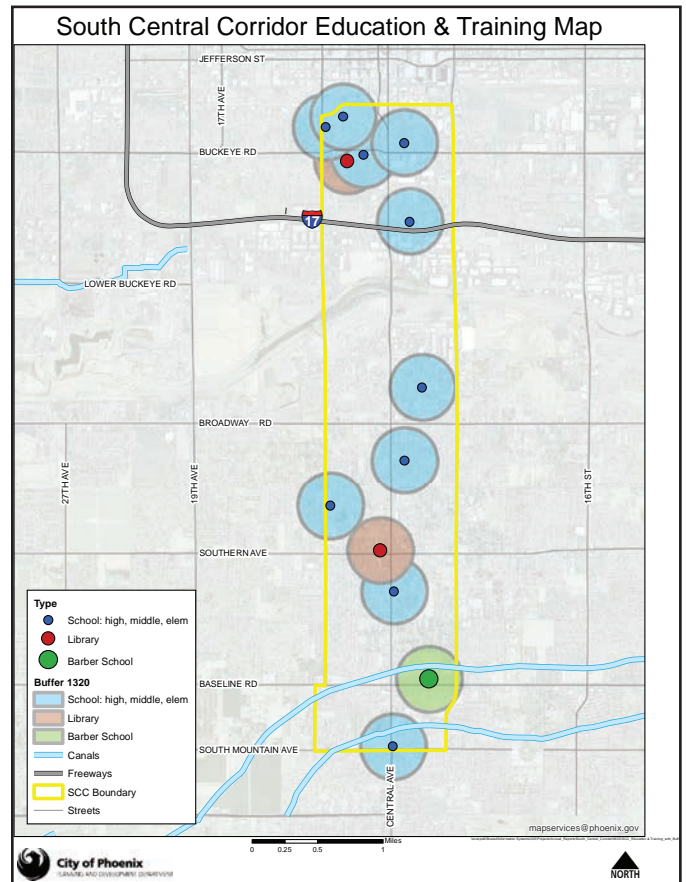
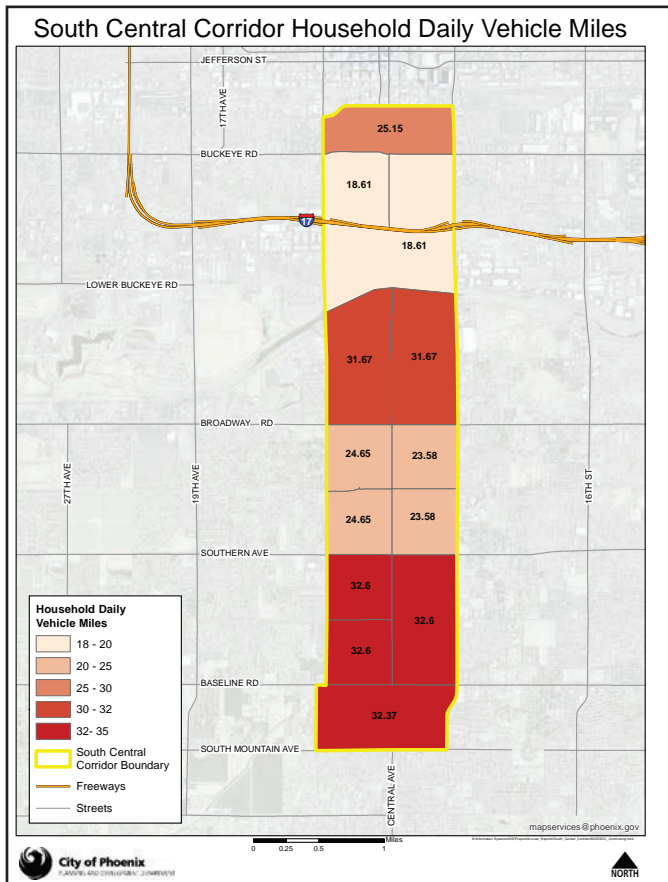
The dominant pattern of development in the South Central Light Rail Corridor is a fine grain grid pattern of blocks. However, there are some exceptions, most notably in the industrial areas north and south of Interstate 17, and north and south of the Rio Salado. There are also significant north/south barriers in the Corridor, including the Union Pacific Railroad, Interstate 17, the Rio Salado, and the Western and Highline Canals.

## Walking and Biking to School Activity

There are areas with a high level of walking and biking activity within one-quarter mile near schools in the South Central Corridor which have been determined to have missing infrastructure. One area is around Buckeye Road between Central Avenue and 7th Avenue. The second area is along 7th Street between Broadway Road and Southern Avenue.

There are three areas of medium level walking and biking activity within one-quarter mile of schools which are missing infrastructure.

One area is between Central Avenue and 7th Street, just north of Broadway Road. The second is along 7th Avenue north of Southern Avenue. The third area is along 7th Avenue south of Baseline Road

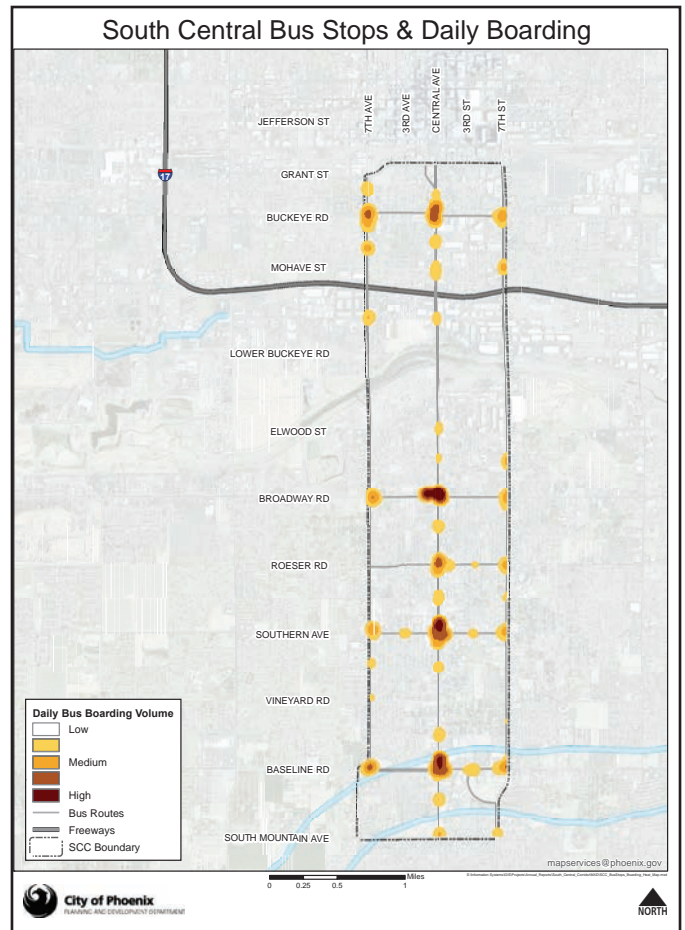
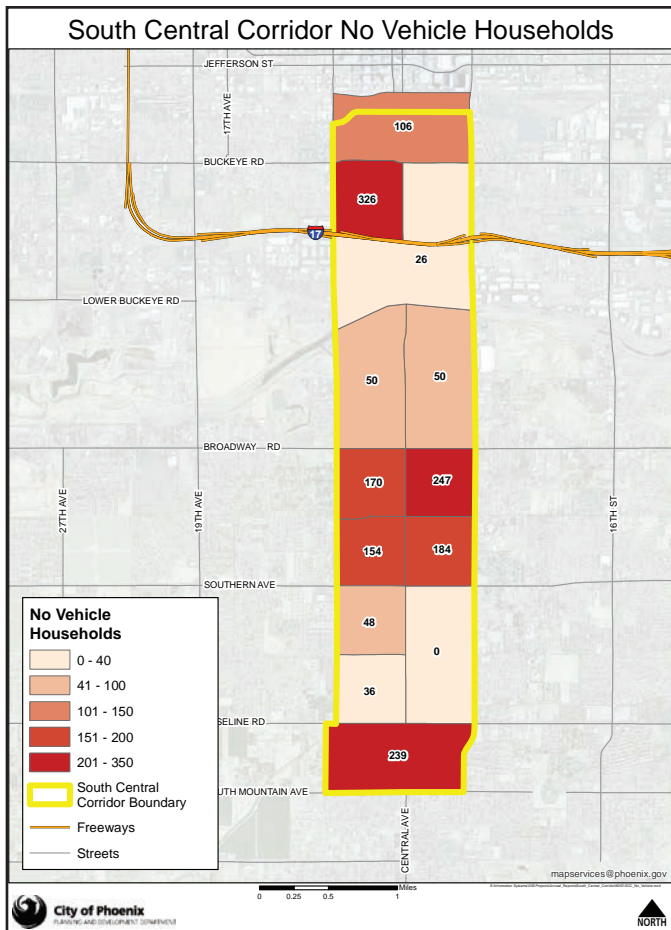


### Zero Car Households

The ability of corridor residents to be able to use alternative transportation methods such as walking, biking, or public transit is key. Census data from 2010, when analyzed by Block Group for the South Central Corridor, shows a high concentration of households without any vehicle ownership between the downtown and Buckeye Road. The number diminishes along the north and south sides of the Rio Salado due to the fact that there are more industrial uses than households in this area, and then climbs again, south to Baseline Road.

### Daily Bike Bus Boardings

In the early 1990s, Phoenix was the first major city to equip all buses with bike racks and the ability to carry two bicycles. Bike racks are available on a first-come, first-serve basis. The ability to access transit with a bicycle allows for easier access to the transit modes from distances which may not be comfortable for walking. The high number of zero car households along the South Central Corridor correlate to the high number of daily bike bus boardings in the Corridor.





## Barriers to North/South Mobility

There are five notable barriers which affect north/south mobility in the South Central Corridor.

### Union Pacific Rail Road

The Union Pacific Railroad tracks have an east/west alignment between Jackson Street and Buchanan Street. There are limited opportunities for vehicles, bicycles and pedestrians to cross in a north/south direction.

- **7th Avenue** - 7th Avenue crosses the railroad tracks with a fly over bridge. The bridge has sidewalks but no bicycle facilities.
- **6th Avenue to 4th Avenue** - 6th Avenue does not connect to the railroad and 5th and 4th Avenues do not cross the railroad tracks.
- **3rd Avenue and 2nd Avenue** - 3rd and 2nd Avenues offer at-grade crossings of the railroad tracks with an upgraded crossing surface of concrete.
- **1st Avenue** - A street called 1st Avenue Frontage terminates on each side of the railroad tracks for vehicular traffic, however bicyclists and pedestrians may cross the tracks through fencing that controls the access. 1st Avenue is a below grade crossing of the railroad, and there are no sidewalks and no bicycle facilities.
- **Central Avenue** - Central Avenue is a below grade crossing of the railroad. There are sidewalks on each side and a bicycle lane.
- **1st Street, 2nd Street, 3rd Street & 4th Street** - 1st through 4th Streets provide at-grade crossings of the railroad tracks with an upgraded crossing surface of concrete. Sidewalks are intermittent.
- **7th Street** - 7th Street crosses the railroad tracks with a fly over bridge. The bridge has sidewalks but no bicycle facilities.

### Interstate 17 (I-17)

Interstate 17 is an elevated freeway corridor also known as the Maricopa Freeway. North/south street crossings of I-17 are:

- **7th Avenue** - at-grade, sidewalks, no bicycle facilities.
- **Central Avenue** - at-grade, sidewalks, no bicycle facilities (bicycle lanes exist north and south of the interchange but do not go through the intersection).
- **7th Street** - at grade, sidewalks, no bicycle facilities (bicycle lanes exist north and south of the interchange, with approximately a 1,500-foot gap for northbound travel, and approximately a 1,400-foot gap for southbound travel).

There is an unpaved, non-vehicular crossing of I-17 at 3rd Street. The opening under the elevated freeway formerly allowed railroad spur access to warehouses on the south side of the freeway. This access point is no longer used by the railroad and the tracks have been removed. The easement remains under the Union Pacific Railroad control.

### Rio Salado

There are three crossings of the Rio Salado in the South Central Corridor:

- **7th Avenue**
- **Central Avenue**
- **7th Street**

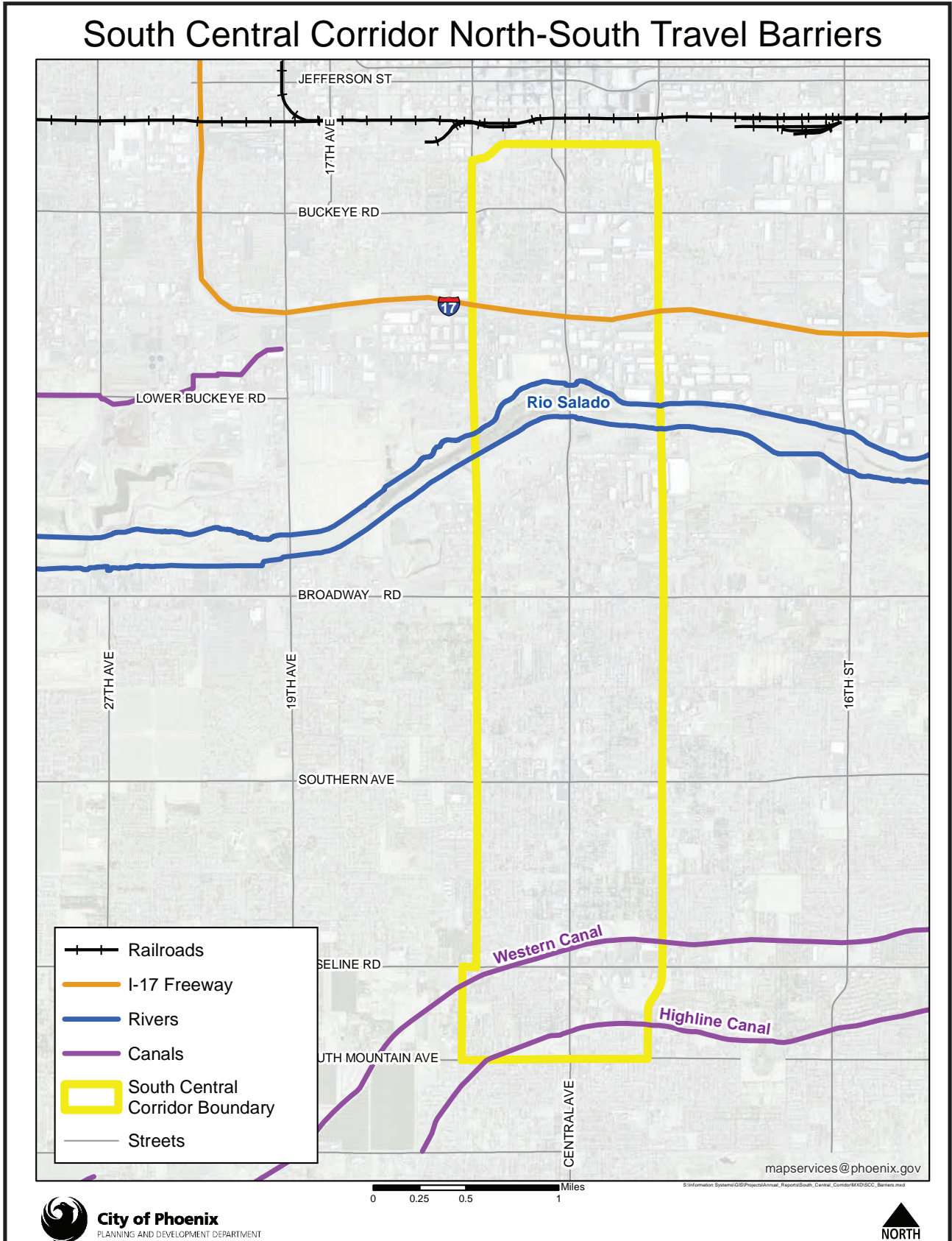
All three crossings are bridges with sidewalks. The Central Avenue and 7th Street bridges have bicycle facilities.

### Western Canal

The Western Canal is slightly north of Baseline Road and is developed with a paved bicycle/pedestrian path. There are few connections directly to Baseline Road. The Canal is underneath Baseline Road where 4th Avenue connects from the neighborhood. Central Avenue, Jesse Owens Parkway and 7th Street cross the canal. There are no pedestrian-only crossings.

### Highline Canal

The Highline Canal is located generally along the South Mountain Avenue alignment and is developed with a paved bicycle/pedestrian path. The canal is crossed by Central Avenue and 7th Street. There are no pedestrian-only crossings.





# **BICYCLE IMPROVEMENTS**

*Bicycling facilities are to make it safer and easier for bicyclists to travel throughout the city and make connections to adjacent communities.*

# COMPREHENSIVE BICYCLE MASTER PLAN

## Overview

The City of Phoenix plan provides a framework for decision-making to expand and improve bicycling facilities within Phoenix. These facilities are to make it safer and easier for bicyclists to travel throughout the city and make connections to adjacent communities as a part of the regional bicycle transportation network. The intent of the plan is to identify specific actions for Phoenix to take, along with an implementation schedule, and provide quantifiable outcomes to measure the success in meeting the goals of the plan. The Plan identified and prioritized corridors to focus future bicycle infrastructure investments. The priorities were established using a methodology that reflects community values, builds upon best practices in bikeway planning, and takes advantage of the latest national research on safety and other issues. The outcome is a three-tiered approach to implement projects over short, medium, and long-term planning horizons.

There are two Tier I Corridors in the South Central Corridor:

- 3rd Street
- Central Avenue

There are seven Tier III Corridors in the South Central Corridor:

- Roeser Road – 19th Avenue to 48th Street
- Baseline Road – 75th Avenue to 48th Street
- Highline Canal – Dobbins Road to Arizona Grand Parkway
- Southern Avenue – 75th Avenue to 48th Street
- Dobbins Road – 51st Avenue to 20th Street
- Western Canal – 27th Avenue to 48th Street
- Broadway Road – 99th Avenue to 48th Street

## Tier I Corridors

### 3rd Street

The 3rd Street Corridor provides connectivity from the Steele Indian School Park/Arizona Veteran Home/VA Medical Center through the Arizona State University (ASU) Downtown Campus and Biomedical Center, past Chase Field and connecting into Buckeye Road, where ASU is considering expanding classrooms. The Corridor offers direct access to the light rail as well as to numerous significant destinations (e.g. Phoenix Center for the Arts, UofA Medical School, Phoenix Convention Center, Phoenix Sheraton, etc.).

### Central Avenue

The Central Avenue Corridor is the connector from north Phoenix to this country's largest municipal park, South Mountain Park. It is Phoenix's main street.





# BIKE ROUTES

The bicycle infrastructure for the South Central Corridor reflects a pattern where bicycle lanes are being added as street repavement opportunities arise. At present, there are only two streets with east/west bicycle routes continuous between 7th Street and 7th Avenue:

- Roeser Road
- Southern Avenue

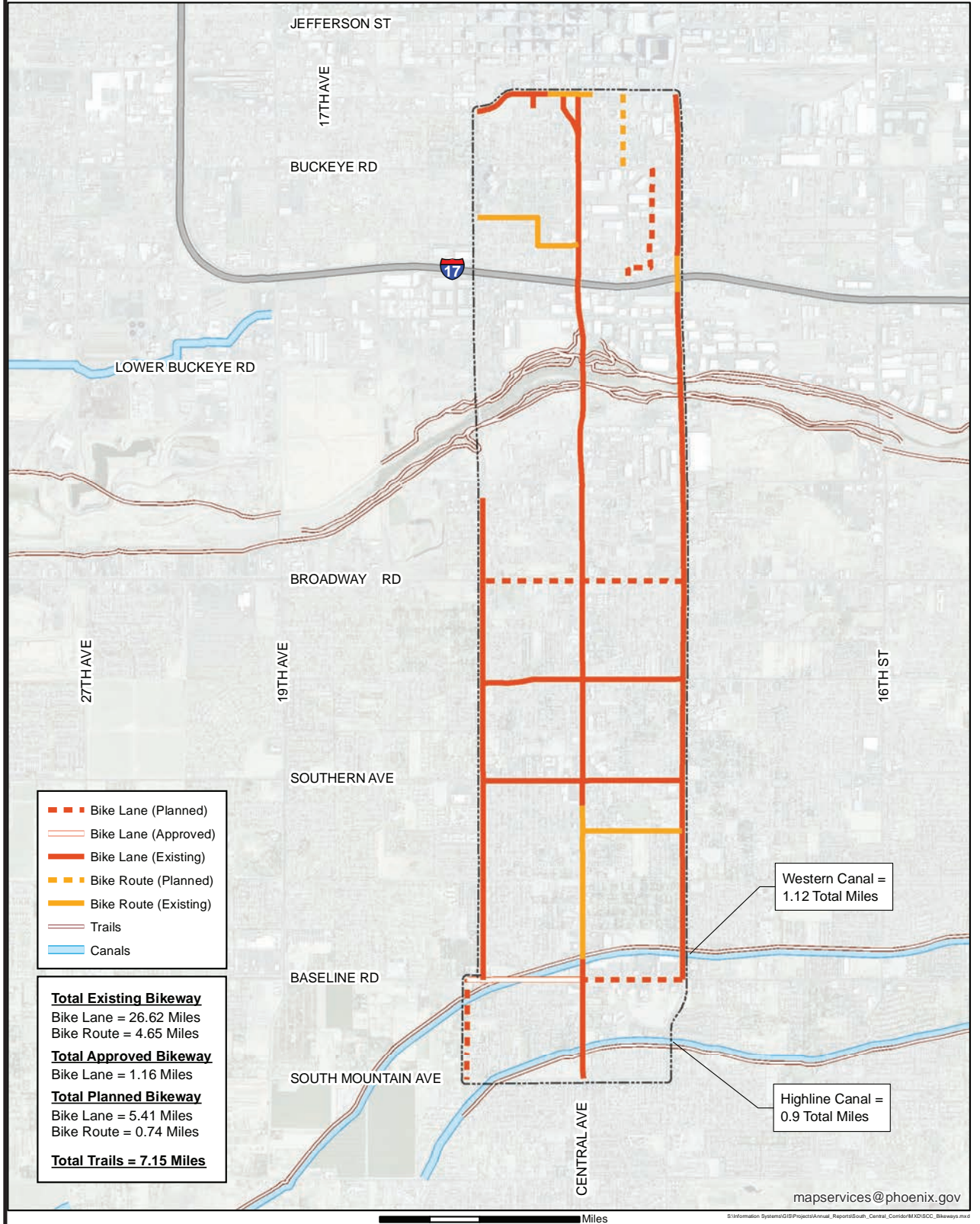
There are no streets with continuous bicycle lanes in a north/south direction. Central Avenue does have bicycle lanes for most of the way, with the exception of the segment between the Western Canal and Lynne Avenue, just south of Southern Avenue.

Bicycle lanes are proposed on Broadway Road between 7th Avenue and 7th Street, as well as on portions of 5th, 4th and 3rd Avenues in the downtown.

While there are hubs for GRID bike share along existing portions of the light rail, there is only one GRID bicycle hub in the South Central Corridor, at Central Avenue and Yuma Avenue.



# South Central Bike Network, Trails, & Canals



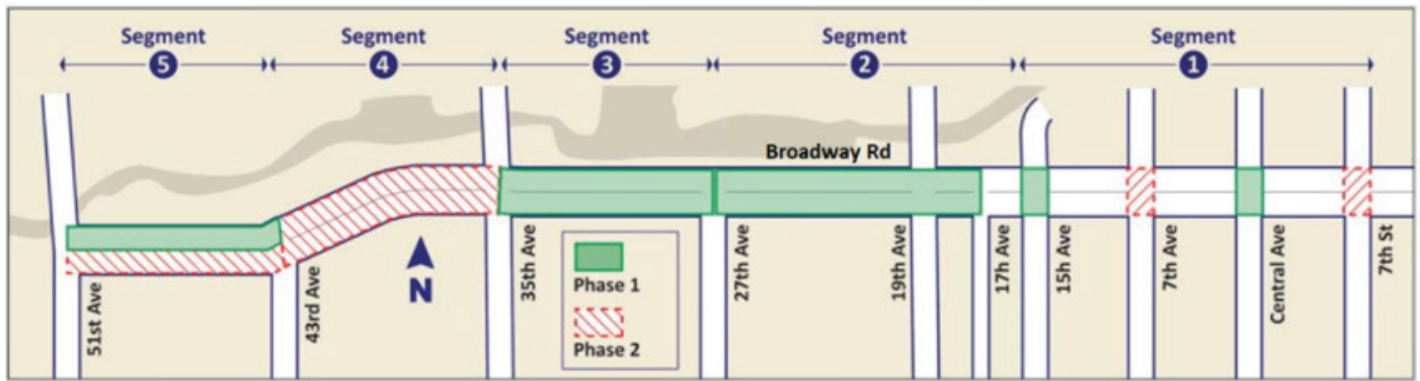


# **STREET IMPROVEMENTS**

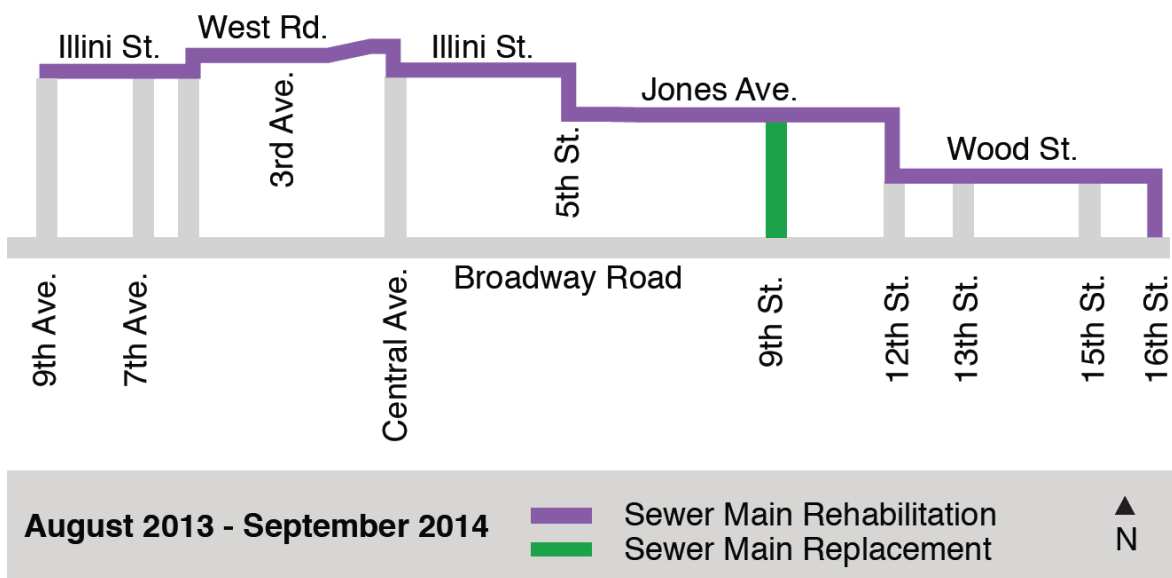
*Intersection improvements, roadway widening and extension, sidewalks, bicycle lanes, landscaping and street lighting.*

### Avenida Rio Salado/Broadway Road

Phoenix has embarked on an \$84 million street improvement project for Avenida Rio Salado/Broadway Road. Funded primarily through federal dollars, the project will provide additional capacity to the current east-west streets south of the Rio Salado. The project spans between 51st Avenue and 7th Street and includes intersection improvements, roadway widening and extension, sidewalks, bicycle lanes, landscaping and street lighting. Improvements to the section between 17th Avenue and 7th Street include rebuilding the curb returns at all major and some minor intersections to meet current standards, at Central Avenue, Broadway Road will be widened on the south side to eliminate the existing lane reduction, and three bus bays will be constructed (southeast corners of 7th Avenue and Broadway Road, and Central Avenue and Broadway Road; northwest corner of 7th Street and Broadway Road). The two phase project has an estimated project completion date of Spring 2019.



In 2014, the Water Services Department completed a sewer main rehabilitation project for various local streets north of Broadway Road between 9th Avenue and 16th Street. The rehabilitation project consisted of the installation of smaller diameter pipe within the existing sanitary sewer main. Rehabilitation of the sewer main reduced odors, improved structural integrity and increased its useful life



## 7th Avenue

One and one-half miles of 7th Avenue from Southern Avenue to the Rio Salado are programmed in the City's 2016-2021 Capital Improvement Program (CIP) for reconstruction.

## Buckeye Road

Two miles of Buckeye Road from Central Avenue to 16th Street are programmed in the 2016-2021 CIP for design, acquisition of right-of-way and construction of the street and sidewalks.

## Pedestrian Crossings

A HAWK (High-Intensity Activated crossWalk beacon) is a traffic control device used to stop road traffic and allow pedestrians to cross safely. There are two HAWK crossings planned in the South Central Corridor. One will be on Buckeye Road between 7th Avenue and Central Avenue. The second is planned for 7th Avenue between Buckeye Road and I-17.

A Rectangular Rapid Flashing Beacons (RRFBs) are user-actuated amber LEDs that supplement warning signs at unsignalized intersections or mid-block crosswalks. They

can be activated by pedestrians manually by a push button, or passively by a pedestrian detection system. One RRFB exists west of Central Avenue at Lincoln Street and 2nd Avenue.

On December 21, 2017, the Federal Highway Administration (FHWA) rescinded its Interim approval for optional use of Rectangular Rapid Flashing Beacons, noting that installed RRFBs may remain in service until the end of useful life of those devices.

IMAGE: RRFB AT LINCOLN STREET





**Pedestrian + Bike Accidents**

Analyzing pedestrian and bicyclist injuries due to collisions provides another way to examine walking and biking conditions in the corridor. These collisions are between a pedestrian or a cyclist and a vehicle or other object, such as a utility pole. In cases where the Phoenix Police Department was called or collisions resulted in a significant injury, data appears in one of two sources—the Arizona Department of Transportation’s Safety Data Mart or the Arizona Department of Health Services’ State Trauma Registry. Incidents of interpersonal violence or an intentional self-inflicted injury are not included.

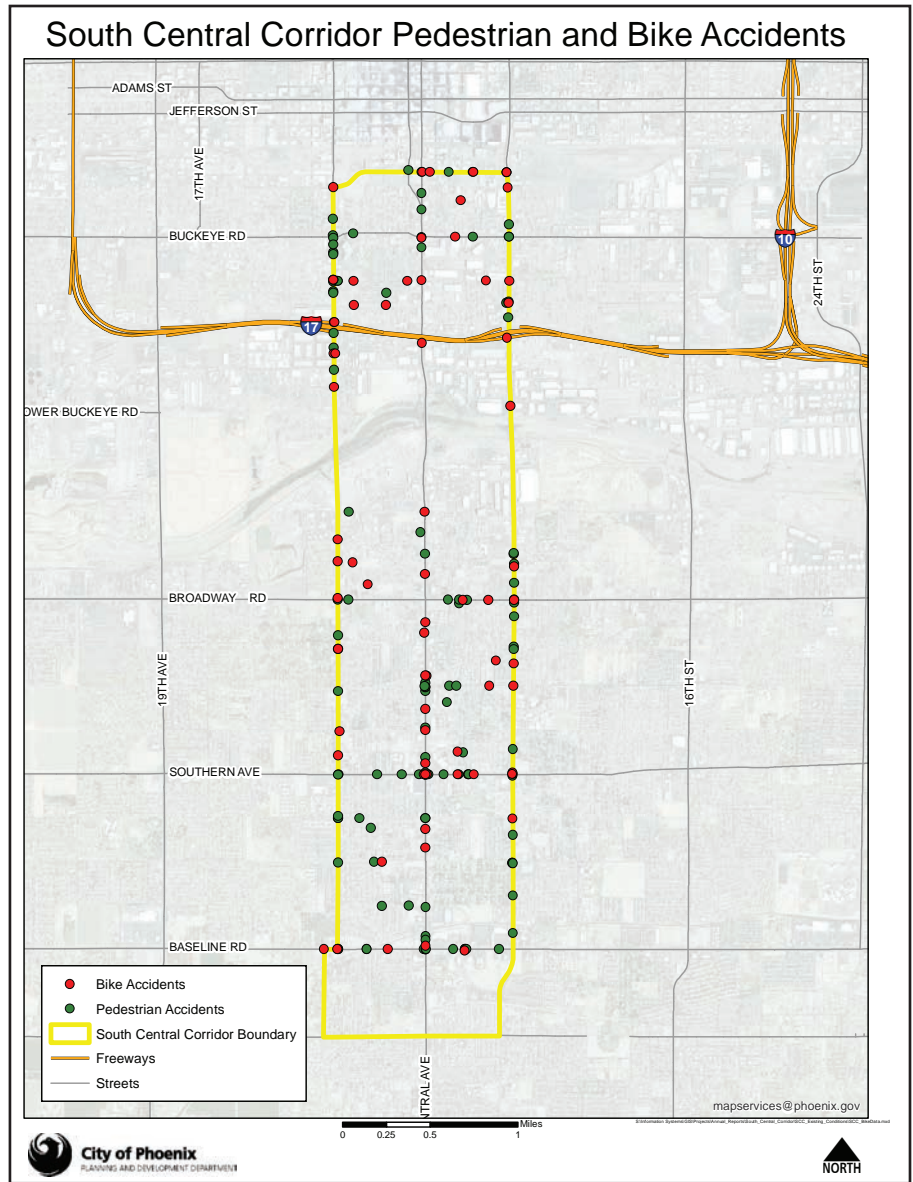
**Bicycling Accidents**

The cost of purchasing a bike and fear of the bike being stolen are two possible explanations for lack of ridership among residents. Additionally, recent federal focus on immigration enforcement and deportation, is a barrier to bicycling. In regard to bike accidents, data from the City of Phoenix Street Transportation Department indicate that in the past 5 years the South Central corridor (from 7th St to 7th Ave and from Washington to Baseline)

experienced 90 bicycle collisions reported to the police, with 3 of these collisions being fatal collisions and 16 serious collisions. Most the bike collisions occurred along Central Ave (14) and along 7th St (12). Two of the 3 fatal bicycle collisions occurred along 7th St. Almost one third of the collisions (29) were due to motorists failing to yield to bikers.

**Pedestrian Accidents**

Regarding pedestrian collisions, in the past 5 years the corridor experienced 142 pedestrian collisions reported to the police with 14 of them being fatal and 29 serious collisions. The majority of the collisions were due to vehicles failing to yield to pedestrians (39) and pedestrians failing to use crosswalks (36). Most collisions occurred on 7th Ave (27), 7th St (20), and Central Ave (22). Most of the fatal collisions occurred along 7th St (3), Buckeye Rd (3), 7th Ave (2), and Southern Ave (2).



## Mobility Area Studies

In 2017 the city of Phoenix began conducting Mobility Area Studies to identify opportunities for new sidewalk construction, bicycle facilities and connections to existing transit stops. The Mobility studies were concentrated in neighborhoods throughout the city that demonstrated needs for improvements due to the following factors:

- Lack of High Intensity Activated CrossWalks (HAWKs) and Rectangular Rapid Flash Beacons (RRFB).
- Number of bus boardings and bus bike boardings
- Location of ADA non-accessible and ADA non-compliant bus stops
- Location of zero car households
- Bikeway gaps
- Walking and biking activity within 1/4 mile from schools

The analysis of these factors led to the development of two Mobility Study Areas in the South Central corridor.

The South Downtown Study Area extends north to south from Lincoln Street to Watkins Street and west to east from 7th Avenue to 3rd Street.

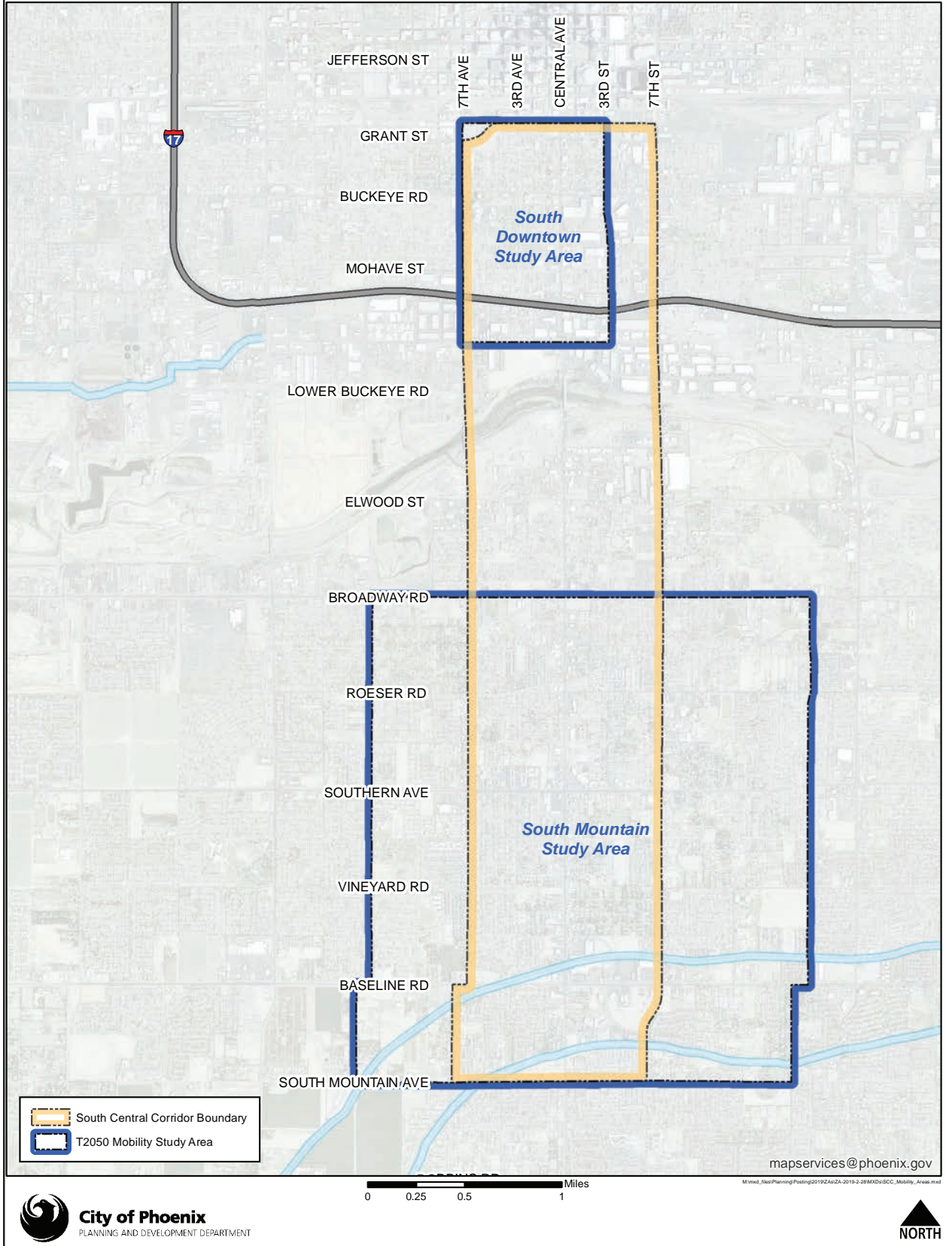
The South Mountain Study Area extends north to south from Broadway Road to South Mountain Avenue and 15th Avenue to 14th Street and west to east.

The studies were conducted receiving feedback from area residents and those who work and live in the Mobility areas. The results of these studies will guide the prioritization of pedestrian and bike infrastructure investments to improve mobility in different parts of the city.





# South Central Corridor Mobility Areas





# **BUS ROUTES & ACCESSIBILITY**

*A network of buses provides service and connectivity through all the main arterial roads in the corridor. Bus service allows for access to and from the corridor and into other areas of town.*

**Overview**

Central Avenue has a high ridership averaging approximately 2,771 riders on weekdays with the majority of bus boardings occurring at the intersections of Broadway Road, Roeser Road, Southern Avenue, and Baseline Road.

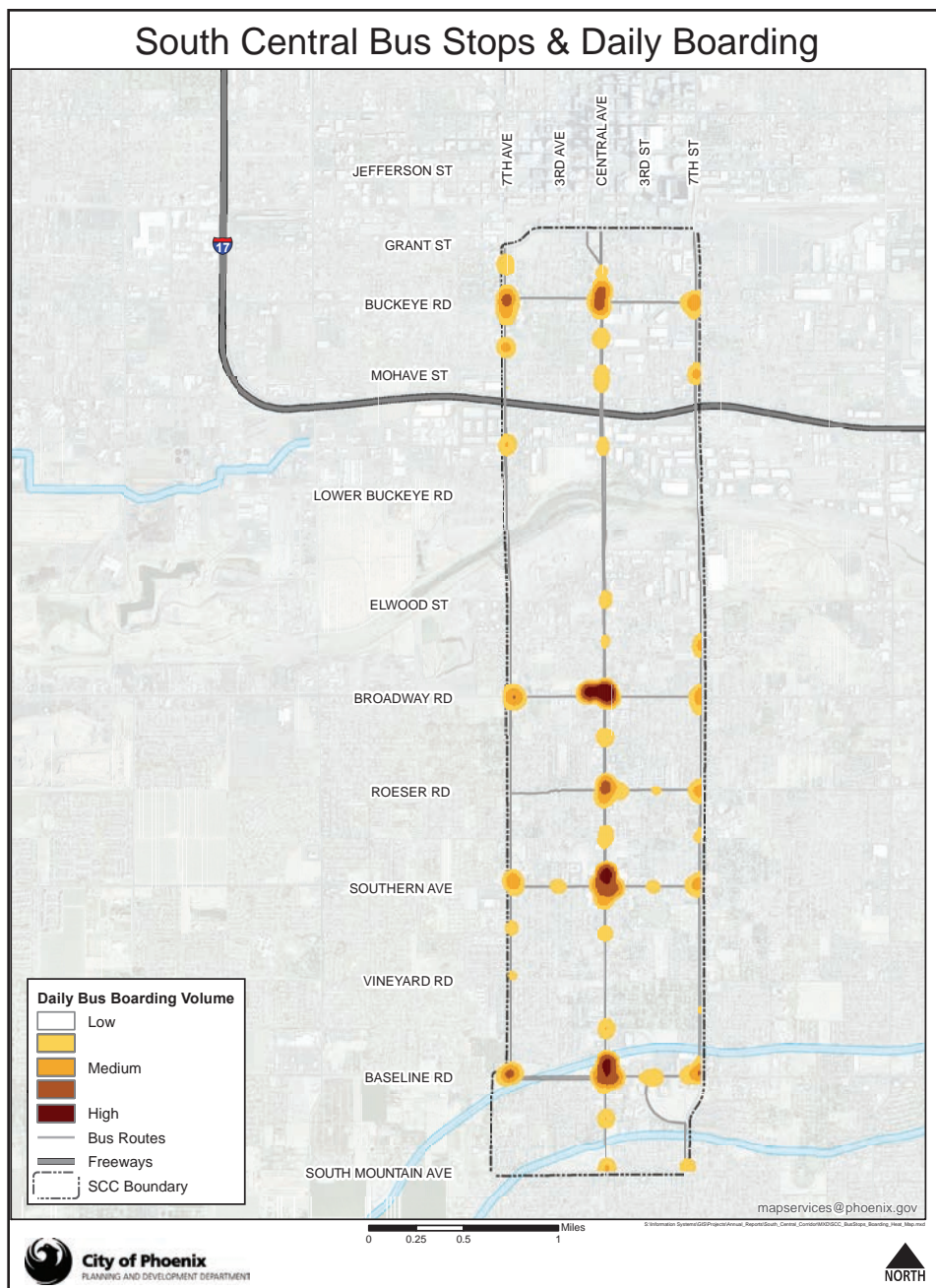
Currently the South Central Corridor is serviced by several bus routes that exist along the following north/south streets:

- 7th Avenue
- Central Avenue
- 7th Street

Additional bus service is provided along the following east/west streets:

- Buckeye Road
- Broadway Road
- Roeser Road
- Southern Avenue
- Baseline Road

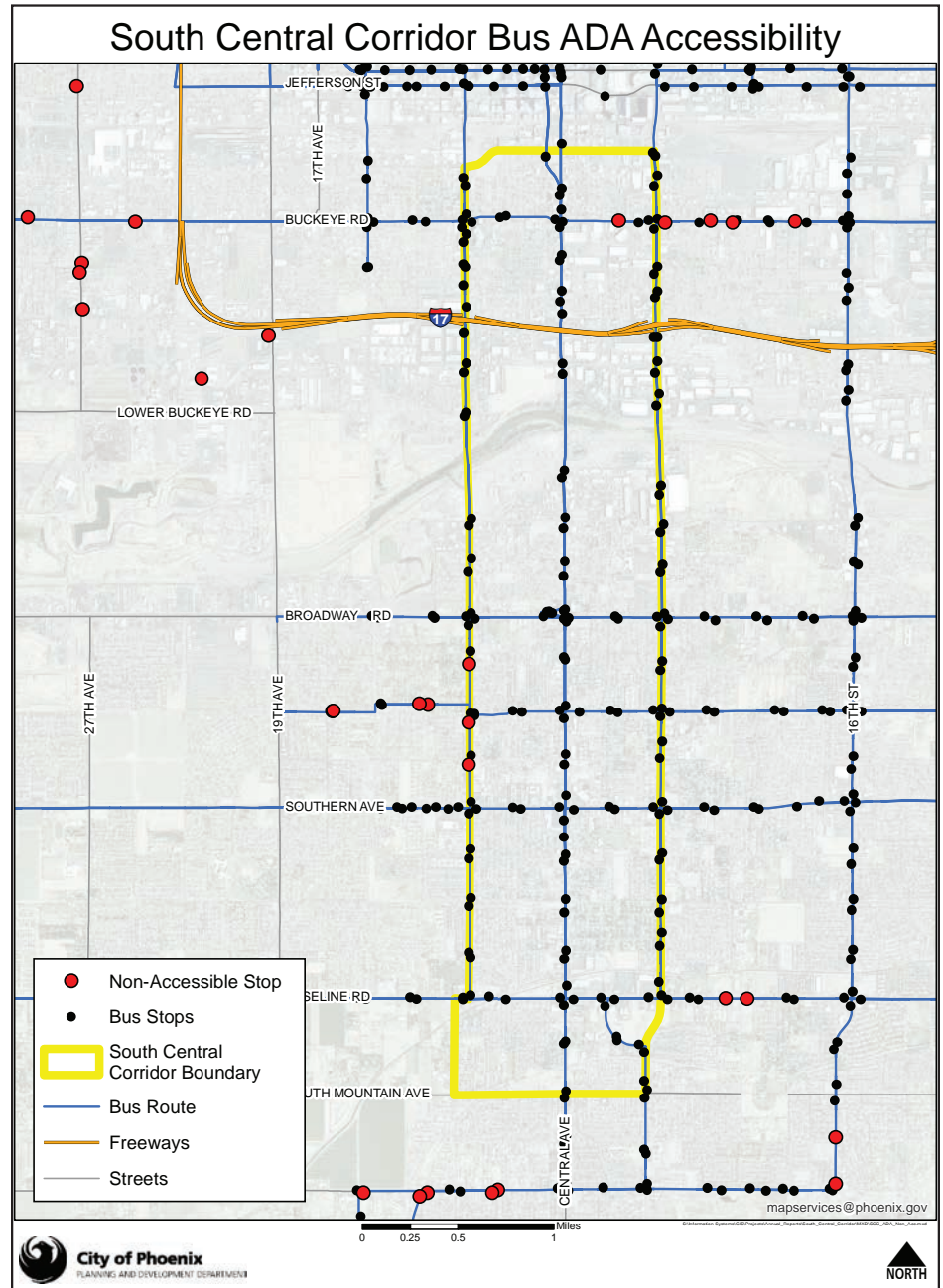
The highest number of boardings occur on Central Avenue, and the least number of boardings occur on 7th Avenue.



**ADA Non-Accessible Bus Stops**

An assessment of bus stops in the South Central Corridor has determined that there are many stops which are not accessible per Americans with Disabilities Act (ADA) standards. These non-accessible stops are measured by their density per one-quarter mile and exist on:

- 7th Avenue - medium to high, between Broadway Road and Southern Avenue
- Buckeye Road - medium to high, between Central Avenue and 7th Street

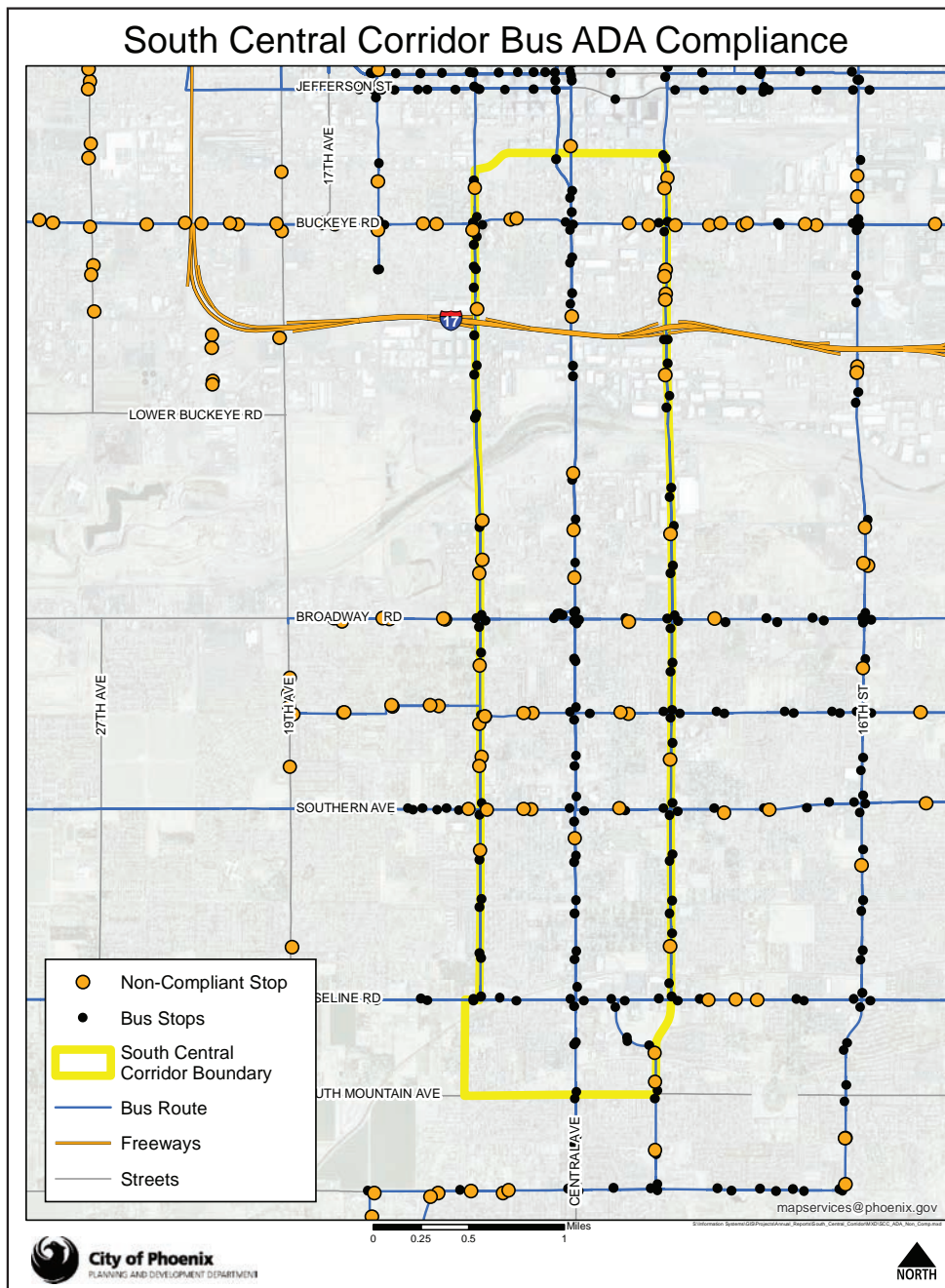




### ADA Non-Compliant Bus Stops

As assessment of bus stops in the South Central Corridor has determined that there are many bus stops which are not compliant with ADA standards. These stops are indicated with a density per one-quarter mile on:

- Central Avenue – low to medium, at Lincoln Street, I-17, between the Rio Salado and Broadway Road, and at Southern Avenue
- 7th Avenue – medium to high, at Buckeye Road, I-17, between the Rio Salado and Southern Avenue
- 7th Street – medium to high, between Lincoln Street and the Rio Salado, and intermittently to Baseline Road
- Buckeye Road – medium to high, between 7th Avenue and 7th Street
- Broadway Road – medium to high, intermittently between 7th Avenue and 7th Street
- Roeser Road – high, between 7th Avenue and 7th Street
- Southern Avenue – medium to high, between 7th Avenue and 7th Street
- Baseline Road – not applicable between 7th Avenue and 7th Street



# **SIDEWALKS CANALS + TRAILS**

*The concept of “complete streets” acknowledges that there is the desire to move cars efficiently, however streets must also accommodate bikes, pedestrians, and public transit.*

## Sidewalks

The streets in the South Central Corridor are primarily oriented towards automobile transportation.

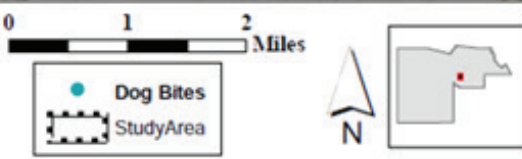
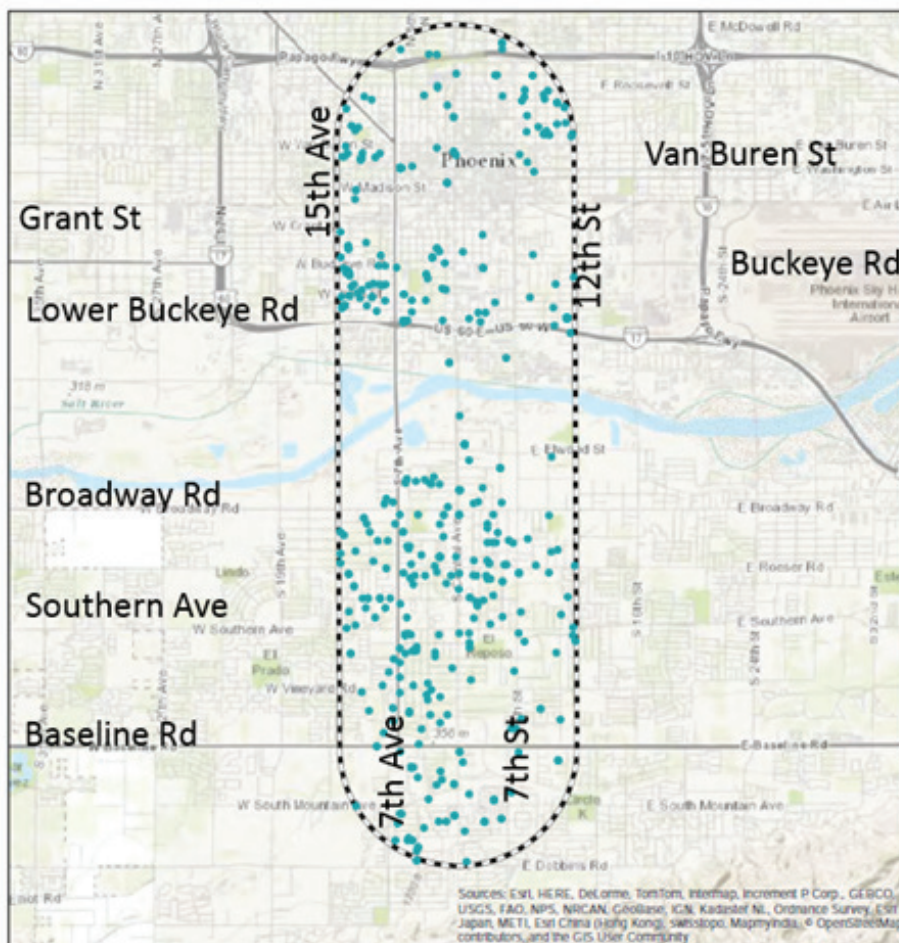
The concept of “complete streets” acknowledges that there is the desire to move cars efficiently, however streets must also accommodate bikes, pedestrians, and public transit.

Walkability is enhanced by smaller block sizes which disperse vehicular traffic and provide greater connectivity for pedestrians.

The existing street pattern in the South Central Corridor has both positive and negative attributes. There is a relatively intact grid structure in most of the existing neighborhoods, but the grid in some cases is interrupted by larger parcels. Many of these large parcels were once agricultural lands and thus, finer grain subdivisions, including a local street structure, have not occurred. The areas north and south of the Rio Salado, and north and south of Interstate 17, have a mix of large areas with limited connectivity, and a few areas with smaller subdivisions and better connectivity.

A Walkability Audit conducted by area residents and Arizona State University graduate students for the South Central Neighborhoods Transit Health Impact Assessment (SCNTHIA) concluded that the arterial, collector and local streets leading to the proposed LRT stations were in worse condition than those surrounding the existing LRT stations. Key findings for the walkability audits of all intersections were:

- General unpleasantness while walking
- Insufficient shade along sidewalks and at bus stops
- No water fountains available
- Inadequate lighting
- Stray or unleashed dogs are a nuisance when biking and a traffic hazard on streets.
- Inferior or non-existent sidewalks, including discontinuous sidewalks
- Feeling that area is unsafe for walking especially at night
- Messy alleys
- Insufficient number of crosswalks encourage pedestrians to cross mid-block



**Dog Bites in the SCNTHIA Study Area**

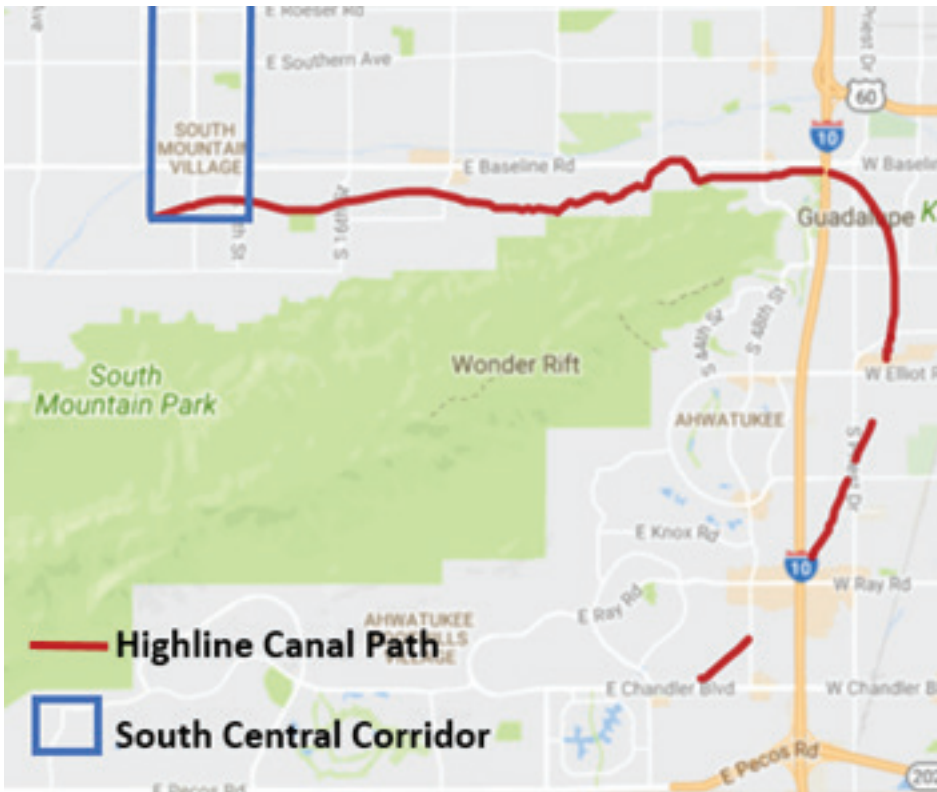
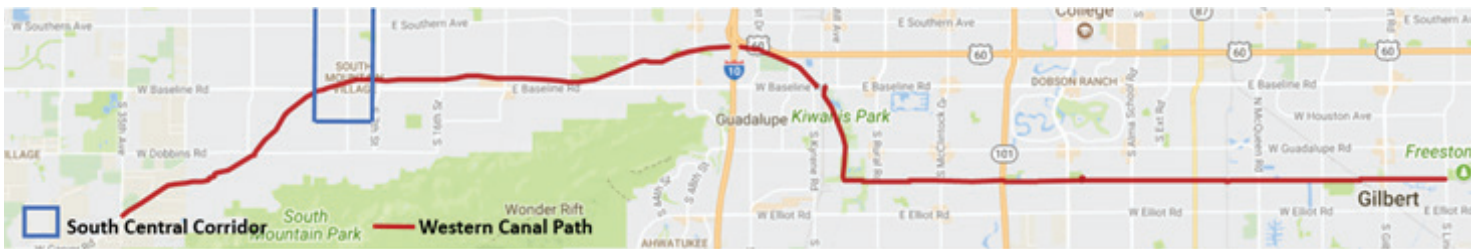


## Western Canal

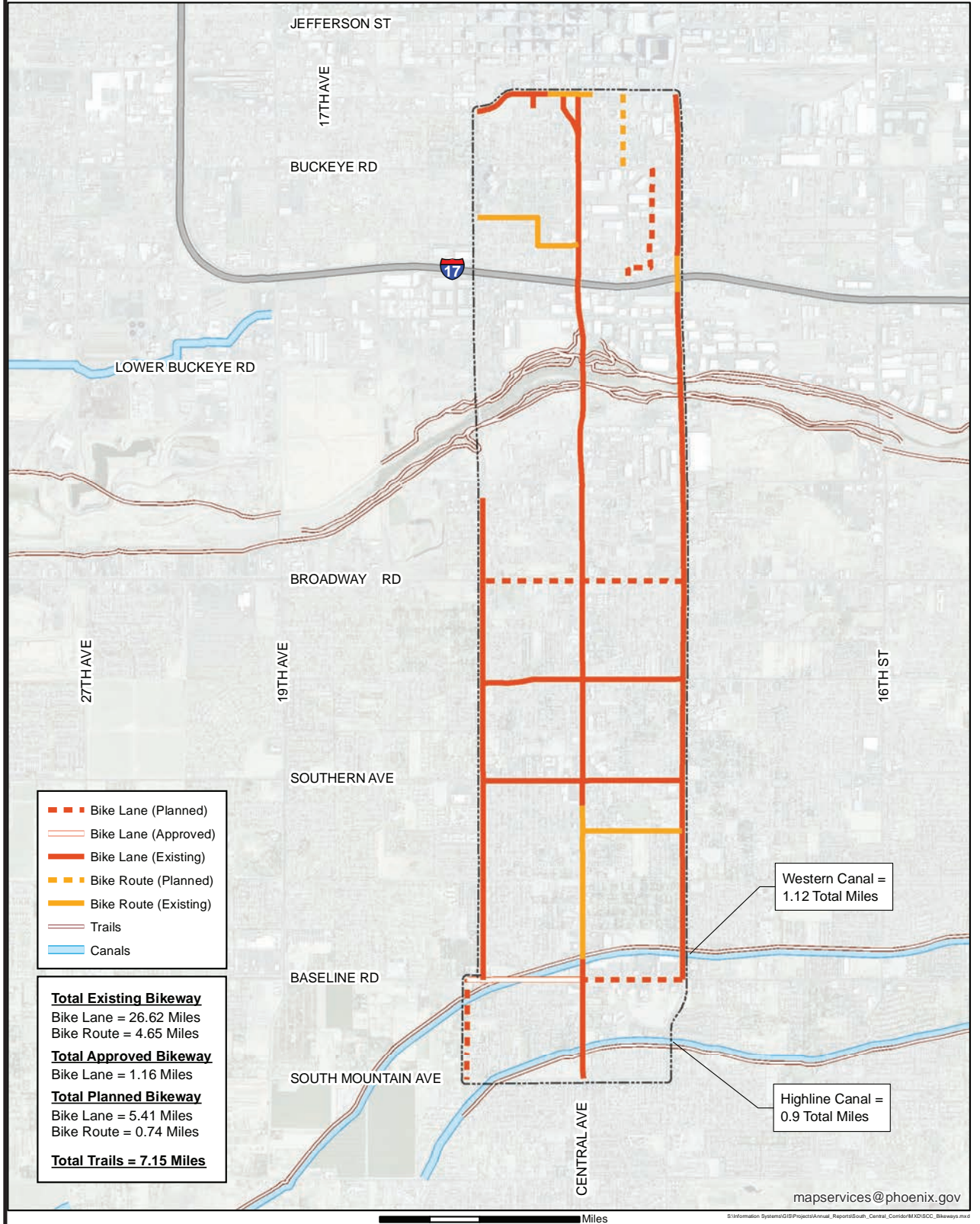
The Western Canal is slightly north of Baseline Road and is developed with a paved bicycle/pedestrian path. There are few connections directly to Baseline Road. The Canal is underneath Baseline Road where 4th Avenue connects from the neighborhood. Central Avenue, Jesse Owens Parkway and 7th Street cross the canal. There are no pedestrian-only crossings. This 20-mile Western Canal Path connects the cities of Phoenix, Tempe, Chandler, Mesa and Gilbert.

## Highline Canal

The Highline Canal is located generally along the South Mountain Avenue alignment and is developed with a 10.4-mile paved bicycle/pedestrian path. The canal is crossed by Central Avenue and 7th Street. There are no pedestrian-only crossings. The Highline Canal Path connects the cities of Phoenix, Tempe and Guadalupe.



# South Central Bike Network, Trails, & Canals











# **GREEN SYSTEMS**

*The Green Systems Element focuses on the design of buildings and infrastructure to improve resource efficiency and environmental protection.*

## Overview

Green systems are building and infrastructure techniques designed to work with nature, the water cycle, and the environment. Green systems use both natural and engineered systems to provide ecosystem services in a given area. Common examples of green systems are vegetated swales or rain gardens, permeable pavement/pavers, and curb cuts. These systems can be implemented and planned in early stages of new construction, often referred to as Low Impact Development (LID), embedded into a revitalization project, or created at pre-existing sites.

Green systems help with the following:

- mitigate flooding
- reduce erosion
- reduce heat-island effect
- preserve natural wildlife, and more.
- helps to filter pollutants from stormwater
- reduces the pressure on current stormwater infrastructure,
- allows more water to filter into the ground
- increases vegetation, which increases livability, and walkability, and reduces ambient heat.

Green systems are known to be solution multipliers that contribute to a variety of community benefits.

Green systems provide a myriad of economic, social and environmental benefits such as:

- reduced energy costs
- improved air quality
- strong quality of place and the local economy
- reduced storm water runoff
- improved social connections
- smart growth and compact development and walkable neighborhoods

Sustainable green systems strive for fully functional stormwater management, preserving and encouraging biodiversity, and resource management practices, as well as sustainable levels of thermal comfort, energy efficiency, and access to green space. There are many opportunities for social and economic benefits of green systems for health, mobility, and biodiversity in the corridor.

The South Central corridor has one demonstration project to accomplish a green street environment located adjacent to Premeria Iglesia United Methodist Church. The corridor currently has seven parks and adding more of these amenities would help achieve the preceding goals, as well as improve health, mobility, and biodiversity.









# THE CONNECTED OASIS

*In an urban setting, green systems encompass the interconnected web of parks, tree lined streets and canals that help sustain an active, cool and healthy city.*

### The Connected Oasis

A major concept from the 2015 General Plan was the idea of the Connected Oasis. This theme, envisioned by many city residents, reimagines our city as a network of vibrant pedestrian paths that incorporate the benefits of cleaner air and shade is key to creating healthy and equitable urban design that is appealing to pedestrians. This network can also provide additional benefits for health, mobility and biodiversity that also help make streets safe and comfortable for pedestrian and bike mobility. In addition to these benefits, the US Department of Agriculture Forest Service estimates that in Arizona trees have a documented return on investment of \$2.23 for every one dollar invested.





## Green Streets

Green streets are part of healthy, equitable urban design that views streets as vital public spaces. Incorporating green elements into streets improves mental and physical health through better air quality, valuable shade, and beautification and contact with nature in areas where access to parks may be limited.

One of NACTO's (National Association of Transportation Officials) green streets principles is that "Street reconstruction projects that incorporate green infrastructure should be aligned with citywide traffic safety and mobility efforts, especially where opportunities arise to move curbs and reallocate street space to people walking and biking. Green infrastructure can be leveraged in conjunction with other street design projects to realize complementary goals, including transit access and safe mobility, providing greater value from city projects."

Permeable pavement, bioswales, planter boxes, and trees are a few elements that may be woven into street design. Several cross-cutting benefits of Green Streets appeal to health, mobility and biodiversity such as creating safe and comfortable pedestrian and bike infrastructure.

These benefits are directly tied to the quantity and quality of green systems incorporated into the Street design. Residents are more likely to use bike and pedestrian paths for recreation and transportation when they are safe, attractive, and cool.

## Shade Canopy and Tree Coverage

Tree canopy cover is a measure of all public and privately-owned trees and woody shrubs. As trees mature, their canopy increases. Large trees have the greatest canopy. Tree canopy provides vital benefits to the community, including improvements to air quality, reduced energy use, management and reduction of stormwater runoff.

Trees tend to increase property values and provide improvements to aesthetics and public health. Tree canopy and other landscaping features have positive effects on human health and wellbeing. Studies show that areas with greater canopy cover experience less violent crime and fewer traffic accidents.

Greater canopy cover also correlates with reduced symptoms of ADD and ADHD, improved test scores, and higher birth weights.





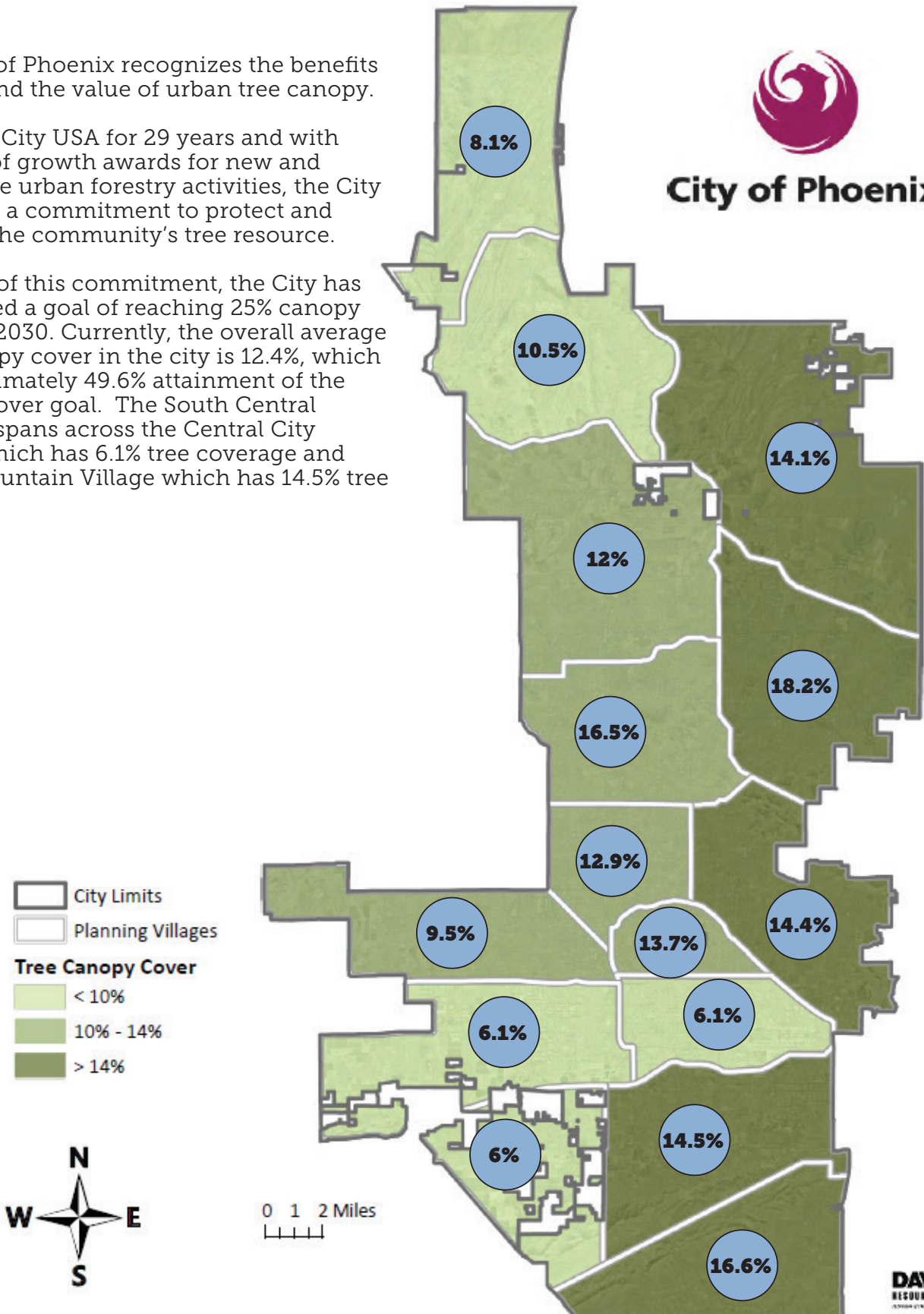
The City of Phoenix recognizes the benefits of trees and the value of urban tree canopy.

As a Tree City USA for 29 years and with 19 years of growth awards for new and innovative urban forestry activities, the City has made a commitment to protect and manage the community's tree resource.

As a part of this commitment, the City has established a goal of reaching 25% canopy cover by 2030. Currently, the overall average tree canopy cover in the city is 12.4%, which is approximately 49.6% attainment of the canopy cover goal. The South Central Corridor spans across the Central City Village which has 6.1% tree coverage and South Mountain Village which has 14.5% tree coverage.



**City of Phoenix**



# STORMWATER HARVESTING

*Sustainable stormwater management practices help to ensure future water needs can be met.*

## Overview

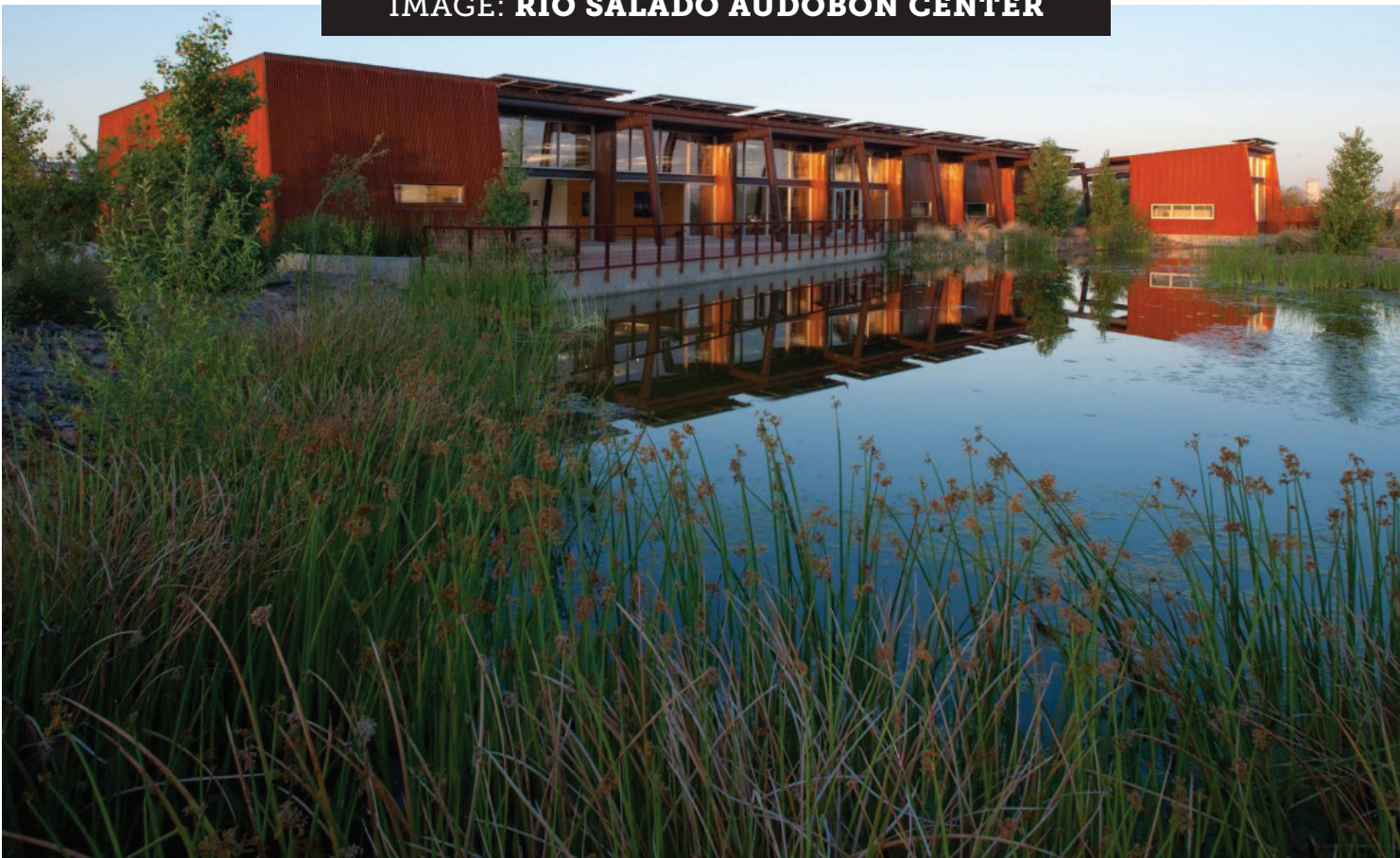
Stormwater management and efficient water use is of particular importance as the region faces a uncertainty with future water needs and resources.

City Codes require businesses with the potential to pollute stormwater to develop and implement a Stormwater Management Plan to protect stormwater quality. Stormwater Management Plans address good housekeeping, chemical and waste management, and outdoor storage practices. The codes also address stormwater discharge related to residences and construction sites.

## Rio Salado Restoration Project

The largest natural green infrastructure system in the South Central Corridor is the Rio Salado Restoration Project. This project is an ongoing effort to restore the native wetland and riparian habitats of the Salt River. There are nearly 600 acres in the Rio Salado Restoration Area, which stretch along 5 miles of the Salt River from 16th Street to 19th Avenue. This restored land provides valuable natural services to the area which include renewal of the natural environment that benefits native flora and fauna, cooler ambient temperatures for surrounding areas, and the collection of rain and stormwater

IMAGE: RIO SALADO AUDOBON CENTER





## Demonstration Project

One of the more recent rainwater capture projects in the corridor was developed with the help of church volunteers between October 2011 and February 2012 in the street (right of way) landscaped area at the Primera Iglesia United Methodist Church at the southeast corner of 1st Street and Grant Street.

This demonstration project was financed through a grant partnership between Watershed Management Group, Arizona Department of Environmental Quality (ADEQ), and Primera Iglesia Unida. In this project, curb cuts and curb cores re-direct stormwater runoff from the street into a water-harvesting basin that includes trees, shrubs, groundcover, and wood chip mulch. These elements filter pollutants carried by stormwater while providing shade and beautifying the block. This project has also stimulated the planting of trees on the block's curves.

## Other natural features

Other natural green infrastructure features in the corridor include parks and private properties with their landscape areas. The seven parks within the South Central Corridor are described more fully in the Health Element section.

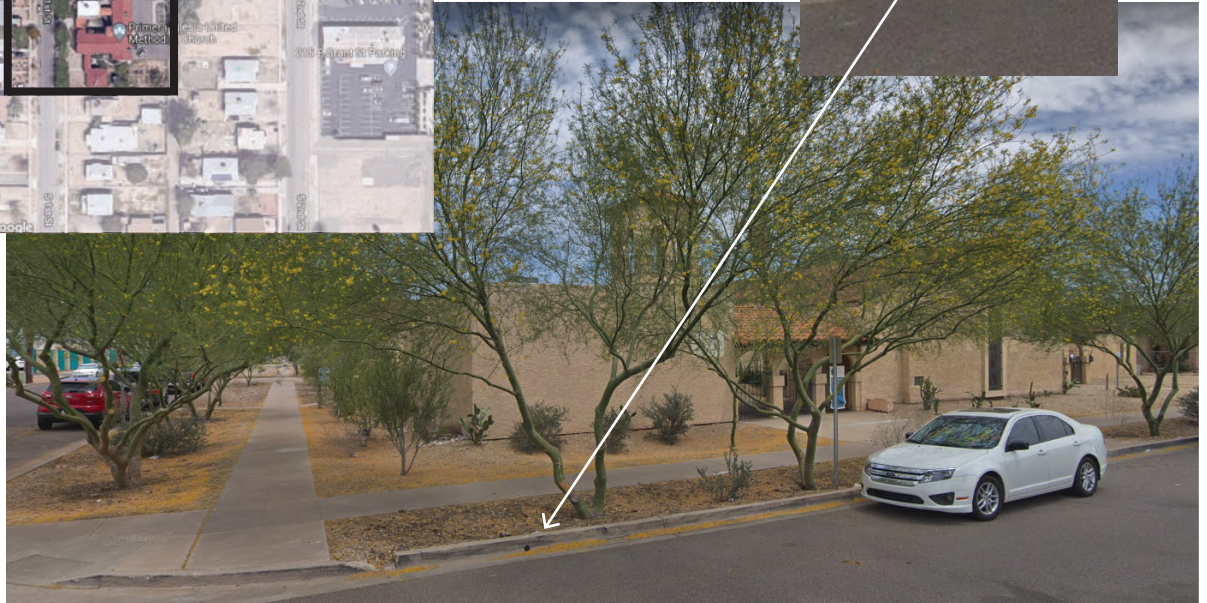
The corridor consists primarily of residentially developed parcels, a small portion of which are lush with trees, shrubs, and groundcover

Generally, the commercially and industrially developed parcels are comprised of building footprints and parking areas with insufficient landscaped area or vegetation to meet sustainable thresholds.

## Primera Iglesia Demonstration Project



## Core Cut



**Stormwater Infrastructure**

The South Central Corridor faces high temperatures from the Urban Heat Island (UHI) Effect. With average annual precipitation of only 5–10 inches, Phoenix has significant incentive to harness water resources that are otherwise lost.

Traditional stormwater management practices use impermeable surfaces, such as roads, curbs, and culverts, to divert large quantities of water into centralized infrastructure. This draws pollution and debris into the infrastructure, with negative effects on water quality. These traditional stormwater management systems increase flooding, pollute surrounding bodies of water, degrade natural habitats, and increase health risks and maintenance costs.

Older parts of Phoenix are served by a stormwater system which collects water and conveys it to local parks, rivers and washes. This runoff flows over impervious areas such as sidewalks, roads and parking lots and picks up contaminants along the way. Contaminants can be chemicals, automobile fluids and pet waste.

Storm drains in the South Central Corridor are primarily in 7th Avenue, Central Avenue and 7th Street.





# **PERMEABILITY AND SURFACE TEMPERATURE**

*Trees provide shade, and along with landscaping, they provide evaporative cooling that can bring down temperatures*

## Overview

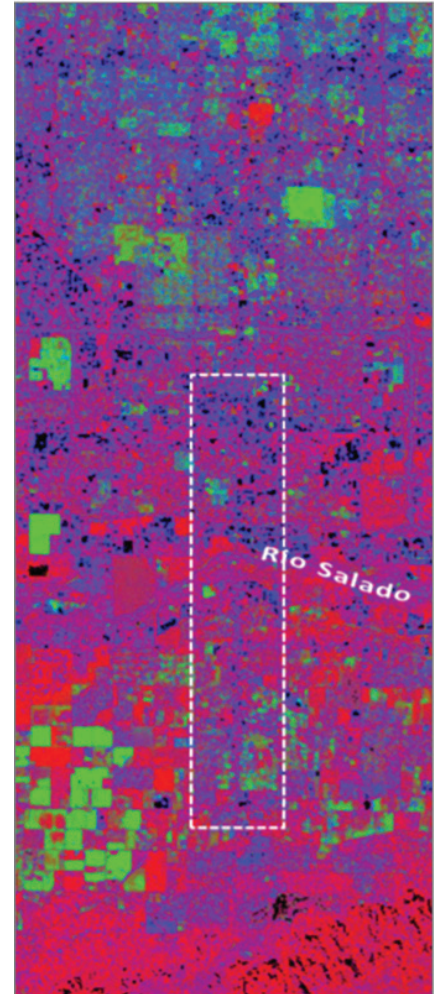
Researchers at NASA's Johnson Space Center, Arizona State University and the University of California at Riverside are studying the relationship between temperature variations and socioeconomic variables across metropolitan Phoenix. They have found that the lower income populations are the most vulnerable to extreme heat.

Those with higher incomes tend to live in areas that are cooler due to the increased amount of vegetation, such as lush lawns and canopy trees, that surround homes or on higher-elevation hillslopes above the hotter Salt River valley floor. Lower income populations tend to live in the urban core of metro Phoenix where the heat island effect is intense. These neighborhoods are located near industrial areas, commercial centers, and bare transportation corridors. There are few amenities, such as parks, and the landscaping has little or no grass or trees.

A detail of the July 24, 2000 spectral analysis of the Landsat Enhanced Thematic Mapper Plus data with the outline of the South Central Corridor in white shows the distribution of vegetation, impervious surfaces and the soil/pervious surfaces.

Compared to Downtown Phoenix, which has seen an explosion in urban development since 2013, there were few developments in the South Central Corridor since the 1980s that could have altered the spectral results. Therefore, the July 2000 spectral analysis is still very representative of the Corridor today.

Although the spectral color for the soil/pervious surfaces is in red, it should not be automatically equated with surface temperature. However, vegetated areas (in green) can be associated with cooler temperatures because trees provide shade, and along with landscaping, they provide evaporative cooling that can bring down temperatures.



July 24, 2000 spectral analysis of the Landsat Enhanced Thematic Mapper Plus data

### LEGEND

Green = vegetated areas  
Red = soil/pervious surfaces  
Blue = hardscape/impervious surfaces

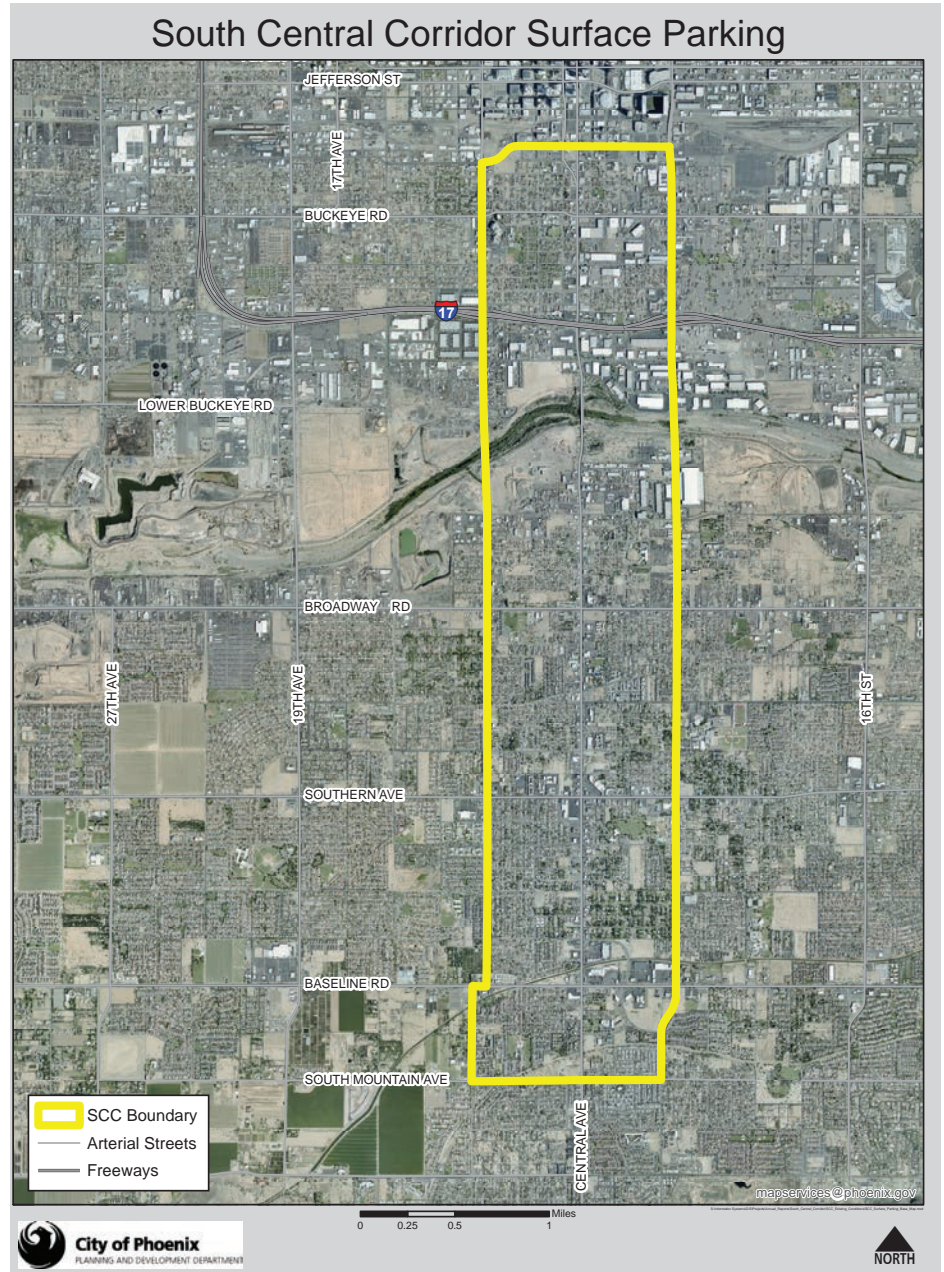


## Non-pervious Areas

The Corridor's environment has large non-pervious areas paved with asphalt that can store heat resulting in much higher surface temperatures.

Urban Heat Island "hot spots" are areas where exposed pavement and building materials absorb solar energy, creating higher surface temperatures.

Non-pervious areas also prevents stormwater permeability and increase surface runoff.

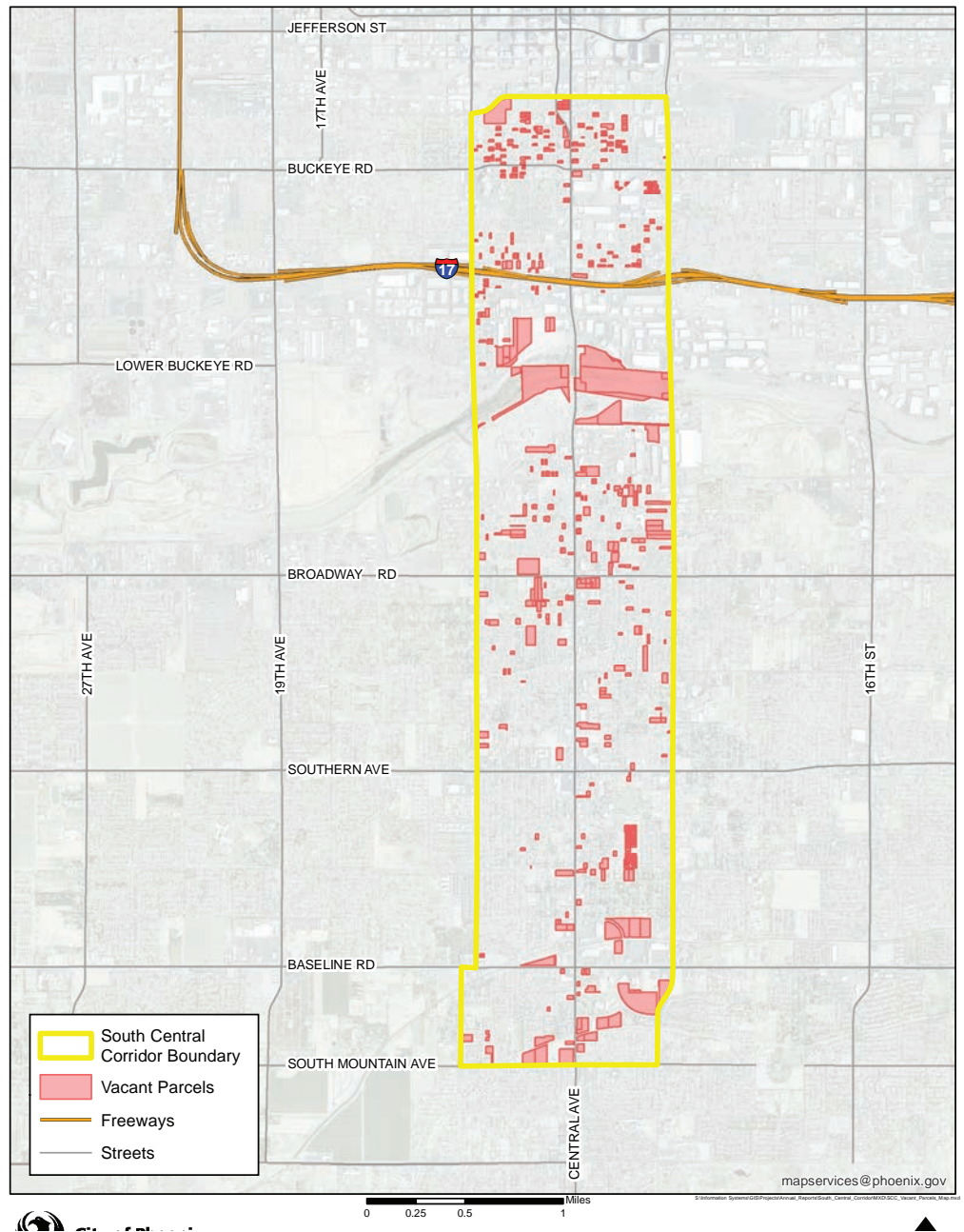


**Vacant/Undeveloped Areas**

Currently the South Central Corridor also has a large number of vacant and undeveloped parcels.

These parcels may contribute to the corridors permeability with minimal impervious surfaces. However, a vacant/undeveloped parcel with low tree/vegetation coverage may negatively contribute to higher surface temperatures and the urban heat island effect.

South Central Corridor Vacant Parcels





# URBAN HEAT ISLAND AND THERMAL COMFORT

*Thermal comfort and mitigation of urban heat island effects are key for the success of the South Central Corridor.*

## Overview

The corridor has large areas paved with asphalt. Asphalt's ability to store heat results in much higher surface temperatures. Open areas without vegetation lead to higher daytime and nighttime temperatures due to the lack of shade and the urban heat island (UHI) effect.

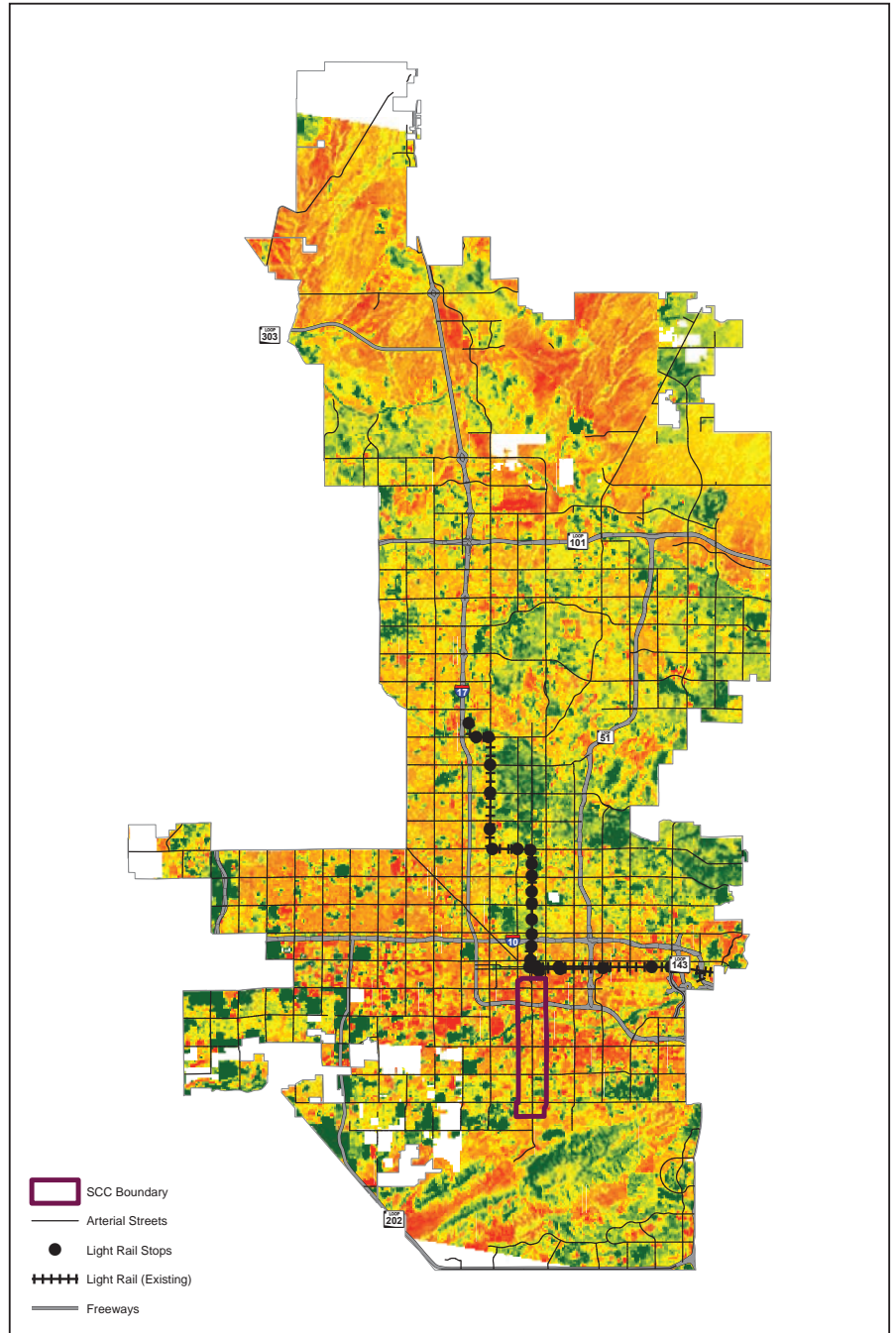
The term "heat island" describes built up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings. In the evening, the difference can be as high as 22°F (12°C).

Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality.

The most common strategies for mitigation of UHI are vegetation, shade structures, and cool materials in built infrastructure. In a city like Phoenix, where outdoor summertime temperatures exceed 110 degrees and surface temperatures can be over 20 degrees higher depending on the location; thermal comfort and mitigation of urban heat island effects are key for the success of the South Central Corridor.

Increased temperatures can lead to cardiovascular stress, heat stress, and heat strokes, as well as higher risks of respiratory distress syndrome, kidney and liver failure, and death. In general, young children, people with chronic diseases, and the elderly have the highest risk for heat related illnesses. The most common strategies for mitigation of urban heat island are vegetation, shade structures, and cool materials in built infrastructure.

City of Phoenix Land Surface Temperature



Land Surface Temperature  
 High : 176.99 °F  
 Low : 70.00 °F

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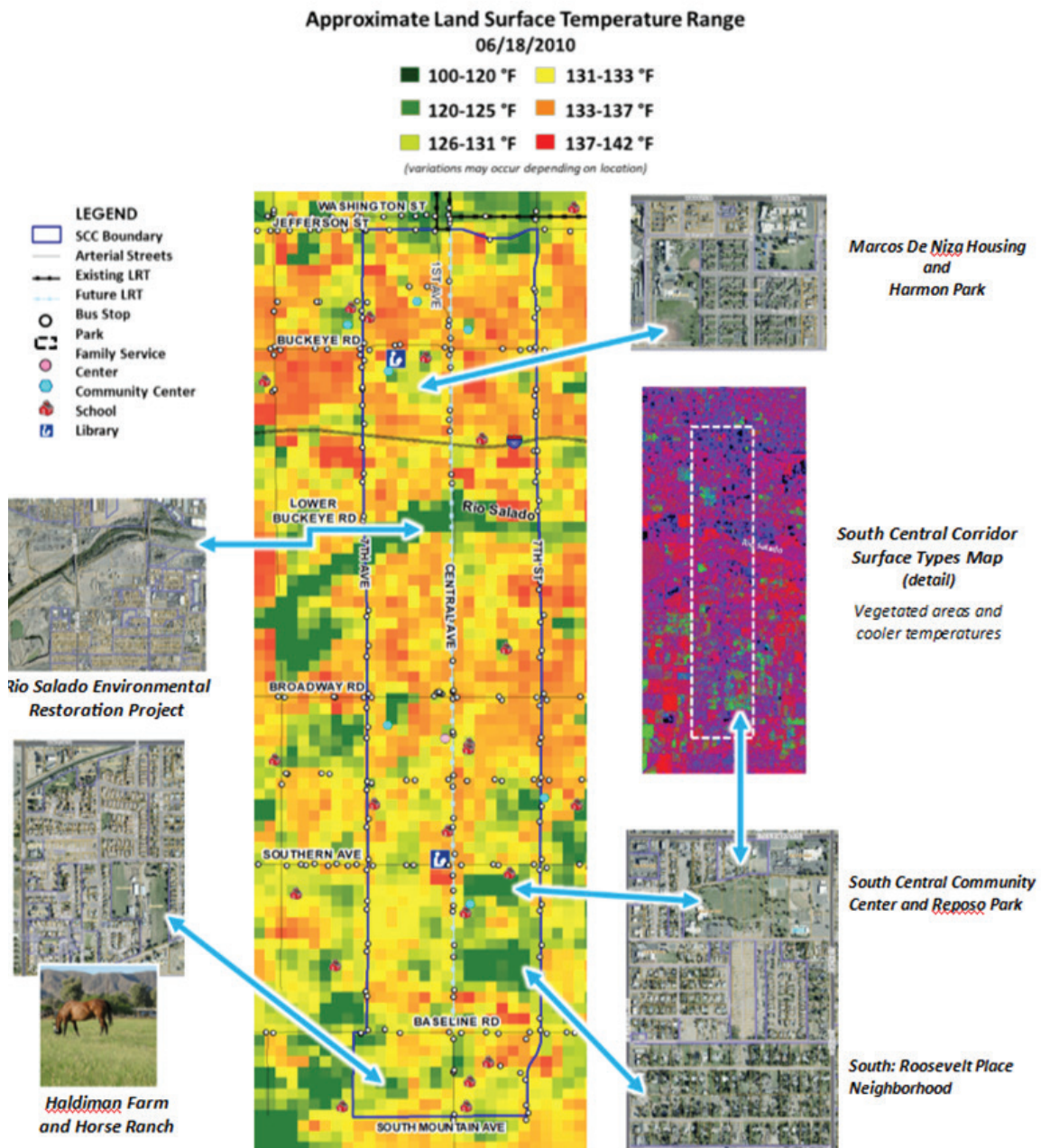




## Thermal Environments

In 2017, In partnership with the City of Phoenix Public Transit Department, ASU's Urban Climate Research Center and the Center for Policy Informatics developed the Phoenix Health & Air Quality project utilizing NASA Earth Observations and Ground Measurements from Landsat 8 Operational Land Imager to better understand thermal environment at transit stops. NASA Earth Observations were used to identify the average land surface temperature (in degrees Fahrenheit) in the areas around the city's unshaded bus stops.

The image produced provides a useful picture of surface temperatures citywide, allowing staff to review these images against existing conditions, not only at bus stops, but throughout the corridor. The area southeast of Southern and Central Avenues is one of the most vegetated and coolest in the Corridor, being flanked by South Mountain Community Center in the north and the irrigated, early midcentury modern Roosevelt Place Neighborhood to the south.



## **Flood Irrigation**

There are a number of areas in the South Central Corridor which receive flood irrigation from Salt River Project (SRP). Flood irrigation is important to the character of the South Central corridor neighborhoods and their quality of life.

This type of irrigation is the most cost-effective way to deep water properties. At the neighborhood level, the water delivery system is made up of open ditches, underground pipelines, control gates and valves. This portion of the system is owned, operated, and maintained by those in the neighborhood who use the system.

With this system, yards are flooded with two to three inches of water that penetrates the ground in approximately 3 hours. Land surface temperature maps for the corridor show a drastic cooling effect around neighborhoods that receive flood irrigation.

## **Water Consumption**

Potable water consumption includes indoor residential, landscaping and irrigation, and industrial and commercial uses. Reduction of potable water consumption conserves a valuable natural resource in a desert climate. Prominent potable water conservation practices include the rainwater harvesting systems, and changes in behavior (i.e. personal conservation habits).

It is acknowledged that there is a conflict between reduced water use and the achievement of green space. For example, lower water use is good for water conservation, but higher water use is beneficial for green space and reducing temperatures.

South Central's indoor water use, which focuses mostly on typical residential water uses such as drinking, cooking, bathing, toilet flushing, swimming pools, lawns, gardens, and washing cars, clothes, and dishes represents almost 2% (4.66 million gallons per day consumption) of the total water use in the city of Phoenix. The corridor contains no commercial-scale agriculture; therefore, water use is lower than some areas of the Valley.