

THE TULSA REGIONAL

# Bicycle and Pedestrian Master Plan



*Recommended for adoption by the Transportation Technical  
Committee: November 18, 2015*

*Adopted by the Transportation Policy Committee: December 2, 2015*

*Endorsed by the INCOG Board of Directors: December 8, 2015*

# ACKNOWLEDGMENTS

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# 1 INTRODUCTION

The Indian Nations Council of Governments (INCOG) and its member jurisdictions are seeking to change the norm for travel in the region by overcoming current challenges to active transportation with smart design and implementation of facilities for pedestrians and bicyclists. As the regional transportation planning body, INCOG provides a vision for transportation, administers funding programs and provides member jurisdictions with resources to plan and implement projects at the local level. This Plan is part of that suite of resources and equips member jurisdictions with:

- Bicycle network recommendations,
- Pedestrian design approaches,
- Policy and funding recommendations, and
- Design guidance.

Each element of this plan will help the 11 cities involved make walking and bicycling safe, comfortable and convenient for its residents and visitors.<sup>1</sup> Taken as a whole, the GO Plan provides a clear path toward achieving this vision for all communities in the region.

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<sup>1</sup> The 11 communities are: Bixby, Broken Arrow, Catoosa, Collinsville, Coweta, Glenpool, Jenks, Owasso, Sand Springs, Skiatook and Tulsa.

# Plan Vision and Goals

## The vision:

The Tulsa metropolitan area is a place where walking and biking are viable and appealing choices for transportation and recreation. Safety, comfort and convenience for users are addressed along roads, at crossings, on multi-use trails and at key destinations.

This powerful vision to make the Tulsa area a great place for walking and biking for everyone was conceived by community members and leaders during an 18-month planning process to create the GO Plan, the region's first comprehensive bicycle and pedestrian plan. This vision and the goals stated below were developed early in the planning process in concert with the project steering committee which includes representatives from all 11 participating communities.

The vision for bicycling and walking in the Tulsa region guided development of the plan process and the goals and recommendations included in this report. They achieve the vision through the following strategy:

1. Make bicycling and walking *viable* options through connected networks of facilities
2. Make bicycling and walking *appealing* options through facilities that provide a level of design that makes them safe, comfortable and convenient for the widest possible range of users

## The goals:



**Goal 1:** Implement and maintain a **connected network** of walking and bicycling facilities focusing on linking destinations to neighborhoods.



**Goal 2: Improve safety and security** for all users of the transportation system by applying strategies that reduce fatal and injury crash rates in the Tulsa metropolitan area.



**Goal 3:** Establish or increase local bicycle and pedestrian **mode share goals** across the Tulsa metropolitan area with target milestones for 2017 and 2022.



**Goal 4:** Develop implementation of **public education campaigns and programs** that include targeted efforts for law enforcement, students, traditionally underserved populations and other key stakeholders with target outreach goals set for 2017.



**Goal 5:** Position Tulsa and the surrounding areas as officially **recognized Walk and Bicycle Friendly Communities** by engaging or continuing efforts to achieve status with the national certification programs applicable to walk and bicycle friendliness.



**Goal 6:** Pursue **funding toward bicycle and pedestrian infrastructure** within local transportation funding bond and sales tax packages.



The Brookside commercial district in Tulsa features pedestrian amenities such as curb extensions, street trees and a lower speed limit.



Area residents enjoy access to long-distance trails such as the Creek Turnpike Trail for recreation and transportation.

## Plan Purpose and Scope

The GO Plan is a regional pedestrian and bicycle plan. It does not provide the same level of detail that a city-scale plan would, but instead seeks to create a bicycle network that connects major destinations in the region. These destinations include significant employment centers, downtown business districts, schools and universities, and the existing trails system. Although the plan provides a list of bicycle network projects and prioritizes arterial sidewalk gaps, it is not a comprehensive master plan for each community. Pedestrian improvements are addressed through recommendations in a community-chosen focus area in each jurisdiction and through design approaches to typical pedestrian challenges in the region. Implementation of the facility recommendations will be an important start to improving pedestrian and bicycling conditions, but the routine application of the Plan's design guidelines for each mode will have an even greater impact over the long term. The design guidelines are included in Appendix A.

## The Benefits of Walking and Biking for the Tulsa Region

Improving walking and bicycling conditions in the Tulsa region can foster economic development, improve health, increase safety and provide additional transportation options for residents.

Cities around the country are recognizing the attractive force of livable places.<sup>2</sup> Communities that are walkable and bikeable for the majority of their residents are seeing rising property values and increases in population.<sup>3</sup> The Tulsa Young Professionals (TYPros) group has seen this national trend and is pushing the city forward by encouraging a focus on creating more pedestrian and bike friendly streets. The 2014 StreetCred event temporarily transformed a street to put the focus on people instead of traffic and showed residents the possibilities when space is reallocated. The City of Broken Arrow has also recognized the importance of creating a better

2 <http://www.realtor.org/sites/default/files/reports/2013/2013-community-preference-analysis-slides.pdf>

3 [http://www.advocacyadvance.org/site\\_images/content/Final\\_Econ\\_Update\(small\).pdf](http://www.advocacyadvance.org/site_images/content/Final_Econ_Update(small).pdf)

walking environment and recently revamped its downtown streetscapes in the Rose District, leading to a more vibrant area that attracts visitors and retains residents. New businesses attracted to the revitalized neighborhood by \$3.7 million in streetscape improvements are already contributing to a 120-percent increase in tax revenues in the district.<sup>4</sup> Other communities in the region can look to these examples to see the power of creating streets that not only move people but create a place where they want to spend time.

Existing trails in the region are already immensely popular with thousands of bicyclists and pedestrians using trails weekly, and improving access to them for bicyclists and pedestrians will enable more residents to use them without needing to get in a car. The Master Trails Plan adopted by INCOG in 1999 set a vision for the development of a robust trail system that reaches and connects all communities. The facilities that have been built as a result of that plan are designed to be comfortable for all types of users from families out for a Sunday walk to running groups to bicyclists on a long ride.

### Low-Stress Bicycle Facilities

Low-stress bicycle facilities include low-speed and low-volume streets with comfortable crossings, cycle tracks or sidepaths on major roads, and paved trails. These streets and off-street facilities are comfortable for the full range of bicyclists – including children and inexperienced riders – and are more likely to encourage greater numbers of people to bicycle. The Tulsa region has the backbone of a low-stress bicycle network with paved trails such as the KATY Trail and Creek Turnpike Trail. While many low-stress neighborhood streets exist, they are disconnected by busy arterial street barriers.<sup>5</sup>

The regional trail system provides opportunities to improve community health through increased physical activity. This is another reason the Tulsa region wants to make walking and bicycling easier and safer beyond trails. Residents who live in communities with opportunities for physical activity nearby are more active.<sup>6</sup> These opportunities can be as simple as a sidewalk network that connects work to a lunch destination, or a safe, comfortable bike route on local streets that connects home to a local grocery store.

Improving pedestrian and bicyclist safety is also a critical element for improving community health. From 2009 to 2014, there were 815 pedestrian and 363 bicycle crashes reported in the region.<sup>7</sup> Most occurred on the high-speed, high-volume arterial streets that connect major destinations in the region and are also the location of much of the commercial development throughout communities. People do and will want to access these stores on foot and by bicycle, so providing adequate facilities for these modes will improve safety.

Enabling and encouraging travel by foot and bicycle can also help take burdens off the roadway system by decreasing the number of necessary car trips. As the Tulsa region grows, automobile traffic will continue to increase. Further investments in the roadway system to increase automobile capacity can require substantial investment by communities, but these may be reduced or avoided through shifting more trips away from single-occupancy automobiles. The region has already recognized the value of improving its transit system with on-going implementation of Fast Forward, the regional transit system plan adopted by INCOG in 2011. The project team recognized that every transit rider is a pedestrian at both ends of his or her trip. Implementation of the GO Plan recommendations will complement and maximize these improvements by providing better first and last mile access to transit stops.

<sup>4</sup> [http://www.tulsaworld.com/communities/brokenarrow/news/broken-arrow-s-rose-district-blossoming/article\\_ca17b50c-9191-53c2-97be-0ccc6055e473.html](http://www.tulsaworld.com/communities/brokenarrow/news/broken-arrow-s-rose-district-blossoming/article_ca17b50c-9191-53c2-97be-0ccc6055e473.html)

<sup>5</sup> The Level of Traffic Stress analysis conducted for this plan is detailed in Chapter 3.

<sup>6</sup> <http://www.hsph.harvard.edu/obesity-prevention-source/obesity-causes/physical-activity-environment/>

<sup>7</sup> Crash data compiled by Oklahoma Department of Transportation from local police department reports.

## Support for Walking and Biking in Existing Plans

Numerous plans developed for the Tulsa region and individual communities have called for and supported improved conditions for pedestrians and bicyclists. In particular, the Connections 2035 Regional Transportation Plan, which was completed in 2012, called for the development of a regional bicycle and pedestrian master plan. The Connections 2035 plan touched on a number of elements that have been further developed in the GO Plan:

- Incorporation of pedestrian and bicyclist needs into the land development process through:
  - Acquisition of trail easements
  - Additional sidewalk connections, and
  - Accommodation at planned transit stops
- Improved connections between regional trails and neighborhoods
- Consistent application of pedestrian and bicycle facility design standards
- Trail improvements including lighting, maintenance and wayfinding
- Use of context sensitive design to improve the pedestrian and bicycling environment

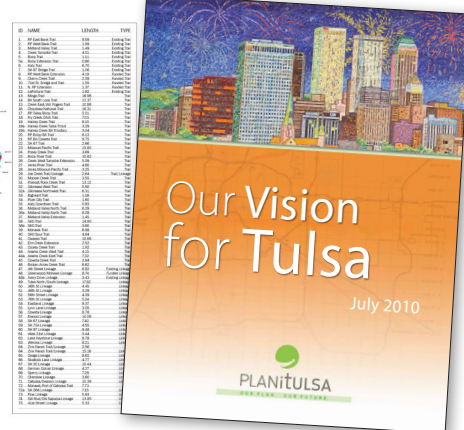
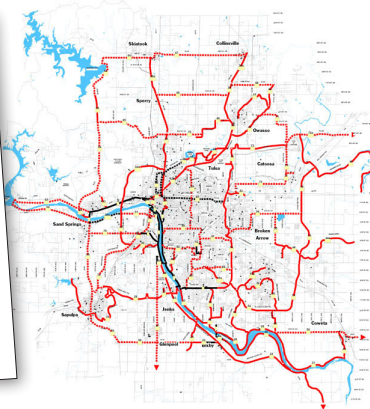
The GO Plan also builds on the bicycle and pedestrian planning effort of the 1999 Trails Master Plan by integrating that Plan's

off-street trail recommendations with new on-street bikeway recommendations to make region-wide connections.

Recent comprehensive planning in the City of Tulsa also supports a multimodal vision. PLANiTULSA, the city's comprehensive plan adopted in 2010, calls for a transportation system that provides a wide variety of mode choices. These choices will be supported by changes in land use that direct development toward downtown and new communities that are mixed use, dense and walkable.

Recommendations in PLANiTULSA about the street network itself call for a greater level of connectivity in the construction of new streets. The City will move away from a disjointed network that funnels trips onto arterial streets and toward one that provides greater connectivity. Street design is also addressed through a recommendation for "context sensitive solutions," which respond to the surrounding land uses rather than prioritizing automobile throughput on all streets. All of these changes would benefit bicyclists and pedestrians through creating the ability to take more short trips and through providing facilities such as high-quality sidewalks and bike lanes on more streets.

Planning efforts in other communities in the region are beginning to reflect this move toward a more concentrated mixed-use development pattern rather than the lower-density single use patterns typical today.



## GO Plan Development

The GO Plan was developed over the course of 18 months during 2014 and 2015. The process was guided by a steering committee, representatives from participating jurisdictions, and INCOG staff. Their input was sought on critical issues such as the Plan vision and goals, bicycle network recommendations, and the project prioritization process. A mid-point check-in was held with the committee and key stakeholders such as elected officials and advocates in October 2014 to ensure the process was on the right track. This stakeholder retreat was also used to gather input and priorities for policy recommendations included in this report.

Public input was sought through a number of means. A kick-off meeting was held in March 2014 which introduced the region's residents to project goals and the upcoming process to develop the plan. Local residents were engaged through a series of "walkshops," walking workshops that evaluated the pedestrian and bicycle conditions for a set of neighborhoods defined by the communities themselves. Most jurisdictions held one walkshop in or near their downtown, and the City of Tulsa held four separate events focused on East Tulsa, Cherry Street, Northwest Tulsa, and South Tulsa. A final public workshop was held for this planning process in September 2015 to celebrate the release of the plan and seek final public comment.

The public was also engaged through two online means: an interactive WikiMap map and a survey. WikiMap input helped identify priority locations for improvements throughout the region where barriers to walking and biking exist today and locations where residents would like to be able to walk and bike more comfortably and safely. The online survey sought more general information about travel patterns and attitudes about bicycling and walking. Survey results are presented throughout the plan and fully reported in Appendix B.

Importantly, staff from each jurisdiction have also been involved throughout the process. Though INCOG is the coordinating body for this plan, recommendations will be implemented by each of its member jurisdictions, so their involvement in the



Community staff reviewed network recommendations throughout the planning process, including at the October 2014 check-in.



The project team presented on the engagement and data analysis that led to draft recommendations development.

plan development was essential. Local staff were involved in the following efforts:

- Development and review of the bicycle network
- Identification of pedestrian focus areas
- Mid-point check-in on plan process and results
- Full-day facilities design training on the 2012 American Association of State Highway and Transportation Officials Guide for the Development of Bicycle Facilities
- Review meetings with INCOG staff for community plans

Regular presentations were also made to update the INCOG Transportation Technical and Policy Committees and Bicycle and Pedestrian Advisory Committee throughout the plan process.

# Plan Organization

The GO Plan contains the following elements to help communities implement pedestrian and bicycle projects and policies.

## 2 Bicycle Strategy

Chapter 2 summarizes the existing state of bicycling in the Tulsa region and outlines the process undertaken to develop the bicycle facility network recommendations of the GO Plan and describes the proposed network.

## 3 Pedestrian Strategy

Chapter 3 summarizes the existing state of the pedestrian environment in the Tulsa region. It provides general guidance about improvements that will increase safety and comfort and a summary of the selected pedestrian focus areas for each community. Concept designs for five typical locations are also provided that can be used by any community with similar pedestrian design challenges.

## 4 Project Implementation

Chapter 4 outlines how bicycle and pedestrian projects were prioritized for this plan and how this prioritized list can be used at the local and regional scales. Cost estimates for bicycle facility types are also presented, as well as a review of the current funding process for bicycle and pedestrian projects and recommendations for future funding.

## 5 Non-Infrastructure Strategies

Recommendations for policy and code changes that will result in an improved bicycling and pedestrian environment are presented in Chapter 5. Brief guidance on education, enforcement and encouragement programs is also provided.

## 6 Community Plans

Chapter 6 contains a summary of input received for each participating community, maps of network recommendations, a table detailing bicycle network facilities, mileage and costs, and the detailed recommendations for each community's focus area(s). This section is intended as a standalone element for each community to use, along with the bicycle and pedestrian design guidelines, in implementing their pieces of the network.

### Appendices:

- A. Bicycle and Pedestrian Facility Design Guidelines
- B. Public Involvement: Complete summary including all survey results
- C. Prioritization: Detail on methodology, scores for all projects
- D. Cost Estimate Details
- E. Policy Review: Full table; summary of input from retreat

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# 2 BICYCLE STRATEGY

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Bicycling is already part of life for many people in the Tulsa region today. Many residents enjoy the extensive system of trails for recreation. There is a strong and growing bicycle culture in the region for recreational road and mountain bike riding. The Tulsa Hub is a nationally recognized nonprofit that provides bicycles and bicycle education to residents. Tulsa Tough, a weekend of professional and amateur racing, is the city's largest event of the year, attracting tens of thousands of spectators and millions of dollars of revenue. And a growing number of the region's residents use bicycles for transportation either out of necessity or by choice. INCOG wants to help its member jurisdictions build on this strong foundation through the implementation of this plan.

Building a connected network of bicycle facilities will help the Tulsa region achieve all of the goals set forth in this plan: It will increase mode share by making more routes comfortable and accessible by bike, spurring residents to choose to ride more often for transportation and recreation. It will improve safety by providing facilities separated from automobile traffic in high-volume, high-speed locations. It will link neighborhoods to destinations. And it will position communities in the region to be recognized by national organizations, such as the Bicycle Friendly Community designation from the League of American Bicyclists, as exemplary places for bicycling.

This chapter provides an overview of the current conditions for bicycling in the region, including travel patterns, infrastructure and attitudes. It then presents the comprehensive and collaborative process through which the consultant team, INCOG staff and local jurisdictions developed the bicycle facilities network. The resulting network is described at the end of this chapter and in further detail within each jurisdiction's community plan section in Chapter 6.

Facility recommendations should be implemented following the Bicycle Design Guidelines presented in Appendix A. While the network provides a framework for facility location decisions, these guidelines provide more detailed instruction on implementation of facilities and should be consulted throughout the design process.

## Existing Bicycle Environment

### Bicycle Travel

Bicycling for transportation in the Tulsa region is limited today. American Community Survey (ACS) data show that the City of Tulsa has the highest bicycle commute mode share in the region at 0.3 percent.<sup>1</sup> All other jurisdictions are estimated to have an average commute mode share of less than 0.1 percent. ACS data also indicate that fewer than 15 percent of those bicycle commuting are women. It is perhaps unsurprising that commute mode share is at this level given that most residents travel five miles or more to their jobs.<sup>2</sup> Employment centers are clustered throughout the region in locations that do not have nearby residential land use. The development pattern of the region has separated home and work far enough that most residents choose to drive. Despite the distances, bicycle commuting could be encouraged by improving the connections between neighborhoods and the existing trails system and transit lines.

1 American Community Survey 5-Year Estimate 2009-2013, Table B08006.

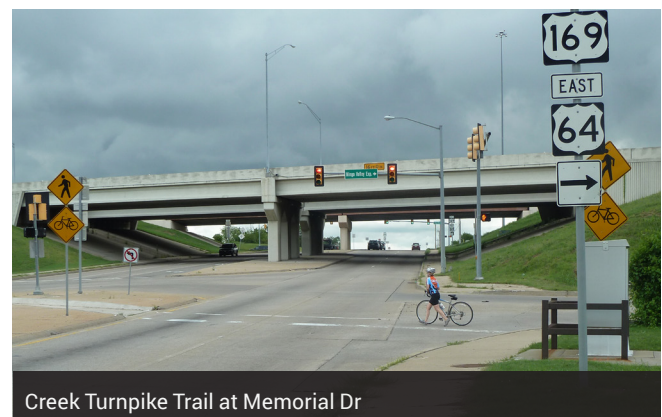
2 GO Plan survey results. This is not a statistically valid survey, but it gives an indication of the region's travel patterns.

Work trips, however, only represent 11.6 percent of all trips in the Tulsa region.<sup>3</sup> There are not good data about the percentage of trips for other purposes – shopping, social, school, etc. – taken by bicycle today. Respondents to the GO Plan survey indicated that about 60 percent of trips for errands, entertainment and meals out are three miles or less. This distance is bikeable for most adults within about 20 minutes, but most trips are completed today by car. They could be taken by bicycle if infrastructure were in place to provide safe and comfortable connections.

### Infrastructure

The region's large trails system forms the backbone of existing bicycle infrastructure in and around Tulsa. These trails take advantage of rail, highway and natural corridors to provide long-distance, separated connections between cities and towns. They are used both for transportation and for recreation and are an attractive amenity for residents, visitors and prospective residents and businesses.

Most trails are asphalt paved and 10 feet wide. These facilities are shared by bicyclists with people walking, in-line skaters and other human-powered modes. Most street crossings are at grade, with crosswalks and signage provided at unsignalized intersections. Some locations, such as the one pictured below at the Creek Turnpike Trail and Memorial Drive, have little indication that drivers should expect a high volume of pedestrians and bicyclists crossing here. A number of trail users have been struck by cars at this location.



Creek Turnpike Trail at Memorial Dr

3 National Household Travel Survey, 2009.

On-street bicycle facilities are limited. Some of the bikeways identified within the City of Tulsa in the 1999 Plan have had bike route signage added and bike symbols that predated the MUTCD standard. Many of the signed bike routes are on comfortable, low-volume local streets and have been adopted into the network for the GO Plan.

Bike lanes are present on several of Tulsa's streets. Existing bike lanes tend to meet national standards for width, but some are not fully compliant with *design* standards. For example, a segment of 4th Place has bike lanes that are striped with a dashed line rather than a solid one as called for in the American Association of State Highway and Transportation Officials (AASHTO) Guide to the Development of Bicycle Facilities. As another example, bike lanes on Delaware Avenue end abruptly before the intersection with 11th Street without accommodation to the crossing of 11th Street. The recommendations of this Plan offer facility recommendations and design guidance in these situations.

Broken Arrow has recently added shared lane markings to Broadway Avenue as part of a larger streetscape project that narrowed the street to calm traffic. These are the only on-street bicycle facilities today in the region outside of the City of Tulsa.

Because of the lack of on-street bicycle facilities, some riders today use the sidewalk network to travel. This is especially the case on high-volume, high-speed arterial streets where riding in the road would be uncomfortable and unsafe. Conflicts arise with pedestrians in areas with transit stops or more pedestrian traffic generators such as a commercial corridor. Conflicts with automobiles occur at driveways, which are frequent along some arterials, and at intersections. Drivers typically do not anticipate a faster moving vehicle on the sidewalk where they expect only pedestrian traffic. Sidewalk riding is not illegal anywhere in the region, except in downtown Tulsa, but it should not be a primary means of accommodating bicycle travel.



Symbols are painted in all lanes and do not include any accompanying arrow or chevron. It is unclear to the bicyclist and the driver what they indicate.



Sidewalk riding is common on high-speed, high-volume streets where people are not comfortable sharing space with cars.



Dashed lines should indicate areas of a bike lane where automobiles will cross the lane such as at a driveway crossing as pictured above.



Where it is not possible to continue a bike lane to the intersection, shared lane markings should be placed in the right turn lane to help bicyclists center themselves in the lane and avoid conflict with a right-turning automobile.

## Attitudes

Residents of the Tulsa region bicycle today for a number of reasons. When asked what they like best about biking in the region, a large majority (88 percent) of survey respondents cited exercise and health benefits. Many also cited the trails system as a major amenity and the opportunity to spend time with family and friends. However, a majority of respondents (55 percent) noted that a lack of comfort with sharing the road with automobiles prevents them from bicycling more. A number also cited the lack of bike friendly roads or trails near their home as a barrier. Respondents said that education and enforcement programs designed to improve driver-bicyclist interaction would increase bicycling in the region. But even when specifically asked about programs that would increase their likelihood of bicycling, many respondents' comments pertained to infrastructure such as bike lanes and trails. The implementation of an on-road and trail network is a clear community priority.

## Study Network Development

The goal in developing a network of bicycle facilities for the Tulsa region is to connect major regional destinations to one another and to connect neighborhoods to the existing backbone network of trails. Examples of regional destinations are communities' downtowns, large shopping centers and colleges and universities. In general, the network is intended to serve both transportation and recreation purposes for a wide range of users.

A study network of 250 miles of roadway was created by the project team and INCOG staff, by utilizing a number of inputs: demand analysis, WikiMap input and on-the-ground community comments from Walkshops.

The demand analysis used a set of generators and attractors of bicyclist and pedestrian trips to estimate likely demand for improved facilities. Factors incorporated into this analysis are noted in the tables on the following page. The resulting generators and attractors maps show that demand for facilities is anticipated to be greatest in the downtown cores of each community and along

some major corridors in the region. Though the analysis was performed for the entire region, City of Tulsa results were studied separately to better illustrate differing gradations of demand within this high-demand area of the region.

WikiMap input also helped define the study network through users' input regarding destinations and areas that need improvement, both specific barriers to travel and longer roadway corridors. Many of the barriers noted were crossings of major streets and highways, as well as access to trails. Lack of a trail or on-road bike facility was cited as the biggest issue for routes that residents would like to bike but currently do not. Respondents' focus on trails is not surprising given the fact that they comprise the majority of bicycle facilities in the region today.

Though Walkshop input focused mostly on pedestrian issues within each of the areas visited, areas needing bicycle improvements were also identified. For instance, participants in Bixby called out a connection between their city and Glenpool along Highway 67 as a critical, longer distance solution to improve bicycle access.

Use of these three tools resulted in a 690-mile initial study network which was further refined by focusing on streets that provide access to the existing regional trail network. The final 250-mile network was assessed through the means described below.

## Study Network Assessment

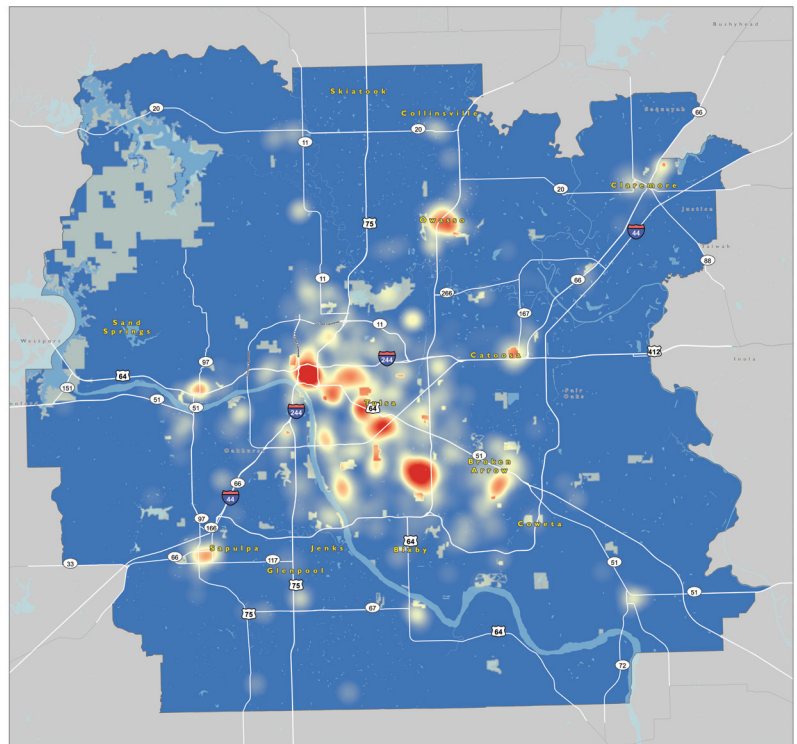
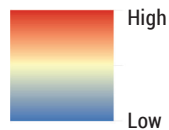
### Fieldwork

Every street in the 250-mile network was visited during a week of fieldwork performed in June 2014. The consultant team documented the study network through photographs and data gathering that included roadway and lane widths, posted speed limits, the presence of curbs, and other general notes about conditions observed along the corridors such as the frequency of driveways, adjacent land uses and intersection configurations where pertinent.

# Demand Analysis

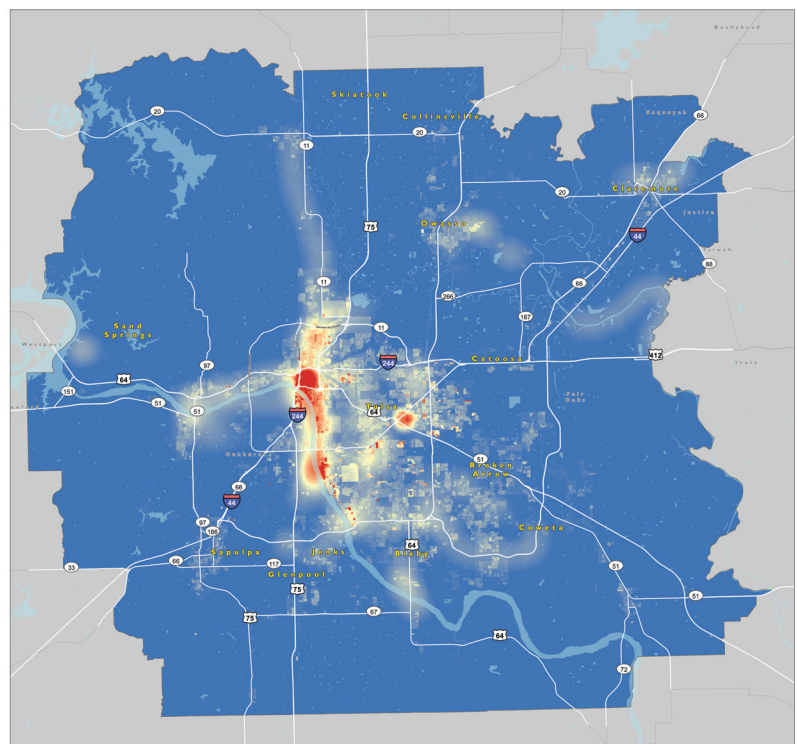
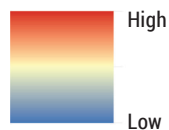
Attractors	Weighting
Employment locations	20
Traffic generators (INCOG dataset)	15
Schools	10
Recreation/community centers	5
Parks	5
Libraries	2.5
Industrial employment	-10

Attractors Demand

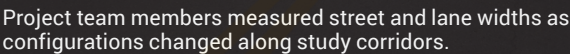


Generators	Weighting
Population density	20
Proximity to existing trail	10
Proximity to transit	10
High percentage of zero car households	2.5
High bicycle mode share	2.5

Generators Demand

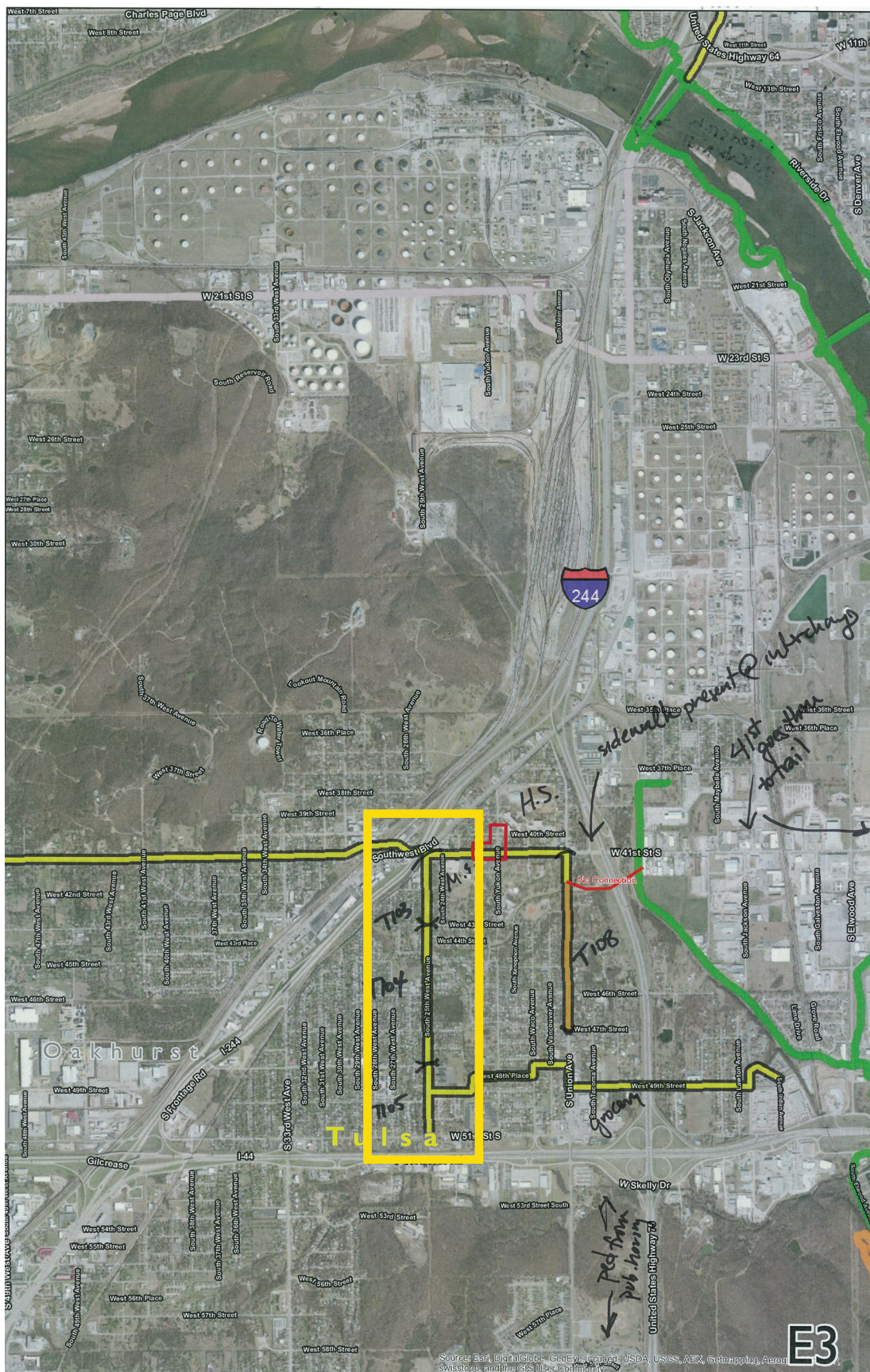


South 25th West Avenue in Tulsa, changes character multiple times along the length included in the study network. The street width, parking and lane configurations change twice in the one-mile segment between West 41st Street and 51st Street. Each change was noted and demarcates the start of a new segment in the study network data as can be seen below in each row of the data collection sheet.



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Fieldwork data collection sheet example. First three rows pertain to S 25th West Ave and indicate changing roadway width and lane configurations. Initial recommendations for bicycle facilities were made in the field, e.g., "BL" in the middle column indicates a bike lane recommendations.



Fieldwork maps were marked with the start and end of each roadway segment as can be seen for South 25th West Avenue in the yellow box below. Notes were also made regarding land use, difficult crossings and other elements that would impact bicyclist and pedestrian travel.

Quantitative roadway data were collected for use in determining what bicycle facility type could fit within the existing curb-to-curb dimension and for performing a Level of Traffic Stress assessment discussed in the following section.

Fieldwork also afforded the opportunity to assess how users of different modes travel along the study network today. For instance, many arterial streets on the one-mile grid have high speeds and traffic volumes that cause bicyclists to avoid arterial streets or to ride on the sidewalk. These streets also often had multiple driveway cuts per business, or long stretches of street without curb which allows drivers to turn at any point across the sidewalk to access adjacent businesses. These multiple entrances create more opportunities for conflicts between automobiles and bicyclists riding along the road edge or on the sidewalk. Many highway underpasses were also observed to lack sidewalks and crosswalks. This placed pedestrians in grass or dirt areas for walking and did not make drivers entering and exiting the freeway aware of potential conflicts with pedestrians at ramps.

In more rural areas, the study network included many county roadways, often two-lane roads through low-density land uses. These roads had high posted speed limits (45+ mph) and low traffic volumes. There were few pedestrians or bicyclists observed, but these roads were included for their potential as routes for longer distance recreational bicycle rides. As these rural areas become developed, however, accommodation for pedestrians and bicyclists making short trips will become more important.

## Desktop Assessment

After completion of the fieldwork, some streets were reviewed via Google Earth and Street View to check the accuracy of data recorded. This method was also used to help assess network streets from the 1999 Trails Master Plan. INCOG staff requested the inclusion of these streets in the GO Plan to the extent that they improved regional connections for bicycling. Streets deemed worthy for inclusion were reviewed for width and

character to determine an appropriate facility type since the 1999 Plan did not indicate facility types or on-street recommendations. All trails from the 1999 Plan were initially adopted into the GO Plan network.

## Level of Traffic Stress Assessment

The Level of Traffic Stress (LTS) assessment analyzes the roads and trails in a bicycle network to identify the amount of comfort a relatively inexperienced bicyclist would likely feel on each road segment. For the purpose of this plan, low-stress streets and bicycle facilities, including paved trails, are those rated with LTS 1 or 2. On-street bicycle facilities in these low-stress categories are those where a bicyclist shares the street with low-volume, low-speed automobile traffic, is adjacent to such traffic in a bike lane of adequate width, or is completely separated from traffic on a sidepath or cycle track.

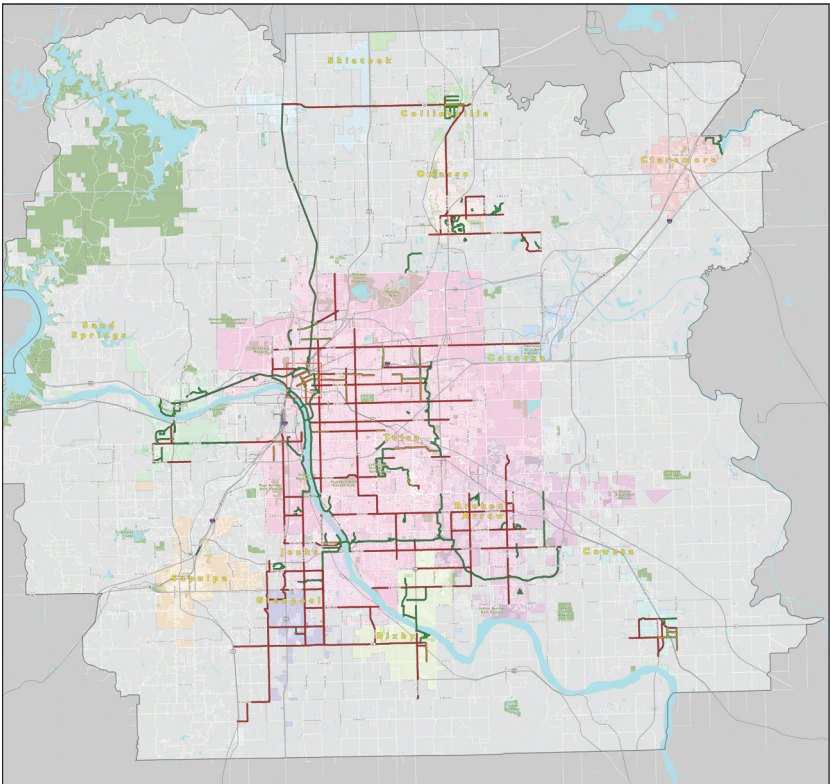
The LTS method uses a number of inputs to evaluate the comfort of a given street segment for bicyclists including:

- Posted speed limit
- Traffic volumes
- Number of automobile travel lanes
- Presence/absence and width of a dedicated bicycle facility

Segments are scored on a least common denominator method whereby the most stressful element assessed overrides the others. For example, a two-lane street with a wide shoulder and low traffic volume would be rated as LTS 4 (most stressful) if the speed limit were over 35 mph. While all of the other characteristics of the street make for a comfortable ride, traffic passing a bicyclist at 35 to 40 mph makes for an uncomfortable ride.<sup>4</sup>

<sup>4</sup> It should be noted that the LTS scoring system is geared toward a less experienced bicyclist whose choice to ride a given street is highly impacted by its infrastructure and traffic characteristics. More experienced bicyclists may not be deterred from riding by sharing the road with higher speed or volumes of traffic.

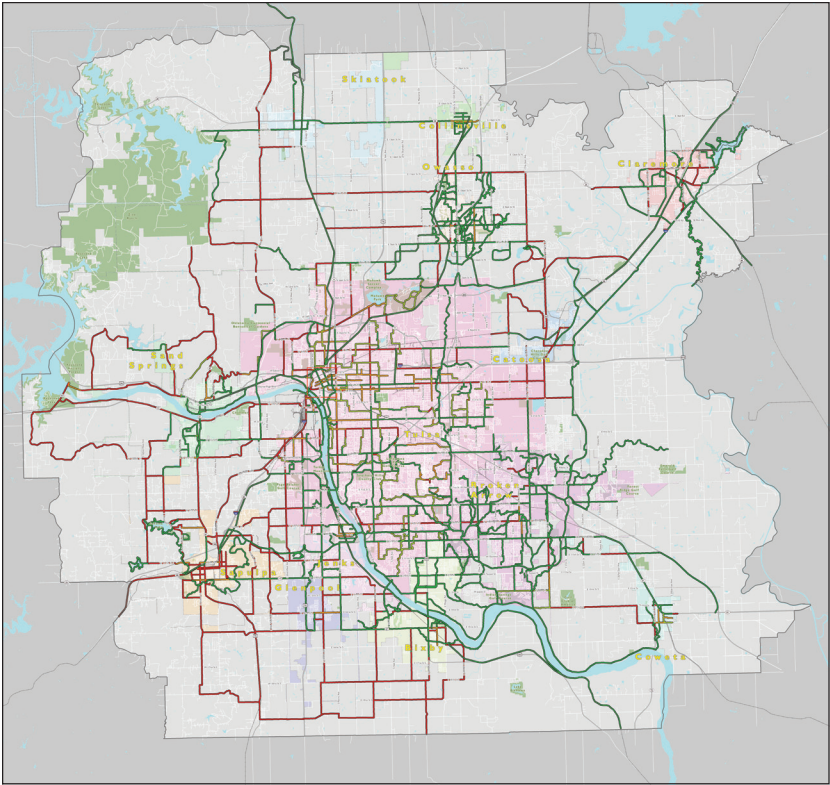
# Study Network



Existing LTS	Percent of Total Network
1	13.66%
2	13.44%
3	4.35%
4	68.54%

Many study network streets are marked here in red indicating LTS 4, the highest stress level for bicyclists.

# Planned Facilities



Planned LTS	Percent of Total Network
1	30.60%
2	12.89%
3	5.32%
4	51.19%

Arterial streets such as SH-20 between Skiatook and Collinsville drop from LTS 4 to LTS 1 in the planned network with the addition of a sidepath.<sup>1</sup>

<sup>1</sup> This assessment only pertains to changes to the original study network since an “before” assessment of added streets as not performed.

Comfortable crossings of major streets are also necessary to complete a low-stress network. A low-volume neighborhood street presents a comfortable riding environment, but it may cross an arterial with no traffic signal, and that crossing presents a high-stress experience for a bicyclist.<sup>5</sup>

The majority of the study network for bicycling today presents a high-stress riding experience. Because this plan seeks to create regional connections, the network includes many arterial streets which provide those direct connections to primary regional destinations. Nearly all of these streets are rated LTS 4 as a result of their traffic volumes and speeds and lack of a dedicated bicycle facility.

## Bicycle Recommendations Development

The team followed a number of principles in developing on-street facility recommendations for the region. The principles are outlined below:

- Facilities fit within the existing pavement width or are off-street construction where there is available right-of-way<sup>6</sup>
- Avoided in-street facilities on high-stress roads: these facilities would remain high-stress owing to traffic volumes and speeds, to the extent possible
- Rural area on-street facilities focus on signed routes for experienced recreational riders
- Urban area on-street facilities focus on sharrows, bike lanes and buffered bike lanes
- Aim for facility types that appeal to and encourage use by casual bike riders
- Continuity of facility is strived for along the length of a studied segment

5 For the purposes of this planning effort, the stress of intersections was not evaluated. It can be assumed that any unsignalized arterial crossing is a high-stress intersection where additional infrastructure will be needed to ensure a comfortable bicyclist crossing. These design treatments are presented in Appendix A.

6 Right-of-way assessment was based on visual inspection not measurement.

These principles reflect both best practices in bicycle planning and residents' opinions expressed in the online survey. Respondents were asked through a series of photo questions which types of bicycle facilities they prefer. All answers indicated that a greater level of separation from both automobiles and pedestrians is desired. It was clear that a shared lane situation on a four-lane street is not a desirable place to bike for most people.

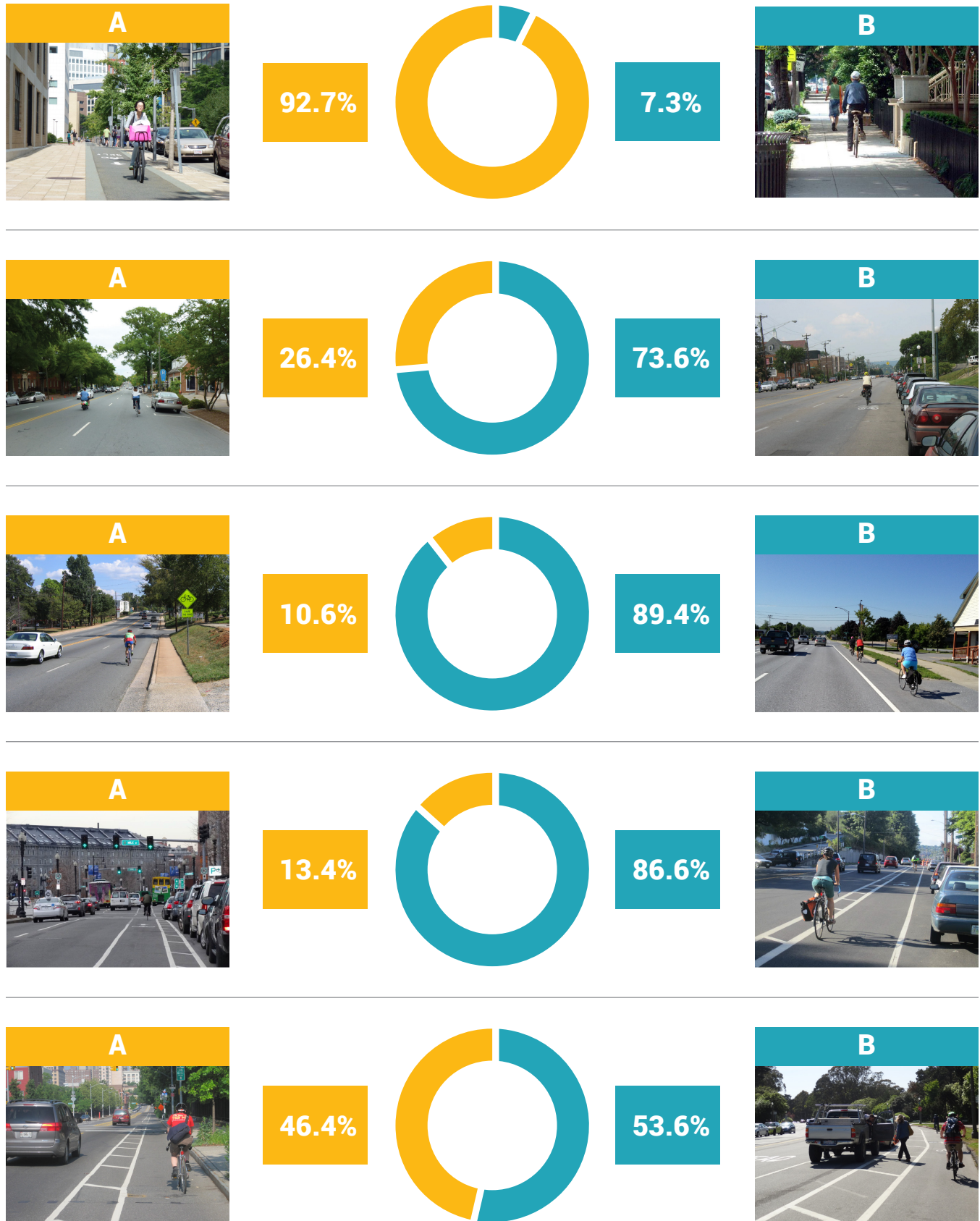
While understanding these preferences, this plan strives to be realistic and understands that inclusion of a sidepath on every high-stress street in the network would create an unreasonable and unattainable goal. Therefore, some streets included in the study network were removed from the recommended facility network because making them comfortable and safe for bicycling would require a high level of investment. Because sidepaths and trails are understood to be a major investment for communities, they may wish to pursue implementation of parallel signed routes first that would connect the same destinations. Investment in these routes would require signage on low-volume local streets and improvements at any difficult arterial crossings.



Confident bicyclists feel comfortable taking the lane as seen here in a group ride on Southwest Boulevard in Tulsa.

# Facility Preferences

Respondents chose the photo for the facility they'd prefer to ride..



The facility types outlined here cover all of the on-street facilities used in the GO Plan network. More detail on their application and design is provided in the Bicycle Design Guidelines in Appendix A.



### Trail

- Path fully separated from a street, shared by bicyclists, pedestrians and others
- Typically paved and marked with a center line
- Located along a separate alignment from street right-of-way
- High-volume or high-speed streets



### Sidepath

- Path for use by both bicyclists and pedestrians within street right of way
- At curb level to separate from traffic, preferably with buffer between path and street
- Typically marked with a center line
- High-volume or high-speed streets



### Cycle Track

- Provides bike-only facility physically separated from automobile travel lane and sidewalk
- Separated from traffic by curb, bollards, parked cars and/or other vertical elements
- Medium- and high-volume streets



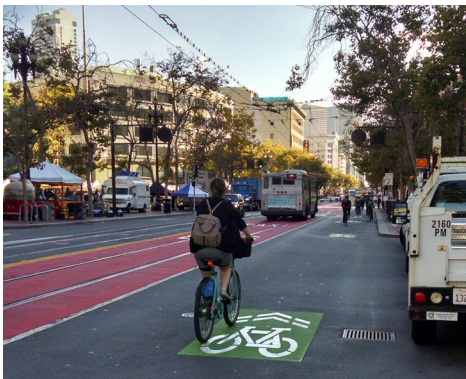
### Buffered Bike Lane

- Increases riding space and comfort by adding a painted buffer to standard bike lane
- Buffer located either between the bike lane and automobile travel lane, or between bike lane and parking
- Medium- to high-volume streets



### Bike Lane

- Marks dedicated space for bicyclists on the street with pavement markings
- Often on the right side of the street, and can be marked on one-way streets
- Medium- or low-volume streets



### Priority Shared Lane Marking

- Similar to Shared Lane Markings but underlaid with a bright green box and spaced more frequently
- Used in locations with higher volumes of traffic and/or complex traffic patterns such as those with higher turnover on-street parking
- Medium- or low-volume streets with speed limits under 35 mph



### Shared-Lane Marking ("Sharrow")

- Shows both bicyclists and drivers where bicyclists should ride on street for safe travel
- Reinforces that bicyclists belong in the lane and drivers must share the road
- Low- and medium-volume streets where bicycle lanes cannot be accommodated



### Signed Route

- Directs bicyclists to connecting routes
- Notifies drivers to expect bicyclists on the roadway
- "Share the Road" signs often used
- Low-volume streets in rural or local neighborhood contexts

## Recommendations Refinement

Once draft facility recommendations were complete, INCOG shared the network with staff in all local member jurisdictions. Staff consulted ranged from City Managers to planning to transportation staff. This local knowledge helped eliminate some projects from both the GO Plan network and incorporated 1999 Plan recommendations. Some facility types were also adjusted based on the comfort level of local officials with roadway changes such as road diets or the construction of a sidepath. Feedback was also sought from INCOG staff knowledgeable about bicycling in the region, the Bicycle and Pedestrian Advisory Committee, and the GO Plan steering committee.

Additionally, the 1999 Plan on-street recommendations were reviewed to assign an appropriate facility type to those routes that represented important regional connections. Many of these “bikeways” in rural areas were recommended to be signed routes that will primarily serve experienced recreational riders. Urban, local street bikeways were predominantly recommended to be signed routes as well. Though these routes consist of low-volume, low-speed local streets, they may need improvements at arterial intersections to function effectively and safely for bicyclists. In the long term, communities may decide that they want to enhance these neighborhood bikeways with traffic calming measures such as those outlined in the Pedestrian and Bicycle Design Guidelines in Appendix A.

## Network Facility Recommendations

The bicycle network for the Tulsa region sets an ambitious vision for connecting major destinations via a 800-mile system of on-street facilities and routes, 165 miles of sidepaths and 408 miles of off-street trails. The full build-out of this network will link communities to one another and important destinations within each community.

Facility Type	Total Regional Mileage
Signed Route	605.7
Shared Lane Markings	33.6
Priority Shared Lane	0.5
Bicycle Corridor	55.5
Bike Lane	89.7
Buffered Bike Lane	5.7
Cycle Track	9.0
Sidepath	165.3
Trail	407.7
<b>TOTAL MILES</b>	<b>1372.8</b>

Overall, the set of facility recommendations provides a lower-stress bicycling experience throughout the region.<sup>7</sup> The 408 miles of recommended trails will provide a family-friendly, off-street riding experience. Sidepaths and cycle tracks on major arterials will allow less experienced riders to access the many commercial destinations located along these corridors. And bike lanes and signed routes on lower volume streets will help bicyclists navigate comfortable routes.

## Wayfinding

The bicycle network will only be useful to the region’s residents if it is clearly recognizable. Though signed routes are the only facility type indicated to explicitly include signage, INCOG should consider a comprehensive wayfinding system to be implemented as bicycle facilities are added to the network. In order to attract riders, this network must be publicized through a new bike map, and more directly identified through a wayfinding and branding system.

<sup>7</sup> The “Bicycle Corridor” facility included in this table is used in the City of Tulsa and indicates a street where a bike lane is the desired facility, but shared lane markings may be necessary in some segments due to roadway constraints.

Wayfinding consists of signs that direct bicyclists along routes, providing clarity about turns and reassuring riders that they are continuing along a designated bicycle route. As new or novice riders see wayfinding signage throughout the region, they may be encouraged to try riding along a new route where they can be assured a low-stress trip. Wayfinding is also helpful to visitors and could help orient newcomers such as University of Tulsa students.

A wayfinding system should indicate distance and destinations. Destinations typically identified by the public as important include: parks, neighborhoods, business districts, schools, and trails. Wayfinding should not be limited to on-street routes. There is no current signage on trails. Wayfinding signs on trails should use the same destinations as the on-street network and should indicate the name of cross streets at access points. Access points can also be marked with directional wayfinding orienting trail users and helping them to make decisions about which way to turn.



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# 3 PEDESTRIAN STRATEGY

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Every resident and visitor in the Tulsa region is a pedestrian at some point. People enjoy strolling their city's main streets and walking and running for health. Some of the region's residents also walk for transportation, for their whole trip or as part of a transit trip. However, the vast majority of trips in the region are still taken by private automobile.

This chapter provides an overview of the existing pedestrian environment and how the region's development patterns have influenced pedestrian travel. It also reports on regional attitudes toward walking and existing infrastructure. The chapter then outlines this plan's approach to pedestrian recommendations and concludes with a set of concept designs for typical challenging pedestrian locations.

## Existing Pedestrian Environment

The decision to walk for a given trip is influenced by a number of factors outlined below. The GO Plan recommendations seek to address the pedestrian environment as it exists today but acknowledges that some influences on walking, such as land use and the layout of street networks, will not change quickly if at all.

## Development Patterns

Today, much of the walking in the Tulsa region is for recreation. Residents indicated on the Plan survey that they view it as great means of exercise,

but walking and bicycling for transportation today are limited. Some residents commute or travel for other purposes by these modes because they are inexpensive, because there is no car available, or because they can complete the “last mile” of a transit trip connecting to a destination not directly on a bus line. Others use these modes because their trips are short, easily completed in a short time on foot or bike. And still other residents use these modes because they want to incorporate activity into their daily travel for health or environmental reasons.

### **Proximity of Destinations**

Many trips in the region cannot be completed by foot today. Sprawling development in the suburban and rural communities of the region has resulted in destinations that are far away from one another. Grocery shopping or dining out, for example, often require trips of at least three miles.

Walk Score, an online resource that rates communities and neighborhoods on their walkability, awards points based on walking distance to amenities. Amenities within a five-minute walk (0.25 miles) are given maximum points. Walk Score also measures pedestrian friendliness by analyzing population density and road metrics such as block length and intersection density. In this evaluation system, the vast majority of the Tulsa region is rated in Walk Score as “car dependent.” There are limited neighborhoods close to downtown Tulsa that are rated “somewhat walkable” because of mixed land use and a more fine-grained street network.

As noted in the Introduction, the region’s planners are hoping to move new development toward mixed-use centers that increase the proximity of destinations and improve walkability.

### **Suburban Street Networks**

The typical street network in suburban development also presents a barrier to making short trips. Outside of downtown and main street core areas, the region’s development is framed by a one-mile arterial grid system. The central areas retain a grid system that was developed in a pre-

automobile era, whereas subsequent development, especially since World War II, moved toward meandering residential streets and cul-de-sacs. The boom in residential development in the last 10 years in the region’s fast-growing communities of Owasso and Broken Arrow has continued in this pattern. This type of street network makes travel through neighborhoods difficult and funnels all modes of traffic onto the arterial grid. Trips are longer than they could be if connections were provided between neighborhoods. Local streets that do not align in a regular intersection across arterial streets also make pedestrian travel difficult, especially when no sidewalk is present on the arterial. Small investments in short connector paths or segments of sidewalk could help overcome these challenges.

### **Infrastructure**

Trips that may be within a walkable distance, such as from a subdivision to a nearby convenience store, are not taken by foot today because pedestrian infrastructure is not reliably available. Sidewalk construction along arterial streets in many communities has been ad hoc as new landowners develop parcels. Even in communities with good sidewalk coverage on arterial streets, there are often gaps approaching intersections where sidewalks dead-end into parking lots for shopping centers, convenience stores or gas stations located on these desirable commercial lots. The resulting fragmented network is substandard and largely inaccessible for physically disabled people or even those pushing a stroller.

### **Pedestrian Travel**

Walking for transportation in the Tulsa region is limited today. American Community Survey (ACS) data shows that the City of Tulsa has the highest walking commute mode share in the region at 1.8 percent which is not surprising given that destinations are in closer proximity than other communities.<sup>1</sup> All other jurisdictions are estimated to have an average walking commute mode

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<sup>1</sup> American Community Survey 5-Year Estimate 2009-2013, Table B08006.

**Sidewalks that do exist in many locations are serviceable but do not provide a pleasant or desirable walking experience.**



Street trees would provide shade and a welcome buffer from traffic on this high-speed arterial. Additionally, vertical elements next to the roadway have been shown to help reduce speeding by visually narrowing the roadway for drivers.



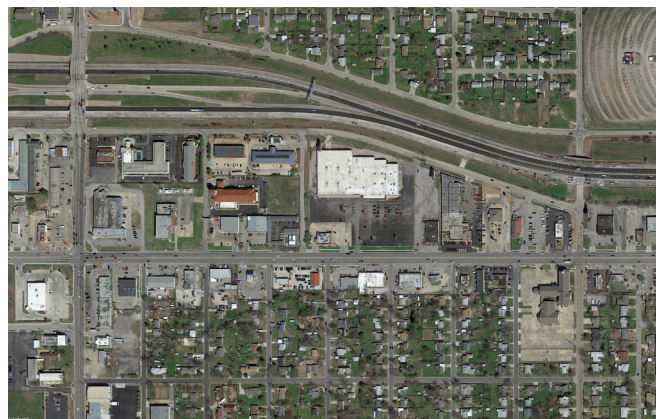
Standard crosswalks consisting of two parallel white lines are less visible to drivers than zebra or ladder designs that include wide white stripes perpendicular to the road edge. Stop bars are also needed at intersections to direct drivers to stop at a greater distance from the crosswalk, making it less likely they will block a pedestrian's path of travel.



The presence of multiple driveway cuts over a short distance creates conflicts between drivers and pedestrians.



To be ADA compliant, curb ramps must meet standards for grade, width and landing area. They must also align directly with crosswalks rather than pointing to the diagonal of an intersection.



Long gaps between signalized crossings on a commercial arterial, such as this segment of Admiral Street, can lead to dangerous crossing behavior for pedestrians accessing destinations on the other side of the street.

## Walkable Districts in the Tulsa Region

The Tulsa region has a number of examples of areas that are or can become highly walkable. Within the City of Tulsa, the Brady Arts and Blue Dome districts in downtown have many commercial and retail destinations in close proximity, and more residential development is being added every year. Streetscape efforts have been made in other small business districts such as Cherry Street and Brookside on Peoria Avenue to make them attractive to pedestrian travel. This encourages “park once” behavior whereby visitors who drive to the district park and complete trips to multiple destinations within the district on foot. Other areas of the City of Tulsa, such as Kendall-Whittier, are starting to redevelop their strips with historical buildings into vibrant, walkable commercial areas.

The downtowns of other smaller communities in the region also have the good bones of a gridded street network and small, historic commercial properties that will lend themselves to becoming highly walkable districts. Some communities, such as Jenks and Broken Arrow, have redesigned their Main Streets through road diets that provide additional space for pedestrians and calm traffic through narrowing the roadway with curb extensions.



share of less than 1.0 percent. The land use and street network patterns described above have contributed to these mode share numbers.

As noted in Chapter 2, work trips account for only 11.6 percent of all trips in the region. According to the GO Plan survey, the most frequently walked-to destination is a restaurant or coffee shop. It is likely that these trips take place during the work day when more respondents are in walkable parts of the region where restaurants are in close proximity to workplaces.

Every community in the region includes some households without access to an automobile. According to the 2013 American Community Survey, Jenks had the lowest percentage of households without a vehicle available (2.1 percent), and Tulsa had the highest (8.4 percent). Residents of households without a vehicle are more likely to walk, bike or take transit trips. Areas with low automobile ownership are priority areas for improvements in this plan.

### Attitudes

Similar to bicycling, residents in the region tend to view walking as a good means of exercise and an opportunity to spend time with friends and family. Survey respondents also recognized that many destinations are simply too far to walk to with 58 percent citing distance as a barrier to walking. In written comments, a number of respondents also noted that the current design of facilities does not invite walking. The lack of a buffer between pedestrians and high-speed traffic and a lack of crosswalks were cited as factors that make residents less likely to walk. Similarly, respondents cited the construction of new sidewalks as the improvement that would make them most likely to walk more. Improved street lighting and additional trails were also cited. Comments received on the WikiMap were similar in citing sidewalk gaps and dangerous intersections as the main barriers to walking.

## Pedestrian Recommendations Approach

Though it is possible to craft a bicycle network at the regional scale as was presented in Chapter 2, the creation of a comprehensive set of pedestrian recommendations is difficult at this scale. Pedestrians take short trips that are not centered on arterial streets but are much more destination-oriented, focused on locations such as transit stops, parks, schools and shopping centers. Fieldwork conducted for the bicycle strategy enabled the project team to gain a general sense of the infrastructure qualities noted above and to see how pedestrians tend to navigate some of the more typical place types and locations found throughout the region. However, detailed data on the pedestrian infrastructure such as curb ramps, crosswalks, signals and sidewalk gaps was not noted.

The pedestrian recommendations of the GO Plan focus on four elements:

- Prioritization of the existing INCOG sidewalk gap inventory,
- Detailed assessment and recommendations for one or more focus areas per jurisdiction,
- Concept designs for typical challenging pedestrian scenarios, and
- Policy recommendations.

All policy recommendations are presented in Chapter 5, some of which are specific to pedestrian access and improvements, and some of which will benefit pedestrians and bicyclists equally.

### Sidewalk Gap Prioritization

Some communities in the region have sidewalk construction policies that have resulted in relatively comprehensive coverage on arterial streets. Gaps in the network do exist, however. INCOG conducted an inventory of arterial sidewalk gaps in 2013 to document segments where there are no sidewalks on either side of the street. Region-wide, gaps were prioritized based on their

proximity to schools, parks, transit lines and areas with low automobile ownership. Streets with higher traffic volumes were also ranked higher.

Within the City of Tulsa, gaps were prioritized using the methodology set forth in a 2015 national report from the National Cooperative Highway Research Program (NCHRP). City staff provided input on what variables to incorporate into the analysis, including data from the City's ADA Transition Plan completed in 2011. The tables on the following page presents the factors, variables and weighting included in this scheme.

This approach is further detailed in Appendix C.

While the inventory is helpful for identifying these worst-case locations, installing a sidewalk on only one side of an arterial is not a best practice. Arterial streets in the region often have long distances between signalized crossings where pedestrians can safely access destinations on the other side of the street. Forcing pedestrians to travel on one side of the street will lead to unsafe midblock crossings where facilities that notify drivers to expect pedestrians are not provided.

All of the sidepath and trail recommendations in the bicycle network will also benefit pedestrians. Some sidepath recommendations will close small sidewalk gaps, while others will provide longer distance connections more likely to be used by recreational walkers and runners.

### Community Focus Areas

The focus areas identified in each community represent high-priority locations for pedestrian improvements. Many are locations of pedestrian crashes or near misses that have occurred in the last few years. They also often include pedestrian traffic generators such as schools and shopping destinations. These small areas were identified by planners in each jurisdiction and by stakeholders at community Walkshops. They should be considered the highest priority pedestrian projects for each community to complete when implementing this plan.

## Regional Pedestrian Prioritization Factors and Variables

Factor	Variables
Safety	
	Roadway average daily traffic (data from INCOG)
Equity	
	Serves area with low automobile ownership
Connectivity	
	Within 10 minute walk of:
	- Schools
	- Parks
	- Transit stops

## City Of Tulsa Pedestrian Prioritization Factors and Variables

Factor	Variables
Stakeholder Input	
	Sidewalk Complaint List
Safety	
	Weighted Pedestrian Accessibility Score from ADA Transition Plan
	Roadway average daily traffic
Demand	
	Proximity to planned dense land use (Building Blocks from PLANiTULSA)
Equity	
	Serves area with low automobile ownership
Connectivity	
	Within 10 minute walk of:
	- Schools
	- Parks
	- Daily shopping needs
	- Medical
	- Transit stops

## Concept Designs

A subset of the focus areas were identified as typical pedestrian environments that occur throughout the region. A concept-level design was prepared for each of these five areas, and elements of these designs can be applied to similar locations. The five areas included six typical situations:

- School connection across state highway
- At-grade highway intersection
- School access on major arterial
- Commercial main street
- Major arterial intersection
- Grade-separated highway interchange

Assessment and design details of these situations are included in the following pages.

## SCHOOL CONNECTION ACROSS STATE HIGHWAY



Lack of sidewalks along S 305th East Ave



Lack of crosswalks and ramps at intersection



Hwy 51 is wide to cross as a pedestrian



No ADA compliance or connection to sidewalks

### Coweta High School and East Highway 51

Highway 51 is a large arterial roadway that is the main thoroughfare from Coweta to Tulsa. S 305th East Ave is a rural 2-lane street that serves as the entry drive to the Coweta High School. Hwy 51 experiences hostile driving patterns from speeding traffic, swerving, and congestion only during the peak times of morning and afternoon rush hour and schools' start and dismissal. At the intersection of S 305th East Ave, the lone crosswalk leads to no ramps or sidewalks and the time between walk signals is too long and the amount of time given to make the long crossing across Highway 51 is not long enough.

The concept solutions range from adding simple things like sidewalks and adding elements to the intersection to make it safer to cross. The intersection of 51 and S 305th East Ave should have push button detection and high visibility crosswalks on all 4 approaches and ADA accessible ramps to sidewalks. Sidewalks should be added along the east side of S 305th East Ave at a minimum and on both sides if available. At the entries to the high school and the high school sports complex off of S 305th East Ave, there should be a raised crossing and HAWK signal to allow easier pedestrian crossing. School zone signage should also be added along Highway 51 to the east of this intersection to notify drivers that they are approaching a high-volume pedestrian area.

## SCHOOL CONNECTION ACROSS STATE HIGHWAY



Existing aerial of the Coweta High School complex and Highway 51



Conceptual plan of the Coweta High School complex and Highway 51

## SCHOOL CONNECTION ACROSS STATE HIGHWAY



Existing photo of S 305th East Ave looking south toward Coweta High School



Conceptual photo-rendering of S 305th East Ave looking south toward Coweta High School

## AT-GRADE HIGHWAY INTERSECTION



No pedestrian crossing across Highway 97



Right turn slip lane on W 41st Street



No sidewalks along E 41st Street



Wide driveway crossing issues along E 41st Street

### Highway 97 at East 41st Street

Highway 97 is a wide, median-divided roadway that is very hostile to pedestrians and bicyclists and lacks sidewalks or crosswalks at any of the approaches at the intersection of West 41st Street. Numerous destinations are located along Highway 97, though, as it is a main suburban commercial corridor for Sand Springs. Commercial destinations are located on three of the four corners at this intersection, and none has suitable pedestrian access. A sidepath exists on the north side of West 41st Street to the east of this area but ends before the intersection of Highway 97.

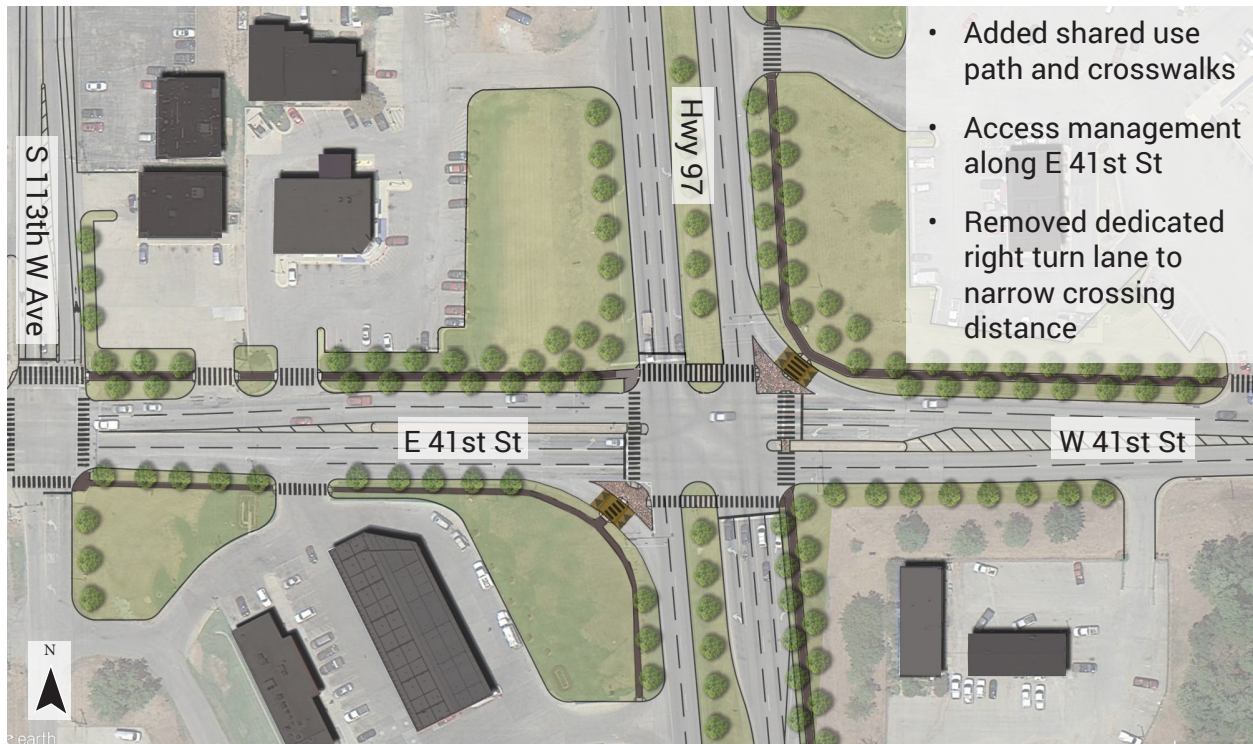
Additionally, Sand Springs has plans for a streetscape project along South 113th West Avenue which is parallel to Highway 97. This project includes a cycle track that will connect with West 41st Street. This facility should be built along the east side of the street to connect to a new shared use path along the north side of West 41st Street. The connection from 113th West Ave to Hwy 97 should be improved by narrowing and controlling driveway access along E 41st Street.

The intersection of 41st Street and Hwy 97 should have pedestrian push buttons, high visibility crosswalks at all approaches, and median refuge areas installed. Crossing distances should also be shortened through removal of the dedicated right turn lanes at all approaches of the intersection of Highway 97 and West 41st Street. A raised crosswalk should be installed across the remaining right turn slip lane on the northeast corner of the intersection.

## AT-GRADE HIGHWAY INTERSECTION



Existing aerial of the intersection of Highway 97 and 41st Street.



Conceptual plan of the intersection of Highway 97 and 41st Street.

## AT-GRADE HIGHWAY INTERSECTION



Existing photo looking east at the crossing of Highway 97 on 41st Street



Conceptual photo-rendering of the proposed crossing of Highway 97

## SCHOOL ACCESS ON MAJOR ARTERIAL



Class dismissal of students crossing N 129th E Ave



Students crossing East 86th St N on N 129th E Ave



Sidewalk along N 129th E Ave and high school parking lot



Sidewalk on west side of N 129th E Ave

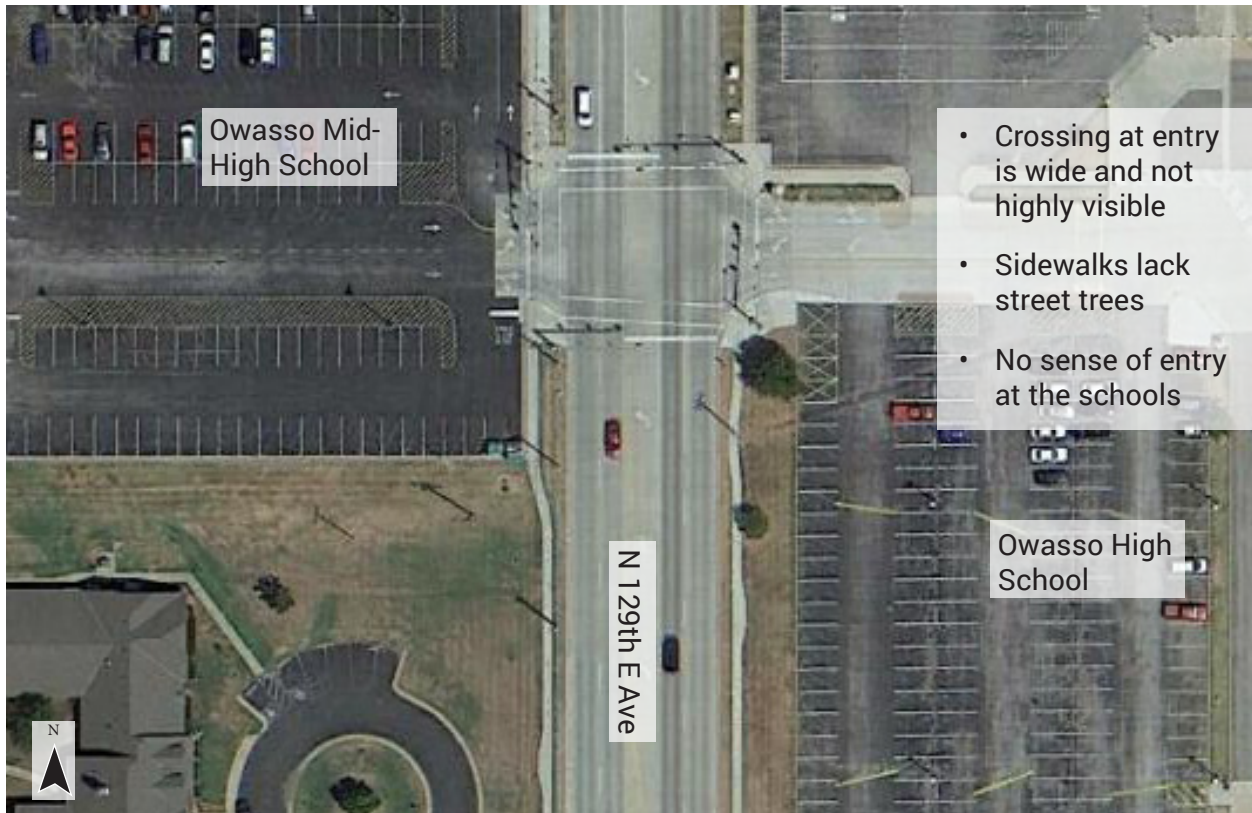
### North 129th East Avenue and East 86th Street North, Owasso High School

North 129th East Avenue and East 86th Street North are both key arterial thoroughfares that connect Owasso to the Mingo Valley Expressway and the surrounding residential areas. Owasso High School and Mid-High School, the City's two largest, are located at this intersection. They are directly across from one another on N 129th E Ave and generate a high volume of vehicular and pedestrian traffic. Crossing guards are currently needed at all of the school entrances to control traffic and pedestrian conflicts. During school arrival and dismissal, four crossing guards assist students to cross this major intersection by controlling vehicle turning movements.

Traffic speeds are relatively normal and slow during school drop-off and pick-up times because of the high volume of traffic, but the rest of the day has vehicular speeding and behavioral issues. Surrounding development is mostly suburban strip retail and gas stations, with some nearby residential development.

The solutions to help this area must focus heavily on pedestrian improvements and ways to calm vehicular traffic along the arterials. The biggest impact would come from constructing raised crosswalks or a fully raised intersection at the High School/Mid-High School entrances off of N 129th East Ave. This would both slow vehicular traffic and would increase the safety of people walking across the intersection. It would also create a gateway to the area and provide sense of entry to the schools. It is also vital to widen the crosswalks and make them high visibility markings at the intersection of N 129th East Ave and E 86th Street N. Planting of street trees in the grass buffer would provide a more comfortable pedestrian experience and help slow traffic. Lastly, a mid-block crossing with HAWK signal and raised median along E 86th St N would allow safer crossing of high school students and the shopping center on the south side of the street.

## SCHOOL ACCESS ON MAJOR ARTERIAL



Existing aerial of the Owasso High and Mid-high school entry intersection



Conceptual plan of the proposed raised intersection at the Owasso High and Mid-high school entry intersection

## SCHOOL ACCESS ON MAJOR ARTERIAL



Existing photo looking east at the entry intersection of the Owasso High and Mid-high schools



Conceptual photo-rendering of the entry intersection of the Owasso High and Mid-high schools

## COMMERCIAL MAIN STREET



Typical sidewalk view on north side of 15th Street



On street parking removed from south side of 15th Street



Lack of mid-block crossings along 15th Street



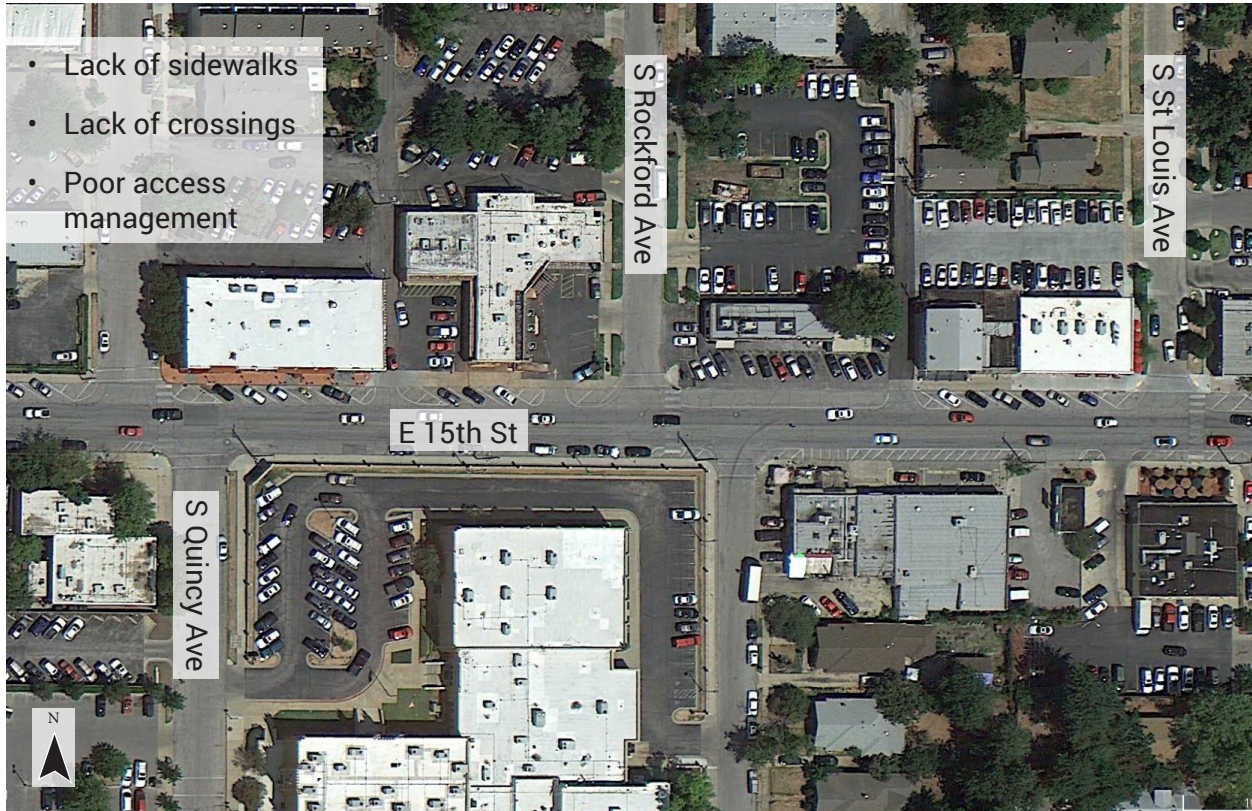
Access management issues along 15th Street

### 15th Street between Peoria Avenue and Utica Avenue

While 15th Street was narrowed from four lanes to two in 2012 this area, there are additional streetscape improvements that would further attract pedestrian traffic to this retail and restaurant corridor. Discontinuous sidewalks, access management issues with many driveways, poor crossing treatments, and the lack of a bicycle facility are all pressing issues for this area. Most of the existing crosswalks along 15th Street are faded and do not adequately alert drivers to pedestrian cross traffic. Many of these crossings also do not have ADA-compliant curb ramps. A dense commercial corridor such as this one needs frequent crossings to enable pedestrians to patronize businesses on both sides of the street safely and comfortably. The City of Tulsa is currently undertaking a streetscape plan for this corridor that should incorporate the recommendations provided here.

The conditions along these corridors can be improved with a few minimal investments and streetscape elements. The sidewalks should be made clear and continuous along both sides of the streets and high visibility crosswalks should be added at the intersection of 15th Street and Utica Avenue. This will require building raised sidewalks at driveway crossings along 15th Street and implementing some access management strategies for businesses that currently have open parking areas to the street. Along 15th Street there should be several mid-block crossings and crossing treatments at the intersection of SH-51/St Louis Avenue, south of 15th St. These crossings should be a part of a streetscape enhancement project that bring in curb extensions with street trees and pedestrian scale street lighting along the sidewalks. A robust planting and lighting plan will truly enhance this commercial corridor and encourage pedestrians to stroll and visit more than one business on a trip.

## COMMERCIAL MAIN STREET



Existing aerial of E 15th Street



Conceptual plan of the proposed crossings, streetscape treatments, and sidewalk improvements on E 15th Street

## COMMERCIAL MAIN STREET



Existing photo looking east at the faded crossing of E 15th Street



Conceptual photo-rendering of a raised mid-block crossing on E 15th Street

## MAJOR ARTERIAL INTERSECTION



Looking west on E 21st St from the intersection of Garnett



Looking east on E 21st St from the intersection of Garnett



Looking North at the crossing of E 21st St on Garnett Rd



Wide intersection at E 21st Street and Garnett Road

### East 21st Street At South Garnett Road

East 21st Street and Garnett Road are key arterials that connect to Mingo Valley Expressway and Interstate 44. They have a typical suburban strip development character. At the intersection of East 21st Street and Garnett Road there is a small node of retail stores, chain restaurants, and gas stations. Unfortunately there are no continuous sidewalks along either side of E 21st Street, and there are multiple driveway cuts and access management issues with the development patterns and large surface parking lots. There are also no sidewalks or crossing treatments as a pedestrian approaches US Highway 169 exit ramps. Along this corridor there are additional pedestrian and vehicle conflicts because of the multiple parking lot entries and poor access management. Transit service exists on both 21st Street and Garnett Road, but the lack of sidewalk connectivity creates a barrier to access the bus stops for both lines.

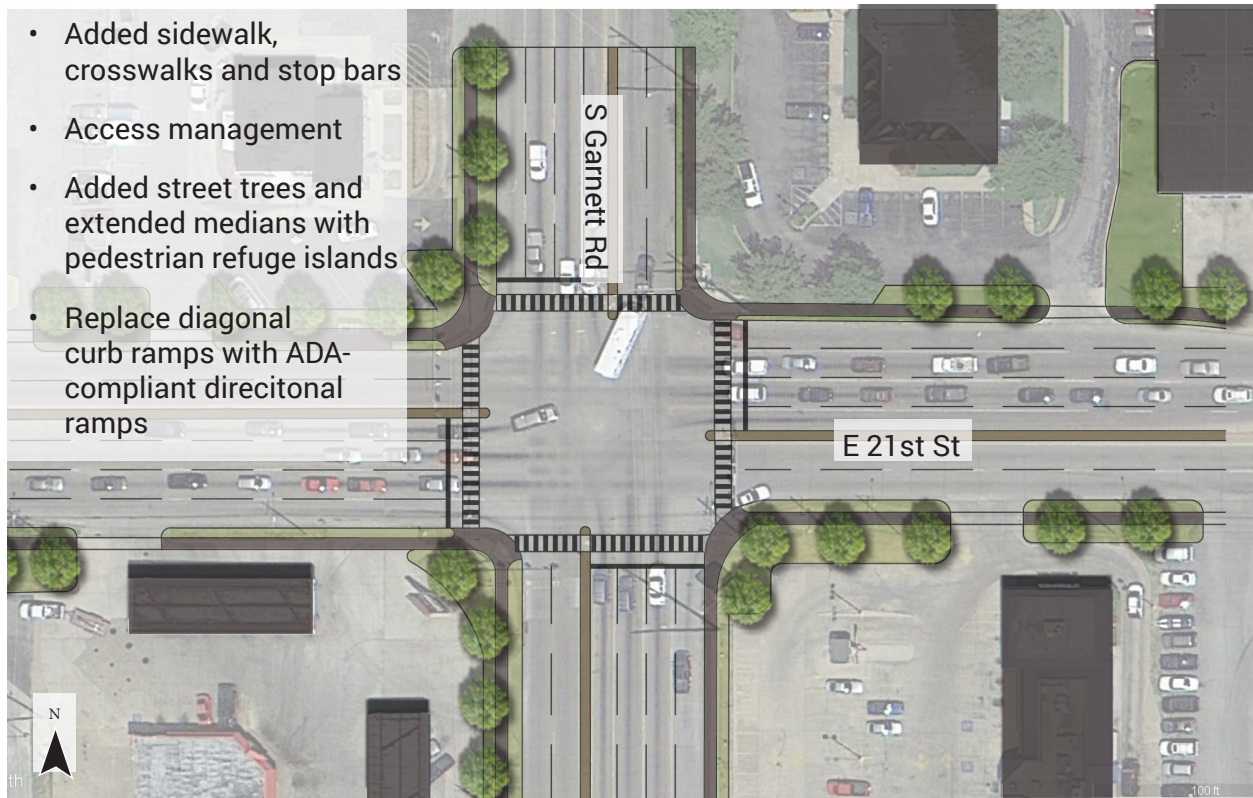
The first improvements to this area should occur within the pedestrian realm. Each side of E 21st Street should have continuous sidewalks with shade trees planted within a grass planting strip between the roadway and the new sidewalk. Access management strategies should be implemented along the streets to make the sidewalks safer from turning vehicles in the multiple driveway cuts for each property and parking lots. This will reduce the number of driveway crossings and make it safer for vehicles traveling along the streets by eliminating a number of conflict points. Eliminating driveway cuts close to intersections will also decrease driver confusion and frustration with vehicles entering/exiting.

There should also be high visibility crosswalk markings added to the intersection of Garnett Road and E 21st Street. These crossings can be further protected by adding raised median islands and extensions to the median island ends to provide refuge areas at the crossings.

## MAJOR ARTERIAL INTERSECTION



Existing aerial of the intersection of E 21st Street and S Garnett Road



Conceptual plan of the proposed crossings, streetscape treatments, and sidewalk improvements at the intersection of E 21st Street and S Garnett Road

## MAJOR ARTERIAL INTERSECTION



Existing photo looking east at the missing crosswalk at the crossing of South Garnett Road



Conceptual photo-rendering of a high visibility crosswalk, re-aligned curb ramp and refuge island median

## GRADE-SEPARATED HIGHWAY INTERCHANGE



Lack of sidewalk under the Highway 169 overpass



Lack of crossing at the Highway 169 off ramps



Lack of sidewalk along East 21st Street



Lack of pedestrian crossings across East 21st Street

### East 21st Street at Highway 169

There are similar issues at the intersection of Highway 169 and East 21st Street to what occurs to the east at the Garnett Road intersection concept area. Sidewalks are not present underneath or to the west of US Highway 169, but frequent pedestrian and bicyclist travel is evident from dirt “cow paths” along the edge of East 21st Street. There are pedestrian signals at the crossings of the highway ramps, but the push buttons are not activated and there are no crosswalks. There is also no ADA-compliant way to cross the median on East 21st Street though there is a pedestrian push button located on the utility pole in the median.

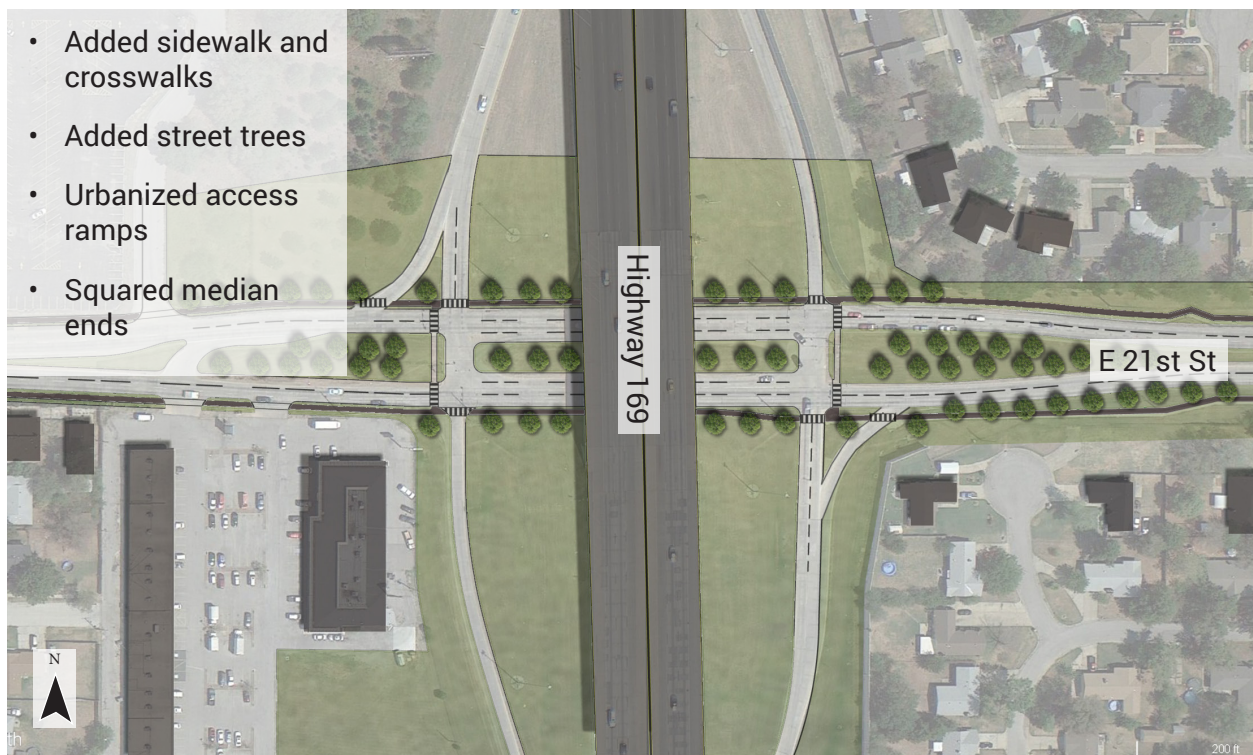
As with the area along East 21st Street to the east, sidewalks and ADA-compliant curb ramps are the top priority in this concept area. To help accommodate bikes these should be shared use paths under the Highway 169 overpass. To make crossings safer and more conspicuous, there should be high visibility crosswalk markings at the Highway ramp intersections and push button detection at the ramp crossings. The geometry of the medians and off ramps should also be urbanized and squared to slow traffic exiting Highway 169 and prepare drivers for interacting with pedestrians and bicyclists crossing their path of travel.

There should also be shade trees from an approved city planting list planted within the planting strip between the roadway and the new sidewalk where right-of-way is available. In this area and similar ones, vegetation should be managed so as not to impede travel along a sidewalk as it does now in the photo above at the bottom left. New street trees can be added through partnerships. The City of Tulsa should approach a third party such as Up With Trees to plant and maintain the plantings indicated.

## GRADE-SEPARATED HIGHWAY INTERCHANGE



Existing aerial of the intersection of E 21st Street and Highway 169



Conceptual plan of the proposed crossings, streetscape treatments, and sidewalk improvements at the intersection of E 21st Street and Highway 169

## GRADE-SEPARATED HIGHWAY INTERCHANGE



Existing photo looking east at the missing crosswalk at the crossing of the Highway 169 on ramp



Conceptual photo-rendering of a high visibility crosswalk at the crossing of the Highway 169 on ramp

# 4 IMPLEMENTATION

The bicycle and pedestrian facility recommendations in this plan are designed to be efficiently incorporated into jurisdiction planning and development processes. Implementation of these recommendations will occur over time, commensurate with available resources in each jurisdiction.

This chapter:

- Provides details on project prioritization and phasing
- Presents planning-level cost estimates and assumptions
- Enumerates possible funding sources

The recommendations for expanding the region's bicycle and pedestrian facility networks were based on historical and anticipated funding levels. The proposed approach also gives jurisdictions flexibility to pursue projects as opportunities arise and conditions change.

## Plan Projects

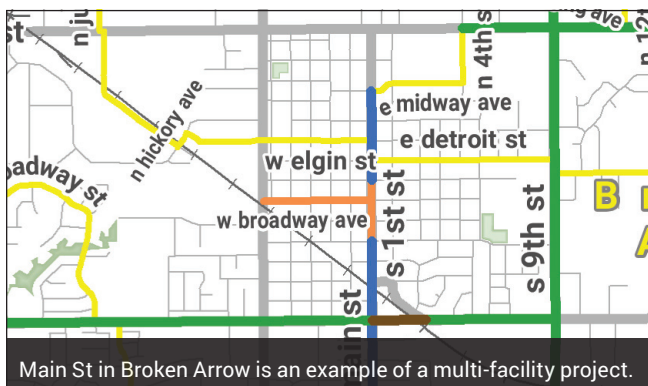
The bicycle network was divided into a set of 700 projects for the purposes of recommending implementation approaches and developing a prioritized list, with cost estimates, by jurisdiction. The network was divided into projects through the following method:

### Geography

- Recommendations located wholly within a city were assigned to that city
- Recommendations with a majority of their mileage located within a city were assigned to that city
- Recommendations with a majority of their mileage outside a city were assigned to the appropriate county
- Recommendations located on a street along a jurisdictional boundary (city-city or city-county) were assigned to the appropriate county

### Facility

- Projects are located along a single street or trail corridor
- Signed routes are bounded by logical end points (e.g. destination, or major street or direction change) and often include more than one street
- Where the facility type changes along a corridor, recommendations were broken into separate projects
  - Exception: a project that calls for a bike lane along part of a street and a shared lane marking for part of that street is considered one project.



This method is intended to produce a project list that will lead jurisdictions logically toward implementation. Individual projects connect to one another to create the full network. However, inevitably, some bicycle facilities will be built that initially do not connect to other facilities or to destinations. This is a result of incremental implementation that will be the most practical approach to building out the entire network. Disconnected segments are particularly likely on arterial streets where sidepaths will be implemented over time during street reconstruction projects. It is important to understand that the ultimate value of a facility will not be fully realized until it is connected to the network.

## Project Implementation

Bicycle and pedestrian projects are typically implemented in one of two ways: as part of a larger roadway project, or as a standalone effort. The former is often more efficient, as costs for materials and labor can achieve economies of scale when folded into a larger project. Bicycle and pedestrian facilities are typically a relatively small portion of a roadway project, whether it is a restriping, resurfacing or reconstruction project. While planned and programmed street improvements can help guide the implementation schedule for this plan, jurisdictions should also consider prioritizing improvements on streets where bicycle and pedestrian projects are recommended.

Standalone projects tend to be facilities that have minimal impact on a street. For bicycle projects, this includes the installation of rural signed routes and the construction of off-street trails. Urban signed routes may also be implemented as standalone projects, but they are more likely to need additional crossing treatments such as warning signage, signals or median islands and short lengths of sidepath that connect offset crossings. Trail projects will also require intersection improvements, but they are not likely to require reconstruction of a street. Projects implemented by striping or other paint installation may also be standalone projects, but they will require eradication of existing pavement markings.

For pedestrian projects, sidewalk gaps will be filled as streets are reconstructed or as new development is located in adjacent parcels. Although funding may not be available to complete all projects at one time, the additional pedestrian recommendations in focus areas are intended to be implemented as a bundle because they work in concert to improve all observed pedestrian safety issues in the area.

Local governments will have primary responsibility for implementing projects in the GO Plan. Responsibility for design and construction of projects will be taken on by each jurisdiction individually. However, because the GO Plan network intends to connect major regional destinations, many projects connect across city lines, INCOG will assist in facilitation of finding federal funding sources and providing technical assistance with project development. It will be advantageous for communities to partner in implementing projects that provide regional connections both from the standpoint of creating a more connected network and for the efficiencies gained through economies of scale in constructing longer projects.

## Project Prioritization

All projects in the bicycle network and sidewalk gap inventory were prioritized as part of the GO Plan. The prioritization methodology used for the plan is based on the 10-step method for prioritizing pedestrian and bicycle improvement locations developed for National Cooperative Highway Research Program (NCHRP) Report 803: *Pedestrian and Bicycle Transportation Along Existing Roads—ActiveTrans Priority Tool Guidebook*. The 10-step method is the result of findings from a national survey, literature review, and agency interviews. This method was used for all of the bicycle network projects as well as the sidewalk gaps within the City of Tulsa.

The prioritization tool reflects input of a project steering committee regarding community priorities. Each project is scored based on a set of criteria and weighting which are determined by the steering committee and reflect the vision



and goals of the project. The scoring uses a combination of selected factors and variables. Factors are categories used in the prioritization process to express community/agency values and group variables with similar characteristics. Variables are measurable characteristics of roadways, households, neighborhood areas and other features.

For this plan, factors, variables and weighting were recommended by the project team and reviewed by stakeholders. City of Tulsa staff from the planning and engineering departments provided input on these aspects of the prioritization tool and requested the inclusion of a number of City-specific variables for both the bicycle and pedestrian prioritization schemes. The project steering committee and the INCOG Bicycle and Pedestrian Advisory Committee also reviewed the prioritization inputs.

All bicycle projects were scored in the same manner across the region. Those located in the City of Tulsa were additionally scored with those variables noted as “Tulsa-specific” in the table below. Because Tulsa had more readily available data regarding prior plans and projected land use, these factors were

incorporated into the prioritization of sidewalk gaps within the city. The final set of factors, variables and weights are provided in the tables [below]. The list of prioritized bicycle projects is presented for each community in Appendix C.

For the rest of the region, sidewalk gaps were prioritized based on proximity to key pedestrian traffic generators: transit lines, schools, parks and areas of low automobile ownership. Additionally, gaps on streets with high traffic volume were ranked higher because of the greater potential

for conflicts between pedestrians and drivers. Each of those variables was weighted equally in the regional prioritization. A map of prioritized sidewalk gaps is presented for each community in Chapter 6.

## Using the Prioritized Lists

Communities should use the resulting prioritized lists as a guide for implementation over the next 25 years. Projects near the top of each community's bicycle projects list will have

## City of Tulsa Bike Prioritization Weighting Factors and Variables

Factor	Variables	Weight
Stakeholder Input		10%
	# WikiMap comments on corridor	
	Presence on project retreat prioritization list	
Opportunities		20%
	% of corridor included on Improve Our Tulsa <sup>1</sup>	
	% of corridor with project identified in prior plan <sup>2</sup>	
	Lower project cost (planning-level cost per mile)	
Safety		20%
	# of bike and pedestrian crashes per mile	
	# of fatal or severe bike and pedestrian crashes per mile	
	Change in Level of Traffic Stress based on recommended bike facility	
Demand		20%
	Average demand score for length of project	
	% of project coincident with existing transit line	
	Population density	
Equity		10%
	# of areas served with low automobile ownership	
	# of areas served a high % of low-income population	
	# of areas served with high % of population under 18	
Connectivity		20%
	# of connections to an existing in-street bike facility	
	# of connections to an existing trail	
	# of connections to a planned on-street bike facility	
	# of connections to planned off-street bike facility	

<sup>1</sup> Tulsa-only variable

<sup>2</sup> Tulsa-only variable. Included multimodal corridors from PLANiTULSA and small area plans provided by the City of Tulsa Planning Department.

the greatest impact on improving the bicycle environment and increasing bicycle travel. The list can also help INCOG prioritize funding decisions for applications that include pedestrian and bicycle infrastructure. Although the data-driven process is intended to determine broad priorities, it should be used as a guide, not as an infallible list of priorities. It's important that the prioritized list *not* be taken so literally as to preclude projects lower on the list from being constructed first if opportunity arises. For example, if a road rehabilitation project is imminent, a project lower on the list should be considered for implementation even if projects above it are not yet funded.

## Cost Estimates

### Bicycle Strategy

An order of magnitude cost estimate was developed for the recommended improvements. Cost estimates were developed by establishing a cost per linear foot for the recommended cross-section and applying it over the length of the project. Cost estimates considered the significant construction items, e.g. asphalt, pavement markings, excavation, etc. Unit prices for construction items were established based on regional historical bid prices and the estimator's experience and judgment. The cost estimate also included a 10 to 30 percent contingency based on the complexity of the improvement. Not included in this estimate are the costs for engineering, permitting, grading, right-of-way, survey, insurance and inspection. Although quantities and unit prices were developed for each estimate, a fluctuation in quantities and bid prices can be expected as the level of design progresses. Actual construction costs can only be determined following final design; as such, the costs at this level of review are budgetary in nature and are typically accurate within +/- 30 percent. Details for cost estimate line items are available in Appendix D.

It should be noted also that costs are for all elements of a facility and do not estimate costs that would be covered by other parts of a street reconstruction or resurfacing project. For instance, all on-street facility striping project costs include



On-street facility cost estimates developed for the GO Plan include the cost of replacing storm drain grates. The region's roads today have a mix of bicycle-safe and unsafe storm drain grates. To be safe for bicyclists, the grate holes must run perpendicular to the path of travel.

the cost of eradicating existing striping, which adds between three and 10 percent to the cost. This cost would not be present in a resurfacing project. Similarly, construction of a 10-foot sidepath instead of simply replacing a 6-foot sidewalk in the course of a reconstruction or widening project would add 60 to 70 percent to the project cost.

The bicycle facility cost estimates provided below were developed with the following assumptions:

- Estimates are in 2015 dollars based on recent bid prices of Oklahoma projects
- All facility types include an estimated cost for signage
- Rural signed routes have less dense sign coverage than urban signed routes because they require fewer turns
- Bike lane, buffered bike lane and cycle track costs include replacement of storm drain grates with bicycle-safe drain grates
- Sidepath and trail costs are based on the recommended 10-foot width

- Cycle track cost assumes a street-level facility separated from automobile traffic by flexible delineators placed in a striped buffer area

Facility Type	Cost/mi (\$)
Rural Signed Route	\$800
Urban Signed Route	\$18,500
Shared Lane Markings	\$33,400
Priority Shared Lanes	\$77,100
Bike Lanes	\$71,600
Bicycle Corridor	\$71,600
Buffered Bike Lanes	\$71,000
Cycle Track	\$120,700
Sidepath	\$719,000
Trail	\$888,100

## Pedestrian Strategy

Greater detail is provided for the pedestrian improvements recommended in each focus area. These sets of recommendations consist of infrastructure elements outlined in Appendix D where costs are listed for each element. The cost of filling gaps in the sidewalk network outside of these areas is not estimated for each community.

## Funding Project Implementation

This section presents the current state of bicycle and pedestrian project funding generally in the U.S. and in the Tulsa region. Recommendations and resources for individual jurisdictions pursuing project funding are presented as well as recommendations to INCOG regarding funding processes.

## Federal Funding Sources

Bicycle and pedestrian projects are broadly eligible for the majority of federal transportation funding programs. Nationally, of the \$1.5 billion of federal-aid program funds obligated to bicycling and walking programs in fiscal years 2013 and

2014, 36 percent came from the Transportation Alternatives Program (TAP) or its predecessor the Transportation Enhancements Program (TEP). Several other federal programs contributed significant portions as well. The Surface Transportation Program (STP) and the Congestion Mitigation and Air Quality Improvement Program (CMAQ) contributed 15 and 12 percent, respectively. The Highway Safety Improvement Program also contributed two percent of the funds spent on bicycling and walking during that period.

It is not uncommon for federal funds to be used for the implementation of pedestrian and bicycle projects in the Tulsa region. INCOG is involved in the selection and administration process for the TAP, STP and CMAQ programs.

### • Transportation Alternatives Program (TAP)

As mentioned above, TAP is a common source of federal funding for pedestrian and bicycle projects under MAP-21. Eligible project types include pedestrian and bicycle facilities, the conversion of abandoned railway corridors to trails, the development of safe routes for non-drivers and safe routes to school.

INCOG administers regional TAP funds and opens funding rounds every other year, awarding approximately \$2.2 million each funding cycle (\$1.1 million per year). Combining two years' worth of funding into one selection cycle allows for funding larger projects. Funding was opened in 2013 for fiscal years 2014 and 2015. Eight projects were selected from 15 applications. There are also TAP funds available for cities and unincorporated areas outside the urbanized area through the ODOT portion of the TAP program.

The Recreational Trails Program (RTP) is a set-aside within TAP that funds all types of recreational trail projects. It is administered by the Oklahoma Tourism and Recreation Department. Approximately \$1.1 million is available for this program in Oklahoma.

- **Surface Transportation Program (STP)**

STP is perhaps the most flexible federal funding program. STP funds can be used for a wide variety of bicycle and pedestrian activities, including any bicycling or pedestrian project-type eligible under the Transportation Alternatives Program (TAP) as well as for any recreational trail project eligible under the Recreational Trails Program.

INCOG receives over \$13 million per year in STP funds, and may consider funding bicycle and pedestrian projects. Currently, INCOG does not typically receive bicycle- and pedestrian-related applications from member communities for STP funds. However, the revised 2015 project prioritization and selection process awards the maximum points under the “livability” criteria to transit, pedestrian or bicycle projects. Road projects that include these components are eligible for five points in the livability section. Projects can also receive points for addressing pedestrian and bicycle safety.

- **Congestion Mitigation and Air Quality Improvement (CMAQ)**

CMAQ funds are administered through the Oklahoma Department of Transportation (ODOT) and through Metropolitan Planning Organizations (MPOs) for areas that do not meet, or formerly did not meet, federal air quality standards. There are currently no such “non-attainment” or “maintenance” areas in Oklahoma. States without non-attainment or maintenance areas may use CMAQ funds for any CMAQ- or STP-eligible project.

INCOG receives approximately \$600,000 per year in CMAQ funds. Most of this funding is used for transit projects. In the past, INCOG has used CMAQ funds for the installation of bike racks, to conduct a bike share study, and to fund signage for bicycle facilities.

The table on the following page provides a list of federal funding sources that may be available for bicycle and pedestrian projects in the Tulsa region.



Popular bicycle and pedestrian infrastructure such as the high-quality, dual treadway River Parks Trails require a significant amount of funding but yield equally significant community benefits.

ACTIVITY	FTA	ATI	CMAQ	HSIP	NHPP/NHS	STP	TAP/TE	RTP	SRTS*	PLAN	402	FLH	BYW**	TCSP**
Access enhancements to public transportation	•	•	•			•	•					•		•
Bicycle and/or pedestrian plans	•					•				•		•		•
Bicycle lanes on road	•	•	•	•	•	•	•		•			•	•	•
Bicycle parking	•	•	•			•	•		•			•	•	•
Bike racks on transit	•	•	•			•	•					•		•
Bicycle share (capital/equipment; not operations)	•	•	•		•	•	•					•		•
Bicycle storage or service centers	•	•	•			•	•							•
Bridges / overcrossings	•	•	•	•	•	•	•	•	•			•	•	•
Bus shelters	•	•				•	•					•		•
Coordinator positions (State or local)			•			•	^		•					
Crosswalks (new or retrofit)	•	•	•	•	•	•	•	•	•			•	•	•
Curb cuts and ramps	•	•	•	•	•	•	•	•	•			•	•	•
Helmet promotion						•	^		•		•			
Historic preservation (bike, ped, transit facilities)	•	•				•	•					•		•
Land/streetscaping (bike/ped route; transit access)	•	•				•	•					•		•
Maps (for bicyclists and/or pedestrians)	•	•	•			•	^		•		•		•	•
Paved shoulders			•	•	•	•	•		•			•	•	•
Police patrols						^	^		•		•			
Recreational trails						•	•	•				•		•
Safety brochures, books						^	^		•		•			
Safety education positions						^	^		•		•			
Shared use paths / transportation trails	•	•	•	•	•	•	•	•	•			•	•	•
Sidewalks (new or retrofit)	•	•	•	•	•	•	•	•	•			•	•	•
Signs / signals / signal improvements	•	•	•	•	•	•	•		•			•		•
Signed bicycle or pedestrian routes	•	•	•		•	•	•		•			•	•	•
Spot improvement programs	•		•	•		•	•	•	•					•
Traffic calming	•			•	•	•	•		•					•
Trail bridges			•	•	•	•	•	•	•			•	•	•
Trail/highway intersections			•	•	•	•	•	•	•			•	•	•
Training			•			•	•	•	•		•			•
Tunnels / undercrossings	•	•	•	•	•	•	•	•	•			•	•	•

• Until Expended

\*\* Until Not Available

^ As Safe Routes To School

## TABLE KEY

**FTA:** Federal Transit Administration Capital Funds

**ATI:** Associated Transit Improvement

**CMAQ:** Congestion Mitigation and Air Quality Improvement Program

**HSIP:** Highway Safety Improvement Program

**NHPP/NHS:** National Highway Performance Program (National Highway System)

**STP:** Surface Transportation Program

**TAP/TE:** Transportation Alternatives Program / Transportation Enhancement Activities

**RTP:** Recreational Trails Program

**SRTS:** Safe Routes to School Program

**PLAN:** Statewide or Metropolitan Planning

**402:** State and Community Traffic Safety Program

**FLH:** Federal Lands Highway Program (Federal Lands Access Program, Federal Lands Transportation Program, Tribal Transportation Program)

**BYW:** National Scenic Byways Program

**TCSP:** Transportation, Community, and System Preservation Program

## Recommendations

- Align the INCOG TAP application scoring system to the project prioritization process identified within this Master Plan.
- Publicize the eligibility and competitiveness of pedestrian and bicycling projects for STP and CMAQ funding among local jurisdictions.
- Increase the weighting for multi-jurisdictional projects with regional implications and possible connections between communities for all competitive funding opportunities.
- Provide application assistance to member communities to identify projects that have more impact.
- Include feasibility/opportunity/project readiness into the scoring of the applications.

## State Funding Sources

Oklahoma recently, in late 2014, hired its first pedestrian and bicycle coordinator at ODOT. In 2013, the state legislature eliminated funding for the state Safe Routes to Schools Program. There is currently no statewide bicycle or pedestrian plan or dedicated state funding stream for projects for these modes. In its 2015 report card assessing Bicycle Friendly State ratings, the League of American Bicyclists noted that Oklahoma is in the bottom five states for federal funding for bicycling and walking projects based on the percentage of available federal funds obligated to those projects.<sup>1</sup>

## Recommendations

- While neither INCOG nor its member jurisdictions can change state policy or funding, involvement in the new ODOT Bicycle and Pedestrian Advisory Committee may help bring state-level decisions to be more favorable to these modes.

<sup>1</sup> League of American Bicyclists, Oklahoma Report Card, accessed 23 June 2015 [http://bikeleague.org/sites/default/files/BFS2015\\_Oklahoma.pdf](http://bikeleague.org/sites/default/files/BFS2015_Oklahoma.pdf).

## Local Funding Sources

The most effective way to fund the projects recommended in the GO Plan will be to review the plan when any decisions are made about street resurfacing, reconstruction and construction projects. In this manner, the projects will be an incremental cost added to a larger project. For standalone high-priority projects, local funds will need to be used on their own or as matching dollars for federal funding.

Local funding of pedestrian and bicycle infrastructure has generally come as part of street improvement projects in the region, with the exception of standalone trail projects. In 2003, Tulsa County voters approved a 13-year one percent **sales tax** increase called Vision 2025. A number of bicycle- and pedestrian-related projects funded under this banner including construction of the Osage Trail connecting Tulsa and Skiatook, an extension of the Midland Valley Trail in Tulsa, street reconstructions, and downtown and neighborhood streetscape projects in 10 communities throughout the county. Revenues from this tax have also leveraged federal funding for several street improvement projects. A renewal of this tax is currently under discussion which may provide further funding for bicycle and pedestrian projects. Other jurisdictions around the country have dedicated a portion of infrastructure sales tax increases to pedestrian and bicycle projects specifically. For instance, residents of the city of St. Louis and St. Louis County approved Proposition P in April 2013 which increased the percentage of sales tax dedicated to building the on- and off-street bicycle network. The 3/16th cent tax will provide \$38.5 million for greenways and parks.

In 2013, City of Tulsa residents approved a **bond referendum** directing investment of \$918.7 million from the Third Penny Sales Tax and General Obligation Bonds to more than 300 projects to improve streets and many city services. The majority, 72 percent, of the funds were allocated to street improvement projects. The locations of these projects were a weighted variable included in prioritizing the bicycle and sidewalk gap networks within the City of Tulsa.

**Impact fees** are another source of local funds for projects. These are assessed on new developments to pay for the construction or expansion of streets, parks, trails, water and wastewater facilities necessitated by and benefitting new growth. Many developments present good opportunities to fill gaps in pedestrian infrastructure, such as sidewalks and crossings, or to provide streetscape improvements and trail connections that make it easier and more appealing to walk or bike.

Funding from communities' **Capital Improvement Plans** (CIP) can also provide for construction and maintenance of pedestrian and bicycle projects on an annual basis. Placing pedestrian and bicycle projects into these annual budgets can guarantee a level of certainty that application funding does not. It is more likely that communities will use a CIP outlay for smaller projects such as on-street markings rather than street reconstructions or trail construction.

## Recommendations

- Encourage member jurisdictions to continue to support continued sales tax and bond funding for street improvements.
- Encourage member jurisdictions to set aside a percentage allowance for bicycle and pedestrian improvements on any sales tax dedicated to infrastructure.
- Provide member jurisdictions with data on the cost-effectiveness of bicycling and walking projects from safety, economic and transportation perspectives.
- Encourage prioritization of street projects that include high-priority bicycle and pedestrian improvements identified in this plan.
- Encourage member jurisdictions to adopt ordinances to allow the collection of impact fees to fund bicycle and pedestrian improvements, among other applicable infrastructure improvements.

# 5 NON-INFRASTRUCTURE STRATEGIES

While the main focus of the GO Plan process has been the development of bicycle network and pedestrian recommendations, infrastructure is not the only element of a bicycle and pedestrian friendly region. Through this Plan, INCOG provides resources and recommendations to its member jurisdictions regarding the underlying policies and public programs that influence conditions for pedestrians and bicyclists.

This chapter provides:

- A brief overview of the policy review conducted during the planning process
- Region-wide policy recommendations for INCOG and its member jurisdictions<sup>1</sup>
- A review of existing efforts by INCOG and other non-governmental organizations to improve bicycling and walking through programming efforts, and
- A short list of programming recommendations based on national best practices

<sup>1</sup> Jurisdiction-specific policy recommendations are provided in the community sections based upon priorities expressed by staff and stakeholders at the GO Plan mid-project retreat.

## Policy Review

As a central element of both the analysis of existing conditions and the recommendations in this plan, the team performed a thorough analysis of the region's policy documents that influence the design of streets, street networks and off-street bicycle and pedestrian facilities. Zoning codes, engineering standards and design criteria and subdivision regulations were reviewed for all eleven jurisdictions involved in the GO Plan where applicable. A full account of this review is provided in tabular form in Appendix F.

Most existing guidelines and engineering standards in the region do not cover criteria for walking and bicycling facilities. Sidewalk, bike lane and trail widths are not addressed in most cities. Nor are other design elements such as the presence of a sidewalk buffer or frequency of driveway crossings that can significantly impact the pedestrian and bicyclist experience. However, sidewalk requirements are present in most communities' subdivision regulations or zoning code.

Subdivision regulations and zoning codes govern the connectivity and block-length of new streets. These elements impact the ability to complete short trips which is essential for effective pedestrian and bicyclist circulation. A connected and redundant street network facilitates these short trips and can make connections to trails, which provide comfortable and safe travel over longer distances. Access to existing trails can also be required through these codes. Some communities' regulations call for residential streets to be configured to discourage through-traffic. While this may reduce high-speed traffic on minor streets, it may also result in a more fragmented and misaligned street network that makes pedestrian and bicyclist travel difficult.

The walkability of an area is also highly influenced by the visual interest and variability of adjacent land use and form. The City of Tulsa's proposed zoning code begins to move the city's regulations in line with the goals of PLANiTULSA to create more livable, walkable places. Broken Arrow's

zoning code also includes provisions to create a walkable downtown. Some key changes that will help in this regard are:

- Reduce off-street parking requirements
- Allow denser residential development and promotion of mixed-use development
- Lot and building regulations for mixed use zones, such as, prohibition of placing parking spaces between the sidewalk and building

## Policy Recommendations

- Adopt regional standards for pedestrian and bicycle facility design as described within the GO Plan Design Guidelines.
- Encourage adoption of similar design guidelines in each jurisdiction to make facility implementation consistent.
- Subdivision regulations should require both residential and non-residential construction of sidewalks and bicycle infrastructure. Regulations should also require connectivity to local and regional trails as part of site review. In-lieu fees and bonding could also be considered by additional communities in the region to fund construction within new developments and connections to trails. Homeowners' associations should be encouraged to maintain sidewalks and bicycle infrastructure.
- Older developments should be required to address missing gaps and improve connectivity as part of resurfacing, redevelopment and retrofit projects. This could be accomplished through association fees or sidewalk grants allocated specifically for these connections.
- Encourage jurisdictions to adopt bike parking standards that include incentives to add bike parking and reduce the number of on-street and off-street parking.
- Encourage jurisdictions to adopt zoning code elements that result in a more pedestrian-friendly development pattern for downtown areas, such as the siting of off-street parking behind buildings and others outlined in the new Tulsa zoning code.

## Other Es: Education, Encouragement, Enforcement and Evaluation and Planning

Bicycle and pedestrian planners typically approach improving the environment for those modes through a “five Es” model: engineering, education, encouragement, enforcement and evaluation and planning. The GO Plan’s infrastructure and design recommendations are the most significant effort INCOG and the Tulsa region has made to date regarding the engineering portion of this model.

### The other Es cover critical non-infrastructure aspects of supporting bicycling and walking:



**Education:** Informs all road users of their rights and responsibilities to ensure safe roads for all.



**Encouragement:** Creates a strong culture that celebrates walking and biking.



**Enforcement:** Works with local law enforcement to target efforts in problem areas to keep all road users safe.



**Evaluation and planning:** Collects data on walking and bicycling to help plan for these modes as safe and viable transportation options.<sup>2</sup>

Much of the programming in these areas is not the responsibility of a metropolitan planning organization (MPO) like INCOG. Typically, bicycle and pedestrian friendly communities take on programming at the city level or through non-governmental organizations such as advocacy coalitions or school-related groups. At INCOG, the Bicycle and Pedestrian Advisory Committee (BPAC) works to promote all five Es by advising the Transportation Committee on technical and policy matters, and by serving as a resource to member jurisdictions seeking public input pertaining to the

bicycle and pedestrian environment. The BPAC also serves as a clearinghouse for efforts related to the five Es throughout the region, whether that is coordination of law enforcement training or disseminating information about nonprofits’ bicycle education programs in schools.

One important step that was recently taken at the state level to improve traffic safety through enforcement is passage of a law banning texting while driving that will go into effect on November 1, 2015. In July 2015, the city of Tulsa updated its ordinances in accordance with the language in state law.

The area in which INCOG can and should take a lead role is evaluation and planning. Recommendations regarding INCOG’s role as an implementer and as a resource are presented below in all four “other E” categories.



### Evaluation and Planning Count Data Collection

INCOG should use volunteers to expand its current biennial trail count program to an annual count program. The BPAC should be tasked with staffing the counts and recruiting additional volunteers.

INCOG should recommend on-street locations for annual counts to member jurisdictions. These counts should be staffed by volunteers or City staff. As more infrastructure is built, on-street counts will help tell the story of the impact on increasing pedestrian and bicyclist volumes. The best practice methodology of the National Bicycle and Pedestrian Documentation Project should be applied for counts.

Additionally, funding should be sought for three to five automatic counters to be placed at key locations along the regional trail system. These counters would supplement an existing automatic counter on the River Parks trails<sup>3</sup> and provide 24-hour coverage to count bicyclists and pedestrians. These continuous counts can be used to compute month- or year-long counts from the annual short-term manual counts.

<sup>2</sup> Definitions adapted from the League of American Bicyclists, accessed 24 June 2015: <http://bikeleague.org/content/5-es>

<sup>3</sup> According to the River Parks Authority, their infrared counter is possibly malfunctioning and should be investigated.

## Annual Report on Bicycling and Walking

INCOG should publish an annual report on bicycling and walking in the region. This report will keep these modes in the public eye and provide an on-going source of information for member jurisdictions. It should include count and crash data analysis, a catalog of newly implemented facilities, BPAC efforts, policy changes and a summary of encouragement efforts completed throughout the year.

## Travel Model

INCOG should refine its regional travel demand model to better reflect bicycle, pedestrian and transit trips. Many innovative MPOs are moving toward an activity-based model that takes personal mode choice into account in assigning trips to modes. Coupled with a new travel model, the region's household travel survey should be refined to better pick up modes that typically are underrepresented in travel surveys. The addition of data loggers with GPS capability would help to capture walk and bike trips and non-motorized trips to access transit.

## Bicycle and Walk Friendly Community Designation

Tulsa is currently designated as a bronze Bicycle Friendly Community by the League of American Bicyclists (LAB). INCOG wrote the original application that led to recognition by the LAB in 2009. INCOG should continue to provide support to other communities completing a new or renewal application for this designation and support any additional communities in the region that apply. INCOG should encourage communities to use the application process for both of these designations as a learning process and a means of bringing together City staff who work on these issues.



## Encouragement Bike Share System

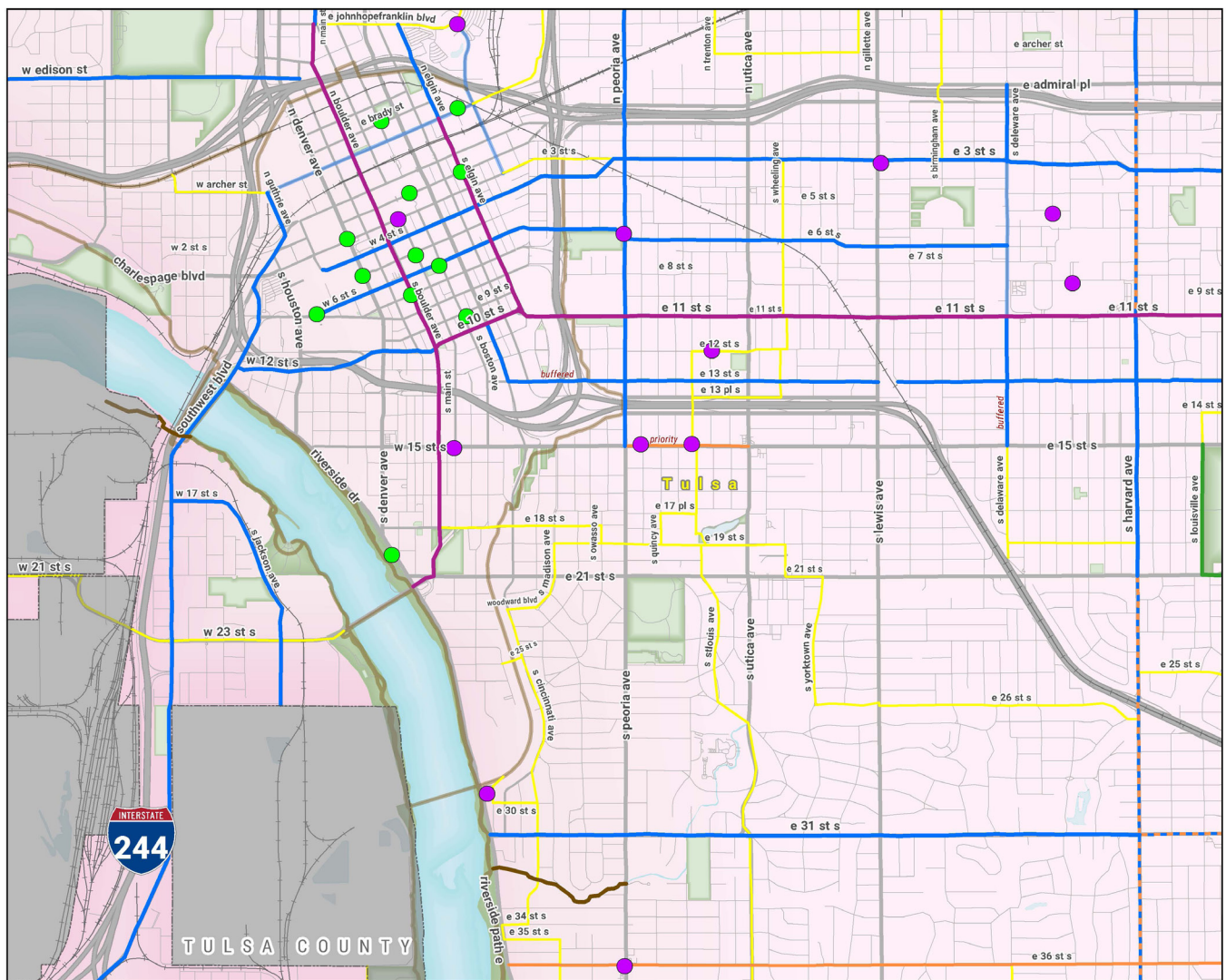
The implementation of a bike share system can increase the number of the region's residents with access to a bicycle and get more people riding. INCOG completed a feasibility study and business plan for a bike share system in the City of Tulsa in 2015. The recommended system will consist of an initial launch phase of 12 stations and 108 bikes at



Cataloging bicycle parking and innovations such as in-street parking corrals should be included in an annual report on bicycling and walking.



The Tulsa Townies bike share system has been an asset to getting more residents and visitors on bikes. A new bike share system will attract even more riders.



key locations downtown and nearby destinations such as the University of Tulsa and the Gathering Place. Phase two will expand the network with 12 additional stations at OSU-Tulsa and University of Tulsa campuses, Pearl District and Brookside. A newly-formed nonprofit organization will own and operate the system, or contract operations to a private vendor.

Phases one and two are expected to cost \$3.2 to \$3.8 million over five years—depending on selected equipment and technology—including capital, launch, administration and operating costs. The key next steps outlined in the Bike Share White Paper should be undertaken by INCOG as soon as possible to aim for a 2017 system launch.



### ***Bike to Work Day***

INCOG is the lead organizer of Bike to Work Day (BTWD) in the region. In most bicycle friendly communities, this is the major bicycle transportation event of the year to encourage more people to ride. INCOG should continue this role and consider providing resources to member jurisdictions to execute their own BTWD events. Continued and increased partnership with outside organizations and business sponsors would help grow the event. A strong partnership with local universities and community colleges is especially recommended for this series of events.

### ***Bike and Walk to School Days***

These events are important components of Safe Routes to School programs to encourage and educate students about how to get to school via bicycling or walking. National resources are available to help school districts plan these events, but the BPAC should make an effort to disseminate these resources to local school districts. The existing bicycle education program at six Tulsa elementary schools could provide an example pilot event to demonstrate its impact to other schools.

### ***Bicycling and Walking Maps***

INCOG already maintains an online trails and bicycle facilities map for the region. This should be continually updated as facilities are implemented. Over time, INCOG should consider upgrading this map to a level of comfort map that uses a Level of Traffic Stress assessment to indicate to bicyclists what streets are most comfortable for riding for a large range of bicyclist types.

INCOG should also provide up-to-date bicycle facility information to Google Maps for use in its bike layer.



### **Education**

Other organizations in the region such as the Tulsa Hub and the afterschool bicycle programs at Tulsa Public Schools are already providing strong education resources about bicycling. Often, these types of organizations are best suited to delivering educational classes, but INCOG should lend support to these efforts where it can through the BPAC.

### ***Traffic Safety Education***

INCOG received a grant from the Oklahoma Highway Safety Office to run public messaging about bicycle and pedestrian safety. The grant has funded radio ads with these messages in 2014 and 2015. Other MPOs coordinate safety campaigns with their member jurisdictions and provide marketing materials to create bus, bus shelter, billboard, online ad buys and other visual advertising. Region-scale campaigns are especially important in places like Tulsa where many residents live and work in different jurisdictions but would see a consistent message throughout the region. Education messages should be targeted at all types of road users.

INCOG should continue to use its social media outlets through the Transportation Resource Center to disseminate safety messages.



### **Enforcement Bicycle Patrol Units**

The Tulsa police department currently has a limited bicycle patrol unit but has expressed interest in increased funding for more officer training and bicycles. INCOG should educate and encourage all jurisdictions to replicate this program within their police departments to the extent feasible.

### ***Bicycle Friendly Training in CLEET***

The Bicycle/Pedestrian Advisory Committee recently started the process of including bicycle law training in regular law enforcement Council on Law Enforcement Education and Training (CLEET) courses. This will enable law enforcement officers to be more educated about bicycle laws and enforce them properly.

### ***BPAC Membership***

The BPAC currently has no representative filling the law enforcement slot. This slot should be filled and rotated among jurisdictions. The enforcement committee of the BPAC should continue its efforts to coordinate among local law enforcement agencies and seek to implement national best practices in bicycle and pedestrian law enforcement.