APPENDIX C: Related Project Documents and Plans

1. INCOG Arkansas River Corridor Master Plan (Phase 1 Vision Plan)
2. Connected 2045 Regional Transportation Plan
3. The Tulsa Regional Bicycle and Pedestrian Master Plan
4. INCOG FFY 2020 – 2023 Transportation Improvement Program
5. INCOG Surface Transportation Program (STP)
6. Tulsa Transit's Connecting Progress
7. Turkey Mountain Master Plan

Tulsa Community River Corridor Connections Project







INCOG

CITY OF Tulsa
A New Kind of Energy

THE CITY OF JENKS OKLAHOMA

U.S. Congressional District OK

2020 BUILD Grant Application

U.S. Department of Transportation, FY2020 Better Utilizing Investments to Leverage Development (BUILD) Application

BUILD Funds Request: $19.67 million

INCOG

Final
Arkansas River Corridor Master Plan
Phase I Vision Plan

August 2004

Prepared for:

Indian Nations Council of Governments
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Carter & Burgess and the Indian Nations Council of Governments especially thanks the following people for their dedication to Tulsa County, its communities, and the Arkansas River Corridor Vision Plan:

Advisory Committee Chairs:
Don Walker, Arvest Bank
Susan Neal, Tulsa City Councilor

Steering Committee Chairs:
Mayor Bill LaFortune, Tulsa
Commissioner Randi Miller, Tulsa County

Steve Turnbo and Jim Gipson of Schnake Turnbo and Frank, who were invaluable team members.

Purpose

The intended purpose of this Vision Plan is to weave the ideas that are cooperatively supported by the community into a plan for the 42-mile river corridor. The elements of the Vision Plan will be tested for technical soundness in a subsequent phase of the Arkansas River Corridor Master Plan by others. That subsequent phase should examine the plan for fatal flaws that can drastically alter the intent and form of the plan. After that subsequent phase, either individual elements or entire phases of the river corridor will be implemented, depending upon their funding and complexity.

The Vision Plan in general by its nature and scale, establishes the major framework in which future design consultant's work will be undertaken. The key elements to the plan are shown on the accompanying graphic and are listed below. Refinement in subsequent phases will be required for each of the plan elements. When completed, the river improvements will be a complete, coherent, and vibrant system.

Carter & Burgess was retained in November 2003 to provide these planning services to the Indian Nations Council of Governments. Their charge was:

- To create a vision for the project area that would enhance the river and the citizens' lives.
- Engage in a public participation process to solicit consensus.
- Develop a Vision Plan that will be the basis for technical evaluation.

The work was undertaken in a series of efforts, each of which was based upon a series of public workshops and meetings to solicit and maintain consensus:

- Base Mapping
- Inventory and Analysis
- Vision Plan Development

The overall process was funded locally through public and private partnerships, and was directed by INCOG. This process was largely completed by July 2004. Subsequent phases will be funded by multiple private and public sources, at the local, state, and federal levels.

Design Process

The design process began with mapping of existing conditions. An aerial photograph was provided by INCOG, and elements from past studies were included in the base information. Extensive site visits were performed throughout the corridor, with photography being the primary means of documentation.

From the base map and the site visits, a site Inventory and Analysis was performed. The resulting graphics included 1 set of three Corridor Analysis plans and 1 set of three Transportation Analysis plans. These plans were presented during a series of 5 public information meetings throughout the river corridor, during which a survey regarding uses in the corridor was distributed. The input gathered from these meetings formed the programming basis for the development of the Vision Plan.

The Vision Plan development began with a 3-day public workshop. Carter & Burgess brought a 3-person design team and worked on the master plan during the day. Each evening, the work products were displayed to the public, and feedback was gathered. Work ensued the next day, based upon the previous evening's feedback. The work products from this 3-day workshop were then refined into the graphics that accompany this document.

Due to the 8 public meetings that were held, the design process has been transparent to the public. That transparency has led to strong public consensus.

The Vision Plan will be presented to the Advisory Committee in early August and to the INCOG Board of Directors on August 12, 2004 for adoption.

Elements and Issues

The Vision Plan can be separated into major elements and issues. The list below discusses the major elements:

- Bridges/Crossings
  - The relatively infrequent crossings of the Arkansas River are important, both visually and functionally. They are major design elements within any view of the river, and are key points within the transportation network due to the funnel effect of the bridges. Land uses adjacent to the crossings and the river should be high-profile uses. For the majority of people in the region, these crossings will be their only interaction with the river.
  - Provide aesthetic bridge enhancements such as railing and column treatments on existing bridges. For future bridges such as the proposed Yale, Gilcrease and 41st street bridges, aesthetic enhancement should be a key consideration, but the proportions of the bridge structure should remain approximately the same as the existing bridges.
  - These enhancements should celebrate the connection of the communities across the Arkansas River, serve as gateways, and assist in reinforcing the identity of the communities they serve.

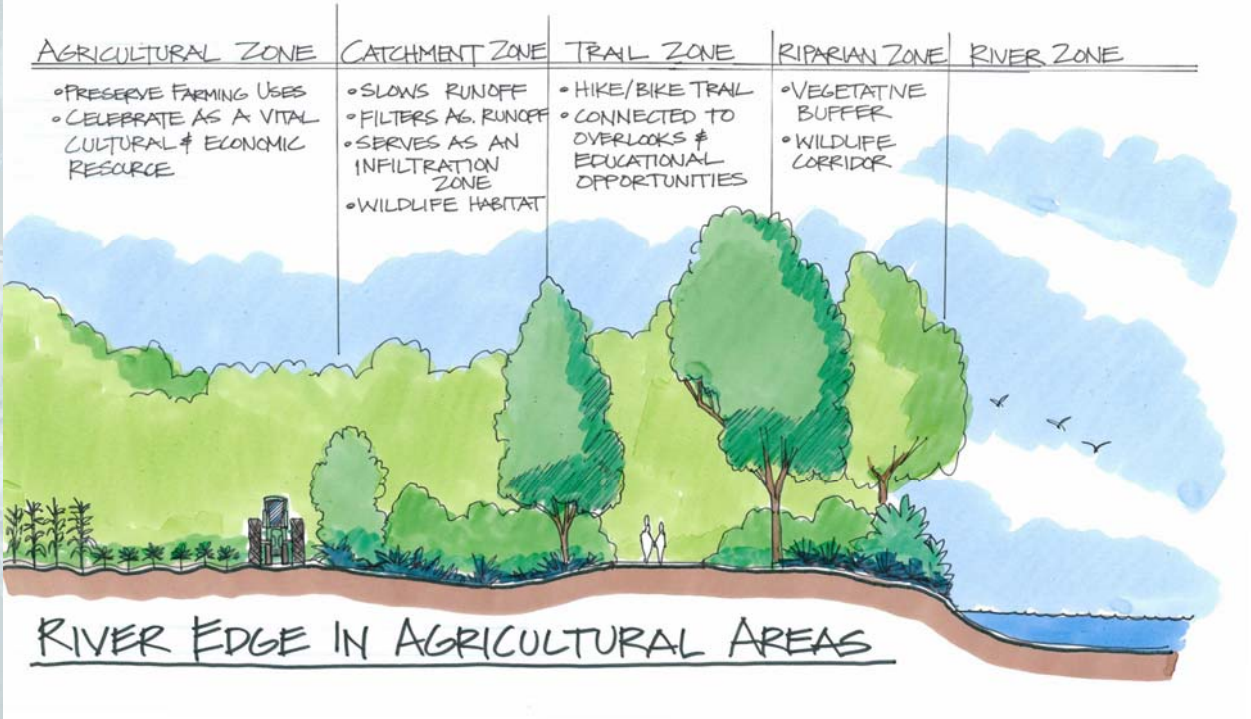
- Make crossings more pedestrian friendly by increasing the separation from traffic to enhance the perceived safety of the walk. Optimally, these walks should be 10' wide and separated from the vehicle travel lanes. If located on the same bridge deck, care should be taken with the height of the travel barrier, width of the walk, and the perceived safety of the crossing. Additionally, river overlooks can be included in the pedestrian links, particularly those facing toward the Tulsa downtown area, the Oklahoma Aquarium, or other major visual points of interest.



Workshop Sketch: Pedestrian Connections at Bridges

- Natural Features as Resources
  - Maintaining significant natural features intact (Turkey Mountain, Chandler Park, Avery Drive, Bald Eagle habitat corridors, et. al.) is a key feature in the Vision Plan. There are obvious ecological benefits to both aquatic and riparian systems by keeping these features in situ. Further, the contrast between the urban fabric and this large green "thread" enhances the quality of life for the citizens of the Tulsa Metropolitan Area. Lastly, celebration of the farming and ranching heritage provides an historical connection to the past and a lasting sense of place.

  - Protect strategic portions of existing agricultural zones as open space provides visual relief, aids in maintaining the economic balance of the region, and can supply a perceived edge to the urban fabric. In the face of development pressures, this can be accomplished by using agricultural production easements and transfer of development rights.



Workshop Sketch: Trail through Agricultural Area

- Many of these agricultural zones can be located within the floodplain of the Arkansas River, where development would be curtailed by inundation concerns.

❖ <u>Low Water Dams</u>

- Seven additional low water dams are envisioned at strategic locations throughout the corridor as an essential feature of the river improvements. These should be treated as permanent structures that are viewed by many citizens of the Tulsa area, so aesthetic considerations are paramount.

- The water bodies impounded by these in-stream dams are an aesthetic enhancement for adjacent properties and those areas with a view to the river.

- The resultant water bodies have a positive environmental impact on the aquatic environment. The staccato hydrology of the Arkansas River leaves the existing fish species with only limited places to retreat to during low water. These lakes would provide a greater variety of stable habitat during times of low water. (Indeed, the Zink Lake dam is a noted striped bass fishery.) Littoral shelves that extend along the water edges will enhance the habitat as well. Structures could be added to aid fish production, which in turn benefits predators such as the Bald Eagle (whose nesting sites are another significant natural feature of the Arkansas River Corridor).

  Presently, the Arkansas River within the project boundaries is already a highly altered, unnatural habitat due to the staccato hydrology. Unaltered river hydrology rises and falls as a natural occurrence, but not on such a severe level as within the project boundaries. The impact on habitat potential is tremendous. One consideration during the design of the low water dams is the creation of aquatic habitat.

- Further, these lakes could provide consistent and reliable Least Tern habitat, which is an endangered species. This habitat can take the form of islands located at the tailwater end of the lake, which would form more consistent habitat through its more consistent water level.

- The low water dams must be designed for fish passage. Relatively little is known about fish migration within the Arkansas River, according to the USFWS and ODWC. In spite of that, common sense and past research on rivers points to this need.

- The low water dams must also be designed to allow continuity of sediment transport. To effectively accomplish this, a sediment transport study should be undertaken to accurately assess the amount of sediment passed through the river system, and whether that amount is increasing or decreasing.

- The low water dams should be sited in such a way so they do not adversely impact mixing zones and zones of recovery for existing wastewater treatment plants.

- The low water dams should be sited with consideration of their impact on local drainage and flood impacts.

- The Vision Plan proposes 7 low water dam locations. These locations have been selected based upon aesthetic considerations, impacts upon WWTP mixing zones, and position relative to large tributary confluences. The USACE is preparing an updated hydrology and hydraulics model for the Arkansas River within the project limits, as of the date of this document. Each of the dams will be examined for hydraulic impacts upon flood event water surface elevations. Some of the dam locations may be altered or eliminated by this examination.

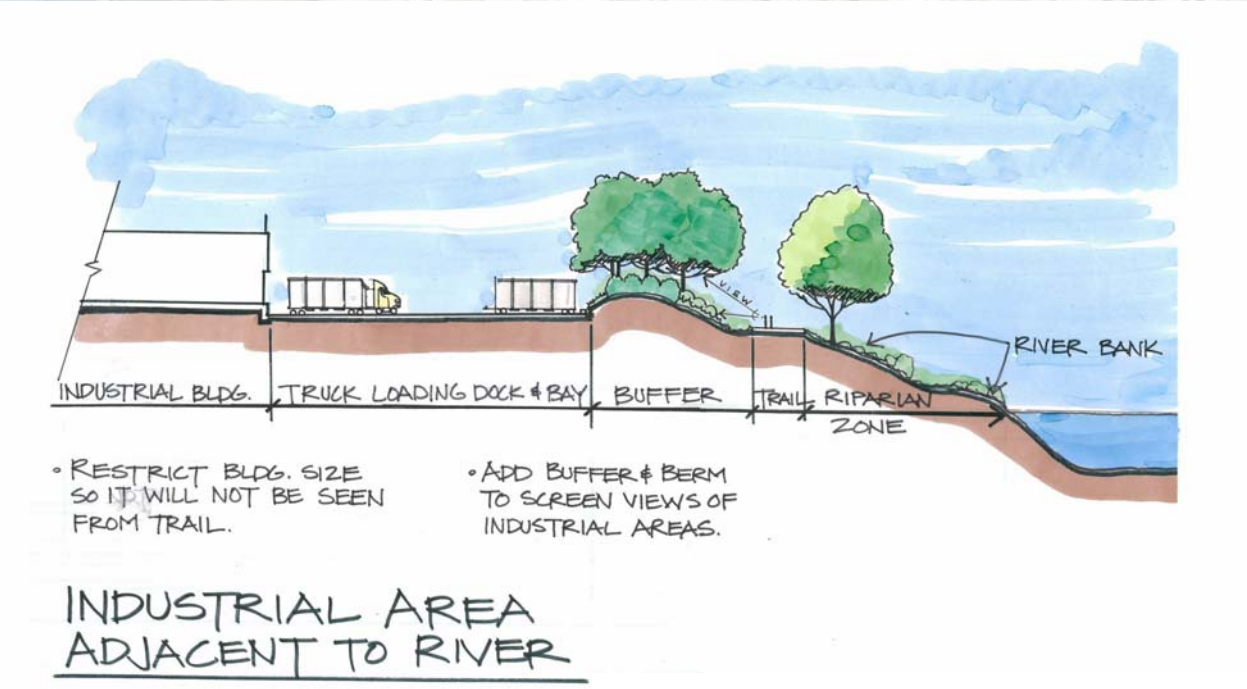
❖ Multi-use Trails and Parks

- The River Parks trails system provides a wonderful example of a well-loved recreational trail system. Extending the network along the entire river corridor and connecting to other area trails is important to the public.

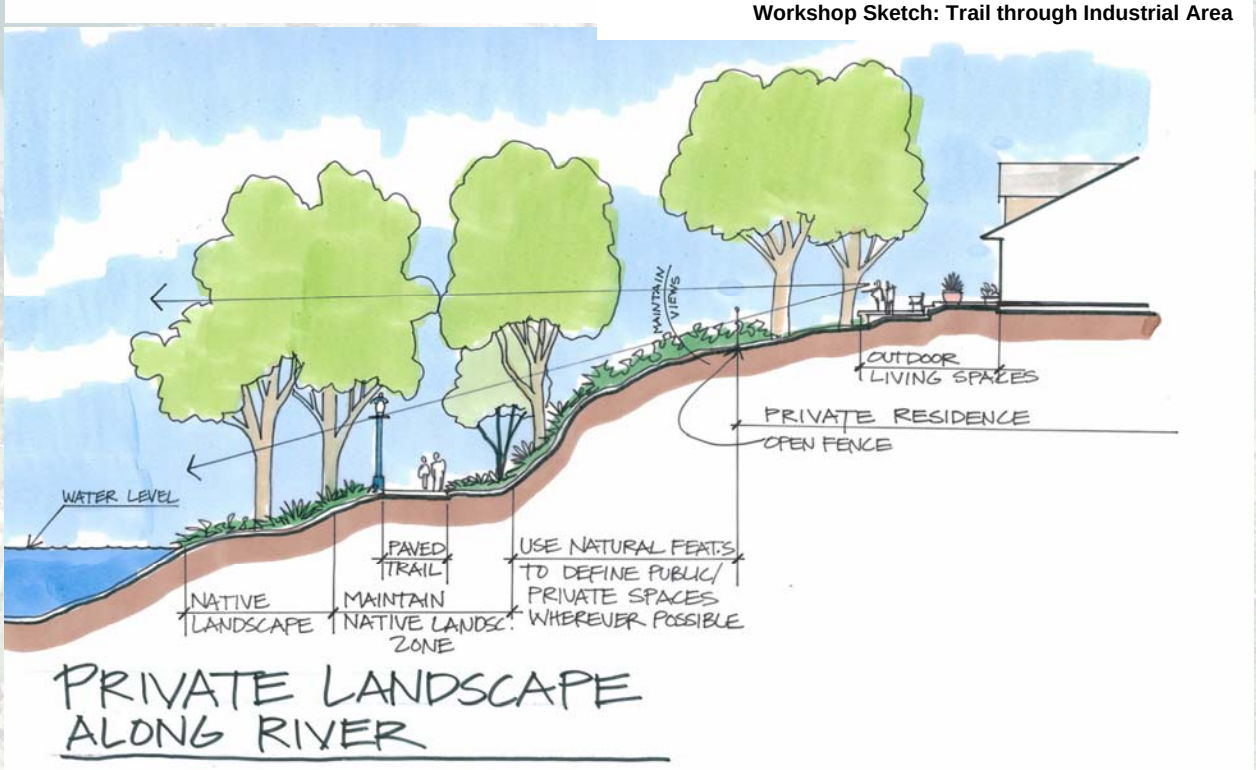
- The trails should be scaled appropriately for the intended use and context. Appropriate materials should be used, also in relation to the intended use and context (concrete, asphalt, pavers, crushed aggregate, etc.).

- In areas of heavy trail usage, including the Pedestrian Bridge, a dual trail or a widened trail should be considered adding trail capacity and providing for separation of conflicting trail uses.

- The trails will traverse a wide variety of land uses. Care must be taken to screen views from the trails that will detract from the recreational experience, provide security to adjacent property owners where needed, and integrate the trails into public spaces on the river.



Workshop Sketch: Trail through Industrial Area



Workshop Sketch: Trail and Hillside Development

- The number of safe access points to the trail system and to the river corridor should be increased. Riverside Drive is of particular concern, since pedestrians have to cross a busy roadway to gain access to River Parks.

- Trails and bike lanes should connect the river trails system to existing parks and neighborhoods. These trails could utilize creek corridors where spatially feasible. The use of creek corridors for trails may also provide for grade-separated crossing of major roadways. Creek corridors in natural conditions are generally preferable to highly altered drainage ways. However, many of the creeks in proximity to the river have been channelized or otherwise made undesirable for people. Some potential creek corridors that provide opportunities for connections to adjacent neighborhoods and activity centers include Crow Creek, Joe Creek, Fred Creek, Haikey Creek and Cherry Creek, to name a few. Local judgment regarding the projected use of trails in such creek segments will have to be used.

- All of the trail zones adjacent to the river should be allowed to function as riparian wildlife corridors. Forested areas adjacent to the river's edge should be left in place without significant trail interruption.

- Several locations along the river offer many educational opportunities. In addition to the ecological education opportunities, subjects such as water quality and the river system (channel, floodplain, sedimentation, etc) can be accommodated.

- Designate old Route 51 (adjacent to the south/west side of the river in the area of Keystone Dam) as a scenic bike trail and/or limited access seasonal road.

- Lighting, where provided on the trails, should be dually served by both solar power and electrical grid.

- Neighborhood-scale park features need to be incorporated with new trail extensions. Such nodes can serve as trail heads as well, and should incorporate pavilions, parking, playscapes, and other amenities.

- Turkey Mountain Urban Wilderness Area occupies one of the most prominent locations along the river corridor and represents a unique opportunity for a substantial urban wilderness in close proximity to the heart of metropolitan Tulsa. The park should be expanded to the extent possible through the acquisition of adjacent undeveloped property and preserved in perpetuity as an urban wilderness/open space area, Development within the park should be limited to uses complementary to this great natural resource, such as hiking, equestrian trails and stables, environmental education and related uses.

- Expand the Indian Springs sports complex in Broken Arrow and the Bixby sports complex to provide major tournament-quality sports facilities. Also, consider providing a medium-size tournament-quality sports complex in the proximity of the planned Yale Bridge, on the east side.

❖ Traffic Network and Gateways

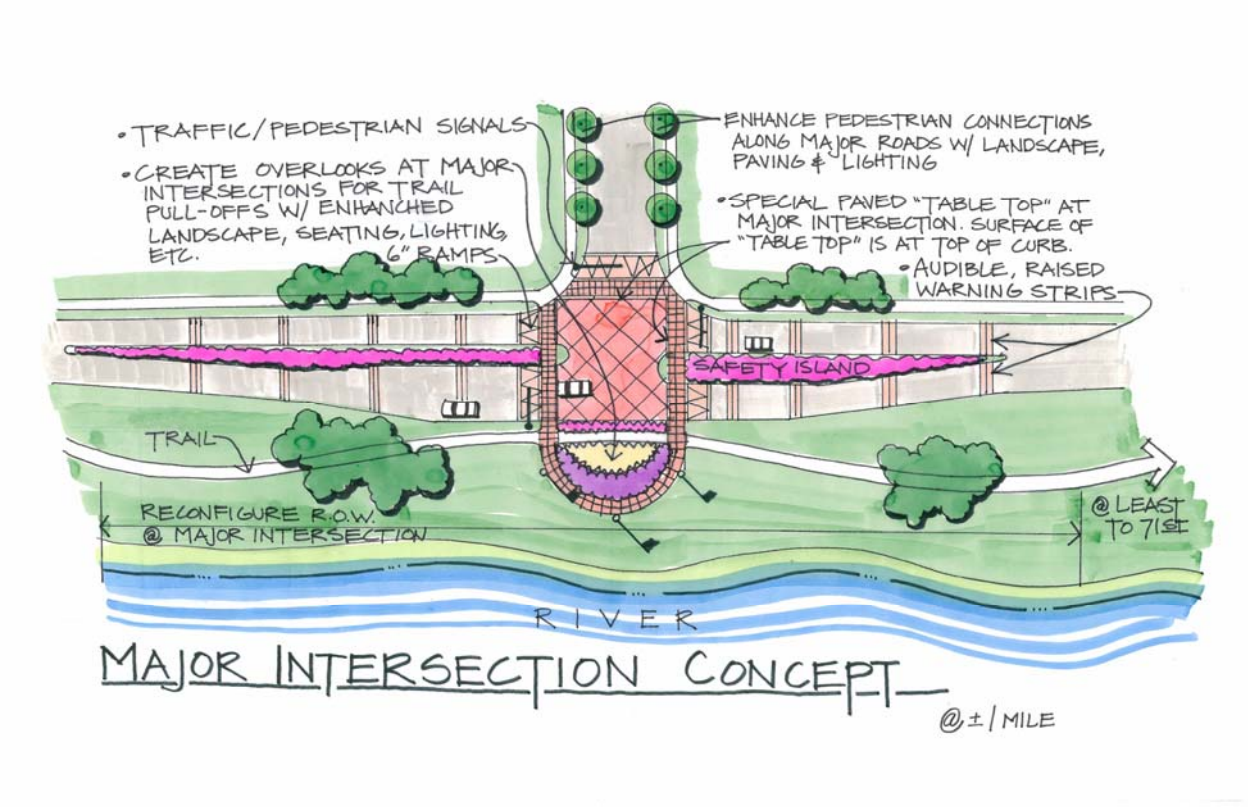
- Designate Avery Drive as a scenic parkway, and provide an overlay district to govern the appearance of the roadway. A bike lane or separate trail must also be included along the Avery Drive. This should also extend from the intersection with Highway 97 westward to the Keystone Dam area.



Workshop Sketch: Avery Drive Designated as a Parkway

- Overlay districts on major roadways paralleling the river should be considered, with the intent of preserving public views to the river and maintaining or enhancing the appearance of the river's banks.

- Provide traffic-calming elements along a newly designed and rebuilt Riverside Drive between I-44 and 21st Street. These traffic calming elements are intended to aid in the movement of pedestrians and cyclists across Riverside Drive between River Parks and the neighborhoods and parking areas on the east side of Riverside.

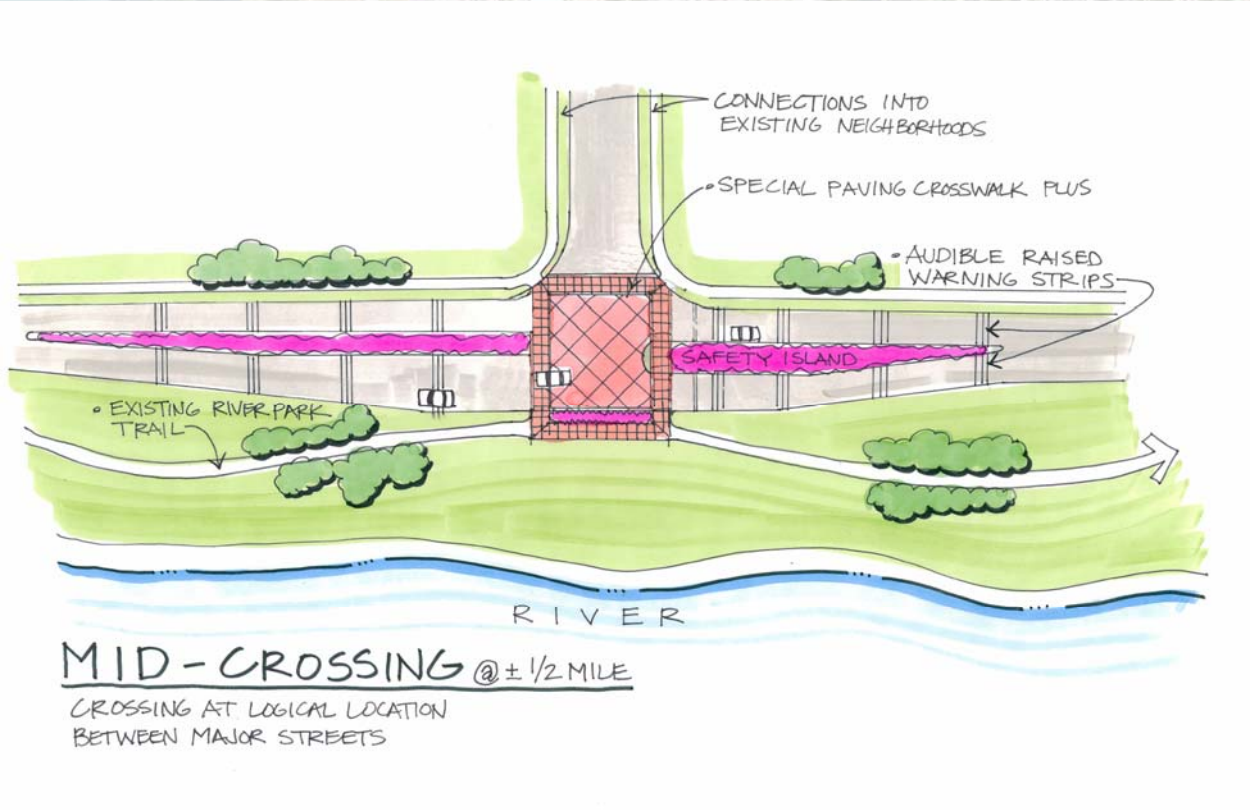


Workshop Sketch: Major Intersection Traffic Calming Concept

The major traffic-calming element would occur at major signaled intersections such as 21st and 31st. The minor element would occur midway between the major elements.

The pieces of these traffic-calming elements include:

- Traffic signals at the major element locations
- Traffic tables at the major intersections, which consist of a raised portion of the pavement level with the top of the curb. The entire intersection is raised with 6" ramps at the 3 sides of the intersection. Specialty pavement is used throughout the intersection that results in a change in wheel noise and sensation.
- Crosswalks are designed with specialty pavement to make them stand out visually.
- Safety islands, a minimum of 6' in width.
- Connections to existing and planned trails and walks.



Workshop Sketch: Minor Intersection Traffic Calming Concept

- Extending 41st Street with a new bridge across the Arkansas River will help to further knit the east and west sides together. It will provide connectivity to future developments on the West Bank and will separate local from through traffic on the existing I-44 Arkansas River Bridge.

- Extend Aspen Avenue southward to the river in Broken Arrow, to connect with the river and provide for better access to the Broken Arrow Sports Complex and other potential activity centers.

- Create a Riverside Drive West, extending southward from Southwest Boulevard to 71st Street and including Elwood Avenue. This will fill a gap in the transportation network and supply meaningful access to key properties on the west side of the River. Further, Riverside Drive (East) has a significant identity to most people, and that identity will transfer somewhat to a parallel road on the west side of the River.

- Provide gateway treatments along major roadways that denote the edges of particular districts. These gateway treatments can be architectural in nature, and will require site specific design. Locations for these gateways include:
  - Denver and Riverside
  - Boulder/21st and Riverside
  - I-244 and the River
  - Riverside at the I-44 overpass
  - The proposed Yale Bridge crossing the river.

- Adding a landscaped buffer treatment along I-244 provides a buffer for the planned residential areas, plus offers a great gateway going northward toward downtown Tulsa.

- Provide a landscaped buffer treatment along both sides of 21st Street west of I-244 to screen current and future land uses in this area.



Workshop Sketch: Buffer to Screen Future Uses

- Replace the sloped concrete pavement on Southwest Boulevard (a.k.a. Lawton Avenue) with terraced planting areas in the vicinity of the Tulsa Regional Medical Center. This will provide some visual relief and a better driving experience along a major artery leading into and out of the Tulsa downtown.



Workshop Sketch: Remove Riprap and Install Planted Terraces on Southwest Boulevard

❖ <u>Community Development Opportunities</u>

- Over the long term, maximize the effect of appropriate land uses along the river. If the Arkansas River is viewed as a valuable public resource, then the land uses that line the shores have intrinsic value. The existing land uses should be examined on a "highest and best use" basis, given their location. Property rights must be respected, so this recommendation will be accomplished in the long-term, not the short-term.

- Because of their obvious importance, the land uses adjacent to the river crossings receive a great amount of emphasis in the Vision Plan. Because of this, the land uses at these intersections must be able to add to the urban vibrancy and commercial potential. That is particularly true of those close to the Tulsa downtown area.

  One example of this is the potential redevelopment of the City of Tulsa Public Works Maintenance Facility. This occupies the southwest corner of 21st Street and the Arkansas River, a prominent location. Given the context of the location, an activity generator such as a new baseball stadium for the Tulsa Drillers or other major recreational or entertainment center would be ideal in this location, and would be catalyst for further redevelopment of the surrounding area.

Another example of a desirable land use along the river at a major crossing occupies the west bank of the river at the 96th Street Bridge. The new Riverwalk Crossing development north of 96th Street and the Oklahoma Aquarium south of 96th Street are the beginnings of a retail/entertainment district that can connect to the proposed Creek Casino and the restaurants/retail nodes across the river via water taxi across a lake formed by a low water dam. The combination of setting, easy access, desirable destinations, and diversity of experiences will contribute to the success of this area. Vibrancy is achieved through such a mix of destination uses.

- Promoting access to the water's edge is important to the sense of place. People should be able to reach the water's edge whether it be in a continuous fashion such as boardwalks or promenades, or in an overlook fashion such as the overlooks by the Pedestrian Bridge or north of the 21st Street Bridge by the River's Edge Café.

  Promenades are a site-specific design solution, and are often a key element in riverside developments. Design Guidelines for the river corridor should address how promenades for retail/entertainment or mixed use developments front onto the river, in terms of spatial relationships to the river and to development, lighting, materials, and other design respects. Key design considerations are the uses that front onto the promenades, the view from and setting of the promenade, and the character or theme created by the improvements. Overlooks should be placed where grand views along the river corridor can be seen.

- The refinery sites within the river corridor include the Sunoco refinery and the Sinclair refinery. Since this plan contemplates possible land uses decades into the future, over time the owners of the refineries may choose to move or modify their presence at the current locations, creating the opportunity for strategic redevelopment opportunities for the uses of this land.

- Should the Sunoco Refinery property become available, it could become light industrial and research and development, taking advantage of the existing connections to transportation resources.

- Should the Sinclair Refinery property become available, it would be a key development site providing connection of east and west Tulsa. It could be a mixed-use site, which might include medium to higher density residential, plus a major development site on the west side, directly across from downtown.

- Provide landscape buffers along the northern edge of the Sunoco Refinery site to mask the current use and the future use.

Workshop Sketch: Potential Loft Style Housing in the Redevelopment of PSO area

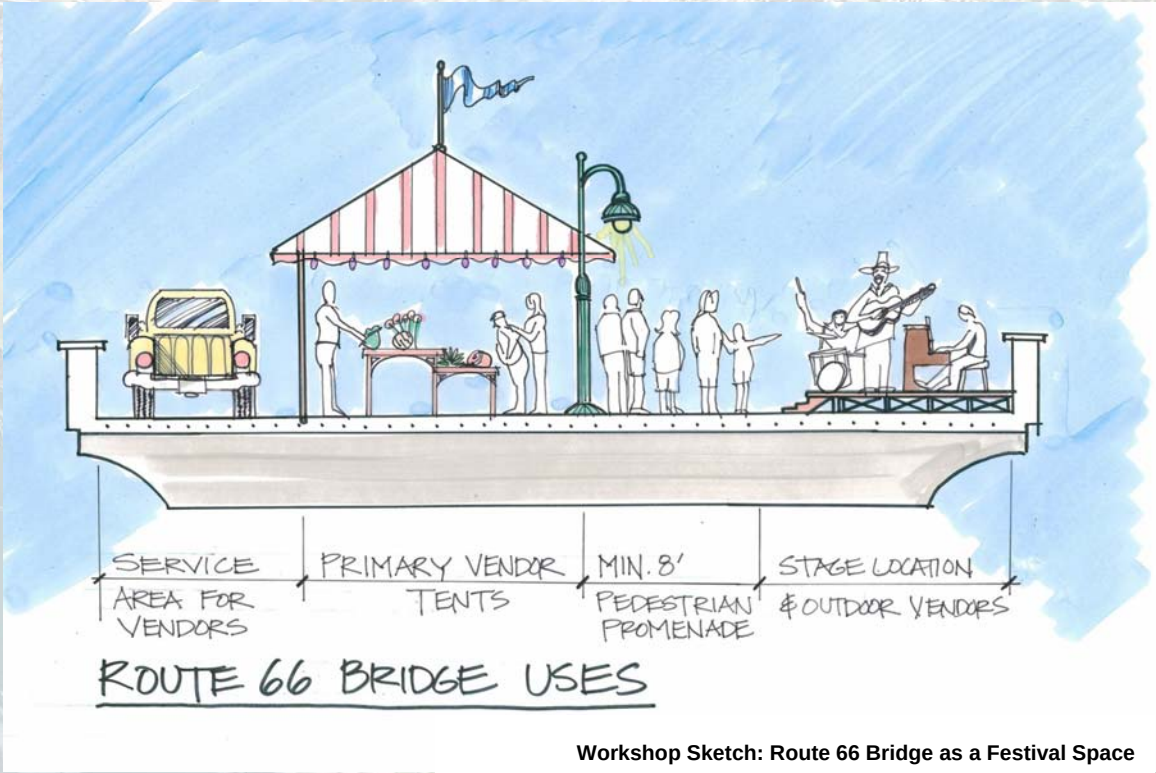


- Plan for additional residential areas on the west bank to provide a housing base. This could be similar in character to the neighborhood between Riverside and Peoria, just across the river. Directly near the riverbank, outside the regulated floodplain area, higher density housing could be placed to take advantage of the riverfront location.
- The AEP/PSO Tulsa power plant is currently a power generating facility, but the potential for redevelopment exists in a similar fashion to the refinery sites. Once the facilities become obsolete for power generation, retain and redevelop the historic brick building (and keep the sign!) as the anchor of a mixed-use development.



Workshop Sketch: Potential Redevelopment of PSO area and View Downstream toward Proposed 41st Street Bridge

- The old Route 66 Bridge can be used as a periodic Festival Space. The venue is unique, the views are desirable, and the programming for the festival already has a recognizable theme. A structural study will have to be performed to see if this proposal is feasible, and infrastructure such as electrical supply and water may have to be extended onto the bridge. This study should be addressed as part of the Route 66 Master Planning effort.



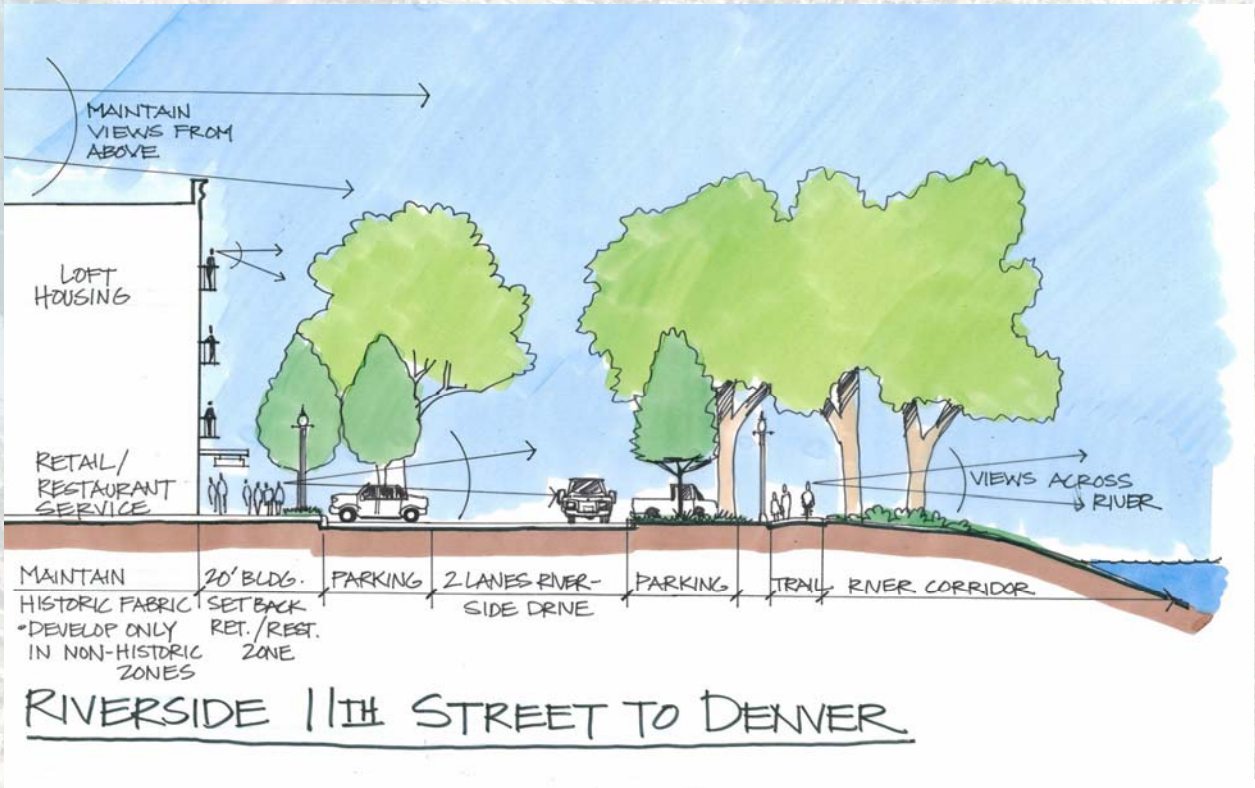
Workshop Sketch: Route 66 Bridge as a Festival Space

- Festival Park, an icon for the Tulsa Metropolitan Area, is expanded southward to 21st Street and northward to the Oklahoma State University Osteopathic College campus. A larger, more functional amphitheater needs to be constructed to accommodate contemporary concert events. This will allow Festival Park to remain as a primary venue for Oktoberfest and other festivals. Further, Festival Park needs to incorporate neighborhood-scale park features so that this function is provided for nearby residential areas. The expansion of the Festival Park to 21st Street will require the relocation of existing uses in the area.

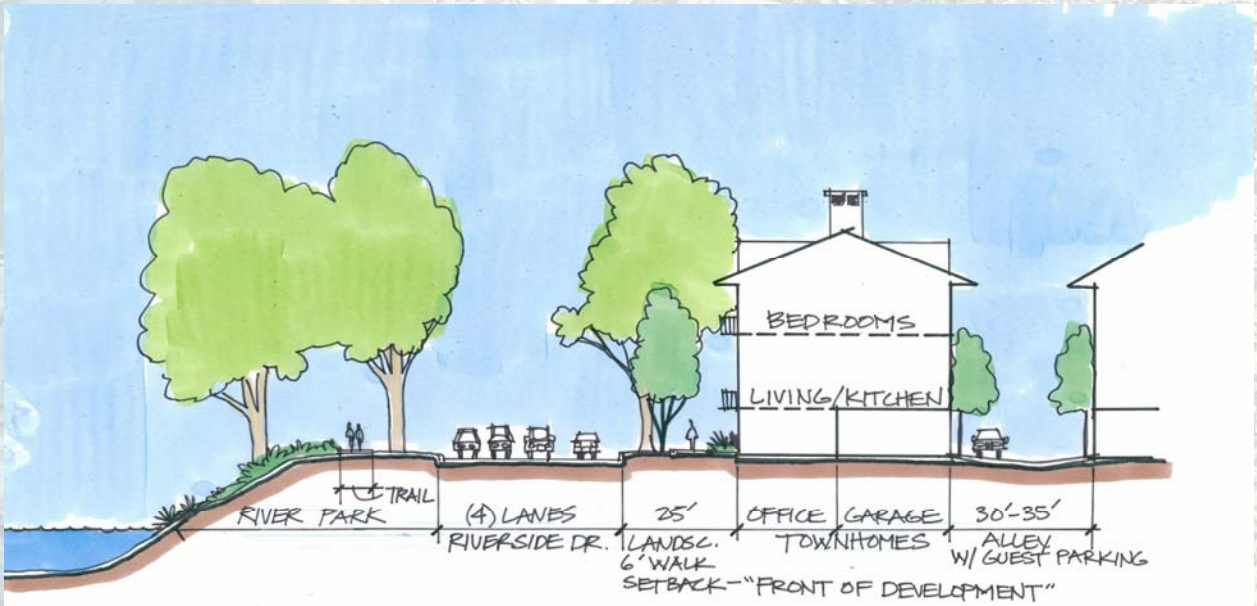
- Development in the area near the Keystone Dam, the Keystone Ancient Forest Preserve, and the surrounding eagle nesting areas should be environmentally sensitive in nature. This should include protecting tree canopy, including LEED (Leadership in Energy and Environmental Design) certified site development techniques such as dispersal of stormwater, breaking up building masses, and minimizing nighttime illumination. These are sustainable development principles that will result in a development footprint that will be in keeping with the surrounding ecologically significant lands. Large, intrusive development parcels have the potential of impacting the surrounding ecologically sensitive areas.

- Local, neighborhood scale bistros and eateries are desirable within discrete key areas along River Parks. An example of this would be an upgraded version of the existing River's Edge Café. Such areas or ancillary parking should not encroach on the trail or the associated green space. Preferably, such opportunities would be restricted to where River Parks is widest, and the site is out of the floodplain.

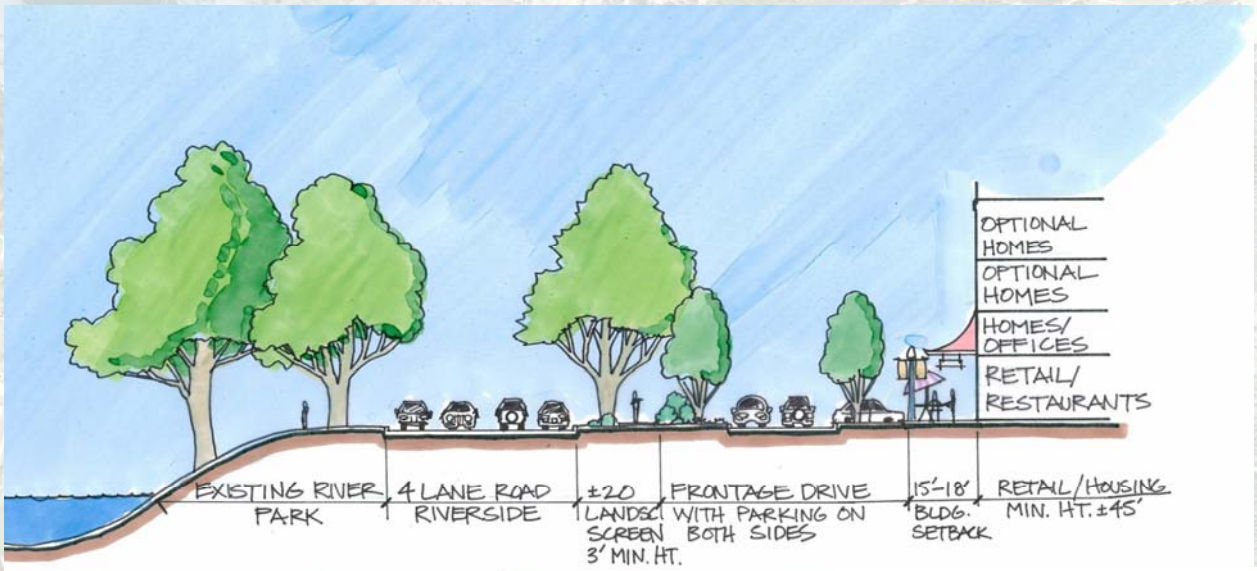
- Several existing neighborhoods create a desirable fabric adjacent to the Arkansas River. An example is the area between Peoria and the river, from 15th Street to 41st Street. The public expressed a strong desire to preserve the nature and feel of these neighborhoods. Creation of localized higher density residential or neighborhood scale commercial opportunities along Riverside Drive is considered as part of the Vision Plan, if carefully and sensitively accomplished, at strategic locations, such as along Riverside Drive from 11th Street to Denver Avenue.



Workshop Sketch: Mixed Use Redevelopment along Riverside north of Denver



Workshop Sketch: Potential Residential Redevelopment along Riverside



Workshop Sketch: Potential Residential Redevelopment along Riverside

- Crow Creek occupies a special location within the Arkansas River corridor. It is a significant natural feature connecting the vibrant Brookside District to the river corridor. Consider expanding Crow Creek as a water feature that is the centerpiece of a mixed-use, pedestrian-oriented urban district extending from Brookside to the river. This is an ideal project that could provide a model for future connections between other neighborhoods and activity centers to the Arkansas River along creek corridors.

- Extending community connections to the river is important, for circulation as well as providing a spine for a development corridor to reach the river. Examples of this include extending Main Street to the river in Sand Springs, and extending Aspen Avenue to the river in Broken Arrow.

- Redevelopment should be market-driven primarily, with assistance from public sources to address large public issues such as low-water dams and roadway extensions. Redevelopment of lesser-desirable areas should also use a market-driven approach with public assistance as appropriate.

- A regional park on the west side of the river is needed to service the planned residential areas as well as provide a new source of recreation fields for the entire Tulsa park system.

- As a rule, the communities' wastewater treatment plants (WWTP's) are located on the Arkansas River. While all of these plants are in conformance with state and federal regulations regarding operations and discharge, they are often not seen as a desirable land use. However, physics governing their location on the river requires their presence. All of the WWTP's should be screened and incorporate odor control measures in order to minimize their perceived presence and negative impact on adjacent development, including the City of Tulsa's Southside WWTP.

❖ <u>River Oriented Activities</u>

- The activities that take place on the impounded water bodies or lakes within the river add to the perception of vibrancy of the community. While it is beyond the purview of the public sector to program all such activities on the river, the public sector can assist events and programs by providing appropriate infrastructure and settings.

- Rowing is an activity that is already proven to draw significant interest. Investigations regarding passing sediment through Zink Lake as well as the other impoundments should be conducted to insure that this activity can continue. Removal of existing sediment accumulations in Zink Lake should also be investigated, as the existing depth in Zink Lake is an impediment to holding large rowing events.

- Kayaking needs to be preserved, as an activity, and the existing hydraulics in the vicinity of the AEP/PSO Tulsa Power Plant need to be enhanced. Enhancements to this opportunity should include convenient and safe access to the river for kayakers; extending the length of the kayaking course; varying the experience of the course from Class 1 rapids to Class 5 rapids, with the potential to provide exits and looping from the exits to the beginning of the course.

- Small sailboats (i.e. Sunfish class as an example) can be allowed on lakes if sufficient length and depth can be maintained.

- Motorboats, either inundated propeller type or airboat type, should be prohibited from travel through the impoundments due to the noise and safety factors.

- Fishing should be encouraged along the lakes with small unobtrusive docks and piers. These piers should be separated from trail traffic, as the trail users and anglers can cause conflicts. For example, the anglers who often populate the existing Pedestrian Bridge and their equipment can conflict with other trail users, and improvements need to be made to the structure to separate the users.

- The existing conservation and habitat areas should be used as environmental education opportunities. Interpretive signs, water quality monitoring stations, field plots and laboratories, birding blinds, and other facilities can expand the opportunity for people of all ages.

In order to bring the Vision Plan to fruition through the upcoming phases of study, design, and construction, cooperation between several agencies at the local, state, and federal levels will be needed. At the local level, Tulsa County and the city governments of Bixby, Broken Arrow, Jenks, Sand Springs and Tulsa will need to work together to move the projects forward. State agencies such as the Oklahoma Department of Environmental Quality will need to be engaged for permitting purposes. Federal agencies such as the USACE can be contacted and engaged for funding and permitting.

Examples of specific tasks where interagency cooperation will be required include:

- The local governments along the river corridor should adopt Regional River Corridor Design Guidelines in order to raise the quality and value of the entire river corridor, and make the development process more predictable.
- Water release/sediment transmission control and other dam-related issues will require the cooperation of several local agencies.
- An exit-enabling strategy for the refineries, which is a regional issue.
- Transfer of development rights to enable landowners to realize the value of their property while maintaining desirable natural or agricultural character.
- Consistency of approach regarding riverfront development with USACE, Levee Districts, and Local Governments
- Local funding matches that are required for grants or federal programs that benefit the region.

Lastly, projects should be prioritized upon the basis of funding, technical complexity, and interrelation to other projects. Also important to prioritization is the perception of the citizenry that progress is being made. As a general observation, people define progress as “built projects”, not necessarily just large design efforts. Projects should be spaced so that some progress is always evident throughout the corridor, and not concentrated in one area. In that fashion, public support can be maintained for the entire Vision Plan.

- <u>Examples of Projects for the Short Term (1 – 5 years)</u>
  - Creation of Design Guidelines for the entire river corridor
  - Expand sports complexes in Bixby and Broken Arrow
  - Bridge Enhancements

- Route 66 Bridge and infrastructure
- Landscape buffers at refineries
- Enhancement of kayaking area below Zink Lake dam at the AEP/PSO Tulsa Power Plant
- Trail widening and/or dual trails from 21st to 71st Streets
- Terraced landscape and slope walls by I-244 river crossing, by Tulsa Regional Medical Center
- Gateway treatments at I-44, Route 66, 21st Street, and the proposed Yale Bridge including landscape buffers and perhaps architectonic monuments.
- Outdoor education at the OK Aquarium
- Extend trail system on both sides of the Arkansas River
- Extend pedestrian connection along Main Street in Sand Springs to the River
- Designate Avery Drive as Scenic Corridor
- Designate old Route 51 near Keystone Dam as a trail corridor
- Broken Arrow – Extend Aspen (145th E.Ave.) to the River

❖ Examples of Projects for the Medium Term (5 - 10 years)

- Riverside Drive improvements
- Retrofit Zink Lake for sediment continuity
- First series of low-water dams
- Major entertainment/recreational venues on west bank locations
- Expand River West Festival Park (River Parks)

❖ Examples of Projects for the Longer Term (longer than 10 years)

- Subsequent low-water dams
- Extension of 41st Street
- Redevelopment of major west bank industrial properties (e.g. refineries; AEP/PSO Tulsa Power Plant)
- Creation of Riverside Drive West

Foreseen Challenges and Hurdles

As with all major civic projects, there are challenges to consider. These challenges consist of technical issues, public relations, funding, and others. During the course of the Vision Plan development, several challenges became apparent and will need addressing in subsequent phases.

❖ Consistent delineation, regulation, and control of the 100-year floodplain

Constituent city governments felt the need for an updated hydraulics and hydrology model (H&H) long before this Vision Plan effort was commissioned. Recent development along the river corridor has also illustrated the need for a comprehensive re-delineation of the regulatory floodplain throughout the study area. As of the date of this document, the USACE is starting a detailed H&H study which can result in a regional delineation of the regulatory floodplain for the Arkansas River.

It would also aid river-oriented development if a common approach to addressing floodplain issues were adopted by the 5 municipal governments. This will aid the private sector by making the development process more predictable.

- Continuity of sediment transport

  Past experience with Zink Lake shows that improvements within the river channel banks cannot be undertaken without consideration for transporting sediment through the system. The existence of the individual sand mining operations in one place for many years also points to the large amounts of sediment that can move through the Arkansas River system. This regional experience indicates that desilting the proposed impounded lakes is not an ideal solution to sedimentation. Therefore, emphasis in subsequent design phases must be placed on moving sediment through the system.

  However, there has been no quantification of the sediment that moves through the study area. Anecdotal evidence was given to the Carter & Burgess design team at the several public meetings. These anecdotes address issues such as the more northern sand operations periodically running out of sand; the bridge piers at the old 96th Street bridge at Jenks were formerly buried, and have now been uncovered; the character and the quality of the sand is changing; the sand plants have never and will never run out of sand, etc. Within these anecdotes, one finds the need to quantify the amount of sediment that can move through the system and how it can move through the system.

  The entire purpose behind a sediment transport study is to develop ways to move sediment through the proposed series of low water dams. Such a study can also predict, on an approximate long-term basis, when desilting operations should occur so that budgets can be predicted. Use of existing sand mining operations to assist in sand management is critical for the continued viability of the local industry and to the cost effective maintenance of the new lakes.

  From our experience, studies of this scope, given the size of the study, can be very involved and consequently costly. However, the downside of not designing the in-channel improvements to correctly respond to the conditions in the river is more costly. That potential loss can be measured in lost development desirability, increased maintenance costs, loss of current sand mining operations, lost habitat potential, lost recreation potential, etc. Since the low water dams and impounded lakes are central to the entire Vision Plan, planning for the success of these elements is also central to the entire Vision Plan.

- Continuity of the Riparian Corridor and Aquatic Environments

  This continuity issue includes both the riparian environments along the shorelines and the aquatic environments within the river. The continuity is important, for several reasons:
  - Sustainability of wildlife, which is currently a desirable feature in the river corridor
  - Sustainability of the river, especially water quality and habitat potential
  - Potentially, these features can figure prominently in obtaining a variety of funding sources

  The major hurdle in the continuity of the shoreline riparian environment is the urban setting of segments of the river, and the desire for promenades and hard edges at the river's edge within the urban setting. The two are exclusive of each other.

When reviewing the Vision Plan maps, the opportunities for hard edges are concentrated, particularly when one considers the amount of shoreline that remains in open space throughout the length of the project. Providing for the opportunity to build hard edges at the river is part of the vision, but only in select areas shown on the Vision Plan graphics.

Open space areas adjacent to the river must include native plantings that are typical of indigenous riparian habitats. Also, islands within the river can provide riparian habitat (please refer to the Low Water Dam section earlier in this report).

- Refineries

The Sunoco and Sinclair refineries have been part of the west bank of the Arkansas River for many years. Long term, there is potential for the owners of the refineries to decide to close or move these facilities and undertake whatever remediation is required. However, it should be noted that the refinery owners are in sole control of that decision, and there has been no indication at present that this is a near-term possibility.

At the appropriate time, the constituent agencies in the Arkansas River Corridor should assist the refineries with a redevelopment strategy that is beneficial for all parties.

Admittedly, this is a long-term effort. When that time comes, we believe that the effort will be worthwhile to the entire metropolitan region in terms of quality of life, return on perception of "livability", and increased vibrancy of the Tulsa city center. These in turn will lead to quality growth for the metropolitan area.

- Maintenance of community engagement and support

The Arkansas River Corridor improvements are a long-term effort and will be able to continue as long as there is public support for it. Maintaining community support should be a key element of subsequent phases. That effort should include public participation as an integral part of later design phases, maintenance of an advisory group and a steering committee, regular updates to the community at large, and other informational functions.

P:\022413.010 - Arkansas River\16 - Tests & Reports\Vision Plan Report 7-23-04.doc

Connected 2045

Regional Transportation Plan

Tulsa Metropolitan Area | Oklahoma | November 2017



INCOG

Transportation Management Area
Base Map



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Legend

- Highways
- Major Streets
- Bodies of Water
- County Boundaries
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Connected 2045 Regional Transportation Plan

INCOG

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View of Downtown Tulsa.

INTRODUCTION





Study Area

The 1,400 square-mile Tulsa Transportation Management Area (TMA) is comprised of Tulsa County and portions of the adjacent counties of Creek, Osage, Rogers, and Wagoner. It is a part of the seven-county Tulsa Metropolitan Statistical Area (MSA), which also includes Okmulgee and Pawnee Counties. The TMA is predominately urban, with nearly 85% of its population being within the incorporated cities of Bixby, Broken Arrow, Catoosa, Claremore, Collinsville, Coweta, Fair Oaks, Glenpool, Jenks, Kiefer, Mounds, Owasso, Sand Springs, Sapulpa, Skiatook, Sperry, Verdigris, and the core city, Tulsa.

As of 2015, the population of the TMA was 804,759, which accounts for 84% of the MSA population of 962,676. The Tulsa MSA is the 55th largest in the country and the primary city, Tulsa, is the 47th most populous city in the country.

INCOG's Role in the Transportation Planning Process

The Indian Nations Council of Governments (INCOG) is a voluntary association of local governments, and was designated by the governor as the area's Metropolitan Planning Organization (MPO). MPOs maintain the primary responsibility for developing transportation plans and programs for urbanized areas of 50,000 or more residents. Federal regulations recognize metropolitan areas with a population of 200,000 or more as Transportation Management Areas (TMA), which places further requirements on the MPO for congestion management, air quality attainment, increasing safety, and other issues.

All TMA transportation plans and programs are based on a continuous, coordinated, and comprehensive planning process, conducted in cooperation with local and state partners. Representatives of each member community (principally-elected officials) are appointed to INCOG's Board of Directors, which serves as a forum for cooperative decision making on issues of regional significance, including transportation.

The transportation planning process involves both long-term transportation system objectives and short-term implementation of projects. Long-term objectives are highlighted in the Regional Transportation Plan from which the implementation program is chosen. The Tulsa Metropolitan Area Major

Street and Highway Plan represents the ultimate street build-out plan for the area and guides the roadway classification for the right-of-way and development purpose, while the Regional Transportation Plan identifies planned transportation improvements to be implemented within the next 20 to 25 years and emphasizes a systematic approach to implement the comprehensive plans for the region. Short-term projects are outlined in the Transportation Improvement Program (TIP), which identifies the projects to be undertaken during the upcoming four years.

All aspects of the process are overseen by the Transportation Policy Committee (TPC) and the Transportation Technical Committee (TTC). Committee members meet monthly and represent federal, state, tribal and local governments and agencies; state and local authorities; and modal interests. The TTC, an advisory group to the TPC, provides technical expertise related to development of urban transportation plans and programs for the TMA. The TPC is an ongoing forum for policy development and adoption related to urban transportation planning, programming, and operation. Upon TPC approval, transportation plans and programs are forwarded to the INCOG Board of Directors for endorsement.

Economic and population projections provided a framework for predicting the transportation needs for 2045. Data were collected and analyzed for this purpose from the Census Bureau, Bureau of Economic Analysis, Oklahoma Employment Security Commission, and the Nationwide Personal Transportation Survey (Federal Highway Administration). Information is included for both the Tulsa TMA and the MSA.

View of the intersection of Peoria Avenue and E 35th St., in the Brookside Entertainment District in Tulsa



The Regional Transportation Plan

The purpose of the Regional Transportation Plan (RTP) is to anticipate the transportation needs for the TMA predicated on demographic and economic assumptions and forecasts for the entire region. It identifies various elements of the desired transportation system for the metropolitan community and the interrelationship of various modes of transportation. To ensure financial feasibility, the RTP summarizes implementation costs and presents practicable funding scenarios while addressing the resulting effects of the investments on the social and natural environments. The RTP will serve as a guide for the investment of local, state and federal resources, and will become a component of the Oklahoma Statewide Intermodal Transportation Plan. In addition, the RTP meets the requirements of federal law authorizing the adoption of a regional transportation plan for the metropolitan planning area for the expenditure of federal transportation resources in the future.

Federal regulations require that the RTP provides for a minimum planning horizon of 20 years, and the plan must be updated every five years. The most recent Regional Transportation Plan, adopted in December 2012, was prepared using 2005 base-year data, pending the outcome of 2010 Census. In the spirit of maintaining a continuous planning process, Connected 2045 was developed using the available 2015 Census data (American Community Survey - ACS).

In recent years, there were several significant developments that directly affected the regional transportation planning process. Those were:

- *Significant project funding through the American Recovery and Reinvestment Act (ARRA) and TIGER grant programs.*
- *Consideration of planning assumptions for land use adopted in July 2010 as part of PLANiTULSA, the Comprehensive Land Use Plan for the City of Tulsa, leaning towards more sustainable development.*
- *Recommended roadway configurations, increased density and public transit proposals, also originating from PLANiTULSA.*
- *Completion of the Regional Transit System Plan: Fast Forward project, endorsed by the INCOG Board of Directors in October 2011, aimed at studying various high-capacity transit corridors, and identifying feasible alternative transportation methods and funding sources.*
- *Completion of the GO Plan, Tulsa's regional bicycle and pedestrian master plan, endorsed by the INCOG Board of Directors in December 2015, aimed at providing resources, guidance and recommendations to improve safety, convenience, and connectivity through walking and cycling in the TMA.*

The timing of these developments, the adoption of PLANiTULSA in 2010, the completion of the Transit System Plan and Bicycle and Pedestrian Plan studies, the effects of ARRA and TIGER funded projects, and the availability of 2010 Census data, coupled with 2011-15 American Community Survey data, led to the development of the Connected 2045 RTP.

The Regional Transportation Plan, Connected 2045, will continue to ensure that a minimum 20-year planning horizon is intact and that transportation planning and project implementation proceeds smoothly. Along with addressing federal regulations for long range transportation planning, this update addresses the areas of Operational and Management Strategies, and Safety. The vision of Connected 2045 is to meet the needs of future TMA travelers focusing on improving roadways, transportation safety, bicycle-pedestrian mobility, and new technologies.

In addition, Connected 2045 includes specific performance measures to be tracked, and uses continuous measurement tools to aid in evaluating the investments made to the regional transportation system.

Population and Employment

The 2045 population and employment projection in the TMA show increases as a result of the growth scenario and the control totals available from Oklahoma Department of Commerce. The 2045 population projection of 1,079,652 represents an increase of nearly 26% from 2015. Likewise, the 2045 employment projection of 539,361 represents a 20% increase in employment totals from 2015, following actual trends.

Table 1. Population and Employment Projections within the TMA

	2015	2045	Change	Percent Change
Population	*804,759*	*1,079,652*	*+ 274,893*	*+ 25.5%*
Employment	*429,693*	*539,361*	*+ 109,668*	*+ 20.3%*

Source: Population data from Census; Employment data from InfoUSA.

The population's composition is also changing. The median age of residents at the MSA has risen from 35.1 in 2000 to 36.8 in 2015, according to current trends, the median age is expected to be 36.9 in 2045. The youth population (19 years of age and younger) of the MSA decreased from 28.3% in 2010 to 27.7% in 2015, as the older population (65 years of age and older) increased from 12.8% to 13.2% in the same period of time. Both groups will keep increasing at a slower pace. The percentage of older adults, as compared to other adult age groups, will increase and these changes will have significant effects on transportation needs.

Figure 1. Tulsa MSA Population and Projection - 1980 to 2045

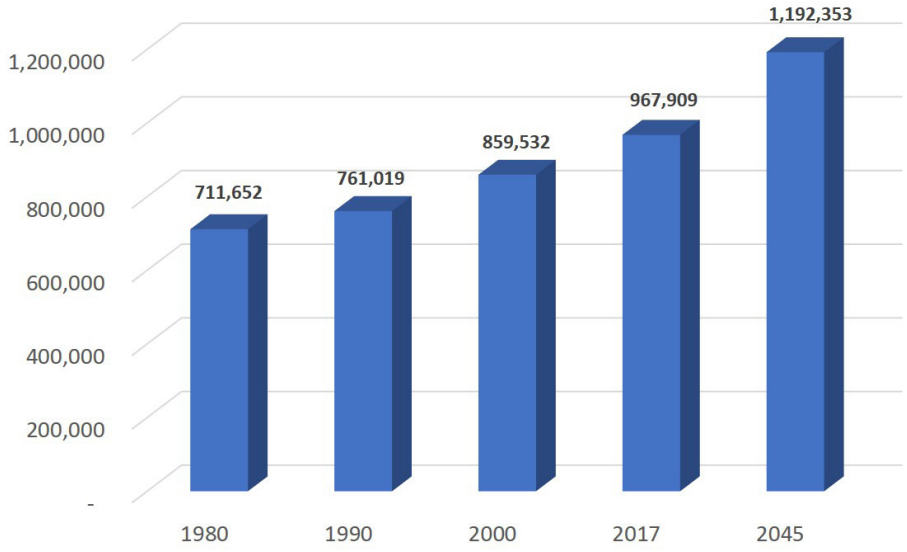
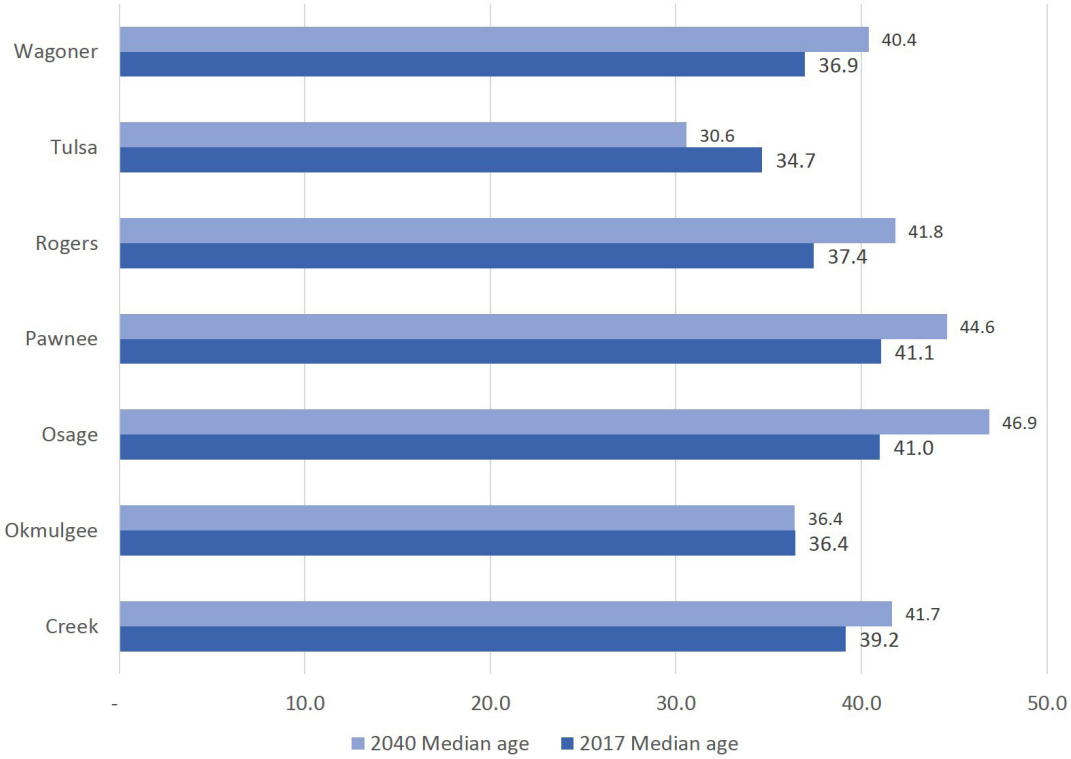
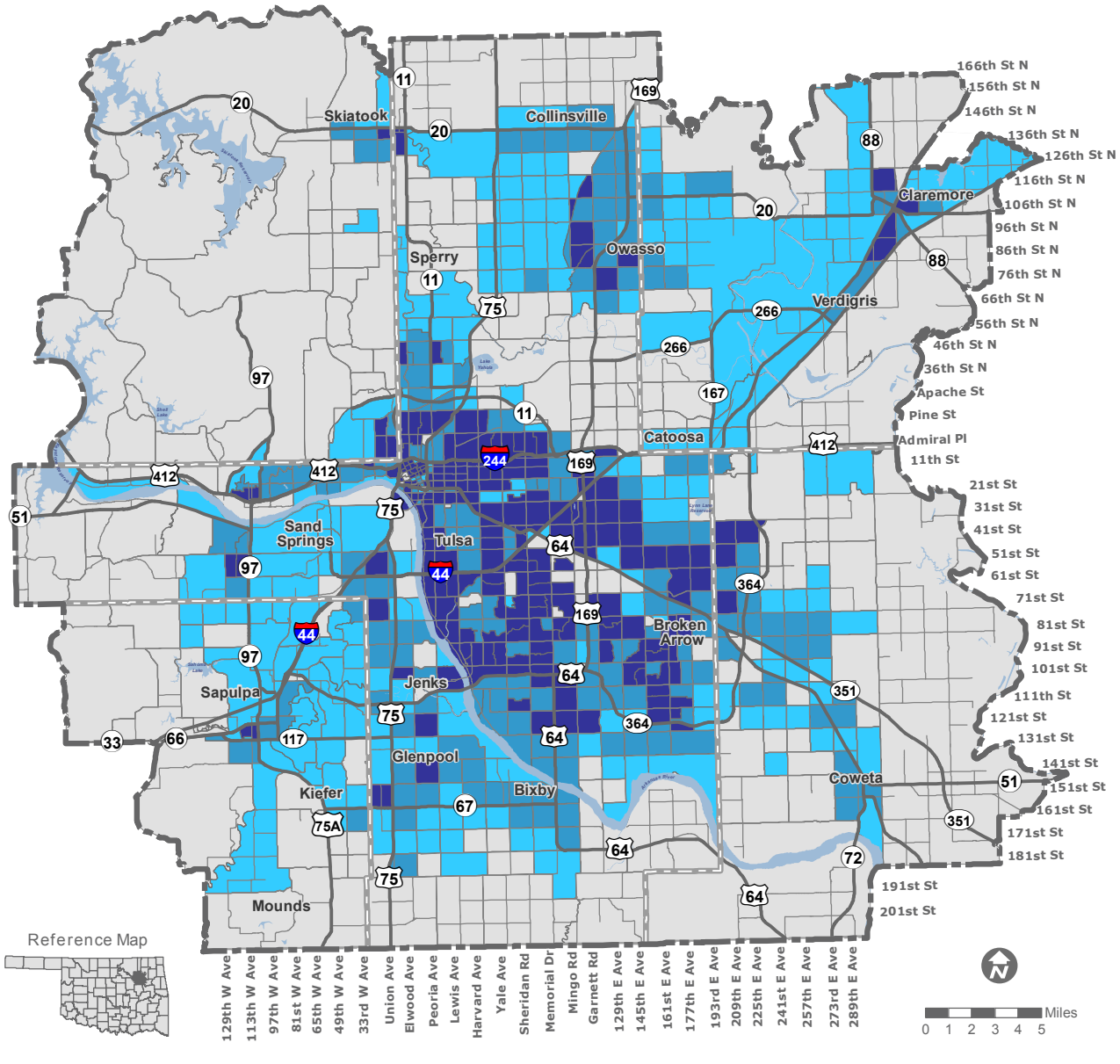


Figure 2. Resident Median Age by County - 2017 and 2040



Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year estimates; 2045 projections based upon trend line from 2017 to 2040 data provided by Woods & Pool 2008 State Profile.

Projected 2045 Population per Square Mile



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Legend

Population 2045

Persons per Square Mile

- 0.0 - 262.3 (Lowest 25%)
- 262.4 - 1,198.2
- 1,198.3 - 3,029.8
- Over 3,029.8 (Highest 25%)

Connected 2045 Regional Transportation Plan

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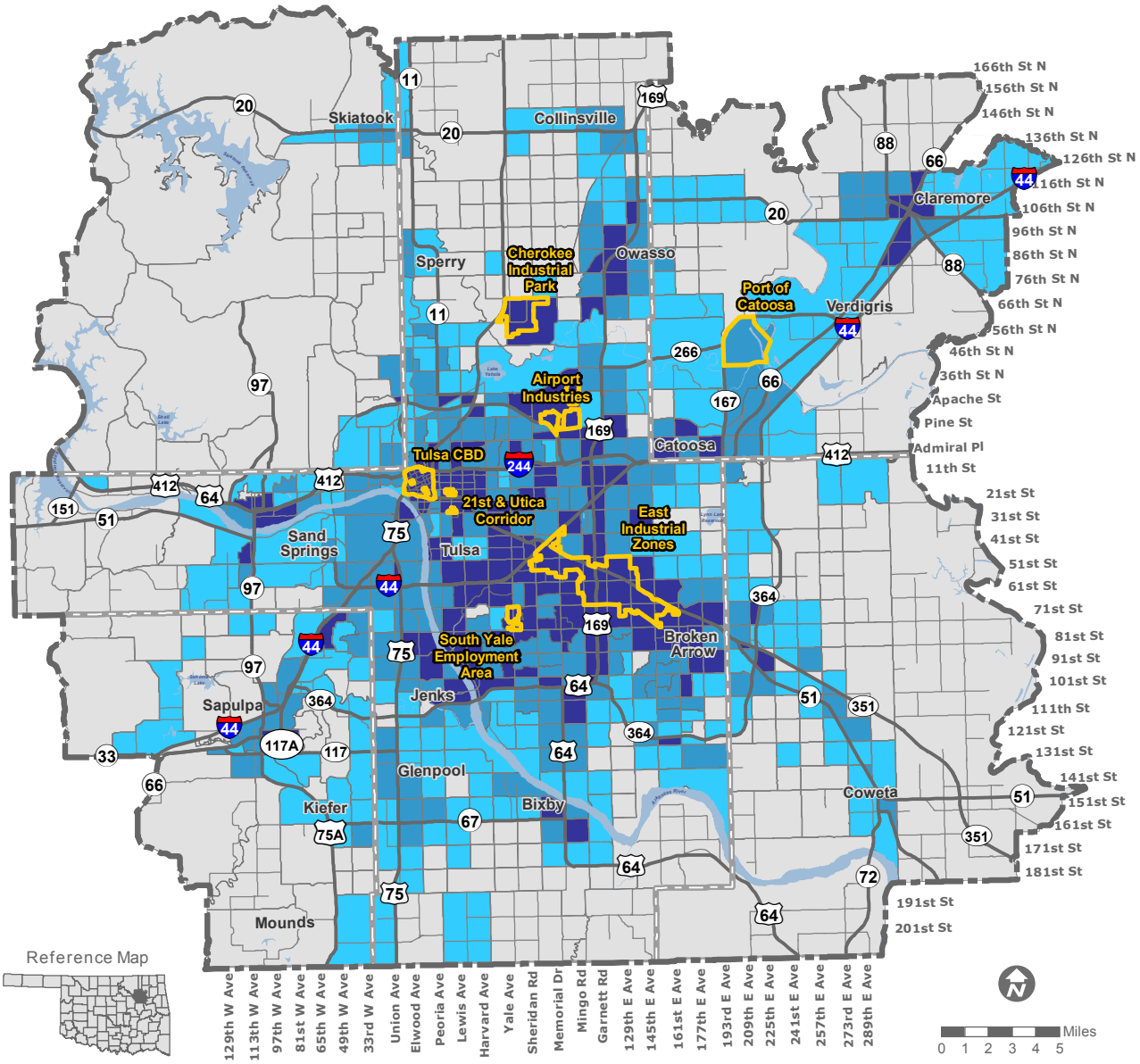
Projected 2045 Employment per Square Mile



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Employment 2045

Employees per Square Mile

- 0.0 - 35.4 (Lowest 25%)
- 35.5 - 329.2
- 329.3 - 1,377.8
- Greater than 1,377.8 (Highest 25%)

Major Employment Centers

Connected 2045 Regional Transportation Plan

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Figure 3. Elderly and Youth Residents in the Tulsa MSA

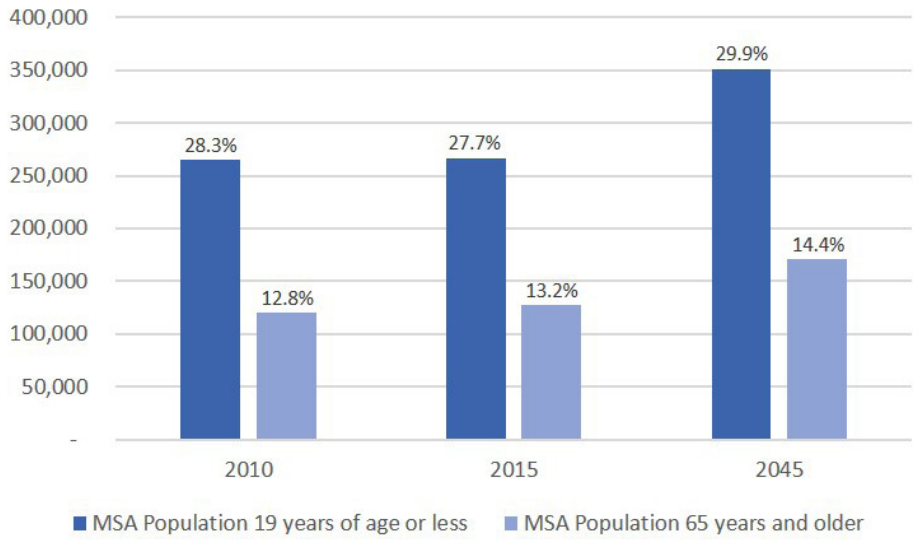
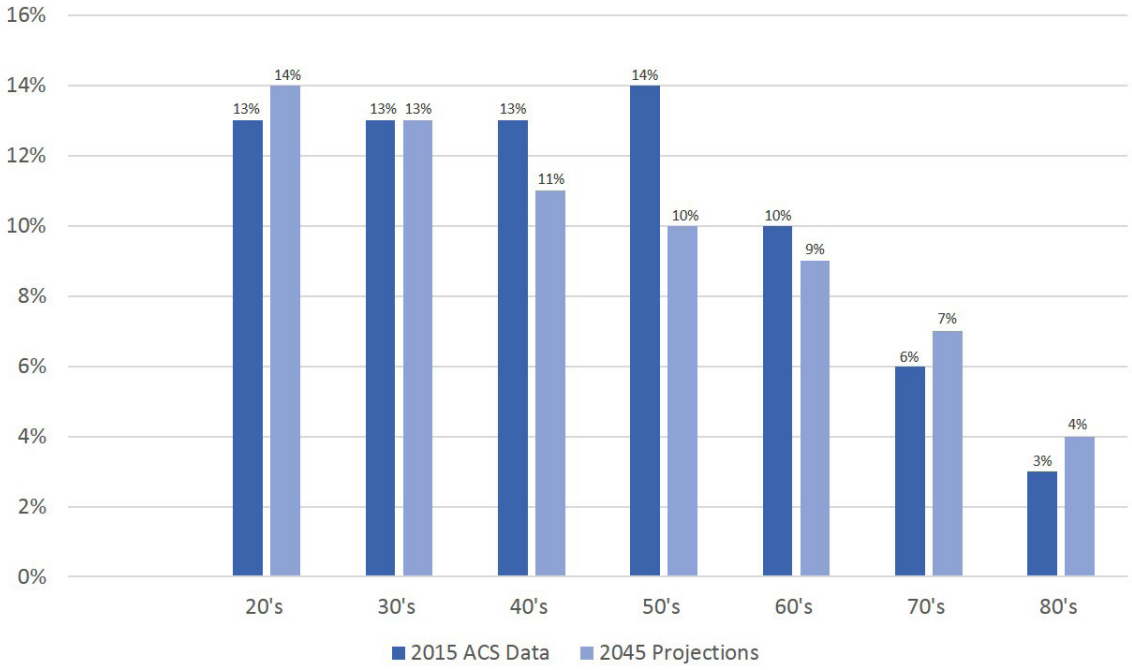


Figure 4. Percentage of MSA Population by Age Group - ACS 2015 and 2045 Projection



Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year estimates; 2045 projections based upon trend line from 2017 to 2040 data provided by Woods & Pool 2008 State Profile.

The decade from 2000 to 2010 was bracketed by two recessions which dramatically affected the local economy. A third recession took place in 2015, with the downturn of values in the oil and gas industries, leading to changes in employment and population. The region's employment growth has lagged behind the previous forecasts. With local employment at the current point in time virtually unchanged from fifteen years ago, job gains during periods of recovery were lost during the economic downturns. The strength of the local economy depended largely on the energy and healthcare industries and diverse investments that kept the Tulsa Metropolitan Area economy on the growth curve since 2008. The City of Tulsa population in 2015 is virtually unchanged from a decade ago.

According to InfoUSA, the health care and social assistance sector is projected to hold the largest share of 2045's total employment at 13.9%, followed by transportation and warehousing (12%) and manufacturing (11.8%). Higher growth rates in total employment within the TMA, from 2015 to 2045, will be experienced by sectors such as administrative, support and waste management and remediation services (from 3.9% to 6.9%), educational services (from 5.4% to 6.5%), and management of companies and enterprises (from 0.1% to 1.0%). Industries that will remain stagnant in terms of growth include agriculture, forestry, fishing and hunting (steady 0.1% from 2010 to 2015), mining (1.3%) and accommodation and food services (8.6%), while decreases will be experienced by finance and insurance (4.7% to 4.1%), real estate (2.7% to 2.0%), and construction (5.4% to 5.2%).

Employment growth in the metro area is anticipated to grow by 20% from 2015 to 2045, with increases primarily focused in employment centers: the 21st Street and Utica Avenue Corridor, the South Yale Avenue Corridor (from 61st to 71st Street South), the US-64/SH-51 (Broken Arrow Expressway) and US-169 Corridor, the Tulsa International Airport area, the Cherokee Industrial Park, and the Port of Catoosa.

Figure 5. TMA Employment Totals



Sources: Previous LRTP forecasts, leading to the actual 2045 forecast.



As for travel characteristics, Tulsa residents still rely primarily on personal automobiles for transportation. As of 2015, 93% of workers 16 years and over in the Tulsa TMA travel to their workplace by car, of which only 10% carpool, 0.6% use public transit, 1.3% walk, and 0.2% ride a bicycle as a means of transportation. It has been estimated that 399,170 motor vehicles are used in commuting by workers within the Tulsa TMA, and the median commute time is 21.3 minutes.

Other Considerations

- ***Alternative Modes.*** The roles of carpooling, vanpooling, transit, bicycling, walking, and telecommuting in the overall transportation system have taken on greater importance. These modes become more attractive when environmental impacts and cost-effectiveness are evaluated. Major obstacles exist, however, in the expansion of these modes. Key challenges to expansion include retrofitting residential and commercial development to provide convenient access to bicycle and pedestrian networks and transit services. The benefits and challenges of these modes are discussed in subsequent chapters.

- ***Land Use and Development.*** How available land is used or developed has predictable effect on transportation facilities and systems, and vice versa. Commercial developments typically have been designed to accommodate automobiles, with limited consideration for public transit, bicycles, and pedestrians. Close coordination of land-use planning and transportation planning is increasingly important.

- ***Congestion.*** Traffic congestion is relative depending on user experience and orientation, and acceptable levels must be defined locally. The region must then decide how best to address congestion from both demand reduction (carpooling, alternative mode usage) and supply provision (new and expanded roadways) approaches.

- ***Resource Utilization.*** Resource management will affect how the transportation vision for 2045 will be realized. Systems must be efficient, therefore planners, engineers, and policymakers must be innovative and flexible to maximize resources and community benefits. Priority uses and preferred facility funding streams must be identified.



Vision

The paramount purpose of the transportation system is to enhance and sustain the quality of life and economic vitality of the region. This will be accomplished by developing, maintaining, and managing a transportation system that meets the accessibility needs of people and goods in the region through safe, environmentally prudent, and financially sound means.



Connected 2045 Vision and Goals

During the public participation process described in a later chapter, each city defined the course INCOG should take in terms of strategic goals for the regional transportation system, followed by data research and a thorough analysis. The main components for the Connected 2045 Regional Transportation Plan include:

- *Evaluation of all major transportation modes and connections among modes: bike, pedestrian, transit, automobile, freight, rail, air, and water transport.*
- *Population and employment forecasts to identify future improvements or needs.*
- *Review of existing and proposed transportation system.*
- *Asset/system preservation.*
- *Energy and environmental considerations.*
- *Prioritized list of short and long range transportation needs.*
- *Funding alternatives to implement the plan.*

Steps for developing the Regional Transportation Plan

1. ***Establish policy goals and objectives***
2. ***Analyze transportation system conditions***
3. ***Perform needs analysis***
4. ***Set priorities***
5. ***Establish a funding plan***

In addition, the Federal Planning Factors considered when developing Connected 2045 include:

- *Support economic vitality.*
- *Address safety of the transportation system and the users.*
- *Ensure security for all motorized and non-motorized users.*
- *Increase accessibility and mobility of people and freight.*
- *Protect and enhance the environment, and promote energy conservation, and improve quality of life.*
- *Enhance the integration and connectivity of the system, across and between modes.*
- *Promote efficient system management and operation.*
- *Emphasize preservation of the existing system.*
- *Improve resiliency and reliability of the system.*
- *Enhance travel and tourism.*

Table 2. Connected 2045 Plan Goals

Goal Area	Goal
Safety	*Achieve a significant reduction in traffic fatalities and serious injuries on all public roads for all users (motorized and non-motorized).*
Infrastructure Condition	*Maintain all public road and transit-related infrastructure in a state of good repair.*
Congestion	*Mitigate congestion at specific identified locations and/or segments.*
Freight Movement and Economic Vitality	*Improve National Freight Network (NFN) within the region and the last mile to increase access to other markets.*
Environmental Viability and Resilience	*Protect and enhance natural environment to complement the built environment, and mitigate any effects.*
Reduced Project Delivery Delays	*Reduce project costs by eliminating delays in development and delivery of public projects.*



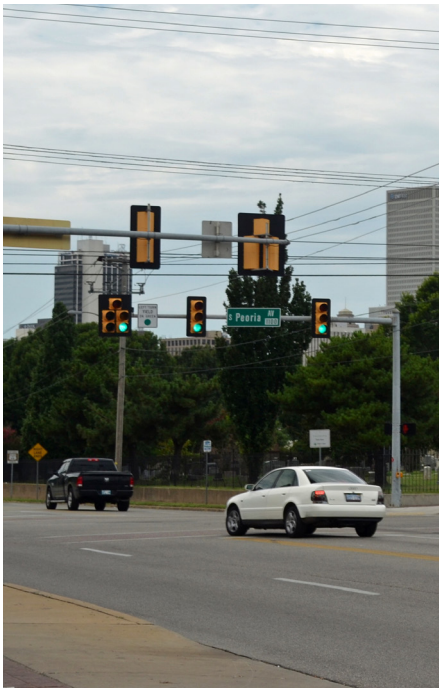
View of the Arkansas River from the River Parks East Bank Trail.

ROADWAYS





Roadways in the Tulsa TMA are comprised primarily of expressways and arterials.



Area Roadways

The TMA roadway system is primarily composed of expressways and arterial streets on a roughly 1-mile grid system. The roadway system is well-served by Interstate highways (I-244 and I-44) and National Highway System (NHS) routes (US-75, US-169, US-64, US-412, SH-51 and SH-266), as well as numerous other state and local highways in the region. The existing-plus-committed roadway system comprises approximately 746 lane-miles of expressways, 314 lane-miles of turnpikes, 4,849 lane-miles of arterials and other regionally-significant streets, and thousands of miles of local streets. Major expressway traffic counts in general keep pace with national traffic trends.

Regional Transportation Computer Model

Geographic Information Systems (GIS) was used extensively in allocating current and future population and employment for the TMA at the zonal level. For the base year (2015), GIS was used to translate population data from Census Block Groups to the zonal level, as well as to geocode existing employment data to the

zones. For the year 2045, population projections were developed for each of the counties, or portion of counties, within the TMA. These projections were in line with the Oklahoma Department of Commerce projections for 2045, which were used as control totals. Employment projections were also developed for each of the counties within the TMA. Both projections were allocated to the zonal level, using GIS based attributes on the attractiveness of available land. Attractiveness is a function of the proximity to infrastructure, current development, and opportunities for growth based on access, land use, and services. Land within floodplains and other undevelopable areas was excluded.

These land use, population, and employment projections were then used to develop a transportation forecasting travel demand model. INCOG maintains a four-step travel demand model for the Tulsa TMA. Travel demand models forecast the traffic volumes based on the interaction of origins and destinations. INCOG's four-step, travel demand model involves following components: 1) trip generation, 2) trip distribution, 3) mode split or mode choice, and 4) trip assignment. The trip-generation components provide tables related to the person trips produced and attracted in each zone. It also considers different purposes of the person trips, such as work, school, shopping, and other trips. Trip distribution connects the origins and destinations based on the attractiveness of each zone. The mode-split component splits the trips based on the mode of choice such as, auto, transit, bicycle, or walking. The basis of mode split is determined with the help of National Household Travel Survey (NHTS) data for the Tulsa TMA. The trip-assignment component determines which route each trip will take while going from zone to zone. This involves assigning the traffic-volume forecast to the road network. This model is then calibrated based on current flows and traffic counts.

Many of our streets are built primarily to move vehicles as quickly as possible, with little consideration of pedestrians and bicyclists. View of Admiral Place, looking west from Memorial Drive.



Table 3. Roadway System Characteristics and Performances

	2015	2045	Difference	Percentage Change
Lane Miles				
Expressway	*746*	*881*	*+ 135*	*+ 18.1%*
Turnpike	*314*	*371*	*+ 57*	*+ 18.2%*
Arterials & Parkways	*4,849*	*5,437*	*+ 588*	*+ 12.1%*
Total Lane Miles	*5,909*	*6,690*	*+ 781*	*+ 13.2%*
Travel				
Vehicle Miles/Day	*36,374,500*	*47,705,000*	*+ 11,330,500*	*+ 31.1%*
Vehicle Hours/Day	*632,900*	*842,800*	*+ 209,900*	*+ 33.1%*
Average Speed (mph)	*35*	*38*	*+ 3*	*+ 8.6%*

Source: ODOT Traffic Counts (2015 traffic is weekday traffic count unadjusted for seasonal or other factors) and INCOG (2045 traffic is an average weekday forecast volume of traffic).

Table 4. Tulsa Area Expressways: 2015 Traffic and 2045 Forecast

Expressway Segment	2015 Traffic	2045 Forecast Traffic	Percentage Change
US-64/SH-51/Broken Arrow Exp. (31st St. to Yale Ave.)	*86,300*	*129,000*	*+ 49.5%*
US-64/SH-51/Broken Arrow Exp. (I-44 to US-169)	*102,600*	*152,000*	*+ 48.1%*
US-169 (I-44 to US-64/SH-51/Broken Arrow Exp.)	*106,379*	*154,000*	*+ 44.8%*
US-169 (US-64/SH-51/Broken Arrow Exp. to 81st St.)	*123,200*	*126,000*	*+ 2.3%*
I-244 (Yale Ave. to Sheridan Rd.)	*66,100*	*127,000*	*+ 92.1%*
I-44 (Yale Ave. to Sheridan Rd.)	*93,100*	*128,000*	*+ 37.5%*
I-44 (145th E Ave. to 161st E Ave.)	*73,200*	*139,000*	*+ 89.9%*
US-412/US-64 (33rd W Ave. to Downtown Tulsa)	*55,400*	*94,000*	*+ 69.7%*
US-75 (I-44 to 61st St. S.)	*55,600*	*106,000*	*+ 90.6%*
US-75 (36th St. N. to 56th St. N.)	*43,500*	*102,000*	*+ 134.5%*

Source: ODOT Traffic Counts (2015 traffic is weekday traffic count unadjusted for a seasonal or other factors) and INCOG (2045 traffic is an average weekday forecast volume of traffic).

Roadways and private automobiles continue to dominate travel in Tulsa TMA. Ensuring safety and mobility has been a cornerstone for the region.

Table 5. Federal Requirements for Metropolitan Transportation Plans

- *Plans must be for a period not less than 20 years into the future.*
- *Plans must reflect the most recent assumptions for population, travel, land use, congestion, employment and economic activity.*
- *Plans must be financially constrained, and revenue assumptions must be reasonable in that funds can be expected to be available during the time frame of the plan.*
- *Plans must conform to the Clean Air Act and its amendments, and to applicable State Implementation Plans for regional air quality.*
- *Plans must be developed through an open and inclusive process that ensures public input and seeks out and considers the needs of those traditionally underserved by existing transportation systems.*

Table 6. Ten Roadway Planning Factors

- *Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency.*
- *Increase the safety of the transportation system for motorized and non-motorized users.*
- *Increase the accessibility and mobility of people and for freight.*
- *Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns.*
- *Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.*
- *Promote efficient system management and operation.*
- *Emphasize the preservation of the existing transportation system.*
- *Improve the resiliency and reliability of the transportation system.*
- *Reduce or mitigate stormwater impacts of surface transportation; and enhance travel and tourism.*

The 2045 Roadways Plan identifies the following goals with regard to the mentioned planning factors as well as federal requirements:

Table 7. The 2045 Roadways Plan Goals

- *Partner with all state and local agencies, trusts and tribal entities in the region to achieve set goals and objectives to ensure safe and economic transportation for all people and goods. Support Oklahoma Department of Transportation (ODOT) and other state and local agencies under mutual agreements and partnership.*
- *Actively work with the Port of Catoosa, Tulsa International Airport Authority, Metropolitan Tulsa Transit Authority and public and private freight entities to advance regional connectivity, and economic competiveness.*
- *Support regional planning and process to advance the region's transportation goals, working with federal, state and local government partners, and community based organizations.*
- *Advance the Regional Intelligent Transportation System (ITS) deployment through annual work program and planning support.*

View of the Intersection of Utica Avenue and 11th Street (Route 66) in Tulsa, where the Hillcrest Medical Center is located.



The 2045 Roadways Plan identifies following strategies and actions to implement goals identified in the Plan:

Table 8. The 2045 Roadways Plan Actions

Strategy	Actions
Roadway Maintenance	• *Maintain sufficiency rating of "Adequate" or higher per ODOT standards on all NHS routes in the region.* • *Monitor and increase funding to adequately maintain area roadways that are deemed regionally significant per the Long Range Transportation Plan.* • *Maintain pavement condition index on local roadways and seek funding solutions to enhance roadway maintenance.*
Freight Network	• *Maintain sufficiency rating of "Adequate" or higher per ODOT standards on all NHS routes.* • *Improve access to freight terminals through intermodal connectors and freight network that sufficiently advances regional and statewide goals to all modes of transportation.* • *Assess and advance intermodal transportation activity based on economic development needs and goals.*
Bridges	• *Reduce or eliminate structurally deficient bridges on state, county and local roadways in the Tulsa TMA.* • *Improve access across the region with additional river crossings.* • *Pursue safer railroad crossings via grade separation where possible and feasible.* • *Pursue funding for interchanges via flyovers over the key movements at regional bottlenecks across the freeway system.*
Intelligent Transportation Systems (ITS)	• *Advance ITS and related activities to provide sufficient information to motorists and agencies to provide congestion relief.* • *Implement systems based on regional architecture to provide implementing agencies sufficient tools to advance the usage of ITS with respect to travel monitoring.* • *Provide real-time data access to the motoring public.*
Safety and Security	• *Explore and implement adequate level of traffic incident management for the region involving various stakeholders.* • *Ensure adequate safety in the region related to vehicular traffic.* • *Implement plans to improve safety with respect to multimodal traffic where needed.*
Financial Feasibility and Coordination	• *Coordinate all implementation activities to ensure timely completion of committed projects with all implementing agencies.* • *Ensure a financially viable plan of action related to each project and across the transportation system, to maintain the system that is built during its life cycle.*

Table 9. RTP Recommended Roadway Capacity Improvements

Expressways	Segment	Proposed Lanes
I-44 (East)	*I-44/I-244 Junction to SH-66*	*8 Lanes*
I-44 (East)	*SH-66 to Creek Turnpike*	*6 Lanes*
I-44/Will Rogers Turnpike	*US-412 to SH-20 in Claremore*	*6 Lanes*
I-44 (West)	*I-244 to US-75*	*6 Lanes*
US-169	*I-244 to 71st St. South*	*8 Lanes*
US-169	*61st St. North to SH-20 (116th St. North)*	*6 Lanes*
US-75	*I-244 to SH-67 (151st St. South)*	*6 Lanes*
US-75	*SH-11 (Gilcrease Exp.) to 86th St. North*	*6 Lanes*
Gilcrease Expressway	*I-44 to Edison Ave.*	*4 Lanes*

Expressway Interchange Reconstruction
I-44 and US-64/SH-51 (Broken Arrow Exp.)
I-44 and US-169
I-44 and SH-66 (East)
I-44 and US-75
I-244 and US-412/US-64 at the Northwest corner of the Inner Dispersal Loop
US-169 and US-64/SH-51 (Broken Arrow Exp.)

Grade-Separated Interchange Improvements
US-75 and 141st St. South
Blue Starr Road and SH-66/BNSF Railroad
SH-20 Bypass and Will Rogers Turnpike
Muskogee Turnpike (SH-351) and 273rd E. Ave.

Table 10. 2045 Roadways Element: Proposed Capacity Improvements

Roadway	Segment	Planned Through Lanes
SH-20	*225th E Ave I-44/Will Rogers Turnpike*	*4 Lanes*
SH-20	*SH-66 to SH-88*	*4 Lanes*
SH-20	*US-75 to 129th E Ave*	*4 Lanes*
SH-72	*SH-51 to 161st St. South*	*4 Lanes*
SH-88	*Blue Starr Rd./116th St. North to SH-20*	*4 Lanes*
SH-97	*Existing SH-97 to SH-20*	*2 Lanes*
SH-97	*2nd St. to 12th St.*	*4 Lanes*
SH-97/Wilson Rd.	*2nd St. to Morrow Rd.*	*6 Lanes*
SH-167/193 East Ave.	*I-44/US-412 to SH-266*	*4 Lanes*
SH-266	*US-169 to SH-167/193rd East Ave.*	*4 Lanes*
SH-266	*SH-167 to I-44/Will Rogers Turnpike*	*4 Lanes*
11th St. South	*129th East Ave. to 145th East Ave.*	*4 Lanes*
25th West Ave.	*Edison Rd. to Pine St.*	*4 Lanes*
33rd West Ave.	*61st St. South to 71st St. South*	*4 Lanes*
33rd West Ave.	*41st St. South to I-44*	*4 Lanes*
41st St. South	*129th E Ave to 177th East Ave.*	*4 Lanes*
41st St. South	*33rd West Ave. to 57th West Ave.*	*4 Lanes*
41st St. South	*Yale Ave. to Sheridan Rd.*	*6 Lanes*
41st West Ave.	*Apache St. to Newton Rd.*	*2 Lanes*
43rd St. North	*N 41st W Ave. to SH-97*	*2 Lanes*
49th/41st West Ave.	*Edison Rd. to Newton Rd.*	*4 Lanes*
51st St. South	*129th East Ave to 193rd East Ave.*	*4 Lanes*
51st St. South	*129th W Ave to SH-97*	*4 Lanes*
61st St. South	*Peoria to Lewis Ave.*	*4 Lanes*
61st St. South	*145th East Ave. to 209th East Ave.*	*4 Lanes*
61st St. South	*US-75 to 49th West Ave.*	*4 Lanes*
66th St. North	*145th E Ave to 161st E Ave.*	*4 Lanes*
71st St. South	*225th East Ave. to 273rd East Ave.*	*4 Lanes*
71st St. South	*33rd West Ave. to US-75*	*4 Lanes*
71st St. South	*US-75 to Arkansas River*	*6 Lanes*
76th St. North	*US-169 to 129th East Ave.*	*4 Lanes*
81st St. South	*Harvard to Sheridan Ave.*	*4 Lanes*
81st St. South	*Garnett to SH-51*	*4 Lanes*

Table 10. 2045 Roadways Element: Proposed Capacity Improvements (Continued)

Roadway	Segment	Planned Through Lanes
81st St. South	*SH-97 to SH-66*	*4 Lanes*
86th St. North	*US-75 to 145th E Ave*	*4 Lanes*
86th/91st St. South/Canyon Rd.	*49th West Ave. to SH-66*	*4 Lanes*
91st St. South	*Delaware Ave. to Memorial Dr.*	*4 Lanes*
91st St. South	*Garnett to 193rd E Ave.*	*4 Lanes*
91st St. South	*Elwood Ave. to Peoria Ave./Elm St.*	*4 Lanes*
96th St. North	*US-169 to 145th East Ave.*	*4 Lanes*
96th St. North	*Memorial Dr. to Garnett Rd.*	*4 Lanes*
96th St. North	*US-75 to Peoria Ave.*	*4 Lanes*
101st St. South	*Riverside Drive to SH-51*	*4 Lanes*
103rd/106th St. North	*Osage Dr. to Cincinnati Ave.*	*2 Lanes*
106th St. North	*Garnett Road to 145th East Ave.*	*4 Lanes*
116th St. North	*US-75 to US-169*	*4 Lanes*
121st St. South	*Memorial Drive to 129th E Ave.*	*4 Lanes*
121st St. South	*161st E Ave to 129th E Ave.*	*4 Lanes*
129th West Ave.	*41st St. South to 51st St. South*	*4 Lanes*
131st St. South	*Peoria Ave./Elm St. to Yale Pl.*	*4 Lanes*
131st St. South	*Yale Pl. (Sandusky Ave.) to Sheridan Rd.*	*4 Lanes*
141st St. South	*193rd East Ave. to SH-51*	*4 Lanes*
141st St. South	*Elwood Ave. to Peoria Ave./Elm St.*	*4 Lanes*
129th East Ave.	*96th Street N to 106th Street N.*	*4 Lanes*
129th East Ave.	*51 Street S. to 71st Street S.*	*4 Lanes*
145th East Ave.	*I-44 to 41st St. South*	*4 Lanes*
145th East Ave.	*71st St. South to 101st St. South*	*4 Lanes*
145th East Ave.	*111th St. South to 135th St. South*	*4 Lanes*
145th East Ave.	*106th St. North to 116th St. North*	*4 Lanes*
145th East Ave.	*41st St. South to 71st St. South*	*6 Lanes*
161st East Ave.	*66th St North to 76th St North*	*4 Lanes*
161st East Ave.	*Admiral Pl. to Tiger Switch Rd.*	*4 Lanes*
177th East Ave.	*71st St. South to 91st St. South*	*4 Lanes*
193rd East Ave.	*I-44 to 121st St. South*	*4 Lanes*
Apache St.	*Osage Expressway to N. 41 W Ave.*	*4 Lanes*

Table 10. 2045 Roadways Element: Proposed Capacity Improvements (Continued)

Roadway	Segment	Planned Through Lanes
Edison Rd.	*Gilcrease Museum Road to Gilcrease Expressway*	*4 Lanes*
241st East Ave.	*101st St. South to 141st St. South*	*4 Lanes*
Adams Rd.	*10th St. South to 12th St. South*	*4 Lanes*
Admiral Pl.	*Garnett Rd. to 129th East Ave.*	*4 Lanes*
Admiral Pl.	*145th East Ave. to Creek Turnpike*	*4 Lanes*
Delaware Ave.	*81st St. South to 91st St. South*	*4 Lanes*
Elwood Ave.	*SH-67/151st St. South to 141st St. South & 71st St. South to 141st St. South*	*4 Lanes*
N. 41st / 52nd W Ave.	*Apache St. to SH-20*	*4 Lanes*
Garnett Rd.	*11th St. South to Pine St.*	*4 Lanes*
Garnett Rd.	*81st St. South to 111th St. South*	*4 Lanes*
Lewis Ave.	*81st St. South to 91st St. South*	*4 Lanes*
Memorial Dr.	*161st St. South to Mingo Rd.*	*4 Lanes*
Memorial Dr.	*I-44 to Creek Turnpike*	*6 Lanes*
Memorial Dr.	*111th St S. to 151st Street S.*	*6 Lanes*
Mingo Rd.	*21st St. South to 41st St. South*	*4 Lanes*
Mingo Rd.	*71st St. South to 121st St. South*	*4 Lanes*
Peoria Ave./Elm St.	*91st St. S to 96th St S & 111 th to151st St. S*	*4 Lanes*
Pine St.	*Mingo Road to SH-66*	*4 Lanes*
Port Rd. Extension	*SH-11 to Sheridan Rd.*	*4 Lanes*
Riverside Dr.	*101st St. South to 121st St. South*	*4 Lanes*
Riverside Dr.	*I-44 to 101st St. South*	*6 Lanes*
Riverside Dr. (Scenic Parkway)	*Houston Ave. to 21st St. & 41st St. to I-44*	*4 Lanes*
Sheridan Rd.	*Apache St. to 36th St. North*	*4 Lanes*
Union Ave.	*51st St. South to 91st St. South*	*4 Lanes*
Wekiwa Rd.	*SH-97 to 129th East Ave.*	*4 Lanes*
Yale Ave.	*101st St. South to 121st St. South*	*4 Lanes*
Yale Ave.	*Pine St. to Apache St.*	*4 Lanes*
Yale Ave.	*US-64/SH-51 (Broken Arrow Exp.) to I-44*	*6 Lanes*
Yale Ave.	*61st St. South to 81st St. South*	*6 Lanes*
Yale Ave.	*101st St. South to 111th St. South*	*6 Lanes*
Yale Ave. / Yale Pl.	*121st - 151st St. South (include River Bridge) - Option #1*	*4 Lanes*
131st St.	*River Crossing - Option #2*	*4 Lanes*

Congestion Management Process

The Tulsa Congestion Management Process (CMP) provides methodology to identify and monitor congestion as inputs into the Regional Transportation Plan (RTP) and the Transportation Improvement Program funding.

A CMP further provides analytical, systematic methods to monitor and evaluate system performance while attempting to deal with congestion in a holistic manner. Options related to land use, travel demand management, traffic or transit operations, as well as new capacity, are all considered and evaluated as a part of the process.

The Tulsa CMP identifies the regional transportation network as defined by the RTP as the basis of the geographic extent for addressing congestion. Congestion is identified in two categories:

Recurring Congestion: Congestion experienced by the user on any travel mode.

Non-Recurring: Congestion or delay due to crashes, construction and other unforeseen events.

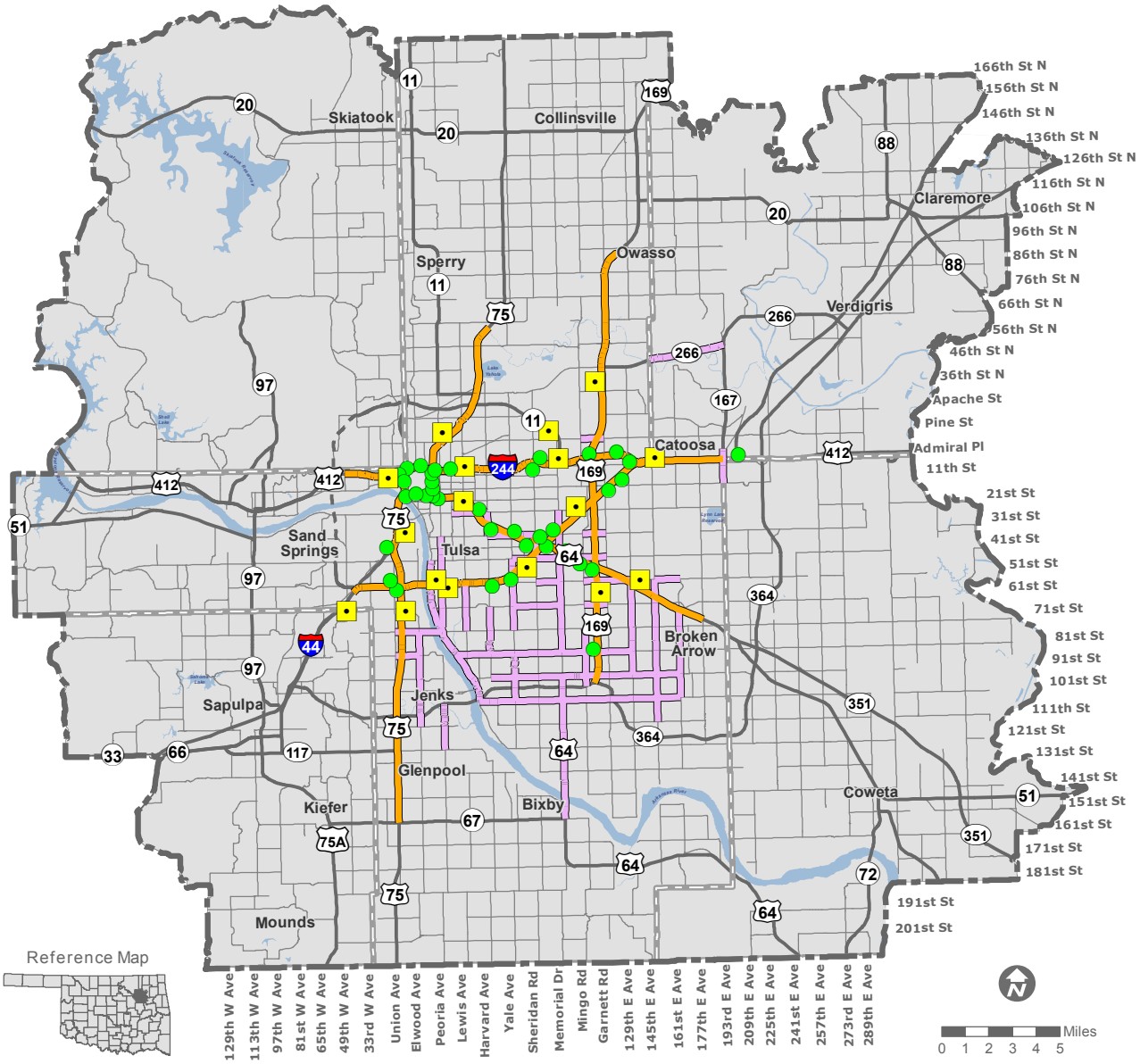
Each is addressed with a different set of strategies. Specifically, roadways not meeting a defined set of levels of performance as below are considered congested.

- *Average Daily Traffic (ADT) count or peak hour count for Roadways (measuring level of service), and*
- *Intersection traffic count (measuring travel delay).*

Various Transportation Control Measures (TCM) grouped under Transportation Demand Management (TDM) options and Transportation System Management (TSM) options are identified specifically for implementation with specific schedules and responsibilities. Monitoring implementation of strategies on a recurring basis is required.

Non-recurring congestion is considered the most predominant cause of congestion for Tulsa TMA. The 2045 Plan identifies safety and traffic management as priorities to alleviate non-recurring congestion. The CMP document adopted by INCOG in 2009 will be updated with changes in traffic, safety studies, and infrastructure changes.

Existing Congestion Management within the Transportation Management Area



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Legend

- Existing and Planned Video
- Existing and Planned Video and Dynamic Message Signs

2015 Base Year Model Congestion

- Congested Highways (Travel Speed at Peak < 50 mph)
- Congested Arterials (Travel Speed at Peak < 25 mph)

Connected 2045 Regional Transportation Plan

INCOG

The Congestion Management Process Framework

Tulsa TMA adapted the framework suggested by the Federal Highway Administration (FHWA) guidance, and involved several stakeholders to further develop the guidelines based on local standards. The process of addressing congestion was developed through identification of the region and objectives, as well as system definition.

The following table summarizes the short-listed strategies along with the linkages to the TIP and RTP for Tulsa TMA.

Table 11. TIP and RTP Strategies for Tulsa TMA

Implementation Strategy	Implementation Term	Effectiveness	Funding Through TIP	Regional Plan Activity
Promote trip sharing	*1-5 Years*	*Very Effective*	*Yes*	*Yes*
Enable telecommuting	*1-5 Years*	*Effective*	*Yes*	*Yes*
Promote alternative work hours	*1-5 Years*	*Very Effective*	*No*	*Yes*
Enhanced public transit	*5-10 Years*	*Very Effective*	*Yes*	*Yes*
Non-motorized transportation improvements	*1-10 Years*	*Effective*	*Yes*	*Yes*
Intersection lane improvements	*5-10 Years*	*Very Effective*	*Yes*	*Yes*
Traffic signal improvements	*1-10 Years*	*Very Effective*	*Yes*	*Yes*
Incident detection and management	*1-10 Years*	*Very Effective*	*Yes*	*Yes*
Land use strategies	*1-10 Years*	*Effective*	*No*	*Yes*
Access management	*1-10 Years*	*Effective*	*No*	*Yes*
Roadway improvement strategies	*1-10 Years*	*Effective*	*Yes*	*Yes*
Parking management	*1-5 Years*	*Effective*	*No*	*Yes*

ACTIVE TRANSPORTATION



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.

Introduction

INCOG, as the regional transportation planning organization, provides a vision for transportation, administers funding programs, and provides member jurisdictions with resources to plan and implement projects at the local level. Integrated, multi-modal transportation that provides safer active transportation choices for residents is a priority for the region.

Active transportation alternatives are crucial to ensure more inclusive and accessible urban environments.







Building a connected network of bicycle and walking facilities will help the Tulsa region. A connected network can increase mode share by making more routes comfortable and accessible, enabling residents to walk or ride more often. Network may improve safety through separation from automobile traffic in high-volume, high-speed locations, and by encouraging higher use and visibility of bicyclists and pedestrians. It will link neighborhoods to destinations, and position communities in the region to be recognized by national organizations, such as the Bicycle Friendly Community designation from the League of American Bicyclists. INCOG is helping its member jurisdictions build this network through the implementation of the GO Plan, the MPO-approved regional pedestrian and bicycle plan.

GO PLAN
Tulsa Regional Bicycle & Pedestrian Master Plan
A PLAN FOR PEOPLE POWERED MOVEMENT

The GO Plan seeks to create a bicycle network that connects major destinations in the region, including significant employment centers, downtown business districts, schools and universities, and the existing trails system. 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. The implementation of the facility recommendations will be an important start to improving pedestrian and bicycling conditions. The routine application of the Plan's design guidelines for each mode will have an even greater effect over the long term. The GO plan is proposed to be a blueprint to develop future active transportation mode choices.

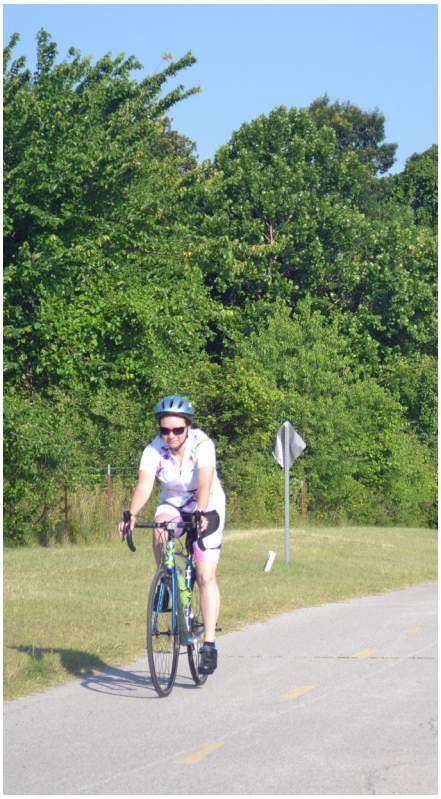
American Community Survey (ACS) data show that the City of Tulsa has the highest bicycle commute mode share in the region, at 0.3 percent.



Existing Conditions

Use of bicycles for commuting is low in the Tulsa region 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. 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 commuters are women. Commute mode share is at this level given that most residents travel five miles or more to their jobs.

The Creek Turnpike Trail is one of Tulsa's main bicycle pedestrian networks.



Employment centers are clustered throughout the region in many locations that do not have nearby residential land use. The predominantly suburban 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, the existing trails system, and transit lines. Additionally, the City of Tulsa has updated its zoning code to allow and encourage more mixed-use development.

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 recreation, and are an attractive amenity for residents, visitors, prospective residents, and businesses. On-street bicycle facilities are limited but growing. 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 Manual on Uniform Traffic Control Devices (MUTCD) standards. Many of the signed bike routes in Tulsa are on comfortable, low-volume local/collector streets and have been adopted into the network for the GO Plan.

Needs Assessment

Transportation planning in Tulsa has typically focused on vehicular usage of streets and highways as the traditional means for transportation. Bicycling and walking facilities have generally been considered recreational amenities and have not yet realized their potential as transportation modes. In recent years, air quality issues, public advocacy, and increased traffic congestion have led to the integration of bicycle and pedestrian planning into the overall transportation planning process. The result is an emerging focus on a more balanced transportation system among all modes of travel. In the Tulsa TMA, bicycle and walking facilities can complement motorized transportation and provide useful travel choices for many users, particularly for short trips, throughout the year.

Stakeholder Priorities

The bicycle and pedestrian planning process has included public involvement through stakeholder meetings. An inventory of local comprehensive plans, policies, requirements, and the identification and assessment of existing facilities was also conducted. Key recommendations originated from the public outreach effort and they are listed in order of priority on the table below.

Table 12. Stakeholder Priorities in Order

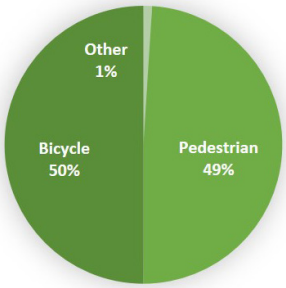
Stakeholder Priorities	Actions Needed
1. Safety	*Improving safety for citizens should be done by addressing the relationship between wider lane widths and safety hazards, educating law enforcement in each community on cyclist and pedestrian laws, and implementing policies like "Vision Zero" in communities that get policymakers involved.*
2. Connectivity	*Connect people and places by working with MTTA and Tulsa Bike Share to create "last mile" connections, as well as multi-modal options; update and implement well-designed crosswalks near schools, intersections, and destinations with high-pedestrian counts; and improve sidewalks by clearing the paths of excess signage, and poles.*
3. Livability	*Create livable areas by increasing land use diversity and density, make the right-of-way attractive to other walkable uses, and seek to mitigate or eliminate minimum parking requirements, which encourage driving and higher VMTs (vehicle miles traveled) and traffic congestion.*
4. Public Health	*Encourage active lifestyles by designing infrastructure to be user-friendly for bicycle and pedestrian uses, and work with the Tulsa Health Department to educate the public on the link between the built environment and public health.*
5. Equity	*Design infrastructure in a way that makes bicycling and walking a viable, attractive choice for those who may not be able to drive, or with no vehicle access and/or live in areas with limited access to bicycle and pedestrian facilities.*
6. Ridership/Usage	*Acquire adequate data to design facilities that accommodate all citizens, applying for funding for projects, and identifying potential opportunities for incremental change.*

Trails and Bikeways Utilization

In 2010, INCOG began a biennial process of collecting trail count data. Counts for 2017 are underway. New count data should assist with the evaluation of the trails by determining the changes in usage between 2010 and 2017. Each trail is counted twice over a two-hour period; once on a weekday (6-8 am) and once on a weekend (8-10 am).

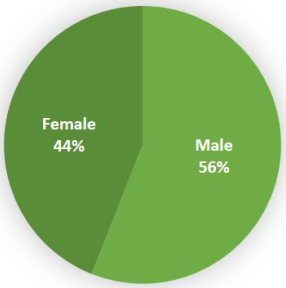
Thus far, all observation days were sunny or slightly overcast. Temperatures ranged between 72 and 85 degrees Fahrenheit. Counts were divided into 15-minute segments for accuracy. Direction of travel was not recorded and users were observed as pedestrians (including runners), bicyclists or other (including skateboarding and rollerblading). Assumed/perceived gender and helmet usage was also recorded.

Activity



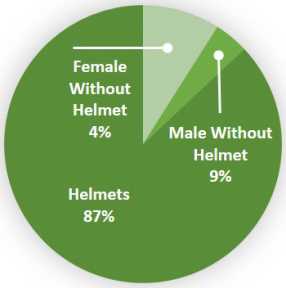
Number Total: 2,254
Bicycle: 1,140
Pedestrian: 1,101
Other: 13 activities, including skateboarding and rollerblading

Gender



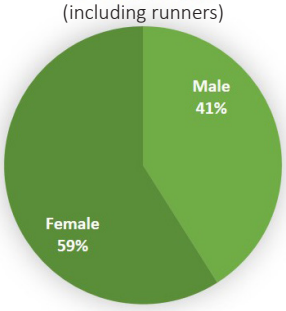
Number Total: 2,254
Male: 1,256
Female: 998

Helmet Usage



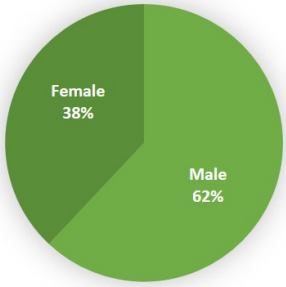
Number Total: 1,140
With Helmets: 992
Males Without Helmet: 103
Females Without Helmet: 45

Pedestrian
(including runners)



Number Total: 1,101
Male: 449
Female: 652

Bicycling



Number Total: 1,140
Male: 703
Female: 437

Results

The pie charts depict the statistics for the trail system as a whole for the year 2015. Counts for weekdays and weekends were added together for each trail and then all trails were totaled together. Individual reports for each trail are similar to the overall data.

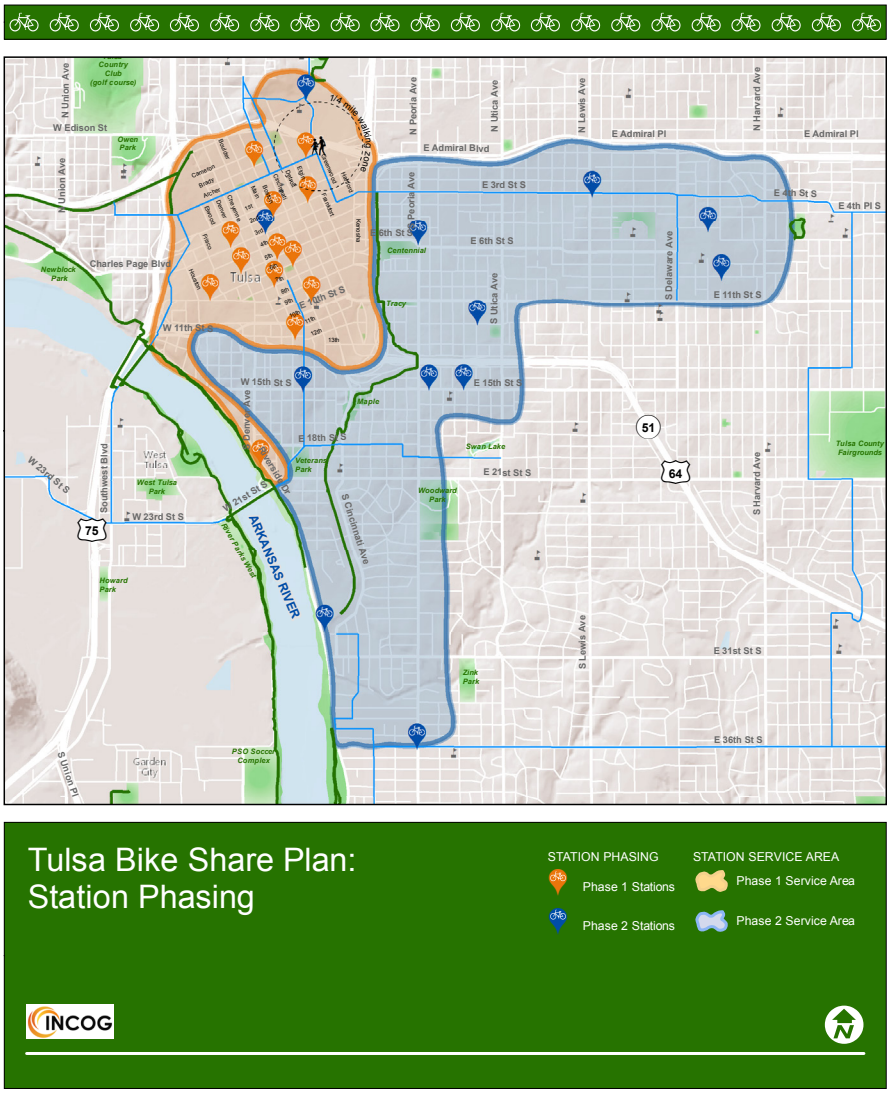
Bike Share

Tulsa was the first city in North America to install a bike share system. The program, Tulsa Townies, began in 2007, and is located in River Parks. It continues to have some of the highest ridership numbers in the nation. In 2018, a new bike share system focused on transportation will launch in downtown Tulsa. Initially there will be 18 stations and more than 200 bikes placed at various locations where bicycle infrastructure is planned to be added to the roadway. The non-profit, Tulsa Bike Share Inc. is a public-private partnership with many stakeholders and sponsors. The second phase will expand the coverage outside the downtown area, connecting destinations like the University of Tulsa, Cherry Street, Brookside, and A Gathering Place for Tulsa.

A parking-protected bike lane on MLK Blvd. in downtown Tulsa's Brady Arts District.



Figure 6. Tulsa Bike Share Stations - Phases 1 and 2



Funding

Bicycle and pedestrian projects are broadly eligible for most 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. INCOG is involved in the selection and administration process for the TAP, STP and CMAQ programs. Local funding of pedestrian and bicycle infrastructure generally comes from bond referenda, capital improvement programs, sales tax initiatives, and development fees.

Table 13. Available Funding Sources and Programs

Source	Description
Surface Transportation Program (STP)	*INCOG receives more than $14 million per year in STP funds, and may consider funding bicycle and pedestrian projects. STP is perhaps the most flexible federal funding program.*
Transportation Alternatives Program (TAP)	*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. TAP is a common source of federal funding for pedestrian and bicycle projects.*
Congestion Mitigation and Air Quality Program (CMAQ)	*INCOG receives approximately $650,000 per year in CMAQ funds. In the past, INCOG has used CMAQ funds to install bike racks, to conduct a bike share study, and to fund signage for bicycle facilities.*
State Funding Sources	*Oklahoma Department of Transportation (ODOT) promotes active transportation facilities through the implementation of eligible projects using statewide TAP funding.*
Local Funding Sources	*Local funding of pedestrian and bicycle infrastructure has generally come as part of street improvement projects in the region, and occasionally from stand-alone trail projects. Other local funding sources have been sales taxes, bond referenda, development fees, or capital improvement plans.*

Strategies

The GO Plan addresses bicycle and pedestrian strategies in detail in chapters 2 and 3, and non-infrastructure strategies in chapter 5. Below is a summary of these strategies.

Table 14. GO Plan Bicycle/Pedestrian Plan Stategies

Strategy	Description
Bicycle Strategy	*The overall bicycle strategy includes developing a network of bicycle facilities for the Tulsa region to connect major regional destinations to one another, and to connect neighborhoods to the existing backbone network of trails. Examples of regional destinations are downtowns, large commercial districts, colleges and universities, and regional parks and activity centers. In general, the network is intended to serve both transportation and recreation purposes for a wide range of users. The bicycle network for the Tulsa region sets an ambitious vision for connecting these major destinations via an 800-mile system of on-street facilities and routes, 165 miles of side paths 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.*
Pedestrian Strategy	*The overall pedestrian strategy is safety, equity and connectivity for the entire Tulsa region. It is broken down into four action steps, which include the prioritization of the existing INCOG sidewalk gap inventory, a detailed assessment and recommendations for one or more focus areas per jurisdiction, concept designs for typical challenging pedestrian scenarios, and policy recommendations. Residents indicated on the Plan survey that they view it as great means of exercise, but walking for transportation today is limited. Sidewalk construction along arterial streets in many communities has been ad hoc as development occurs. 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.*
Non-infrastructure Strategy *Bicycle and pedestrian planners typically approach improving the environment for those modes through a "Four Es" model: education, enforcement, encouragement, and evaluation and planning.*	***Enforcement.*** *Work with local law enforcement to target efforts in problem areas to keep all road users safe. Action items include working on adding bicycle patrol units on the streets and bicycle friendly training in CLEET courses.* ***Education.*** *Inform all road users of their rights and responsibilities to ensure safe roads for all. 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. INCOG should lend support to these efforts where it can through the BPAC, as well as utilize FHWA and Highway Safety grant money for messaging throughout the region.* ***Encouragement.*** *Create a strong culture that celebrates walking and bicycling. Some of the programs in effect are bike-to-work events, bike-to-school day at schools, accessible walking and biking maps, and an upcoming bike share program.* ***Evaluation.*** *Collect data on walking and bicycling to help plan for these modes as safe and viable transportation options. INCOG manually conducts a biennial count on the trails. Permanent and movable counters should be used. Tulsa is currently designated as a bronze Bicycle Friendly Community by the League of American Bicyclists (LAB), and the City of Tulsa is currently applying for silver status.*

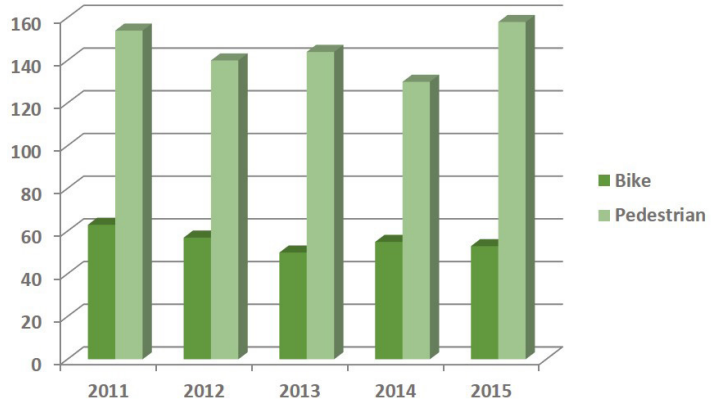


Safety

Recommendations for bicycle facilities on arterial streets focus on providing sidepaths or protected bike lanes, facilities separated from fast, high-volume traffic, where feasible. Close to 75% of bicycle crashes occurred on arterial streets between July 2009 to July 2014. Bicyclists do not avoid riding on arterials since they are often the most direct route, but may ride on the sidewalk. A larger percent of these arterial crashes resulted in incapacitating injuries or fatalities than those on local streets and collectors, likely due to the higher speed of automobiles involved in the crashes.

Table 15. Reported TMA Bicycle and Pedestrian Crashes

Year	Bicycle	Pedestrian
2011	*63*	*154*
2013	*57*	*140*
2013	*50*	*144*
2014	*55*	*130*
2015	*53*	*158*



Implementation:

Funding, Issues and Actions, Development Practices

The bicycle component of the GO Plan 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 bound by logical end points (e.g. a 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 will connect to one another to create the full network. Bicycle and pedestrian projects are typically implemented in one of two ways: as part of a larger roadway project, or as a standalone effort. While planned and programmed street improvements can help guide the implementation schedule for this plan, jurisdictions should also consider prioritizing projects on streets where bicycle and pedestrian projects are recommended.

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, and many projects connect across city lines, INCOG will assist in securing federal funding 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 larger projects.





View of the Osage Prairie Trail leaving Central Park, in Skiatook.

Design Guidelines

The design guidelines are intended to broaden the range of design options for streets in the Tulsa region, recognizing that streets and public rights-of-way comprise a significant portion of a city's area and as such must maximize the public benefit they offer.

For many decades beginning in the mid-twentieth century, street design focused primarily on motor vehicle movement, and the emerging discipline of traffic engineering worked to integrate cars and trucks into pre-existing urban forms. While there were benefits to accommodating automobile movement through the city, the negative effects have become increasingly evident over the last forty years. The focus on automobiles has resulted in a different form of land development patterns, namely emphasizing access for vehicles to buildings and property, but not access for people. This access comes at the expense of other uses of the street and other transportation choices. A detail of design guidelines is included in Appendix A.





Prioritization

All projects in the bicycle network and sidewalk gap inventory were prioritized as part of the GO Plan. Each project is scored based on a set of criteria and weighting determined by the steering committee, and reflect the vision and goals of the project. The scoring uses a combination of selected factors and variables such as stakeholder input, safety, demand, connectivity, and equity. All bicycle projects were scored in the same manner across the region. The full regional list of prioritized bicycle projects and scores was subdivided into lists for each participating community. City-specific prioritized lists are provided in Tables 1 through 11 in the appendix of the GO plan.

Policy Review

As a central element of both the analysis of existing conditions and the recommendations in the GO Plan, the planning 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. Sidewalk requirements are present in most communities' subdivision regulations or zoning codes. The GO Plan recommended adopting standard regional design guidelines and practices for sidewalks, buffer, bike lanes, signage, and other visible infrastructure.







GO Plan Recommendations

The GO Plan also made recommendations regarding funding and policy after evaluating the existing conditions and strategies for future implementation, including:

Table 16. GO Plan Recommendations for Funding

- *Encourage member jurisdictions to continue funding for street improvements that include GO Plan recommendations.*
- *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.*
- *Pursue available funding opportunities that support the implementation of trails and bikeways as recommended.*
- *Align the INCOG TAP application scoring system to the project prioritization process identified within the GO 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 greater effects.*
- *Include feasibility/opportunity/project readiness into the scoring of the applications.*

Table 17. GO Plan Recommendations for Policy

- *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 construction of sidewalks and bicycle infrastructure in both residential and non-residential areas.*
- *Regulations should also require connectivity to local and regional trails as part of site review. Fees in lieu 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.*
- *Local governments are encouraged to address missing gaps and improve connectivity as part of resurfacing, redevelopment and retrofit projects. This could be accomplished through local projected funding association fees or sidewalk grants allocated specifically for these connections.*
- *Encourage jurisdictions to adopt bicycle parking standards that include incentives to add bicycle parking and reduce requirements for off-street parking spaces.*
- *Encourage jurisdictions to adopt zoning code elements that result in a more pedestrian-friendly development pattern for downtown areas and neighbor centers, such as off-street parking behind buildings, and other strategies outlined in the new Tulsa zoning code.*



Table 18. Regional Priorities: Trail / Sidepath Projects

Segment	Length	Estimated Cost
Trail along Gilcrease Expressway from S. 49th W. Ave. to Katy Trail	*5.5 Miles*	*$4.8M*
West bank trail from 71st St. S. to 96th St. S.	*3.3 Miles*	*$3M*
East Bank Trail from Delaware Ave. to Fry Ditch Creek	*4.8 Miles*	*$4M*
Trail along US-169 from 51st St. S. to 71st St. S.	*2 Miles*	*$2M*
Sidepath along 101st St. S. from Riverside to Creek Turnpike	*5.5 Miles*	*$4M*
Sidepath along SH-97 from Sapulpa to Sand Springs	*8.6 Miles*	*$6M*
Ranch Creek Trail from E. 76th St. N. to E. 96th St. N.	*2.5 Miles*	*$2.2M*
Sidepath along Route 66 from Verdigris River to Will Rogers Blvd. in Claremore	*9 Miles*	*$8M*



Bicycling Facilities



Bike Lane

Conventional bike lanes designate an exclusive space for bicyclists through the use of pavement markings and signage. They have a minimum width of 5 feet. Similar to 4th Pl. between Yale Ave. and Sheridan Rd.

GO Plan example: 3rd St. from Downtown to Yale Ave.
Cost per mile: $70,000



Cycle Tracks / Protected Bike Lane

A facility in the right-of-way that is physically separated from automobile traffic for the exclusive use of bicyclists. Separation is provided by vertical elements, whether pylons, bollards, parked cars, curb, planters, or by the cycle track being at a different height than the street.

GO Plan example: 11th St. from Elgin Ave. to Sheridan Rd.
Cost per mile: $120,000



Buffered Bike Lane

Buffered bike lanes are conventional bicycle lanes paired with a designated minimum 3 foot buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane.

GO Plan example: 11th St. from Sheridan Rd. to Garnett Rd.

Cost per mile: $71,000



Sidepath

Similar to a trail, but adjacent to a roadway. Sidepaths are within the street right-of-way, but at curb level and separated by a buffer from traffic. Similar to Elm St. in Jenks between the Creek Turnpike and 111th St.

GO Plan example: 81st St. from Riverside Dr. to Garnett Rd.
Cost per mile: $719,000

Source: GO Plan

Bicycling Facilities



Signed Route

A known bike route with "Share the Road" signage to alert drivers to the presence of cyclists.

Cost per mile: $800-$18,000



Shared Lane Marking (Sharrows)

Marked shared lanes are indicated by specific bicycle symbols with two chevrons positioned above a bicycle symbol.
Similar to 36th St. in Tulsa.
GO Plan example: 36th St. between Riverside Dr. and Hudson Ave.
Cost per mile: $33,000



Priority Shared Lane Marking

Shared lane markings (sharrows) can be enhanced with a green colored backing. They do not represent a dedicated bike lane, but suggest that bicycles have priority in the right lane.
GO Plan example: 15th St. from Peoria Ave. to Utica Ave.
Cost per mile: $77,000



Trail

A minimum 10-foot, 2-way path shared by bicyclists, runners, walkers skateboards. Similar to the Creek Turnpike Trail or the River Parks trails. Usually located on open land, along watercourses or former rail lines.
GO Plan example: Mingo Trail from 51st St. to 71st St.
Cost per mile: $888,000
Dual Trail: $1.6 million

Source: GO Plan

TRANSIT





Users on board being surveyed on MTTA's public transit service.



Introduction

Public transit has long been an integral part of Tulsa's transportation network. Numerous private streetcar lines continued to develop the city until 1935. The region also saw the creation of two interurban rail lines connecting the cities of Sand Springs and Sapulpa to the city of Tulsa. Today, the TMA has one primary transit service provider, the Metropolitan Tulsa Transit Authority (MTTA). MTTA was created in 1968, and operates bus services for the region, as well as some of the region's paratransit services. MTTA provides 3 million fixed-route trips and 120,000 paratransit trips (through their Lift service) annually. Though presently passenger rail does not exist in Tulsa, there are many significant corridors identified for future implementation as the need develops in the region.

Facing new and evolving challenges and opportunities, INCOG has taken the opportunity to engage the public, study alternative transportation solutions, and create community visions to help guide regional success. One such initiative, the Regional Transit System Plan (RTSP or the Fast Forward Plan), recommends a comprehensive, long-range, realistic system of transit corridors to help meet the region's transportation needs over the next 25 years. The plan defines corridor priorities for the region and defines policy needs for feasible development. Throughout the study, the RTSP was centered on a technically sound, data-supported planning process which enables the region to be well positioned

for potential future grant funding. The RTSP plans to guide the region's transportation investments to meet the growing needs of the community, and is the foundation for all transit-related guidance and recommendations of Connected 2045.

Following the adoption of the Fast Forward Plan, voters in the City of Tulsa approved a local tax package which included capital and operational funding for Bus Rapid Transit (BRT) projects mentioned later. Bus Rapid Transit is a premium fixed-route bus service which provides more frequent, faster service, and more reliable travel times than the traditional bus services, with fewer stops along each route. The first of these routes is the Peoria BRT line, which will travel along Peoria Ave. from the northern and southern edges of the city. This project is currently underway with the final design to be completed in 2017, construction in 2018, and operation set to begin in spring 2019. The second BRT line is planned to travel east-west, on 11th and 21st streets. This project is anticipated to be completed and operational by spring 2021.

"Between 2001 and 2009, the average number of miles driven by 16 to 34 year-olds dropped by 23 percent, as a result of young people taking fewer trips, shorter trips, and a larger share of trips by modes other than driving."

(Dutik and Inglis, 2014) [1]

Needs Assessment

The importance of transit has received much political recognition in the region in recent years. The Mayor of the City of Tulsa, G.T. Bynum, emphasized the importance of access to quality transit in his administration's goals, the most obvious of these being a primary goal to increase the population within half mile of transit. Currently 24.8% of Tulsa's residents fit this criteria.

By providing greater access to convenient, reliable transit, vehicle ownership is not necessary for mobility and transportation needs, thereby potentially reducing household expenses on transportation. Research has also found that providing transit access to students has proven to both decrease absenteeism (23%) and increase involvement in additional after-school learning opportunities (Fan & Das, 2015)[2]. This likely results in increasing high school graduation rates. The region has already taken action and created other partnerships between MTTA, Tulsa Public Schools, Tulsa Community College, and others, providing free services to students through the programs TPS Rides and TCC Rides Free.



1. http://www.uspirg.org/sites/pirg/files/reports/Millennials%20in%20Motion%20USPIRG.pdf
2. Assessing the Impacts of Student Transportation on Public Transit, at http://www.atten-danceworks.org/wordpress/wp-content/uploads/2013/01/Minneapolis-Student-Pass-Study.pdf

This need for transit is also evidenced by the growth the Tulsa metro is currently experiencing. In 2015, Tulsa County accounted for 77 percent of the population of the total TMA. Tulsa County is expected to experience the highest growth in population density by 2045, adding approximately 331 persons per square mile. In terms of changing travel patterns, as the population increases, trip patterns will become more dispersed. This growth translates into comparable, if not greater, increases in vehicle miles traveled (VMT), vehicle emissions, fuel consumption, and collisions.

In 2015, Tulsa County contained 88% of the TMA's total employment, approximately 74% of the employment growth in the future is expected to occur within Tulsa County. These trends support the possibility that expanding the capacity of the transit system to meet these demands is perhaps one of the greatest economic and organizational challenges the region faces.

While congestion is not currently a serious problem in the region, a high-quality transit system and corresponding transit-oriented development (as supported by PLANiTulsa, the City of Tulsa's Comprehensive Plan) provide a more economically-sustainable pattern of growth and infrastructure efficiency. Additionally, technology in the transportation sector is undergoing rapid change, and with it comes changing societal expectations of how mobility is integrated into daily life. Tulsa's transit system and the transportation network as a whole must prepare for the future of tomorrow.



The integration of technology will play an integral role in the future of transit and its ridership. Numerous studies have found that the millennial and subsequent generations both drive less and are increasingly choosing forms of transportation other than vehicle ownership, including ride-sharing, public transit, or various means of active transportation. Also well documented is the attachment these same generations have to technology and demand-response services. When applying this knowledge to the future of transit in the Tulsa region, it becomes increasingly important for transit professionals to adopt technologies that allow the agency to better understand how riders are using their system and how it can be improved.

It is essential to utilize technology that enables transit services to more easily integrate into daily life, whether this is reflected in partnerships with ride-sharing services for first-mile/last-mile connections or the utilization of big data and smart infrastructure to better adapt and predict ridership needs. The end goal should be to make using transit the easy and convenient choice.

Users will combine transit with other active means of transportation and technology to fit new needs and lifestyles.





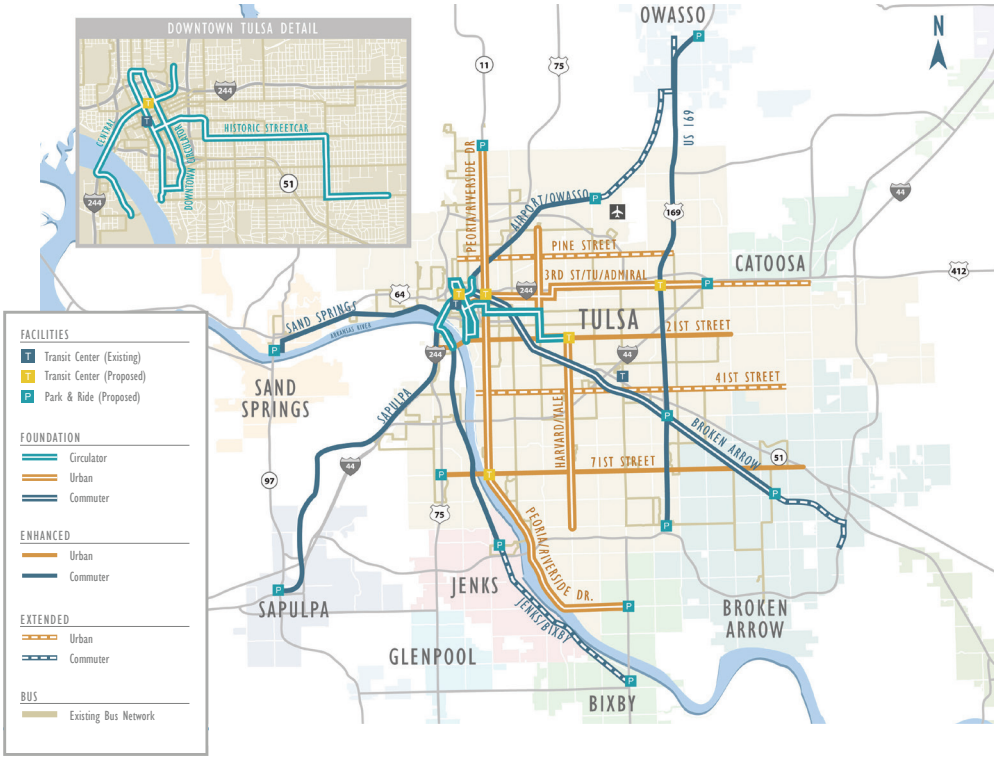
Transit Corridor Prioritization

The RTSP, better known as the Fast Forward Plan, established three transit market groups in order to discern the relative difference in high capacity transit needs among corridors with like characteristics. Transit market groups were defined as Circulator, Commuter and Urban Corridors. Typical travel demand, built environment, and operating characteristics of each market group are described in the following table:

Table 19. Transit Market Groups and Networks

Corridor Type		
Circulator	**Commuter**	**Urban**
• *Provides transit service throughout downtown central business district.* • *Supports commuter and transit networks.*	• *Established highway or rail corridors connecting suburban and rural areas to the urban core.* • *Trips are generally inter-urban, work based, and occur during peak travel times.*	• *Compact, developed urban and suburban areas.* • *Serves high population and employment density corridors with a more even distribution of peak and off-peak trips.*
Network Type		
Foundation	**Enhanced**	**Extended**
• *High usage corridors with high transit demand.* • *Corridor needs are addressed with implementation of high-capacity transit technology: commuter rail, light rail, streetcar, and bus rapid transit.* • *Higher investment improvements, requiring significant capital investment and used in conjunction or in lieu of improvements identified for Enhanced or Extended Network corridors.*	• *Corridor needs are addressed with a variety of transit and/or roadway improvements, including high capacity technologies and service improvements.* • *Proven low-cost solutions may be deployed in advance of more significant investment projects to improve efficiency or customer service; success of improvements to be evaluated within 3-6 months.*	• *Areas with limited transit service needs within the RTSP planning horizon year (2045).* • *Immediate improvements may be introducing fixed route service, providing stops, and basic shelter, etc.* • *May be eligible for Enhanced Network Improvements, though within a longer timeframe.*

Source: Fast Forward Regional Transit System Plan (2011), INCOG.



Fast Forward: Regional Transit System Plan (2011), INCOG.

Interregional Public Transportation

There are four interregional bus services that travel daily through the Tulsa region. Greyhound operates ten buses per day with direct connections to Kansas City, St. Louis, Memphis, Dallas, Oklahoma City, and Denver. Jefferson Lines operates two regional buses per day; one travels from Kansas City to Wichita Falls, TX and another from Wichita Falls, TX to Minneapolis, MN. The third and fourth services are Turimex Internacional and Zavala Plus. Each operate one bus per day in Tulsa, with connections to thirteen southern and eastern states in the US, and twelve northern and central states in Mexico.





Implementation Strategy

Informing local officials and the community on the benefits, costs and effects of transportation options is crucial for project implementation.



Foundation corridors will be advanced to planning, environmental review, and engineering and design before they reach construction. The first phase of advanced planning is established in the form of an Alternatives Analysis (AA). An AA evaluates transit technology and alignment options for a corridor. Informing local officials and community members on the benefits, costs and effects of transportation options, enables the community to identify a preference. This phase is complete when local and regional decision makers select a locally-preferred alternative that is adopted by INCOG into the region's long-range transportation plan.

The second phase of project development concerns the preliminary engineering and environmental review. During the preliminary engineering (PE) phase of project development for transit projects, consideration for all design options is established to refine the locally-preferred alternative and complete the National Environmental Policy Act (NEPA) process. Preliminary engineering improves estimates of project costs, benefits, and effects. Final design is the third and last phase of project development, and includes preparation of final construction plans, detailed specifications, and bid documents.

Development timelines fluctuate depending on the total length of the corridor, the transit technology mode, and funding sources. As corridors are individually studied, they will be assessed to verify projected transit demand and needs.

Funding Strategies

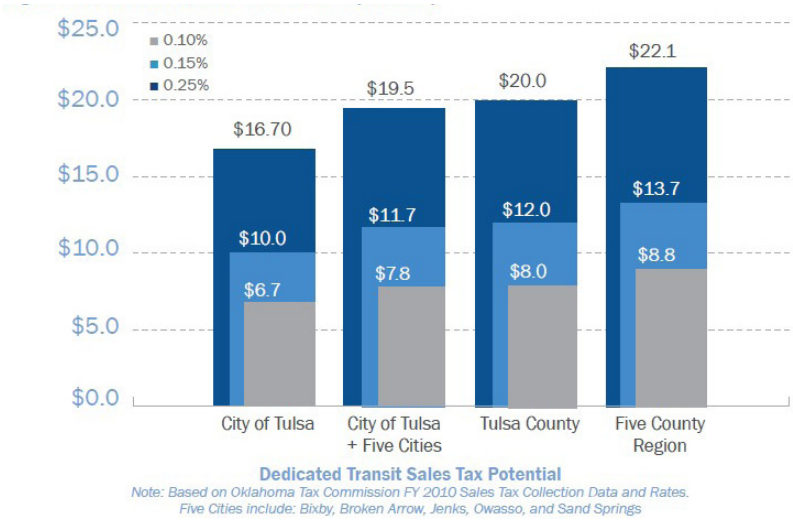
The RTSP (Fast Forward Plan) recommended maintaining momentum for cost-neutral transportation/bus enhancements prior to the availability of dedicated regional tax revenues. It was recommended that the City of Tulsa, other neighboring jurisdictions, and Tulsa County significantly increase local funding for transit.

Based in part on these recommendations, in April 2016, voters in the City of Tulsa passed a permanent sales tax of 0.085% in the city's Vision 2025 package. This includes funding for transit operations and capital projects. Fifteen year projections indicate this amounts to $58M for transit funds. This is the first permanent local funding source for transit in state history.

Table 20. Transit Revenue Forecasts

Source	2015	2045	Notes
Local Funding (dedicated to public transportation)	*$6M*	*$6-22M*	*Local funds are typically only used for operations and providing a 20% match for federal grant funds.* *Local funds depend on the scope and scale of the system proposed and varies based on city/county initiatives.*
Federal Funding	*$8M*	*$8-12M*	*Federal funds are typically used for capital investment projects. Amounts are based in part on ridership and MTTA service miles.* *Federal funding is contingent on future authorization of transportation legislation.*
Fare, Advertising and Other	*$4M*	*$4-6M*	*Amounts are based in part on ridership. Projections range from no change to a 50% increase in ridership.* *Fares and advertising revenue as collected depends on the extent of the system and ridership.*

Fast Forward: Regional Transit System Plan (2011).



The region suffers from many gaps in sidewalks and infrastructure.



The RSTP (Fast Forward Plan) recommends exploring amending enabling legislation to allow for alternative financing mechanisms, which include property taxes, vehicle fees, car rental fees, vehicle lease fees, parking fees, utility fees, motor fuel taxes, and battery taxes to fund transit. The RTSP also highly recommends pursuing all federal funding sources. Any local commitment of resources toward capital and operations can be successfully leveraged and complemented with all federal avenues for funding of capital projects. In addition to future potential capital-intensive projects, it was recommended that various categories of funding be pursued, including:

- *The State of Good Repair Initiative.*
- *The Livability Expansion Initiative, which includes the Alternatives Analysis program and Bus and Bus Facilities.*
- *Other FTA programs, including the Clean Fuels program and the Transit Investment.*

In order to adopt proposed transit improvements into the fiscally-constrained Regional Transportation Plan, conceptual cost estimates must be developed to the greatest extent possible to allow for accurate projection of cost, as well as identification of revenues and funding sources. Transit technology modes and service operating characteristics are discussed in greater detail within the full Regional Transit System Plan (Fast Forward Plan).

Governance

The RTSP (Fast Forward Plan) recommends regional action on critical issues pertaining to governance and finance of the transit system, including both high-capacity and fixed-route bus services. As a result, the Task Force on Transit Governance and Funding was created with a mission to implement the transit projects previously recommended by the RTSP and PLANiTULSA.

Below are recommendations established throughout the technical process in consultation with input from regional stakeholders. The recommendations include:

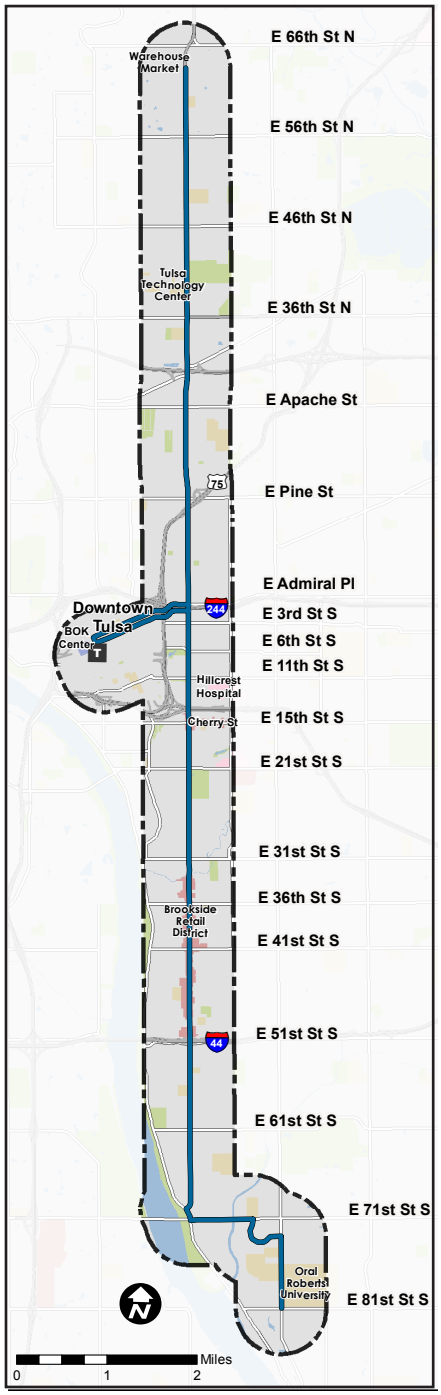
Table 21. Governance and Finance Recommendations of the Transit System

- *Expand the existing Tulsa Transit Board of Trustees to include more regional representation; specifically, the municipalities that contract with MTTA (such as a rotating seat on the board, filled by a contracting municipality).*
- *Establish necessary interim steps to move forward with the recommended governance mechanism.*
- *Generate additional funds to maintain and improve existing transit service.*
- *Develop a specific plan and program of investments for which additional funding is needed, and demonstrate the benefits that are expected from the proposed investments.*
- *Clearly identify established roles, responsibilities, and procedures for executing the funding and investment strategy and implementing the proposed improvements.*
- *Design and carry out a public education and advocacy plan and campaign.*
- *Develop sustained leadership and demonstrable, sustained support.*



Next Steps for Regional Transit Implementation

The planned Peoria BRT Line, going from North to South Tulsa.



As previously discussed, the Peoria BRT project is currently in the design phase and is on track for a spring 2019 operational start date. Upon completion of the Peoria BRT, the second phase of the BRT construction will begin with the development of the East-West BRT corridor. The exact route has not been defined, though it is planned to be a combination of 11th st. and 21st st., extending from Downtown Tulsa to the Eastgate Metroplex at the intersection of 21st st. and 145th E. Ave. This 11-mile BRT route will provide an essential connection to the Peoria BRT.

The Bus Rapid Transit lines will include the following amenities:

- *15-minute frequency during peak hour; 20-minute frequency off-peak.*
- *Signal preemption.*
- *Stations approximately every half mile.*
- *Level boarding, often resulting in stops of less than 20 seconds.*
- *Real-time travel information displays.*
- *Off-board, on-board, and online payment options.*
- *Bicycle storage.*

Examples of key destinations on the Peoria Corridor and within 10 minutes of walking distance



Downtown Tulsa



Tulsa Technology Center



Markets



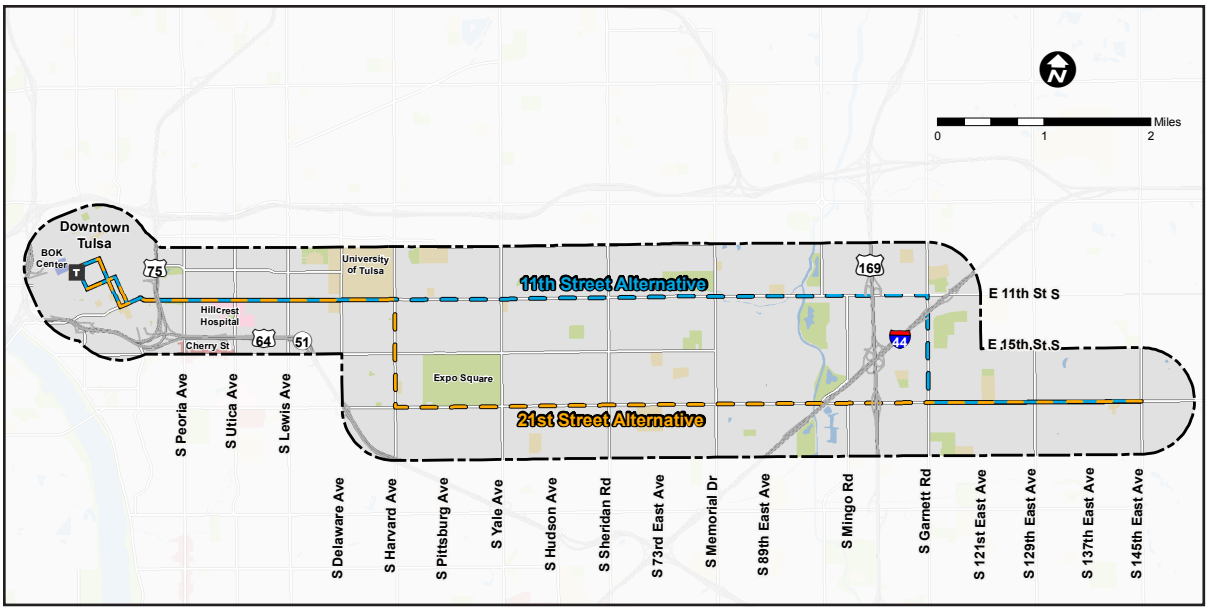
Entertainment Districts



Oral Roberts University



St. John and Hillcrest Hospitals



The East-West BRT Corridor is being planned along 11th St./ 21st St.

Examples of key destinations on the 21st St. Corridor



Tulsa Fairgrounds



Markets / Shopping Center



McClure Park

Downtown Tulsa on the west end and the Eastgate Metroplex on the other end of the BRT line.



Examples of key destinations on the 11th St.Corridor



Rose Bowl Event Center



Route 66 Destinations

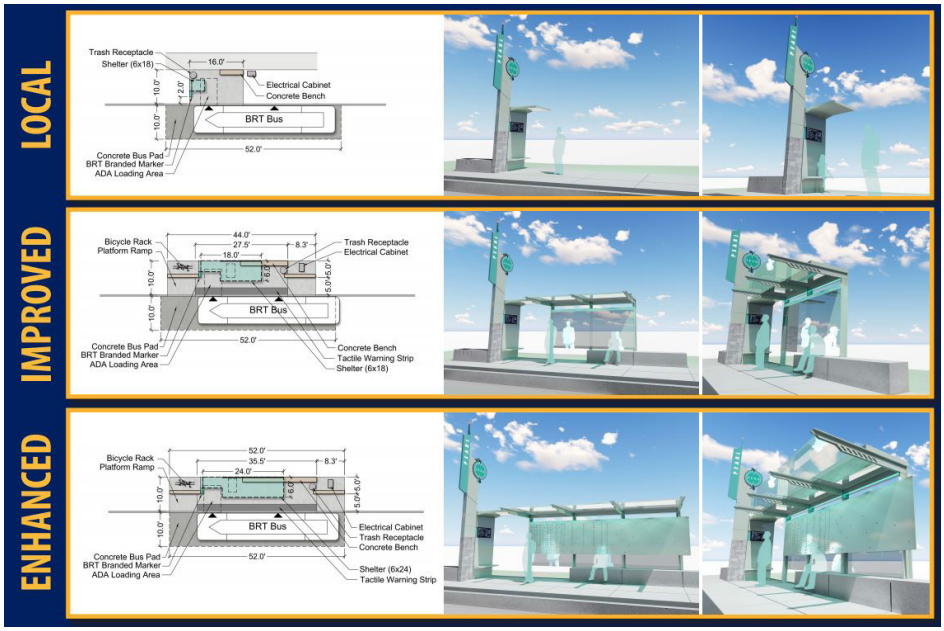


The University of Tulsa



Potential branding for buses and station design concepts for the new Peoria BRT Line, unveiled by the City of Tulsa in July 2017.





Flier highlighting workshops and public engagement for the BRT implementation process.



Evaluation and Performance

The introduction of the premium transit service provided by the BRT lines will enable an opportunity for a change to include faster service to connect primary hubs for transfers such as the Denver Avenue Station and major destinations. Tulsa Transit envisions that these two BRT routes will become the primary hubs for transfers, rather than those currently occurring at the Denver Avenue Station. This will modernize the entire route network, expand the capacity and efficiency of the system, and positively affect the riders themselves and their mobility experience.

A necessary component of a comprehensive review of the network is data availability. Presently, there is limited data available to Tulsa Transit for ridership analysis. Much of the existing knowledge regarding ridership boarding and alighting has come from additional studies conducted externally; however, MTTA is in the process of purchasing on-board automated passenger counters (APCs) for all system buses. These will allow MTTA to track a route's boarding and alighting by location, time, and direction of travel, providing a critical data need which has not been readily available to MTTA without a labor- and cost-intensive study. The APCs are planned to be operational on all MTTA buses by fall 2017, providing ridership data almost immediately.

Connected 2045 recommends that MTTA utilize the ridership data and complete a Comprehensive Operational Analysis (COA). With the additional data availabilities, Connected 2045 proposes the establishment and tracking of the following performance measures:

Table 22. Transit Performance Measures

Measure	Description
Ridership	*Annual ridership totals should be compiled for comparison to the 2011 Bus Operations Plan and the 2017 Route Integration Study, both prepared by Connectics Transportation Group. At the time of the Bus Operations plan, ridership was holding steady at 2.5 million annually. Daily ridership peaked in 2015 at approximately 12,000 daily riders; however economic events (such as lower fuel costs) have resulted in ridership counts trending downwards. Today, daily ridership varies between 9,000 and 11,000.* *The demographic profile of riders depicted a largely transit-dependent rider base. With the amenities and benefits provided by addition of the BRT routes, it is anticipated that the number of choice riders will increase. Ridership should be watched for increases in ridership totals, as well as increases in choice riders.*
Revenue Service	*Revenue service refers to the amount of time (hours, miles, or trips) a vehicle is available to the public, and there is an expectation of carrying passengers. Revenue service data should be compiled for comparison against the 2011 Bus Operations Plan analysis, which shows a 20% decrease in revenue hours over the years between 2002 and 2009.*
Service Effectiveness	*Measures used to evaluate service effectiveness include passengers per revenue hour and passengers per revenue mile. Both measures saw increases in 2004, before decreasing and stabilizing through 2009. Service effectiveness should be measured annually, along with ridership and revenue to determine overall quality of transit service being provided.*





Tulsa Transit's Route 105, going north on Peoria Avenue.

HUMAN SERVICE TRANSPORTATION AND COORDINATION



Purpose

The purpose of the Coordinated Public Transit Human Services Transportation Plan is to identify the transportation needs of the target populations and develop alternatives to address these needs. These alternatives are developed by INCOG in coordination with the region's transit providers and the Regional Council for Coordinated Transportation (RCCT).



Obstructions including event equipment and road construction signs are often found on sidewalks.



Introduction

SAFETEA-LU, the federal transportation reauthorization act, required the establishment of a locally-developed Coordinated Public Transit-Human Services Transportation Plan for three FTA human services transportation programs — the Job Access and Reverse Commute Program (JARC, Section 5316), New Freedom (Section 5317), and the Formula Program for Elderly Individuals and Individuals with Disabilities (Section 5310). Under SAFETEA-LU, to receive program funding from FFY 2006 on, federal program grantees must certify that approved projects were derived from the coordinated plan developed through a process that includes representatives of the general public as well as public, private, and non-profit transportation and human services providers. In June 2012, the Federal government signed into law a new two-year federal surface transportation authorization entitled Moving Ahead for Progress in the 21st Century (MAP-21). The new authorization maintained most of the coordinated planning provisions under SAFETEA-LU but made significant changes to the specialized transportation grant programs under the new bill.

Under MAP-21, the New Freedom Program, which provided grants for services for individuals with disabilities that went above and beyond the requirements of the Americans with Disabilities Act (ADA), was consolidated with the existing Section 5310 program for the Enhanced Mobility of Seniors and Individuals with Disabilities. In addition to renaming the program, the new legislation expanded

the activities eligible for funding and allowed more flexibility in the administration of the program. While funds were previously allocated directly to the State, MAP-21 allows MPOs to be the designated recipient of these funds and be responsible for program administration. JARC, which focused on providing services to low-income individuals to access jobs, was consolidated into Section 5307 Urbanized Area Formula Program, and the coordinated planning requirement for this program was eliminated.

Continued under the current legislation, Fixing America's Surface Transportation Act (the FAST Act), Section 5310, the Enhanced Mobility of Seniors and Individuals with Disabilities Program is the only funding program with coordinated planning requirements. For distribution of any funds under Section 5310, projects selected should be included in the coordinated public transit-human services transportation plan, developed and approved through participation of seniors, people with disabilities, representatives of public, private, and non-profit transportation and human service providers, and other members of the public, and services coordinated with other transit providers.



The Gatesway Foundation is one of Tulsa's non-profit agencies that serves individuals with disabilities and partners with INCOG.



The Tulsa TMA faces many challenges to human service transportation.



Human service transportation offers a variety of options to meet the needs of a diverse population.



Description

Human service transportation includes a broad range of transportation service options designed to meet the needs of a variety of populations. Choices range from the public transit fixed-route system, specialized dial-a-ride van programs, and taxi vouchers, to volunteer drivers. The array of services often results in multiple, underutilized, inefficiently operated vehicles. At the same time, there are often large numbers of people unable to access transportation services when and where they need them. Coordination of transportation program services, appropriately implemented, reduces individual inefficiencies and encourages sharing of existing community resources. In communities where coordination is a priority, all citizens benefit from having more transportation choices through expanded service, lower costs, and easier access.

INCOG, in coordination with local officials, was designated by the Governor of Oklahoma as the organization responsible for developing and implementing the Coordinated Public Transit-Human Services Transportation Plan (CTP) and a competitive process to select and prioritize projects for the Tulsa TMA.

The 2015 Coordinated Plan was developed with ongoing participation by representatives from public, private, and agency transportation providers, Departments of Human Services, Health, Mental Health, Rehabilitation Services Employment, and Education, along with the Area Agency on Aging, faith-based organizations, and private, non-profit organizations such as the United Way. It focuses on transportation services for older adults and persons with disabilities. With these populations rapidly growing, it is vital to identify ways to meet the demand and mobility needs of these populations. This plan assists transit

agencies and human service organizations in identifying and addressing gaps and needs in transportation services provided to the Tulsa region citizens, and serves as a resource to transportation providers in the region.

The Coordinated Public Transit-Human Services Transportation Plan (CTP) also endorsed the creation of an ongoing planning committee to promote adequate funding, inter-organizational coordination, and oversee the implementation of all the recommendations presented in the Coordinated Plan. The Regional Council on Coordinated Transportation (RCCT) was established in February 2008, and has met every other month since its creation. It is represented by state and local organizations, as well as tribal agencies.

The 2015 Coordinated Plan update focuses on engaging stakeholders and the public in the coordination process, developing an inventory of services provided in the region, determining transportation needs and gaps, and establishing strategies to be implemented in the future.

The full plan update may be accessed at:
http://www.incog.org/Transportation/coordinatedplan.htm

Action Plan

The action plan identified the following needs:

1. *List all the transit providers in the Tulsa TMA.*
2. *Inventory service, equipment, and facilities available.*
3. *Assess service gaps, equipment, and facilities needs.*



Gaps and Needs

The action plan further identified the following:

Table 23. Gaps and Needs identified in the Coordinated Plan

- *Limited transit funding prohibits the expansion of services.*
- *Little or no service provided to Tulsa's surrounding communities.*
- *Funding sources restrict services to specific populations for specific purposes and therefore, under-capacity vehicles from different organizations can be traveling the same route at the same time unable to pick up additional riders.*
- *No transit service on holidays.*
- *Limited service in the evenings.*
- *Human service agencies are often limited by federal requirements that restrict services to specific target population or destination type.*
- *Barriers to accessibility to routes such as lack of transit and pedestrian-friendly developments.*
- *Depending on the need and program, riders need to make different arrangements with different providers.*
- *Multiple operators have different phone numbers and operating procedures.*
- *Vehicles are not used efficiently (church buses, school buses, etc.).*
- *Some agencies can only provide services to people who are eligible for ADA and Medicaid programs.*
- *Different transit systems have different fares and policies, which can be confusing.*
- *Human service agencies need a better understanding of the transportation system infrastructure to accomplish coordination objectives.*
- *Agencies wrongly believe that the cost of liability insurance will increase if they transport riders who are not their clients.*
- *Confusion about how nightline systems work, what routes are available, and calling for deviations.*
- *Lift service is not always on time making it difficult to schedule pick up from doctors' appointments.*
- *Human service agencies have limited capacity for scheduled services (shortage of seats).*
- *Call centers are operated individually by each organization.*
- *Different eligibility requirements for each program.*

Table 23. Gaps and Needs identified in the Coordinated Plan (Continued)

- *"Turfism" (concerns about loss of control over services, riders, funding).*
- *On-board safety and nighttime safety.*
- *Requiring advanced scheduling does not allow riders to be spontaneous about their trips.*
- *Lack of transportation and planning for emergencies/disasters.*
- *Due to limited funding for marketing, riders are not aware of the options available to them.*
- *Lack of education and advertising to alleviate transit stigma and low usage.*
- *Individual purchase of vehicles and equipment.*
- *Skepticism about benefits.*
- *Driver training programs are operated individually by each organization.*
- *In-house vehicles maintenance programs are operated individually by each organization.*

Based on discussions of the Tulsa area gaps and needs, the RCCT developed strategies and solutions to address the region's transportation problems and prioritized these strategies for the implementation of the Coordinated Public-Transit and Human Service Transportation Plan. The strategies and solutions address the needs of a growing population of the elderly, low-income, and people with disabilities. Nearly all new programs recommended are low-cost, non-traditional services to be implemented with new or additional state funding and Section 5310 funding.



Strategies and Actions

Table 24. Strategies and Actions in the Coordinated Plan

Strategies and Actions
Goal 1. Safety and Accessibility
• *Increase transit service area to include regional medical facilities, employment centers, and social activities.*
• *Develop and implement Pedestrian Master Plan to assess sidewalks, safe routes to transit, and elimination of barriers.*
• *Incorporate FHWA and NACTO guidelines for new streets and highways that are accessible for aging and disabled populations.*
• *Improve facilities and amenities at regional stops and transfer stations.*
• *Implement policies and programs that address safety concerns at bus stops, transfer stations, and on-board, especially at night.*
• *Encourage provision of travel hosts to assist people making transfers, persons with disabilities, users needing door-to-door service, visitors, or those with other transit concerns.*
• *Create and implement an emergency/disaster plan and an inclement weather plan that addresses the needs of those without personal transportation.*
Goal 2. Mobility
• *Increase transit frequency to allow users to make health care and other appointments, look for employment, and chain trips for both paratransit and fixed route service.*
• *Increase service area to connect neighboring communities outside the Tulsa metro area.*
• *Develop a Mobility Management Center.*
• *Extend transit service to evenings.*
• *Provide transit service on holidays.*
• *Establish an authority to oversee implementation and ongoing operations of Mobility Management Center.*
• *Increase human service agencies capacity for scheduled services.*

Strategies and Actions

Goal 3. Develop Awareness

- *Educate transit providers and human service agencies about the benefits of coordination.*
- *Provide human service agencies with travel information resources or tools, and help caseworkers and other appropriate agency representatives understand the lowest cost transportation options for their clients.*
- *Add transit links to the human service 211 hotline.*
- *Encourage projects that engage community members or other partners in spreading the word about available mobility options.*
- *Develop innovative marketing and information partnerships and strategies that alleviate the stigma of riding transit and illustrate available services.*
- *Add transit/mobility center links to sites for services provided to the elderly, low-income, and people with disabilities.*
- *Create a transit options brochure and website that are user-friendly and which details options available to potential customers.*
- *Expand exposure of regional fixed routes and ride share programs to policy makers, funders, and untapped markets.*

Goal 4. Funding

- *Allow mixing of funding so agencies aren't restricted to serving specific target populations or specific destination types.*
- *Diversify and expand funding sources by partnering with the private sector (both for-profit and non-profit).*
- *Promote mileage reimbursement for volunteer drivers, volunteer exchange to trade skills, carpooling, and taxi vouchers to reduce trip cost.*

Goal 5. Efficiency

- *Increase service efficiency to decrease delayed pick-ups.*
- *Develop a unified policy that allows all providers to accept transit users regardless of their individual eligibility (ADA, Medicaid and other programs).*
- *Incorporate Intelligent Transportation Infrastructure Technology options to integrate the use and function of each transportation mode.*
- *Agree upon common fare structure for all agencies represented in the vehicle pool.*
- *Decrease lead-time needed in scheduling for paratransit service.*
- *Increase the ability of school districts and churches to be part of the community transportation provider pool.*

Following the adoption of the Plan by the INCOG Board of Directors, INCOG developed a competitive selection process and criteria, and solicits applications from eligible entities for disbursement of the funds allocated to our region. Applications for 5310 funding within the Tulsa TMA must meet a need identified by the Coordinated Plan. To ensure consistency with the Coordinated Plan, 5310 applications are evaluated based on the selection process included in the Plan. As the Plan continues to guide projects in successive years, this review process will be evaluated and refined as necessary to ensure projects funded under this program are complementary to one another and fit into the vision and goals of the Coordinated Plan.

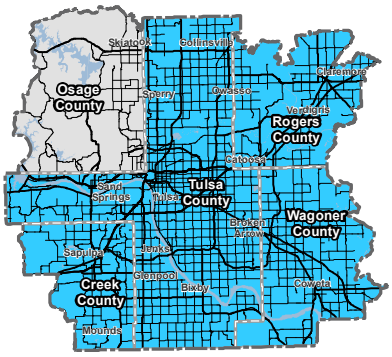






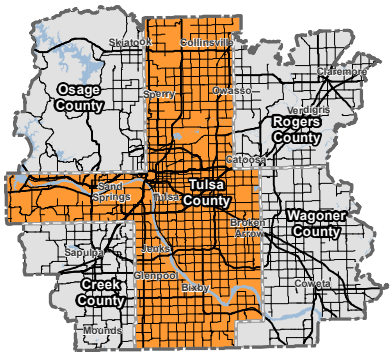
Coordinated Plan Area of Service within the Transportation Management Area

New Leaf



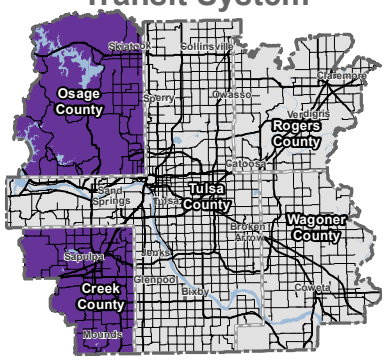
Serving:
- Creek County
- Rogers County
- Tulsa County
- Wagoner County

Gatesway



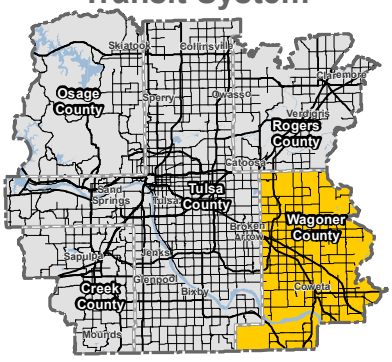
Serving:
- Tulsa County

Cimarron Public Transit System



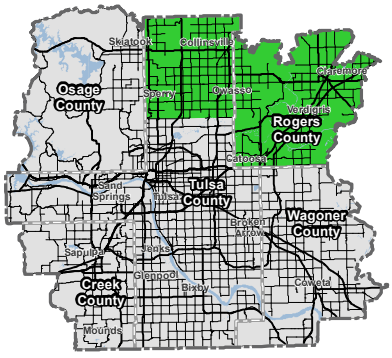
Serving:
- Creek County
- Osage County

KiBois Area Transit System



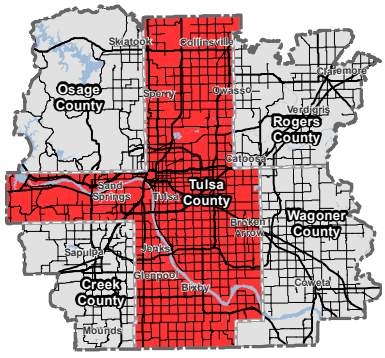
Serving:
- Wagoner County

Pelivan Transit



Serving:
- Rogers County
- Northern Tulsa County

Morton Comprehensive Health Services



Serving:
- Tulsa County

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Legend

- New Leaf
- Gatesway
- Cimarron Public Transit System
- KiBois Area Transit System
- Pelivan Transit
- Morton Comprehensive Health Services

Connected 2045 Regional Transportation Plan

INCOG

Since FY 2013, INCOG has allocated more than $1.5 M to transit agencies and human service organizations in Section 5310 funds.

Table 25. Allocated Section 5310 Funds

Transit Agencies / Human Service Organization	Use of Funding
United Community Action (Cimarron)	*Operating and capital assistance to provide transportation for clients to social services, employment, and education, for people with disabilities and seniors in Creek and Osage Counties, and connecting to the Tulsa metro area.*
KiBois	*Operating and capital assistance to support and expand public transportation to address the needs of persons with disabilities and seniors, including transportation to and from jobs, social service providers, shopping, training, and recreation, beyond required by ADA in Wagoner County, Tulsa, and surrounding areas. Door-to-door services also linking to MTTA fixed routes.*
DaySpring Villa	*Operating and capital assistance to provide transportation for clients to jobs and mental health services.*
Morton	*Operating and capital assistance to continue improvement of existing social transportation services. Addition of a Saturday route.*
MTTA	*Enhanced accessibility to 27 bus shelters on 11 bus routes across the City of Tulsa. Improvements include correcting the slope on the concrete pads leading to shelters, extending the shelter slab, connecting the shelter pad to nearby sidewalks, repairing broken sidewalks adjacent to the shelter, and moving the shelter to a more accessible location.*
Gatesway	*Operating and capital assistance to provide transportation services to people with intellectual and physical disabilities to work, medical appointments, shopping, recreation, and leisure.*
A New Leaf	*Operating and capital assistance to provide transportation services to individuals with developmental disabilities to employment, medical appointments, and social activities in Tulsa, Rogers, Wagoner, Creek, Okmulgee, and Muskogee Counties.*
Pelivan Transit	*Operating and capital assistance to the Rogers County area for demand response service for medical transportation for people with disabilities.*

FREIGHT


MWCX
461743
UTLX 660959
BRADY DISTRICT PARKING
$2.00 THURSDAY, FRIDAY
SATURDAY NIGHT



Freight includes movement by air, water, and land.



Introduction

Freight transportation plays an integral role in the economy. It is defined as the movement of raw materials to manufacturers for production, then the movement of manufactured goods to businesses and consumers. The movement of goods affects quality of life, economic vitality, safety, congestion, and air quality. Freight planning is required as part of the long-range transportation planning process.

Due to the increasing size and complexity of urban areas, intra-regional goods movements have outpaced goods movement between regions. According to the Federal Highway Administration (FHWA), the freight transportation system relies on a variety of modes to support domestic and international supply chains. As shown in the next table, trucks carry the majority of freight in the continental United States, both by tonnage and value. Pipelines carry the second largest tonnage, although this mode involves only specific liquid and gaseous commodities.

Table 26. Mode Share by Tonnage and Value in the United States, 2015

Domestic Mode	Milllions of Tons				Billions of 2015 USD			
	Domestic Only	Export	Import	Total	Domestic Only	Export	Import	Total
Air (include truck-air)	*0%*	*0%*	*0%*	*0%*	*1%*	*17%*	*14%*	*4%*
Multiple modes and mail	*2%*	*5%*	*3%*	*2%*	*12%*	*6%*	*6%*	*11%*
Other modes and unknown	*0%*	*0%*	*0%*	*0%*	*0%*	*1%*	*2%*	*0%*
Pipeline	*19%*	*13%*	*16%*	*18%*	*9%*	*4%*	*4%*	*8%*
Rail	*9%*	*15%*	*9%*	*9%*	*3%*	*5%*	*5%*	*3%*
Truck	*66%*	*52%*	*35%*	*64%*	*73%*	*57%*	*53%*	*69%*
Water	*4%*	*15%*	*11%*	*5%*	*3%*	*10%*	*9%*	*4%*
No Domestic Mode	*0%*	*0%*	*25%*	*2%*	*0%*	*0%*	*7%*	*1%*
Total	*16,045*	*912*	*1,099*	*18,056*	*15,558*	*1,745*	*2,567*	*19,871*

Source: Federal Highway Administration at https://ops.fhwa.dot.gov/publications/fhwahop16083/ch1.htm#t1

The Moving Ahead for Progress in the 21st Century (MAP-21) Act and its successor, the Fixing America's Surface Transportation (FAST) Act provided the basis for states and metropolitan areas to examine and address freight transportation issues in the context of metropolitan Long Range Transportation Plans. The Connected 2045 Long Range Transportation Plan (LRTP) Freight Transportation Element highlights the multimodal aspects of the infrastructure that facilitates freight movement in the region, including two internal ports, an international airport, two Class I railroads, several short-line railroads, and trucking. These strategic regional facilities are well connected to one another and to the National Highway System (NHS) .



Development Process

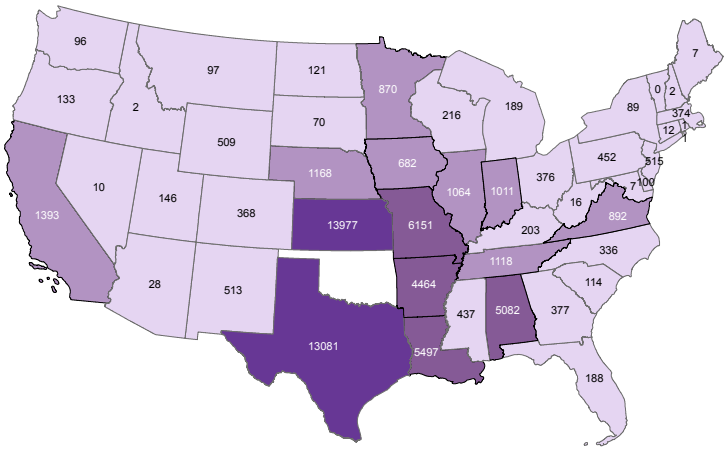
Developing the freight movement element of the Connected 2045 RTP involved the collection of data related to the five modes of moving goods in the Tulsa area, including trucking, rail, water, and air transportation. The local freight operators and stakeholders, including the Tulsa Port of Catoosa, Tulsa International Airport, and several freight operators were consulted. Data acquisitions and data collection efforts provided information that was used in developing the freight element.

The RTP freight transportation element examines the importance of the freight and goods movement and highlights the freight flow changes in the region. The major data source for this analysis is the Fright Analysis Framework (FAF). FAF is a partnership between Bureau of Transportation Statistics (BTS) and FHWA. It integrates data from a number of sources to create a picture of freight movement among states and major metropolitan areas by all modes of transportation. According to FAF data, Texas is the largest exporter of freight to Oklahoma, and that is expected to remain the case in 2045. Texas and Kansas are the two largest destinations of Oklahoma freight, currently and in 2045. The remaining large origins and destinations of freight are shown in the following figure. Surrounding states are the major freight partners for Tulsa, at the same time, Tulsa has freight-flow connections with more distant states such as California, and North Carolina.

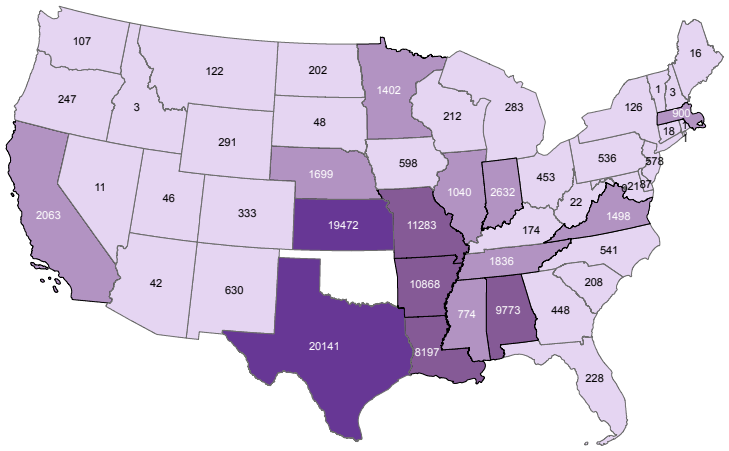


Figure 7. Inbound and Outbound Freight Flow

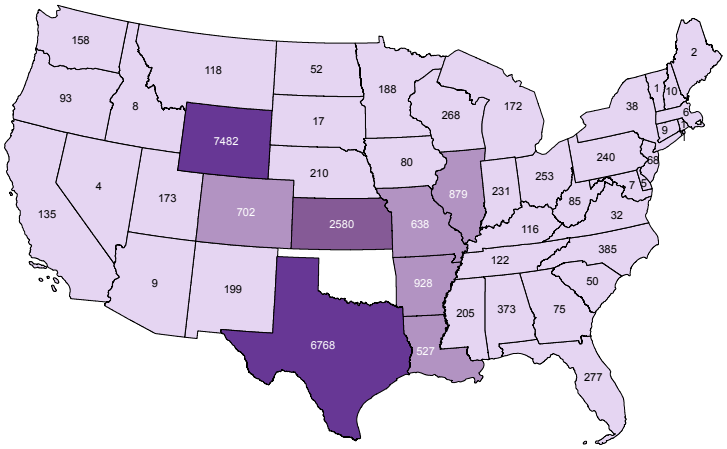
States Receiving Freight from Tulsa 2015 (Thousand Tons)



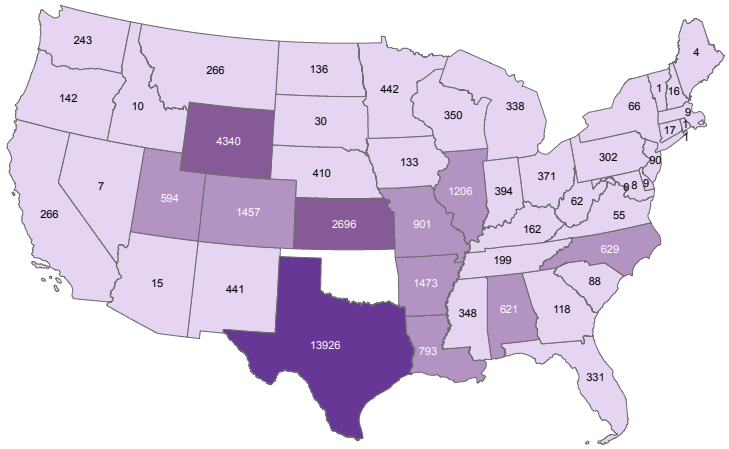
States Receiving Freight from Tulsa 2045 (Thousand Tons)



States Sending Freight to Tulsa 2015 (Thousand Tons)



States Sending Freight to Tulsa 2045 (Thousand Tons)

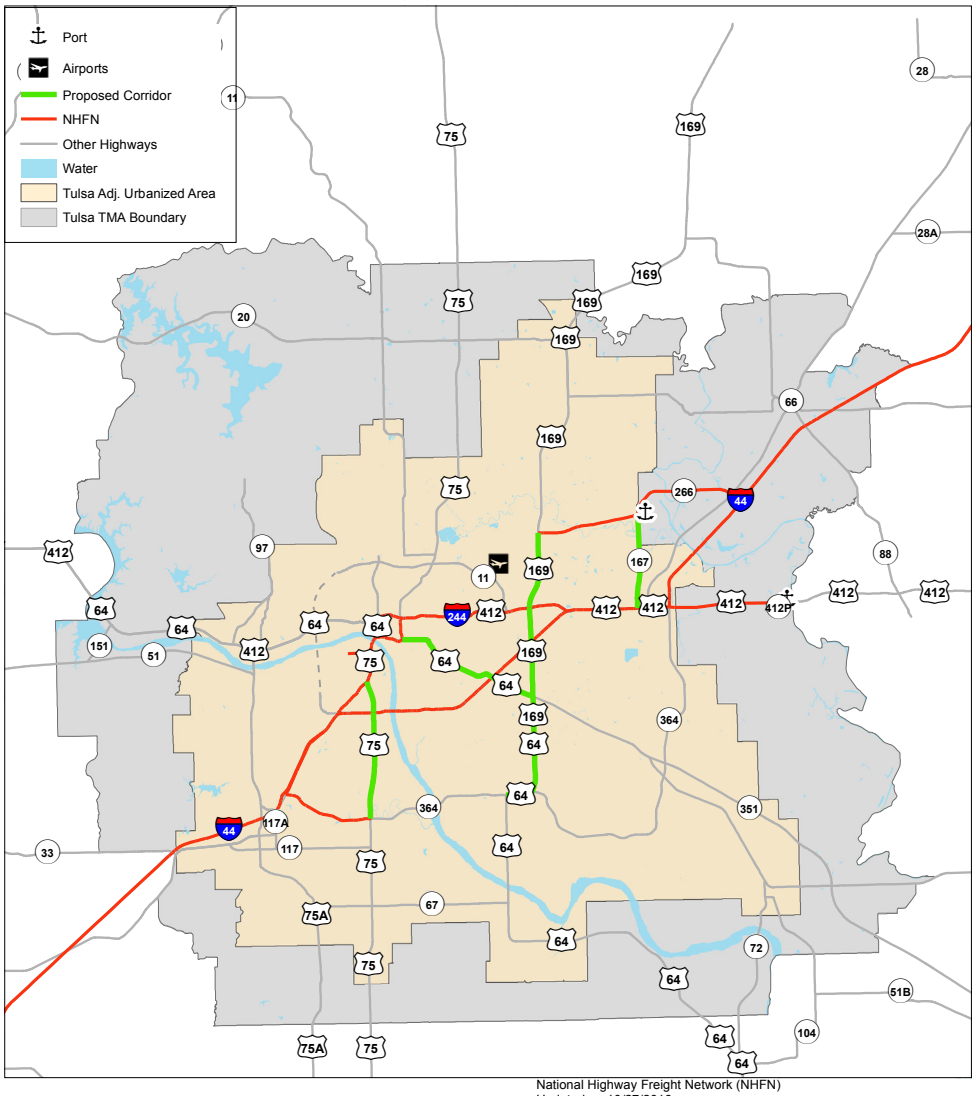


The National Highway System (NHS) consists of the Interstate Highway System, plus selected other US and state highways, links, and connections that serve the major population centers, ports, airports, public transportation facilities, intermodal transportation facilities, and major travel destinations. The NHS network of significant highways was approved by congress in 1995.

Freight Analysis Framework from https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm

INCOG and ODOT are responsible of designating public roads for the critical national freight corridors in accordance with Section 1116 of the Fixing America's Surface Transportation Act (FAST Act), and the designated National Highway Freight Network (NHFN) by FHWA. The freight corridors and NHFN are important as the National Highway Freight Program (NHFP) provides formula funds to the states to improve the efficient movement of freight on the NHFN. Oklahoma anticipates receiving approximately $18 million annually through this program. The map below shows the NHFN network and proposed freight corridors in Tulsa TMA. It also includes significant freight locations, such as Tulsa International Airport and the Tulsa Port of Catoosa.

Figure 8. National Highway Freight Network (NHFN): Tulsa, OK



As shown in Table 26, the primary mode of freight transportation in the Tulsa TMA is by truck, but rail and water freight are also significant and have opportunities for growth. The Tulsa TMA is a net exporter of freight, according to FAF data.

Table 27. Mode Share by Origin and Destination to the Tulsa Region

Thousand Tons	Tulsa Origin (Export)			Tulsa Destination (Import)		
	2015	2045	Percentage Change	2015	2045	Percentage Change
Rail	*10,479*	*19,383*	*+ 85%*	*9,243*	*7,052*	*- 24%*
Truck	*75,030*	*115,789*	*+ 54%*	*40,587*	*56,156*	*+ 38%*
Water	*8,975*	*10,214*	*+ 14%*	*141*	*292*	*+ 107%*
Grand Total	***104,682***	***155,409***	***+ 48%***	***63,883***	***83,530***	***+ 31%***

Source: Freight Analysis Framework from https://ops.fhwa.dot.gov/freight/freight_analysis/faf/index.htm

Rail Corridors

As Oklahoma's second largest city, Tulsa became attractive to railroad companies when a federal post office was opened and an influx of goods and money from ranchers and farmers began. The implementation of the railroad resulted in easy access to the city and rapid growth. The favorable economy in Tulsa brought one of the most prestigious railroads of the country, the Santa Fe Railway, to Tulsa in 1905. The railroad had a profound effect on the development of the city and numerous businesses established along the rail tracks. The effects can also be seen on the alignment of downtown streets oriented in northeast-southwest and northwest-southeast directions at right angles, parallel and perpendicular to the Frisco railroad tracks.

Today, rail transportation in the Tulsa area is provided by two class-I carriers and five short-line carriers. The class-I carriers are Union Pacific (UP) and Burlington Northern Santa Fe Railway Company (BNSF). Together, they operate approximately 200 miles of track in the area. The five short lines that operate in the Tulsa region are the South Kansas and Oklahoma Railroad (SKOL), Tulsa-Sapulpa Union Railroad (TSU), Sand Springs Railroad (SS), Tulsa Port of Catoosa (PC), and Stillwater Central. The short lines operate on approximately 66 miles of track in the area. The two major commodities transported by the railroads in Oklahoma are coal and grain, with coal terminating in the state and grain being shipped beyond Oklahoma. Most of the freight movement within the state is between the Oklahoma City and the Tulsa areas.



The Burlington Northern Santa Fe Railroad (BNSF) has the largest rail yard in the area, located southwest of downtown Tulsa. Access to the BNSF yard is from US-75 and I-44 provide access to the BNSF yard. Approximately 5,400 tons of freight and 160 rail cars are operated daily, originating and terminating in the Tulsa area. The trains generally run east-west, and destinations vary greatly, with bulk industrial products being the primary cargo. BNSF provides rail access to the Tulsa Port of Catoosa and the manufacturing plants near the Tulsa International Airport. BNSF operates on about 150 miles of track in the Tulsa region.

The Union Pacific line runs between Muskogee and Tulsa, and their warehouse is the former Katy yard near 51st and Mingo. The Union Pacific Railroad operates on about 40 miles of track at two train yards in the Tulsa area, processeing four trains per day, including support operations for the UP regional terminal facility in Muskogee. UP transports most of the coal utilized at electric generating plants outside the Tulsa metropolitan area in Chouteau, Muskogee, and Oologah.

The short-line railroads serve primarily as the connection between shippers and class-I rail carriers. The Sand Springs Railroad is owned by OmniTrax Inc., and it operates service between downtown Tulsa and Sand Springs with 32 miles of track connecting freight cars daily with the Burlington Northern Santa Fe Railroad, Union Pacific Railroad, and the South Kansas Oklahoma Railroad (SKOL). Their covered storage facility is multimodal and contains 100,000 square feet.

The South Kansas and Oklahoma Railroad (SKOL) is a segment of the former Santa Fe line to Kansas City. The company warehouse is located in Owasso between 76th St. N. and 86th St. N., one mile west of US-169. The trains run north out of Owasso and south to Tulsa, connecting with BNSF and UP. It also serves the Tulsa Port of Catoosa daily via an eight-mile

track from Owasso to the Port. The Tulsa-Sapulpa Union Railroad is primarily a switch carrier between Class I carriers (BNSF and UP) and customers located on TSU railway. It serves the metropolitan area, running from Sapulpa to West Tulsa to Jenks on a total of 23 miles of track. It is one of Oklahoma's oldest and smallest operating railroads. In January 2001, TSU became operator of UP track connecting Tulsa and Jenks, and connecting with the BNSF railroad in Sapulpa.



Stillwater Central operates a 97-mile line between Sapulpa and Oklahoma City. In Sapulpa, it interchanges the cars to BNSF, which then distributes the cars accordingly. In cases where Stillwater Central interchanges cars with SKOL, SKOL carries the traffic across to Tulsa.

The Port of Catoosa, five miles from Tulsa, is one of the country's most inland ports, and it operates its own railroad. It has two switch engines, and serves customers on 13 miles of rail track. The Port is also served directly by BNSF and SKOL.

Water Transportation

The Tulsa Port of Catoosa is located at the head of the navigation channel for the McClellan-Kerr Arkansas River Navigation System. The 445-mile waterway links Oklahoma and the surrounding five-state area with ports on the U.S. inland waterway system, and foreign and domestic ports beyond, by way of New Orleans and the Gulf Intracoastal Waterway. The Port is owned jointly by the City of Tulsa and Rogers County, and is operated through a public authority appointed by both governments.



The Port complex encompasses a 2,000-acre industrial park, offering fully developed sites for prospective industry, and a 500-acre terminal area for public and private barge-handling operations. The port channel is 1.5 miles long, and the port facilities include two towboats for barge switching, liquid cargo loading and unloading docks, a grain-handling facility, a dry-cargo wharf, an overhead-traveling crane, and dolphins for barge mooring. The port area also contains dry bulk-storage compartments, sites for warehousing and fabrication, and other terminal operations within the industrial complex. The Port's intermodal capabilities include barge switching service, in-port rail operations, pipelines, and access to class-I rail service.

The Port is accessible from I-44 and US-169 via SH-266 (Port Road), and SH-167, and is located about eight miles northeast of Tulsa International Airport. In December 1979, the Port was designated as a duty-free port, or Foreign Trade Zone No. 53. This designation covers an area of 52 acres, including an area that may be used by individual companies for construction of their foreign trade-zone facility. A foreign trade zone is an area considered outside the customs territory of the United States, where foreign and domestic merchandise may be admitted for storage, exhibition, assembly, processing, manipulation, relabeling, sampling or manufacturing, duty free and without quota, while being processed for the consumer market. Payment of customs duties on foreign goods is not required unless and until the merchandise enters customs territory for domestic consumption. The port handled 1,551,808 tons of freight in 2015. Of this, 670,510 tons or approximately 43% was inbound, while 881,298 tons or 56% was outbound, as shown in the table below:

Table 28. 2015 Tulsa Port of Catoosa Tonnage Data

Tonnage Report 2015	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	TOTAL
INBOUND TONS / BARGES													
Total Tons	*85,189*	*82,452*	*88,771*	*85,998*	*32,436*	*13,992*	*50,033*	*71,130*	*49,128*	*48,523*	*35,194*	*27,734*	*670,510*
Total Barges	*56*	*53*	*58*	*56*	*21*	*9*	*33*	*45*	*32*	*32*	*25*	*19*	*439*
OUTBOUND TONS / BARGES													
Total Tons	*117,572*	*65,883*	*77,236*	*60,689*	*14,370*	*44,278*	*18,481*	*84,860*	*44,496*	*122,228*	*111,216*	*119,989*	*881,298*
Total Barges	*63*	*39*	*48*	*39*	*6*	*22*	*12*	*45*	*27*	*68*	*63*	*68*	*500*
TOTAL (INBOUND AND OUTBOUND)													
Total Tons	*202,761*	*148,335*	*166,007*	*146,687*	*46,806*	*58,200*	*68,514*	*155,990*	*93,624*	*170,751*	*146,410*	*147,723*	*1,551,808*
Total Barges	*119*	*92*	*106*	*95*	*27*	*31*	*45*	*90*	*59*	*100*	*88*	*87*	*939*
CUMULATIVE (JAN 1971 TO 2015)													
Total Tons	*76,370,345*	*76,518,680*	*76,684,687*	*76,831,374*	*76,878,180*	*76,936,380*	*77,004,894*	*77,160,884*	*77,254,508*	*77,425,259*	*77,571,669*	*77,719,392*	*77,719,392*
Total Barges	*46,604*	*46,696*	*46,802*	*46,897*	*46,924*	*46,955*	*47,000*	*47,090*	*47,149*	*47,249*	*47,337*	*47,424*	*47,424*

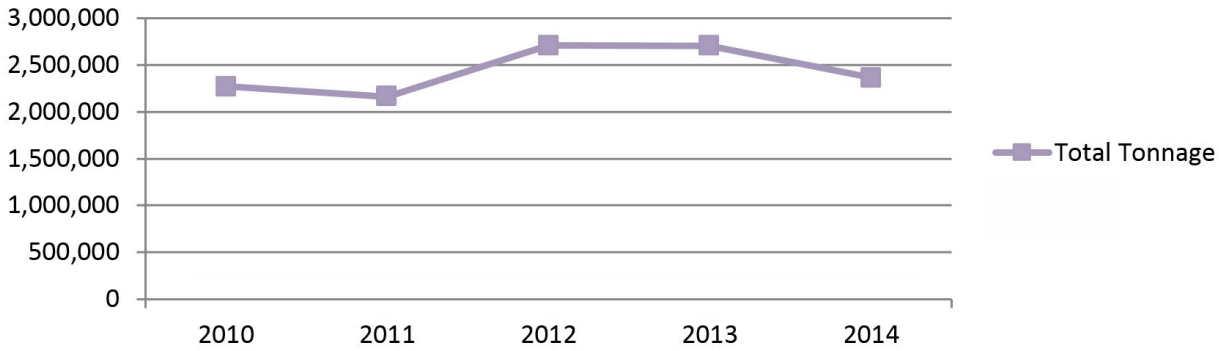
Source: Tulsa Port of Catoosa from http://www.tulsaport.com



Additionally, Johnston's Port 33, a privately-owned and operated port facility, is located at the eastern boundary of the TMA near the intersection of US-412 and the navigation channel. It consists of five separate docks for simultaneous loading and unloading, two service boats, and capacity for several barges, conveyor systems, barge unloading excavators, and a scrap handling magnet. The Port has capacity for open bulk storage, including fertilizer and grain storage. The Port's primary outbound shipments consist of liquid bulk and agricultural products, as well as grain transported by truck from Enid, Oklahoma.

Water transportation will continue to play an important role in the Tulsa area. According to figures provided by the Tulsa Port of Catoosa, the total annual tonnage grew a little more than 19% from 2011 to 2013, followed by a slight decrease in 2014, attributed to factors including excessive rain affecting navigability.

Figure 9. Tulsa Port of Catoosa Total Tonnage Data by Year



The number of businesses located at the Port of Catoosa also continues to grow, and now stands at 72. The Port is involved in an ongoing marketing program offering prime industrial sites for lease or sale in the adjacent Riverview Business Park. Port officials are predicting that the growth in total tonnage transported and in the number and variety of industries at the port will continue.

Air Transportation

The Tulsa International Airport (TIA) is owned by the City of Tulsa and operated by the Tulsa Airport Authority. Established in 1928 on a 390-acre tract, Tulsa International today encompasses more than 4,300 acres just 10 minutes northeast of downtown. The airport complex is classified as a medium hub, primary commercial service airport by the FAA's National Plan for Integrated Airport Systems (NPIAS). It presently covers 4,360 acres and operates with three runways, along with parallel and connecting taxiways that provide aircraft access to the airport terminal and other airport facilities. Air carrier, general aviation, military, and air taxi aircraft utilize these runways. The airport's air carrier terminal is currently set up to operate as many as 22 passenger loading gates, serving 10 passenger air carriers, and processing 2.8 million passengers in 2016. There has been nearly a 15% decrease in enplanements and deplanement since 2007, and only a 2.56% increase from 2012 to date.

Table 29. Summary Data - Tulsa International Airport (U.S. Flights Only)

	2016**	2017**	Percentage Change	Rank***
Passengers				
Arrival	*1,356k*	*1,335k*	*- 1.53%*	*79*
Departure	*1,354k*	*1,335k*	*- 1.38%*	*79*
Scheduled Flights				
Departures	*19,323*	*18,751*	*- 2.96%*	*79*
Freight/Mail (lb.) (Scheduled and Non-Scheduled)				
Total	*115m*	*111m*	*- 3.10%*	*65*
Carriers				
Scheduled	*18*	*20*	*+ 11.11%*	

Source: Bureau of Transportation Statistics from https://www.transtats.bts.gov

** Scheduled enplaned revenue passengers.*
*** 12 months ending April of each year.*
**** Among 789 U.S. Airports, 12 months ending May 2017*



Airport facilities include passenger terminals serving major air carriers, including American, Delta, Southwest, United Airlines, and regional commuter air carriers including Northwest Airlink, American Eagle, Comair, and Atlantic Southeast. The air cargo terminal facility is located directly south and east of the passenger terminal building. The air cargo terminal consists of a landside and an airside, where incoming and outgoing cargo is processed and loaded from trucks to aircraft and vice versa. The air cargo terminal is currently occupied by Airborne, Burlington, Emery, Federal Express, Martinaire, and United Parcel Service. In addition, some freight and mail, including US Postal Service mail, is transported on scheduled air carrier and commuter airlines serving the airport.

Tulsa International Airport

The Tulsa International Airport (TIA) handled 53,612 tons of cargo in 2016 including airmail and airfreight, transported by airfreight carriers and in the cargo-hold of passenger aircraft. This total included nearly equal amounts of inbound and outbound cargo. Total air cargo activity at TIA has decreased by about 5% since 2012. Direct access to TIA is provided via SH-11/Gilcrease Expressway, which runs east-west along the southwest corner of the air carrier terminal. Access is also provided from the north by SH-266 (Port Road). The airport is accessible from I-244, US-169 and US-75 via SH-11/Gilcrease Expressway. In addition, the airport is accessible from several major north-south arterials in the area, including Memorial Dr., Sheridan Rd., and Mingo Rd.

The Burlington Northern Santa Fe Railway (BNSF) operates a line that runs east-west along the southern edge of the airport. Another rail line operated by the SKOL is located north of the airport and veers in a northeasterly direction. A rail spur that branches out from the BNSF rail line provides rail access to the manufacturing plants adjacent to the airport; however, there is no direct rail connection with the airport terminal facility at this time. A general aviation airport in the area, Richard Lloyd Jones, Jr. Airport (Riverside), is designated by the Federal Aviation Administration (FAA) as a reliever for TIA. This reliever is part of the Tulsa metropolitan area Airport System Plan and is located about 15 miles south and west of TIA, near Jenks. This airport is equipped to handle potential excess capacity at TIA. The current access to the airport is adequate and provided through a variety of roadways and streets from the south and east; however, as the airport grows and expands, design and engineering will be initiated as necessary to improve any traffic bottlenecks.



Issues and Actions

Since freight transportation is a means to various regional economic ends, changes to the regional economy, such as manufacturing and retail, directly affect freight transportation and vice versa. In addition, access to raw materials and markets are key factors in the location decision of most manufacturing and distribution companies. Building efficient freight infrastructure will require coordination among the various modes of freight transportation. An efficient freight movement system would expand markets, increase opportunity, production, and competition. The major issues associated with freight transportation in the TMA can be grouped into five broad categories, including land and regulatory, energy efficiency, safety, economic development and physical infrastructure. These issues have been evaluated, and the following actions are proposed:

Table 30. Issues and Actions for Freight

Issue	Actions
Land and Regulatory	
According to an Oklahoma trucking industry survey, the most burdensome issue in the goods movement process continues to be government regulation. In spite of federal deregulation of the trucking and airline industries in the late 1980s and early 1990s, individual states have continued to maintain restrictions on the weight and size of trucks that can operate within their borders.	• *In conjunction with the chambers of commerce, and local freight transporters, identify any legal and regulatory impediments to freight movement in the Tulsa area. A key concern is the Tulsa Port of Catoosa DPS (Department of Public Safety) inspection and permitting system and legislative issue with nightly freight/shipping issues.*
Energy and Efficiency	
The current system for moving freight relies heavily on trucking, which is one of the least fuel-efficient modes. Trends in freight transportation (just-in-time, next day delivery, etc.), appear to suggest that trucking and airfreight are the wave of the future. *One prominent goal is to develop a Transportation System that ensures energy efficiency. In order to advance such a goal, the freight element of the LRTP identifies resources that foster the development of more efficient freight vehicles, better technology, or operational strategies that minimize the use of energy. An energy efficient goods movement plan should focus on the following actions.*	• *Encourage the use of cleaner burning alternative fuels and their potential application in the goods movement process.* • *Support the development of more efficient freight vehicle technology and the use of energy efficient alternatives such as double stacked railcars, longer trailers, electronic sorting and tracking of packages, freight consolidation techniques, satellite distribution centers, etc.* • *Support the local emergency/hazardous materials management agency in identifying alternative routing options in the area, for transportation of potential hazardous materials.* • *Develop an Oversized Load Dispatch process to direct shippers to proper routes to accommodate necessary weight, height, and axle spacing.* • *Support efforts to maximize efficiency in the goods movement process, including handling and transporting goods to minimize air emissions and achieve air quality goals.*

Table 30. Issues and Actions for Freight (Continued)

Issue	Actions
Safety	
The goods-movement process is concerned with issues of safety. Freight movement involves safety at facilities, vehicle operational safety, and safety along the roadways. The safety issues associated with individual terminal facilities are the responsibility of terminal operators; however, drivers must be certified, and vehicles must pass safety inspections in order to operate on the roadways. *Similarly, the local roadway network must meet the minimum design standards to maximize safety for vehicles and other road users. Therefore, the freight transportation plan for the region must address the issue of safety from the perspective of the driver, the vehicle, and the roadway. The LRTP must also address safety as it relates to trains, barges, and other freight transportation modes.*	• *Identify the high incident/collision locations involving freight movement in the region, including highways, railroads, railroad crossings, and waterways. Work with the local freight operators to identify and address safety-related issues on the road network and elsewhere.* • *In conjunction with ODOT, rail operators and local governments, develop and maintain an inventory of rail/highway crossings in the area, including at-grade and grade separated crossings, and use the results to guide the prioritization and selection of potential projects.* • *Collect and maintain data related to truck collisions and truck safety on the region's primary roadways.* • *Encourage the development and use of improved vehicle technologies to enhance safety, such as collision mitigations systems, and support a vehicle life cycle tracking system and ongoing vehicle safety inspection program for all modes.* • *Identify bottlenecks, missing links, safety hazards, and other needed components of the regional infrastructure.*
Economic Development	
Because the movement of freight is closely related to regional economic activity, changes in the economy are likely to affect the volume and pattern of regional goods distribution. Trends in regional production, manufacturing, and distribution will be closely monitored and characterized to get a better understanding of freight activity in the Tulsa area. As the region grows and expands economically, so will the need for freight service. Therefore, the goods movement planning process must support regional economic development activities.	• *Work with local businesses, chambers of commerce, local governments and authorities to identify freight-related long-range and short-range transportation projects and encourage their funding and implementation.* • *Support the use of state and local economic development programs to develop regional transportation facilities, improving industrial areas and other freight activities that have the potential to strengthen the local economy.* • *Encourage public/private partnership ventures that provide leverage for local freight transportation projects.*

Table 30. Issues and Actions for Freight (Continued)

Issue	Actions
Physical Infrastructure	
Regional freight infrastructure consists of networks, vehicles, and terminal facilities. These include airports, port facilities, and roadways that are built, maintained, and operated by the public sector. *A significant portion of the infrastructure belongs to the private sector, including airplanes, barges, towboats, trains, rail facilities, trucks, truck terminals, pipelines, etc. This difference in ownership may present some challenges when it comes to planning for future infrastructure needs. The focus of the freight element is on the infrastructure that is built, maintained and operated by the public sector. Following are some actions that would facilitate the smooth flow of goods into and through the Tulsa region.*	• *Work with the Oklahoma Department of Transportation and other agencies to continue development and maintenance of the roadways and bridges in the area, including those that connect the manufacturing, storage, and distribution centers in the area to other market areas beyond the TMA. Most freight companies would support increased diesel tax if additional funds were to be used for road maintenance.* • *Develop criteria to evaluate and monitor the performance of the freight movement infrastructure including roadways, railways, airports, and other networks in the area.* • *Encourage feasibility studies to designate/add interstates, and investigate opportunities to improve the Mingo and Pine corridors, and US-75, US-169, and I-44 to facilitate freight movement between Tulsa and the surrounding metropolitan areas of Dallas/Ft. Worth, Texas; Kansas City and St. Louis, Missouri; and Wichita, Kansas.* • *Support development of regional ITS applications, in compliance with national ITS architecture for truck facilities and operations in the TMA.* • *Enhance the development of the Tulsa International Airport and the Port of Catoosa through implementation of planned physical infrastructure improvements, including additional air cargo facilities and improved landside access, and additional dock capacity at the Port of Catoosa for general cargo, dry bulk, and container cargo; support efforts to widen and deepen the Port of Catoosa water channel .*



SAFETY





Safety and congestion are both public issues; however, congestion, is repeatedly ranked as number one or two in urban polls. The public expects the DOTs to address the issue and judges their effectiveness on its ability to alleviate congestion; therefore, substantial funding is aimed at strategies to reduce congestion.

Study results suggest the public needs to better understand the societal costs associated with crashes, to elevate safety as a policy issue of equal importance[3.]





Introduction

An assessment of the crash data from 2011-2015 in the TMA revealed that there were 390 collisions that resulted in at least one fatality. Over this same time period, there were 28,551 collisions resulting in an injury; 2,699 of these included an incapacitating injury in which at least one occupant was unable to continue normal activities (such as walking or driving) as a result of the collision. The societal impacts of these collisions are significant, both socially and financially. Yet the financial perspective is often unknown to the general public. Because of this, the defining objectives of this chapter are to discuss the importance of emphasizing safety in transportation matters and highlight what INCOG and the region are doing to address this issue.

In 2011, the American Automobile Association (AAA) published *Crashes VS. Congestion: What's the Cost to Society?* [3] and according to report, the FHWA estimated that the average cost of a single motor vehicle fatality is $6,000,000 (equivalent to $6,956,025 in 2017 dollars). The study estimated that the cost of

3. http://newsroom.aaa.com/wp-content/uploads/2011/11/2011_AAA_CrashvCongUpd.pdf

an injury averages $126,000 (in 2009 dollar values). For year 2009, AAA found that the Tulsa MSA reported 163 fatalities and 9,989 injuries. As a result, Tulsa experienced a financial loss of $2.237 billion, including $978 million from fatalities and $1.2 billion from injuries in 2009 dollars. This equates to approximately $2,408 per resident. Of the 99 metropolitan areas analyzed, Tulsa recorded the 3rd highest cost per person among the 31 medium-sized metros and the 8th highest overall.

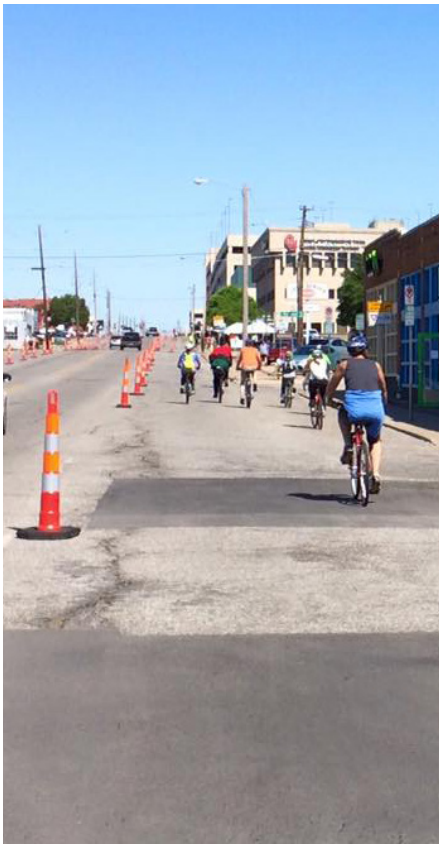
The collision costs are strongly contrasted by the costs of congestion in which Tulsa reported some the lowest costs in the country. According to AAA, the urbanized area lost $202 million due to congestion (only 9% of the total collision costs). This is approximately $289 per person (12% of the collision costs). This ranked Tulsa as 24th of the 31 medium-sized metros for highest financial losses due to congestion, and 75th among all metros evaluated. These costs are in line with the *2011 Urban Mobility Report (Texas Transportation Institute)* [4] which reported the Tulsa Urban Area lost $183 million due to congestion ($368 per auto driver). This report aligns with INCOG's findings when comparing the collision patterns of the Tulsa metro to other peer cities. According to this report, the INCOG region experiences a significantly greater financial loss from collisions than it does from congestion. As a result, it is the recommendation of Connected 2045 that a greater regional emphasis and greater resource allocations should be placed on transportation safety initiatives.



INCOG's Role in Regional Transportation Safety

As the MPO for the region, INCOG's involvement in safety is comprehensive in nature. From hosting local conferences taught by practicing engineering and design professionals, to conducting media campaigns targeting the region's highest priority areas for awareness of bike and pedestrian safety, INCOG has taken a holistic approach to further safety in the region. Though INCOG has been involved in education and outreach, the primary responsibility includes providing the resources and guidance necessary for the planning and evaluation of member agencies' transportation safety projects. Through the creation of planning documents such as the GO Plan (the regional bicycle and pedestrian master plan) and Connected 2045, INCOG has made a significant effort in identifying regional needs and priorities to further the safety of all modes of transportation.

4. https://nacto.org/docs/usdg/2011_urban_mobility_report_schrank.pdf



INCOG also provides services for collisions data analysis to all member governments seeking to identify and address safety concerns in their municipalities. By using the Oklahoma DOT Collision Database (SAFE-T) in combination with various mapping tools, INCOG is able to evaluate historical crash data to assess existing conditions and collaborate with traffic/design engineers to determine solutions. INCOG representatives also serve on multiple safety-related boards, including the state Traffic Incident Management Coalition, the High Crash Task Force (City of Tulsa), and the Bicycle & Pedestrian Advisory Committee (BPAC), at the Tulsa metro.

Collision Analysis - Automobiles

When evaluating all TMA crashes, the majority of these occur with the City of Tulsa. As shown in the following maps, when evaluating highway/interstate collisions, there are two areas with the highest number of collisions: the Broken Arrow Expressway interchanges at Interstate 44, and at U.S. Highway 169. When evaluating non-interstate/highway crashes, the areas showing the highest number of collisions are downtown Tulsa and the 61st to 71st corridors, between South Memorial Dr. and South Mingo Road.

The majority of motor vehicle collisions in the TMA occur within the City of Tulsa.



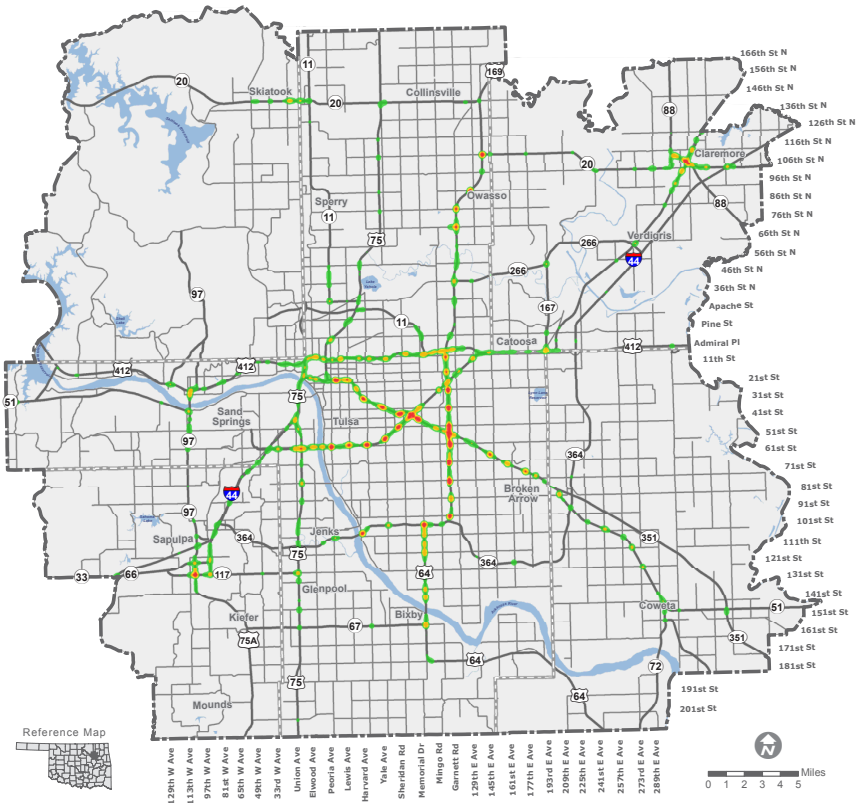


Figure 10. Highway Crashes within the TMA

Legend

Highways
Major Streets
Bodies of Water
County Boundaries
TMA Boundary

Density of Crashes

Greater — Less

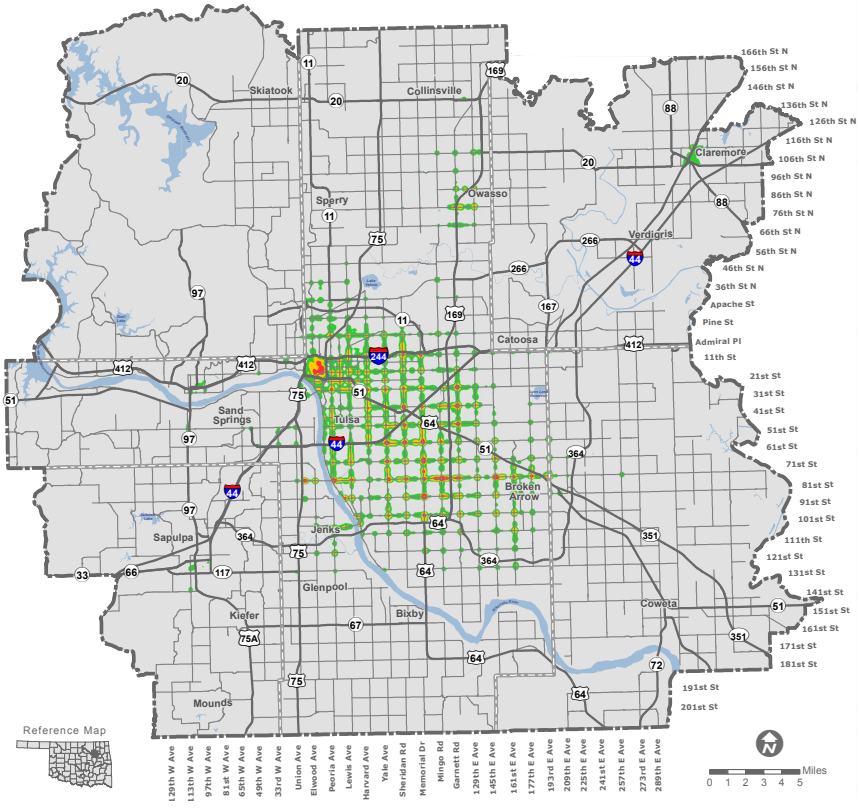


Figure 11. Street Crashes within the TMA

Legend

Highways
Major Streets
Bodies of Water
County Boundaries
TMA Boundary

Density of Crashes

Greater — Less

The majority of non-highway collisions occur at (or approaching) the intersections of major arterials. It is at these locations where high volumes of traffic converge, often traveling at high speeds. Based on frequent land use and access management practices, these areas also tend to have high numbers of access points leading to unpredictable yet frequent turning movements. This produces a higher number of collisions and more high-severity collisions resulting from cross-traffic, angle turns. When studying collisions at these locations, there are numerous ways in which this data may be evaluated. Common practices include ranking intersections by the number of collisions, cumulative severity, or a collision rate based on traffic volume, such as AADT (Annual Average Daily Traffic). The table below lists the TMA's top 25 intersections ranked by total number of collisions. These alone contributed nearly 5,000 collisions from 2011-2015, acounting for 7% of all crashes in the TMA.

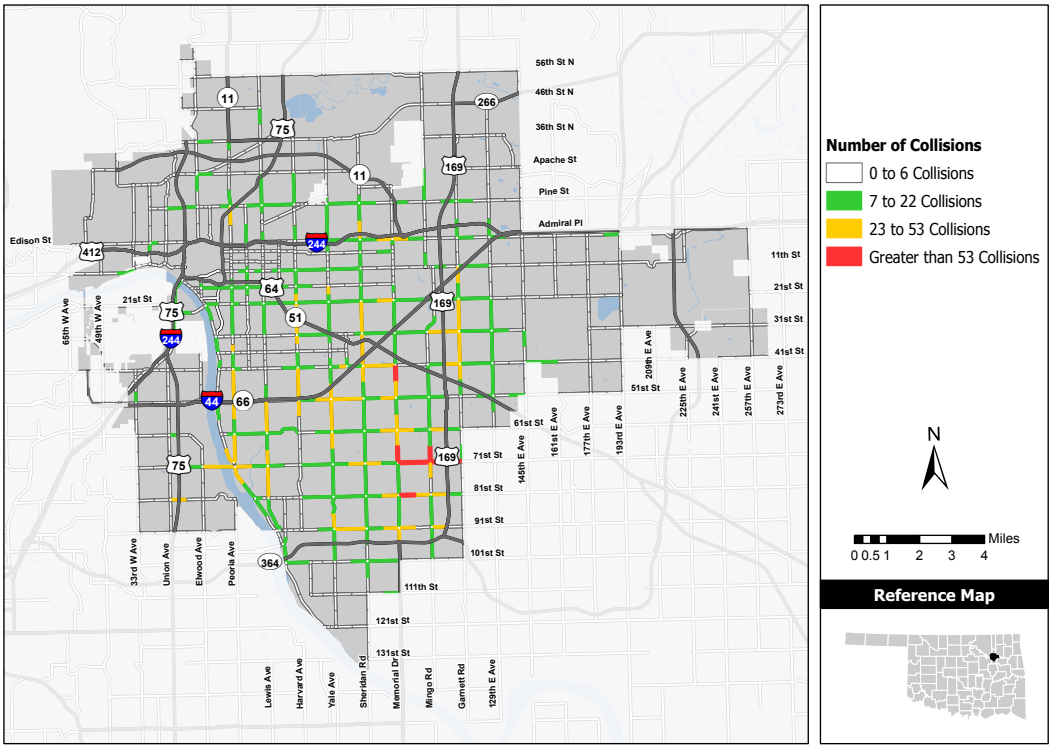
Table 31. INCOG TMA Crashes 2011-2015

Intersection	Number of Crashes	Rank by Rate	Rank by Number of Crashes	Sum of all Traffic Counts	AADT (Based on Weekdays-270)	Rate per 1M Vehicles Entering
Aspen Ave. and Kenosha St.	*342*	*1*	*3*	*93,157*	*46,579*	*5.44*
Memorial Dr. and 81st St.	*346*	*2*	*2*	*108,200*	*54,100*	*4.74*
Mingo Rd. and 71st St.	*354*	*3*	*1*	*139,400*	*69,700*	*3.76*
109th E. Ave. and 71st St.	*154*	*4*	*21*	*60,959*	*30,480*	*3.74*
101st E. Ave and 71st St.	*199*	*5*	*9*	*94,000*	*47,000*	*3.14*
Garnett Rd. and 41st St.	*198*	*6*	*10*	*94,200*	*47,100*	*3.11*
92nd E. Ave and 71st St.	*210*	*7*	*6*	*104,200*	*52,100*	*2.99*
Kenosha St. and 23rd St.	*158*	*8*	*18*	*79,520*	*39,760*	*2.94*
Garnett Rd. and 31st St.	*186*	*9*	*11*	*95,300*	*47,650*	*2.89*
Riverside Dr. and 71st.	*224*	*10*	*5*	*119,800*	*59,900*	*2.77*
Sheridan Rd. and 31st. St.	*167*	*11*	*16*	*90,000*	*45,000*	*2.75*
Memorial Dr. and 61st St.	*239*	*12*	*4*	*132,500*	*66,250*	*2.67*
Garnett Rd. and 21st St.	*178*	*13*	*14*	*100,600*	*50,300*	*2.62*
Memorial Dr. and 51st St.	*176*	*14*	*15*	*106,200*	*53,100*	*2.46*
Olympia Ave. and 71st St.	*201*	*15*	*8*	*121,600*	*60,800*	*2.45*
Sheridan Rd. and 51st. St.	*166*	*16*	*17*	*104,500*	*52,250*	*2.35*
Yale Ave. and 91st St.	*134*	*17*	*29*	*87,900*	*43,950*	*2.26*
Mingo Rd. and 81st St.	*142*	*18*	*26*	*93,700*	*46,850*	*2.25*
Memorial Dr. and 71st.	*202*	*19*	*7*	*135,300*	*67,650*	*2.21*
Kenosha St. and 9th St.	*136*	*20*	*27*	*92,808*	*46,404*	*2.17*
Mingo Rd. 51st St.	*149*	*21*	*25*	*102,300*	*51,150*	*2.16*
Sheridan Rd. and 71st St.	*182*	*22*	*12*	*132,200*	*66,100*	*2.04*
Memorial Dr. and Admiral Pl.	*135*	*23*	*28*	*98,800*	*49,400*	*2.02*
Memorial Dr. and 41st St.	*153*	*24*	*22*	*115,100*	*57,500*	*1.97*
Lewis Ave. and 71st St.	*156*	*25*	*19*	*119,800*	*59,900*	*1.93*

Source: SAFE-T collission database at https://www.oksafe-t.org/

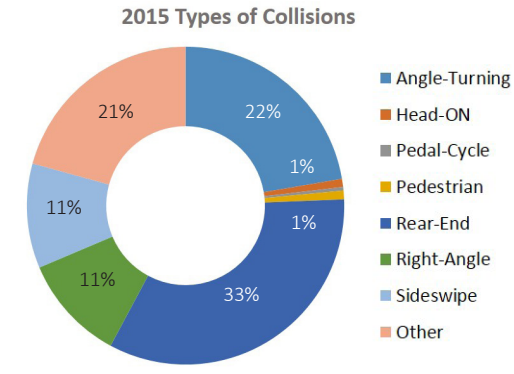
INCOG also uses collision data to assist member governments in prioritizing street projects. As an example, staff were able to evaluate and rank all half-mile arterial segments within the City of Tulsa based on the total number of crashes. This method was selected to better coincide with the City of Tulsa's existing street project funding and implementation practices. At their request, this was done while excluding all collisions within the intersections themselves, as these equally impact conditions on all "legs" touching the intersection. The result is a true ranking of non-intersection collisions occurring on arterials. The following map presents these findings.

Figure 12. City of Tulsa 2013-2015 Crashes, By Half-Mile Segments on Arterials only



Source: SAFE-T collission database at https://www.oksafe-t.org/

In terms of trends, over the past decade the region has experienced little change in collision rates. In 2006, the City of Tulsa reported a rate of 10.2 auto-related fatality collisions per 100K population. In 2015, there were 8.9. Over this same time period, injury collisions have experienced a slow and steady decline, going from 1,200 collisions per 100K population to a rate of 1,000. There is also little fluctuation in the percentages of each type of collision that occurs. The chart on the right includes percentages for each type of crash in 2015. Each category has changed no more than 1% since 2011.



Types of Collisions for each type of crash in 2015 within the TMA. INCOG.

When comparing the INCOG region to peer and neighboring metros, the Tulsa region does produce higher collision rates based on population. The following table shows that the City of Tulsa had the highest fatality rate and the second highest injury rate of the ten cities evaluated. These findings support those of the aforementioned AAA study.

Table 32. Peer City Collision Comparisons

Year	City	Population Estimate	Fatality Collisions	Injury Collisions	Property Damage	Total Crashes	Fatality Collision Rate (Per 100 K)	Injury Collision Rate (Per 100 K)	Property Damage (Per 100 K)	Rate of Total Crashes (Per 100 K)
2014	**Tulsa, OK**	395,599	47	4,082	5,687	9,816	11.88	1031.85	1437.57	2481.30
2013	**Little Rock, AR**	195,092	23	2,401	4,911	7,335	11.79	1230.70	2517.27	3759.76
2014	**Dallas, TX**	1,240,985	143	10,137	17,490	27,770	11.52	816.85	1409.36	2237.74
2015	**Tucson, AZ**	531,641	53	2,468	2,487	5,008	9.97	464.22	467.80	941.99
2014	**Fort Worth, TX**	778,573	77	4,841	7,898	12,816	9.89	621.78	1014.42	1646.09
2014	**Oklahoma City, OK**	600,729	53	4,526	10,360	14,939	8.82	753.42	1724.57	2486.81
2014	**Arlington, TX**	375,305	28	2,508	3,141	5,677	7.46	668.26	836.92	1512.64
2014	**Wichita, KS**	385,518	27	2,609	5,399	8,035	7.00	676.75	1400.45	2084.21
2014	**Austin, TX**	864,218	54	6,592	5,374	12,020	6.25	762.77	621.83	1390.85
2014	**Overland, KS**	178,945	3	886	2,876	3,765	1.68	495.12	1607.20	2104.00
2014	**Kansas City, MO**	459,787	44	4,106	13,008	17,158	9.57	893.02	2829.14	3731.73

Source: State highway safety offices city crash statistics.



Collision Analysis- Pedestrians and Cyclists

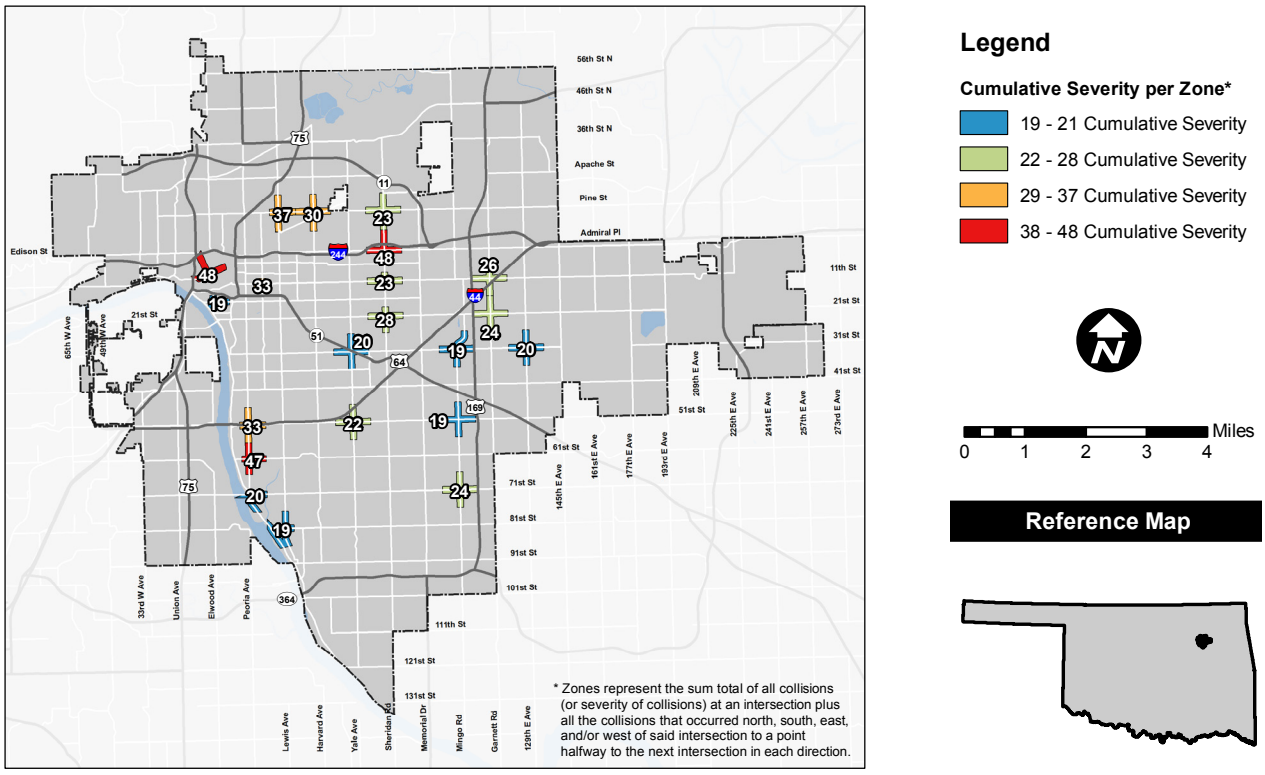
INCOG has long had a strong presence in advancing the needs and safety concerns for the bicycle and pedestrian communities. Over the past decade the region has undergone significant improvements to the regional, off-street trails network as well as the advancement of local policies for sidewalks and ADA accessibility. Despite these efforts, the region is experiencing a significant increase in pedestrian fatalities. In 2006, there were 7 pedestrian fatalities in the region. Since then, fatalities have been on the rise, resulting in 13 fatalities in 2015. Over the past decade, pedestrians bicycle fatalities have been average 17% of all collision fatalities. In 2015, that number rose to 23% with no bicycle-related fatalities. Estimates indicate that the 2016 number of pedestrian fatalities continues to increase.

To better understand these trends, INCOG partnered with the regional Bicycle and Pedestrian Advisory Committee (BPAC) to identify the priority areas where these collisions are occurring. The map below ranks all City of Tulsa intersections by cumulative severity of all pedestrian/bike collisions in each "Zone", which represent the sum total of all collisions at an intersection plus all the collisions that occured north, south, east and/or west of said intersection to a point halfway to the next intersection in each direction.

Cumulative Severity is the sum of all collision severities for crashes occurring within a defined geographical boundary. Collision Severity is a 5-point scale which relates to the level of injury the individuals involved in a collision received as a result of the collision. This includes a fatality (5) collision, incapacitating injury (4), non-incapacitating injury (3), possible injury (2), and property damage a (1) if the individual(s) has no apparent injuries. Only a single value may be assigned per collision and must equate to the highest severity of injury reported in the collision. A collision with one fatality and one serious injury is considered a fatality-5 collision.

With this information, INCOG has been able to target these priority areas with a media campaign. INCOG also uses this information to provide a pedestrian/cyclist perspective on upcoming street rehabilitation projects. There are plans to further study these areas and more clearly define the present issues and solutions, whether based in engineering/design, enforcement, education, etc.

Figure 13. City of Tulsa Severity of Pedestrian and Bicycle Collisions (2012-2015) by Zone



Source: SAFE-T collission database at https://www.oksafe-t.org/





Governmental Priorities on Transportation Safety

Transportation safety has reached new heights for awareness and advancement. Throughout the nation, cities and governments are adopting policies, programs, and funding packages that are aimed at preventing all traffic-related deaths. This focus on safety is present in the Tulsa TMA. Tulsa Mayor G.T. Bynum has named decreasing the number of traffic fatalities as one of his top administrative goals. Tulsa City Councilors have also sought to address transportation safety through the creation of the High Crash Task Force, a multi-disciplinary team tasked with studying the regional intersections with the highest crash rates.

The federal government has also taken a special interest in transportation safety. In 2016, the FHWA published the Highway Safety Improvement Program (HSIP) and Safety Performance Management Measures (Safety PM) Final Rules. The rule, effective date of April 14, 2016, establishes five safety performance measures, with a purpose of establishing measures for State Department of Transportation (DOTs) to use to carry out HSIP and to assess:

(1) Number of Fatalities
(2) Rate of Fatalities per 100 Million Vehicle Miles Traveled (VMT)
(3) Number of Serious Injuries
(4) Rate of Serious Injuries per 100 Million VMT
(5) Number of Non-motorized Fatalities and Non-motorized Serious Injuries

The Safety PM Final Rule also defines the process for state DOTs and MPOs to establish and report their safety targets, and the process that FHWA will use to assess whether State DOTs have met or made significant progress toward meeting their safety targets. The Safety PM Final Rule also establishes a common national definition for serious injuries. These regulations are intended to improve data; foster transparency and accountability, and allow safety progress to be tracked at the national level. They will inform state DOT and MPO planning, programming, and decision-making for the greatest possible reduction in fatalities and serious injuries.

Funding for Transportation Safety

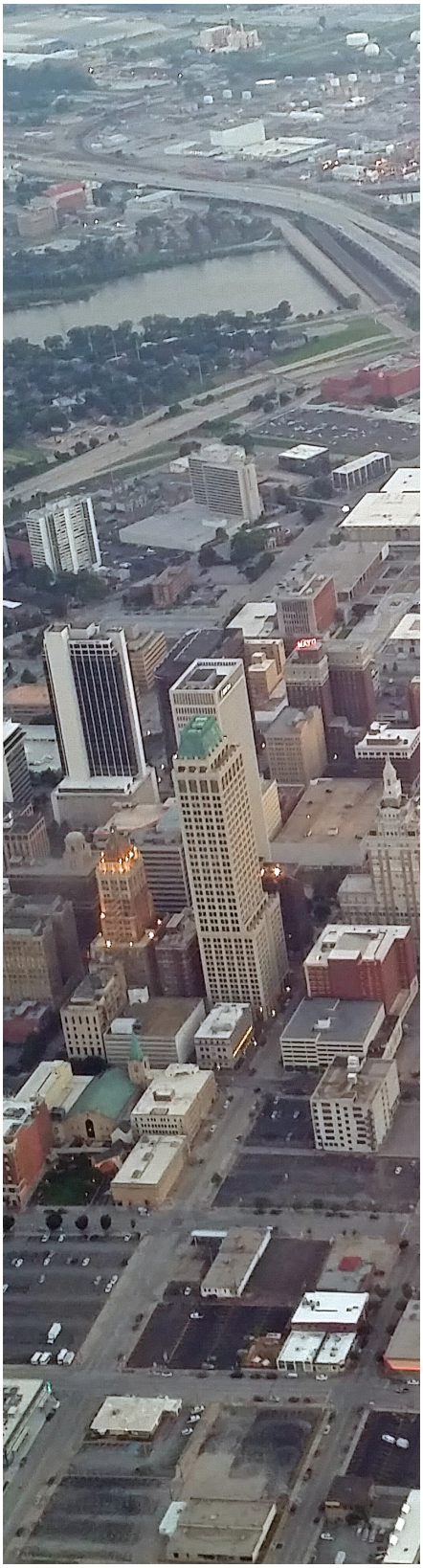
Apart from data analysis, the most significant responsibility INCOG has regarding safety is to evaluate local surface transportation projects on funding allocations. INCOG evaluates member government projects and makes recommendations with consideration to transportation safety improvements. Though the implementation of these countermeasures are carried out by member governments, INCOG plays a crucial role in this process. During project review, INCOG staff evaluates each project and assigns points based on a variety of categories, including safety. INCOG's project selection criteria is weighted for safety when final recommendations are made using federal funds.

Currently there are three sources of federal funds available to INCOG member governments for the implementation of transportation safety projects: (1) Transportation Alternatives Program (TAP), (2) Surface Transportation Program (STP), and (3) Congestion Mitigation and Air Quality Improvement Program (CMAQ).

Table 33. Federal Funding Sources for Transportation Safety Programs

Program	Description
Transportation Alternatives Program (TAP)	*The Transportation Alternatives Program was authorized under Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012. At this time, ODOT began suballocating a portion of these funds to the INCOG region with the potential to use a portion for Safe Routes to School (SRTS) projects. INCOG administers $1.1 million in TAP funds per year; however, the selection process occurs once every two years, resulting in $2.2 million each funding cycle. Eight projects were selected for fiscal years 2014 and 2015.*
Surface Transportation Program (STP)	*Beginning in 2016, the FAST Act converted the long-standing Surface Transportation Program into the Surface Transportation Block Grant Program, acknowledging that this program has the most flexible eligibilities. INCOG receives more than $13 million per year in STP funds.*
Congestion Mitigation and Air Quality Improvement (CMAQ) Program	*As part of a recent safety-focused initiative, INCOG began allocating a portion of CMAQ funds to purchase transportation safety materials for member governments. These funds are for small-scale safety improvements. The materials available for purchasing include thermoplastic paint for restriping crosswalks, Rectangular Rapid Flashing Beacons, bicycle safety equipment, signage (e.g. in-street crosswalk signs), etc. Additionally, INCOG has an agreement with Tulsa County for sign fabrication.*

In conjunction with the materials purchasing, member agencies may seek INCOG assistance in identifying priority areas needing safety improvements, utilizing the ODOT SAFE-T Collision database.



Highway Safety Improvement Program

In addition to the three funding sources available, the Highway Safety Improvement Program (HSIP) is a core federal aid program and plan providing guidance with the purpose of achieving a significant reduction in traffic fatalities and serious injuries on all public roads, including non-state-owned roads and roads on tribal land. HSIP requires a data-driven, strategic approach to improving highway safety on all public roads with a focus on performance. HSIP provides guidelines and criteria to be considered when allocating resources to problem locations, giving consideration to the number of fatalities, the amount of travel, and the lane-miles of public roadway available.

Outlook of Transportation Safety in the Region

Technology is rapidly redefining the transportation safety arena. Whether it is autonomous vehicles, pedestrian detection systems, or vehicle-to-vehicle communications, it is becoming increasingly important for regional and local governments to be aware of the present and future state of the transportation industry as it affects policy and investment decisions. As previously discussed, INCOG has taken a proactive approach to transportation safety by devoting resources, funds, and staff to evaluate the existing conditions in the region, and by seeking to implement change through planning, policy, and collaboration.

The INCOG region has experienced the advancement of Intelligent Transportations Systems (ITS) technologies, as well as the creation of Traffic Management Center (TMC) housed at the City of Tulsa traffic operations office. With these technologies, transportation professionals can examine existing conditions and deliver real-time information and guidance to emergency responders or the traveling public, resulting in a reduction of crashes, alternate route notification, reduced congestion, and an overall more efficiently-run transportation network.

With the development of the physical infrastructure comes the need for accompanying local agreements and policy framework to guide the efforts between varying agencies and governing bodies. The Tulsa Regional Intelligent Transportation Systems (ITS) architecture plan was developed in 2003, in

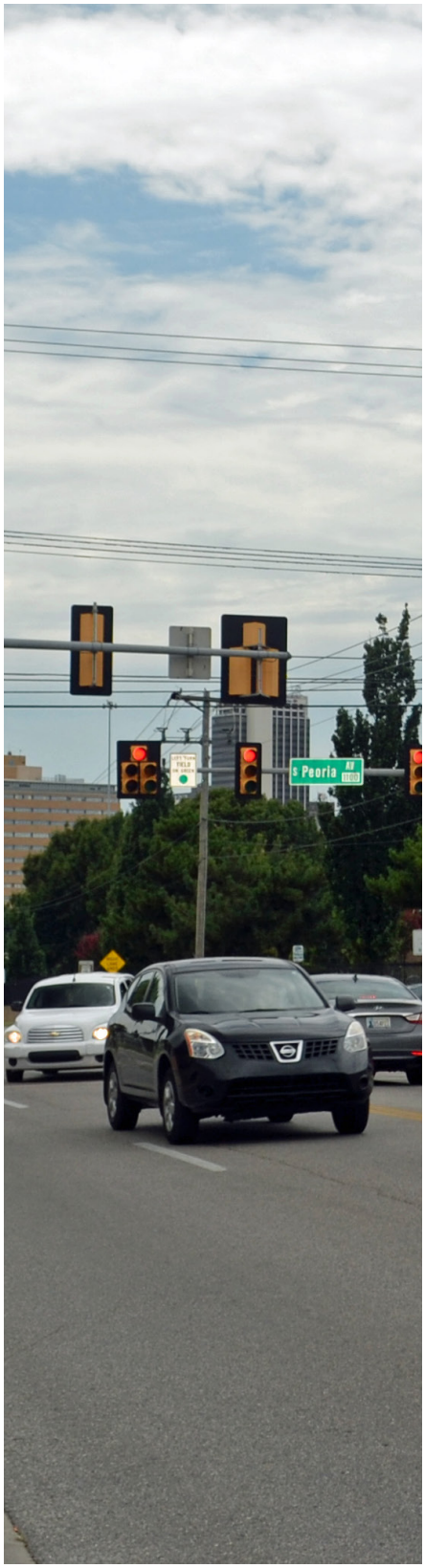
coordination with the U.S. Department of Transportation and ODOT. It includes three main sections and was developed as a means to define:

1. ***Communications*** **-** How information is transferred between transportation systems.

2. ***Transportation*** **-** Which transportation systems transfer what information.

3. ***Institutional*** **-** The supporting institutional structure, policy, and strategies ensuring specific services are implemented.

Much progress has been made in region since this plan was created. Because of the physical and policy infrastructure changes, Connected 2045 recommends updating the Tulsa Regional ITS architecture plan.



Safety Evaluation and Performance

As highlighted throughout this chapter, there are numerous efforts underway to further safety in the region; however, the majority of these efforts focus on individual member governments or single modes of travel. There is a lack of regional cooperation and oversight for safety initiatives, even though many transportation safety concerns are rarely confined by corporate boundaries. Therefore, Connected 2045 recommends the creation of an INCOG Regional Safety Council to aid in the creation of a regional safety plan, explore and promote best engineering and design practices, and establish goals and priorities for the region.

A transportation safety plan would include the regions priorities and goals for addressing transportation safety concerns, as well as identifying the strategies, responsibilities, and resources necessary for achieving these goals. The plan would seek to provide guidance and promotion of best practices in terms of engineering and design, and direction towards academic resources and case studies to validate promoted best practices. The plan would also seek to provide assistance on enforcement and public policy related to transportation safety, as well guidance for public outreach, promotion, and other education activities involved in safety. Connected 2045 recommends that the Regional Safety Council and the safety plan be created and implemented within the next five years.

In addition to a regional plan, INCOG plans to further develop collision analysis tools and strategies. INCOG's current practices are heavily reliant on historical crash data and seek to address high crash locations after they become problem areas. This process is referred to as "hot spot" analysis; however, transportation safety is a rapidly evolving field. Some transportation professionals are developing methods of predictive analysis which seek to identify future high-crash locations before they become problem areas.

Another key component to improving transportation safety in the region is the creation of a transportation safety committee within INCOG to oversee safety-related programs and projects and monitor progress on goals established by the regional transportation safety plan, as well the performance measures established by the FHWA.

- Number of Fatalities
- Rate of Fatalities
- Number of Serious Injuries
- Rate of Serious Injuries
- Number of non-motorized fatalities and serious injuries



Attendees of the Strong Towns Summit in Tulsa test tactical speed reduction techniques by narrowing travel lanes.

PUBLIC INVOLVEMENT



Mission Statement

The intent of the Public Participation Plan is to encourage and support active public participation throughout the planning and decision-making process related to the development of proposed transportation plans, programs, and projects so that a safe, efficient transportation system reflecting the needs and interests of all stakeholders can be provided.

Introduction

Public participation processes inform citizens, groups, and organizations about specific decisions likely to affect their lives, ensure that planning and decision making consider views and inputs from stakeholders, and resolve issues and problems, taking into consideration multiple interests and concerns. Above all, public participation processes encourage citizens and organizations to take an active role in their community's transportation issues, building a relationship for better communication and cooperation.

Public participation is encouraged when planning in order to achieve better results and benefit all of the community.







Public Participation Process

INCOG maintains a website where citizens can review posted information and send comments via online forms and email. The website hosts information of interest to the public: meeting schedules and agendas, the RTP, the updated TIP, planning products available from INCOG, and demographic and traffic data. A brochure with a brief description of the regional transportation planning process is also published and distributed. In addition, the INCOG database is used to provide citizens, affected public agencies, emergency response agencies, representatives of public transportation employees, freight shippers, providers of freight transportation services, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian and bicycle transportation facilities, representatives of persons with disabilities, and other interested parties with a reasonable opportunity to comment on the RTP and TIP and become involved with the transportation planning process, in accordance with federal regulations.

Various provisions of MAP-21, the federal transportation law, require expanded consultation and cooperation with federal, state, local and tribal agencies responsible for land use, natural resources, and other environmental issues. Throughout the planning process INCOG will seek to engage and will incorporate comments from such agencies. INCOG will seek to engage these segments of the community and incorporate their comments throughout the planning process. INCOG will also undertake appropriate consultant and coordination activities with agencies related to safety planning and security planning. Appropriate consideration of these two factors will be included in all projects and planning activities.

According to the 2015 American Community Survey, 83,312 people 5 years and older (11.1%) in the Tulsa TMA speak a language other than English at home.



Specific Environmental Justice and Limited English Proficiency (LEP) Considerations

Environmental Justice initiatives in the planning process will help benefit all diverse groups in the community.



State and federal policies and regulations, including Environmental Justice initiatives, reinforce the need of agencies to focus attention on reaching low-income and minority households. There are many individuals whose primary language is not English. Individuals who do not speak English as their primary language and who have a limited ability to read, write, speak or understand English are known as Limited English Proficient (LEP). This language barrier may prevent individuals from accessing services and benefits. To include traditionally underserved communities in the decision-making process, it is necessary to identify key stakeholder groups that have low or no participation, what is preventing them from participating, and what can be done to overcome barriers and increase the levels of participation. Some explanations for the lack of participation include cultural and language barriers, disabilities, economic constraints, and lack of participation opportunities.

To ensure that cultural and language barriers are overcome, LEP procedures will be implemented, such as making information readily available and having documents translated and public notices broadcast for Spanish-speaking populations, since that is the most common non-English language spoken at home (74% of the total non-English homes in Tulsa County). Meetings and/or public hearings shall be made accessible and user friendly for all stakeholders, taking into consideration convenient locations and schedules. In addition, INCOG will provide appropriate accommodations for citizens with hearing and/or sight impairment. Effective participation, education and communication shall be tailored to specific non-traditional transportation stakeholders and problems.

To assist the LEP populations in the Tulsa TMA and assure that persons with limited ability to speak, read, write, and understand the English language participate in all INCOG's programs, INCOG will develop a list of vital plans and documents, essential for public participation, that should be translated. Public participation meeting notices will be posted in accessible locations, both in English and Spanish, with INCOG's contact for further assistance to other languages translation. INCOG will keep a database of personnel with foreign language skills that will be posted on INCOG's website and internal website.

Once a year, INCOG personnel will be trained on how to effectively provide assistance to the LEP population and how to use telephone translation services when needed. A language chart will be available to help identify what language a LEP person speaks and will be located in public areas. The public will be notified of the availability of translation services for all public meetings. Upon request, interpreters will be made available to assist LEP persons. INCOG will forward emails written in foreign languages for translation and an interpreter will provide assistance to the sender. INCOG will maintain the Four Factor Analysis (see right) updated to monitor and evaluate the language assistance plan and to keep it updated to better serve the LEP population.

To reach the LEP population, a "Four Factor Analysis" outlined in the US Department of Transportation policy guidance will be followed:

1. *The number or proportion of LEP persons eligible to be served or likely to be encountered by a program, activity, or service of the recipient or grantee.*
2. *The frequency with which LEP individuals come in contact with the program.*
3. *The nature and importance of the program, activity, or service provided by the recipient to people's lives.*
4. *The resources available to the recipient and costs.*





Regional Transportation Plan

The Regional Transportation Plan (RTP) has at least a 20-year horizon and is necessary for the effective programming and implementation of transportation improvements. The RTP is predicated on demographic and economic assumptions and forecasts for the region. It identifies the various transportation systems: roadways, public transportation (transit), bicycle/pedestrian, and freight systems desired for the TMA, as well as how the transportation modes interrelate with each other. The RTP summarizes the costs of the investments that will be needed, the resources necessary and expected to achieve the recommended improvements, and the resulting effects or impacts such investments will produce. The RTP serves as a guide for the investment of local, state, and federal resources, and becomes a component of the Oklahoma Statewide Intermodal Transportation Plan. It also serves as the foundation for plans to improve the overall transportation system.

Public participation is an integral part of the RTP, and the plan itself must reflect the desires of the communities within the region to help them attain their transportation goals. To this end, INCOG, in addition to its outreach efforts as required by federal and state laws, will seek to interact with the following specific groups through techniques aiming to inform, involve, give feedback, and achieve significant participation:

Table 34. Stakeholder Target Groups for Public Participation

Neighborhood / Homeowners' Associations	*Particularly groups that are directly affected by a proposed project.*
Business Professionals	*Tulsa's Young Professionals, local business leaders, and other organizations, chambers of commerce, etc.*
Schools	*Tulsa Community College, Tulsa Technology Center, public and private schools (elementary, middle, high schools and universities), and others as appropriate.*
Churches / Religious Institutions	*Religious venues located in affected areas.*
Media Representatives	*Reach out to reporters who have worked with INCOG in the past and form new relationships with representatives from various media types, including television, newspaper, radio and online.*
Elected Officials / Community Representatives	*Engage local elected officials, community planners, and planning commissioners on a regular basis.*
Civic / Focus Groups and Emergency Response Agencies	*Speak with organizations at their regularly scheduled meetings. Host retreats to encourage participation from particular organizations and businesses with a vested interest in transportation.*



Public participation is a crucial part of the Regional Transportation Plan.

INCOG engages the public throughout the process of developing the Regional Transportation Plan using the following actions:



1. Early and Continuing Public Participation. A visioning session that started with Technical Advisory and Transportation Policy Committees became broad-based goals for the region, reflecting what is important to residents. Additionally, a contact list based on previous public participation efforts, including civic groups, neighborhood associations, chambers of commerce, special interest groups, and other interested parties is updated on a continual basis. When appropriate, INCOG conducts visual and descriptive presentations as well as other visualization techniques. Extended stakeholder group meetings are conducted to seek input into the overall process as well as specific elements of the plan.



2. Timely Information. INCOG provides information about transportation issues and processes to interested parties and citizens affected by the transportation plan. INCOG has done so by: providing news releases to local media outlets, producing and distributing newsletters, publishing a web-based newsletter, attending area community group meetings to disseminate information, and talking with area public officials to encourage them to reach out to local civic groups within their jurisdictions.



3. Reasonable Public Access. INCOG seeks opportunities to participate in existing meetings or events to educate and/or involve the public. INCOG further provides citizens and interested parties affected by the transportation plan opportunities to view technical and policy information used in the development of the plan. This includes holding group sessions to review information, providing a summary of detailed demographics, and disseminating demographic details in a newsletter available at area libraries.

4. Adequate Public Notice. INCOG provided public notice of public participation activities and public review and comment periods at key decision points. Notices of public meetings are posted in area newspapers, libraries and on the INCOG website. Invitations are also sent to the established contact list.

5. Explicit Consideration and Response. INCOG follows the process as defined in the respective plan or program for demonstrating to the public that their input during the planning and development process is received. All comments received are documented, along with specific responses to significant comments. The comments and responses are made available via website, newsletter, and the final documents.

6. Seeking Out and Considering the Needs of Those Traditionally Underserved. INCOG identifies concentrations of traditionally-underserved households (such as low-income and minority households that face challenges for accessing employment and other amenities) within the region and pursues opportunities to encourage public participation from these communities. INCOG provides for interpreters to overcome language barriers as needed, publishes educational materials about the process in bilingual formats, and submits news releases to local media outlets that serve these groups.

7. Periodic Review. The effectiveness of the public participation plan will be reviewed to ensure it provides full and open access to all, and portions of the process that are not meeting the needs of our constituencies will be revised. After a public participation activity has taken place, INCOG will evaluate its effectiveness and incorporate desired changes based upon that evaluation.









Different ways of engaging with the public during the planning process.

Documentation Process

In accordance with federal regulations, INCOG documents all aspects of the public participation process. This information includes sign-in sheets, meeting minutes, outreach materials, and other essential meeting details and data. The following table includes feedback provided by stakeholders per city.

Table 35. Stakeholder Meeting Feedback

Date / City	Comments
February 3rd, 2017 Broken Arrow	*Comments included adding express buses to the transit plan. Broken Arrow staff mentioned 81st St. (Houston) was having some friction with freight traffic, and suggested an elevated crossing. Congestion issues included 91st St., Aspen between 41st St. and 51st St., the corridor of County Line Road (193rd E. Ave.) from 51st St. to US-412, and 161st E. Ave. (Elm). The railroad crossing over 91st St in Wagoner County is not in good condition and a new grade crossing is needed both there and north of NSU. Map insights included adding bicycle and pedestrian improvements to the OK-51 bridge expansion, as well as along expansion of bridge and addition along 81st St. (Houston), from Lynn Lane to OK-51.*
February 3rd, 2017 Jenks	*Comments included a desire for expanding Main St., and returning one-way streets to two-way traffic. There is strong interest in trails and pedestrian improvements in the area. Congestion issues included 121st and Elwood. Map insights indicated a desire to expand US-75 from 81st St. to 96th St.; upgrade Elm St. from 111th to 131st, and the need for pedestrian upgrades for a new school site on Adams St.*
February 7th, 2017 Owasso	*Comments mentioned the slow pace and multiple delays each day caused by the South Kansas and Oklahoma railroad grade crossings. Comments also suggested 76th St. N. needs turning lanes. People also wanted to add bike lanes to a planned expansion off 129th E Ave. Individuals expressed concern on increased traffic from Macy's Distribution Center seasonal workers on US-75, and heavy freight traffic from the National Steak and Poultry facility and Cherokee Industrial Park. US-169 has congestion issues north of the recent lane expansions. There is interest in having transit service for Owasso residents from Council. City staff commented on slow timelines with ODOT projects.*
February 7th, 2017 Bixby	*Comments expressed a desire to connect Bixby to the regional trail system, intersection modification at specific locations, interlocal agreements to maintain streets on the periphery, connecting south Bixby with the north by building a bridge at Yale Ave. or another arterial, and signal maintenance.*
February 8th, 2017 Coweta	*Comments included a desire to prioritize connecting the Liberty Trail at NSU-BA. A mapping error of 121st St. in the previous LRTP was mentioned. Residents noted that the sports complex parking lot is being used as an unofficial park and ride location for many residents. The city is experiencing growth issues with the rural water supply and is seeking options.*

Date / City	Comments
February 9th, 2017 Claremore	*Comments included the need to update the map to reflect Lowry Rd. as a four-lane road. The City staff commented that processes with ODOT are slow and laborious. There is a diamond crossing at the north end of town and the city doesn't have the resources to fix it; however traffic funneled from the state is growing. City staff mentioned there is a need to build a bridge over the railroad crossing.*
February 9th, 2017 Sapulpa	*Comments Included concern over the high rate of collisions on 49th W. Ave. at OK-117. The city desires to bring the Ozark Trail to SH-117 and SH-66. There is a desire to put in a trail along OK-97 to connect Sand Springs and Sapulpa. Residents also mentioned the need for sidewalks on Wickham Rd. leading up the school.*
February 21st, 2017 Collinsville	*Commentors were interested in a bypass for SH-20 and I-44 to improve access to I-44. The city plans to connect to the Tulsa trails system and Mohawk Park. The city mentioned struggling with a slow process on a Safe Routes to Schools grant. Commentors also mentioned a high crash spot at SH-20 and the Yale access road.*
February 21st, 2017 Glenpool	*Commentors mentioned an unofficial park and ride location at 141st and US-75. US-75 from 151st St. to 171st St.has a lot of freight traffic and there is a need for an arterial east of US-75 from 151st St. to 171st. St. City staff highlighted a plan to install a bike path along 131st St. The school district is buying land at Elwood Ave. and 141st St. and is interested in a possible Safe Routes to School application to identify the crosswalk sections. There is southbound congestion on US-75 from 141st St. to 161st St. City staff highlighted signalization changes on 121st and Elwood Ave., 145th and Peoria, and at 121st and SH-117.*
February 22nd, 2017 Tulsa County	*Commentors expressed a desire for a bridge over Posey Creek using Vision funding. Staff mentioned a potential HAWK beacon on the 111th St. trail project. County leaders indicated potential signalization changes to County Line Rd. at 31st St.and 41st St. School zones have used RRFB's. By statute, money can only be spent for maintenance. Staff also mentioned that Tulsa County doesn't maintain trails unless it's a side path, on a county road.*
February 24th, 2017 Tulsa	*Staff mentioned that primary arterials of Memorial and Yale are designated to be expanded; 25th West Ave to Gilcrease Museum is being considered for a three-lane road with a turning lane for safety; and that 21st St. is more of a central point in East Tulsa than 11th St., and the BRT line, which follows 11th St. and drops down to 21st at Harvard Ave. and continuing on 21st St. should be studied.*
March 2nd, 2017 Sand Springs	*Comments included the need for extended bus service to Tulsa Community College down from the current stop. There is a process for community feedback on the service currently underway. There is also interest in connecting with a trail to Sapulpa, and conversations between the two communities will be happening in the near future.*



PLAN EFFECTIVENESS





Public Transit leaving the Denver Avenue Station, in downtown Tulsa.



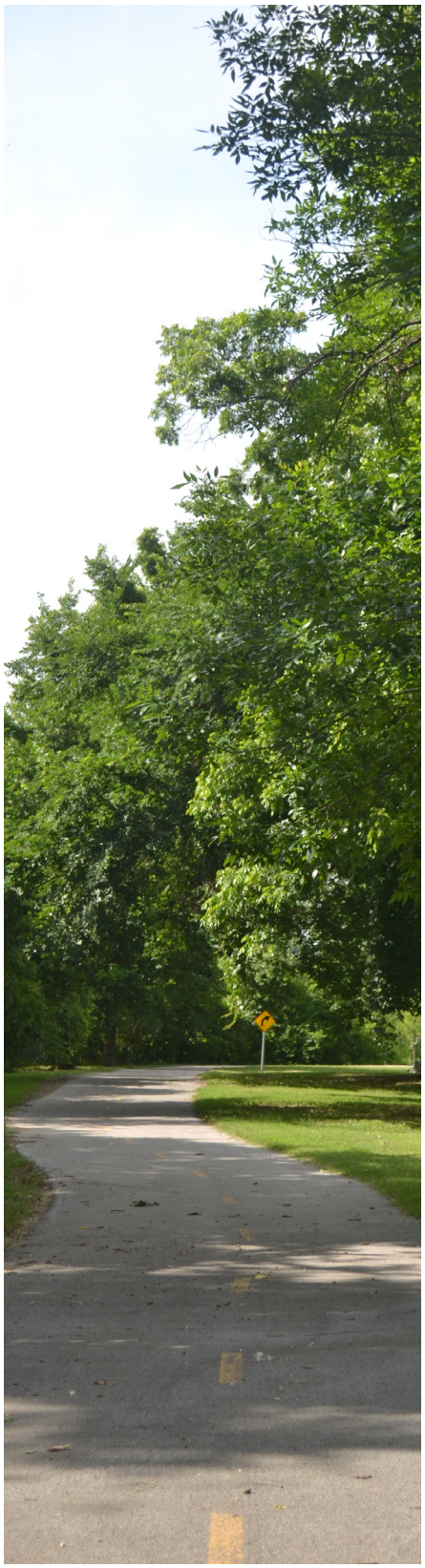
Introduction

Federal regulations require that the Connected 2045 LRTP be financially feasible and demonstrate fiscal constraint over the long-range planning horizon. Implementation of transportation improvements is contingent on available funding, and a plan is considered fiscally constrained when revenue is available to build the planned projects as well as fund the maintenance and asset management of the existing system across all modes of transportation. The 2045 LRTP must estimate costs and identify expected sources of revenue available to projects and programs listed in the plan, as well as any additional financial strategies used to implement the plan. The financial plan for the 2045 LRTP must also involve public transit operators in the development of funding estimates and estimating year of expenditure dollars for all projects and strategies.

Funds may be federal, state, and/or local. Federal funds are available through various programs administered by the state for roadway construction and other multimodal projects including, but not limited to, pedestrian, bicycle, and transit facilities. By reviewing projected and expected funding resources, the program of projects was linked to reasonable and expected funding sources, resulting in a financially-feasible plan.

Financial Plan

The Connected 2045 Regional Transportation Plan is financially constrained. This fiscal constraint is designed to ensure that revenue will be available to build the planned projects as well as fund the maintenance and asset management of the existing system across all modes of transportation.



Cost Considerations

Cost considerations to estimate the plan expenditure utilized cost estimates that were currently available based on year of expenditure. These estimates are based on several inputs from member entities.

- *ODOT 8-Year Construction Program.*
- *City of Tulsa Capital Improvement Program and historical funding.*
- *Estimates outside the 8-Year Construction Program for critical pieces of infrastructure.*
- *Cost of operations as available from the existing transit service provider, MTTA.*
- *All additional costs associated with Transit System Plan and High Capacity Transit Alternatives are assumed to have matching revenue streams, as identified in those plans.*

Expressways and highway interchanges are estimated to account for 34% of the total cost of maintaining and reconstructing the system. Arterials would cost approximately 38% of the total cost of the transportation plan. The current Public Transportation System represents 20% of the total cost of the plan whereas 2% of the plan expenditure is estimated to be toward pedestrian and bicycle linkages. These costs do not include costs incurred for residential streets or linkages outside of the significant transportation facilities. Table 35 illustrates the total cost and cost estimates.

Table 36. 2015 - 2045 Cost Estimate Summary
(in Thousands)

Facility / Source	Operating and Maintenance Costs	Construction and Capital Costs	Total Costs	Percent of Total
Expressways	*$ 282,000*	*$1,345,000*	*$1,627,000*	*26.0%*
Turnpikes	*$119,000*	*$250,000*	*$369,000*	*5.9%*
Arterials	*$1,740,000*	*$587,000*	*$2,327,000*	*37.2%*
Highway Interchanges	*$0*	*$480,000*	*$480,000*	*7.7%*
Subtotal	***$2,141,000***	***$2,662,000***	***$4,803,000***	***76.7%***
Percent	***44.6%***	***55.4%***	***100%***	
Public Transportation (Current System)	*$400,000*	*$50,000*	*$450,000*	*7.2%*
Dedicated Public Transportation	*$400,000*	*$500,000*	*$900,000*	*14.4%*
Bicycle/Pedestrian Links	*$22,000*	*$86,000*	*$108,000*	*1.7%*
Subtotal	***$822,000***	***$636,000***	***$1,458,000***	***100%***
Total	***$2,963,000***	***$3,298,000***	***$6,261,000***	
Percent	***47.3%***	***52.7%***	***100%***	



Revenue Estimates

The revenue was estimated using the most recent available information from local, state and federal agencies and organizations that have historically provided funding for TMA projects.

Following sources for revenue estimates are used:

- *ODOT, state and federal budget estimates*
- *City of Tulsa Public Works operations and capital budget estimates*
- *City of Tulsa sales tax and bond program*
- *Community and county Vision Programs*
- *Tulsa County 4-to-Fix program*

- *Other municipal and county revenue for transportation estimate*
- *FTA support for Tulsa Transit program*
- *Oklahoma Turnpike Authority capital budget estimate*
- *INCOG Surface Transportation Program Revenue forecast*
- *Transportation Alternative Program Revenue forecast*



In addition, the revenue available for future transit expansion in the areas of corridor-based projects, as well as potential high-capacity improvements and the turnpike portions of spending, is assumed to come from the respective entities through dedicated monies.

Local resources (cities and counties) are estimated to provide 37% of the total revenue. About 22% of the total is estimated for implementation of the public transportation system plan which is contingent upon that revenue stream.

The following table illustrates the total revenue estimates.

Table 37. 2015 - 2045 Revenue Estimates Summary

Revenue Source	Estimated Revenue
Local (City and County tax and bond evenue estimate)	*$2,350,000*
ODOT revenue estimate (state and federal) and federal discretionary grants	*$1,710,000*
Federal urbanized area surface transportation program and Transportation Alternatives Program estimate	*$483,000*
OTA revenue estimate to match projected spending for capital projects within TMA	*$369,000*
Public transportation (current system at cost)	*$450,000*
Dedicated transit/city/federal (to match the planned costs estimated)	*$900,000*
Total	***$6,262,000***



Social Environment

Increasing the number of decision makers and overall involvement from historically underrepresented communities, known as Socially Sensitive Groups (SSG's), is a key consideration of this Regional Transportation Plan (RTP). A SSG is a population within the Tulsa Transportation Management Area (TMA) that encompasses a majority percentage of minorities, Hispanics, low-income, elderly and/or children of single parent female-headed households. As part of the National Environmental Policy Act (NEPA) process and the Executive Order on Environmental Justice (1994), the RTP identifies any SSG (particularly minority and/or low-income populations) that reside in proximity to planned projects and examines issues and effects associated with the proposed projects.

Regulations and Mission

Title VI of the 1964 Civil Rights Act states *"No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving federal financial assistance."* Title VI prohibits intentional discrimination as well as any discriminatory policy or practice that has a negative effect on protected groups.

The 1994 presidential executive order stated, "Federal Actions to Address Environmental Justice in Minority and Low-income Populations." The Executive Order focuses federal attention on the environmental and human health conditions of minority and low-income populations, promotes nondiscrimination in federal programs affecting human health and the social environment, and provides minority and low-income populations access to public information and an opportunity to participate in matters relating to the environment.

In 1999, the FHWA and the FTA drafted a memorandum titled Implementing Title VI Requirements in Metropolitan and Statewide Planning. This document clarifies the process by which metropolitan and statewide planning agencies evaluate long-range plans and potential effects on communities with high percentages of minority and low-income populations. Both orders relate directly to addressing environmental justice activities in the transportation planning process.

It is INCOG's intent to ascertain during the planning process if any SSG would be disproportionately affected by the recommended transportation projects in the LRTP. In order to accomplish this end, it is essential for both planning organizations and implementing bodies to be conscious of possible effects from improvements to the transportation system. Informed planners and engineers will be able to make better decisions if the LRTP includes information identifying locations of socioeconomic groups covered by the Executive Order on Environmental Justice and Title VI provisions.

Methodology for Identifying Socially Sensitive Groups (SSG)

The analysis INCOG conducted was to ensure the plans do not disproportionately affect any Socially Sensitive Areas (SSAs), a region defined as having a concentration of minority, Hispanic, low-income, elderly (65 and older), youth (under 18 years of age), persons with disabilities, persons who have Limited English Proficiency and/or single-parent, female-headed households with children younger than 18. A review of the 2011-2015 American Community Survey data was conducted for the TMA for potential environmental justice issues including:

- *Displacement/relocation of minority and low-income residents.*
- *Effects on local commute times and availability of public transportation.*
- *Access to bike/pedestrian trails.*
- *Separating/bisecting minority and/or low-income communities.*





The SSA map included in this chapter shows the greatest concentration of all the groups in the TMA comprising socially-sensitive areas, particularly minority and low-income populations. Additional maps in the chapter show the TMA's greatest concentration of SSG populations in relation to TMA roadway (Social Environment and Planned Roadways), transit (Social Environment and Planned Public Transportation) and multimodal routes (Social Environment and Planned Trails & Bikeways).

Studies were conducted for neighborhoods affected by the planned public transportation system and the planned bicycle/pedestrian system. Results from that examination showed areas with high concentrations of minority and/or low-income households are well-served by the proposed projects and that particular consideration should be given to those areas when specific projects are implemented.

In addition to looking at the geographical impacts of the proposed improvements, a broad analysis was conducted of the mean travel time for SSA residents. Median commute time for the Tulsa TMA was computed based on 2015 ACS data and compared with the SSAs for the same year. The TMA median commute was 20.34 minutes while the SSA commute time was 19.02 minutes. Therefore, it is expected that the median travel time for SSA residents will be proportional to that of TMA residents overall.

Special Populations

For the purposes of this LRTP and in conformance with the Executive Order, minority and low-income populations are defined as follows:

- ***Minority*** refers to persons who are Black (having origins in any of the black racial group of Africa or African American); Hispanic (of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race); Asian American (having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands); or Native American Indian and Alaskan (having origins in any of the original people of North America maintaining cultural identification through tribal affiliation or community recognition). The U.S. Census separates Hawaiian (including people of the Pacific Islands) from Asian American.

- ***Low-income*** refers to total income for a family or unrelated individuals that fall below the relevant poverty thresholds, then the family and every individual in it or unrelated individuals are considered in poverty. As of 2016 the poverty threshold for a family of 4 was $24,339 (U.S. Census Bureau). The median household income in the Tulsa Transportation Management Area is $51,466 (ACS 2011-2015).

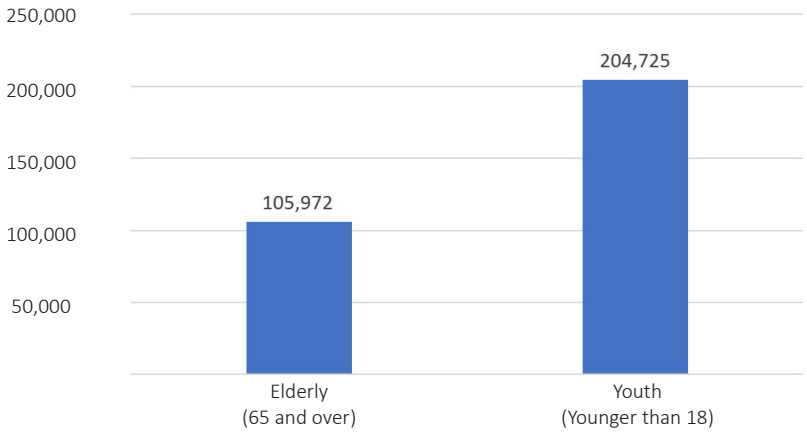
The FHWA and the FTA reference Health and Human Services (HHS) Federal Poverty Guidelines in determination of poverty. These guidelines are based on the U.S. Census Bureau's poverty thresholds. Tulsa TMA population determined by the 2015 ACS estimate to be below the poverty threshold were mapped, as seen on the Persons Below Poverty Levels in the Transportation Management Area map included in this chapter.

For planning purposes, the INCOG Transportation Planning Division uses a broader definition of low-income that includes more residents. In addition, areas where 51% or more of households make less than 80% of the median household income (the U.S. Department of Housing and Urban Development [HUD] definition of low/moderate income) were also analyzed. Using these definitions of low-income allows INCOG to extend its planning and outreach considerations.

Although the U.S. Census data give a demographic profile of the study area, further research was conducted to identify low income populations and to gain a better awareness or "sense of place" within those communities. This research included insight from area planning officials and comments submitted by neighborhood and civic organization representatives, as well as the general public. Census data indicate a range of socioeconomic and demographic characteristics within the TMA. Statistically, most of the neighborhoods immediately north and west of Downtown Tulsa were found to have the greatest concentrations of minority populations and households with incomes below the national poverty level.

Areas having high concentrations of elderly and youth were also studied in order to identify possible needs for new or modified facilities and public involvement. Elderly is defined as TMA residents age 65 and older. According to the 2015 ACS, 105,972 persons (13.1% of the general population) in the TMA are age 65 and over. Most of this group is situated within the east and southeast sections of Tulsa's corporate limits.

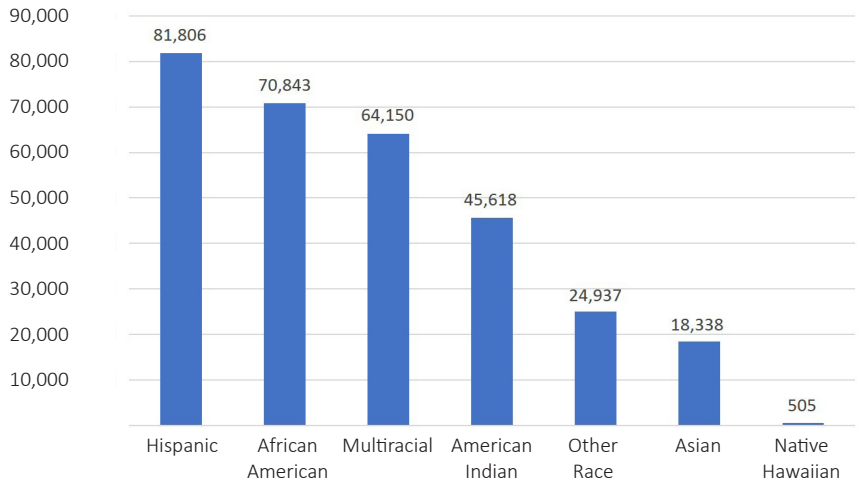
Figure 14. Elderly vs Youth Residents in the Tulsa TMA - ACS 2011-2015



The youth demographic is often overlooked in the transportation planning process. Nearly 205,000 persons in the Tulsa TMA are younger than 18 (almost 25.4% of the population). A key indicator of youth possibly lacking adequate transportation is the number of single-parent female-headed households with children younger than 18. According to 2015 ACS data, there are nearly 29,000 single-parent, female-headed households in the TMA, and this group represents nearly 9.3% of the total households. Many persons in this category, according to most statistics, live in low-income areas with little or no means of reliable transportation. Therefore, access to transportation facilities, such as transit routes and on-street bikeways, is vital and creates a dual benefit that serves not only the parent, who may need transportation to commute to work, but also the youth who relies on safe transportation to school or community centers. Residents with a disability also account for a significant portion of the TMA population. More than 108,000 residents 5 years old or older have a reported disability, which accounts for 13.6% of the population.

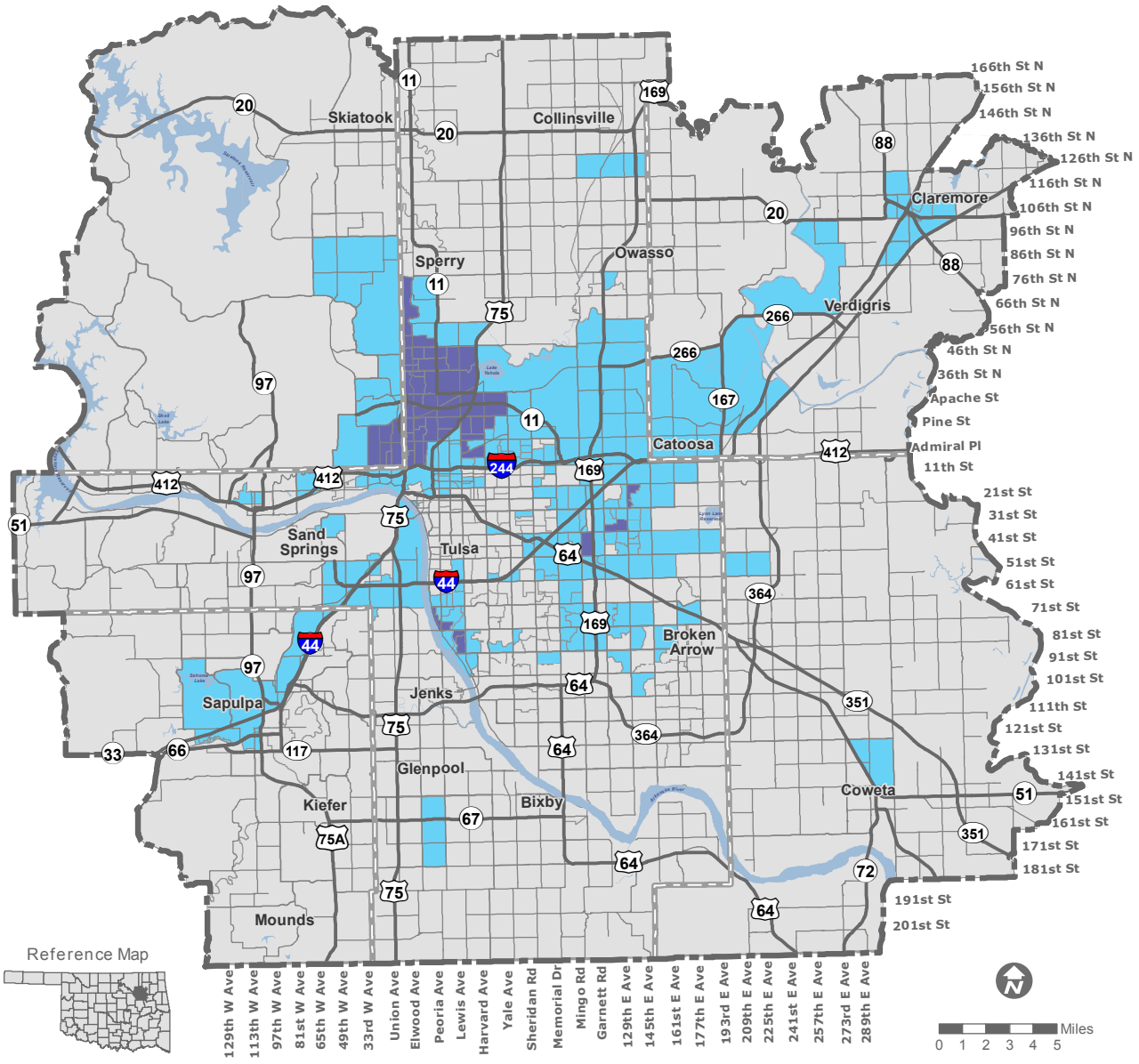
INCOG staff utilize census data and maps displaying the geographic distributions of the socioeconomic groups relative to major highway and transit projects. This data is used to analyze the benefits and burdens of the RTP, the Public Transit – Human Services Coordinated Plan, and other proposed transportation projects in the Tulsa TMA on transportation-disadvantaged groups. Minority-population information obtained from 2015 ACS estimate showed that the TMA minority population was approximately 27.8% of the general population. The chart below presents the number of TMA residents who belong to each race/ethnicity classification.

Figure 15. Minority Race/Ethnicity Residents in the Tulsa TMA - ACS 2015





Minority Population Concentration within the Transportation Management Area



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Legend

Index Value All Minorities

- Less than 1.00
- 1.00 to 1.99
- Greater than 2.00

Total population within the TMA = 804,758

Total All Minorities population within the TMA = 224,391

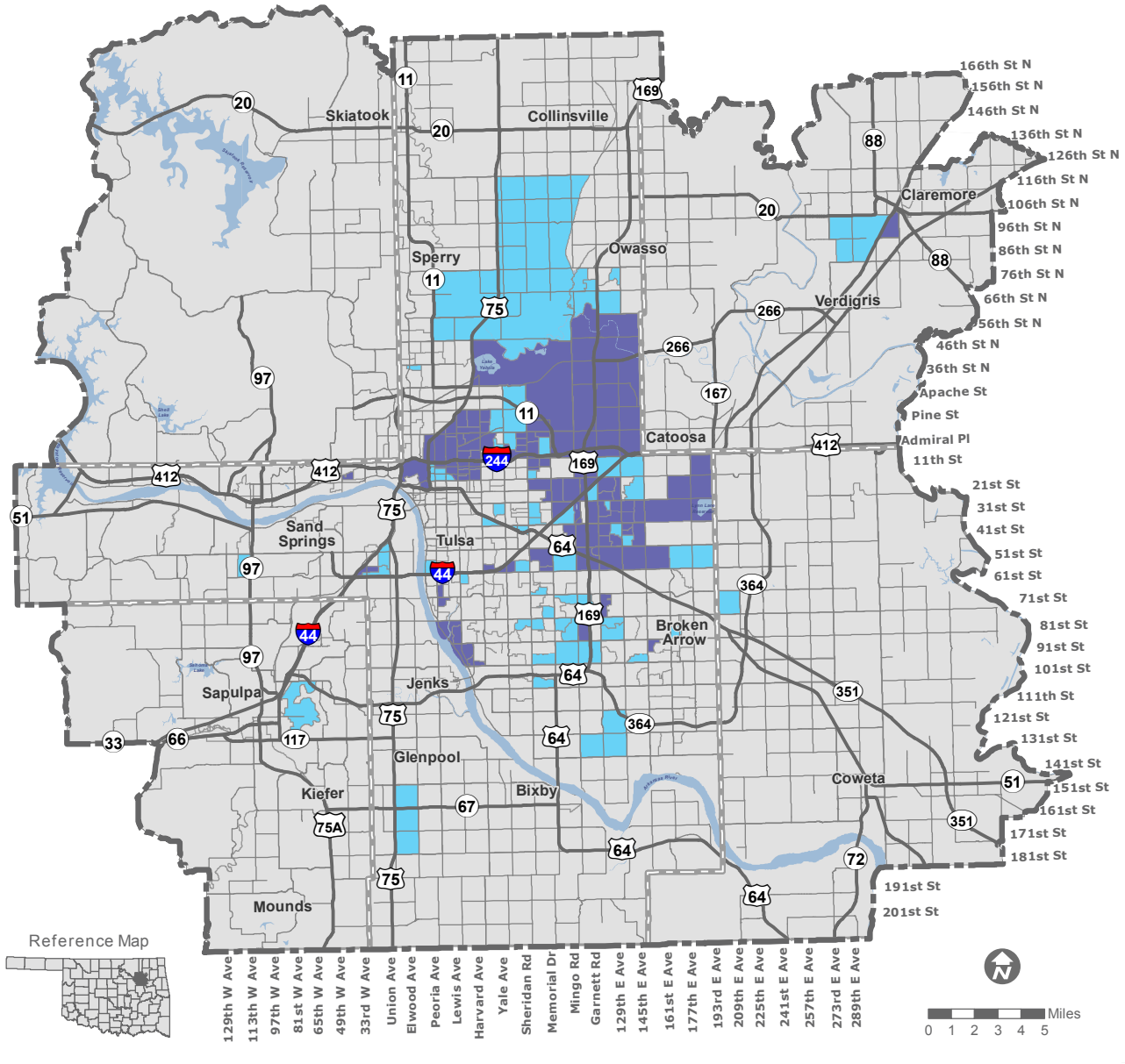
Percent All Minorities population within the TMA = 27.88%

The index value is the comparison of the percentage of the All Minorities population for the block group to the same percentage of the All Minorities population for the whole TMA. The higher the index number the greater the concentration of the All Minorities population.

Connected 2045 Regional Transportation Plan

INCOG

Concentration of Persons with Limited English Proficiency within the Transportation Management Area



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Legend

Index Value Persons who speak English "not well" or "not at all"

- Less than 1.00
- 1.00 to 1.99
- Greater than 2.00

Total population 5 years and older within the TMA = 747,386

Total Population who speak English "not well" or "not at all" within the TMA = 19,267

Percent Population who speak English "not well" or "not at all" within the TMA = 2.58%

The index value is the comparison of the percentage of the population who speaks English "not well" or "not at all" for the block group to the same percentage of the population who speaks English "not well" or "not at all" for the whole TMA. The higher the index number the greater the concentration of the population who speaks English "not well" or "not at all."

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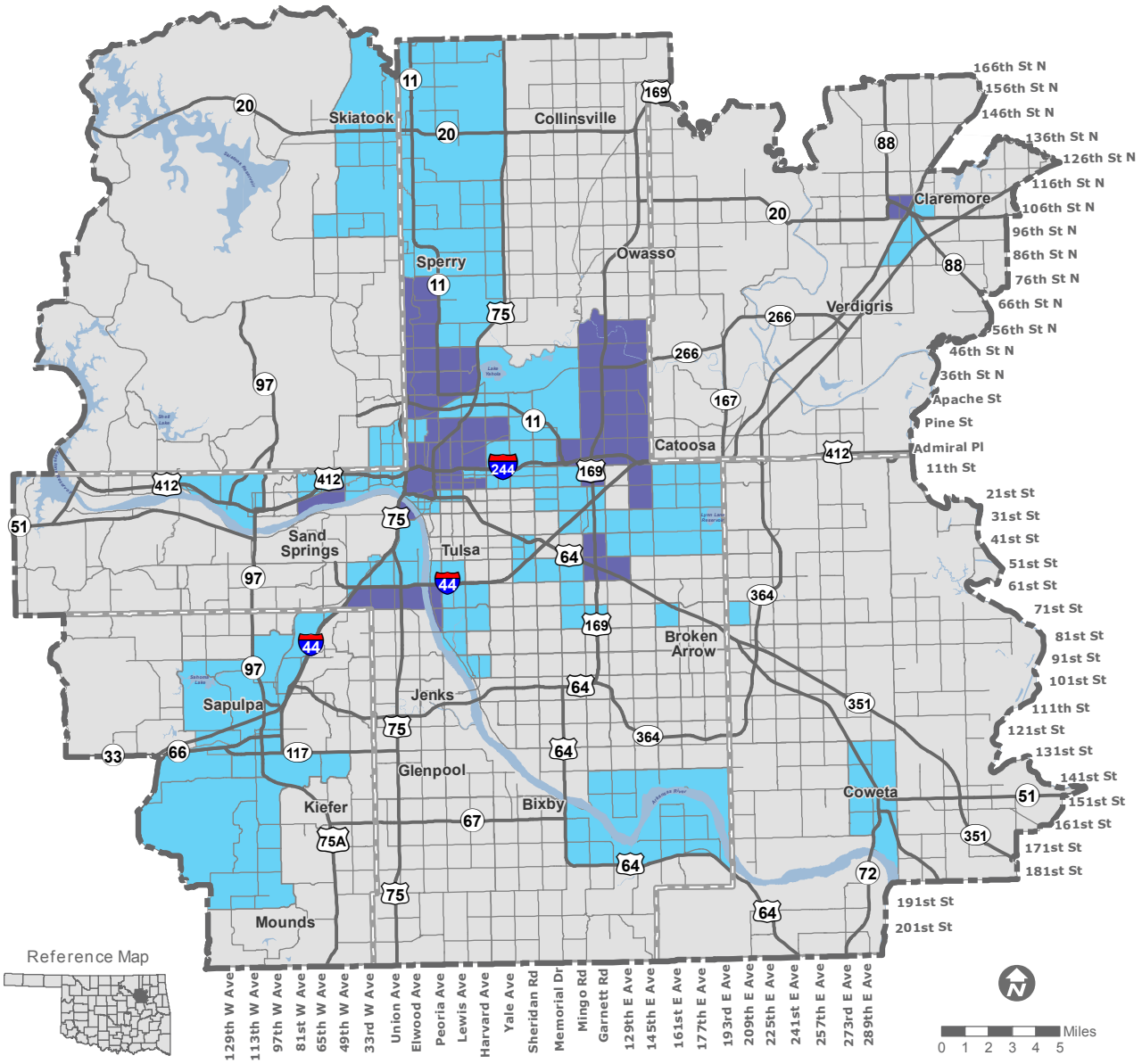
Concentration of Persons Below Poverty within the Transportation Management Area



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Legend

Index Value Below Poverty

- Less than 1.00
- 1.00 to 1.99
- Greater than 2.00

Total population for whom poverty is determined within the TMA = 794,927

Total population below poverty within the TMA = 115,835

Percent population below poverty within the TMA = 14.57%

The index value is the comparison of the percentage of the population below poverty for the block group to the same percentage of the population below poverty for the whole TMA. The higher the index number the greater the concentration of the population below poverty.

Connected 2045 Regional Transportation Plan

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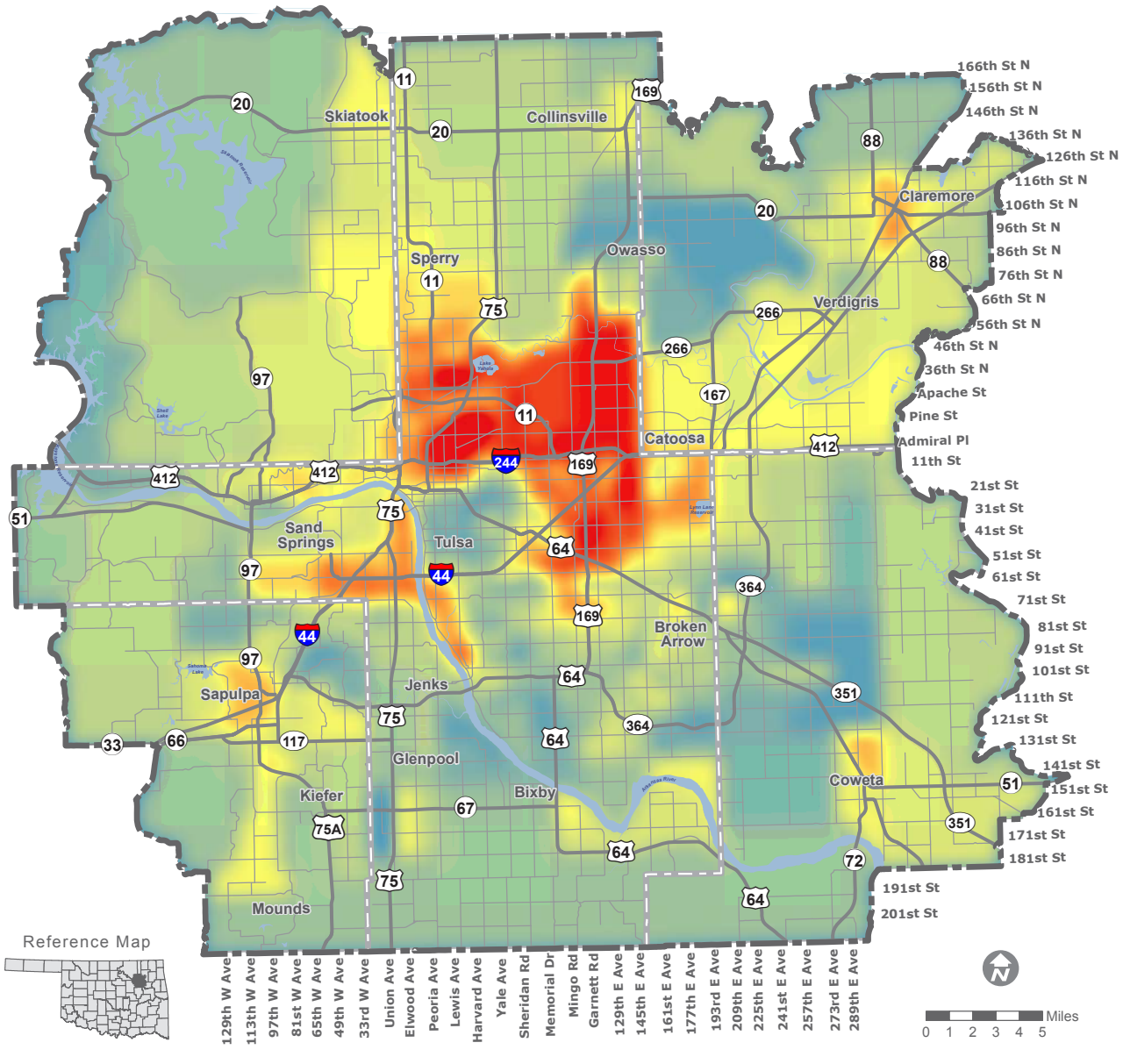
Socially Sensitive Areas
within theTransportation Management Area



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Legend

Concentrations

Greater

Less

The map is a combination of all the environmental justice factors considered, including:

- African American race
- American Indian race
- Asian race
- Native Hawaiian race
- Some Other race
- Two or more races
- Hispanic origin
- Persons 65 years or older
- Persons under 18 years of age
- Persons with disabilities
- Persons below poverty
- Persons with limited English Proficiency
- Female headed households with kids

Connected 2045 Regional Transportation Plan

INCOG

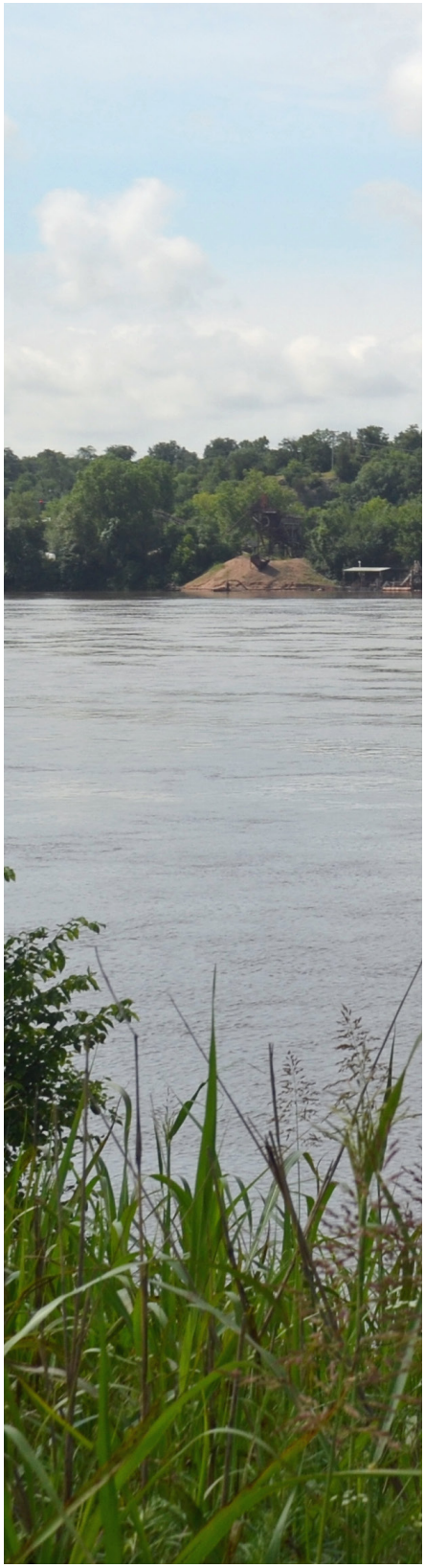
Natural Environment Review

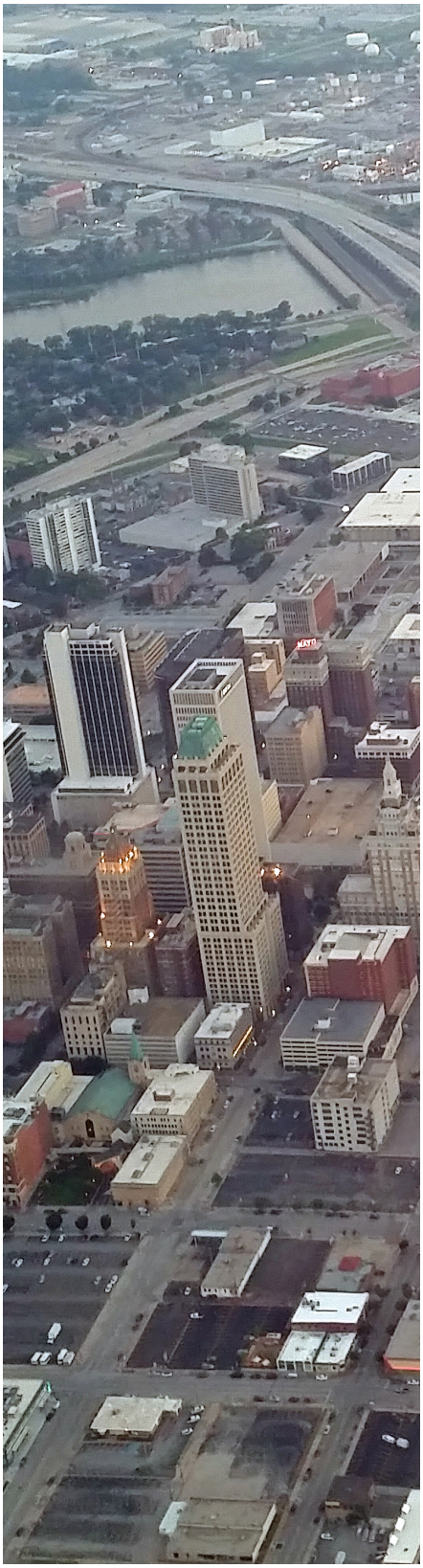
The natural environment is an important consideration in transportation planning. It is the purpose of this section to provide information that may expedite and enhance the planning, permitting, and implementation process for planned projects where environmental issues must be considered.

For the purpose of this section, various environmental considerations specific to the TMA were selected based on the data that was available for analysis on a regional basis:

- *Lakes, ponds, or other water bodies*
- *Impaired streams (including a 1⁄4 mile buffer)*
- *100-year floodplain*
- *McClellan-Kerr Navigation System (including bordering property owned by the Army Corps of Engineers)*
- *Bald Eagle habitat and nesting areas (including a one-mile buffer)*
- *Arkansas River Least Tern Preserve*
- *Parks (including a quarter-mile buffer)*
- *Skiatook Wildlife Management Area*
- *Oil and gas wells*
- *Keystone Ancient Forest (Sand Springs)*
- *Prime farmland*

These considerations were mapped, combined to create an index of environmentally sensitive areas, and compared with planned transportation projects for roadways, public transportation and bicycle/pedestrian facilities. Areas showing clusters of multiple considerations adjacent to planned projects were termed Environmentally Sensitive Areas (ESAs). These areas were considered in relation to planned roadway, bicycle/pedestrian, and public transportation projects.





Effects on ESAs by bicycle/pedestrian facilities and public transportation projects were mitigated during the planning process; however, these projects will still require permitting and interagency cooperation during implementation. Planned roadway projects were determined to have the greatest potential effects on ESAs. These projects will require more rigorous environmental reviews and cooperative strategies between federal, state, tribal and local agencies. It is recommended that all parties involved in any aspect of planned projects in ESAs engage the various state, tribal and federal permitting agencies early in the development of the transportation projects. INCOG will monitor the ESAs and project proposals to ensure the early and continuous involvement of all affected agencies.

As part of its long-term planning process, INCOG strives to ensure the preservation of historical archeological sites, as identified by the Oklahoma Archeological Survey (OAS) and in cooperation with the State Historic Preservation Office of the Oklahoma Historical Society. These sites range from prehistoric occupations dating back some 9,000 years to historic manifestations of the 1930s and 1940s. According to OAS, there are more than 1,650 prehistoric and historic archeological sites in the Tulsa TMA (184 in Creek County, 714 in Osage County, 330 in Rogers County, 170 in Tulsa County, and 253 in Wagoner County).

Although many of these sites fall some distance from urbanized areas, they remain as key features that will continue to have a bearing on the long-term directional growth patterns of the TMA. Comprehensive cultural resource studies should be undertaken with all transportation infrastructure projects.

Air Quality Consideration

Primary Pollutants, Hydrocarbons (HC), Nitrogen Oxides (NOx) and Carbon Monoxide (CO) are below the 2010 base year modeled estimates for the plan year 2045.

INCOG has transitioned to the Environmental Protection Agency (EPA) recommended MOVES Model to estimate mobile emissions. INCOG uses national setting for vehicle mix because of lack of complete inventory of vehicles by type and use at the present time.

Ozone Alert! ScoreCard

Consideration of air quality issues is vital to long-term transportation planning. Areas not in compliance with one or more of the six National Ambient Air Quality Standards (NAAQS) may be designated by the Environmental Protection Agency (EPA) as a federal non-attainment region. In addition to the impediment created by transportation conformity analysis requirements, federal nonattainment designation hinders regional economic growth. Through aggressive and significant voluntary emission reduction efforts, the Tulsa region has successfully remained in attainment with all federal air quality standards.

The Tulsa region's Ozone Alert! program and its multi-faceted public education and outreach efforts improve air quality by promoting voluntary strategies to reduce the emissions that create ground-level ozone (O3). The program's website, www.OzoneAlert.com , is a key resource providing regional air quality information including tips and strategies for reducing air emissions, geographically-based real-time air monitor data, and the ozone season's Scorecard which reflects daily monitor values as they relate to compliance with the EPA ozone standard.

The ozone Scorecard indicates when a monitor exceeds the standard as well as the first through fourth highest daily values for the five regional ozone monitors. The ozone standard is exceeded when any monitor records a daily value greater than 70 parts per billion (ppb). As the ozone season progresses, the fourth highest value for each monitor is averaged with the established fourth highest value from the two prior years, and a current three-year average Ozone Design Value is reflected daily. The Ozone Design Value must also be no greater than 70 ppb to meet the ozone standard. The ozone season daily ScoreCard provides a valuable educational resource and tool for public officials, media, and the general public.

Since 2015, the Tulsa area has experienced eight Ozone Alert! days, three of which took place in the summer of 2017, and only five of them catalogued as exceedance days. By comparison in 2011, the Tulsa Area experienced 25 Ozone Alert! and exceedance days, and 21 Ozone Alert! and 26 days in exceedance in 2012.

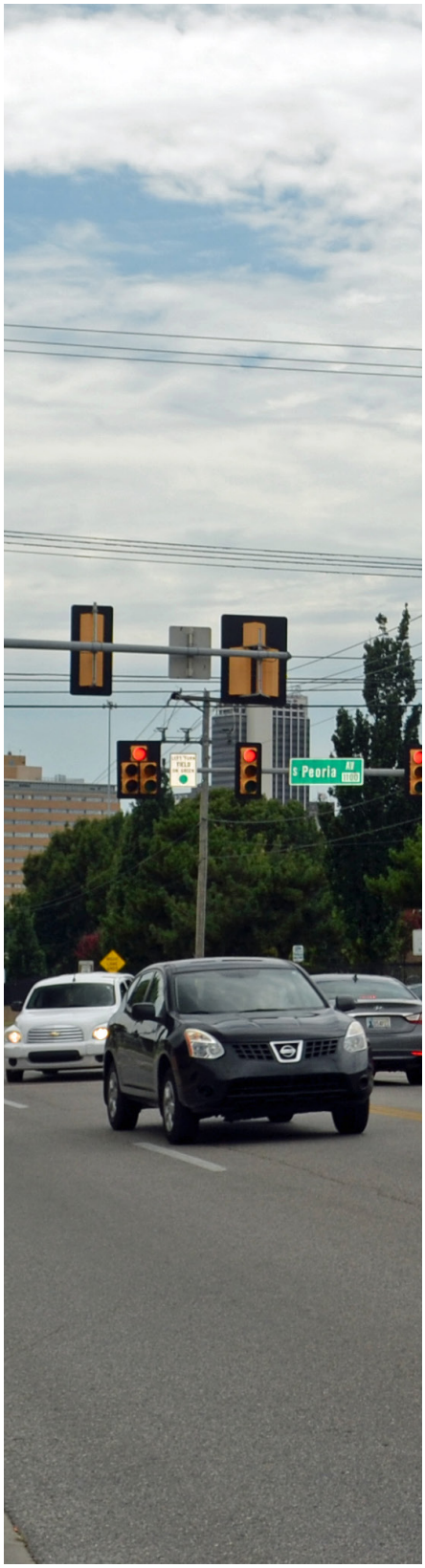


Figure 16. Ozone Alert! Scorecard

OZONE ALERT.COM
LET'S CLEAR OUR AIR

2017 SEASON OZONE SCORECARD

Tulsa Area Ozone Trends Chart

Exceedance Days: Sept. 14 — *Last updated 10/23/2017 at 7:45 am*

Monitor Site			2017 Highest 8-Hr Ozone Averages (ppm)* (1st through 4th highest daily readings)				DESIGN VALUE 3-Year Average of the 4th highest readings	
2014 4th High	2015 4th High	2016 4th High	1st Highest *date*	2nd Highest *date*	3rd Highest *date*	4th Highest *date*	*2014-2016 3-Yr Avg*	2015-2017 3-Yr Average
West (#144 Mannford)			.066 *2-Aug*	.065 *7-Apr*	.064 *7-Jun*	.064 *19-Jun*	*.064*	**.063**
.066	.063	.064						
East (#178 Lynn Lane)			.068 *26-May*	.068 *7-Jul*	.065 *3-Aug*	.064 *13-Sep*	*.063*	**.064**
.063	.065	.063						
Central (#1127 Tulsa)			.063 *7-Apr*	.063 *7-May*	.062 *8-May*	.062 *13-May*	*.065*	**.064**
.065	.068	.062						
North (#226 New Location in Skiatook)			.073 *14-Sep*	.065 *7-Apr*	.065 *8-May*	.064 *7-May*		
		.064						
South (#174 Glenpool)			.069 *23-Jul*	.066 *6-Jun*	.065 *7-Jun*	.063 *7-Apr*	*.062*	**.062**
.062	.061	.064						

An Ozone Exceedance = .071 ppm or greater
Exceedance days are unhealthy air days and shown in red in the table above.

The EPA Ozone Standard uses the Design Value: Although certainly concerning, exceedance days are not the same thing as 'violating the ozone standard'. The standard uses the 4th highest reading each year and averages it with the 4th highest readings from the two prior years. This 3-year average is called the Design Value. In the table above, the middle columns with dates show this year's 1st through 4th highest daily readings for each monitor. The 4th highest column is the one that counts at year end - the one that is averaged with the 4th highest readings from the two previous years. Each monitor's readings and averages are calculated uniquely and whichever Design Value is the highest becomes the area's Ozone Design Value.

A Violation of the ozone standard = Design Value .071 or greater.

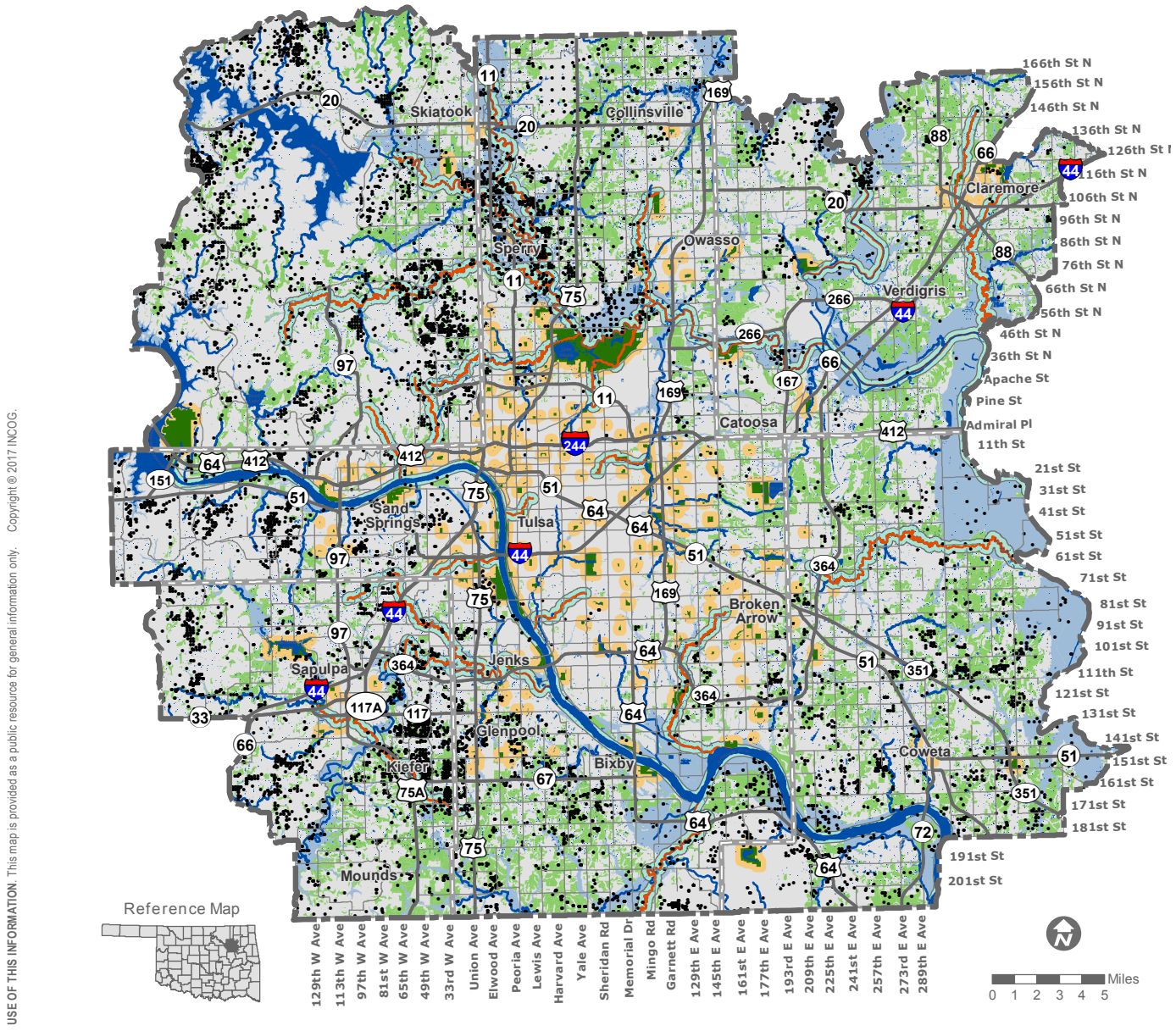
Our current Design Value is .064 ppm calculated by the CENTRAL monitor's averaging 2015's 4th high value (.068), 2016's 4th highest value (.062) and our 2017 current 4th highest reading of .062 ppm (the standard uses no rounding).

Does our 2015-2017 Design Value meet the EPA ozone standard? Yes.

*2017 data is preliminary and subject to change as a result of the ODEQ/EPA verification process

Source: http://ozonealert.org

Environmentally Sensitive Areas
within the Transportation Management Area



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Legend

- Oil and Gas Wells
- Streams
- Bodies of Water

Impaired Streams

- Stream (Impaired)
- 1/4 mile buffer zone

Floodplains

- 100-year Floodplain

Parkland

- Park
- 1/4 mile buffer

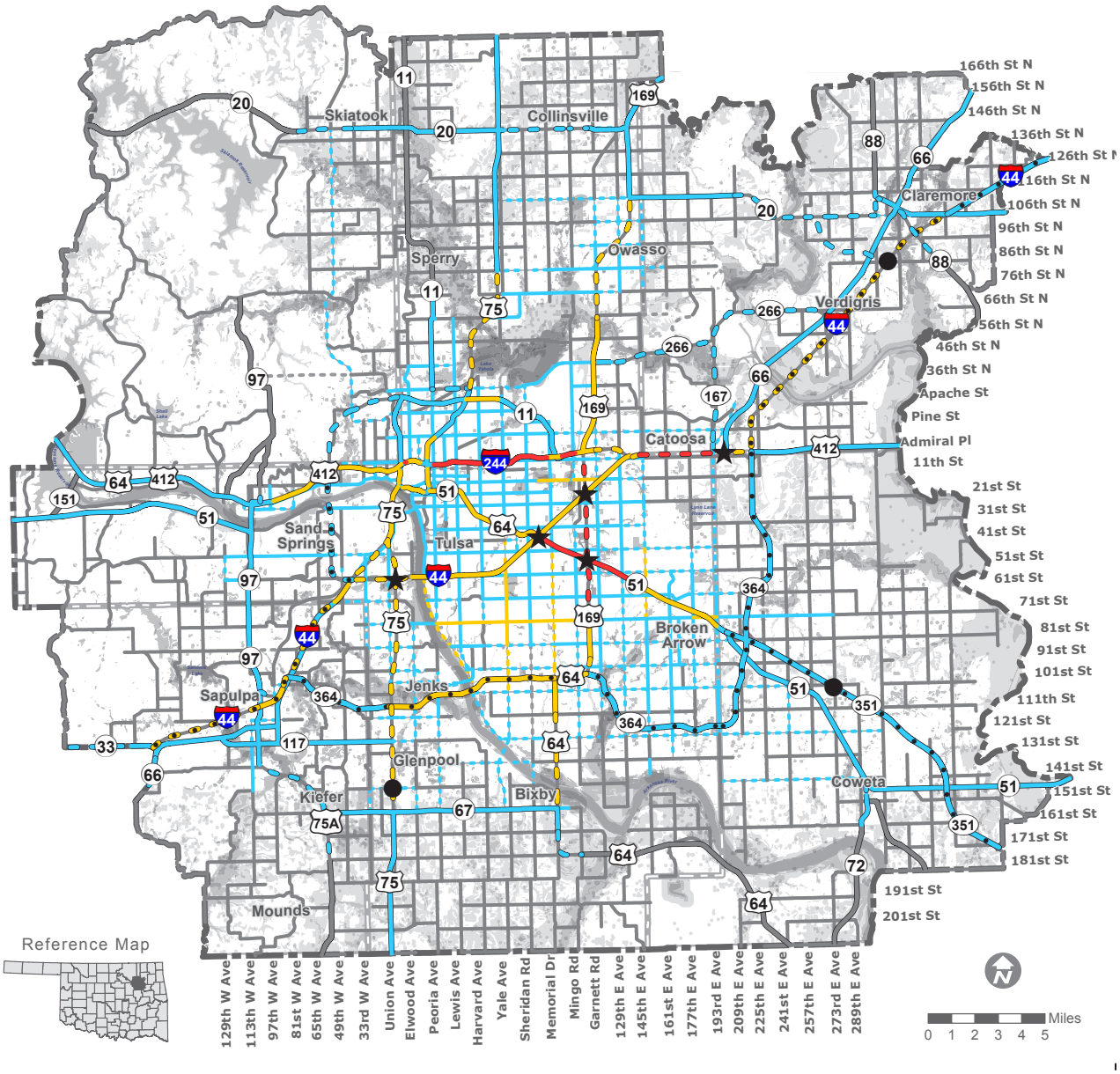
Prime Farmland

- Prime Farmland

Connected 2045 Regional Transportation Plan

INCOG

Environmentally Sensitive Areas with Planned Roadways



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Legend

- Expressway Interchange
- Grade-Separated Interchange

Roadway Type

- Arterial
- Highway
- Turnpike

Roadway Status

- New/Changed Roadway
- No Roadway Changes

Roadway Through Lanes

- 2 Lanes
- 4 Lanes
- 6 Lanes
- 8 Lanes

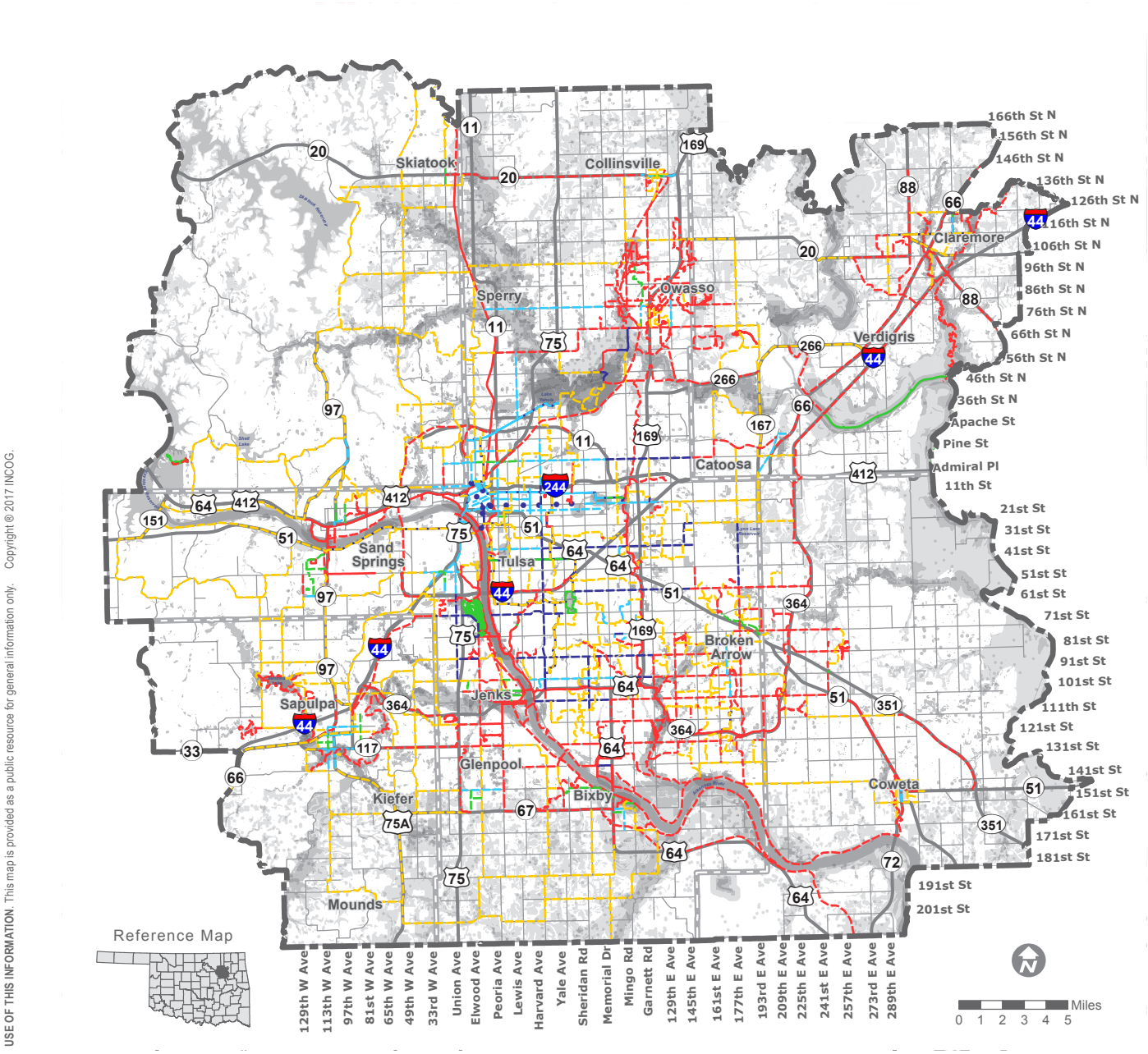
Environmental Factors

- 1 Factor
- 2 Factors
- 3 Factors
- 4 Factors
- 5 Factors
- 6 Factors

Connected 2045 Regional Transportation Plan

INCOG

Environmentally Sensitive Areas with Existing and Planned Trails and Bikeways



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Legend

GO Plan Recommendations

- Bike Lane/Buffered Bike Lane
- Bike Corridor
- Cycle Track
- Priority Shared lane/ Sharrow
- Signed Route
- Sidepath/Trail

Existing Trail Type

- Bike Lane
- Bikeway
- Trail
- Unpaved Trail

Environmental Factors

- 1 Factor
- 2 Factors
- 3 Factors
- 4 Factors
- 5 Factors
- 6 Factors

Connected 2045 Regional Transportation Plan

INCOG

Connected 2045: Technology Enhancements for Tulsa TMA

The Connected 2045 Transportation Plan will be updated every five years with specific improvements related to technological advances that will take place as they are deployed throughout the region.

Many of those projects will be common factors among metropolitan transportation choices people will adapt to make a safe and convenient transport for all involved. As public and private spending increases in areas that make it possible, deployment of technologies in the following areas is anticipated:

- ***Integrated Data Exchange.*** Data from multiple sources is coming together so we can make better decisions and solve problems more efficiently for more people.
- ***Connected Vehicles.*** Equipped cars that communicate with other cars with the same devices. This allows cars to "talk" to each other, notify drivers of possible problems, and avoid collisions.
- ***Common Payment.*** Pay once technology to get rid of unneeded complexity that affects lives every day.
- ***Multimodal Trip Planning.*** Trip planning is expected to be at one place with less time worrying how to get to destinations.
- ***Smart Mobility Hubs.*** Biking, driving and taking the bus are all great ways of getting around so several of these will be co-located – a hub – at select spots so residents can get to them – and onto where they need to go – more easily.
- ***Street Lighting.*** Light-emitting diode (LED) lights in the community can improve safety, and Wi-Fi connectivity with lighting operations is on the horizon.
- ***Collision Avoidance.*** A system that uses camera technology will spot potential human-bus collisions and alert bus drivers to it. That makes neighborhoods safer in the short run, and the data captured shapes bus system route decisions in the long run.
- ***Mobility Assistance.*** Helping people with cognitive disabilities get around by designing technology suited especially for them.

Source: Smart Columbus Initiative

- ***Enhanced Permit Parking.*** As our urban core flourishes, more visitors seek out downtown's amenities. Residents get tech-enabled parking permit that help city staff to quickly distinguish what vehicles belong where.

- ***Event Parking Management.*** With technology that tells users where parking exists and helps them access it, we'll get them there more directly, reduce congestion, and improve the experience of residents and visitors alike.

- ***Delivery Zone Availability.*** Real time answer to scheduling deliveries and coordination to make it easier and get goods where they need to go better.

- ***Connected Electric Autonomous Vehicles (CAV).*** CAV corridors will connect riders and potentially deliveries through popular retail and commercial hubs – to first and last mile stops. CAVS can make getting around safer.

- ***Truck Platooning.*** Expressways will be introduced to long-haul trucks coupled via sensors that let them "talk" to one other. This saves on fuel and reduces emissions.

- ***Oversize Vehicle Routing.*** Tulsa can become an even better place to do business when technology will provide a better guide to wide and tall trucks, giving drivers what they need to know to avoid low clearances and narrow corridors.

- ***Interstate Truck Parking.*** Trip planning can become safer and more efficient for long haul drivers when we work to build a platform for them that locates truck parking options.



Source: http://www.suratsmartcity.com

CONTACT INCOG

In developing the Connected 2045 Regional Transportation Plan, INCOG's Transportation Planning Division has concentrated on producing a document that is both useful and comprehensive. If during your review of this document you have any questions or need additional information, please feel free to contact the Transportation Planning Division using the contact information below.

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This report was prepared by INCOG and was financed in part through United States Department of Transportation funds (Federal Highway Administration and Federal Transit Administration), and in part through local matching funds provided by INCOG member governments. The contents of this report are the responsibility of INCOG. The United States government and its agencies assume no liability for the contents of this report or for the use of its contents.

Recommended for Approval by the Technical Advisory Committee : October 18th, 2017

Adopted by the Transportation Policy Committee: October 25th, 2017
Endorsed by the INCOG Board of Directors: November 14th, 2017

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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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C. Prioritization

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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.[1] Taken as a whole, the GO Plan provides a clear path toward achieving this vision for all communities in the region.

1 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.



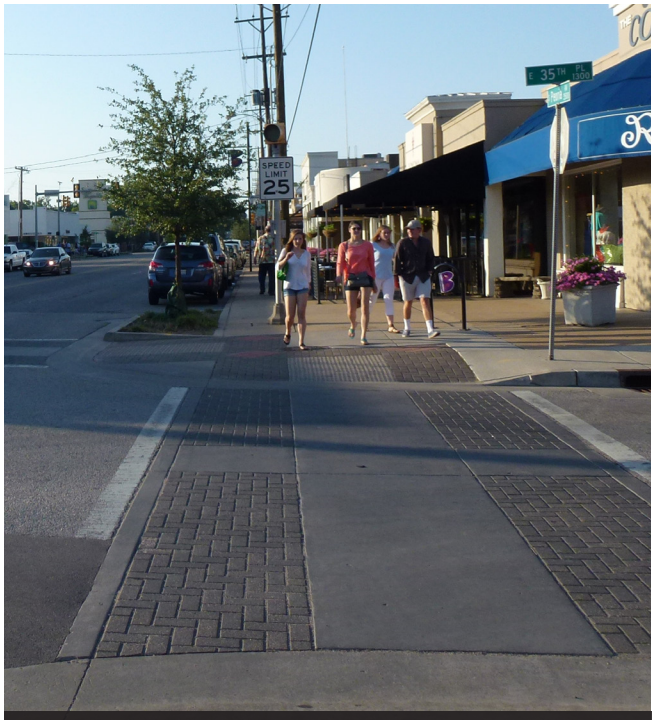
Goal 4: Develop implementation of **public education campaigns and programs** that include targeted efforts for law enforcement, students, traditionally underserved populations and other key stakeholders with target outreach goals set for 2017.



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 feautres 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.[2] Communities that are walkable and bikeable for the majority of their residents are seeing rising property values and increases in population.[3] 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

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.[4] 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.[5]

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.[6] 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.[7] 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.

4 http://www.tulsaworld.com/communities/brokenarrow/news/broken-arrow-s-rose-district-blossoming/article_ca17b50c-9191-53c2-97be-0ccc6055e473.html

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

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

7 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:

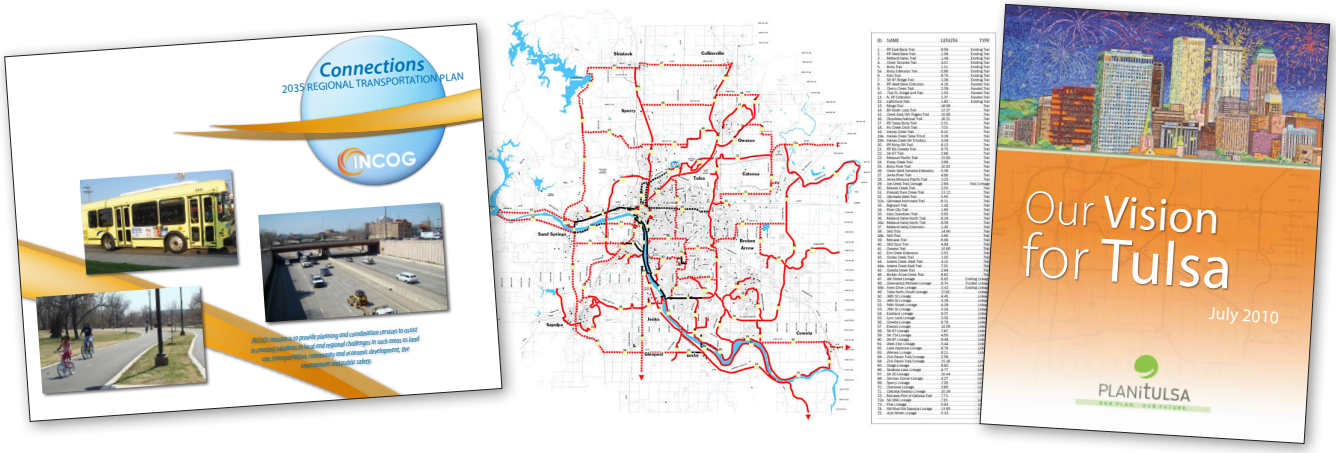
- Incorporation of pedestrian and bicyclist needs into the land development process through:
  - Acquisition of trail easements
  - Aditional sidewalk connections, and
  - Acommodation at planned transit stops
- Improved connections between regional trails and neighborhoods
- Consistent application of 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 plan development was essential. Local staff were involved in the following efforts:



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.

- 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

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.[1] 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.[2] 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.

Work trips, however, only represent 11.6 percent of all trips in the Tulsa region.[3] 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

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.

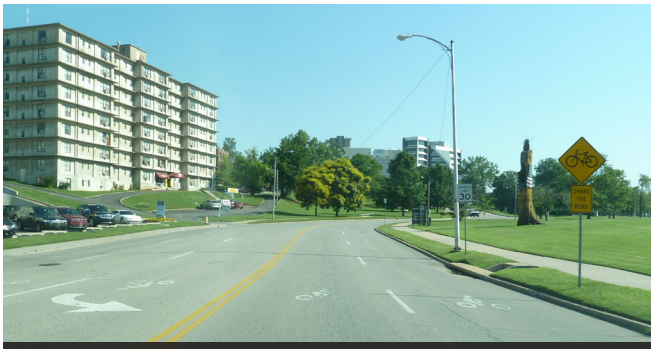
3 National Household Travel Survey, 2009.

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.

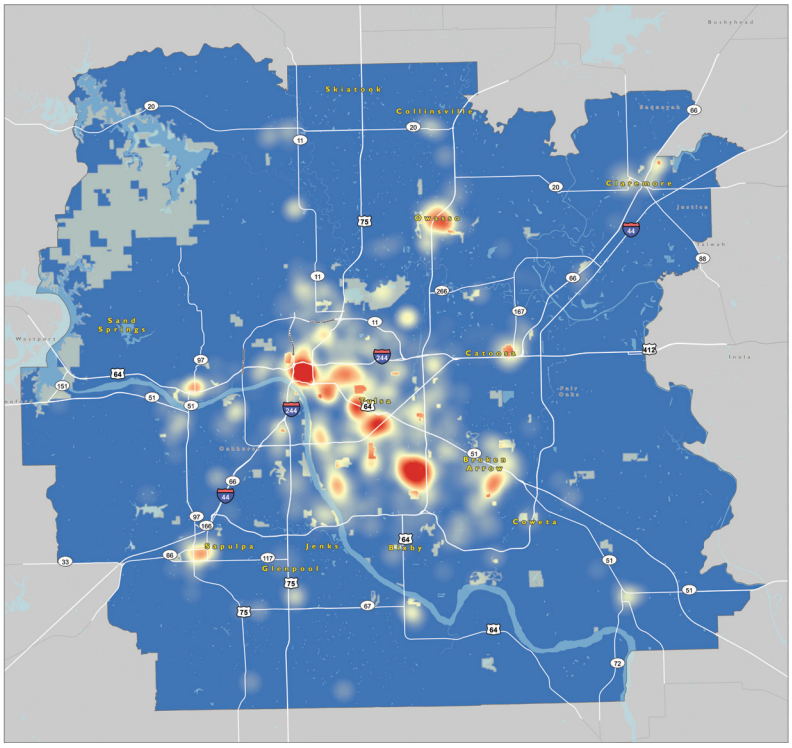
Study Network Assessment

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

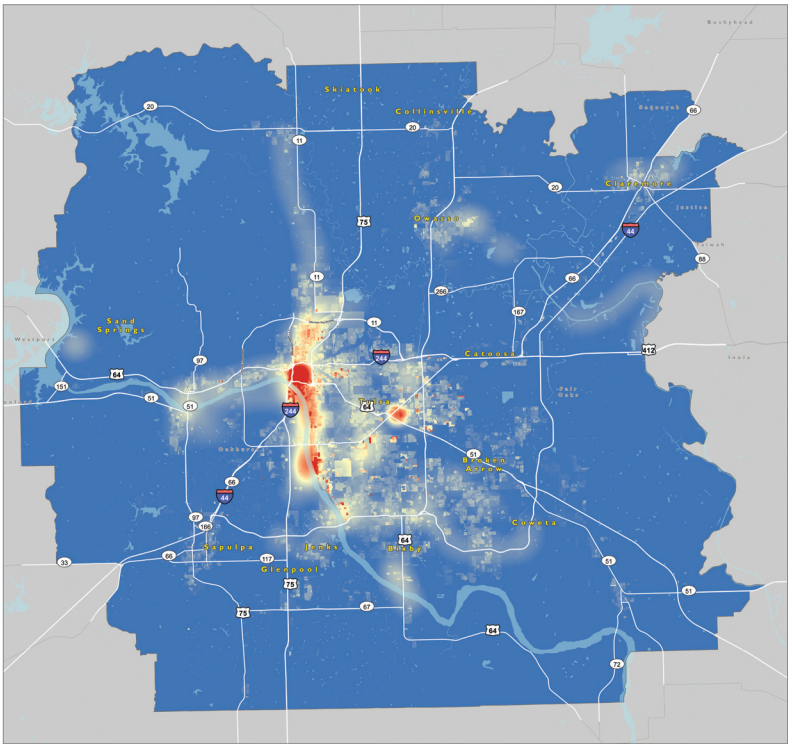


Attractors Demand

High

Low

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

High

Low

Fieldwork Data Example

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.



Project team members measured street and lane widths as configurations changed along study corridors.

Data Collection Team:_____ Date:_____ Photo Filenames (range): _____

Tulsa
Data Collection Sheet

BBL: Buffered Bike Lane
GBL: Green Bike Lane
BL: Bike lane
SH: Sharrow
PSL: Priority Shared Lane
ABL: Advisory Bike Lane
SS: Striped Shoulder (3-4.5)
CL: Climbing Lane
SP: Separated path
CT: Cycletrack
FS: Further Study

N: None
WR: Widen Road
RD: Road Diet
LD: Lane Diet
PR: Parking Remove
LS: Lower Speed
TC: Traffic Calming

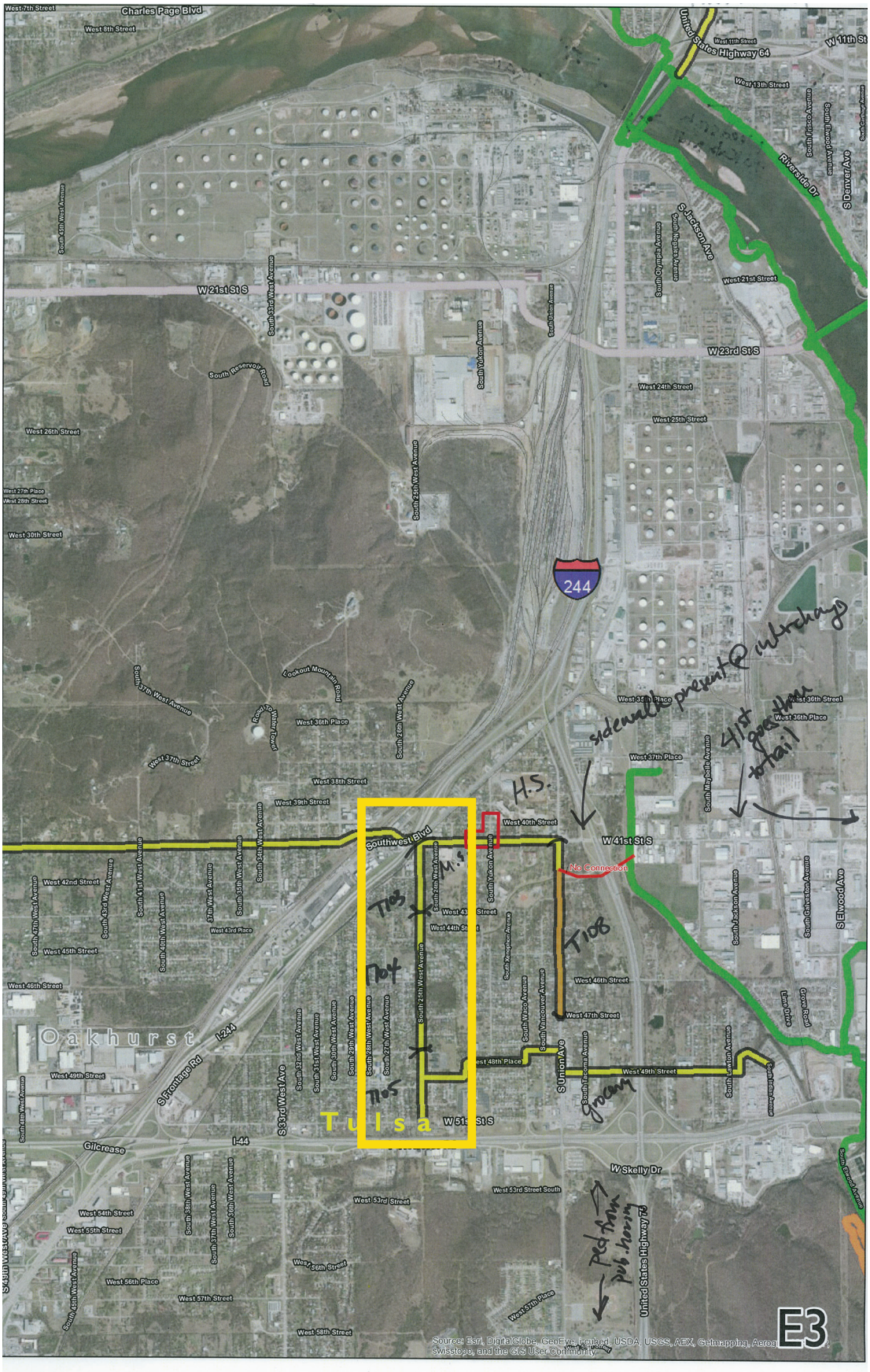
1 - Easy
3= Hard
Describe your levels on the back

Issues to Note:
One Way: (N, NW, NE, S, E, W, etc.)
Edge of Road: Guardrail, Utility Poles, Drainage, Slopes
Sight Distance, road geometry
Bridge width
Driveways
Truck traffic from Ind./Com. Land Use
Bus Stops
Surrounding land use

Center Configuration:
CM--Concrete Median
GM--Grass Median
PM--Planted Median
StrM--Striped Median
Striped / Unstriped
None

ID: A-	Street (Name/Rte #)	From	To	Notes	Rec Facility (notes)	Major Action	Level of Effort	Wayfind Signs	Exist or New	Speed Limit	Total Width	Median Width	Bicycle Direction	N, S, E, W	S/P & Width	Width in Feet								S/P & Width		Right Turn lane? (Intersection where it drops)
T103	S 25th W Ave	W 41st St	W 43rd St	· SW both sides · no parking	SH	N	1		Existing:	Psted 30	24											12				
									New:	New																
T104	25th W Ave	W 45th St	W 49th	· SW E side · parking allowed	BL	PR			Existing:	Psted 30	38					19						19				
									New:	New	38			8	5 BL	10						10	5 BL			
T105	25th W Ave	W 49th St	W 51st St	· SW E side ·	BL	RD			Existing:	Psted 30	40					10	10					10	10			
									New:	New	40				5 BL	10		10				10	5 BL			
T106	W 41 ST ST	S 25th W Ave	S Tacoma Ave	· Parking allowed	BL	PR			Existing:	Psted 30	40					20						20				
									New:	New	40			8 P	6 BL	10						10	6 BL			
T107	W 41 ST ST	S Tacoma Ave	S Elwood Ave	· drainage swales swap sides	SR	N			Existing:	Psted 35	24					12						12				
									New:	New	24					12						12				
T108	Union	41st	49th		BL	RD			Existing:	Psted 40	40					10	10					10	10			
									New:	New	40				5 BL	10		10				10	5 BL			
T109	Union	Skelly Dr W	W 51st ST	· Bridge retrofit		CON			Existing:	Psted																
									New:	New																
T110	Harvard	Admin Xpressway	Pine		BBL	RD			Existing:	Psted	55					11	11		6M 11	11	11					
									New:	New					11 BBL	11			6M 11	11	11 BBL					
									Existing:	Psted																
									New:	New																

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 initiall 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.

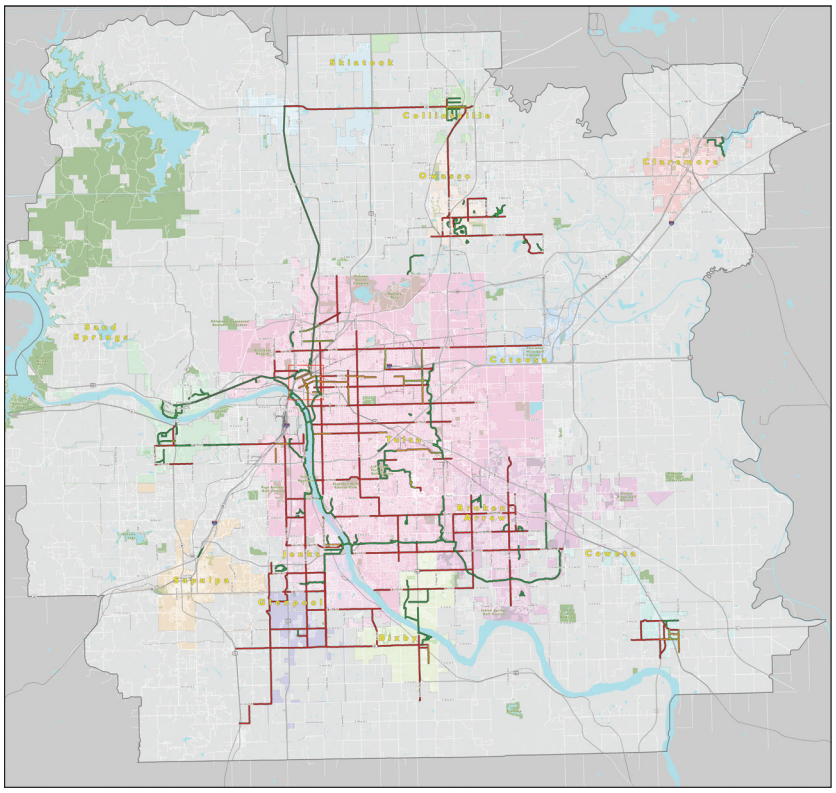
The LTS method uses a number of inputs to evaluate the comfort of a given street segment for bicyclists including:

- 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.[4]

4 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.

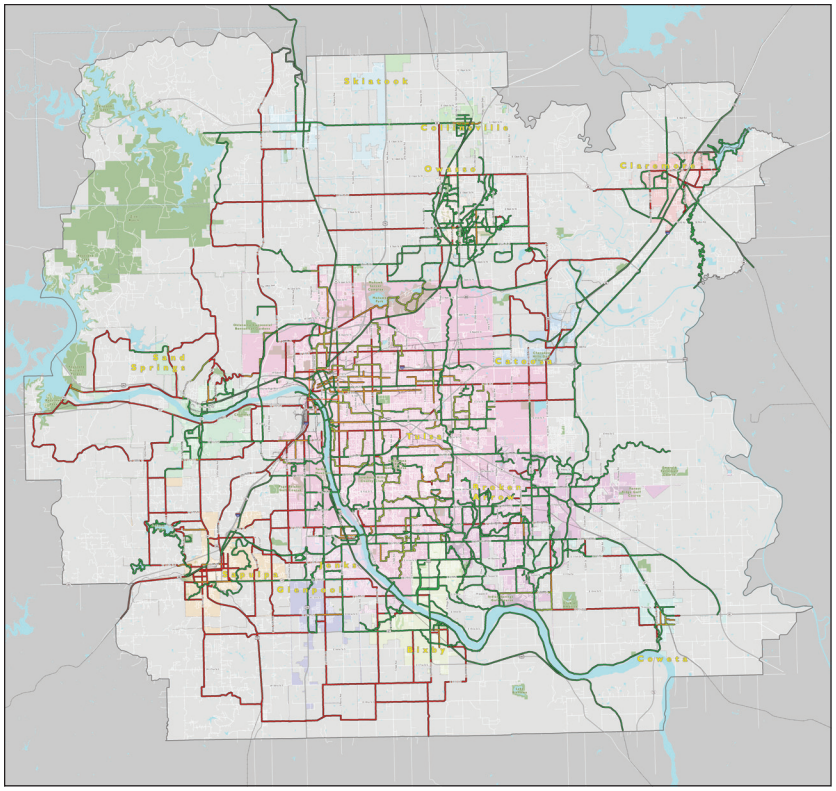
Study Network



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.[1]

1 This assessment only pertains to changes to the original study network since an "before" assessment of added streeets 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.[5]

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[6]
- 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

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.



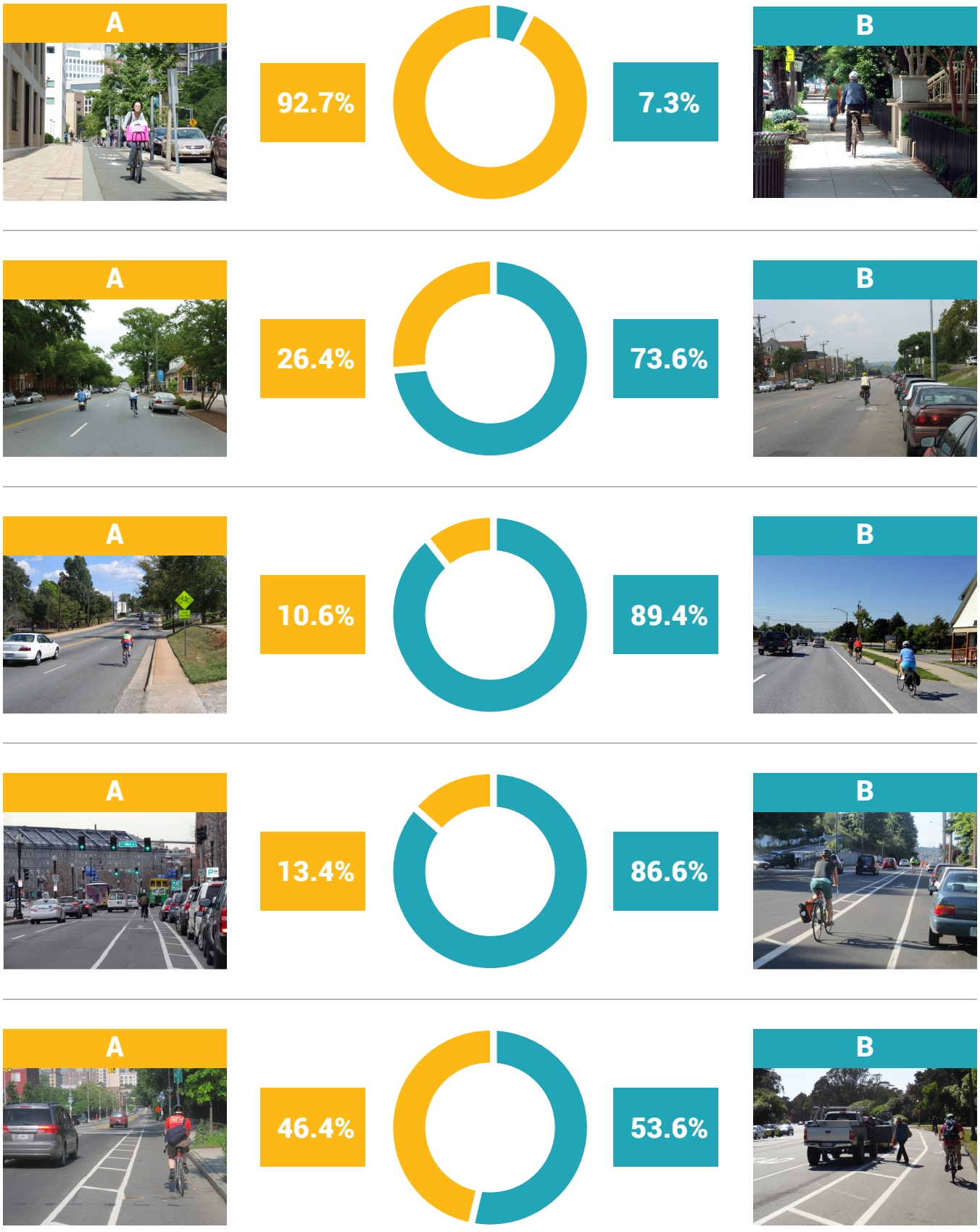
Confident bicyclists feel comfortable taking the lane as seen here in a group ride on Southwest Boulevard in Tulsa.

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.

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 bicylists, 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 underlayed 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 wtih 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
TOTAL MILES	1372.8

Overall, the set of facility recommendations provides a lower-stress bicycling experience throughout the region.[7] 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.

7 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.



Wayfinding signage design guidance is provided in the MUTCD and results in assemblies like the one pictured above.

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3 PEDESTRIAN STRATEGY

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.[1] All other jurisdictions are estimated to have an average walking commute mode

1 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.



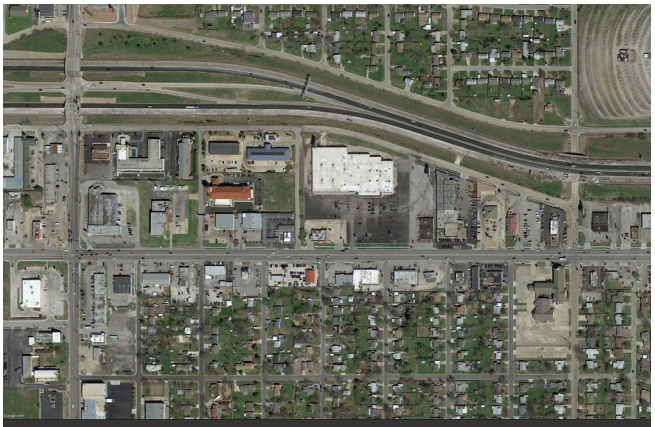
The presence of multiple driveway cuts over a short distance creates conflicts between drivers and pedestrians.



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.



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.



Broken Arrow's Rose District features a pedestrian-friendly streetscape.

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



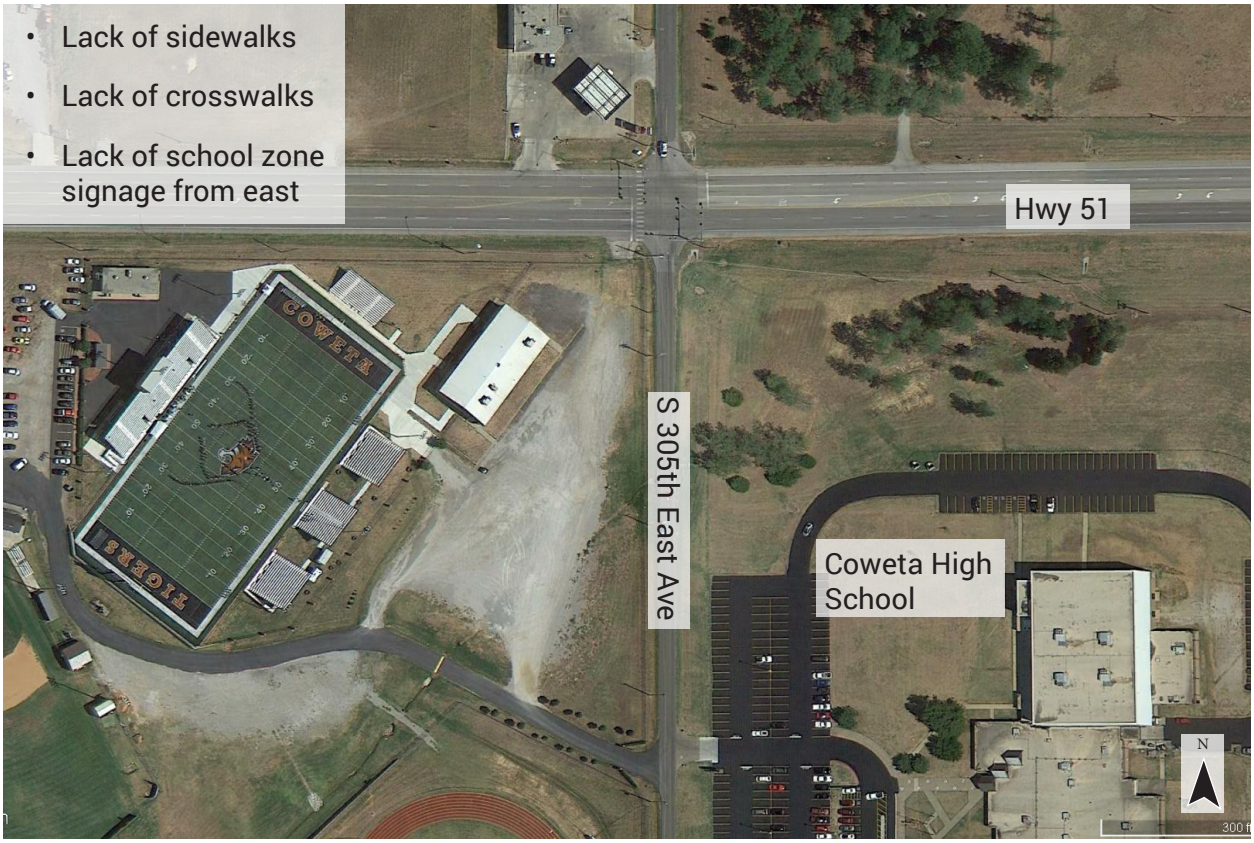
No ADA compliance or connection to sidewalks

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.

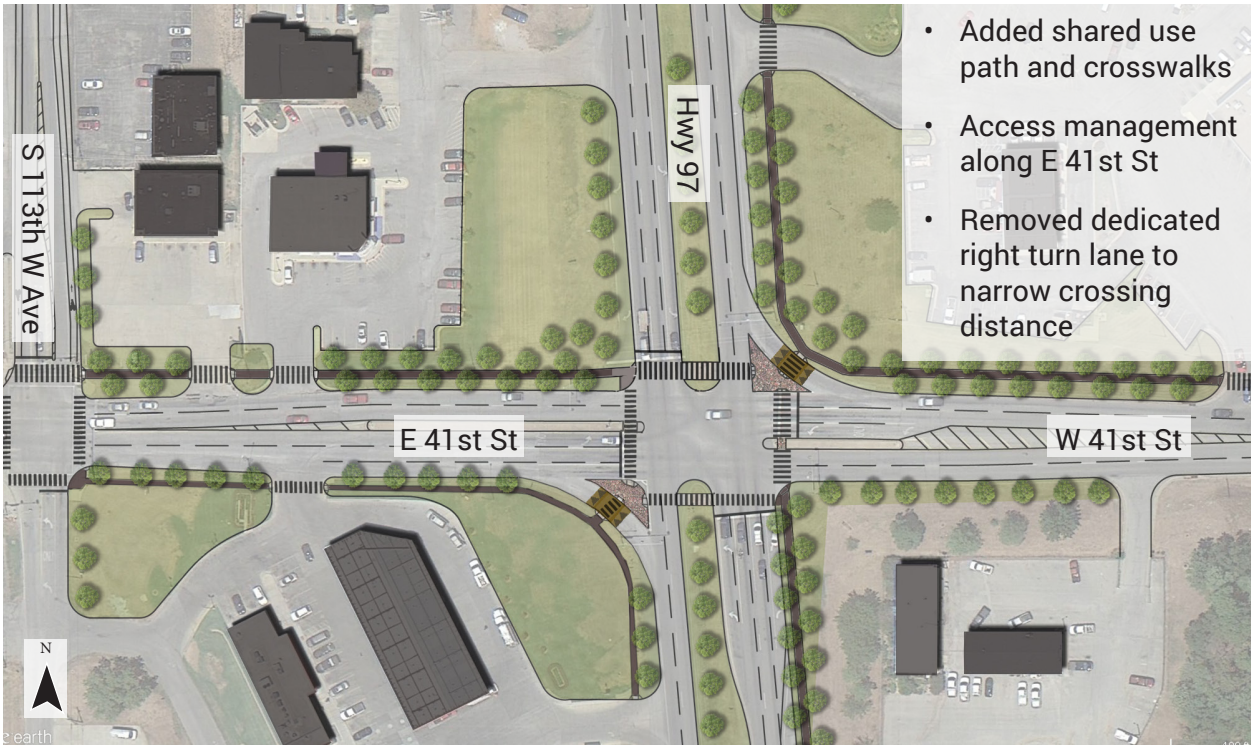
Additionally, Sand Springs has plans for a streetscape project along South 113th West Avenue which is parallel to Highway 97. This project includes a cycle track that will connect with West 41st Street. This facility should be built along the east side of the street to connect to a new shared use path 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

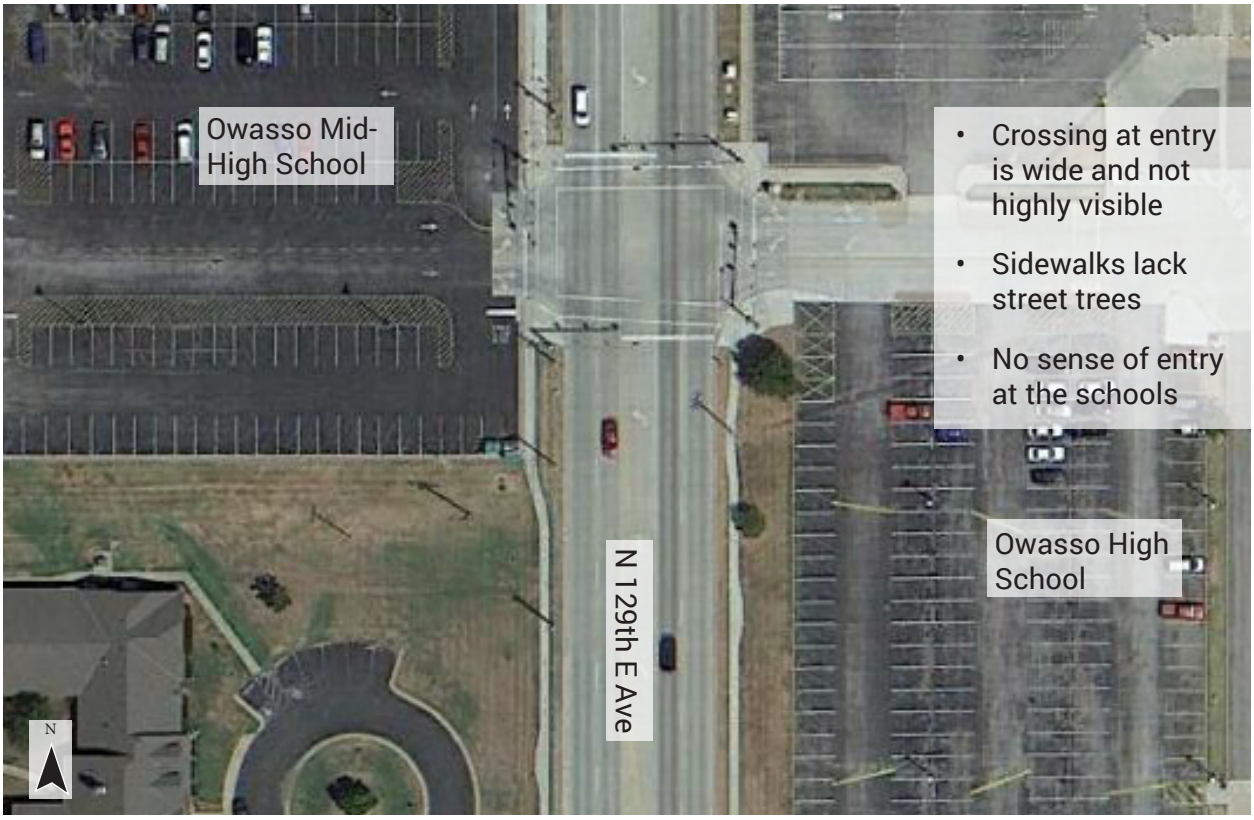
North 129th East Avenue and East 86th Street North, Owasso High School

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.

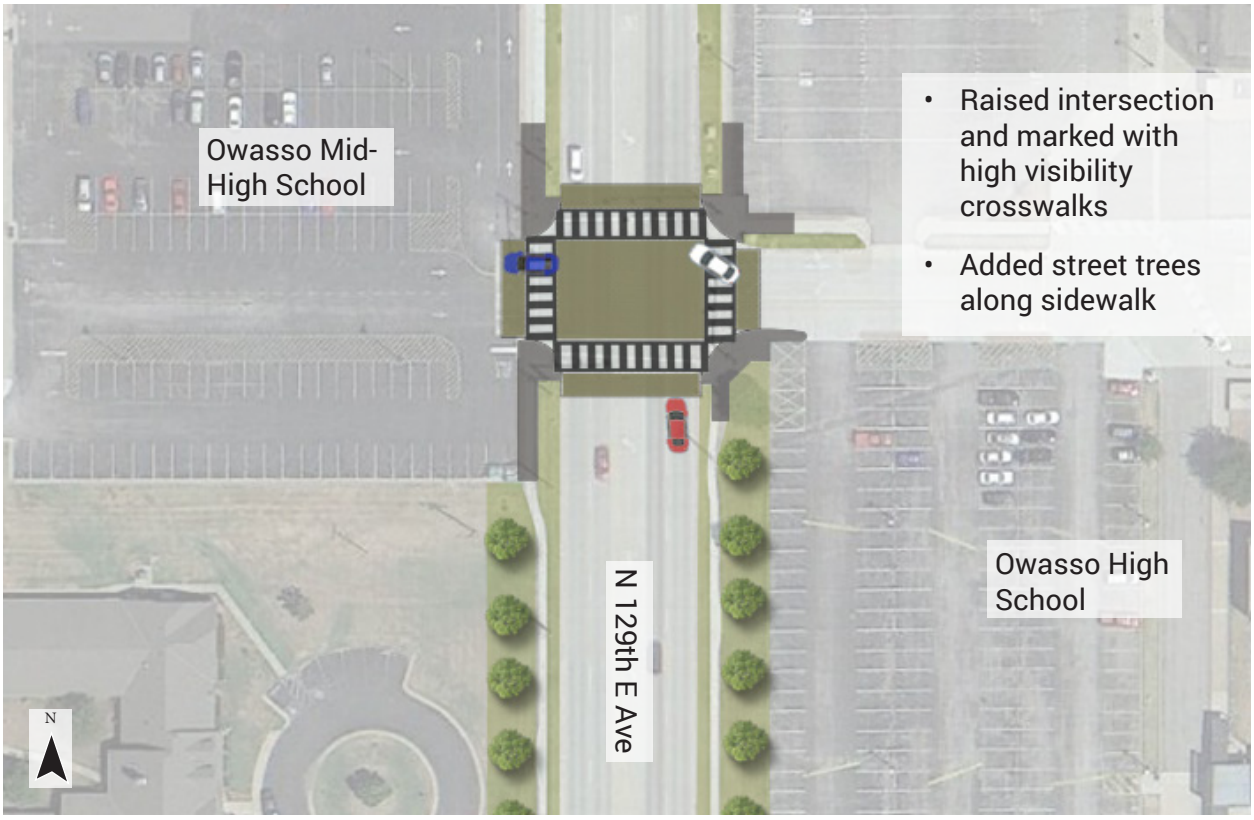
Traffic speeds are relatively normal and slow during school drop-off and pick-up times because of the high volume of traffic, but the rest of the day has vehicular speeding and behavioral issues. Surrounding development is mostly suburban strip retail and gas stations, with some nearby residential development.

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



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

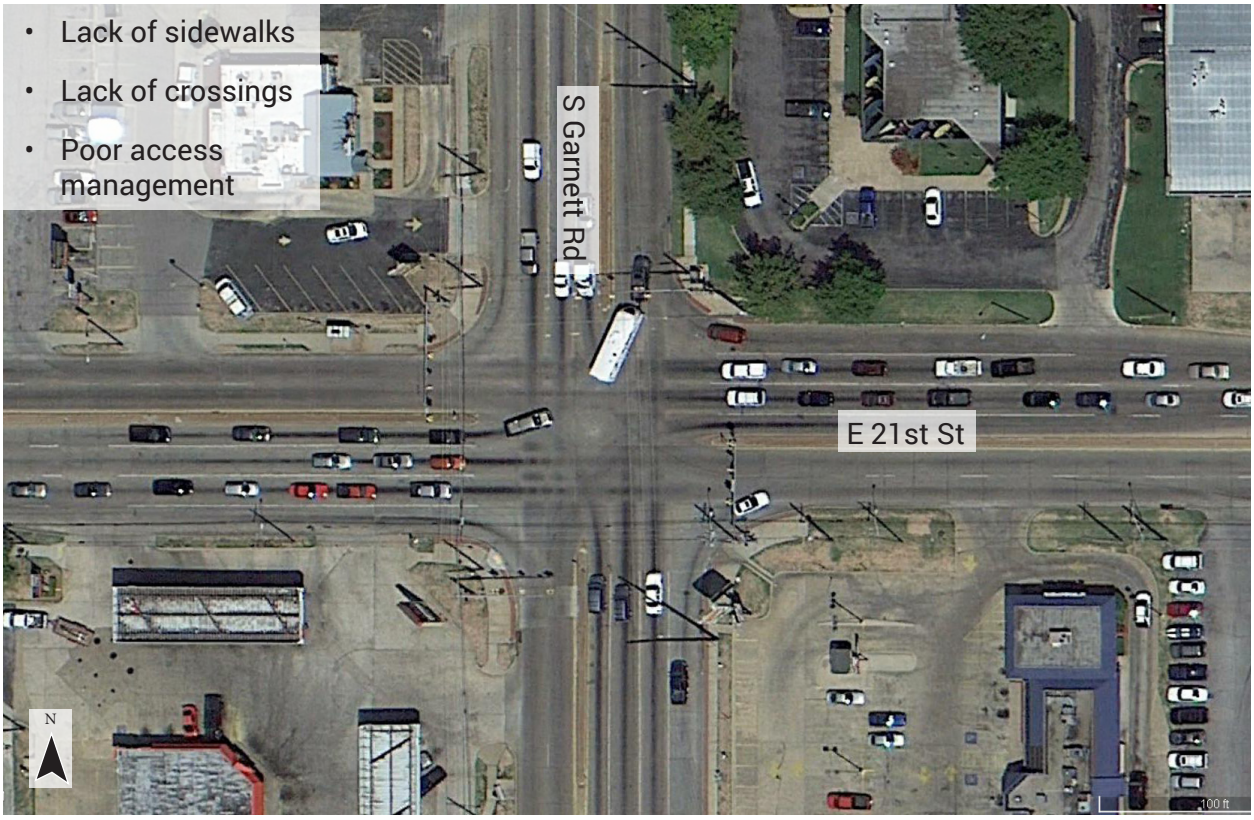
East 21st Street At South Garnett Road

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.

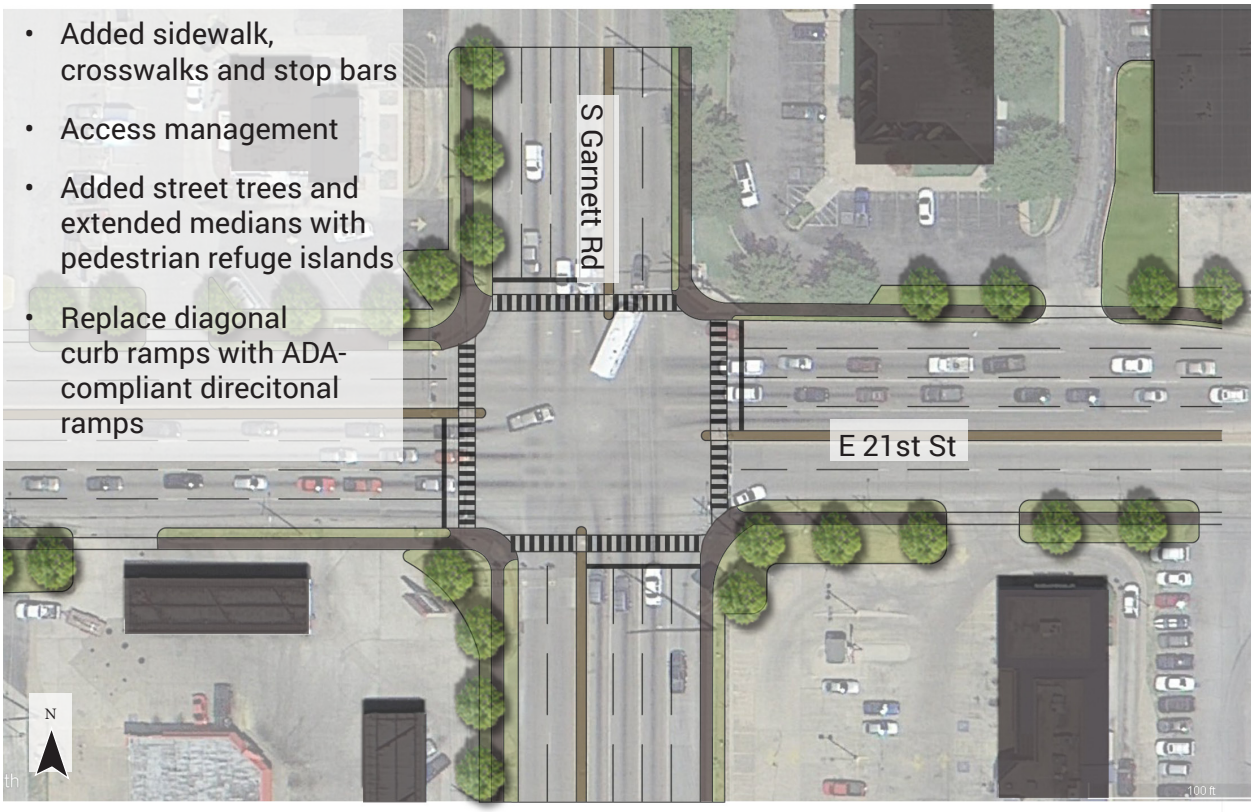
The first improvements to this area should occur within the pedestrian realm. Each side of E 21st Street should have continuous sidewalks with shade trees planted within a grass planting strip between the roadway and the new sidewalk. Access management strategies should be implemented along the streets 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



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.

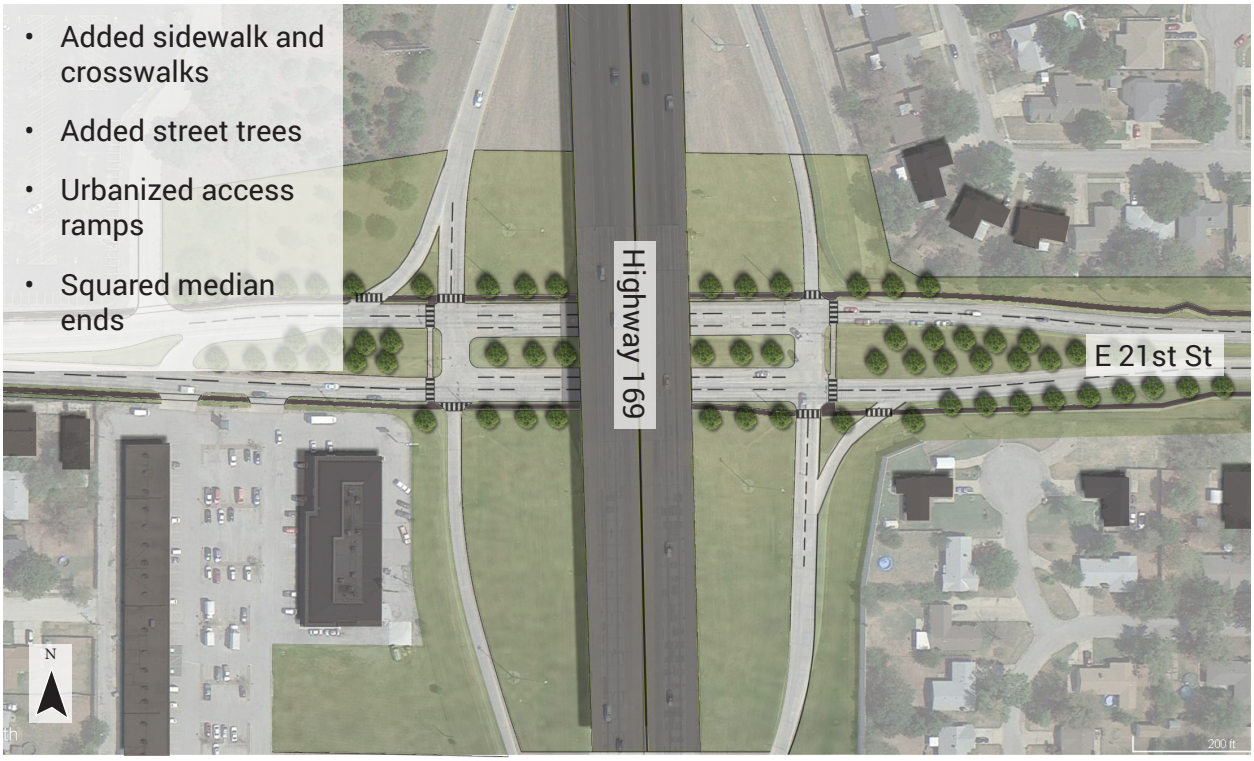
As with the area along East 21st Street to the east, sidewalks and ADA-compliant curb ramps are the top priority in this concept area. To help accommodate bikes these should be shared use paths under the Highway 169 overpass. To make crossings safer and more conspicuous, there should be high visibility 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

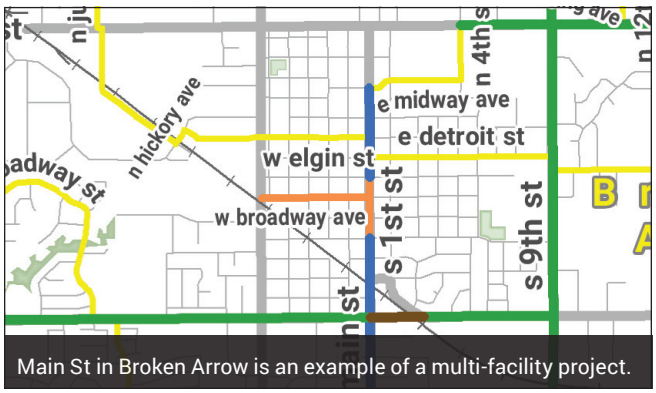
The bicycle network was divided into a set of 700 projects for the purposes of recommending implementation approaches and developing a prioritized list, with cost estimates, by jurisdiction. The network was divided into projects through the following method:

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.



Main St in Broken Arrow is an example of a multi-facility 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



Sidewalk gaps such as this one on Union Street in Tulsa were prioritized based on a number of factors.

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[1]	
	% of corridor with project identified in prior plan[2]	
	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	

1 Tulsa-only variable

2 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 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.



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 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). Combing 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.[1]

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.

1 League of American Bicyclists, Oklahoma Report Card, accessed 23 June 2015 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[1]
- 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

1 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.[2]

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[3] 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.

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

3 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

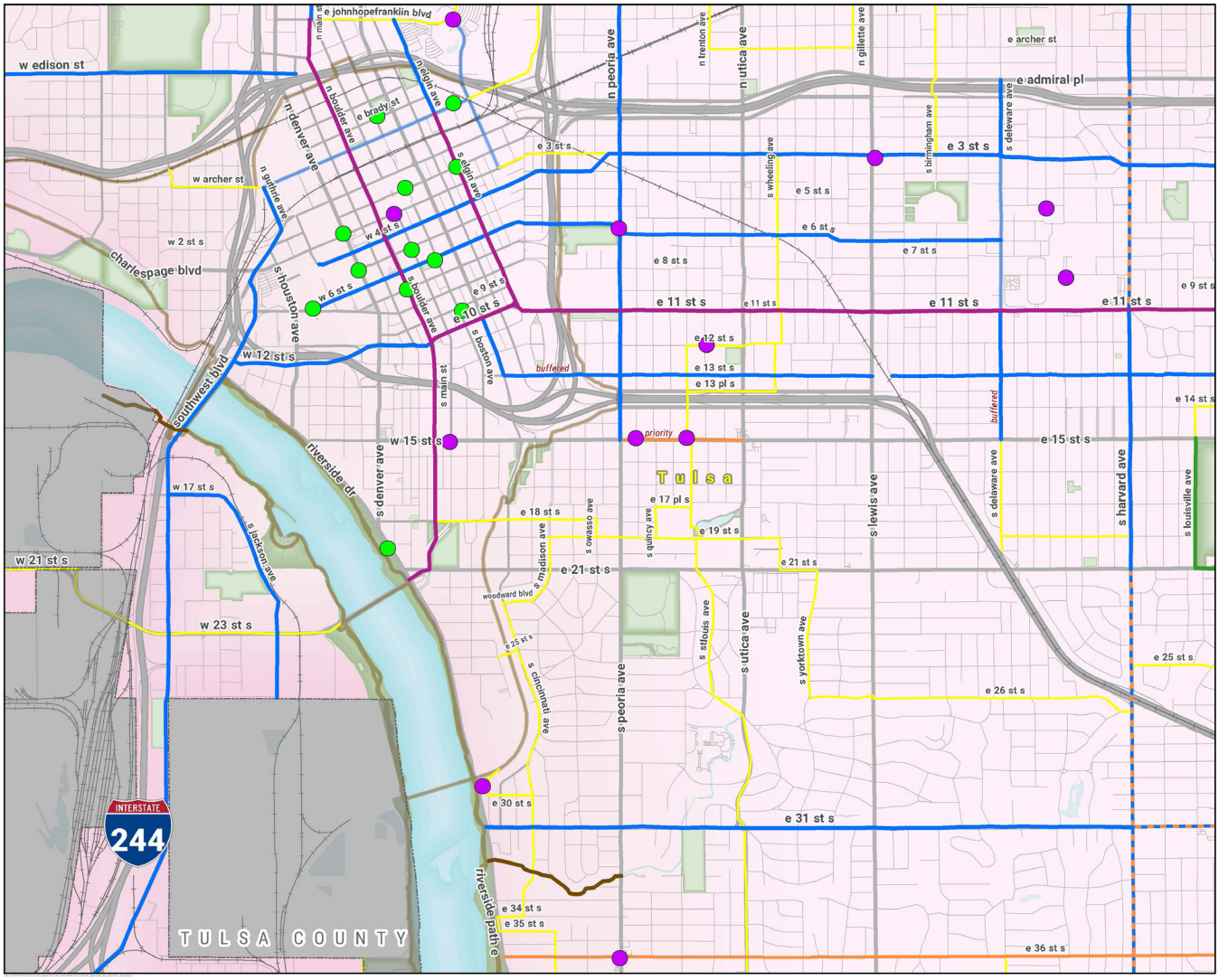
The implementation of a bike share system can increase the number of the region's residents with access to a bicycle and get more people riding. INCOG completed a feasibility study and business plan for a bike share system in the City of Tulsa in 2015. The recommended system will consist of an initial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

Phase
- 1
- 2

Recommendations
- Trail
- Sidepath
- Cycle Track
- Bike Lane
- Bike Corridor
- Shared Lane Marking
- Signed Route
- Trail
- Bike Lane

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.

FFY 2020 – 2023
Transportation Improvement Program

For the Tulsa Transportation Management Area

Endorsed by the INCOG Board of Directors August 13, 2019

This report was prepared by INCOG and was financed in part through United States Department of Transportation funds (Federal Highway Administration and Federal Transit Administration), and in part through local matching funds provided by INCOG member governments. The contents of this report are the responsibility of INCOG. The United States government and its agencies assume no liability for the contents of this report or for the use of the contents.

Contacting INCOG

The *Transportation Improvement Program* is occasionally updated or amended. If you have questions or would like the most current information please contact the INCOG Transportation Planning Division.

Phone: 918-584-7526

E-mail:transportation@incog.org

Web Page: www.incog.org/Transportation

Address: 2 West 2nd Street, Suite 800, Tulsa, OK, 74103

Resolution

Joint resolution between the Indian Nations Council of Governments and the Oklahoma Department of Transportation

A RESOLUTION TO ADOPT THE *FFY 2020 – 2023 TRANSPORTATION IMPROVEMENT PROGRAM* FOR THE TULSA TRANSPORTATION MANAGEMENT AREA

WHEREAS, the Indian Nations Council of Governments, as the Metropolitan Planning Organization designated by the Governor of the State of Oklahoma for the Tulsa Metropolitan Area, is responsible for the operation and maintenance of a comprehensive, cooperative and continuing transportation planning process designed to prepare and adopt transportation plans and programs; and

WHEREAS, the transportation planning process is carried out by the Indian Nations Council of Governments through a Memorandum of Understanding with the Oklahoma Department of Transportation and the Metropolitan Tulsa Transit Authority, dated April, 1975; and

WHEREAS, the Governor of the State of Oklahoma has designated the Oklahoma Department of Transportation as the state agency responsible for review and approval of Transportation Improvement Programs developed in Oklahoma under the requirements of Section 134, Title 23, United States Code, of Fixing America's Surface Transportation Act (FAST Act); and

WHEREAS, a Transportation Improvement Program for the Tulsa Transportation Management Area, containing highway, transit, bicycle/pedestrian, airport, and air quality improvement projects expected to be carried out from FFY 2020 to FFY 2023, has been prepared through the planning process; and

WHEREAS, opportunities for citizens, affected public agencies, private providers of public transportation, and other interested parties to participate in and have their views considered in the development of the Transportation Improvement Program were provided through public meetings and public notices;

NOW, THEREFORE BE IT RESOLVED that the Indian Nations Council of Governments, as the Metropolitan Planning Organization, hereby endorses the approval of the *FFY 2020 – 2023 Transportation Improvement program* by the Transportation Policy Committee, and the Oklahoma Department of Transportation hereby adopts the *FFY 2020 – 2023 Transportation Improvement Program* for the Tulsa Transportation Management Area.

Indian Nations Council of Governments — Date: 10/10/2019

Oklahoma Department of Transportation — Date

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Introduction & Background

The Tulsa metropolitan region's changing pattern of land development and travel demand requires a continuous program of managing and improving the area's surface transportation system. The availability of good surface transportation facilities and services has always been one of the major factors affecting industrial location, commercial activity, and residential development in a changing metropolitan environment. In fact, the transportation system plays a central role in the lives of the citizens of the region as they go about their daily business and activities. If the metropolitan area is to enjoy an enhanced quality of life and maintain a competitive position both regionally and nationally, a transportation improvement program is necessary to assure that the transportation system is positioned to make a positive contribution.

The *Federal Fiscal Year (FFY) 2020 – 2023 Transportation Improvement Program (TIP)* presents a program of improvements to the surface transportation system within the Tulsa Transportation Management Area (see map on page 3) to be implemented with federal matching funds. The projects, which have a combination of federal, state, and local funding sources, cover a wide range of transportation modes, including streets and highways, public transportation, bicycle and pedestrian facilities, and airport improvements. Planned improvements include new construction; expansion of existing services and facilities; operation, maintenance and reconstruction of existing facilities; efficiency improvements to increase the effectiveness of existing transportation investments; and projects specifically identified for their ability to maintain the Tulsa area's "clean air" status.

The TIP was prepared by INCOG, the Metropolitan Planning Organization (MPO) for the Tulsa Transportation Management Area (TMA), under the guidance of the Transportation Policy Committee (TPC) and the Transportation Technical Committee (TTC). It represents a cooperative effort between INCOG and its member governments in the Tulsa area, The Metropolitan Tulsa Transit Authority (MTTA), and the Oklahoma Department of Transportation (ODOT).

The TIP serves as a short-range implementation program, identifying projects to be initiated during the upcoming four-year period. Additionally, the TIP is used as a program management tool, to gauge progress toward implementing transportation plans for the region. Specifically, improvements contained within the TIP must be consistent with approved transportation plans, primarily the Regional Transportation Plan (RTP), and the Tulsa Metropolitan Area Major Street and Highway Plan (MSHP), and should reflect progress toward implementation of the plans in light of the overall transportation goals of the metropolitan area.

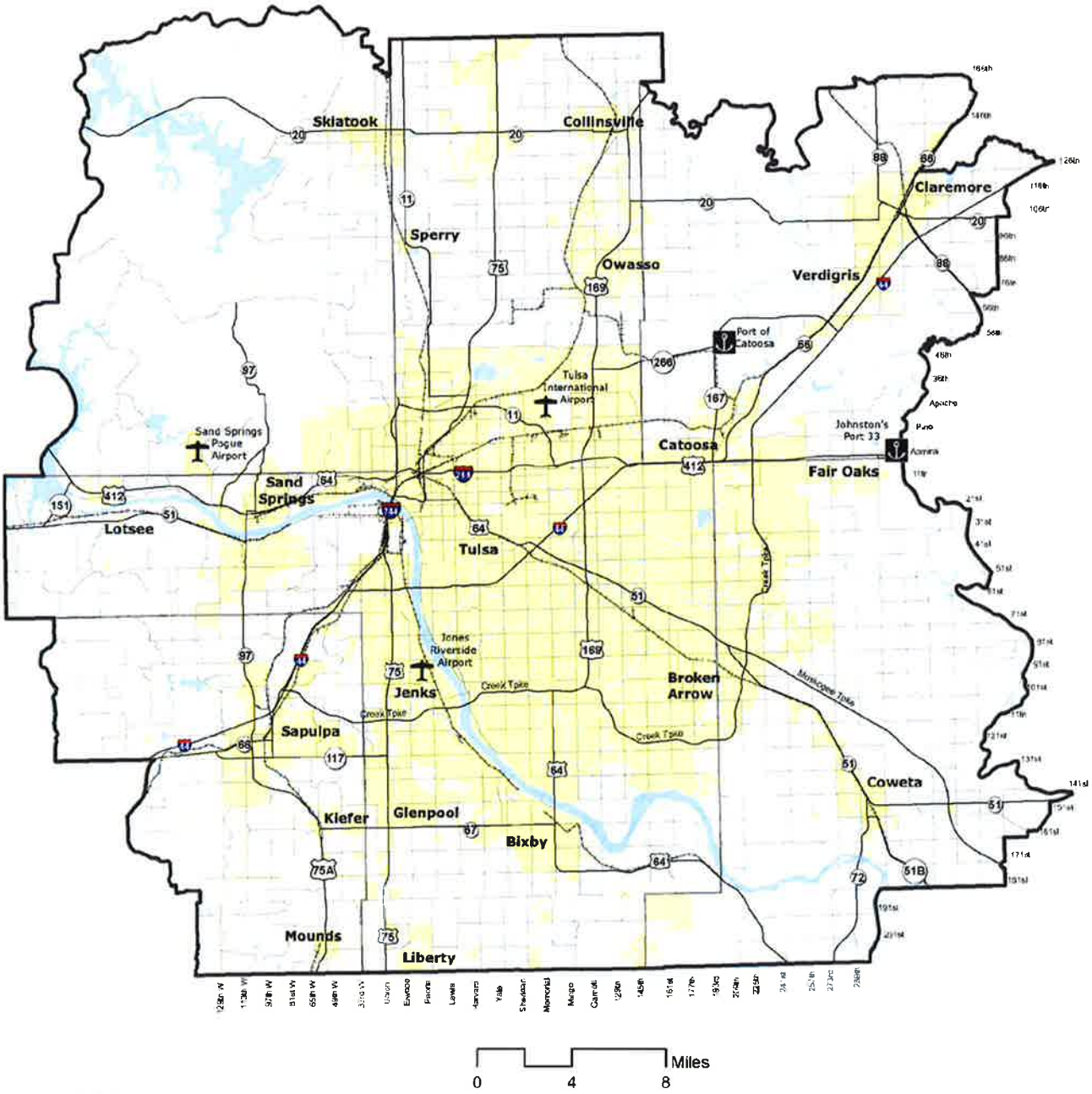
The TIP is a program of projects for which funding is expected to be available. As a result, the *TIP* reflects the transportation improvements priorities of the region, given the resources available. The Program Detail on page 4 lists, by funding program, the total funds expected and programmed from all sources (federal, state, and local).

TIP Document Organization

The TIP is intended to provide technical information that transportation professionals use in a format that is understandable by anyone interested in surface transportation improvements in the region. To accomplish this, some key features should be noted.

- The projects are grouped by year and within each year they are grouped by County in alphabetical order and then by Job Number.
- Summaries of funding by program for each year follow the project listings
- Because the TIP is a dynamic document, being updated or occasionally amended, a page has been included at the front with information on contacting INCOG's Transportation Division
- Finally, the list of projects will be included in the Programs/Projects section on the web page (www.incog.org/transportation), and will be updated as often as necessary.

Tulsa Transportation Management Ar



Highways

Arterials

Railroads

Water Bodies

Streams

Corporate Limits

County Boundary

Transportation Management Area



OKLAHOMA DEPARTMENT OF TRANSPORTATION
CONSTRUCTION WORK PROGRAM
FFY 2020-2023

CREEK COUNTY
OSAGE COUNTY
ROGERS COUNTY
TULSA COUNTY
WAGONER COUNTY

Federal Fiscal Year 2020 (FFY2020)

County	JP No.	Type	Highway	Length	Description	Cost
CREEK	24131(05)	RIGHT OF WAY	SH016	4.5mi	SH-16: FROM 1.0 MILE EAST OF JCT. SH-48N, EAST 4.5 MILES (UT FOR 2413104)	$ 1,007,925.00
CREEK	24131(06)	UTILITIES	SH016	4.5mi	SH-16: FROM 1.0 MILE EAST OF JCT. SH-48N, EAST 4.5 MILES (UT FOR 2413104)	$ 336,000.00
CREEK	24425(05)	RIGHT OF WAY	US075A	5.5mi	US-75A: FR: APPROX. .34 MI. NORTH OF THE OKMULGEE C/L NORTH APPROX. 5.5 MILES, TO KIEFER (RW FOR 24425(04))	$ 548,995.00
CREEK	24425(06)	UTILITIES	US075A	5.5mi	US-75A: FR: APPROX. .34 MI. NORTH OF THE OKMULGEE C/L NORTH APPROX. 5.5 MILES, TO KIEFER (UT FOR 24425(04))	$ 316,645.00
CREEK	29682(05)	RIGHT OF WAY	SH016	0.1mi	SH-16 OVER SAND CREEK, 0.7 MILES EAST OF THE JCT. SH-48RW FOR 29682(04)	$ 115,540.25
CREEK	29682(06)	UTILITIES	SH016	0.1mi	SH-16 OVER SAND CREEK, 0.7 MILES EAST OF THE JCT. SH-48UT FOR 29682(04)	$ 115,540.26
CREEK	29684(04)	BRIDGE & APPROACHES	SH016	0.1mi	SH-16 OVER WEST SPRING CREEK, 6.4 MILES SOUTH 0F THE JCT. SH-33	$ 442,867.01
OSAGE	24262(04)	BRIDGE & APPROACHES	SH018	0.5mi	SH-18: OVER SALT CREEK, 2.0 MILES NORTH OF THE PAWNEE C/L	$ 4,551,454.64
OSAGE	24752(04)	BRIDGE & APPROACHES	SH020	0.13mi	SH-20 OVER GRAY HORSE CR APPROX. 1.6 MILE EAST OF SH-18	$ 3,690,603.30
OSAGE	24752(05)	BRIDGE & APPROACHES	SH020	0.25mi	SH-20: SYCAMORE CREEK , 7.9 MILE EAST OF SH-18	$ 2,185,452.97
OSAGE	27084(04)	BRIDGE & APPROACHES	SH020	0.3mi	SH-20: BUG CREEK, 11.5 MI EAST OF JCT. SH18	$ 6,811,233.44
OSAGE	28262(05)	BRIDGE & APPROACHES	SH011	0.02mi	SH-11: OVER RED EAGLE BRANCH CREEK, 9.2 MILES EAST OF JCT. SH-99(PHASE II)	$ 640,000.03
OSAGE	28860(04)	BRIDGE & APPROACHES	SH099	0.5mi	SH 99 OVER BIRCH CREEK, 2.7 MI NORTH OF JCT SH 10	$ 1,218,752.58
OSAGE	29587(04)	BRIDGE & APPROACHES	US060	0.1mi	US-60 OVER SALT CREEK, 1.2 MI WEST OF THE JCT OF SH-18	$ 2,402,392.60
ROGERS	27031(04)	GRADE, DRAINING, BRIDGE & SURFACE	SH020	3.9mi	SH-20: FROM 4 MILES EAST OF TULSA COUNTY LINE EAST TO .65 MILE EAST OF VERDIGRIS RIVER	$ 47,800,961.00
ROGERS	31093(05)	RIGHT OF WAY	US412	2.0mi	US 412 ADD J-TURNS AT 265TH E AVE & 289TH E AVEAPPROX. 2.8 MI & 4.3 MI EAST OF I 44 JCT RW FOR 3109304	$ 54,500.00
ROGERS	31093(06)	UTILITIES	US412	2.0mi	US 412 ADD J-TURNS AT 265TH E AVE & 289TH E AVEAPPROX. 2.8 MI & 4.3 MI EAST OF I 44 JCT UT FOR 3109304	$ 54,500.00
TULSA	10981(06)	RIGHT OF WAY	IS044	0.3mi	TULSA: I-44 AT US 169 INTERCHANGE(SELECTED MOVEMENTS)[RW FOR 10981(05)] (IM EARMARK)	$ 3,316,298.51
TULSA	10981(07)	UTILITIES	IS044	0.3mi	TULSA: I-44 AT US 169 INTERCHANGE(SELECTED MOVEMENTS)(UT FOR 10981(05)	$ 1,955,226.61
TULSA	26505(04)	GRADE, DRAINING, & SURFACE	SH051	0.22mi	SH-97: FROM 500' SOUTH OF MORROW DRIVE NORTH IN SAND SPRINGS	$ 7,627,883.49
TULSA	27073(04)	BRIDGE & APPROACHES	US169	0.25mi	US-169 OVER 76TH STREET (SH-135), 8.7 MI. NORTH OF I-44	$ 10,506,000.00
TULSA	29693(04)	BRIDGE & APPROACHES	IS044	0.1mi	I-44 OVER 33RD WEST AVE EAST AND WESTBOUND, 0.6 MILES EAST OF SH-66 (IN EARMARK)	$ 12,039,285.81
TULSA	30318(10)	BRIDGE PAINTING		0.0mi	DIVISION 8 BRIDGE PAINT (VARIOUS LOCATIONS)	$ 1,000,000.74
TULSA	31083(04)	BRIDGE REHABILITATION	IS444	0.2mi	3RD ST REHAB BRIDGE OVER I 444 LOCATED .9 MI N OF SH 51	$ 2,999,999.63
TULSA	31094(05)	RIGHT OF WAY	SH051	0.5mi	SH 51 ADD J-TURNS AT 265TH W AVE/COYOTE TRAILLOCATED .6 MILES EAST OF CREEK CL RW FOR 3109404	$ 54,500.00
TULSA	31094(06)	UTILITIES	SH051	0.5mi	SH 51 ADD J-TURNS AT 265TH W AVE/COYOTE TRAILLOCATED .6 MILES EAST OF CREEK CL UT FOR 3109404	$ 54,500.00
TULSA	31095(05)	RIGHT OF WAY	SH011	1.0mi	SH-11 @ 86TH ST NORTH: 5.6 MI N OF GILCREASE INTERSECTION MOD RW FOR 3109504	$ 54,500.00
TULSA	31095(06)	UTILITIES	SH011	1.0mi	SH-11 @ 86TH ST NORTH: 5.6 MI N OF GILCREASE INTERSECTION MOD UT FOR 3109504	$ 54,500.00
TULSA	31943(08)	BRIDGE WATER PROOF SEAL		0.0mi	DIVISION 8 SILANE PROJECTS - MULTIPLE LOCATIONS	$ 1,000,000.74
TULSA	31944(08)	JOINT SEAL/REPAIR		0.0mi	JOINT SEAL/REPAIR	$ 1,000,000.74
WAGONER	31209(05)	RIGHT OF WAY	US069	0.81mi	US-69: BRIDGES OVER UP R.R.(NB), .7 MI. & 1.5 MI. NORTH OF SH-51 JCT	$ 125,000.00
WAGONER	31209(06)	UTILITIES	US069	0.81mi	US-69: BRIDGES OVER UP R.R.(NB), .7 MI. & 1.5 MI. NORTH OF SH-51 JCT.UT FOR 31209(04)	$ 50,000.00

Federal Fiscal Year 2021 (FFY2021)

County	JP No.	Type	Highway	Length	Description		Cost
OSAGE	24268(04)	WIDEN & RESURFACE	SH020	5.0mi	SH-20 FROM SH-99 IN HOMINY, EAST 5.0 MI	$	8,226,415.09
ROGERS	20899(10)	RIGHT OF WAY	SH066	0.16mi	SH-66: OVER BIRD CREEK (NORTHBOUND) & ROAD UNDER, 3.68 MILES NORTH OF I-44(RW FOR 20899(09)	$	190,800.00
ROGERS	20899(11)	UTILITIES	SH066	0.16mi	SH-66: OVER BIRD CREEK (NORTHBOUND) & ROAD UNDER, 3.68 MILES NORTH OF I-44(UT FOR 20899(09)	$	100,011.00
ROGERS	26242(04)	GRADE, DRAINING, BRIDGE & SURFACE	SH020	1.4mi	SH-20: REALIGNMENT FROM SOUTHAVEN RD, EXTEND EAST APPROX. 1.4 MILES TO KING RD. TIED TO 26242(07)	$	17,119,784.40
ROGERS	26242(07)	GRADE, DRAINING, BRIDGE & SURFACE	SH020	2.8mi	SH-20: REALIGNMENT FROM .65 MILES EAST OF THE VERDIGRIS RIVER, SE APPROX. 2.8 MILES TO SOUTHAVEN RD. TIED TO 26242(04)	$	16,399,790.00
TULSA	20931(05)	RIGHT OF WAY	US169	0.5mi	US-169: INTERCHANGE AT BROKEN ARROW EXPRESSWAY (SELECTED MOVEMENTS)(RW FOR 20931(04)	$	3,923,160.81
TULSA	20931(06)	UTILITIES	US169	0.5mi	US-169: INTERCHANGE AT BROKEN ARROW EXPRESSWAY (SELECTED MOVEMENTS)(UT FOR 20931(04)	$	1,690,119.09
TULSA	26301(06)	PAVEMENT REHABILITATION	IS244	2.1mi	I-244: FROM US-75 SOUTH JCT. EXTEND NORTH 2.1 MI. TO ARKANSAS RIVERAND REHAB BRIDGE OVER 31ST. STREET TIED TO 26301(05)	$	21,800,000.00
TULSA	28896(05)	RIGHT OF WAY	US064	2.0mi	US 64 FR SOUTH 161 STREET IN BIXBY SOUTH & EAST TO MINGO RD(RW FOR 2889604)	$	3,198,473.38
TULSA	28896(06)	UTILITIES	US064	2.0mi	US 64 FR SOUTH 161 STREET IN BIXBY SOUTH & EAST TO MINGO RD(UT FOR 2889604)	$	1,884,990.48
TULSA	31098(05)	RIGHT OF WAY	SH020	0.04mi	SH-20 INTERSECTION MODIFICATION WITH TRAFFIC SIGNALS AT 145THRIGHT OF WAY FOR 3109804	$	545,000.00
TULSA	31098(06)	UTILITIES	SH020	0.04mi	SH-20 INTERSECTION MODIFICATION WITH TRAFFIC SIGNALS AT 145THUTILITIES FOR 3109804	$	545,000.00
TULSA	33343(04)	INTERCHANGE	US064	0.07mi	US-64 (MEMORIAL DR.) & US-169 INTERCHANGE IMPROVEMENT	$	2,469,974.90
TULSA	33788(04)	INTERCHANGE	IS044	1.0mi	I-44/US-75 INTERCHANGE RECONSTRUCTION FROM UNION AVE TO THE ARKANSAS RIVER(WP 1)	$	80,000,002.00
WAGONER	20916(04)	GRADE, DRAIN, & SURFACE	SH072	1.77mi	SH-72: FR 2.15 MILES NORTH OF MUSKOGEE C/L, EXT. NORTH 1.77 MILES	$	5,161,000.01
WAGONER	21951(04)	BRIDGE PAINTING	US069	0.2mi	US-69: OVER THE VERDIGRIS RIVER/NAVIGATION CHANNEL, 4.9 MI. N. OF THE MUSKOGEE C/L	$	2,982,299.99
WAGONER	32817(04)	MONEY ONLY	SH051	0.02mi	SH-51: SH-51 @ ONETA RD. (INCOG)	$	350,000.00

Federal Fiscal Year 2022 (FFY2022)

County	JP No.	Type	Highway	Length	Description	Cost
CREEK	27992(04)	PAVEMENT REHABILITATION	SH051	2.5mi	SH-51: FROM CREEK COUNTY LINE, EAST 2.5 MILESTIED TO 27978(04) (05)(06)	$ 3,180,000.88
CREEK	33826(04)	SAFETY IMPROVEMENT	SH097	3.23mi	SH-97: FROM 91ST STREET TO 51ST STREET (SAFETY IMPROVEMENTS)	$ 3,501,080.00
OSAGE	20288(04)	GRADE, DRAIN, & BRIDGE	SH011	2.00mi	SH-11: FR BARNSDALL, EXTEND SOUTHEAST APPROX. 2.0 MILES	$ 7,549,308.39
OSAGE	24233(04)	GRADE, DRAIN, & SURFACE	US060	4.96mi	US-60: BEGIN JCT. US-60/SH-35 & EXTEND EAST 4.96 MILES	$ 21,800,000.00
OSAGE	29686(04)	BRIDGE & APPROACHES	SH099	0.1mi	SH-99 OVER PENN CREEK, 0.3 MILES NORTH OF THE JCT. SH-20	$ 2,499,836.52
OSAGE	31075(04)	BRIDGE & APPROACHES	SH018	0.2mi	SH 18 BRIDGE AND APPROACHES OVER SALT CREEK LOCATED 5.3 MI N PAWNEE CL	$ 4,759,687.74
ROGERS	30353(04)	BRIDGE REHABILITATION	US412	0.87mi	US-412: VERDIGRIS RIVER WESTBOUND, 7.5 MILES EAST OF I-44	$ 15,260,000.00
ROGERS	31093(04)	INTERSECT MODIF	US412	2.0mi	US 412 ADD J-TURNS AT 265TH E AVE & 289TH E AVEAPPROX. 2.8 MI & 4.3 MI EAST OF I 44 JCT	$ 272,500.00
ROGERS	32694(05)	RIGHT OF WAY	US412	6.44mi	I-44/US-412 FROM 1.06 MILES EAST OF SH-66, EXTEND EAST 6.44 MILESRW FOR 32694(05)	$ 54,500.00
ROGERS	32694(06)	UTILITIES	US412	6.44mi	I-44/US-412 FROM 1.06 MILES EAST OF SH-66, EXTEND EAST 6.44 MILESUT FOR 32694(04)	$ 54,500.00
TULSA	26301(05)	PAVEMENT REHABILITATION	IS244	2.0mi	I-244: FROM I-44 NORTH 2 MI. TO US-75 AND REHAB BRIDGES OVER 48TH STTIED TO 26301(06)	$ 21,800,000.00
TULSA	26303(08)	PAVEMENT REHABILITATION	SH051	1.0mi	SH-51: (BROKEN ARROW EXP.) FROM PEORIA EAST TO LEWIS AVE.	$ 10,000,000.08
TULSA	28899(04)	PAVEMENT REHABILITATION	IS444	1.15mi	I-444 FROM SH 51 INTERCHANGE NORTH TO INDEPENDENCE(EAST LEG OF IDL)	$ 18,781,120.58
TULSA	30374(04)	BRIDGE & APPROACHES	US075	0.2mi	US-75 OVER 81ST STREET SOUTH, NORTHBOUND AND SOUTHBOUND, 7 MILES NORTH OF JCT. US-75/SH-67	$ 10,929,282.85
TULSA	31094(04)	INTERSECT MODIF	SH051	0.5mi	SH 51 ADD J-TURNS AT 265TH W AVE/COYOTE TRAILLOCATED .6 MILES EAST OF CREEK CL	$ 272,500.00
WAGONER	29665(04)	INTERSECT MODIF	US069	0.3mi	US-69/US-51: INTERSECTION IMPROVEMENT IN WAGONER	$ 545,000.00
WAGONER	32818(05)	RIGHT OF WAY	SH051B	0.04mi	SH-51B/SH-104 INTERSECTION	$ 109,000.00
WAGONER	32818(06)	UTILITIES	SH051B	0.04mi	SH-51B/SH-104 INTERSECTION	$ 109,000.00

Federal Fiscal Year 2023 (FFY2023)

County	JP No.	Type	Highway	Length	Description		Cost
CREEK	24425(04)	WIDEN, RESURFACE, & BRIDGE	US075A	5.5mi	US-75A: FR: APPROX. .34 MI. NORTH OF THE OKMULGEE C/L NORTH APPROX 5.5 MILES, TO KIEFER	$	7,500,000.00
CREEK	31089(04)	PAVEMENT REHABILITATION	SH048	5.35mi	SH 48 BEGIN 5.56 MILES NORTH OF SH 66 EAST JCT AND EXT NORTH 5.35 MI	$	5,000,000.00
OSAGE	24265(04)	WIDEN & RESURFACE	SH011	3.75mi	SH-11: FROM 2.0 MILES S.E. OF BARNSDALL EXTEND S.E. 3.75 MILES	$	5,488,800.00
OSAGE	24266(04)	WIDEN & RESURFACE	SH011	4.96mi	SH-11 FROM 9.0 MI S.E. OF BARNSDALL EXTEND S.E. 4.96 MILE TO THEWASHINGTON C/L	$	6,805,700.00
OSAGE	24267(04)	WIDEN, RESURFACE, & BRIDGE	SH020	2.4mi	SH-20: FROM 4.06 MLES WEST OF THE TULSA C/L, EAST 2.4 MILES	$	6,000,000.00
OSAGE	27040(05)	RIGHT OF WAY	SH018	3.2mi	SH18: FROM 5.68 MILES NORTH OF PAWNEE C/L, NORTH APRROX. 3.2 MILESROW FOR 27040(04)	$	2,056,604.00
OSAGE	27040(06)	UTILITIES	SH018	3.2mi	SH18: FROM 5.68 MILES NORTH OF PAWNEE C/L, NORTH APRROX. 3.2 MILESUT FOR 27040(04)	$	1,028,302.00
ROGERS	20899(09)	BRIDGE & APPROACHES	SH066	0.16mi	SH-66: OVER BIRD CREEK (NORTHBOUND) & ROAD UNDER, 3.68 MILES NORTH OF I-44	$	6,000,000.00
ROGERS	30323(04)	GRADE, DRAIN, & BRIDGE	SH266	2.55mi	SH-266 FR: .45 MILES EAST OF TULSA C/L EAST TO JCT SH-266/SH-167ROADWAY FILL ONLY	$	3,710,000.00
TULSA	10981(05)	INTERCHANGE	IS044	0.3mi	TULSA: I-44 AT US-169 INTERCHANGE(OPERATIONAL IMPROVEMENTS)	$	8,000,000.00
TULSA	30368(04)	BRIDGE REHABILITATION	US064	0.1mi	US-64 OVER 25TH WEST AVE NORTH AND SOUTHBOUND, 13.8 MILES SE OF OSAGE CO	$	6,889,600.00
TULSA	31077(04)	BRIDGE REHABILITATION	IS244	0.2mi	1ST ST TO I 244 NB REHAB BRIDGE OVER I 244 AND RR LOCATED 5.2 MI N I 44	$	590,000.00
TULSA	31078(04)	BRIDGE REHABILITATION	IS244	0.2mi	UTICA & LEWIS AVE REHAB BRIDGES OVER I 244 LOCATED .65 & 1.2 MI E JCT I 44431078	$	5,000,000.00
TULSA	31079(04)	BRIDGE & APPROACHES	SH011	0.2mi	SH-11 OVER BIRD CREEK, LOCATED 2 MI S WASHINGTON CO	$	2,048,800.00
TULSA	31080(04)	BRIDGE REHABILITATION	US064	0.2mi	US 64 REHAB BRIDGES OVER MAIN ST, 49TH W AVE, & 33RD W AVE LOCATED.3 MI E JCT SH 97, 12.3 & 13.3 MI S-E OSAGE CO	$	4,930,000.00
TULSA	31082(04)	BRIDGE REHABILITATION	IS444	0.2mi	BRIDGE REHAB: DENVER AVENUE OVER I-444 LOCATED 0.7 MI E OF I-244	$	2,600,000.00
TULSA	31084(04)	BRIDGE REHABILITATION	US075	0.2mi	US 75 REHAB BRIDGE OVER BIRD CREEK O'FLOW LOCATED .4 MI N OF 56 S	$	2,820,000.00
TULSA	31095(04)	INTERSECT MODIF	SH011	1.0mi	SH-11 @ 86TH ST NORTH: 5.6 MI N OF GILCREASE INTERSECTION MO	$	1,260,000.00
WAGONER	29746(05)	RIGHT OF WAY	SH051	0.95mi	SH-51:FROM 6.8 MILES EAST OF SH-51/US-69 JCT. IN WAGONER, EAST 0.95 MILESROW FOR 29746(04)	$	850,000.00
WAGONER	29746(06)	UTILITIES	SH051	0.95mi	SH-51:FROM 6.8 MILES EAST OF SH-51/US-69 JCT. IN WAGONER, EAST 0.95 M US FOR 29746(04)	$	348,000.00
WAGONER	31209(04)	BRIDGE & APPROACHES	US069	0.81mi	US-69: BRIDGES OVER UP R.R.(NB), .7 MI. & 1.5 MI. NORTH OF SH-51 JCT	$	5,700,000.00
WAGONER	32104(04)	RESURFACE	US069	2.5mi	US-69: FROM MUSKOGEE/WAGONER C/L NORTH 2.5 MILES	$	4,000,000.00
WAGONER	32819(05)	RIGHT OF WAY	SH051	4.3mi	SH-51: FROM SH-51/SH-16, EAST 4.3 MI.	$	200,000.00
WAGONER	32819(06)	UTILITIES	SH051	4.3mi	SH-51: FROM SH-51/SH-16, EAST 4.3 MI.	$	175,000.00

INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG)

SURFACE TRANSPORTATION PROGRAM – URBANIZED AREA (STP-UZA)

- LIST OF APPROVED PROJECTS PRIOR TO FEDERAL FISCAL YEAR 2020
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2020
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2021
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2022
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2023*

*FFY 2023 PROJECTS ARE YET TO BE DETERMINED/SELECTED

Exhibit B

INCOG Board Approval
August 13, 2019

Projects Approved for Prior Federal Fiscal Years (Prior to FFY2020)

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway (Some funds have been expended prior to delegating the project to the Oklahoma Turnpike Authority)	Engineering design, right-of-way acquisition, utility relocation, and construction	$54,000,000	$22,500,000	$76,500,000
Tulsa / INCOG / ODOT	Gilcrease Expressway Turnpike Project	GARVEE Project has been approved by INCOG Board with future Surface Transportation Program funding to connect Edison/US-412 with I-44	$71,100,000	Oklahoma Turnpike Authority	Federal: 71,100,000
Tulsa / INCOG / OTA	Gilcrease Expressway Turnpike Project	TIFIA (Transportation Infrastructure Finance and Innovation Act) Finance toward constructing Gilcrease Expressway Turnpike by the Okalhoma Turnpike Authority combined with the GARVEE funding listed above.	$108,600,000	Oklahoma Turnpike Authority	Federal: 108,600,000
Sand Springs	SH-97(Wilson Ave.) from W. 2nd St. to Morrow Rd.	Conceptual plans, right-of-way, and phase 1 utility relocation for ultimate widening to 6-lanes including 5 intersections, signailzation, and sidewalks.	$1,600,000	$400,000	$2,000,000
Jenks	Elwood Ave. and 111th St. Intersection	Engineering, design, and right-of-way for construction of intersection to 4 to 5-lane roadway with turn lanes, bridge replacements, sidewalks, drainage improvements and signage.	$512,000	$128,000	$640,000
Jenks	Elwood Ave/111th St. Intersection	Widening intersection to 4-5 lanes, with turn lanes, signalization, and other improvements	$1,728,600	$402,000	$2,130,600
Catoosa	161st East Avenue/Pine Street Intersecti	Construct roadway with shoulders and signalization of intersection	$720,000	$180,000	$900,000
Broken Arrow	23rd (193rd) Street	Widening 23rd to 3 lanes from Kenosha (71st) to Houston (81st) and replacement of the bridge over SH-51	$1,377,931	$344,483	$1,722,414
Broken Arrow	23rd Street from Kenosha to Houston	Widening of 23rd Street (193rd E. Ave) to 5-lanes and replacement of bridge to 4-lanes over SH-51.	$2,499,982	$624,996	$3,124,978
Catoosa	161st East Avenue I-44 to Pine	Reconstruction to 4-lanes, curb and gutter, storm sewer, intersection improvement at Pine including dedicated left turn lanes, concrete pavement and large turning radii.	$1,731,382	$998,689	$2,730,071
Broken Arrow	23rd Street from Kenosha to Houston	Widening of 23rd Street (193rd E. Ave) to 5-lanes and replacement of bridge to 4-lanes over SH-51.	$2,499,982	$624,996	$3,124,978
Catoosa	161st East Avenue I-44 to Pine	Reconstruction to 4-lanes, curb and gutter, storm sewer, intersection improvement at Pine including dedicated left turn lanes, concrete pavement and large turning radii.	$1,731,382	$998,689	$2,730,071
Sapupla	Taft & Hickory Intersection	Traffic Signal Upgrade: Replacing loop detectors with video detection	$107,000	$10,000	$117,000
Sapulpa	Dewey & Mission Intersection	Traffic Signal Replacement: Replacing loop detectors with video detection	$192,000	$15,000	$207,000
Catoosa	Pine Street from SH-167 to SH-66	Widen and overlay to 3 lanes, drainage, sidewalks and traffic signals	$1,808,040	$341,469	$2,149,509
Owasso	E 76th Street North from US-169 to N 129th E Ave	Widening of E. 76th Street North from 2-lanes to 5-lanes	$3,472,000	$868,000	$4,340,000
Sand Springs	S 113th West Ave	Widening, resurface, add turnlanes, sidewalks, signage improvements on South 113th West Ave.	$1,718,685	$706,895	$2,425,580
Broken Arrow	23rd Street from Kenosha to Houston	Widening of 23rd Stret to 5 Lanes with sidewalk and multi-use trail	$220,788	$73,597	$294,385

Projects Approved for Prior Federal Fiscal Years (Prior to FFY2020)

City/County	Project	Description	Federal $	Local $	Total $
Bixby	Memorial Drive	Corridor Traffic and Signalization Study	$ 68,850	$ 21,250	$90,100
Sand Springs	S 113th W Ave	Phase 2 Widening Project, Intersection Improvement at E 34th Street	$ 795,502	$ 934,078	$1,729,580
Jenks	Elwood Ave (Main to 111th)	Engineering design, right-of-way acquisition, utility relocation, and construction between Main St/Elwood to 111th/Elwood intersections	$ 1,441,030	$ 360,258	$1,801,288
Broken Arrow	23rd Street(193rd E Ave)	Right of Way, Utility relocation, widening of 23rd Street from Houston (81st St) to New Orleans Street (101st Street) from 2 lanes to 5 lanes, with multipurpose asphalt trail and concrete sidewalk.	$ 2,730,000	$ 910,000	$3,640,000
Owasso	Garnett Road (96th St to 106th St)	Widen N. Garnett Road from a 2 lane roadway to 4 lane road, including a center left turn lane/landscaped median with sidewalks and dedicated on-street bike lanes.	$ 3,250,000	$ 3,712,000	$6,962,000
Tulsa County	E 51st Street	Engineering, Right of Way and Utility relocation for a future widening of E 51st Street S beteen 162nd E Ave & 177th E Ave.	$ 650,000	$ 220,000	$870,000
Owasso	116th St N & 129th E Ave	Widen intersection with turn lanes	$ 2,186,000	$ 1,403,000	$3,589,000
Broken Arrow	23rd Street (193rd E Ave)	81st Street to 101st Street: ROW, utlities, widening	$ 2,580,000	$ 860,000	$3,440,000
Sapulpa	Canyon Road	Sh-66 to Freedom Road Rehabilitation	$ 329,353	$ 342,796	$672,149
Jenks	Main Street & TSU Raiload area	Main St at TSU RR intersection & vicinity	$ 2,627,200	$ 656,800	$3,284,000
Sand Springs	S. 113th West Ave Phase III	Phase III of S 113th West Ave to expand the street from 2 lanes to 3 lanes, adding sidewalks, lane markings & improve intersections at W 38th St & W 49th St	$ 1,789,278	$ 1,869,628	$3,658,906
Tulsa County	E 51st Street South	Construciton for widening of E 51st St S from 161st E Ave to 177th E Ave	$ 2,900,844	$ 966,948	$3,867,792
Catoosa	SH-167 & Pine	Planning, Design & Spec with estimates to widen SH-167 to provide left turn lane & Pine St west of SH-167 to provide 4 lanes & traffic signals	$ 107,640	$ 26,910	$134,550
Jenks	Elwood Ave	Expansion of Elwood from Main St to 111th St: Construction Phase 1	$ 2,268,000	$ 700,000	$2,968,000

Projects Approved for Federal Fiscal Year 2020

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway	Engineering design, right-of-way acquisition, utility relocation, and construction from Edison to I-44	$ 6,000,000	$ 1,500,000	$7,500,000
Bixby	Memorial Corridor Synchronization	Traffic signal coordination: Creek Tpk to 171st St	$ 182,250	$ 56,250	$238,500
City of Tulsa	BA Expressway lighting	Highway lighting from Peoria to Columbia on BAX	$ 960,000	$ 240,000	$1,200,000
Tulsa County	51st & Lynn Lane	Construction for widening of E 51st St & 177th E Ave	$ 1,306,384	$ 435,461	$1,741,845
Broken Arrow	Olive Ave from Kenosha to Albany	Widening of Olive Ave (129th) from 2 to 5 lanes from Kenosha to Albany St	$ 3,930,000	$ 3,000,000	$6,930,000
Wagoner County	101st St from 117th to 241st St	Grade, drain & surface 101st St from 117th to 241st St	$ 500,000	$ 2,510,000	$3,010,000
Catoosa	Pine Street: SH-167 to 145th E Ave	Engg, plan, spec & overlay of Pine St with striping and showlder barrieer	$ 560,000	$ 390,000	$950,000
Owasso	106th St N & 129th E Ave Intersection	Widen t 106th St N. & 129th E Ave intersection from 2 lane 4-way stop to a 5-lane signalized	$ 1,561,366	$ 2,050,000	$3,611,366
Total			$ 15,000,000	$ 10,181,711	$ 25,181,711

Projects Approved for Federal Fiscal Year 2021

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway	INCOG Approved for GARVEE (match provided by OTA)	$ 6,000,000	$ 1,500,000	$7,500,000
Bixby	Memorial Corridor Synchronization	Traffic signal coordination: Creek Tpk to 171st St	$ 969,854	$ 299,338	$1,269,192
Broken Arrow	Washington St: Garnett to Olive Ave	Widen Washington St (91st S) from Garnett Rd to Olive Ave	$ 3,000,000	$ 7,740,000	$10,740,000
City of Tulsa	Memorial Dr: 81st St to Creek Tpk	Rehabiliation of Memorial Drive from 81st St S to Creek Turnpike	$ 1,930,000	$ 650,000	$2,580,000
City of Tulsa	61st & Yale Intersection	Rehabilitation of arterial intersection	$ 1,070,000	$ 405,000	$1,475,000
Jenks	111th Street: Elwood to US-75 S; 111th & Elwood intersection	Widen t 111th St between Elwood & US-75 S to four lanes	$ 2,518,666	$ 750,000	$3,268,666
Total			$ 15,488,520	$ 11,344,338	$ 26,832,858

Projects Approved for Federal Fiscal Year 2022

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway	INCOG Approved for GARVEE (match provided by OTA)	$ 6,000,000	$ 1,500,000	$7,500,000
City of Tulsa	71st St & S Sheridan Intersection	Intersection Rehabilitation	$ 2,900,000	$ 730,000	$3,630,000
Broken Arrow	Elm Place: Kenosha to SH-51	Widen Elm Place and Rehab Intersection	$ 3,000,000	$ 3,400,000	$6,400,000
Bixby	SH-67 Corridor Traffic Study	Corridor Traffic & Accessibility Study	$ 90,000	$ 30,000	$120,000
Owasso	E 86th St from 118th to 128th	Street Rehabilitation	$ 957,000	$ 395,000	$1,352,000
Wagoner County	101st St: 209th E Ave to Oneta Road/SH-	101st St reconstruction: 209th - Oneta	$ 3,000,000	$ 5,900,000	$8,900,000
Jenks	Elwood Phase 2	Reconstruct from North of Polecat Creek to North of Conoco Facility	$ 1,841,000	$ 614,000	$2,455,000
Total			$ 17,788,000	$ 12,569,000	$ 30,357,000

Projects Approved for Federal Fiscal Year 2023

City/County	Project	Description	Federal $	Local $	Total $
To be determined (TBD)	To be determined (TBD)	To be determined (TBD)	To be determined (TBD)	To be determined (TBD)	To be determined (TBD)

INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG)

TRANSPORTATION ALTERNATIVES PROGRAM (TAP) – URBANIZED AREA

LIST OF APPROVED PROJECTS PRIOR TO FEDERAL FISCAL YEAR FROM YEARS 2011-2018

FFY 2020-23 Transportation Enhancement (TE) Program & Transportation Alternatives Program (TAP): Projects selected from years 2011-2018

Project Number	Sponsor of Project	Description of Project	Federal Funds Approved
22629 (04)	City of Tulsa	Mingo Trail: 41st to 51st Street	$68,760
28846(04)	City of Tulsa	ADA Arterial Sidewalk Project	$600,000
28844(04)	City of Sand Springs	Park Road Trail	$596,039
28845(04)	City of Glenpool	Bicycle/Pedestrian Sidewalk Expansion	$550,800
28839(04)	City of Skiatook	Osage Trail Extension	$520,916
31619(04)	City of Tulsa	4th Street Bikeway	$75,000
31620(04)	City of Tulsa	Eliot Elementary Safe Routes to Schools	$334,184
31621(04)	City of Tulsa	ADA Arteral Sidewalk & Curb Improvements	$500,000
31615(04)	City of Bixby	East Fry Creek Trail and Pedestrian Bridge	$500,000
31601(04)	City of Broken Arrow	Broken Arrow Creek Trail	$497,562
31617(04)	Tulsa County	West Bank Bike/Ped Trail Study	$75,000
33012(04)	Rogers County	Route 66 Sidepath	$699,587
33019(04)	Tulsa County	Wekiwa Bike/Roadway	$694,780
33034(04)	City of Tulsa	Citywide Safe Pedestrian Crossings/Beacons	$75,000
33036(04)	City of Bixby	East Fry Creek Trail and Pedestrian Bridge	$271,005
33037(04)	City of Sand Springs	SH-97 Trail Project	$495,000
33038(04)	City of Tulsa	11th & 12th Street Bike Lanes	$75,000
33039(04)	City of Jenks	Churchill Park Restoration	$74,978
33041(04)	City of Coweta	SRTS Project	$348,496
34056(04)	City of Collinsville	19th Street from SH-20 to Collinsville City Park	$125,000
34065(04)	City of Tulsa	Mingo Creek Trail: I-244 to Pine Street	$750,000
34067(04)	City of Sand Springs	E 81st West Ave, Connector Trail	$750,000
34066(04)	City of Broken Arrow	Broken Arrow Creek Trail Phase II	$750,000

INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG) REGION

METROPOLITAN TULSA TRANSIT AUTHORITY (MTTA) PROJECTS

- FFY 2020 TULSA TRANSIT PROJECTS
- FFY 2021 TULSA TRANSIT PROJECTS
- FFY 2022 TULSA TRANSIT PROJECTS
- FFY 2023 TULSA TRANSIT PROJECTS*

*FFY2023 PROJECTS ARE YET TO BE DETERMINED

FFY 2020 Tulsa Transit Projects

County	Sec	Type	Mode	Description	FTA	Local	Total
Tulsa	TBD	Transit Capital	Transit	Preventative Maintenance	$3,109,500	$775,500	$3,887,000
Tulsa	TBD	Transit Capital	Transit	Operations	$1,428,000	$1,428,000	$ 2,856,000
Tulsa	TBD	Transit Capital	Transit	ADA/CC/Audit	$669,000	$167,250	$836,250
Tulsa	TBD	Transit Capital	Transit	Leases/Audit Services	$108,000	$27,000	$135,000
Tulsa	TBD	Transit Capital	Transit	Long & Short Range Planning	$1,293,000	$323,300	$1,616,300
Tulsa	5339C	Transit Capital	Transit	No Lo Emission Buses	$2,991,000	$2,708,000	$5,699,000
Tulsa	TBD	Transit Capital	Transit	CMAQ – Outreach/Planning Activities	$250,000	$62,500	$312,500
				Totals	$9,848,500	$5,491,550	$15,342,050

FFY 2021 Tulsa Transit Projects

County	Sec	Type	Mod	Description	FTA	Local	Total
Tulsa	TBD	Transit Capital	Transit	Preventative Maintenance	$3,109,500	$775,500	$3,887,000
Tulsa	TBD	Transit Capital	Transit	Operations	$1,428,000	$1,428,000	$ 2,856,000
Tulsa	TBD	Transit Capital	Transit	ADA/CC/Audit	$669,000	$167,250	$836,250
Tulsa	TBD	Transit Capital	Transit	Leases/Audit Services	$108,000	$27,000	$135,000
Tulsa	TBD	Transit Capital	Transit	Long & Short Range Planning	$1,293,000	$323,300	$1,616,300
Tulsa	TBD	Transit Capital	Transit	CMAQ – Outreach/Planning Activities	$250,000	$62,500	$312,500
				Totals	$6,857,500	$2,783,550	$9,643,050

FFY 2022 Tulsa Transit Projects

County	Sec	Type	Mode	Description	FTA	Local	Total
Tulsa	TBD	Transit Capital	Transit	Preventative Maintenance	$3,109,500	$775,500	$3,887,000
Tulsa	TBD	Transit Capital	Transit	Operations	$1,428,000	$1,428,000	$ 2,856,000
Tulsa	TBD	Transit Capital	Transit	ADA/CC/Audit	$669,000	$167,250	$836,250
Tulsa	TBD	Transit Capital	Transit	Leases/Audit Services	$108,000	$27,000	$135,000
Tulsa	TBD	Transit Capital	Transit	Long & Short Range Planning	$1,293,000	$323,300	$1,616,300
Tulsa	TBD	Transit Capital	Transit	CMAQ – Outreach/Planning Activities	$250,000	$62,500	$312,500
				Totals	$6,857,500	$2,783,550	$9,643,050

FFY 2023 Tulsa Transit Projects

County	Sec	Type	Mode	Description	FTA	Local	Total
Tulsa	TBD	TBD	Transit	TBD	$6,857,500	$2,783,550	$9,643,050

INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG) REGION

CONGESTION MITIGATION AND AIR QUALITY (CMAQ)

- FY 2012 LIST OF PROJECTS
- FY 2013 LIST OF PROJECTS
- FY 2014 LIST OF PROJECTS
- FY 2015 & FY 2016 LIST OF PROJECTS
- FY 2017 LIST OF PROJECTS
- FY 2018 LIST OF PROJECTS

INCOG Regional Congestion Mitigation & Air Quality Program (CMAQ)

2012 Projects	Fed	Local	Total
Alt Fuels: Fleet Conversion	$175,000	$43,750	$218,750
Bikeshare Study	$25,000	$6,250	$31,250
Green Traveler	$65,000	$0	$65,000
Ozone Alert Marketing	$85,000	$21,250	$106,250
Traffic Operations /incident Management	$50,000	$0	$50,000
MTTA Operations	$250,000	$62,500	$312,500

2013 Projects	Fed	Local	Total
Alt Fuels: Fleet Conversion	$180,000	$45,000	$225,000
Carpool/ Transportation Resource Center(TRC)	$85,000	$0	$85,000
Ozone Alert Marketing	$85,000	$21,250	$106,250
Traffic Operations /incident Management	$50,000	$0	$50,000
MTTA Operations	$250,000	$62,500	$312,500

2014 Projects	Fed	Local	Total
Alt Fuels: Fleet Conversion	$100,000	$25,000	$125,000
BikeShare	$250,000	$62,500	$312,500
Carpool/ Transportation Resource Center(TRC)	$62,500	$0	$62,500
Ozone Alert Marketing	$62,500	$15,625	$78,125
Traffic Operations /incident Management	$50,000	$0	$50,000
MTTA Operations	$125,000	$31,250	$156,250

2015 &2016 Projects	Fed	Local	Total
Alt Fuels: CNG Vehicles & Conversion	$175,000	$43,750	$218,750
Electric Vehicle Charging Infrastructure	$175,000	$43,750	$218,750
BikeShare	$250,000	$62,500	$312,500
Carpool/ Transportation Resource Center(TRC)	$75,000	$0	$75,000
Ozone Alert Marketing	$125,000	$31,250	$156,250
Traffic Operations	$250,000	$0	$250,000
Incident Management	$250,000	$0	$250,000

2017 Projects	Fed	Local	Total
Public Fleet Alt Fuels & Idle Reduction Infrastructure	$272,500	$68,125	$340,625
Carpool/ Transportation Resource Center(TRC)	$65,000	$0	$65,000
Ozone Alert Marketing	$62,500	$15,625	$78,125
Bike / Pedestrian Infrastructure	$250,000	$62,500	$312,500

2018 Projects	Fed	Local	Total
Public Fleet Alt Fuels & Idle Reduction Infrastructure	$250,000	$62,500	$312,500
Carpool/ Transportation Resource Center(TRC)	$85,000	$0	$85,000
Ozone Alert Marketing	$65,000	$16,250	$81,250
Tulsa Bus Rapid Transit Corridor Technologies	$250,000	$62,500	$312,500

INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG) REGION

FEDERAL TRANSIT ADMINISTRATION SECTION 5310 PROJECTS

- FY 2015 LIST OF PROJECTS
- FY 2016 LIST OF PROJECTS

SECTION 5310 APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2015				
Project	**Federal**	**Local**	**Total**	**Category**
1. DaySpring Villa	$ 33,620.00	$ 33,620.00	$ 67,240.00	Operating expenses: Non-traditional - 35% of the total
	$ 21,054.00	$ 5,264.00	$ 26,318.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 54,674.00	**$ 38,884.00**	**$ 93,558.00**	
2. Kibois	$ 50,000.00	$ 50,000.00	$ 100,000.00	Operating expenses: Non-traditional - 35% of the total
	$ -	$ -	$ -	Vehicles + Preventive Maintenance - 55% of the total
	$ 50,000.00	**$ 50,000.00**	**$ 100,000.00**	
3. United Community Action (Cimarron)	$ -	$ -	$ -	Operating expenses: Non-traditional - 35% of the total
	$ 94,000.00	$ 23,500.00	$ 117,500.00	Vehicles - traditional - 55% of the total
	$ 94,000.00	**$ 23,500.00**	**$ 117,500.00**	
4. Grand Gateway (Pelivan Transit)	$ 50,000.00	$ 50,000.00	$ 100,000.00	Operating expenses: Non-traditional - 35% of the total
	$ 86,400.00	$ 21,600.00	$ 108,000.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 136,400.00	**$ 71,600.00**	**$ 208,000.00**	
5. A New Leaf	$ 36,008.00	$ 36,008.00	$ 72,016.00	Operating expenses: Non-traditional - 35% of the total
	$ 5,905.00	$ 1,476.00	$ 7,381.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 41,913.00	**$ 37,484.00**	**$ 79,397.00**	
6. Vintage Housing	$ -	$ -	$ -	Operating expenses: Non-traditional - 35% of the total
	$ 15,783.00	$ 3,945.00	$ 19,728.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 15,783.00	**$ 3,945.00**	**$ 19,728.00**	
7. Gatesway	$ 36,008.00	$ 36,008.00	$ 72,016.00	Operating expenses: Non-traditional - 35% of the total
	$ 100,000.00	$ 20,000.00	$ 120,000.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 136,008.00	**$ 56,008.00**	**$ 192,016.00**	

SECTION 5310 APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2016				
Project	**Federal**	**Local**	**Total**	**Category**
1. DaySpring Villa	$ 33,692.00	$ 33,692.00	$ 67,384.00	Operating expenses: Non-traditional - 35% of the total
	$ 2,688.00	$ 672.00	$ 3,360.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 36,380.00	**$ 34,364.00**	**$ 70,744.00**	
2. Kibois	$ 135,000.00	$ 135,000.00	$ 270,000.00	Operating expenses: Non-traditional - 35% of the total
	$ 8,000.00	$ 2,000.00	$ 10,000.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 143,000.00	**$ 137,000.00**	**$ 280,000.00**	
3. United Community Action (Cimarron)	$ -	$ -	$ -	Operating expenses: Non-traditional - 35% of the total
	$ 112,000.00	$ 28,000.00	$ 140,000.00	Vehicles - traditional - 55% of the total
	$ 112,000.00	**$ 28,000.00**	**$ 140,000.00**	
4. Grand Gateway (Pelivan Transit)	$ 25,000.00	$ 25,000.00	$ 50,000.00	Operating expenses: Non-traditional - 35% of the total
	$ 38,482.00	$ 9,621.00	$ 48,103.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 63,482.00	**$ 34,621.00**	**$ 98,103.00**	
5. A New Leaf	$ 172,388.00	$ 172,388.00	$ 344,776.00	Operating expenses: Non-traditional - 35% of the total
	$ 68,594.00	$ 17,149.00	$ 85,743.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 240,982.00	**$ 189,537.00**	**$ 430,519.00**	
6. Morton	$ -	$ -	$ -	Operating expenses: Non-traditional - 35% of the total
	$ 76,870.00	$ 19,218.00	$ 96,088.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 76,870.00	**$ 19,218.00**	**$ 96,088.00**	
7. Gatesway	$ 35,716.00	$ 35,716.00	$ 71,432.00	Operating expenses: Non-traditional - 35% of the total
	$ 85,200.00	$ 21,300.00	$ 106,500.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 120,916.00	**$ 57,016.00**	**$ 177,932.00**	
8. NewView OK	$ 4,865.00	$ 4,865.00	$ 9,730.00	Operating expenses: Non-traditional - 35% of the total
	$ -	$ -	$ -	Vehicles + Preventive Maintenance - 55% of the total
	$ 4,865.00	**$ 4,865.00**	**$ 9,730.00**	
9. INCOG VRC	$ -	$ -	$ -	Operating expenses: Non-traditional - 35% of the total
	$ 48,000.00	$ 12,000.00	$ 60,000.00	Vehicles + Preventive Maintenance - 55% of the total
	$ 48,000.00	**$ 12,000.00**	**$ 60,000.00**	

PROJECT SELECTION PROCESS AND CRITERIA
OKLAHOMA DEPARTMENT OF TRANSPORTATION (ODOT)
INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG)

Project Selection Criteria

ODOT has established a project selection process with the adoption of their Construction Work Plan. This selection process applies to Interstate Maintenance, National Highway System, Surface Transportation Program (outside of the Tulsa Adjusted Urbanized Area), and Bridge Replacement/Rehabilitation projects in the TMA. In cooperation with INCOG, ODOT selects these projects at the Commission District level based on projected available resources and with consideration of ODOT's Needs Study, population, highway system miles, and historical funding trends. This process is documented in the ODOT Construction Work Plan.

INCOG established a process for the prioritization of transportation projects to be funded with Urbanized Area Surface Transportation Program (STP) funds for inclusion into the TIP for the Tulsa Transportation Management Area. In 2018, The Urbanized Area STP ranking criteria were revised to provide direct application for funding for all communities in the TMA. With the input of local officials through the Transportation Technical Committee (TTC), Transportation Policy Committee (TPC), and INCOG Board of Directors, projects are evaluated annually for eligibility and to establish priorities. Candidate projects will be programmed into the TIP based on priorities and the availability of funds and selected for construction in order of meeting all requirements and being ready to proceed.

Urbanized Area STP funds are spent within the Tulsa Transportation Management Area but are not used on roads functionally classified pursuant to federal guidelines as local or rural minor collectors, except for bridges. The allocation of Urbanized Area STP funds to the Tulsa Urbanized Area is based on the 2010 Census population within the Census defined Tulsa Urbanized Area boundary. The Adjusted Tulsa Urbanized Area currently includes the Cities of, Bixby, Broken Arrow, Catoosa, Coweta, Jenks, Sand Springs, Sapulpa, Sperry, and Tulsa and adjacent portions of Creek, Osage, Rogers, Tulsa, and Wagoner Counties. Urbanized area is expected to change with the FHWA consent to adding Glenpool and Owasso based on Census proposal and it will be adjusted accordingly. Entities within the Adjusted Tulsa Urbanized Area are eligible to utilize the Urbanized Area STP funds. Projects located outside the defined Urbanized Area boundary may be considered but must be sponsored by an eligible entity.

Project sponsors submit projects for implementation using Tulsa Urbanized Area STP funds by completing a Transportation Project Rating Form for each project. The form is used to establish project eligibility and to score transportation projects proposed for funding. The prioritization results from the form's scoring system allow fair competition and selection based on the project's individual characteristics, status, and local commitment relative to the other projects. Specifically, projects are evaluated on the following characteristics:

A. Travel Time Improvements
B. Safety Improvements
C. System Maintenance and Management
D. Project Preparation
E. Livability
F. Freight Movement and Intermodal Linkages
G. Special Benefits

Projects were previously selected and funded through FFY 2022. INCOG anticipates that project selection and programming for INCOG Surface Transportation Projects for 2023 will take place in FFY 2020.

Financial Resources

More than $265 million in federal funds are anticipated to be available to the Tulsa Transportation Management Area over the next four years for surface transportation improvements. The resources are expected from a variety of sources, including Federal Highway Administration funds, Federal Transit Administration funds, and Federal Aviation Administration funds, to be matched with miscellaneous local funds provided by local governments in the Tulsa Transportation Management Area. The Program Detail on page 4 reflects the funds estimated to be available and the proposed expenditure of funds over the TIP period by funding program, while the Source of Revenue Estimates table (below), identifies the source of the estimated federal funds. Local funds programmed in the TIP are those required to match the federal funds, unless otherwise noted.

Source of Revenue Estimates for the Tulsa TMA

Funding Program	*Source of Revenue Estimate*
Urbanized Area Surface Transportation Program	Direct allocation to the Tulsa TMA based on the Tulsa Urbanized Area population.
Interstate Maintenance	Coincides with estimates programmed in the Tulsa TMA by ODOT for FFY 2018 – 2021.
Bridge Program	Coincides with estimates programmed in the Tulsa TMA by ODOT for FFY 2018 – 2021.
National Highway System	Coincides with estimates programmed in the Tulsa TMA by ODOT for FFY 2018 – 2021.
Congestion Mitigation and Air Quality	Direct allocation to the Tulsa TMA by ODOT for ozone reduction and congestion reduction projects.
Surface Transportation Program	Coincides with estimates programmed in the Tulsa TMA by ODOT for FFY 2018 – 2021.
Transit Section 5307	Urbanized formula apportionment form the Federal Transit Administration.
Transit Section 5309	Urbanized formula apportionment form the Federal Transit Administration.
Transit Section 5310	Urbanized formula apportionment form the Federal Transit Administration for Enhanced Mobility of Elderly & Disabled
Metropolitan Planning Program	Direct FHWA Planning Assistance and FTA Section 5303 allocation funds to the Tulsa TMA based on ODOT's distribution formula.
Airport Improvement Program	FAA entitlement and discretionary funds. Local funding is from Passenger Facility Charges.

Public Involvement Process

Public involvement activities related to the development and maintenance of the TIP are detailed in INCOG's Public Involvement Process (Appendix A.)

As a part of the process to develop the TIP there were several public involvement opportunities available to interested area citizens. As a part of continuous process to seek input and/or provide information at each milestone event, upon the request of interested parties, public notices are published with a list of submitted projects from the various agencies available via the INCOG website. Each Technical Advisory Committee (TAC) and Transportation Policy Committee (TPC) was open to the public to allow area citizens to express their views. The document was made available through INCOG's transportation web page and in the INCOG offices. In addition to the publicly posted open meetings of TAC and TPC, from July 15th through August 9th, 2019 the public had opportunities to present their views and opinions regarding the TIP. A direct email was sent out to the area agencies, stakeholders and public involvement database to inform the public of the final TIP document. A public notice was also published in local area newspapers. INCOG Board of Directors approved the TIP on August 13th 2019.

Legal notices were advertised in area newspapers or periodicals including a Spanish language publication. INCOG web site had over 600 unique visitors and over 1,200 unique page views during the public notice period.

The TIP is a dynamic document that is amended from time to time. All amendments to the TIP will have ample opportunity for public review and comment, through media notices, direct mailings to interested parties, and agenda postings on the INCOG internet home page. The TAC and TPC will review all proposed amendments and forward recommendations to the INCOG Board of Directors. All approved amendments will be included in the TIP document and transmitted to ODOT for inclusion in the Statewide Transportation Improvement Program.

Air Quality

The US Environmental Protection Agency (EPA) sets air quality standards, known as National Ambient Air Quality Standards (NAAQS). Areas not meeting one or more NAAQS are considered to be in violation of the standard and eligible for nonattainment. MPO's in areas designated (or formerly designated) nonattainment must assure transportation projects conform to state and local air quality planning efforts without increasing the area's mobile source emissions. Challenged by many years of ozone near-nonattainment status, INCOG has aggressively pursued voluntary emission reduction strategies, improved air quality, and successfully maintained compliance with the ozone NAAQS. The Tulsa Transportation Management Area (TMA) is in attainment of all NAAQS.

Based on a 2010 emission inventory for ozone in the Metropolitan Statistical Area (MSA), On-Road mobile sources accounted for 47% of hydrocarbon emissions, 35% of nitrogen oxide emissions, and 67% of carbon monoxide emissions. The 2025 plan estimated emissions from mobile sources will decrease over time due to cleaner vehicles, cleaner fuels, and higher travel speeds. All projects listed in this TIP are consistent with the Long Range Transportation Plan (LRTP).

INCOG, with the Oklahoma Department of Environmental Quality (ODEQ), is an active participant in the EPA's Ozone Advance Program. Ozone Advance is a voluntary

collaborative program to encourage local actions in attainment areas to reduce emissions that form ground-level ozone to continue to maintain the national standards and improve air quality.

Long Range Transportation Plan Compliance

The goals of the *2045 Regional Transportation Plan* focuses on providing a range of transportation choices; providing access to jobs, activities, and services throughout the region; enhancing the livability of the community; promoting the area economy; using resources efficiently, and enhancing the safety and security of the system. Projects in the *TIP* reflect those goals by expanding the modes of transportation, increasing access to employment centers, improving the safety of various components of the surface transportation system, and maximizing the investment in the transportation system in the region.

Appendix A – Public Involvement Process

Excerpts from the Public Involvement Process for the Tulsa Transportation Management Area.

Transportation Improvement Program

The Transportation Improvement Program (TIP) describes all federally-funded transportation projects or programs that will be carried out over the next three years. These projects or programs must be derived from the LRTP, and therefore, the TIP is an implementation tool of the LRTP. The TIP is developed every two years and lists projects beginning with the subsequent odd-numbered year. INCOG develops the TIP for the Tulsa TMA in cooperation with the ODOT, the Metropolitan Tulsa Transit Authority (MTTA), and airports in the TMA. Because the TIP is a short-term program, it has relatively immediate impact on the transportation system in the region; therefore, an informed and involved public is essential in setting the priorities in the TIP.

As a part of the process of developing the TIP, INCOG will prepare a detailed list of objectives and procedures to obtain public involvement as it relates to the Transportation Improvement Program. This detailed list will be based upon the following general guidelines:

1. **Specific Outreach** – INCOG will notify in writing individuals, organizations and associations, partner agencies, and local governments at the initiation of the TIP development. This notification will include a description and timeline of the development process, a general outline of the programs and types of projects affected, and detail the opportunities for input and review.
2. **Media Relations Activities** – Press releases, media advisories, and legal notices will be sent to the local media at the initiation, draft, and final approval stages of the TIP development. Articles will be written for inclusion in various organization publications.
3. **Public Meetings** – A total of at least two public meetings including one for each of the TAC and TPC will be held to allow opportunities for public comment prior to the TIP advancing to the next stage of development. These meetings will be posted in accordance with open meetings act requirements.
4. **TIP Online** – The draft TIP and final TIP will be posted on the INCOG website with an e-mail link allowing for comments or questions to be submitted. Once the TIP is adopted, a current copy will be maintained on the website reflecting the most recent amendments and progress and/or delay in implementing the TIP.

As a part of these general guidelines, there will be a 21-day comment period before the TIP will be formally adopted and a 14-day comment period before the Board of Directors endorses amendments. Also, public notices will be published in local newspapers and sent to all interested parties. All TAC, TPC, and Board of Directors meetings are open to the public and held at handicapped accessible locations.

The Transportation Improvement Program Plan of Action

The TIP serves as a short-range implementation program, identifying surface transportation projects to be initiated during the three-year period. Additionally, the TIP is used as a program management tool to gauge progress toward implementing transportation plans for the region. Specifically, improvements contained within the TIP must be consistent with the *2045 Regional Plan Update* and the Tulsa Metropolitan Area Major Street and Highway Plan, and should reflect progress toward implementation of the plans in light of the overall transportation goals of the metropolitan area. The projects in the TIP, which have a combination of federal, state,

and local funding sources, cover a wide range of transportation modes, including streets and highways, public transportation, bicycle and pedestrian facilities, and airport improvements.

Generally, the planned improvements include new construction; expansion of existing services and facilities; operation, maintenance and reconstruction of existing facilities; efficiency improvements to increase the effectiveness of existing transportation investments; and projects specifically identified for their ability to maintain the Tulsa area's "clean air" status. The availability of good surface transportation facilities and services has always been one of the major factors affecting air quality, commercial activity, and residential development in a changing metropolitan environment. In fact, the transportation system plays a central role in the lives of the residents of the region as we go about our daily business and activities. If the metropolitan area is to enjoy an enhanced quality of life and maintain a competitive position both regionally and nationally, a transportation improvement program is necessary to assure that the transportation system makes a positive contribution.

The Transportation Planning Division will be seeking comments from the public throughout the TIP development process. At key milestones in the process INCOG will provide specific opportunities directly to the public for review and comment on the projects in the TIP. We will be posting all information on our website as well so visit our web page (www.incog.org/Transportation/Transportation.htm), for regular updates on the TIP development and opportunities for input.

For questions regarding the TIP you may contact the Transportation Planning Division via email at incog@incog.org, by fax 918-583-1024, phone 918-584-7526, or mail to 2 West Second Street, Suite 800, Tulsa, OK 74103

Surface Transportation Program (STP) Project Prioritization & Selection Process

For the Tulsa Urbanized Area

Revised November 28, 2018

INCOG

Surface Transportation Program (STP)
Project Prioritization and Selection Process
For the Tulsa Urbanized Area

INCOG, as the Metropolitan Planning Organization (MPO) for the Tulsa metropolitan area, is required to establish a selection process for the distribution of STP funds. Priority funding will be given to projects that meet federal regulations (Attachment B), and help advance the Regional Transportation Plan (RTP) in the following areas:

1. Arterial Intersections – Safety and capacity improvements to existing intersections. Sample projects include, but are not limited to:
   - Railroad crossing improvements
   - Signal prioritization, automation, preemption, and/or synchronization
   - Intersection lighting, markings, and/or signage
   - Pedestrian safety measures
2. System Preservation – Maintenance or preservation projects for existing transportation infrastructure. Sample projects include, but are not limited to:
   - Pavement resurfacing, replacement, reconstruction and/or rehabilitation
   - Pavement management system
   - Bridge restoration and/or operational improvements
3. System Management and Integration – Technology systems for the management of, and communication between transportation-related systems. Sample projects include, but are not limited to:
   - Highway courtesy patrols
   - Congestion/Incident Management Systems
   - Advanced Traveler Information Systems (ATIS)
   - Intermodal transportation facilities and systems (including CVISN)
   - Traffic management center capital and O&M costs
   - Data storage and transmission
   - Intelligent Transportation System (ITS) roadside hardware
4. Alternative Transportation – Projects that promote alternatives to Single Occupant Vehicle (SOV) usage. Sample projects include, but are not limited to:
   - Transit capital, research, safety improvements, and/or management systems costs
   - Carpool/vanpool projects
   - Sidewalk modifications and/or walkway projects
   - Bicycle transportation projects
   - Multimodal connections (park & ride lots)

5. Capacity Expansion -- Construction projects that add capacity to an existing street or interstate, or construction of new facilities. Sample projects include, but are not limited to:
   - Adding lanes to existing streets or highways
   - New Interchanges
   - New Roads
   - Bridge Replacement
   - Bridge Widening and/or Lane Additions

With the input of local officials through the Transportation Technical Committee (TTC), Transportation Policy Committee (TPC), and INCOG Board of Directors, proposed projects will be evaluated for eligibility and priority based on a 100-point grading system. Selected projects will be included in the Transportation Improvement Program (TIP) for the Tulsa Transportation Management Area (TMA).

Achieving Performance Targets

Goals for the STP Project Selection process is to achieve a safe, reliable transportation that is maintained in a state of good repair. Performance measures are adopted to reflect these goals for the INCOG Region (set in cooperation with ODOT & per FHWA guidance). More specific goals are spelled out at the state level. The reference here is to provide context for STP projects selected to affect the outcomes in the following areas.

Safety (PM1):
- Number of fatalities
- Fatalities per 100 million vehicle miles traveled
- Number of serious injuries
- Serious injuries per 100 million vehicles miles traveled
- Number of non-motorized fatalities and non-motorized serious injuries

Pavement Condition (PM2):
- Percentage of pavements on the interstate system in Good condition
- Percentage of pavements of Interstate system in Poor condition
- Percentage of pavements on the non-Interstate NHS in Good condition
- Percentage of pavement of the non-Interstate NHS in Poor condition

Bridge Condition (PM2):
- Percentage of NHS bridges in good condition
- Percentage of NHS bridges in Poor condition

System Performance (PM3):
- Interstate Travel Time Reliability Measure (Percent of person-miles traveled on Interstate that are reliable)
- Non-Interstate Travel Time Reliability measure (Percent of person-miles traveled on the non-Interstate NHS that are reliable)

Freight Movement on the Interstate System (PM3):
- Freight Reliability (Truck Travel Time Reliability Index)

Traffic Congestion (PM3):
- Peak Hour Excessive Delay
- Non-Single Occupant Vehicle Travel (SOV)

On Road Mobile Source Emissions (PM3):
- Total Emission Reductions

Eligible Transportation Improvements

In order for a project to be eligible for Tulsa Urbanized Area STP funds, it must meet the following criteria:

1) The proposed project must represent at least one of the following:
   A) An implementation of actions and/or projects listed from the Connected 2045 LRTP.
   B) A transportation system management (including congestion management) project,
   C) Transportation control measures from the Air Quality State Implementation Plan,
   D) A safety or transportation enhancement project, or
   E) System preservation of a transportation facility (*i.e.*, reconstruction, rehabilitation, resurfacing, restoration and operational improvements).

2) Projects must be located within the Tulsa Transportation Management Area (TMA) (Attachment C).

3) Funds must be used for roads classified as Urban Collectors and Arterials or Rural Collectors and Arterials under the Federal Highway Administration Functional Classification System. Bridges are exempt from this rule. In addition, Projects on roadways planned for inclusion as proposed revisions to Federal Highway Functional Classification, contingent upon concurrence and approval by the FHWA, will be eligible. http://www.incog.org/Transportation/documents/FedClassMaps.htm

4) The local project sponsor must be a local unit of government or instrumentality thereof (such as the Metropolitan Tulsa Transit Authority or INCOG), within the Tulsa Urbanized Area (Creek County, Osage County, Rogers County, Tulsa County, Wagoner County, City of Bixby, City of Broken Arrow, City of Catoosa, City of Coweta, City of Glenpool, City of Jenks, City of Owasso, City of Sand Springs, City of Sapulpa, Town of Sperry, Town of Kiefer or City of Tulsa) or within the Tulsa Transportation Management Area (City of Claremore, City of Collinsville, or the City of Skiatook, Town of Mounds, Town of Verdigris.)

5) The local project sponsor must provide to INCOG an STP Project Resolution (Attachment A), adopted by the governing body at a public meeting, which describes the project, including the type of improvement, project location, total project cost, and source(s) of matching funds. The sample resolution may be modified to reflect specific agreements between the project sponsor and ODOT or to meet local city charter requirements.

6) **The local project sponsor must provide to INCOG a preliminary cost estimate adjusted for inflation using a rate of 4% per year over four years, and with a contingency of approximately 15%,(+ or – 5%). Cost estimates for construction projects must be submitted by a registered professional engineer, architect, or landscape architect as appropriate, licensed in the State of Oklahoma.**

Funding Ratios

The United States Department of Transportation (USDOT) will divide Surface Transportation Program funds each year among the states based on their respective amounts of highway mileage, vehicles miles traveled, and fuel tax contributions. The Oklahoma Department of Transportation (ODOT) uses 37.75% of allocated funds for various projects throughout the state, with the remaining 62.25% being divided between the Oklahoma City and Tulsa Transportation Management Areas. INCOG's share is on average an estimated $15 million per year. Based on the priorities established, projects representing the expected resources may be programmed in the TIP to be funded with Urbanized Area STP funds.

In order to accelerate completion of the expressway system and/or initiate rail-transit system planning within the Tulsa metropolitan area, up to 15 percent of the Urbanized Area STP funds may be set aside for corridor analysis, functional planning/engineering and environmental studies; up to 50 percent for right-of-way acquisition and utility relocation; and up to 60 percent for construction related to completion/upgrading of the Expressway System (*i.e.*, Gilcrease Expressway/Parkway and Osage/L.L. Tisdale Expressway). Furthermore, Urbanized Area STP funds may be committed to pay bonds and associated financing for projects completing the Expressway System.

Exclusive Intelligent Transportation System (ITS) projects or Incident Management projects may also be given due consideration within the scope of the same 5% annual apportionment. In addition, a system wide, regional level funding goal for a better performing transportation system is outlined as below:

- Traffic Flow Improvements (Arterial intersections, System Management & Integration): 20% of total STP funding

- System Preservation: 20% of total STP funding

The balance of the Urbanized Area STP funds will be made available for construction/implementation of transportation projects, utilizing a process to prioritize and select projects to be awarded funding. For those projects selected for funding, expenses associated with the development of engineering plans, right-of-way acquisition and utility relocation are eligible but must meet all state and federal policies. Local sponsors will also be responsible for providing required matching funds.

Urbanized Area STP projects will be funded at a ratio of 80 percent federal funds and 20 percent local funds for eligible project costs. Certain safety projects may be funded at 100 percent of the cost by federal funds upon approval by ODOT. Such safety projects are described in Title 23, U.S.C., Section 120(c), and include traffic control signalization, pavement marking, commuter carpooling and vanpooling, or installation of traffic signs, traffic lights, guardrails, impact attenuators, concrete barrier end treatments, breakaway utility poles, or priority control systems for emergency vehicles at signalized intersections.

All state and federal requirements in conjunction with the use of federal funds (*i.e.*, uniform relocation, Davis-Bacon, NEPA, etc.) must also be met. In general, it is expected that no single project or entity will be allocated more than 60% of the total STP Urbanized Area funds available per year. And furthermore, no other single project or entity will be allocated more than 50% of the remaining balance of STP Urbanized Area funds available per year. Final project scheduling by fiscal year for selected projects will be based on project phasing, project size and anticipated resources available.

STP Funding Allocation Summary

(A) Total anticipated STP Allocation to INCOG:		$15 M
(B) Current commitment by INCOG:	$6M/Year toward completing the regional expressway system	
(C) Available Funds for 2021		$9 M
(D) Goal #1 Intelligent Transportation System Projects **AND/OR** Incident Management Projects		5% (450K)
(E) Goal #2 Traffic Flow Improvements **AND/OR** System Preservation (Shoulders/Rehab)		20% ($1.8M)
(G) Capacity addition projects		$6.75M

Other Notes:

No single entity may receive a combined sum of more than $3M for any federal fiscal year, for all projects. Projects selected for any federal fiscal year will be advanced based on first-ready first-let.

Under a rare and extenuating circumstance, funded projects may be allowed for substitution at the request of the project sponsor provided the project requested would satisfy all the requirements for the given year the original project is selected & the evaluation criteria is satisfied after ranking and rating of the project. Staff recommendation in such circumstances will be forwarded to the Transportation Technical Committee, Transportation Policy Committee and the INCOG Board of Directors for approvals and endorsement.

Instructions for Project Submittals

Any entity wishing to sponsor functional planning/engineering, Major Investment Studies, and environmental studies, right-of-way acquisition, and utility relocation related to completion/upgrading of the Expressway System must submit a request to INCOG. Each request will be evaluated on a case-by-case basis to determine if funds will be set aside for this purpose.

A project sponsor wishing to submit a project for implementation using Tulsa Urbanized Area STP funds must complete a *Transportation Project Rating Form* (Attachment D) for each proposed project. The *Transportation Project Rating Form* will be used to establish project eligibility and to score transportation projects proposed for funding. The prioritization resulting from the form's scoring system will allow fair competition and selection based on a project's individual characteristics, status, and local commitment relative to other proposed projects.

Proposed projects will be evaluated on the following characteristics:

Selection Criteria	CAPACITY PROJECTS	NON-CAPACITY PROJECTS
H. Travel Time Improvements	Maximum 30 points	12 points
I. Safety Improvements	Maximum 30 points	30 points
J. System Maintenance and Management	Maximum 0 points	20 points
K. Project Preparation	Maximum 20 points	8 points
L. Livability Criteria	Maximum 0 points	10 points
M. Freight Movement and Intermodal	Maximum 10 points	10 points
N. Multijurisdictional/Special Benefits/goals	Maximum 10 points	10 points
	Total 100 points	100 points

The prioritization scoring will serve as the initial screening used to select projects for funding with Urbanized Area STP funds. Certain types of projects that cannot be evaluated through the project rating process due to their characteristics (*e.g.*, planning and engineering studies, carpool programs, wetlands mitigation, research programs, etc.) may be submitted for consideration. These "exception" projects along with the initial prioritized list will be presented to the TAC, TPC, and the INCOG Board of Directors, which together will establish the final priorities.

Completion of the preliminary activities (functional planning/engineering, and environmental studies) will make the projects better able to compete for construction funds available through other programs for projects statewide. Affected/interested entities will select a lead agency that will act as project sponsors and will be responsible for coordinating the provision of local matching funds. Funding for right-of-way acquisition and utility relocation will only be eligible upon state and federal approval of required functional planning/engineering and environmental studies.

INCOG, as the MPO, will notify ODOT of the programming of projects and will provide to ODOT copies of the project sponsors' STP Project Resolution and preliminary cost estimate. The project sponsor must file with ODOT evidence that the local matching share for the proposed project is in hand and immediately available to the project, and three copies of documentation as to the provision of engineering services to the project sponsor for preparation of plans, as applicable, for construction projects. The project sponsor must also execute a project agreement with ODOT within 180 days of project approval by the Board of Directors. INCOG reserves the right to reprogram funds for projects whose sponsors fail to execute agreements within that period.

Project funding will be obligated (approved by ODOT and FHWA) in consultation with INCOG on a "first ready, first funded" basis, regardless of project sponsor. Projects that fail to be ready to be obligated by the Federal Fiscal Year in which they were selected for funding will be jointly assessed by the project sponsor, INCOG, ODOT and USDOT, to determine if the project should be terminated and the funds reprogrammed. Reprogrammed funds will be made immediately available for projects that are ready to proceed. Project selection by the MPO will be considered to occur when the project is included on the TIP approved by the Transportation Policy Committee and endorsed by the INCOG Board of Directors. Upon receipt of MPO concurrence, ODOT will place the project on a scheduled letting list, and request the local funding share from the project sponsor. The matching funds must be received by ODOT before the project can be advertised for bids. Prior to bid opening, ODOT will request Federal authorization of the project.

Project Monitoring

It is the responsibility of ODOT to keep INCOG informed of the status of all Urbanized Area STP projects within the Tulsa area, and to report project cost adjustments so that cost estimates can be replaced with actual construction costs when the projects are let for bid and completed. ODOT shall provide to INCOG verification of the final project cost upon its completion. ODOT shall also provide to INCOG a quarterly status report summarizing the Tulsa Urbanized Area STP program, including the status of all selected projects and the amount of unobligated funding available for programming additional projects.

INCOG will routinely prepare a summary of all Tulsa Urbanized Area STP projects, including location, cost, and status, which have been obligated since the inception of the program.

ATTACHMENT A

Resolution to Request Programming of Tulsa Urbanized Area Surface Transportation Funds

WHEREAS, Surface Transportation Program Urbanized Area funds have been made available for transportation improvements within the Tulsa Transportation Management Area; and

WHEREAS, The [PROJECT SPONSOR] has selected a project described as follows:

_____
_____
_____
_____; and

WHEREAS, the selected project is consistent with the local comprehensive plan, including applicable Major Street and Highway Plan Element, and the Regional Transportation Plan; and

WHEREAS, the engineer's preliminary estimate of cost is $_____, and Federal participation under the terms of the Moving Ahead for Progress in the 21st Century Act relating to Surface Transportation Program Urbanized Area funds are hereby requested for funding of ____ percent of the project cost; and

WHEREAS, the [PROJECT SPONSOR] proposes to use [SOURCE] funds for the balance of the project costs; and

WHEREAS, the [PROJECT SPONSOR] has arranged for _____, a qualified [ENGINEER/ARCHITECT/LANDSCAPE ARCHITECT] licensed in the state of Oklahoma to furnish professional services in the preparation of detailed plans, specifications and estimates; and

WHEREAS, the [PROJECT SPONSOR] agrees to provide for satisfactory maintenance after completion, and to furnish the necessary right-of-way clear and unobstructed; and

WHEREAS, the [PROJECT SPONSOR] has required matching funds available and further agrees to deposit with the Oklahoma Department of Transportation said matching funds within thirty (30) days after approval by the Federal Highway Administration.

NOW, THEREFORE, BE IT RESOLVED: That the Indian Nations Council of Governments is hereby requested to program this project into the Transportation Improvement Program for the Tulsa Transportation Management Area; and

BE IT FURTHER RESOLVED: That upon inclusion in the Transportation Improvement Program, the Oklahoma Transportation Commission is hereby requested to concur in the programming and selection of this project and to submit the same to the Federal Highway Administration for its approval.

ATTEST:

_____ _____

(Chief Elected Official or local governing body) (Clerk/Secretary/Attorney)

Appendix C – TIP Development Process

PROCEDURES FOR DEVELOPING THE OKLAHOMA METROPOLITAN PLANNING ORGANIZATIONS (MPO) TRANSPORTATION IMPROVEMENT PROGRAM (TIP) and THE OKLAHOMA STATEWIDE TRANSPORTATION IMPROVEMENT PROGRAM (STIP)

Title 23 USC 135(g)(1) requires each State to develop a statewide transportation improvement program for all areas of the State to cover a period of 4 years and be updated every 4 years or more frequently if the Governor elects to update more frequently. In addition, Title 23 USC 135(j)(1) requires Metropolitan Planning Organizations (MPO) designated for each metropolitan area to develop a TIP in the area for which the MPO is designated, in cooperation with the State and affected public transportation operators. In accordance with these requirements, the Oklahoma Department of Transportation (ODOT) in cooperation with the Association of Central Oklahoma Governments (ACOG), the Indian Nations Council of Governments (INCOG), the Lawton Metropolitan Planning Organization (LMPO), the Bi-state Metropolitan Planning Organization (BSMPO), Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), have developed the following procedures and deadlines for coordinating and approving the Transportation Improvement Programs (TIP).

TIP DEVELOPMENT PROCEDURES AND DEADLINES

PROCEDURE	DEADLINE
The MPOs will begin the annual preparation of a 4 year TIP. All projects within the boundaries of a metropolitan study area requiring Federal participation, excluding projects undertaken on the National Highway System and pursuant to the Bridge and Interstate Maintenance programs, will be selected by the MPOs designated for such area in consultation with the State and in conformance with the approved Long Range Transportation Plan for such area. Projects undertaken on the National Highway System or pursuant to the Bridge and Interstate Maintenance program will be selected by the State in cooperation with the MPOs. In areas of the state not covered by an MPO, all projects in the STIP will be selected by the State in cooperation with the affected local officials	October
ODOT will request the FHWA to provide a list of Indian Reservation Roads (IRR) to be included in the TIPs	October November

ODOT will provide the TMAs (ACOG, INCOG) with a written estimate of anticipated apportionments and obligation authority to be used for preparing their TIPs	
FTA through ODOT Transit Division will provide a list of all Transit Programs and Funds to be included in each fiscal year of the TIPs.	January
ODOT will provide the MPOs a list of all Federal Funded Projects related to Highway, Public Transit, Public Lands, Railroad, County Roads, City Streets, City Bridges, Highway, Enhancement projects and FTA Section 5303 funds available to be included in the TIPs for ACOG, INCOG and LMPO	January
Each MPO will provide ODOT a copy of its preliminary TIP for review and comment concurrent with its release for public review and comment, in accordance with Title 23 USC 134(j)(1)(B). A minimum of twenty-one days from the date of first publication will be provided for public review and comment.	April
ODOT will provide written responses to the MPOs indicating if any specific problem(s) exist and the action necessary to correct the Preliminary TIPs.	April
A copy of the Final TIPs will be provided to ODOT for review and approval.	May
ODOT will provide the MPOs written notification approving the Final TIPs.	June
Final MPO TIPs will be amended to the current STIP without modification.	September

STIP DEVELOPMENT PROCEDURES

PROCEDURE	DEADLINE
The State shall develop a new 4 year Statewide Transportation Improvement Program every 2 years. Development of the STIP shall be directly related to the currently approved 8 Year Construction Work Plan. Thereafter, the STIP will be revised as necessary through a series of amendments, administrative modifications and the annual inclusion of the MPO TIPs without modification.	
Development of the STIP will begin with a request to the FHWA for the current Indian Reservation Roads (IRR) TIP.	January
FTA through ODOT Transit Division will provide a list of all Transit Programs and Funds to be included in each fiscal year of the STIP.	January-February
The Preliminary STIP will be distributed to Federal, State and Local Government agencies, Indian Tribal Governments, the MPOs, public transportation operators and the public for review and comments for a minimum period of twenty-one days.	July-August
All substantive written comments received on the Preliminary STIP will be addressed and included in the Final STIP for presentation to the Oklahoma Transportation Commission for approval. The Final STIP, including the MPO TIPs, will then be forwarded to FHWA and FTA for formal approval prior to implementation.	September
If the Transportation Commission approves a County Road, County Bridge, City Street, City Bridge or other local government entity sponsored project, the sponsoring local government entity will be responsible for advertising the project as an addition to the STIP. The public notice will allow a minimum of 14 days from the first date of publication for public review and comment.	
The FHWA Oklahoma Division will take formal action on all proposed highway amendments to the STIP. Similarly the FTA Region VI will take formal action on all proposed transit amendments to the STIP. This formal action will be provided in a form letter with signature and date block. ODOT will prepare said standard from letter for requesting approval of highway amendments to the STIP. When ODOT submits a request for approval of a proposed highway project amendment via email, it will also transmit the same request on the standard form letter to the FHWA. The email request will be sent directly to the FHWA Oklahoma Division general email (www.hdaok@fhwa.dot.gov), with copies to the Planning and Technical Services team leader and the Division Planner. FHWA will review the request and if there are no	

issues of concern, send a response via email as soon as possible. Transit amendments will be forwarded by FHWA to FTA for review and approval. Subsequently, the FHWA will sign the standard form letter and transmit back to ODOT within 3 working days of receipt of the email

STIP AND TIP AMENDMENT PROCEDURES

Projects in any of the first four years of the STIP and TIP may be advanced in place of another project in the first four years of the STIP and TIP subject to the project selection requirements of 23 CFR 450.220 and 450.330. In addition, the STIP and TIP may be revised at any time under procedures agreed to by the State, MPO(s), and public transportation operator(s) consistent with the STIP and TIP development procedures established by 23 CFR 450.216, 450.324. Changes that affect fiscal constraint must take place by amending of the STIP.

(1) When the MPO approves an amendment to the TIP, a copy of the amendment will be forwarded to ODOT for approval, as the Governor's Designee, and subsequently added to the STIP. ODOT will forward notification of the amendment to FHWA and FTA for review and comment. The MPO will be responsible for advertising the amendment and providing an opportunity for public review and comment in accordance with Title 23 USC 134(j)(1)(B). The public notice must allow a minimum 14 days from first date of publication for public review and comment. MPO will provide ODOT with the publication date, any written substantive comments and appropriate responses.

In case of conflicts with MPO amendment request, ODOT will provide a written response within 15 calendar days of receipt of request, indicating the problem and the action necessary to correct the problem. Once the conflict has been resolved, ODOT will provide the MPO written approval of the amendment and amend the STIP.

(2) If ODOT approves an amendment to the STIP within the ACOG, INCOG or LMPO metropolitan study area, ODOT will forward notification of the amendment to FHWA and FTA for formal action. ODOT will then make a written request to the MPO to amend the TIP. ODOT will provide the MPO any written substantive comments and appropriate responses.

In case of conflict with ODOT amendment request, the MPO will provide a written response within 15 calendar days of receipt of request, indicating the problem and the action necessary to correct the problem. Once the conflict has been resolved, the MPO will amend their TIP and provide ODOT with written approval of the amendment.

(3) When the Oklahoma Transportation Commission approves a federally funded project on the State Highway System and adds it to a currently approved STIP, ODOT will forward notification of amendment to FHWA and FTA for formal action. ODOT is responsible for advertising the project for public review in accordance with Title 23 USC 135(g)(3).

MPO SELF-CERTIFICATION

Metropolitan Transportation Planning Process Self-Certification

The Oklahoma Department of Transportation (ODOT) and the INCOG (Indian Nations Council of Governments), the designed Metropolitan Planning Organization for the Tulsa Transportation Management area hereby certify that the transportation planning process is being carried out in accordance with all applicable requirements including:

1. 23 U.S.C 134 and 49 U.S.C. 5303;
2. Title VI of the Civil Rights Acts of 1964, as amended (42 U.S.C. 200d-1) and 49 CFR part 21;
3. 49 U.S.C. 5332, prohibiting discrimination on the basis of race, color, creed, national origin, sex or age in employment or business opportunity;
4. Section 1101(b) of the MAP-21 legislation and 49 CFR Part 26 regarding the involvement of disadvantaged business enterprises in USDOT funded projects;
5. 23 CFR Part 230, regarding the implementation of an equal employment opportunity program on Federal and Federal-aid highway construction contracts;
6. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et. seq.) and 49 CFR parts 27, 37 and 38
7. The older American Act, as amended (42 U.S.C. 6101), prohibiting discrimination on the basis of age in programs or activities receiving Federal financial assistance;
8. Section 324 of title 23 U.S.C. regarding the prohibition of discrimination based on gender; and
9. Section 504 of the Rehabilitation Act of 1973 (29 U.S.C. 794) and 49 CFR part 27 regarding discrimination against individuals with disabilities.

Indian Nations Council of Governments	Oklahoma Dept. of Transportation
_____	_____
Signature	Signature
Rich Brierre	_____
Printed Name	Printed Name
Executive Director	_____
Title	Title
_____	_____
Date	Date

DEFINITIONS

UPDATE – An update is defined as making current a long-range statewide transportation plan, metropolitan transportation plan, TIP or STIP through a comprehensive review. States and MPOs may choose to "update" their transportation plans and programs well in advance of the prescribed update cycles.

AMENDMENTS – Major revisions which require public review and comment, demonstration of fiscal constraint (except for long-range statewide transportation plans), and a conformity determination (for metropolitan transportation plans and TIPs in nonattainment and maintenance areas).

ADMINISTRATIVE MODIFICATIONS – Minor revisions not requiring public review and comment, demonstration of fiscal constraint or conformity.

A) Examples of administrative modifications include but are not limited to:

1. Revision to a project description without changes to the project scope or conflict with the environmental document;
2. Changes to the source of funds;
3. Changes to project lead agency;
4. Splits or combines of individually listed projects; as long as cost, schedule and scope remain unchanged or conforms to Section B below.
5. Adding or deleting projects from grouped project (Line Item) listings as long as the funding amounts stay within the guidelines in number two above;

B) ODOT will notify FHWA when the federal share of the project cost listed in the STIP increases or decreases by 50 percent AND the federal share of the project cost is greater than $4 million. In addition, ODOT will also provide justification for the project cost increase or decrease. In time sensitive circumstances, ODOT may request FHWA review a project to determine if an amendment OR administrative modification is necessary.

C) All other revisions/changes not identified as administrative modifications would be classified as amendments to the TIP and STIP, subject to public review and comment, demonstration of fiscal constraint and conformity determination in nonattainment and/or maintenance areas.

STATEWIDE LINE ITEM – Refers to projects with similar scope not defined by specific location or cost.

APPROVAL OF PROCEDURES FOR THE STIP AND TIP

In order to develop the Transportation Improvement Program for the four Metropolitan Planning Organizations and the Statewide Transportation Improvement Program for the State of Oklahoma, these procedures have been prepared by the Oklahoma Department of Transportation in cooperation with the Association of Central Oklahoma Governments, Indian Nations Council of Governments, Lawton Metropolitan Planning Organization, the Bi-state Metropolitan Planning Organization, Federal Highway Administration and Federal Transit Administration. Each Metropolitan Planning Organization will be responsible for completing their Transportation Improvement Program in accordance with these procedures. The Oklahoma Department of Transportation will then be responsible for developing the Statewide Transportation Improvement Program and coordinating these efforts with the Federal Highway and Federal Transit Administration. Any changes to specific items presented in this procedural guide will require formal approval of the undersigned agencies and MPOs.

Glossary of Terms and Acronyms

ADA	American with Disabilities Act
BHFY	Federal Bridge Rehabilitation on collector street or greater
BHIY	Federal Bridge Rehabilitation on Interstate
BRFY	Federal Bridge Replacement on collector street or greater
BRO-C	Bridge Replacement on County Roads
CMA	Congestion Mitigation and Air Quality
DPI	Federal-Aid Demonstration Project
EH	Transportation Enhancement
FFY	Federal Fiscal Year
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
IMY	Interstate Maintenance
IMG	Interstate Maintenance Safety
INCOG	Indian Nations Council of Governments
JARC	Job Access-Reverse Commute transit grant
Local	Project funding for local government unit
LRTP	Long-Range Transportation Plan
NHY	National Highway System
NHIY	National Highway System funds used on the Interstate System
ODOT	Oklahoma Department of Transportation
PL	Metropolitan Planning Program
SEC 5303	Metropolitan Planning for Transit
SEC 5307	Urbanized Area Formula Program for Transit
SEC 5309	Capital Program for Transit
SEC 5310	Capital Program for Transit serving the elderly/handicapped
SFY	State Fiscal Year
SH	State Highway designation
STIP	Statewide Transportation Improvement Program
STPY	Surface Transportation Program

TAC	Technical Advisory Committee
TIP	INCOG Transportation Improvement Program
TMA	INCOG Transportation Management Area
TPC	INCOG Transportation Policy Committee

FFY 2020 – 2023
Transportation Improvement Program Addendum
Performance Management

INTRODUCTION

Performance Measures

Fixing America's Surface Transportation Act (FAST Act) and its predecessor, Moving Ahead for Progress in the 21st Century (MAP-21), require that state DOTs, MPOs, and transit agencies conduct performance-based planning and programming. The objective is to invest resources in projects that will collectively progress toward the achievement of national goals. A performance-based approach to transportation planning and programming is intended to ensure the most efficient use of transportation funds, facilitate improved investment decision- making, and increase accountability and transparency.
INCOG must demonstrate that the TIP "makes progress towards achieving the performance targets" and that the TIP includes, "to the maximum extent practicable, a description of the anticipated effect of the TIP towards achieving the performance targets" (23 CFR § 450.326). The national goal areas are as follows:

Safety
Infrastructure condition
Congestion reduction
System reliability
Freight movement and economic vitality
Environmental sustainability
Reduced project delivery delays

As the designated MPO for the region, INCOG is required to set targets for each of these performance measure areas. A target is defined as "a quantifiable level of performance or condition, expressed as a value for the measure, to be achieved within a time period required by the Federal Highway Administration (FHWA)" (23 CFR § 490.101). INCOG must set these targets no more than 180 days after ODOT sets their targets and can establish these targets by either: (1) agreeing to plan and program projects so that they contribute toward the accomplishment of ODOT's targets for the performance measures; or (2) committing to a quantifiable target for the performance measures, as stipulated by the FHWA. The current and first performance period began on January 1, 2018 and will end on December 31, 2021.

Goals for the Surface Transportation Block Grant Program (STBGP)

Goals for the Surface Transportation Block Grant Program (STBGP) Project Selection process is to achieve a safe, reliable transportation that is maintained in a state of good repair. Performance measures are adopted to reflect these goals for the INCOG Region (set in cooperation with ODOT & per FHWA guidance). More specific goals are spelled out at the state level.

Safety (PM1):
- Number of fatalities
- Fatalities per 100 million vehicle miles traveled
- Number of serious injuries
- Serious injuries per 100 million vehicles miles traveled
- Number of non-motorized fatalities and non-motorized serious injuries

Pavement Condition (PM2):
- Percentage of pavements on the interstate system in Good condition
- Percentage of pavements of Interstate system in Poor condition
- Percentage of pavements on the non-Interstate NHS in Good condition
- Percentage of pavement of the non-Interstate NHS in Poor condition

Bridge Condition (PM2):
- Percentage of NHS bridges in good condition
- Percentage of NHS bridges in Poor condition

System Performance (PM3):
- Interstate Travel Time Reliability Measure (Percent of person-miles traveled on Interstate that are reliable)
- Non-Interstate Travel Time Reliability measure (Percent of person-miles traveled on the non-Interstate NHS that are reliable)

Freight Movement on the Interstate System (PM3):
- Freight Reliability (Truck Travel Time Reliability Index)

Traffic Congestion (PM3):
- Peak Hour Excessive Delay
- Non-Single Occupant Vehicle Travel (SOV)

On Road Mobile Source Emissions (PM3):
- Total Emission Reductions

INCOG Selection Criteria for Projects

INCOG Project Selection process for the Surface Transportation Block Grant Program (STBGP) allows for projects related to Safety and capacity improvements arterial intersections, Maintenance of system preservation, Transportation system management, Alternative transportation and Capacity addition.

These selection criteria as outlined would address the Performance Criteria as below:

INCOG Surface Transportation Block Grant Program (STBGP)
Selection Criteria & the Performance Goals

INCOG Project Types & Weighting Criteria	**Performance Goal**
Safe Arterial Intersections Safety Score (30%)	Safety for motorized travel (PM1) Safety for non-motorized travel (PM1)
System Preservation (0% - 20%)	Pavement Condition (PM2) Bridge Condition (PM2)
Transportation System Management (0% - 20%)	Improve Travel Time Reliability (PM3) Improve System Performance (PM3)
Alternative Transportation (0% - 10%)	Safety for non-motorized fatalities & Injuries (PM1) On Road Mobile Source Emissions (PM3)
Capacity Addition/Travel Time (12% - 30%)	Traffic Congestion (PM3) Transportation System performance (PM3) Traveler Safety (PM1) Pavement Condition (PM2) Bridge Condition (PM2) On Road Mobile Source Emissions (PM3)

The scoring and ranking of projects submitted each year allows for the ranking and rating of projects following locally set criteria to address above Performance Measures and Targets.

INCOG Target Setting for Safety for All Travelers (PM1)		
Performance Measure	ODOT*	INCOG
Number of Fatalities	691	Support ODOT Target
Number of Serious Injuries	14,083	Support ODOT Target
Fatality Rate per 100 Million VMT	1.41	Support ODOT Target
Serious Injury Rate per 100 Million VMT	28.9	Support ODOT Target
Total number of non-motorized fatalities and non-motorized serious injuries	698	Support ODOT Target

*Statewide Targets set by ODOT based of 5-year rolling annual average

INCOG Target Setting for System Performance Measure (PM2)			
Performance Measure	2020 ODOT Target	2022 ODOT Target	INCOG
% of Interstate NHS with reliable travel times	> 90%	> 90%	Support ODOT Target
% of Non-Interstate NHS with reliable travel times	> 80%	> 80%	Support ODOT Target
Truck travel time reliability	1.33	1.33	Support ODOT Target

INCOG Target Setting for Infrastructure Condition Measure (PM3)			
Performance Measure	2020 ODOT Target	2022 ODOT Target	INCOG
% of Interstate System pavement in good condition	> 50%	> 50%	Support ODOT Target
% of Interstate System pavement in poor condition	< 3%	< 3%	Support ODOT Target
% of Non-Interstate System pavements in good condition	> 45%	> 45%	Support ODOT Target
% of Non-Interstate System pavements in poor condition	< 5%	< 7%	Support ODOT Target
% of NHS Bridges classified as good condition	> 55%	> 60%	Support ODOT Target
% of NHS Bridges classified as poor condition	< 5%	< 7%	Support ODOT Target

Indian Nations Council of Governments (INCOG): Tulsa Transportation Management Area
FFY2020 Transportation Improvement Program Amendments: October 2020

Federal Fiscal year	County	ODOT Job Piece Number	Program	Project Description	Type of Work	Funding
2020	Tulsa	29326(04)	INCOG Surface Transportation Program	Owasso: 76th Street N from US-169 to 129th E Ave Intersection	Roadway	Federal: $6,970,195 Other Funds: $3,301,910 Total: $10,092,105
2020	Tulsa	29326(08)	INCOG Surface Transportation Program	Owasso: 76th Street N from US-169 to 129th E Ave Intersection	Roadway	Federal: $188,203 Other Funds: $0 Total: $188,203

INDIAN NATIONS COUNCIL OF GOVERNMENTS (INCOG)

SURFACE TRANSPORTATION PROGRAM – URBANIZED AREA (STP-UZA)

- LIST OF APPROVED PROJECTS PRIOR TO FEDERAL FISCAL YEAR 2020
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2020
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2021
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2022
- LIST OF APPROVED PROJECTS FOR FEDERAL FISCAL YEAR 2023*

*FFY 2023 PROJECTS ARE YET TO BE DETERMINED/SELECTED

TIP Edited to add ODOT Job Piece Numbers to Urbanized Surface Transportation Projects. This portion did not change or alter the scope or funding level for any of approved project.

Exhibit B

INCOG Board Approval
August 13, 2019

Projects Approved for Prior Federal Fiscal Years (Prior to FFY2020)

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway (Some funds have been expended prior to delegating the project to the Oklahoma Turnpike Authority) J/P 31313(04)	Engineering design, right-of-way acquisition, utility relocation, and construction	$54,000,000	$22,500,000	$76,500,000
Tulsa / INCOG / ODOT	Gilcrease Expressway Turnpike Project	GARVEE Project has been approved by INCOG Board with future Surface Transportation Program funding to connect Edison/US-412 with I-44	$71,100,000	Oklahoma Turnpike Authority	Federal: 71,100,000
Tulsa / INCOG / OTA	Gilcrease Expressway Turnpike Project	TIFIA (Transportation Infrastructure Finance and Innovation Act) Finance toward constructing Gilcrease Expressway Turnpike by the Okalhoma Turnpike Authority combined with the GARVEE funding listed above.	$108,600,000	Oklahoma Turnpike Authority	Federal: 108,600,000
Sand Springs J/P 26505(04)	SH-97(Wilson Ave.) from W. 2nd St. to Morrow Rd.	Conceptual plans, right-of-way, and phase 1 utility relocation for ultimate widening to 6-lanes including 5 intersections, signailzation, and sidewalks.	$1,600,000	$400,000	$2,000,000
Jenks J/P 25212(04)	Elwood Ave. and 111th St. Intersection	Engineering, design, and right-of-way for construction of intersection to 4 to 5-lane roadway with turn lanes, bridge replacements, sidewalks, drainage improvements and signage.	$512,000	$128,000	$640,000
Jenks J/P 25212 (04)	Elwood Ave/111th St. Intersection	Widening intersection to 4-5 lanes, with turn lanes, signalization, and other improvements	$1,728,600	$402,000	$2,130,600
Catoosa J/P 29324 (04)	161st East Avenue/Pine Street Intersecti	Construct roadway with shoulders and signalization of intersection	$720,000	$180,000	$900,000
Broken Arrow J/P 26308 (04)	23rd (193rd) Street	Widening 23rd to 3 lanes from Kenosha (71st) to Houston (81st) and replacement of the bridge over SH-51	$1,377,931	$344,483	$1,722,414
Broken Arrow J/P 26308(04)	23rd Street from Kenosha to Houston	Widening of 23rd Street (193rd E. Ave) to 5-lanes and replacement of bridge to 4-lanes over SH-51.	$2,499,982	$624,996	$3,124,978
Catoosa J/P 29324 (04)	161st East Avenue I-44 to Pine	Reconstruction to 4-lanes, curb and gutter, storm sewer, intersection improvement at Pine including dedicated left turn lanes, concrete pavement and large turning radii.	$1,731,382	$998,689	$2,730,071
Broken Arrow J/P 26308(04)	23rd Street from Kenosha to Houston	Widening of 23rd Street (193rd E. Ave) to 5-lanes and replacement of bridge to 4-lanes over SH-51.	$2,499,982	$624,996	$3,124,978
Catoosa J/P 29324(04)	161st East Avenue I-44 to Pine	Reconstruction to 4-lanes, curb and gutter, storm sewer, intersection improvement at Pine including dedicated left turn lanes, concrete pavement and large turning radii.	$1,731,382	$998,689	$2,730,071
Sapulpa J/P 29328(04)	Taft & Hickory Intersection	Traffic Signal Upgrade: Replacing loop detectors with video detection	$107,000	$10,000	$117,000
Sapulpa J/P 29329(04)	Dewey & Mission Intersection	Traffic Signal Replacement: Replacing loop detectors with video detection	$192,000	$15,000	$207,000
Catoosa J/P 33314(04)	Pine Street from SH-167 to SH-66	Widen and overlay to 3 lanes, drainage, sidewalks and traffic signals	$1,808,040	$341,469	$2,149,509
Owasso J/P 29326(04)	E 76th Street North from US-169 to N 129th E Ave	Widening of E. 76th Street North from 2-lanes to 5-lanes	$3,472,000	$868,000	$4,340,000
Sand Springs J/P 29307 (04)	S 113th West Ave	Widening, resurface, add turnlanes, sidewalks, signage improvements on South 113th West Ave.	$1,718,685	$706,895	$2,425,580
Broken Arrow J/P 26308(04)	23rd Street from Kenosha to Houston	Widening of 23rd Stret to 5 Lanes with sidewalk and multi-use trail	$220,788	$73,597	$294,385

Projects Approved for Prior Federal Fiscal Years (Prior to FFY2020)

City/County	Project	Description	Federal $	Local $	Total $
Bixby J/P 33315(04)	Memorial Drive	Corridor Traffic and Signalization Study	$ 68,850	$ 21,250	$90,100
Sand Springs J/P 30731(04)	S 113th W Ave	Phase 2 Widening Project, Intersection Improvement at E 34th Street	$ 795,502	$ 934,078	$1,729,580
Jenks J/P 30160(04)	Elwood Ave (Main to 111th)	Engineering design, right-of-way acquisition, utility relocation, and construction between Main St/Elwood to 111th/Elwood intersections	$ 1,441,030	$ 360,258	$1,801,288
Broken Arrow J/P 30917(04)	23rd Street(193rd E Ave)	Right of Way, Utility relocation, widening of 23rd Street from Houston (81st St) to New Orleans Street (101st Street) from 2 lanes to 5 lanes, with multipurpose asphalt trail and concrete sidewalk.	$ 2,730,000	$ 910,000	$3,640,000
Owasso J/P 30742(04)	Garnett Road (96th St to 106th St)	Widen N. Garnett Road from a 2 lane roadway to 4 lane road, including a center left turn lane/landscaped median with sidewalks and dedicated on-street bike lanes.	$ 3,250,000	$ 3,712,000	$6,962,000
Tulsa County	E 51st Street J/P 30885(04)	Engineering, Right of Way and Utility relocation for a future widening of E 51st Street S beteen 162nd E Ave & 177th E Ave.	$ 650,000	$ 220,000	$870,000
Owasso J/P 30703(04)	116th St N & 129th E Ave	Widen intersection with turn lanes	$ 2,186,000	$ 1,403,000	$3,589,000
Broken Arrow J/P 30917(04)	23rd Street (193rd E Ave)	81st Street to 101st Street: ROW, utlities, widening	$ 2,580,000	$ 860,000	$3,440,000
Sapulpa J/P 31554(04)	Canyon Road	Sh-66 to Freedom Road Rehabilitation	$ 329,353	$ 342,796	$672,149
Jenks J/P 31550(04)	Main Street & TSU Raiload area	Main St at TSU RR intersection & vicinity	$ 2,627,200	$ 656,800	$3,284,000
Sand Springs J/P 32532(04)	S. 113th West Ave Phase III	Phase III of S 113th West Ave to expand the street from 2 lanes to 3 lanes, adding sidewalks, lane markings & improve intersections at W 38th St & W 49th St	$ 1,789,278	$ 1,869,628	$3,658,906
Tulsa County J/P 30885(04)	E 51st Street South	Construciton for widening of E 51st St S from 161st E Ave to 177th E Ave	$ 2,900,844	$ 966,948	$3,867,792
Catoosa J/P 32543(04)	SH-167 & Pine	Planning, Design & Spec with estimates to widen SH-167 to provide left turn lane & Pine St west of SH-167 to provide 4 lanes & traffic signals	$ 107,640	$ 26,910	$134,550
Jenks J/P 30160(04)	Elwood Ave	Expansion of Elwood from Main St to 111th St: Construction Phase 1	$ 2,268,000	$ 700,000	$2,968,000

Projects Approved for Federal Fiscal Year 2020

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway	Engineering design, right-of-way acquisition, utility relocation, and construction from Edison to I-44	$ 6,000,000	$ 1,500,000	$7,500,000
Bixby 33315(04)	Memorial Corridor Synchronization	Traffic signal coordination: Creek Tpk to 171st St	$ 182,250	$ 56,250	$238,500
City of Tulsa	BA Expressway lighting 33316(04)	Highway lighting from Peoria to Columbia on BAX	$ 960,000	$ 240,000	$1,200,000
Tulsa County	51st & Lynn Lane 30885(04)	Construction for widening of E 51st St & 177th E Ave	$ 1,306,384	$ 435,461	$1,741,845
Broken Arrow	Olive Ave from Kenosha to Albany J/P 3331(04)	Widening of Olive Ave (129th) from 2 to 5 lanes from Kenosha to Albany St	$ 3,930,000	$ 3,000,000	$6,930,000
Wagoner County	101st St from 117th to 241st St J/P 29395(04)	Grade, drain & surface 101st St from 117th to 241st St	$ 500,000	$ 2,510,000	$3,010,000
Catoosa	Pine Street: SH-167 to 145th E Ave J/P 33314(04)	Engg, plan, spec & overlay of Pine St with striping and showlder barrieer	$ 560,000	$ 390,000	$950,000
Owasso	106th St N & 129th E Ave Intersection J/P 33317(04)	Widen 106th St N. & 129th E Ave intersection from 2 lane 4-way stop to a 5-lane signalized	$ 1,561,366	$ 2,050,000	$3,611,366
Total			$ 15,000,000	$ 10,181,711	$ 25,181,711

Projects Approved for Federal Fiscal Year 2021

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway	INCOG Approved for GARVEE (match provided by OTA)	$ 6,000,000	$ 1,500,000	$7,500,000
Bixby 33315(04)	Memorial Corridor Synchronization	Traffic signal coordination: Creek Tpk to 171st St	$ 969,854	$ 299,338	$1,269,192
Broken Arrow 33955(04)	Albany St: 9th to 23rd Street	Widen Albany from 9th to 23rd Street Rehabiliation of Memorial Drive from 81st St S to Creek Turnpike	$ 3,000,000	$ 7,740,000	$10,740,000
City of Tulsa 3395904	Memorial Dr: 81st St to Creek Tpk 61st	Rehabilitation of arterial intersection	$ 1,930,000	$ 650,000	$2,580,000
City of Tulsa 33958(04)	& Yale Intersection	Widen 111th St between Elwood & US-75 S to four lanes	$ 1,070,000	$ 405,000	$1,475,000
Jenks 25212(04)	111th Street: Elwood to US-75 S; 111th & Elwood intersection		$ 2,518,666	$ 750,000	$3,268,666
Total			$ 15,488,520	$ 11,344,338	$ 26,832,858

Projects Approved for Federal Fiscal Year 2022

City/County	Project	Description	Federal $	Local $	Total $
Tulsa	Gilcrease West Expressway	INCOG Approved for GARVEE (match provided by OTA)	$ 6,000,000	$ 1,500,000	$7,500,000
City of Tulsa	71st St & S Sheridan Intersection	Intersection Rehabilitation	$ 2,900,000	$ 730,000	$3,630,000
Broken Arrow	Elm Place: Kenosha to SH-51	Widen Elm Place and Rehab Intersection	$ 3,000,000	$ 3,400,000	$6,400,000
Bixby	SH-67 Corridor Traffic Study	Corridor Traffic & Accessibility Study	$ 90,000	$ 30,000	$120,000
Owasso	E 86th St from 118th to 128th	Street Rehabilitation	$ 957,000	$ 395,000	$1,352,000
Wagoner County	101st St: 209th E Ave to Oneta Road/SH-	101st St reconstruction: 209th - Oneta	$ 3,000,000	$ 5,900,000	$8,900,000
Jenks	Elwood Phase 2	Reconstruct from North of Polecat Creek to North of Conoco Facility	$ 1,841,000	$ 614,000	$2,455,000
Total			$ 17,788,000	$ 12,569,000	$ 30,357,000

Projects Approved for Federal Fiscal Year 2023

City/County	Project	Description	Federal $	Local $	Total $
To be determined (TBD)	To be determined (TBD)	To be determined (TBD)	To be determined (TBD)	To be determined (TBD)	To be determined (TBD)

Indian Nations Council of Governments (INCOG): Tulsa Transportation Management Area
FFY2020 Transportation Improvement Program Amendment: Administrative Modification

Federal Fiscal year	County	ODOT/OTA* Job Piece Number	Program	Project Description	Type of Work	Funding
2020	Tulsa	3251204	TIFIA** Funding	Gilcrease Expressway Project: TIFIA finance toward constructing Gilcrease Expressway Turnpike project by the Oklahoma Turnpike Authority combined with the GARVEE*** funding as programmed within the FFY2020-23 INCOG TIP.	Roadway	Federal: $120,644,732 (previous Federal: $108,600,000) Other Funds: ODOT (GARVEE) & OTA

*ODOT: Oklahoma Department of Transportation; OTA: Oklahoma Turnpike Authority

** TIFIA: Transportation Infrastructure Finance and Innovation Act

*** GARVEE: Grant Aniticipation Revenue Vehicle Funding

Indian Nations Council of Governments (INCOG): Tulsa Transportation Management Area
FFY2020 Transportation Improvement Program Amendments

Federal Fiscal year	County	ODOT Job Piece Number	Program	Project Description	Type of Work	Funding
2020	Creek	TBD	ODOT CIRB CED/OCCEDB Funds	Creek County: W 49th Street from SH-117 to SH-67	Roadway	Federal: $100,000 Other Funds: $0 Total: $100,000
2020	Tulsa	33019(04)	ODOT Enhancement: Transportation Alternatives	Tulsa County: Wekiwa Road Project - 129th W Ave to 161st W Ave	Pedestrian Improvements	Federal: $694,780 Other Funds: $173,695 Total: $868,475

Indian Nations Council of Governments (INCOG): Tulsa Transportation Management Area
FFY2020 Transportation Improvement Program Amendments: January 2020

Fiscal Year	Region/County	Project Sponsor	Summary	Funding
2020	Tulsa TMA	City of Tulsa: Transportation of People with Disabilities	Contracting Service	Federal: $70,000 Local: $17,500 Total: $87,500
2020	Tulsa TMA	Kibois Transportation	Operating Expense	Federal: $87,500 Local: $87,500 Total: $175,000
2020	Tulsa TMA	United Community Action (Cimarron) Transportation	Vehicles - Capital	Federal: $81,600 Local: $14,400 Total: $96,000
2020	Tulsa TMA	A New Leaf, INC - Transportation for Disabled	Operating Expense	Federal: $50,000 Local: $50,000 Total: $100,000
2020	Tulsa TMA	Morton Comprehensive Health Services	Vehicles - Capital	Federal: $46,175 Local: $8,150 Total: $54,325
2020	Tulsa TMA	Life Senior Services Transprotation	Operating Expense	Federal: $34,503 Local: $34,503 Total: $69,006
2020	Tulsa TMA	Life Senior Services Transprotation	Vehicles - Capital	Federal: $76,160 Local: $13,440 Total: $89,600
2020	Tulsa TMA	Life Senior Services Transprotation	Tulsa CAN Plan Operating	Federal: $10,000 Local In-kind: $10,000 Total: $20,000
2020	Tulsa TMA	Rogers County Elder Daycare Center	Vehicles - Capital	Federal: $59,925 Local: $10,575 Total: $70,500
2020	Tulsa TMA	INCOG Veterans Ride Connect	Contract Services	Federal: $25,000 Local: $6,250 Total: $31,250

Indian Nations Council of Governments (INCOG): Tulsa Transportation Management Area				
FFY2020 Congestion Mitigation & Air Quality Projects (CMAQ Program) Projects				
Federal Fiscal year	**Geography**	**Project Description**	**Type of Work**	**Funding**
2020	Tulsa TMA	Public Fleet Alternative Fuels & Idle Reduction Program	Alt Fuels	Federal: $200,000 Other Funds: $50,000 Total: $250,000
2020	Tulsa TMA	Bus/Shuttle Service for Targeted Areas	Alt Modes	Federal: $100,000 Other Funds: $25,000 Total: $125,000
2020	Tulsa TMA	Ozone Alert! Marketing & Active Transportation Marketing	Air Quality	Federal: $100,000 Other Funds: $25,000 Total: $125,000
2020	Tulsa TMA	Tulsa Bikeshare	Alt Modes	Federal: $250,000 Other Funds: $62,500 Total: $312,500

Indian Nations Council of Governments (INCOG): Tulsa Transportation Management Area
FFY2020 Transportation Improvement Program Amendment: Administrative Modification - March 2020

Federal Fiscal year	County	ODOT/OTA* Job Piece Number	Program	Project Description	Type of Work	Funding
2020	Tulsa	3251204	TIFIA** Funding	Gilcrease Expressway Project: TIFIA finance toward constructing Gilcrease Expressway Turnpike project by the Oklahoma Turnpike Authority combined with the GARVEE*** funding as programmed within the FFY2020-23 INCOG TIP.	Roadway	Federal: $120,116,133 (previous Federal: $120,644,732) Other Funds: ODOT (GARVEE) & OTA

*ODOT: Oklahoma Department of Transportation; OTA: Oklahoma Turnpike Authority

** TIFIA: Transportation Infrastructure Finance and Innovation Act

*** GARVEE: Grant Aniticipation Revenue Vehicle Funding

Federal Fiscal year	County	FTA Program	Program	Project Description	Type of Work	Funding
2020	Tulsa	BUILD Grant	2018 BUILD Grant	Install Fiber/Broadband on two BRT Corridors; Connect traffic Signals to the Tulsa Traffic Management Center and Bus Rapid Transit Stations to enable real time information & install Transit Signal Priority for BRT.	Information Technology, Traffic & Transit	Federal Grant: $6,5000,000 Other Funds: $3,000,000

Federal Fiscal year	County	ODOT JP #	Program	Project Description	Type of Work	Funding
2020	Tulsa	25212(04)	INCOG STP-UZA Program	Jenks: Widen 111th Street between Elwood & US-75 to 4 Lanes AND widen Elwood & 111th Intersection to 4/5 lanes, with turn lanes, signalization, and other related improvements. This is to merge previously approved project phases into one project.	Roadway	Federal: $4,980,773 Local: $1,637,576

CONNECTING PROGRESS

Final Plan

August 2018

Presented to

TULSA TRANSIT

INCOG
Regional Partners - Regional Solutions

Submitted by

CTG Connetics Transportation Group





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Chapter 1 Executive Summary

The Metropolitan Tulsa Transit Authority[1] will soon begin construction of its first AERO Bus Rapid Transit (BRT) service along Peoria Avenue, while a second AERO BRT line is proposed to serve 11th and 21st streets. The *Connecting Progress Plan* was undertaken by Tulsa Transit to support the successful launch of AERO BRT, while simultaneously reviewing and improving the rest of the local bus network. The overarching theme of the Connecting Progress Plan is to determine the best way to deploy and reorganize resources to best serve existing and future transit customers. Improvements to trip speed, frequency, connections, and access are all expected outcomes when the proposed network is implemented.

1.1 Study Goals

Five goals were identified for the Connecting Progress Plan, including:

- Goal 1: Help Tulsa Transit determine how to improve service frequencies and reduce rider travel time without additional operating costs.
- Goal 2: Build network off the AERO Peoria BRT in the short term and AERO Route 66 BRT in the intermediate term
- Goal 3: Improve Tulsa Transit's presence in the community through a robust and meaningful public outreach process as well as aligning services with stakeholder goals.
- Goal 4: Make recommendations related to Tulsa Transit's "hub and spoke" design while also addressing schedule adherence issues.
- Goal 5: Recommend other non-traditional service delivery approaches like private providers, TNCs, and demand response zones, as appropriate.

These goals provided guidance throughout the study. They were also used to review the recommended plan to ensure the final recommendations fulfil the desired outcome of the Connecting Progress Plan. The goal review is discussed in Section 5.4 of Chapter 5.

[1] Referred throughout this document as Tulsa Transit or MTTA

1.2 Recommended Plan

The Connecting Progress Plan included extensive data collection and analysis. All work was vetted through a robust outreach process that included:

- A Tulsa Transit working group consisting of drivers, customer service representatives, planning and administrative staff, a member of the Tulsa Transit Board of Trustees, and INCOG staff;
- An advisory committee consisting of regional stakeholders, social service representatives, and staff from Cities of Tulsa, Broken Arrow, Jenks, and Sand Springs.
- Public open houses held in multiple locations in downtown Tulsa, West Tulsa, East Tulsa, and North Tulsa
- An on-line community survey on desired improvements.

This work led to two main recommendations for the plan: a cost-neutral short-term plan to restructure the route network to be implemented in 2019, and a mid-term service expansion plan to be implemented in 3 to 5 years as funding becomes available.

Short-Term Plan

The short-term plan recommends a major restructuring of the Tulsa Transit network. Among the highlights of this plan:

- A series of hubs established throughout Tulsa to facilitate timed connections at locations other than Denver Avenue Station (DAS) and Midtown Memorial Station (MMS).
- Establishment of Peoria AERO BRT, the region's first BRT line. Peoria AERO BRT will operate at a high frequency, providing excellent north-south mobility in the revised network.
- Establishment of five daytime corridors operating every 30 minutes:
    - Route 1 - MLK
    - Route 2 - Southwest Boulevard
    - Route 10 - 3rd/Admiral
    - Route 11 - 11th/21st (the future Route 66 BRT alignment)
    - Route 13 - 31st Street
- Establishment of new (or longer) corridor-based service on Harvard, Yale, Sheridan, and 31st Street corridors.
- Improvement in Saturday network headways, with all routes to operate every 60 minutes except for Peoria AERO BRT, which is to operate every 20 minutes.
- Revising the night and Sunday network so that it is a subset of Daytime routes operating at a consistent 60-minute headway.
- Introduction of three policy changes:
    - Establishment of performance standards for monitoring the new network
    - Elimination of flag stops throughout the system
    - A stop amenity policy for the provision of shelters at local stops.

Figures 1-1 through 1-3 show the recommended weekday daytime, Saturday daytime, and night/Sunday networks.

Figure 1-1. Recommended Weekday Daytime Network

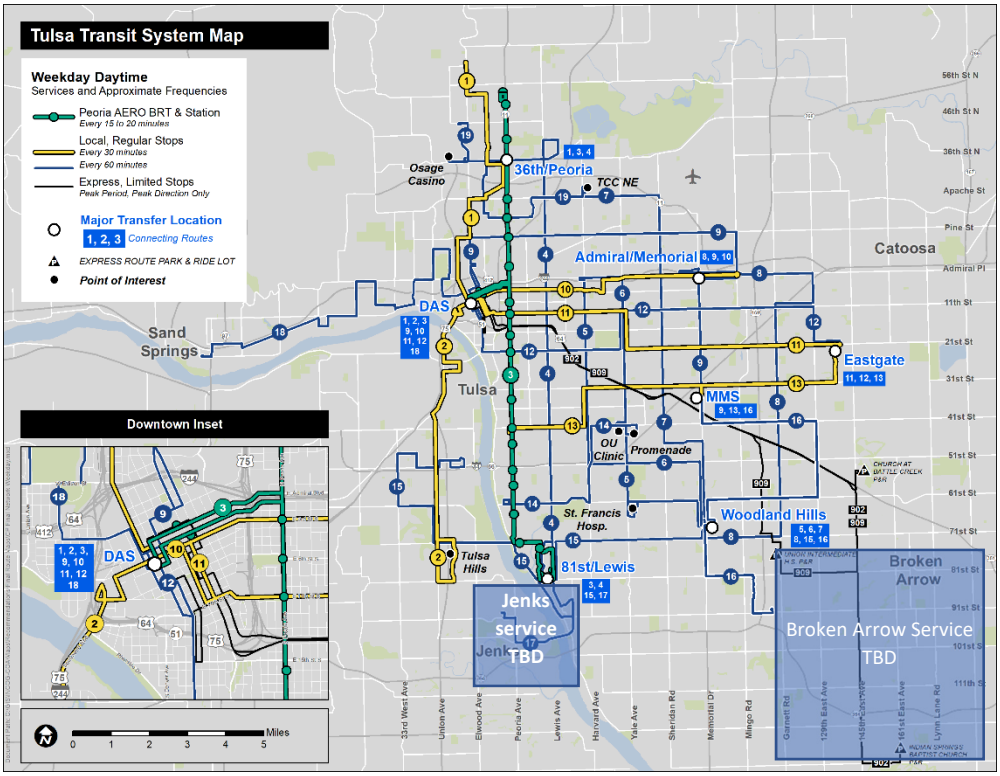


Figure 1-2. Recommended Saturday Daytime Network

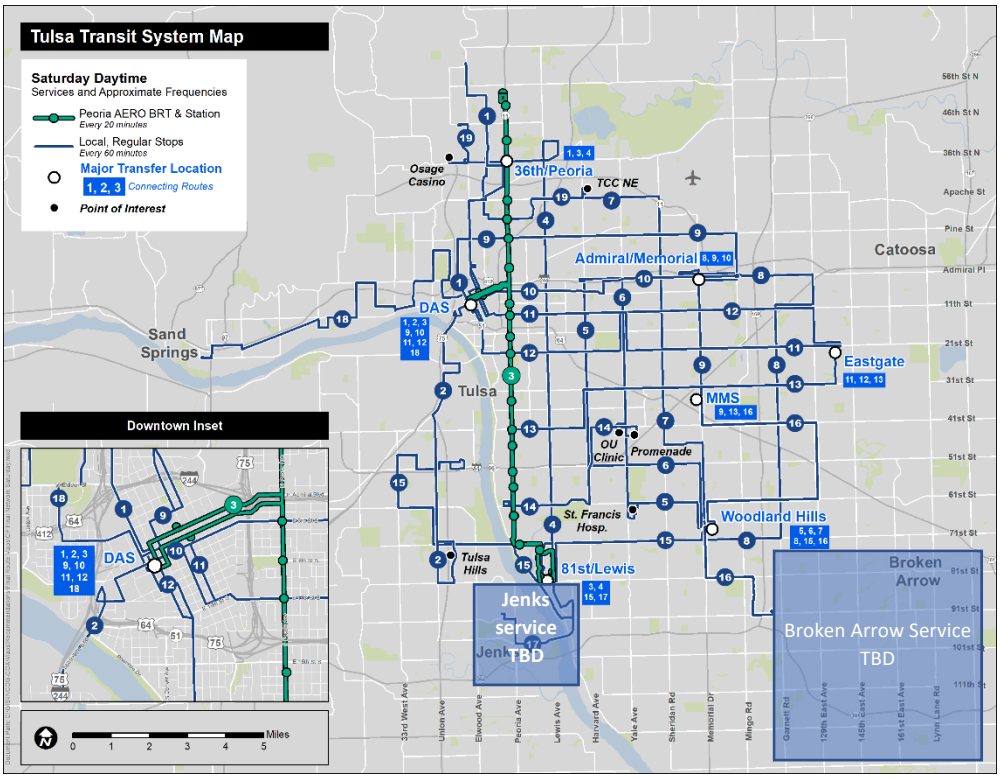


Figure 1-3. Recommended Night/Sunday Network

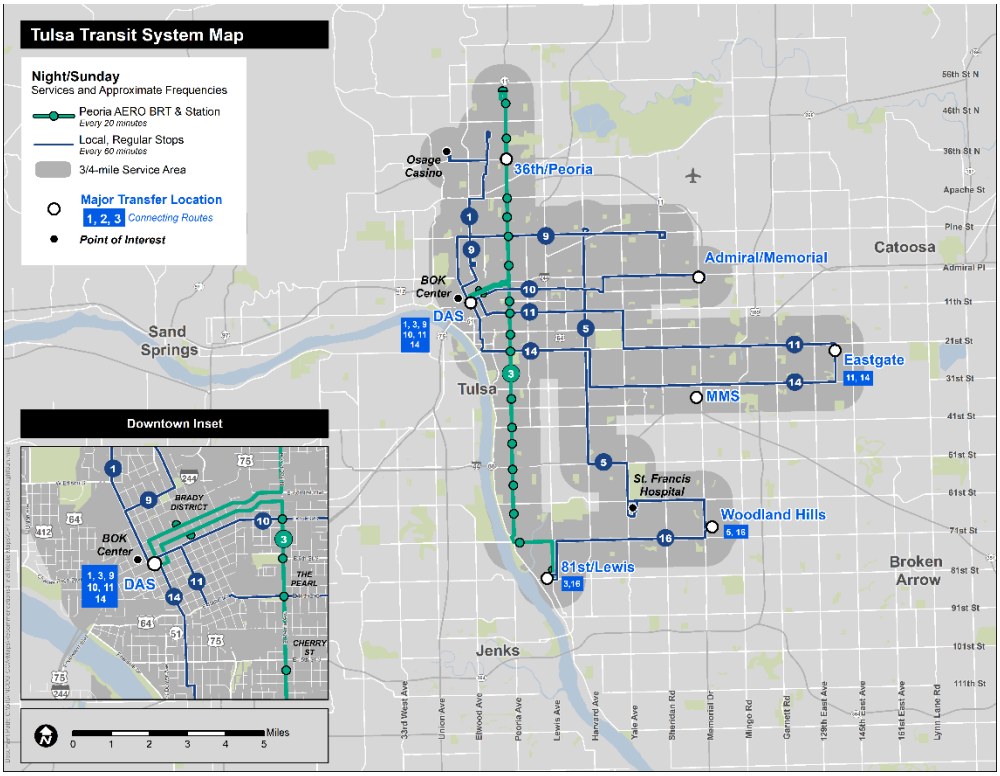


Table 1-1. Daytime Network Summary

Number	Name	Description	Weekday Peak		Weekday Offpeak		Saturday	
			Headway	Span	Headway	Span	Headway	Span
1	MLK	From 61st Street N to DAS	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
2	Southwest Blvd	From DAS to Tulsa Hills	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	15 min	6 hrs	20 min	8 hrs	20 min	13 hrs
4	Lewis	From 36th Street N/Hartford to 81st Street Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
5	Harvard/61st	From Harvard/Admiral to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
6	Yale/51st	From Harvard/Admiral to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
7	Sheridan	From TCC NE to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
8	Garnett	From Admiral/Memorial to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
9	Pine/Memorial	From DAS to MMS	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
12	21st/11th Streets	From DAS to Eastgate	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
13	31st	From 41st/Peoria to Eastgate	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
14	61st/41st	From 61st/Peorial to The Promenade Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
15	West Tulsa/71st Street	From 49th/Jackson to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
16	Southeast Tulsa	From Woodland Hills Mall to St Francis Hosp. South	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
17	Jenks Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
18	Sand Springs	From DAS to Sand Springs Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
19	North Tulsa Circulator	From Dream Center (46th Street N) to TCC NE	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
20	BA Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
902	BA Express	From B.A. to Downtown Tulsa	4 Trips	-	-	-	-	-
909	Union Express	From Union HS to Downtown Tulsa	2 Trips	-	-	-	-	-

Table 1-2. Night/Sunday Network Summary

Number	Name	Description	Weekday Night		Saturday Night		Sunday	
			Headway	Span	Headway	Span	Headway	Span
1	MLK	From 46th Street N to DAS	60	3 hrs	60	3 hrs	60	10 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	20	3 hrs	20	3 hrs	20	14 hrs
5	Harvard/61st	From Harvard/Admiral to Woodland Hills Mall	60	3 hrs	60	3 hrs	60	10 hrs
9	Pine/Memorial	From DAS to Pine/Sheridan	60	3 hrs	60	3 hrs	60	10 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60	3 hrs	60	3 hrs	60	10 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	60	3 hrs	60	3 hrs	60	10 hrs
13	31st	From DAS to Eastgate	60	3 hrs	60	3 hrs	60	10 hrs
15	71st Street	From 81st Walmart to Woodland Hills Mall	60	3 hrs	60	3 hrs	60	10 hrs

Mid-Term Plan

The mid-term plan is a list of potential service expansion projects that Tulsa Transit would implement as soon as additional funding is available. The expectation is that these projects would take three to five years to implement.

This expansion list is based on demographics and data analysis along with feedback from the Tulsa Transit working group and Connecting Progress advisory committee. The list of projects is also consistent with public feedback from the community survey.

Potential projects include:

Weekday Daytime

- Improve Route 5 - Harvard to operate with 30-minute headways

Saturday Daytime

- Improve Route 1 - MLK to operate with 30-minute headways
- Improve Route 2 - Southwest Boulevard to operate with 30-minute headways
- Improve Route 10 - Admiral to operate with 30-minute headways

Weekday Night

- Add 2 more hours of service to weekday night network (for routes 1, 3, 5, 9, 10, 11, 13, 15)
- Add routes 6, 7, 12, and 19 to the weekday night network (operating three hours each)

Sunday

- Add routes 6, 7, 12, and 19 to the Sunday network (operating ten hours each)

Each project is projected to cost between $100,000 and $300,000 (in FY17 dollars). These identified projects are all designed to be scalable – meaning they could be implemented individually or in combination, depending on available dollars.

Evaluation of the Recommended Plan

The recommended Connecting Progress Plan is a major change to the network, but one that will result in significant improvement to existing riders, while at the same time attracting new riders to use the system. Improvements include:

- Establishes a set of strategically-located transit subhubs on the periphery of Tulsa Transit's service area to facilitate transfers at locations away from Denver Avenue Station (DAS) and Midtown Memorial Station (MMS). While exact locations and amenities are to be determined, each subhub is presumed to include an off-street waiting area, one or two shelters and benches, and other amenities like lighting, trash receptacle, bicycle parking, and schedule and route information.
- The establishment of subhubs will improve rider travel times by timing transfers in locations other than DAS and MMS and by reducing out of the way travel. The implementation of subhubs is expected to result in an average savings of 16 minutes per one-way trip and removes the need to travel downtown to transfer.
- Provide more continuous corridor-based service on major thoroughfares, including Harvard, Yale, Sheridan, and 31st Street.

- Improves the Saturday network, with all routes proposed to operate every 60 minutes except for Peoria AERO BRT, which is to operate every 20 minutes.
- Adds frequency improvement for weekday service on routes 11 (11th/21st Street) and 13 (31st Street).
- Improves the night network so that routes are same as daytime routes, operating at a consistent 60-minute headway.
- Improves transfers to Peoria AERO BRT, with eleven routes connecting to the Peoria corridor; three of the connecting routes (1, 11, 13) have proposed 30-minute frequency service.
- Establishes Route 11 on alignment of future Route 66 AERO BRT route. This route is proposed to have 30-minute frequency service which can be scaled up with the introduction of BRT service.
- Route-to-route connections outside of subhub locations are spread more evenly throughout the metropolitan area, which substantially cuts down on out-of-direction travel for riders.
- The flag stop policy is recommended to be eliminated, which will give routes greater ability to adhere to their schedules.
- This study considered a variety of non-traditional service delivery approaches, particularly in low-productivity areas of the Tulsa Transit service delivery area.
- This study recommends the use of alternative services in Broken Arrow and Jenks, subject to discussion with each city.

Chapter 2 Public Outreach Process

"I prefer frequency to coverage. 1 hour is too long to wait with children if it's cold."

"Please duplicate daytime routes at night."

"Bidirectional service is preferred to one-way loops."

"We need later bus service. Till 1 am."

""Frequency is critical to more people using it. To all demographics."

"I really like the sub-hubs."

"Are employers open on weekends and evenings being served?"

"Transfers are okay if it improves frequency."

These are some of the thoughts and questions voiced by the ridership of Metropolitan Tulsa Transit Agency (MTTA), as well as potential riders and associated agency representatives.

One of the five goals of the Connecting Progress Plan is to "Improve MTTA's presence in the community through a robust and meaningful public outreach process as well as aligning services with stakeholder goals." This plan sought to achieve meaningful public outreach through a combination of actives including:

- Roundtable discussions with community leaders (defined as *Advisory* and *Stakeholder* committees),
- Two phases of public outreach meetings. The meetings were strategically located across the city to facilitate a diverse representation of attendees. Phases focused on existing conditions and draft recommendations.
- Interviews with Tulsa Transit drivers, supervisors, and call center staff in December 2017
- A route workshop conducted with Tulsa Transit operations and planning staff, INCOG planning staff, and an MTTA board member in April 2018.
- A digital survey and webpage were used to increase reach of public involvement efforts.

It was this goal and these activities that established the feedback necessary to understand how riders utilize existing services, defined present barriers that are inhibiting ridership growth, and establishment of a meaningful connection between the riders and MTTA.

The public outreach component is the foundation of the Connecting Progress Plan itself. Success here is essential if the identified recommendations presented in Chapter 5 are effectively implemented by Tulsa Transit, thereby improving service and advancing the mission of *connecting people to progress and prosperity*.

2.1 Advisory Committee and Stakeholder Groups

During the initial planning stages for public involvement, it was determined that the plan should engage a diverse group of committee leaders, transportation professionals, and social service agency

representatives. An initial list was created and then participants were separated into two groups based on their desired involvement. Table 2-1 presents the initial participation list.

The distinguishing factor between the two groups is that the advisory committee would have increased opportunity to provide feedback on recommendations. Whereas the stakeholder groups were larger audiences to diversify perspectives and gain feedback, the advisory committee was a more defined group with a select number of attendees to ensure thorough group discussions on the overall process, recommendations, and implications of implementation.

Table 2-1. Advisory and Stakeholder Groups

Bama Pie	Growing Together	Tulsa Housing Authority
Bicycle Pedestrian Advisory Committee	Hispanic Chamber of Commerce	Tulsa Hub
BRRX4VETS	INCOG	Tulsa Tech
Center for Individuals with Physical Challenges	Mental Health Association Oklahoma	Tulsa Transit Advisory Board
City of Broken Arrow	MODUS	TYPROS
City of Tulsa	Morton	Women in Recovery
Community Care College	The Parks Authority Board (Conner & Winters)	Workforce Tulsa
Community Health Connection	TPS Transportation	Youth Services of Tulsa
CSC COURTS Program	Tulsa Community College	Zarrow Tulsa City-County Library
CSC Tulsa Reentry One-Stop	Tulsa Health Department	

2.2 Phase 1 Meetings

The purpose of the Phase 1 meetings was to present findings of existing conditions analysis and gain perspectives on what works well and what does not work well within the Tulsa Transit network. Meetings consisted of an advisory committee meeting, three stakeholder committee meetings, and a public open house at Tulsa America Job Center. Advisory and stakeholder committee meetings were conducted at the Center for Family and Children Services. The committee meetings included a presentation on transit planning approach and existing conditions including: individual route performance comparisons, peer review analysis of Tulsa Transit with regional neighbors, and a facilitated group discussion of existing strengths and weaknesses.

Advisory Committee

- Wednesday, February 28, 2018, 10:00 a.m. to 11:30 a.m.

Stakeholders

- Wednesday, February 28, 2018, 3:00 p.m. to 4:30 p.m.
- Thursday, March 1, 2018, 10:00 a.m. to 11:30 a.m.
- Friday, March 2, 2018, 10:00 a.m. to 11:30 a.m.

Public Open House

- Thursday, March 1, 2018, 4:00 p.m. to 6:00 p.m.

Feedback from Phase 1 meetings is presented in Appendix 2A.

2.3 Phase 2 Meetings

The purpose of the Phase 2 meetings was to present a draft recommendation gauge reaction to the changes in the Tulsa Transit network. Phase 2 meetings consisted of one advisory committee meeting,

three optional stakeholder committee meetings before each open house, and three public open house meetings strategically located throughout the city of Tulsa to facilitate a diverse participation of attendees. Meeting times were tailored by location to maximize attendance, and multiple translators were provided for LEP (limited English proficiency) residents.

The overall theme of the Phase 2 meetings was to gain feedback on the CTG draft recommendations which included: two overall options for the route network for weekday daytime, changes to weekday night network, changes to the Saturday daytime network, and changes to the Sunday network. Other concepts discussed were the findings of the digital survey, ridership preferences on transfers and the creation of sub-hubs and the removal of flag stops. The advisory committee meeting was held at INCOG offices, included group discussion, comment periods, etc. The public open house included similar poster boards and materials.

Advisory Committee

- Tuesday, May 22, 2018, 10-11:30am

Stakeholders

- Tuesday, May 22, 2018, 3:30-4:00 p.m.
- Wednesday, May 23, 2018, 5:30-6:00 p.m.
- Thursday, May 24, 2018, 9:30-10:00 a.m.

Public Open Houses

- North Tulsa (Rudisill Public Library) Tuesday, May 22, 2018, 4:00 p.m. to 6:00 p.m.
- Downtown (Denver Avenue Station) Wednesday, May 23, 2018, 11:30 a.m. to 2:30 p.m.
- East Tulsa (Plaza Santa Cecilia) Wednesday, May 23, 2018, 5:00 p.m. to 7:00 p.m.
- West Tulsa (Park View Terrace Apartments) Thursday, May 24, 2018, 10:00 a.m. to 12:00 p.m.

Feedback from Phase 2 meetings is presented in Appendix 2B.

2.4 Community Survey

A digital survey and webpage were used to increase reach of public involvement efforts. A user-friendly online survey (Survey Monkey) was distributed to contacts lists from MTTA, INCOG, and the Community Services Council.

The survey categorized responders by (1) General public transit users (2) General public non-users and (3) Agency representatives. The responders were asked various questions based on chosen category. Questions ranged from trip purpose and transfer locations to preferences in service options (such as *coverage* vs. *frequency* or *one-set rides* vs. *transfers*). The number of survey responses exceeded 500. Additional information on the survey result is presented in Chapter 4 and in Appendix 4A.

Chapter 3 Existing Conditions

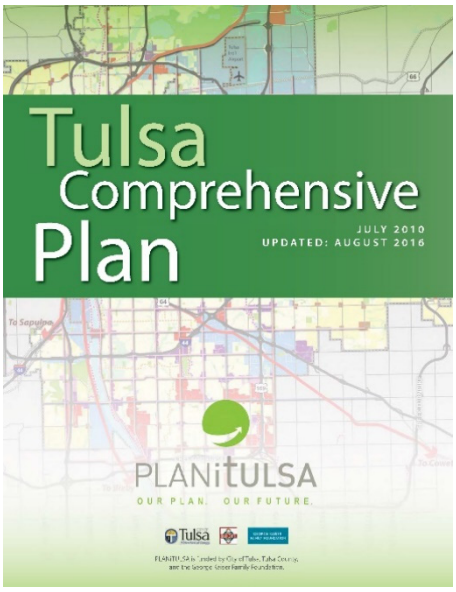
Chapter 3 presents the existing conditions analysis, the first major phase of analysis completed for the Connecting Progress Plan. Demographic data on Tulsa and performance data for the Tulsa Transit network was collected and assessed to establish an understanding of how the city and system are performing, what does well and what is not performing as well. These findings were then used in later phases to inform the final recommendations of the Connecting Progress Plan.

3.1 Review of Relevant Plans

Several recent planning documents in Tulsa have relevance to the Connecting Progress Plan and were reviewed for context to this planning effort, including:

- PLANiTULSA Tulsa Comprehensive Plan,
- Connected 2045 Long Range Transportation Plan,
- Fast Forward Regional Transit Service Plan,
- Peoria Avenue BRT Land Use Framework,
- GO Plan: The Tulsa Region Bicycle and Pedestrian Master Plan, and
- Tulsa Bike Share Strategic Plan.

PLANiTULSA Tulsa Comprehensive Plan



In 2010, *PLANiTULSA* was adopted by the City of Tulsa and was updated in 2016. It is the city's long-range comprehensive plan which guides land use development through a series of goals and policies. Both the City of Tulsa and INCOG maintain and implement aspects of the comprehensive plan and new developments are vetted to ensure they align with the goals and policies documented within the plan. The comprehensive plan is a three-part framework: the comprehensive plan, a strategic plan, and a monitoring program. A strategic plan document was developed to accommodate immediate, short-term developments as well as determine funding sources for projects. The strategic plan has six strategies which assist in implementing the comprehensive plan, of which "Draft and launch a new transportation strategy," is the most pertinent to the Connecting Progress Plan. In response to this strategy, in 2013 Tulsa adopted a Complete Streets Manual which provides an overview of Complete Streets planning and implementation.[2] The monitoring program is *Tulsa 2030*, a way to evaluate the progress of the comprehensive plan, develop and test methodologies to chart progress, assess achievements, and evaluate best practices going forward. A progress report was also released in

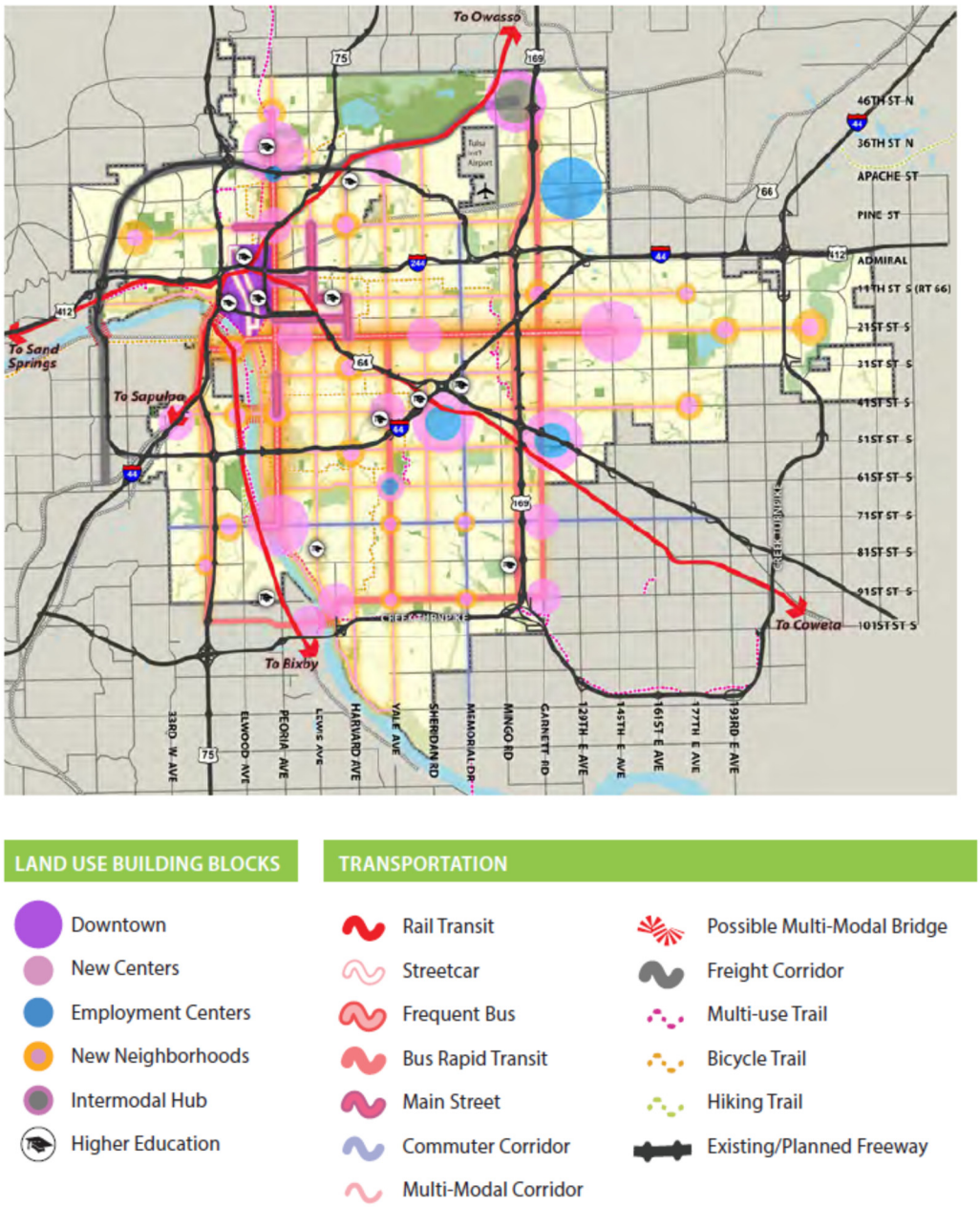
[2] Complete Streets is an idea which provides a greater range of users on a given roadway instead of only automobiles. Context Sensitive Solutions (CSS) seeks to match transportation facilities with the areas they serve, such as incorporating more alternative modes into the transportation network where feasible, and to prioritize the movement of people rather than only automobiles. CSS considers how best to incorporate bicyclists, pedestrians and transit within a transportation facility.

2016 which charted the progress made over the prior five years. The monitoring plan reviews five areas which include land use; transportation; economic development; housing; and parks, trails and open space. The Vision Plan, shown in Figure 3-1. Tulsa Vision Plan, July 2010, summarizes major land use and transportation goals into a single graphic.

Noteworthy specifics within the comprehensive plan with relevance to Connecting Progress include:

- A need to better coordinate land use and transportation planning decisions to target density and residential uses in downtown and centralized new communities built around transit and pedestrian amenities (wider sidewalks, shorter street crossings, bicycle infrastructure, etc.)
- Closely coordinate with Tulsa Transit on transit improvements in high frequency bus, bus rapid transit, streetcar, light rail and commuter rail corridors.
- Priority corridors include Peoria Avenue, 21st Street, 91st Street, Yale Avenue and Garnett Road; design/redesign roads for BRT: Garnett Road, 91st Street, and Yale Avenue.
- Less emphasis on new roadway lane miles, and more emphasis on maintenance and transportation facilities which are oriented more toward pedestrians, bicycles, and transit.
- If goals enacted in Tulsa 2030 are met, transit ridership could increase 600% by 2030 due to increased homes and jobs constructed around transit service.
- The comprehensive plan notes that the growth of Tulsa Transit is "…hampered by automobile-oriented street design, low population density, and the lack of complementary pedestrian and bicycle infrastructure."
- U.S. Highway 169 and the Broken Arrow Expressway see the highest peak hour congestion in the region; rapid transit in these corridors could see decent ridership levels and may be eligible for federal funding.
- High frequency bus would benefit from transit priority improvements (signal changes, bus lanes, etc.), particularly on Peoria Avenue and 21st Street corridors.
- 21st Street and Utica Avenue is a potential location for timed transfers and is a location where Transit Oriented Development is recommended.

Figure 3-1. Tulsa Vision Plan, July 2010



Source: PLANiTULSA

Connected 2045 Long Range Transportation Plan

Connected 2045 is Tulsa's Regional Transportation Plan, released in November of 2017. It is updated every five years and has a 20-year planning horizon. It anticipates the transportation needs of the region based on planning assumptions and modeling estimates and serves as a guide for the investment of regional transportation resources. Because 2045 horizon year is well beyond the planning timeline for the Connecting Progress Plan, the overlap between these two documents is narrow. However, *Connected 2045* addresses transit and pedestrian bicycle infrastructure needs and recommends more

investment in supporting these modes. The *Regional Transit System Plan* was noted to recommend BRT investment on the Peoria Avenue and 11th and 21st Street corridors. As noted in *Connected 2045*, the second phase of BRT service along some combination of 11th and 21st Streets will allow for a decentralized network and will aid in modernizing the system. Further, the plan recommended the use of performance measures to aid in monitoring the performance of the Tulsa Transit system.

Table 3-1. Transit *Performance Measures*

Ridership	Annual ridership should be compared with 2011 Bus Operations Plan and 2017 Route Integration Study. Post BRT-implementation, ridership should be monitored for increase overall and increase in choice riders.
Revenue Service	Revenue service should be compared with 2011 Bus Ops Plan to ensure service grows. (Service was shown to decrease 20% between 2002 and 2009.)
Service Effectiveness	Passengers per revenue mile and revenue hour are two key metrics. Service effectiveness should be measured annually, along with ridership and revenue service to determine overall quality of service.

Source: Summarized from Connected 2045.

Fast Forward Regional Transit System Plan (RTSP or *Fast Forward*)



The RTSP represents the culmination of at least a decade of focused transit planning in the region. Released in 2011, the data-driven and technically-focused plan informed recommendations to guide development of increased regional mobility within the Tulsa transportation management area through year 2035. To determine regional transportation needs, the RTSP incorporated future travel patterns and demand and future population and employment growth.

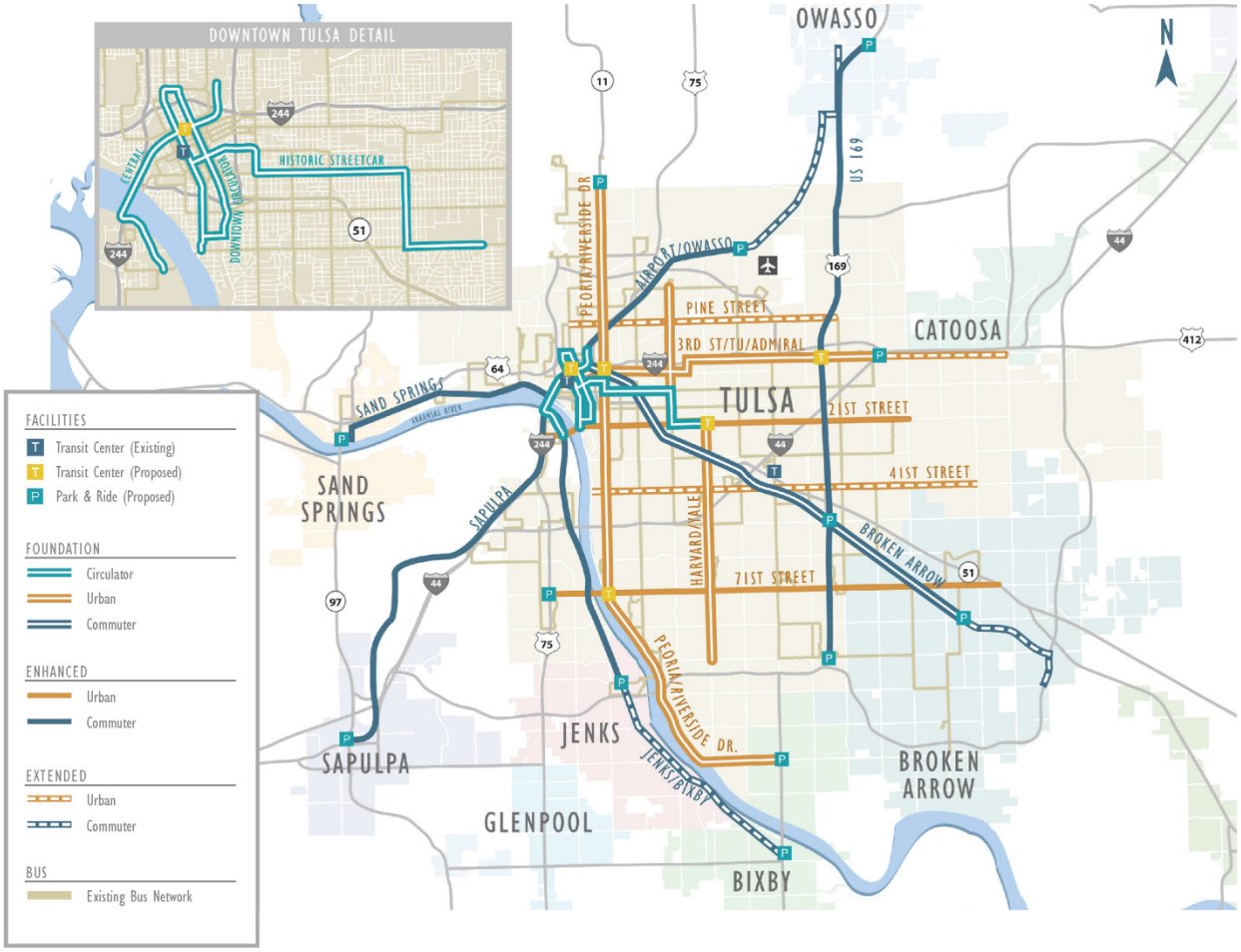
Based on prior reports and studies, twenty-two corridors for improved transit service comprised an initial list of investments. An evaluation process ranked the potential performance of each these corridors, resulting in the highest-ranked corridors or segments. The evaluation process also prioritized which corridors would receive further analysis and potential capital investment in a future Alternatives Analysis study. Corridors were identified as being Foundation, Enhanced, or Extended which prioritizes their further study and likely implementation. Within these groupings, transit corridors were categorized by their level of service needs and transit market characteristics and were considered circulator, urban, or commuter-oriented services.

Recommendations from this process are shown in Figure 3-2. One of the corridors is the future Peoria Avenue AERO BRT which was a Foundation Urban corridor. Tulsa Transit's second AERO BRT corridor will be on a combination of 11th and 21st Streets and was previously identified as portions of a Foundation Circulator and Enhanced Urban service.

This effort also included three reports addressing Tulsa Transit service at a system level: existing service, peer and system analysis, and future near-term and long-term recommendations. The final RTSP incorporated key near-term and long-term recommendations for improving the existing Tulsa Transit system, several of which have already been implemented:

- Use clock headways for bus service (30-, 45-, 60-minute frequencies).
- Implement timed transfers at transit centers.
- Simplify circuitous routing.
- Replace Nightline routes with evening and night service on regular routes.
- Develop detailed downtown transit service map for inclusion in Tulsa Transit *Traveler*.
- Pursue aggressive rebranding, marketing and outreach of the system and its changes.
- Develop "super stop" or "sub-hub" locations (transfer locations besides the existing two at Denver Avenue and Midtown Memorial Stations) and improved information kiosks.
- Provide bus schedule and route information at bus stops.
- Introduce real-time passenger information at key bus stops.

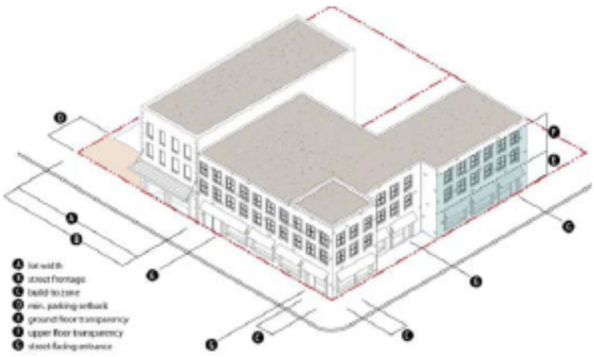
Figure 3-2. Fast Forward Regional Transit System Plan



Source: Fast Forward Regional Transit System Plan*, 2011*

Peoria Avenue BRT Land Use Framework

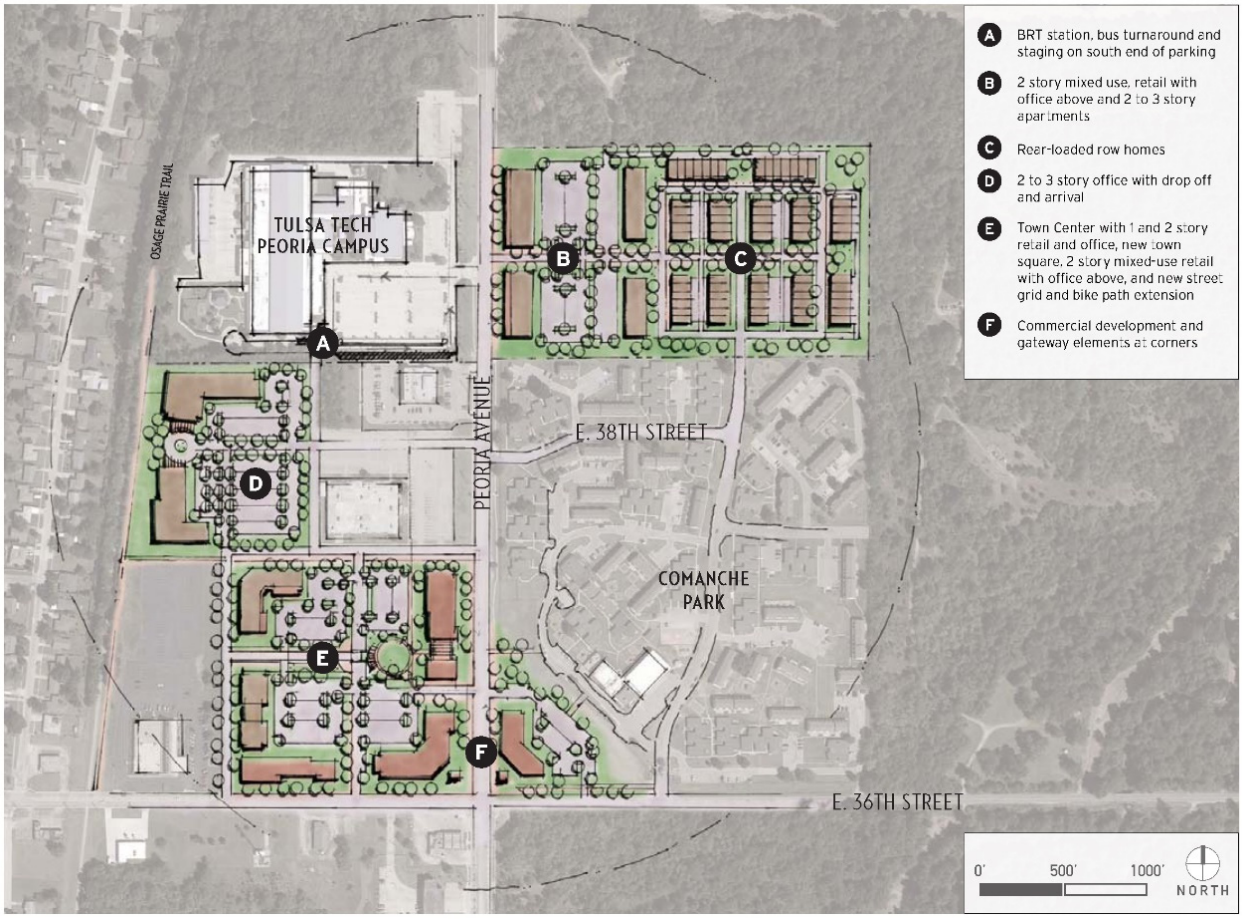
Major transit investments are often associated with land use investments, as the two mutually support one another. To maximize the return on investment of the future Peoria Avenue AERO BRT, the *Peoria Avenue BRT Land Use Framework* was recently developed. This document provides a range of zoning, land use, and street enhancement strategies. These were based on an examination of both the existing physical development along the corridor as well as Tulsa's existing regulatory environment and incorporation of feedback from an extensive public outreach process. Further, eight Small Area Plans were found to be immediately relevant to the Peoria Avenue corridor and were summarized with the document.



MX-Pedestrian (P) character diagram. Source: Tulsa Zoning Code

Overall, the findings and recommendations tailored for the Peoria Avenue corridor could be applicable to the second AERO BRT line on a combination of 11th and/or 21st Streets. Because many areas along the Peoria Avenue corridor are under-developed or were built to accommodate automobile uses, these recommendations focus on providing a friendly environment to the pedestrian or bicyclist, namely those who would likely be using transit. The framework provides recommendations at both the station-area level and the corridor or district level. These include concentration of development into denser, mixed land uses, reduction of parking, bringing building fronts to the edge of the sidewalk as well as incorporation of pedestrian-oriented architecture, addition of street amenities (trees, street furniture, lighting, etc.), consideration for bicycle and pedestrian infrastructure, and a focus on improvements in the top tier of BRT stations (those designated as "enhanced" or those anticipated to see the highest ridership).

Figure 3-3. 38th Street North and Peoria Avenue Station Area Development Concept



Source: Peoria Avenue BRT Land Use Framework, *2017*

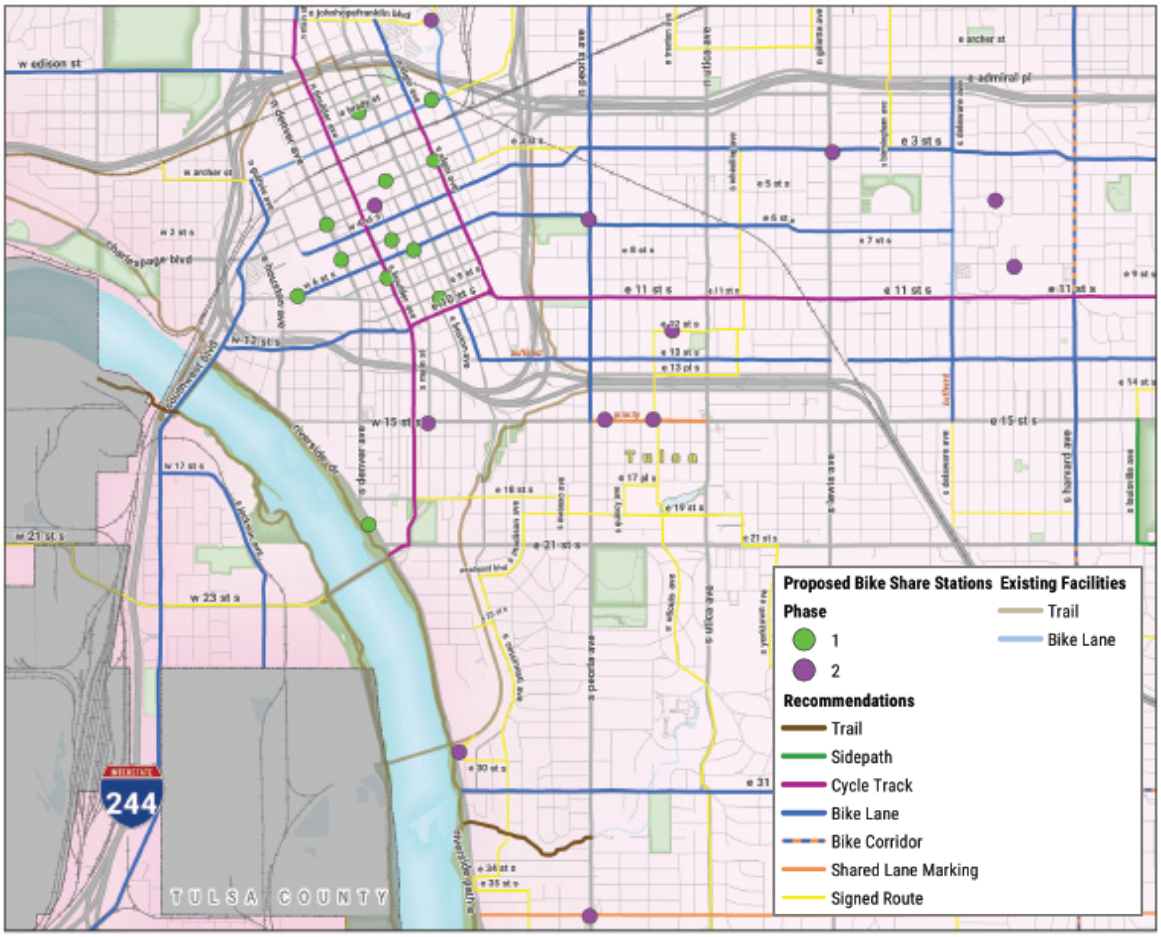
GO Plan: The Tulsa Region Bicycle and Pedestrian Master Plan

In the past several years, bicycle and pedestrian planning has been at the forefront of planning activities for the region. Bicycle and pedestrian activity is highly correlated to transit use because transit riders begin and end their trip as pedestrians. Thus, improvement of these networks will aid in both attracting new riders to transit and providing a safe network that transit riders can utilize. Recently, the City of Tulsa has adopted INCOG's *GO Plan* (2015), the region's very first bicycle and pedestrian master plan. This visionary document builds upon both the *Connections 2045* Regional Transportation Plan and the 1999 *Trails Master Plan* and seeks to improve the bicycling and pedestrian experience in the Tulsa region. Study goals include implementing an interconnected network of bicycle and pedestrian facilities to increase the share of those modes.

Addressing bicycling and pedestrian needs have occurred in several other planning documents, particularly those described previously, but the *GO Plan* lays out concrete goals and objectives so that

the 11 cities in the Tulsa region[3] have the tools to implement aspects of the plan such as the prioritized list of bicycle and pedestrian projects. A comprehensive list of bicycle facility types was provided and a targeted list of pedestrian improvements, particularly those near high schools, was included as recommended improvements.

Figure 3-4. GO Plan Existing and Proposed Facilities



Source: GO Plan

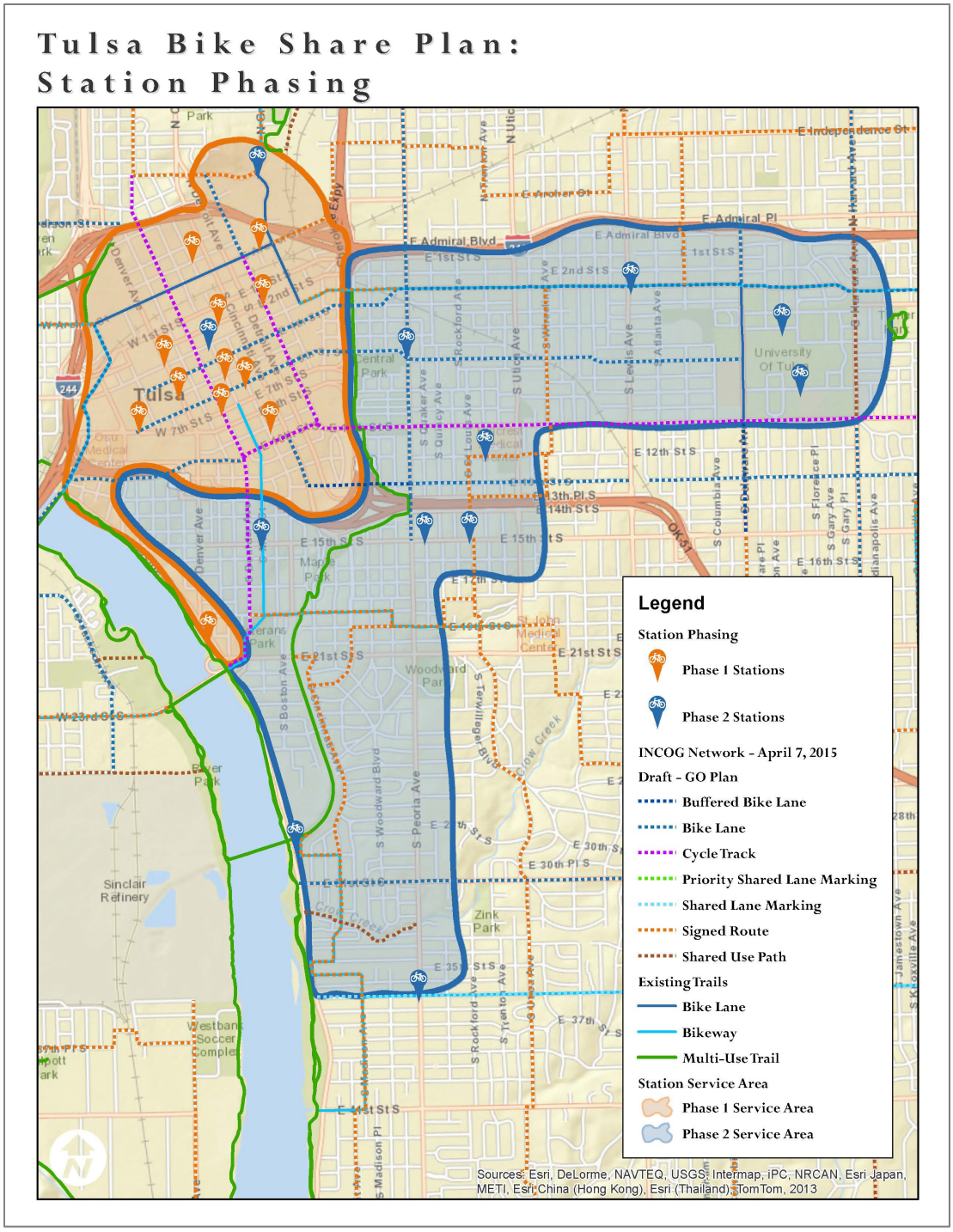
Tulsa Bike Share Strategic Plan

Tulsa will soon also benefit from a bike share program which will be implemented in two phases as funding is secured and planning is finalized: Phase 1 targets the urban core/central business district with 12 initial stations and 108 bicycles; Phase 2 branches out of downtown into the Pearl District area with another 12 stations. Typically, bike share locations are best co-located with transit facilities (such as rail or bus stations) or major activity areas and can bridge the "last mile" gap from origin to destination in many instances. Thus, downtown is logical since this is where much activity occurs and where most of Tulsa Transit's routes connect with one another at Denver Avenue Station.

[3] Bixby, Broken Arrow, Catoosa, Collinsville, Coweta, Glenpool, Jenks, Owasso, Sand Springs, Skiatook, and Tulsa.

As the BRT corridors are implemented, planning should be closely coordinated with INCOG and Tulsa Transit to determine the best high-ridership stations where future bike hubs may be located. These stations may be predetermined based on the scale of station investment (large stations), ends-of-line, or stations where high ridership is generated.

Figure 3-5. Tulsa Bike Share Hub Locations



Source: Tulsa Bike Share

3.2 Market Analysis

This section presents a snapshot of the current demographic and market conditions within the city and county of Tulsa, specifically those correlated to transit ridership. In economic terms, transit is a derived good, meaning people consume it to do something else. Thus, the key to demographic and market analysis is to identify factors that determine transit trip purpose.

Most trips within the Tulsa metropolitan area are completed by automobile. There are many reasons for this, among them urban sprawl, urban freeways, free or inexpensive parking, and low gasoline prices. Much of this trend is due to decades of subsidization from Federal, state, and local governments.[4] People have demonstrated they will choose an alternative mode if the subsidization of auto travel ceases and/or if the alternative mode becomes competitive with auto travel times.

Given the above knowledge, this section reviews data to answer questions about the Tulsa transit market, including where people begin their trip (their origin), where people end their trip (their destination), and what groups of people are most likely to take transit in the city and county. Using these data will assist in understanding where Tulsans are currently using transit and where the transit market has potential to successfully expand.

Study Area and Data Sources

The study area is the area of analysis for all maps presented in this section. The area was defined with assistance from INCOG staff. Consideration included Tulsa Transit's service coverage area (defined as a three-quarter-mile buffer around existing transit routes to match up with the farthest extent of possible ADA coverage) and Tulsa's corporate limits and urbanized area boundary as well as considering which census tracts and census block groups nested within these boundaries. Portions of Catoosa and Sapulpa were included for employment and population considerations. The final proposed study area boundaries contain 402 census block groups for analysis. Figure 3-6 shows the study area boundaries for the market analysis as well as the service coverage of Tulsa Transit routes.

Demographic data was obtained from several sources based on both the origin and destination part of the trip. The American Community Survey 5-year Estimates (2012 – 2016) was used for origin data, while the 2015 Longitudinal Employer-Household Dynamics (LEHD) was used for destination data; both datasets originate from the United States Census Bureau. The principal geographic unit is the census block group for each dataset.

Demographic Review

The demographic review included ten distinct datasets selected because of their correlation to transit ridership. Definitions for each dataset are presented in subsections below.

Specific origin-based data used for this analysis includes:

- Household density
- Minority population
- Population under 25 years of age

[4] Subsidization includes government backed roadway projects, free or reduced parking costs, and low gasoline costs.

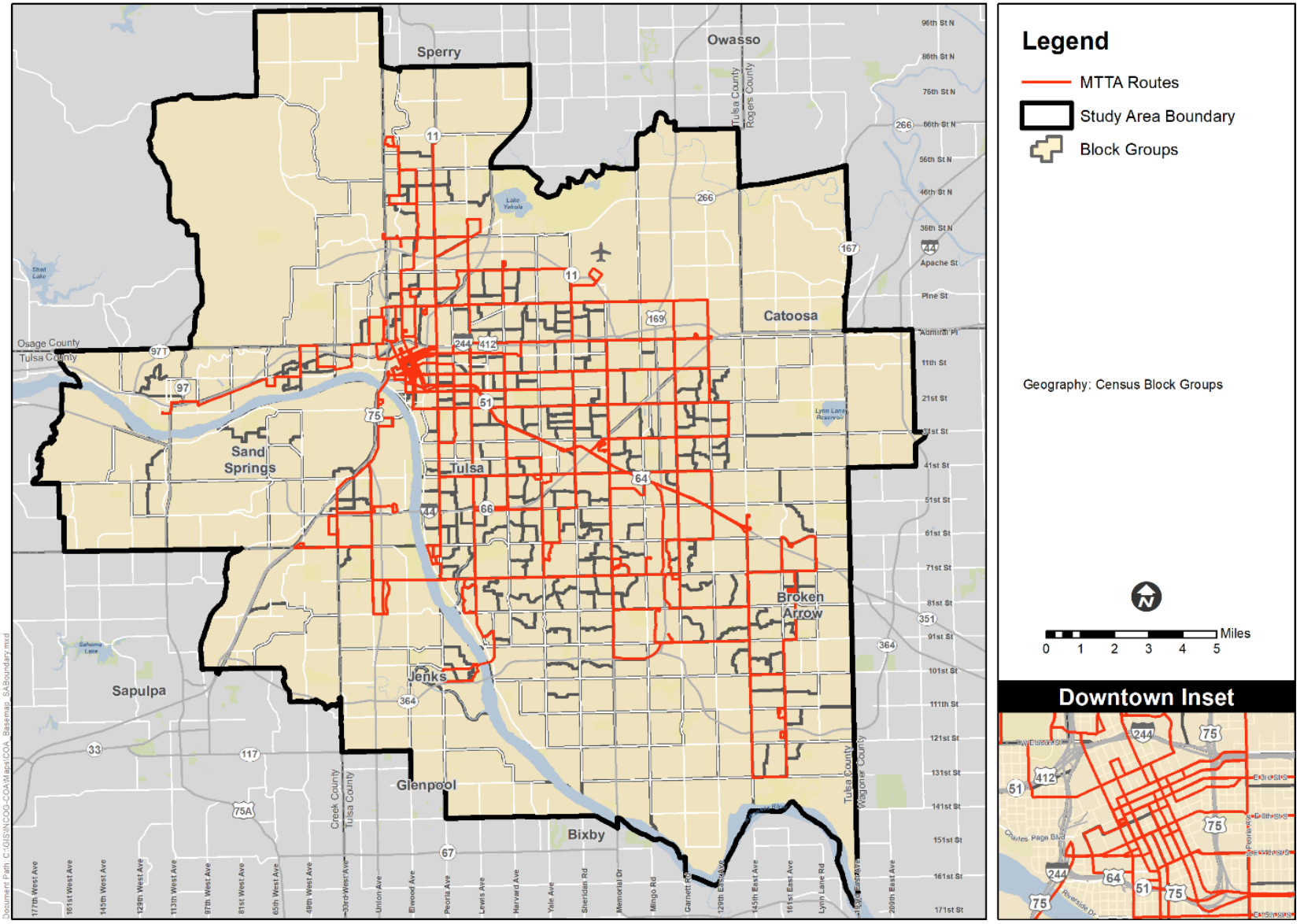
- Population over 65 years of age
- Percentage of households with annual incomes under $30,000
- Unemployment status
- Limited English Proficiency (LEP) households
- Zero-vehicle households
- One-vehicle households

In addition to the origin-based data, a tenth dataset related to the destination part of the trip was aggregated using LEHD Origin-Destination Employment Statistics (LODES) data. A total of eight specific categories were reviewed and used to create a destination index, including:

- Jobs earning less than $1,250 per month
- Jobs earning between $1,250 and $3,333 per month
- Jobs within the retail trade
- Jobs in Healthcare / Social Assistance
- Jobs in Arts, Entertainment, Recreation
- Jobs in Accommodation, Food Service
- Jobs for workers with less than a High School diploma
- Jobs for High School equivalent

The final part of this section is a transit propensity index. Each of the 10 datasets was given a weighted scoring depending on its impact to transit use. Full understanding of the transit market comes by considering all demographics together, which allows to a comprehensive understanding of the transit market in Tulsa.

Figure 3-6. Market Analysis Study Area Boundary



Population Density

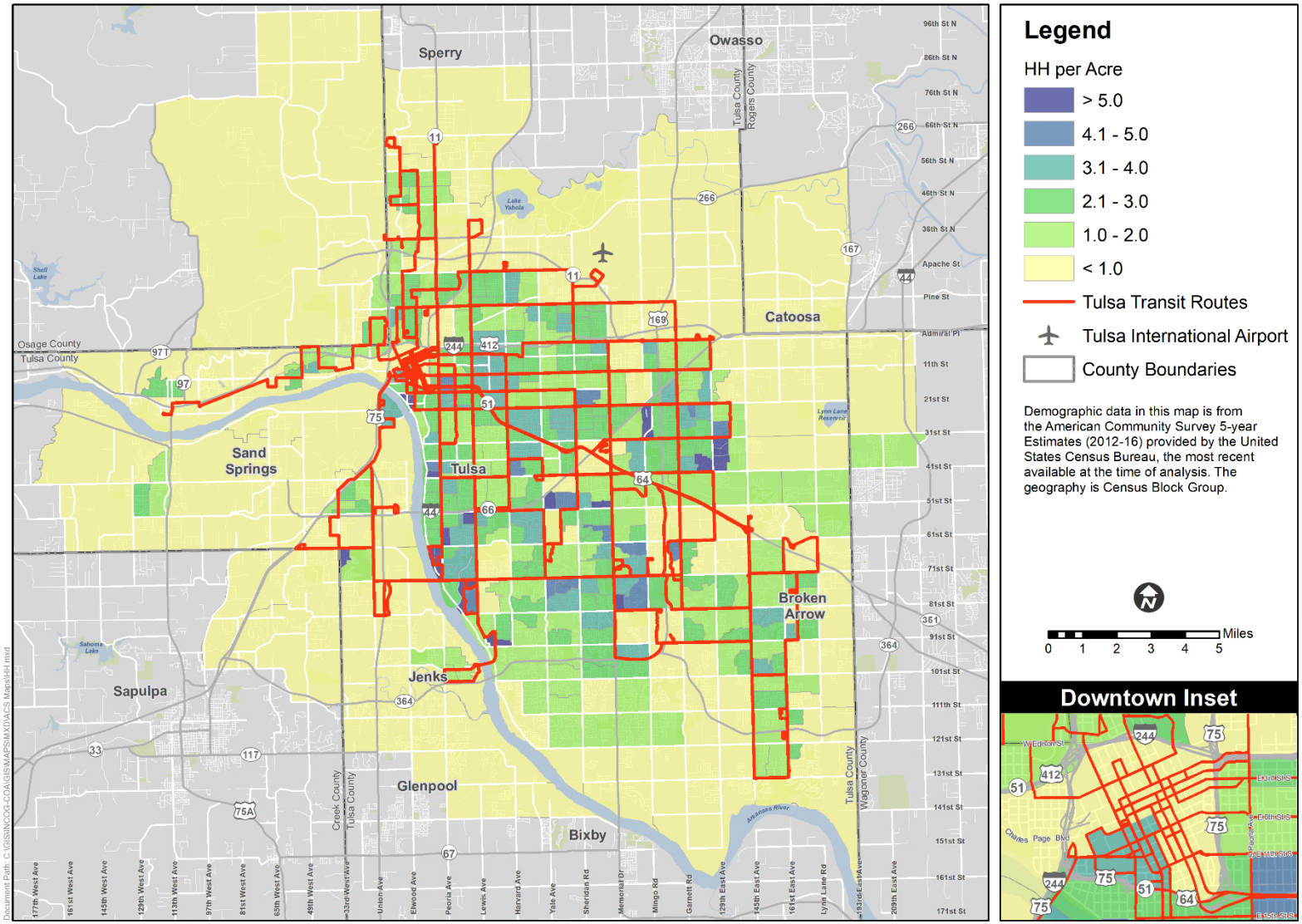
Population density is a significant indicator of where transit origins are occurring. There are two reasons for this. First, density means more people in a smaller geographic area, which in turn means more trips. Second, the density itself means more traffic congestion and more parking constraints, which in turn means more people are likely to choose transit.

The map in Figure 3-7 shows household density within the study area. The areas with the highest household[5] densities are not in the urban core as one might expect, but in areas in the south, southeast, and east sides of the city. One significant reason for this is because Tulsa is comprised mostly of single family homes. Apartments that do exist tend to be auto-oriented developments on the periphery of the metro area.

Areas of noteworthy household density (between 6 and 14 units to an acre) include the neighborhood south of downtown bounded by US Highway 75, the Arkansas River and Main Street; Memorial Drive at 81st Street, multiple locations along South Peoria Avenue and South Lewis Avenue (mostly south of Interstate 44); locations along 51st Street between Yale Avenue and Memorial Drive; Mingo Road between 21st and 31st Streets; and along 129th Avenue between 31st and 41st Streets.

[5] Household is defined as a dwelling unit with one or more adults living in it.

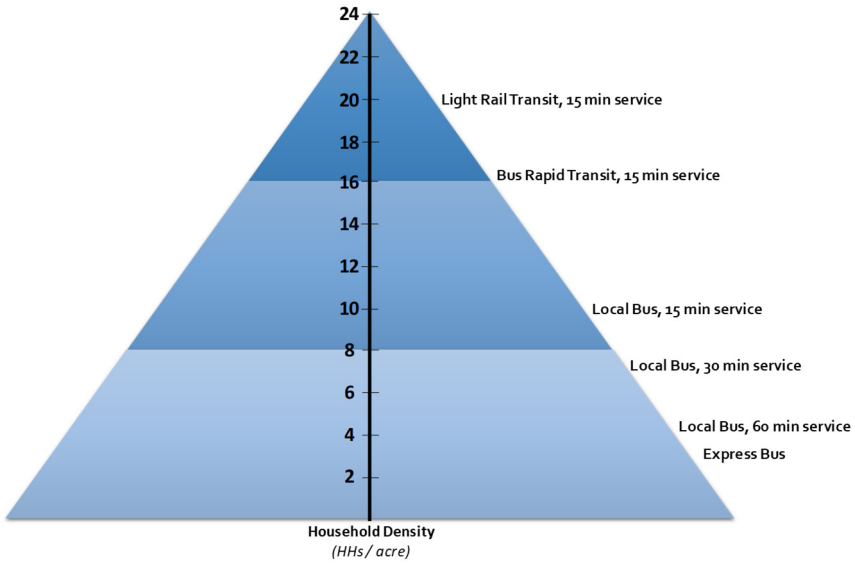
Figure 3-7. Household Density



Study Area median household density: 2.05 HH/acre

Transit service threshold guidelines for various levels of household density, as published by the Transit Cooperative Research Program (TCRP), are shown below in Figure 3-8. Based on the chart, Tulsa's population density suggests that most service should be at 60-minute frequency. However, this is only one factor in many that help determine frequency and service type. Existing ridership, other economic factors, and destination locations are all important before determining frequency for any corridor. As Tulsa continues to develop, particularly if development is channeled towards existing neighborhoods and corridors, higher demand will result in the need for higher frequencies.

Figure 3-8. Transit Thresholds for Household Densities



Source: TCRP 167 Making Effective Fixed Guideway Transit Investments

Minority Population

Minority populations were reviewed in this document to ensure that environmental justice for disadvantaged groups is included as part of the Connecting Progress recommendations. A recent APTA report compiling over 200 passenger survey results across the country noted that while 63% of the population in the United States is considered White/Caucasian, this ethnic group accounts for 40% of transit users. In contrast, other ethnic groups are more likely to have a disproportionately higher proportion of transit users.[6]

The following Census Bureau race and ethnicity categories were included within a combined "minority" population analysis:

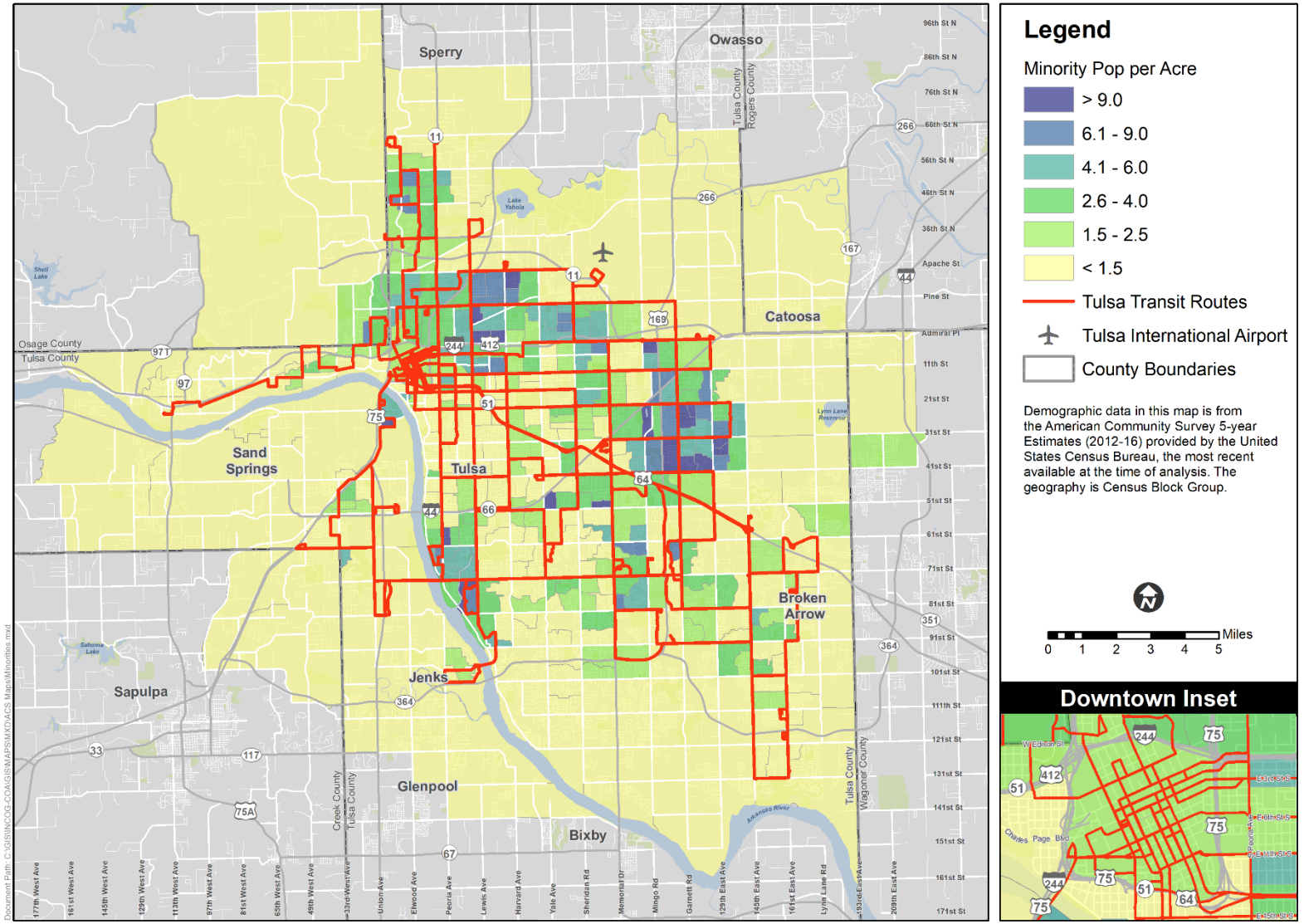
- African American
- Native American
- Asian

[6] American Public Transportation Association. Who Rides Public Transportation, January 2017.

- Asian-Pacific Islander
- Other
- Mixed
- Hispanic Origin

A map of minority population densities is shown in Figure 3-9. Areas with highest minority population densities are located northeast of downtown Tulsa (Apache to 11th Streets and Lewis to Yale Avenues), east of Midtown (areas between 11th and 41st Streets and Mingo Road and 145th Avenue), areas along the South Peoria Avenue corridor (south of 56th Street to 71st Street), and some pockets of higher concentration between southeast Tulsa and Broken Arrow. A general observation is that African Americans live in greater concentrations north and northwest of downtown Tulsa as well as areas of the South Peoria Avenue corridor. Hispanic populations live in greater concentrations in East Tulsa. These areas currently have transit access at least within a half-mile (if not closer) and at varying service levels.

Figure 3-9. Minority Population Density



Study area median Minority Population Density: 1.59 persons/acre

Age

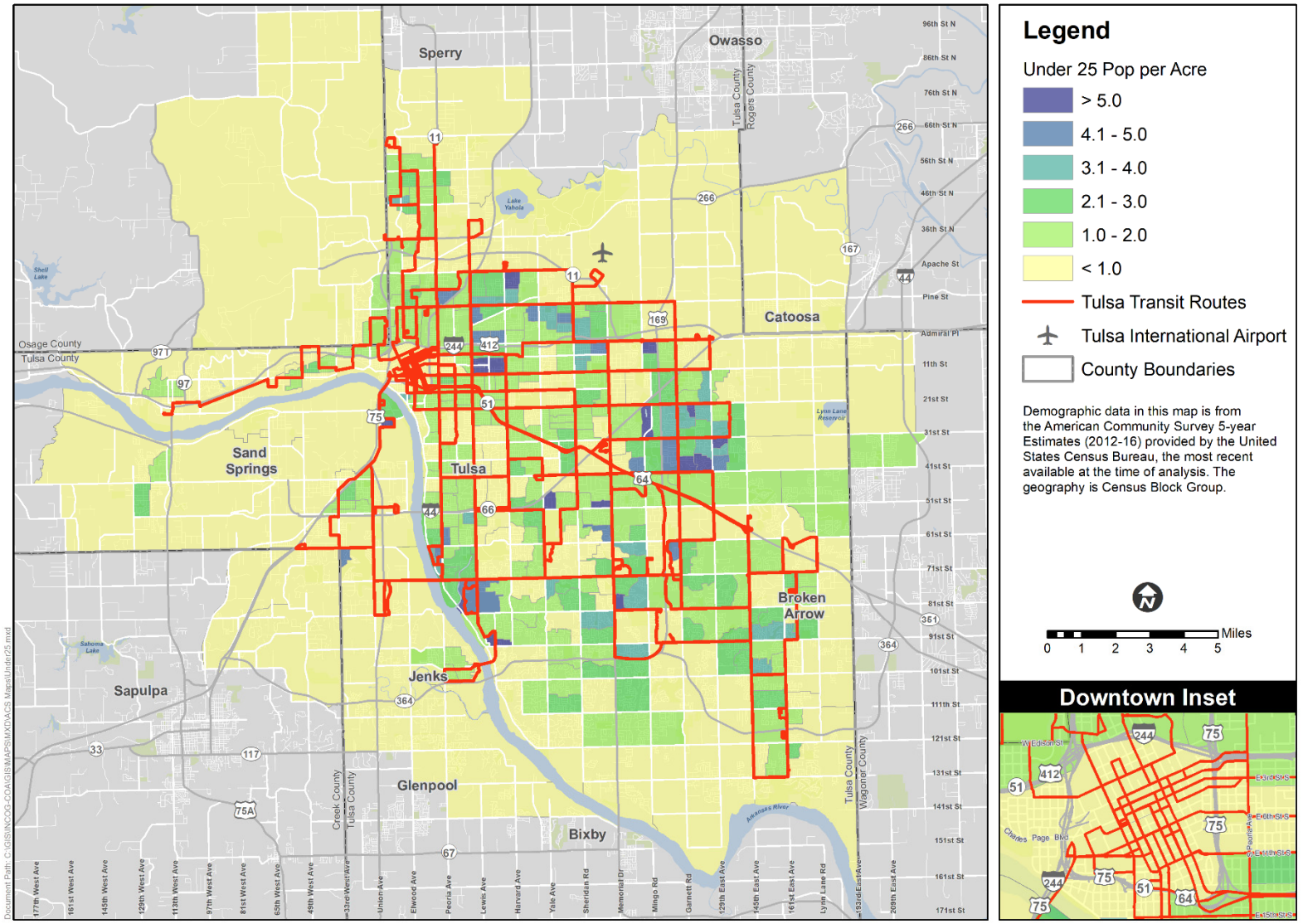
Persons under 25 tend to ride in higher numbers because many are in school or early in their careers and may not have the income to afford an automobile. There are also indicators that Millennials (those born between 1981 and 1997) are not acquiring driver's licenses at the same rate as previous generations.[7]

The under 25 population density in the study area is shown in Figure 3-10. Highest concentrations are the areas around Oral Roberts University and University of Tulsa. East Tulsa also has a higher concentration of persons under 25, likely related to areas with apartment complexes.

Persons over 65 is another population group which tends to utilize transit in higher numbers, either because seniors are on a fixed income (and cannot afford an automobile) or because they have mobility issues related to physical decline. Figure 3-11 shows the over 65 population density within the study area. A large portion of this population resides in the south and southeast sides of the city. This could be due to the age of single family homes in the area, with residents raising children in these neighborhoods in the 1970s and 80s, and now aging in place.

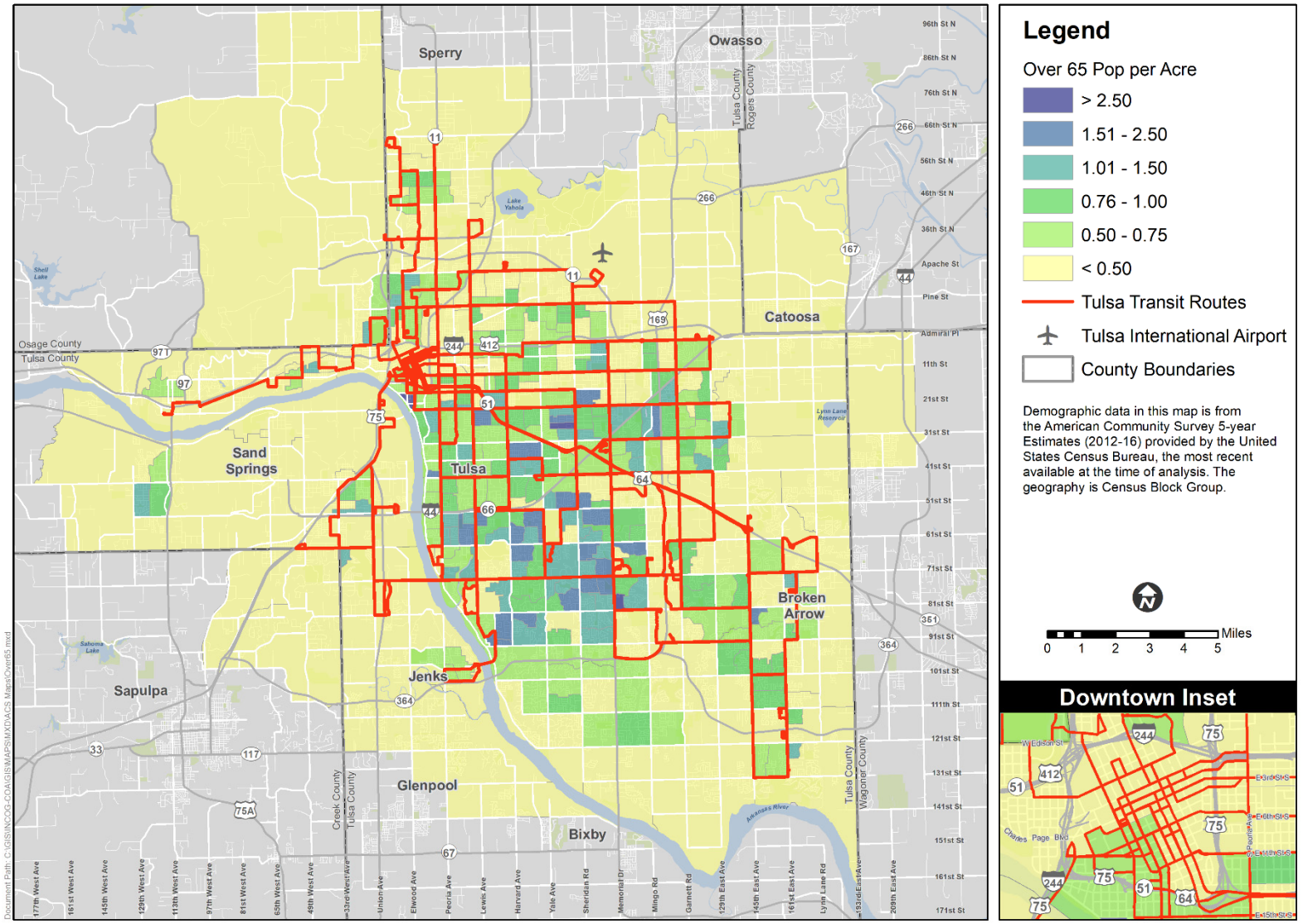
[7] Sivak, Michael. *Has Motorization in the U.S. Peaked? Part 9: Vehicle Ownership and Distance Driven, 1984 to 2015.* February 2017. Sustainable Worldwide Transportation, University of Michigan. http://www.umich.edu/~umtriswt/PDF/SWT-2017-4.pdf

Figure 3-10. Population Under 25 Years of Age Density



Study area median under 25 density: 1.44 persons/acre

Figure 3-11. Population Over 65 Years of Age Density



Study area median over 65 density: 0.60 persons/acre

Income

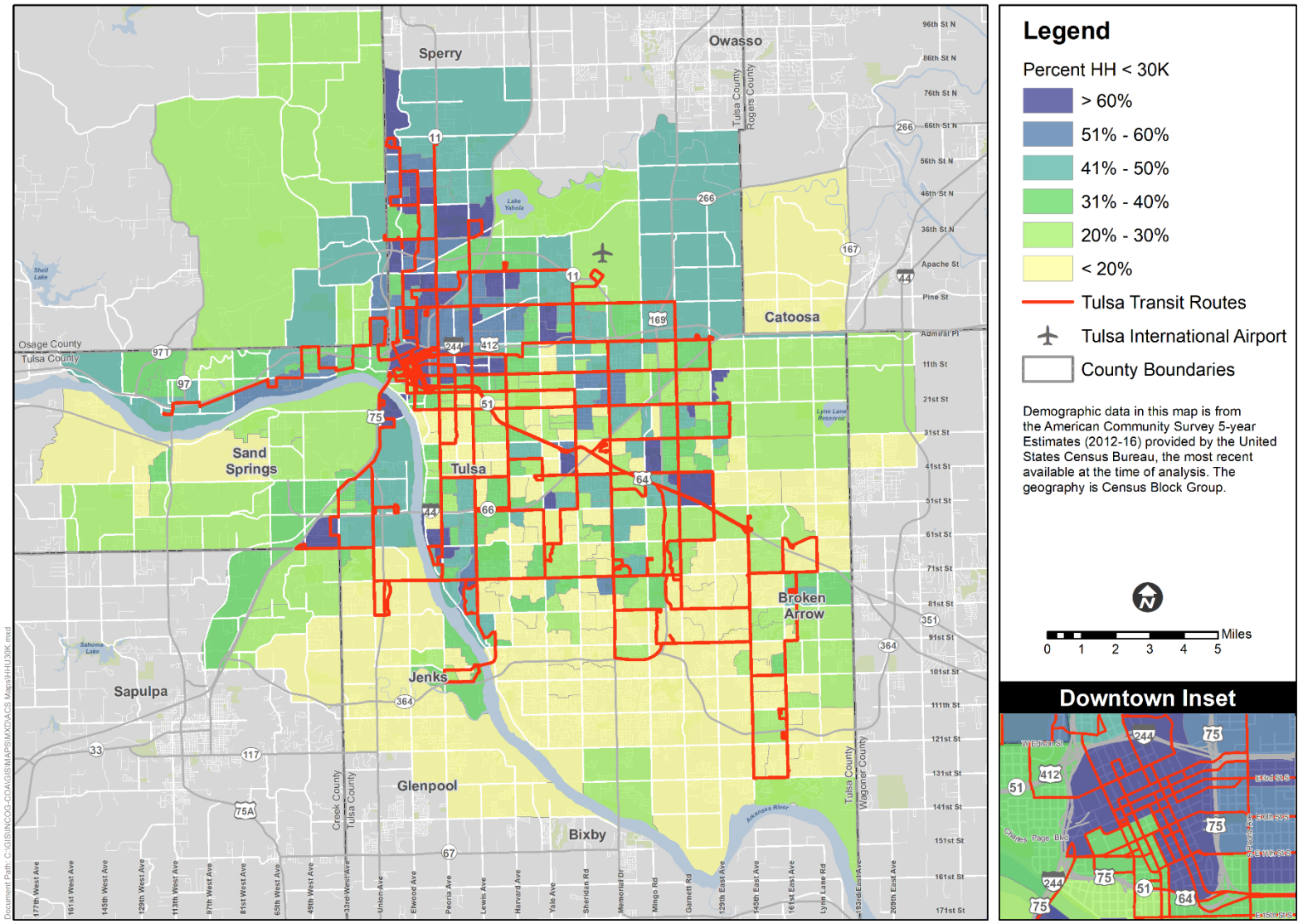
Persons at the lower end of the income scale who cannot afford to own and operate an automobile ride in higher numbers than the population at large. The density of households with annual incomes under $30,000 is mapped in Figure 3-12. Household income and mode choice is a bit difficult to explain with a single metric. A 1-person household with income of $30,000 is above the poverty line and may own an automobile, while a household with one working adult and four children with the same income is below the poverty line and more likely to not own an automobile. As a result, household income must be combined with other demographics to best understand the transit market.

Census blocks with more than 60 percent of households earning annual incomes under $30,000 are concentrated mostly in the north and northeast neighborhoods of Tulsa, with a few zones located south, southeast, and east. The map also shows a distinctive pattern of zones surrounding an "island" of higher income neighborhoods in midtown Tulsa.

Unemployment Density

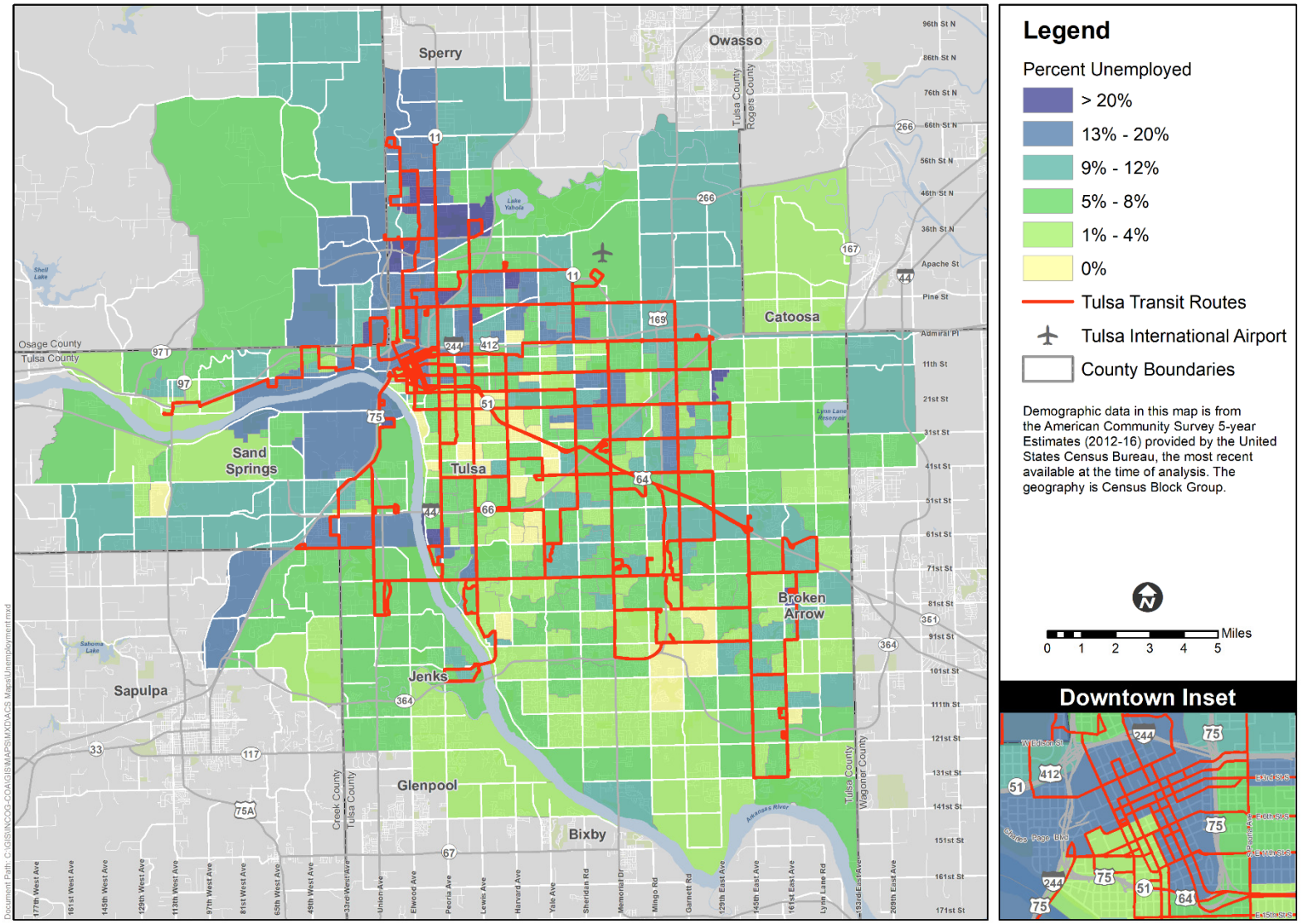
Unemployment density, like household income, can indicate the presence of transit riders because the unemployed likely cannot afford to own and operate an automobile. A scoring of block groups with the percent of the labor force (those 16 years and over) unemployed is shown in Figure 3-13. While unemployment can fluctuate with the economy, this map is instructive to show the parts of the study area with greatest average concentrations of unemployment. It would be desirable to ensure these areas are served by transit, since lack of access to jobs would be a barrier to employment. Concentrations of unemployment at levels above 12 percent of the labor force include much of north and northeast Tulsa, along the Arkansas River west to Sand Springs, West Tulsa, pockets along South Peoria Avenue at 61st Street, and along 129th Avenue at 11th Street.

Figure 3-12. Percent of Households with Annual Incomes Below $30,000



Study area median percentage with household income under $30,000: 28.7%

Figure 3-13. Percent of Labor Force (16 and Over) Unemployed Scores



Study area median percent unemployment: 6.1%

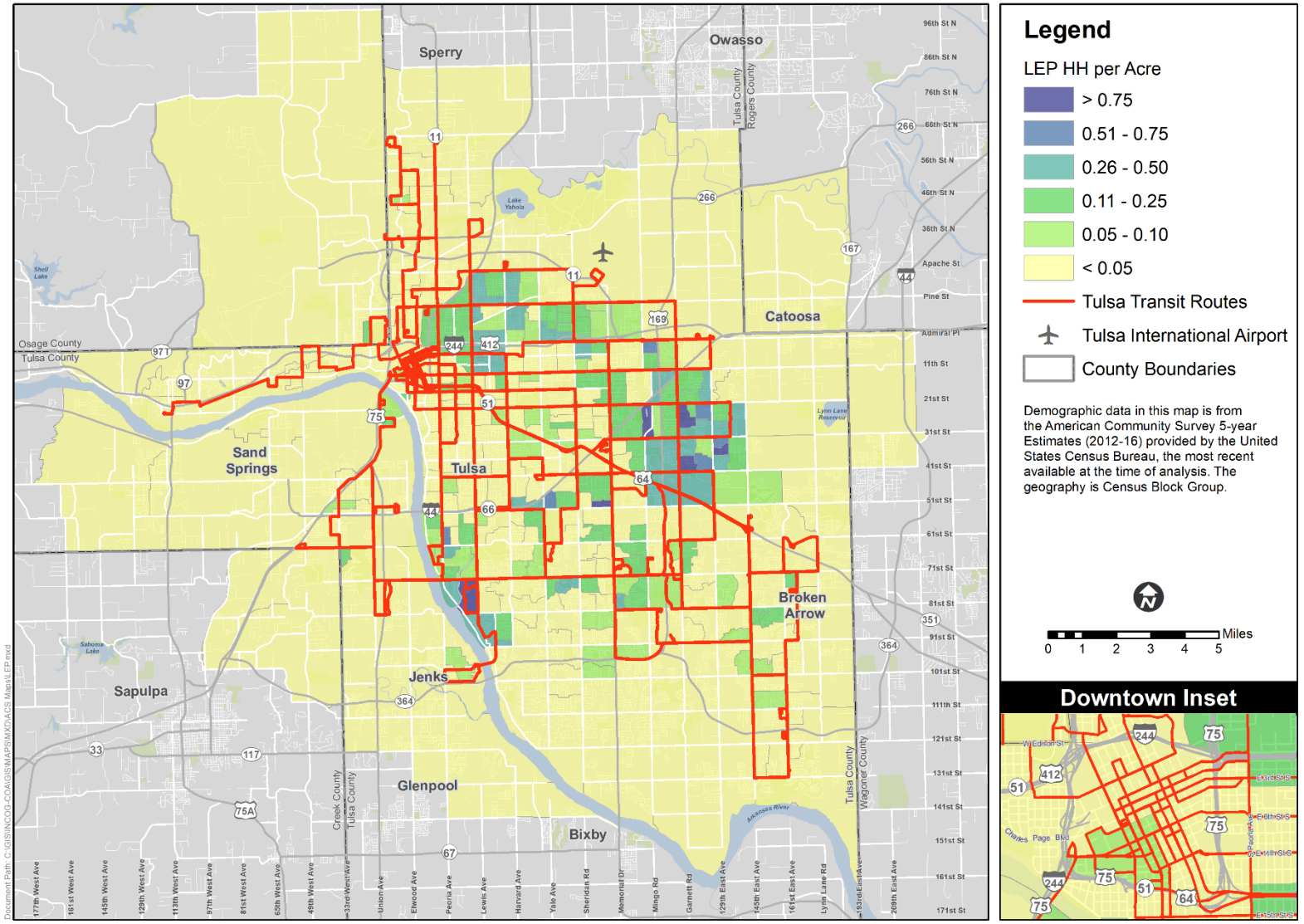
Limited English Proficiency (LEP) Households

Limited English Proficiency (LEP) households are an indicator that residents are new to the United States. That could mean a reliance on low-skill and low-wage jobs, which in turn results in the need for transit services. Many LEP residents have emigrated from counties where public transportation is a primary means of travel, and they are comfortable using transit to access jobs and services. Older Latino and Asian communities often make up the largest share of local populations with LEP households and the largest share of LEP transit riders.[8]

A map of LEP household density is shown in Figure 3-14. The map indicates that LEP households are generally located in East Tulsa, which corresponds to the predominantly Hispanic neighborhoods between Mingo Road and 145th Avenue and 21st and 41st Streets. The map also shows LEP household concentrations along South Peoria Avenue and 71st to 81st Streets.

[8] Community Transportation Association of America. *Transportation for Persons with Limited English Proficiency*. FTA Circular 4702.1A. http://www.ctaa.org/webmodules/webarticles/articlefiles/LEP.pdf

Figure 3-14. Limited English Proficiency Households Density

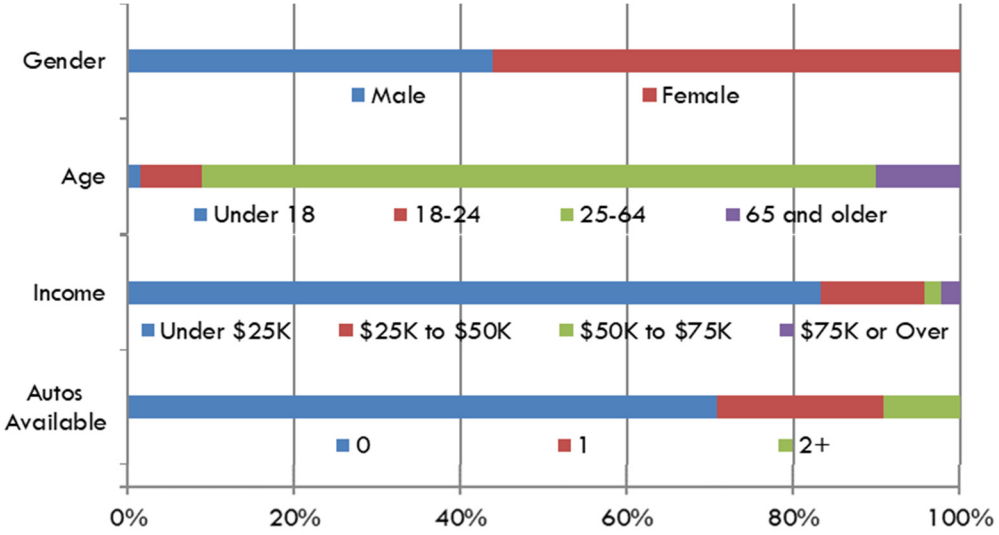


Study area median LEP HH density: 0.01 HH/acre

Automobile Ownership

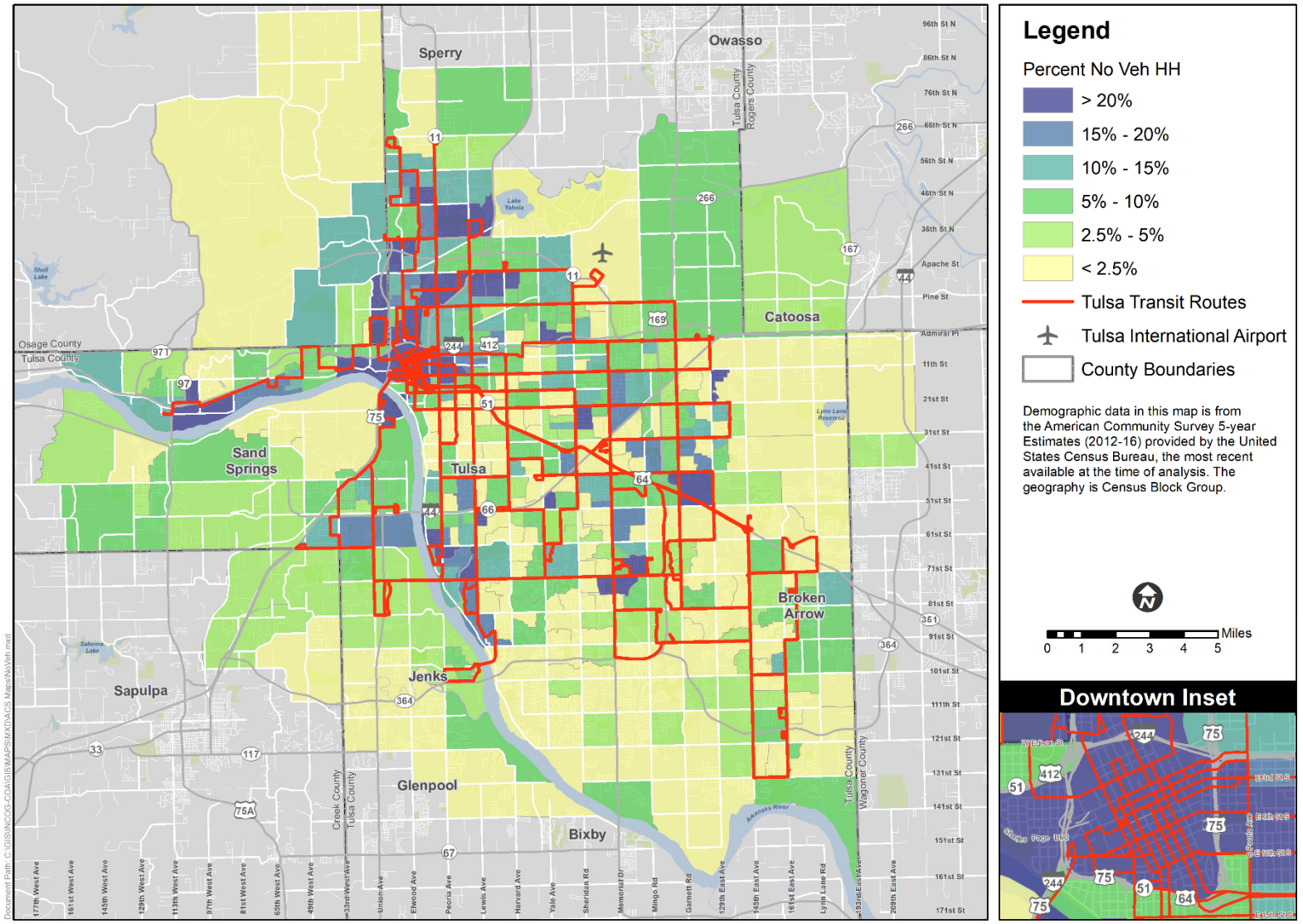
Automobile ownership (or lack thereof) is a major indicator of transit use; low automobile ownership is associated with higher transit use. A 2017 Tulsa Transit rider survey indicated that 2 in 3 riders live in a zero-vehicle household, and almost 75% of riders have no automobile available to them. Thus, automobile ownership is a vital factor driving transit ridership in Tulsa.

Figure 3-15. Rider Characteristics from 2017 Tulsa Transit Survey



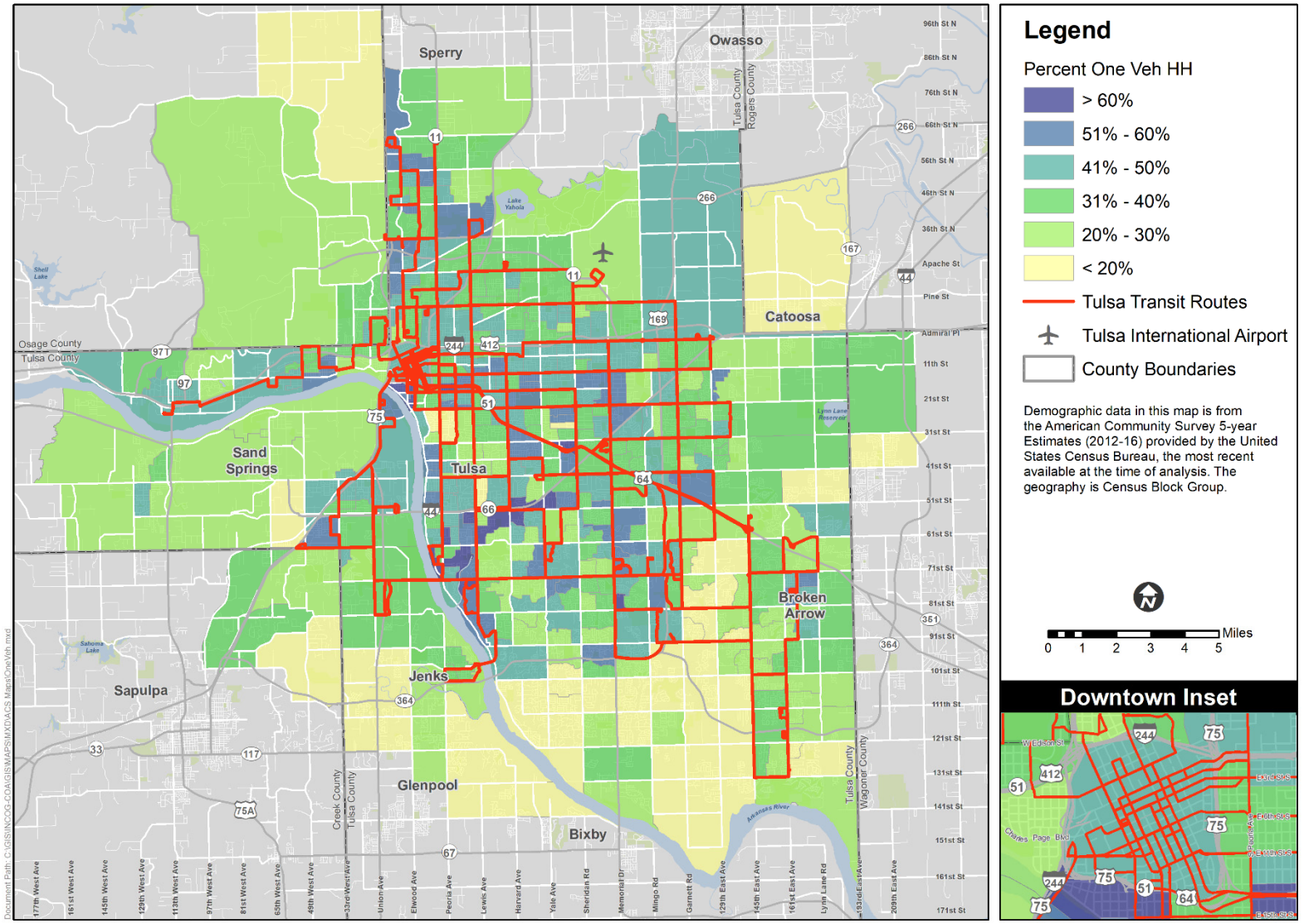
Zero and one-vehicle households were mapped in Figure 3-16 and Figure 3-17, respectively. These maps echo the income density map, which is logical since income is the primary resource required for auto ownership. Overall, zero vehicle households are concentrated in north Tulsa, west to Sand Springs, and South Peoria Avenue between 61st and 81st Streets. One vehicle households are spread more evenly across the entire metro area, with concentrations in south and southeast Tulsa. Depending on household size, one car households may or may not indicate a potential for transit ridership.

Figure 3-16. Percent of Zero Vehicle Households



Study area median percentage zero vehicle households: 4.9%

Figure 3-17. Percent of One Vehicle Households



Study area median percentage one vehicle households: 37.7%

LEHD Origin-Destination Employment Statistics Data

Data from the Census Bureau's 2015 Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) provides information on employment characteristics, including information on income, industry, and education level. This data can be used to determine zones of employment with the most potential for transit riders.

Two distinct maps were created to review employment statistics in Tulsa. Figure 3-18 shows total employment within the study area along with transit coverage within ¼ mile of each route alignment. Two trends are apparent in this map. First, downtown Tulsa has the highest concentration of jobs within the study area, which is consistent with other data in this document. Second, there is a large spread of jobs in the southeast corner of the study area, roughly from Yale to Garnett and from 41st to 71st streets. This area is a major destination for many trips in the metropolitan area.

A second, more in depth analysis focused on characteristics that represent low-income employment (thus reflecting a greater propensity for transit ridership in Tulsa), including:

- Income characteristics:
  - Jobs earning less than $1,250 per month
  - Jobs earning between $1,250 and $3,333 per month
- Jobs within certain industries:
  - Retail trade
  - Healthcare / Social Assistance
  - Arts, Entertainment, Recreation
  - Accommodation, Food Service
- Jobs for certain educational attainment levels:
  - Jobs for workers with less than a High School diploma
  - Jobs for High School equivalent

The densities of these employment characteristics (jobs per acre) were given weighted scores and then aggregated into a total score. The weights applied to each LODES metric are listed in the table below.

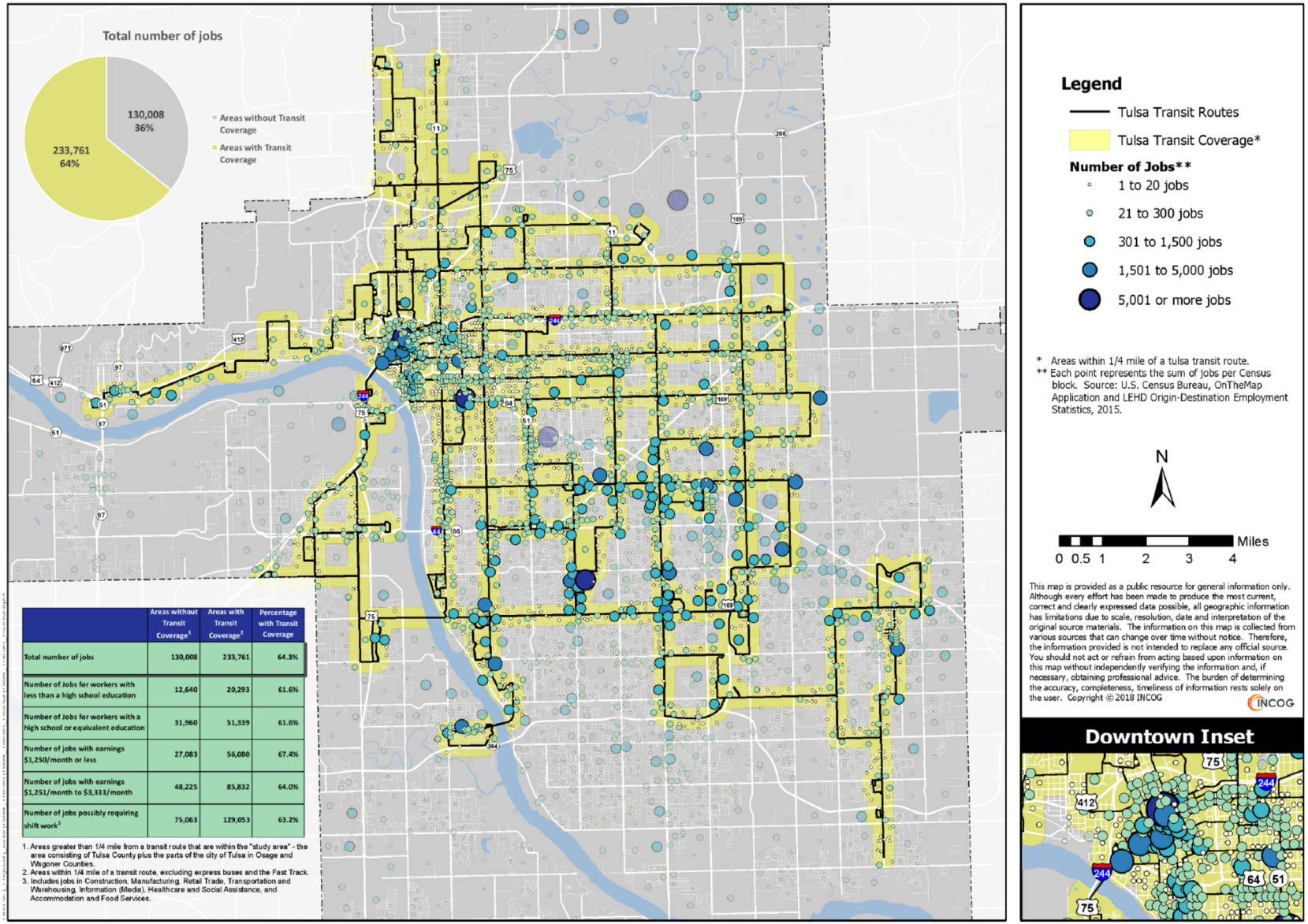
Table 3-2. LODES Metric Weighted Scores

LODES Metric	Weighted Score Range
Jobs earning <$1,250 per month	0 - 1
Jobs earning $1,251 to $3,333 per month	0 - 0.5
Jobs in Retail Trade	0 - 0.25
Jobs in Health Care-Social Assistance	0 - 0.5
Jobs in Arts-Entertainment-Recreation	0 - 0.25
Jobs in Accommodation-Food Services	0 - 0.25
Jobs for Workers with less than H.S. Diploma	0 - 1
Jobs for High School Equivalent	0 - 1
Total Weighted Score Range	**0 - 4.75**

A map of the aggregate scoring is presented in Figure 3-19. Generally, the map indicates areas of high potential as a transit destination. These areas include downtown Tulsa, the Pearl District, the Cherry

Street corridor, Harvard Avenue at 31st Street, areas around the Southroads Shopping Center and the Tulsa Promenade mall, St. Francis Hospital and the block it sits within (Yale Avenue, 61st and 71st Streets, and Sheridan Road), and Memorial Drive between 61st and 71st Streets which includes Woodland Hills Mall and the many establishments surrounding it. It should be noted that much of the transit ridership potential is in the central business district as well as in south and southeast Tulsa.

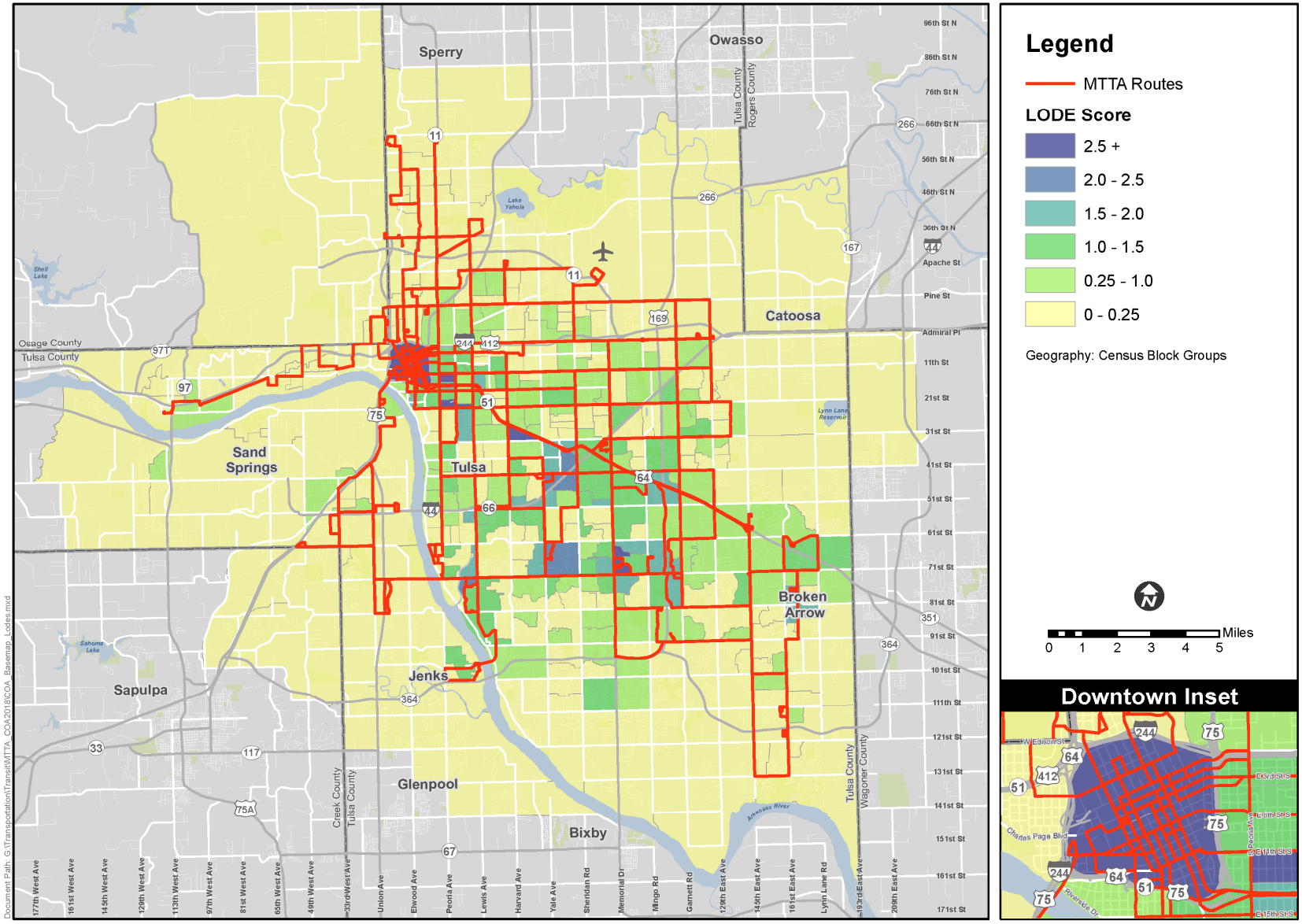
Figure 3-18. Total Employment



	Areas without Transit Coverage[1]	Areas with Transit Coverage[2]	Percentage with Transit Coverage
Total number of jobs	130,008	233,761	64.3%
Number of Jobs for workers with less than a high school education	12,640	20,293	61.6%
Number of Jobs for workers with a high school or equivalent education	31,960	51,339	61.6%
Number of jobs with earnings $1,250/month or less	27,083	56,080	67.4%
Number of jobs with earnings $1,251/month to $3,333/month	48,225	85,832	64.0%
Number of jobs possibly requiring shift work[3]	75,063	129,053	63.2%

1. Areas greater than 1/4 mile from a transit route that are within the "study area" - the area consisting of Tulsa County plus the parts of the city of Tulsa in Osage and Wagoner Counties.
2. Areas within 1/4 mile of a transit route, excluding express buses and the Fast Track.
3. Includes jobs in Construction, Manufacturing, Retail Trade, Transportation and Warehousing, Information (Media), Healthcare and Social Assistance, and Accommodation and Food Services.

Figure 3-19. Employment Zones with Highest Transit Ridership Potential



Transit Propensity

The demographics presented above each provide a piece of Tulsa's potential transit market. Combining these individual pieces into a single index gives us a reasonable assessment of the likely transit market. Therefore, a transit propensity index was created. This score includes both an origin score (how likely someone would use transit at their origin) and destination score (how likely someone would use transit to get to their destination). Both scores are comprised of weighted scores of their respective datasets.

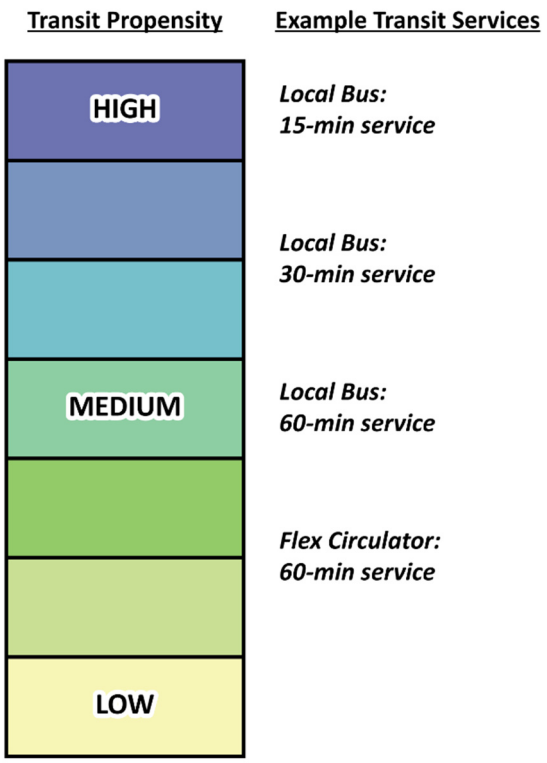
The origin score incorporated data included the following:

- Household density
- Minority populations
- Population under 25 years of age
- Population over 65 years of age
- Percentage of households with annual incomes under $30,000
- Unemployment status
- Density of Limited English Proficiency (LEP) households
- Zero-vehicle households
- One-vehicle households

For the destination score, incorporated data included the following:

- Jobs earning less than $1,250 per month
- Jobs earning between $1,250 and $3,333 per month
- Jobs within the retail trade
- Jobs in Healthcare / Social Assistance
- Jobs in Arts, Entertainment, Recreation
- Jobs in Accommodation, Food Service
- Jobs for workers with less than a High School diploma
- Jobs for High School equivalent

Figure 3-20. Transit Propensity and Example Transit Services



Source: TCRP 167 and CTG

The destination-end scores (LODES scores) were previously presented in Table 3-2. The origin scores are listed in Table 3-3 below.

Table 3-3. Origin-End Data and Weighted Score Ranges

Metric	Data Range	Max. Value	Score Range
Population Density			
Minority	0 - 9+	17.6	0 - 1
Under 25	0 - 5+	10.4	0 - 1
Over 65	0 - 2.5+	4.6	0 - 1
Household Density			
Household Density	0 - 5+	13.9	0 - 5
LEP Households	0 - 0.75+	1.32	0 - 1
Percentages			
% Unemployed	0 - 20%+	34.1%	0 - 1
Household % <$30k	0 - 60%+	93%	0 - 1
Zero-veh. Households	0 - 20%+	54%	0 - 2
One-veh. Households	0 - 60%+	78%	0 - 1
Maximum Score Range			**0 - 14**

The imbalance between origin and destination data is because the Census Bureau reports much more information on where people live than where they work. Nevertheless, the index includes enough information on both the origin and destination part of the trip to make desired conclusions.

The transit propensity scoring from high scores to low scores is shown in Figure 3-20, alongside modes of transit most likely to be served with each level for the Tulsa service area. A transit network with 60-minute frequency is viable when the transit propensity score is medium or better. Increased frequency generally becomes more viable with a medium-high score (30-minute frequency) or high score (15-minute frequency).

The daytime transit network was overlaid on results from the transit propensity analysis in Figure 3-21 and the nightline services were overlaid in Figure 3-22. The maps show a ring of high scoring adjacent to downtown Tulsa, with other high scoring zones located on the south, southeast, and east sides of the city. Interestingly, only a single zone on the north side of Tulsa scores a high in the transit propensity index, but there are many continuous zones that score the second highest level. Thus, many continuous zones of medium high score provides more transit riders than a single zone of high scoring.

Altogether, the transit propensity index shows a core centered on downtown Tulsa with enough blue zones to potentially support a few 15-minute frequency corridors connecting areas north, east and south of downtown. The transit propensity score in most other areas indicate a 30- to 60-minute frequency network is more appropriate.

Figure 3-21. Daytime Transit Network Overlaid on Results from Transit Propensity Analysis

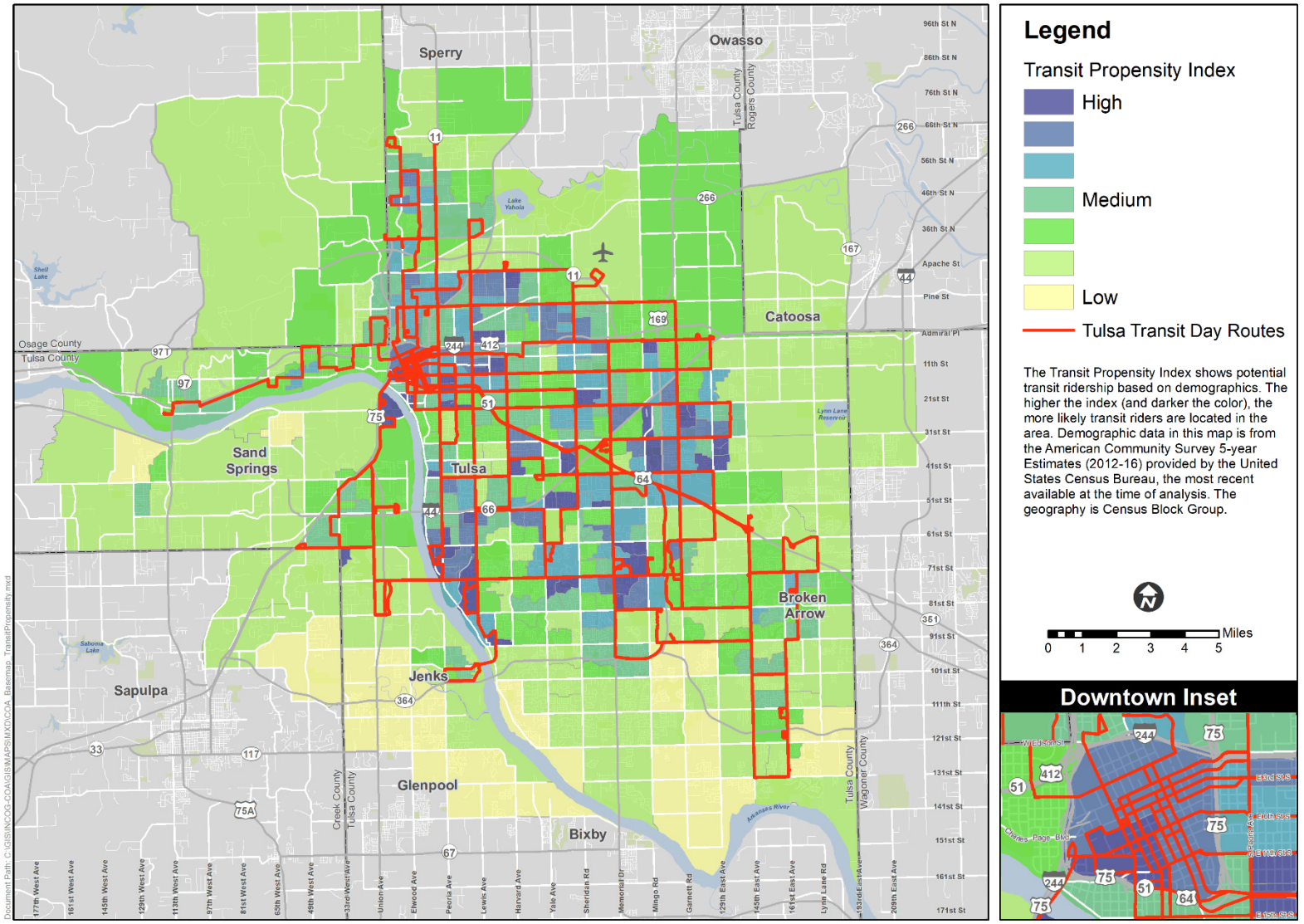
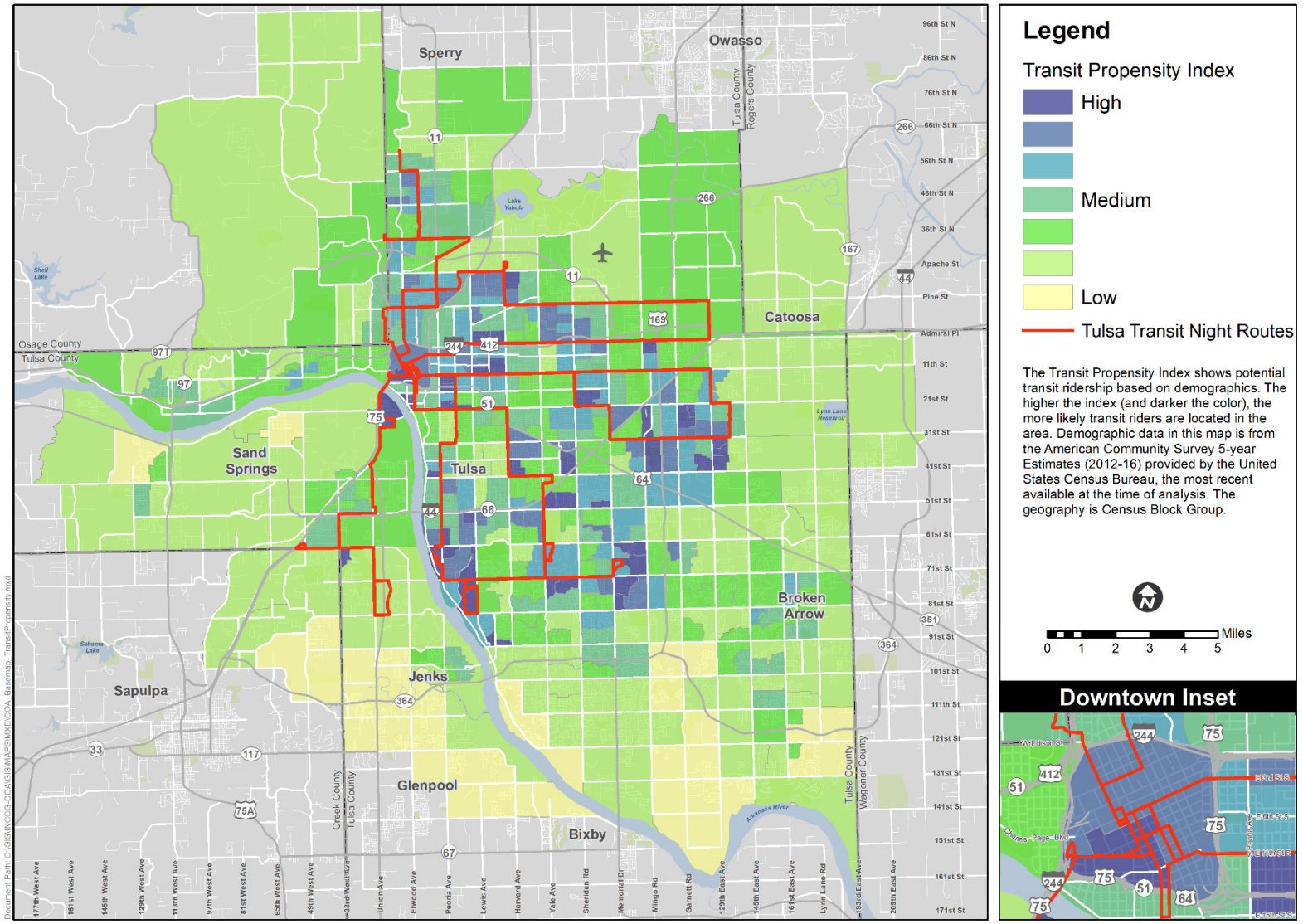


Figure 3-22. Night Transit Network Overlaid on Results from Transit Propensity Analysis



3.3 Peer Analysis

Analysis in this section focuses on the performance of the Tulsa Transit network and how the agency compares to other service providers. A peer analysis was conducted to provide context for Tulsa Transit's recent service delivery as well as how the agency compares to others of similar size. A trend analysis was also conducted using National Transit Database (NTD) data for the years 2011 through 2015, which was the most recent data included with the software that was used to select peers.

A peer analysis provides the means to compare various system wide metrics for Tulsa Transit against other agencies of similar size and operation. Transit agencies provide annual reporting of operational and financial data to the Federal Transit Administration (FTA) which in turn records this data within the National Transit Database (NTD). FTA reviews and confirms the accuracy of the information received and publishes a final report after a reporting transit system successfully responds to all comments and inquiries. The NTD has strict reporting requirements and, as such, provides a uniform, consistent, and reliable database.

Peer Selection Process

The peers for comparison with Tulsa Transit were selected from a list generated by the Florida Transit Information System (http://www.ftis.org). Their Integrated National Transit Database for urban transit systems (Urban iNTD) allows for selection of peer agencies based on a target agency. With Tulsa Transit identified as the target agency, a list of peers was generated based on service area population, population density, service area size, revenue hours and peak vehicles in operation.

Based on this initial list, CTG and Tulsa Transit selected five agencies that are of similar size and are also located in the same region of the country. Peers selected are mapped in Figure 3-23, and include:

- Colorado Springs, Colorado (Mountain Metro Transit)
- Little Rock, Arkansas (Rock Region Metro)
- Oklahoma City, Oklahoma (Embark)
- Omaha, Nebraska (Metro)
- Wichita, Kansas (Wichita Transit)

Figure 3-23. Location of Peer Agencies



Table 3-4 and Table 3-5 summarize the service area and service, service effectiveness and service efficiency metrics, respectively. As the tables show, the peer list contains cities that are close to Tulsa's size as well as two cities that are larger (Oklahoma City) and smaller (Little Rock) to give a sense of scale. Tulsa's service area population of just over 490,000 ranks it about in the middle of its peers, just over the peer average of 457,359. Tulsa is also about in the middle of this pack in terms of average service area population density, with approximately 2,501 people per square mile (3.9 people per acre).

In terms of service provided, Tulsa is again close to the peer average. In 2015, Tulsa Transit operated 51 vehicles for fixed route peak service compared to the peer average of 58. Tulsa's nearly 177,000 revenue hours compare closely with the average of just over 175,000; Omaha operated the most hours (285,537) and Wichita and Colorado Springs ran less. Annual revenue miles show a similar trend. Over 2.9 million trips were made in 2015 on Tulsa Transit buses. This compares with 2.87 million as the peer average. Colorado Springs (just over 3 million) and Oklahoma City (3.09 million) handled slightly more trips and Omaha carried much more (3.78 million).

Among service effectiveness measures, two key ratios include revenue hours per capita (how much service is provided to citizens) and trips per service hour or mile (how much the service is being utilized). Tulsa Transit operates 0.36 revenue hours per capita, compared to 1.06 in Little Rock and 0.51 in Omaha, both strong performing peers. In terms of passenger trips per revenue hour, Tulsa Transit is at 16.6 trips per hour, which is where most of the peers sit. Outliers include Colorado Springs with the highest at 23.0 trips per revenue hour and Omaha the lowest at 13.2 trips per revenue hour.

Service efficiency ratios measure the level of service provided by the operating budget, or the cost of providing the service for each revenue unit. In 2015, Tulsa Transit's operating budget was just under $13.5 million compared with a peer average of $15.8 million. While the agency is spending less than its peers on service, cost efficiencies are better than average. Tulsa's operating expense per capita was $27.53 compared with the peer average of $41.13, and its operating expense per revenue hour was $76.38 compared to the peer average of $90.76. Hence, Tulsa is more efficient with the dollars being spent than peer agencies.

Table 3-6 details the six-year trend (expressed as percent change) in key metrics across the peer agencies. Overall, Tulsa Transit operates an efficient system compared to similar peers and has maintained these efficiencies even as its operations have grown. For instance, while operating budget and revenue hours have both grown 8 percent, passenger trips have increased 18 percent. Thus, productivity has increased over the six years. Only Colorado Springs has shown a similar increase in productivity, with all other peers seeing a decrease in productivity. Because these numbers are from 2015 and national trends show ridership losses in almost every system, it is unclear whether service productivity remains above the peer average.

Additional charts with peer information are in Appendix 3A. Additional graphs of Tulsa Transit's six-year performance trends are in Appendix 3B.

Table 3-4. Urbanized Area and Service Area Statistics Summary

Numbers	Omaha, NE Metro	Oklahoma City, OK Embark	Wichita, KS Wichita Transit	Little Rock, AR METRO	Colorado Springs, CO Mountain Metro	Tulsa, OK Tulsa Transit
Service Area						
Population	561,920	650,221	382,386	164,972	527,294	490,195
Size (square miles)	178	244	159	97	257	196
Population Density	3,157	2,665	2,405	1,701	2,052	2,501

Table 3-5. Service and Service Metrics Summary

Numbers	Omaha, NE Metro	Oklahoma City, OK Embark	Wichita, KS Wichita Transit	Little Rock, AR METRO	Colorado Springs, CO Mountain Metro	Tulsa, OK Tulsa Transit
Service Operated						
Vehicles Operated in Maximum Service	98	48	38	49	35	51
Revenue Hours	285,537	174,955	111,056	174,303	130,696	176,672
Revenue Miles	3,979,913	2,684,935	1,719,897	2,434,063	1,787,192	2,651,980
Passenger Trips	3,780,468	3,085,663	1,886,498	2,573,938	3,009,500	2,940,575
Service Effectiveness						
Revenue Hours per Capita	0.51	0.27	0.29	1.06	0.25	0.36
Revenue Miles per Capita	7.08	4.13	4.50	14.75	3.39	5.41
Revenue Hours per Square Mile	1,604	717	698	1,797	509	901
Revenue Miles per Square Mile	22,359	11,004	10,817	25,093	6,954	13,531
Revenue Hours per Peak Vehicle	2,914	3,645	2,923	3,557	3,734	3,464
Revenue Miles per Peak Vehicle	40,611	55,936	45,260	49,675	51,063	52,000
Passenger Trips per Capita	6.7	4.8	4.9	15.6	5.7	6.0
Passenger Trips per Revenue Mile	1.0	1.2	1.1	1.1	1.7	1.1
Passenger Trips per Revenue Hour	13.2	17.6	17.0	14.8	23.0	16.6
Service Efficiency						
Total Operating Expense	$24,311,195	$20,224,843	$9,400,841	$14,002,229	$11,508,698	$13,494,700
Operating Expense Per Capita	$43.26	$31.10	$24.58	$84.88	$21.83	$27.53
Operating Expense Per Peak Vehicle	$248,073	$421,351	$247,391	$285,760	$328,820	$264,602
Operating Expense Per Passenger Mile	$1.69	$1.21	$1.02	$0.97	$0.89	$0.84
Operating Expense Per Revenue Hour	$85.14	$115.60	$84.65	$80.33	$88.06	$76.38
Operating Expense Per Revenue Mile	$6.11	$7.53	$5.47	$5.75	$6.44	$5.09
Operating Expense Per Passenger Trip	$6.43	$6.55	$4.98	$5.44	$3.82	$4.59
Farebox Recovery (%)	18%	13%	19%	14%	23%	20%

Table 3-6. Percent Change for Selected Metrics, Fiscal Years 2010 through 2015

Operator	Change, FY2010-15							
	Revenue Hours	Revenue Miles	Passenger Trips	Trips per Capita	Trips per rev mi	Trips per rev hr	Operating Cost	Cost per Rev Hr
Tulsa, OK (MTTA)	8%	6%	18%	-4%	12%	10%	8%	0%
Omaha, NE (Metro)	-5%	-2%	-10%	-7%	-8%	-5%	6%	13%
Oklahoma City, OK (Embark)	14%	11%	14%	14%	3%	-1%	24%	8%
Little Rock, AR (METRO)	10%	6%	9%	6%	2%	-1%	23%	12%
Colorado Springs, CO (Mountain Metro Transit)	10%	-15%	19%	-1%	39%	7%	5%	-5%
Wichita, KS (Wichita Transit)	2%	14%	-15%	-14%	-25%	-16%	-3%	-4%

3.4 System Wide Performance Analysis

The system wide performance section presents ridership information recently obtained through a comprehensive data collection effort using automatic passenger counters (APCs) and analyzes this information to show where and when ridership activity is occurring. Ridership data was collected at the stop level on all Tulsa Transit routes for weekday, Saturday and Sunday service. Data outputs from the APCs were then formatted and analyzed for visual production. Ridership data (boardings and alightings) were parsed at the route, trip, time point segment and stop levels, including various combinations of these stratifications.

The last system wide on-board survey was conducted in 2010/2011. This allowed an origin- destination analysis as provided in the *Fast Forward Regional Transit System Plan*. In April 2017, a targeted on-board survey was conducted for Route 105 as part of the initial work for the *Peoria Bus Rapid Transit Route Integration Study* which allows an updated understanding of origins and destinations on the Peoria corridor. Results of this survey can be found in the *Peoria Avenue BRT Route Integration Study*.

The CTG team also conducted three days of in-field observations to gain a thorough understanding of the Tulsa Transit system and the surrounding metropolitan area. This allowed our team to refresh our understanding of the transit system and operating environment.

Data collected from APCs was used to assess the systemwide performance of the Tulsa Transit network. The APC data collection effort was conducted by a subcontractor, UTA, using temporarily-installed counters on Tulsa Transit buses from October through December of 2017. Buses were then rotated through routes, trips, and time periods, resulting in a statistically valid ridership average for weekday, Saturday, Sunday and night service. These data included route, ridership and geographic information, among others. Data was not collected for Route 508 because a vehicle with a passenger counter was not available. Instead its ridership was assessed through recent farebox figures provided by Tulsa Transit.

System wide Stop Activity

Daily ridership activity (boardings plus alightings) was aggregated by stop for the entire Tulsa Transit system for multiple periods, including weekday daytime, weekday night, Saturday daytime, and Sunday daytime time periods. Activity averages from the APC data collection effort were used for the following figures, and combined activity at Denver Avenue Station was excluded so that its activity would not dwarf (and thus cover up, as mapped) all other stops.

Weekday Daytime Stop Activity

Figure 3-24 below shows the average ridership activity by stop for the weekday daytime network. Generally, most of the system wide stops serve 15 or fewer passengers per weekday. However, several locations accommodate more than 75 daily riders. Denver Avenue Station is obviously the best performing location in the system, due mainly to transfers between routes. Beyond DAS, many high performing stops are located on Routes 101 and 105, two of the top routes for ridership in the system. Another top performing stop is at the Midtown Memorial Station where riders can transfer to several other routes.

Several other noteworthy locations carry between 40 and 75 passengers per day and these are scattered throughout the system at major transfer locations (Routes 101 and 105 along 36th Street, Routes 101

and 112, Routes 117 and 418, and Routes 100 and 203), major shopping and retail employment destinations (Walmart locations and Woodland Hills Mall) and major employment or service centers (St. Francis Hospital, Eastgate Metroplex, Turley Correction Center, etc.).

Weekday Night Stop Activity

Weekday Nightline service was reviewed, shown in Figure 3-25 shows stop-level ridership activity. Top performers were on the south end of Tulsa, at the 81st Street Walmart and at 61st Street and Peoria Avenue. A few other stops were also noteworthy for the nightline service: 36th Street at the Osage Casino on Route 840, Tulsa Community College on Route 850, and the Southroads Shopping Center and Tulsa Promenade Mall stop at 41st Street and Yale Avenue and at the stop just south of there on 51st Street and Yale Avenue on Route 860.

Saturday Daytime Stop Activity

The Saturday daytime stop activity map is shown in Figure 3-26. The map shows similar patterns as weekday daytime, with major stop activity on routes 101 and 105 in the north and route 105 in the south. East and south stops with high activity include Midtown Memorial Station, Woodland Hills Mall, and the end of route 100 at Admiral/129th Street.

Sunday Daytime Stop Activity

The Sunday daytime stop activity is shown in Figure 3-27. Overall the activity is like the weekday night map, but with more overall activity because the service is in the daytime and has longer service span. Like other time periods, top performers include the 81st Street Walmart, 61st Street and Peoria Avenue, 36th Street and Hartford Avenue, Osage Casino, the Southroads Shopping Center, the Admiral Place Walmart, 21st Street and Memorial Drive, St Francis Hospital, and Eastgate.

Figure 3-24. Weekday Average Ridership Activity, Daytime Service

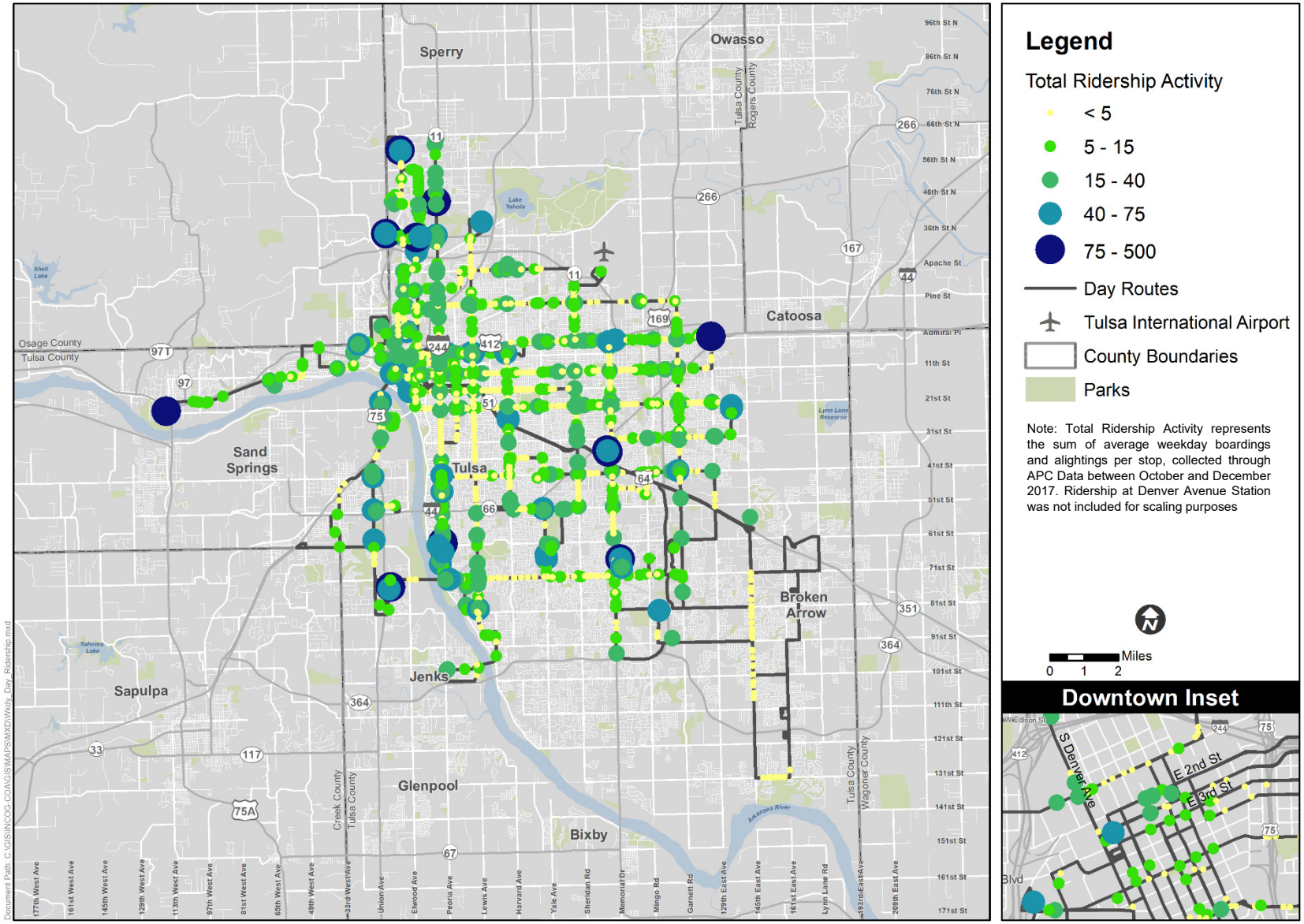


Figure 3-25. Weekday Average Ridership Activity, Nightline Service

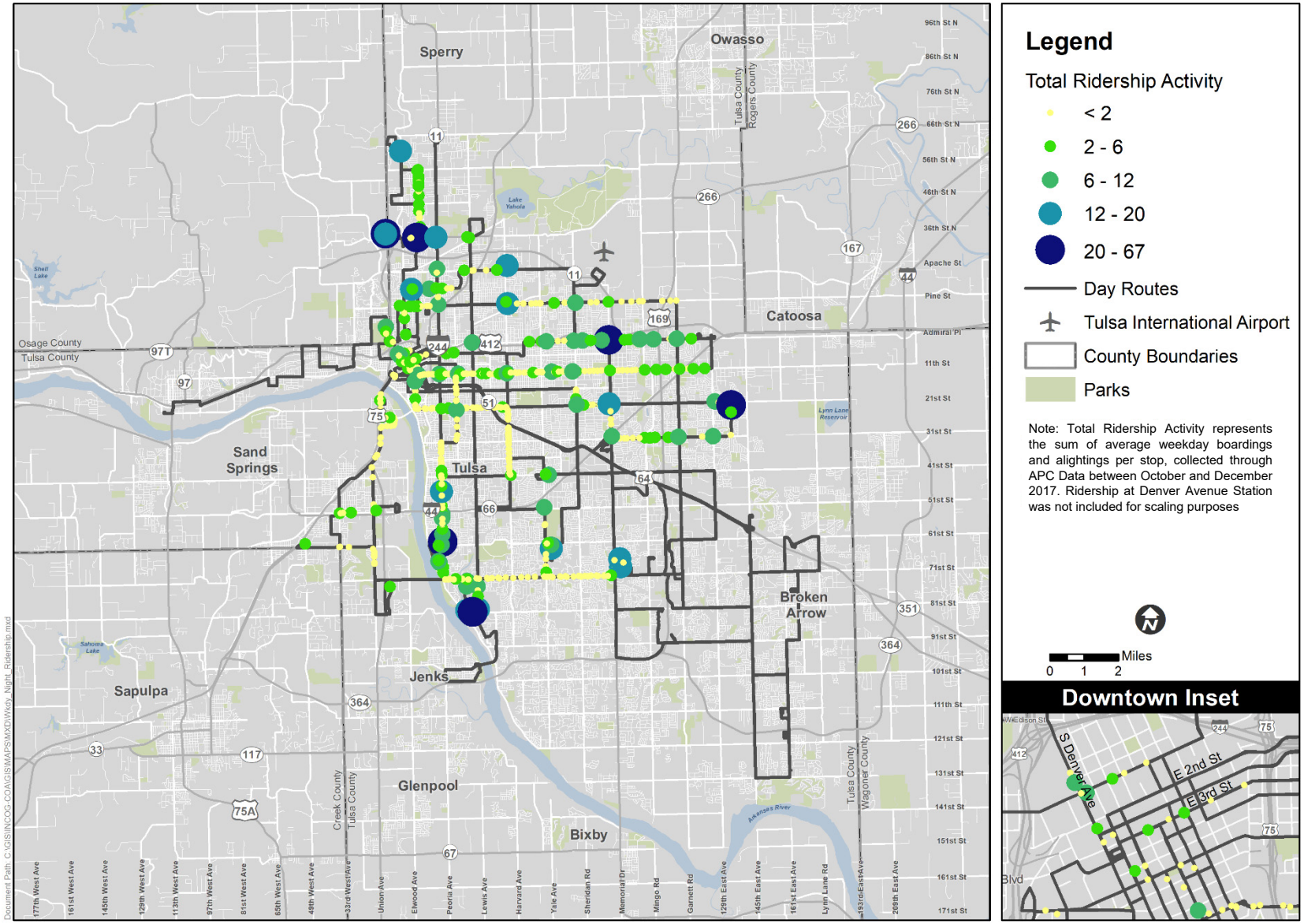


Figure 3-26. Saturday Average Ridership Activity, Daytime Service

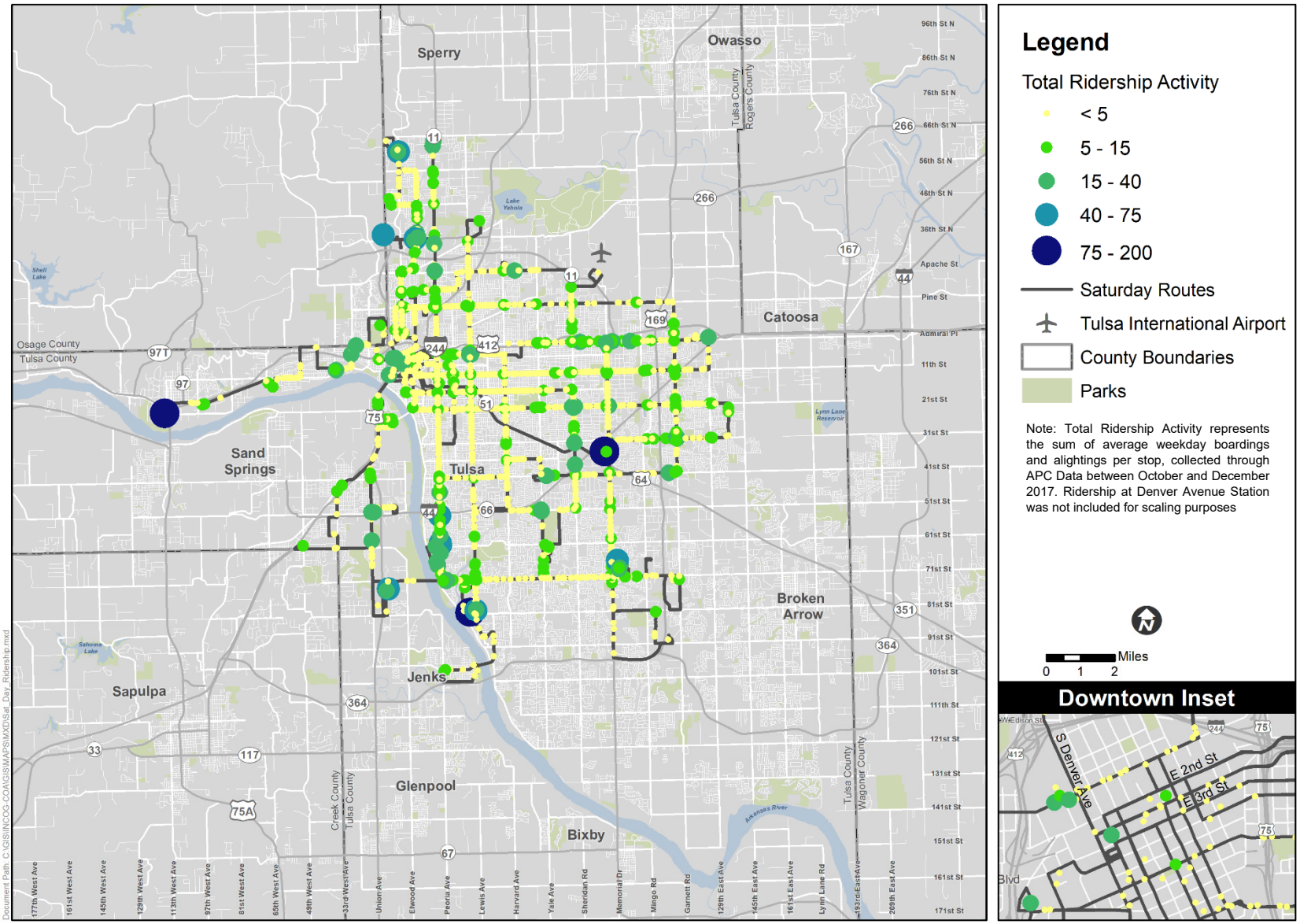
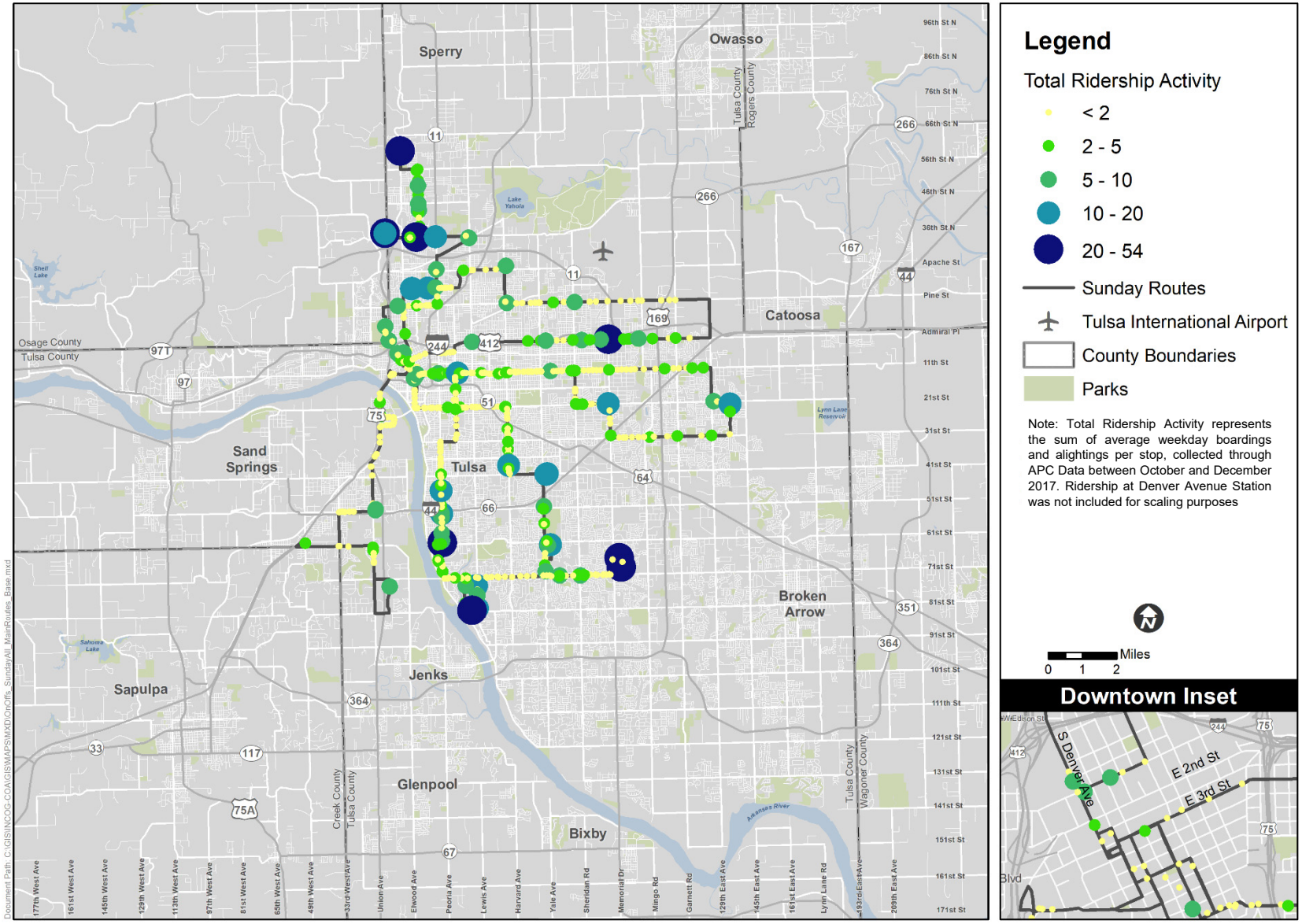


Figure 3-27. Sunday Average Ridership Activity



Segment Analysis

A segment-level analysis was conducted utilizing the collected APC data. The data was analyzed by route, day, and direction at the segment level; segments were defined by Tulsa Transit's scheduled timepoints. This level of detail is helpful to understand the parts of each route that do best. For example, route 114 has two productive segments (Sand Springs and Northwest Tulsa), with a lower performing segment in between on Charles Page Boulevard. This uneven productivity can help make decisions on whether to adjust the route alignment, and what parts of the route are best candidates to make a change.

Weekday Daytime Productivity Analysis

The maximum passenger load and average passenger activity by revenue hour and revenue mile were examined for weekday routes. Figure 3-28 shows the maximum passenger load by route segment, Figure 3-29 shows the average passengers per revenue hour, and Figure 3-30 shows average passengers per revenue mile. The segments with strongest performance include parts of Route 101, the southern half of Route 105, the easternmost segment of Route 114, Route 251, and segments close to Midtown Memorial station.

Beyond the above routes and route segments, it is also noteworthy that many segments within Midtown Tulsa also have productive segments. This is a somewhat denser part of the city which results in higher productivities. Conversely, the outer parts of south and southeast Tulsa show lower productivity despite having many transit riders. This is because lower densities result in routes traveling farther to pick up passengers compared to the Midtown area.

Weekday Daytime On Time Performance

On time performance was examined for weekday daytime routes and results are presented in Figure 3-31. The dataset calculated the average actual travel time (collected from APC data) and compared it to the scheduled time. Segments were color coded from early (yellow) to late (dark blue). The map shows early arrivals for segments on routes 101, 114, 210, 251, 418 and 471. For the most part, these may be built-in allowances in the schedule to allow for traffic conditions. Nevertheless, these are routes where timetables could be updated, or drivers will need to better adhere to scheduled timepoints to ensure no early arrivals to improve the customer experience.

Regarding late-performing segments, portions of Routes 100, 101, 105, 117, 210, and 318 average between two and four minutes behind schedule. The only route segment consistently more than four minutes behind schedule is Route 101 along 46th Street. Route 251 is consistently early traveling between Midtown Memorial Station and Denver Avenue Station.

Figure 3-28. Maximum Passenger Load by Segment

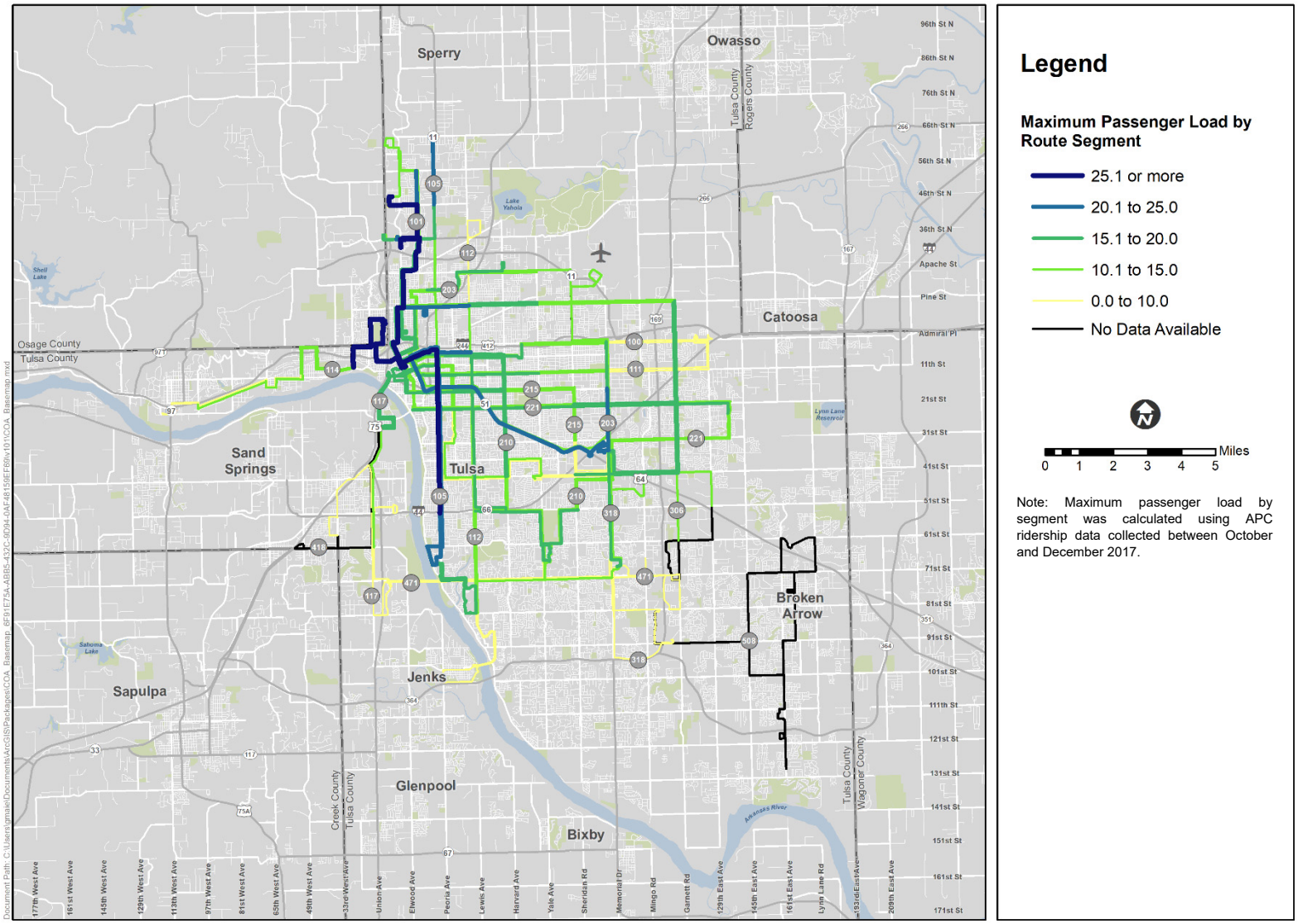


Figure 3-29. Average Passengers per Revenue Hour by Segment

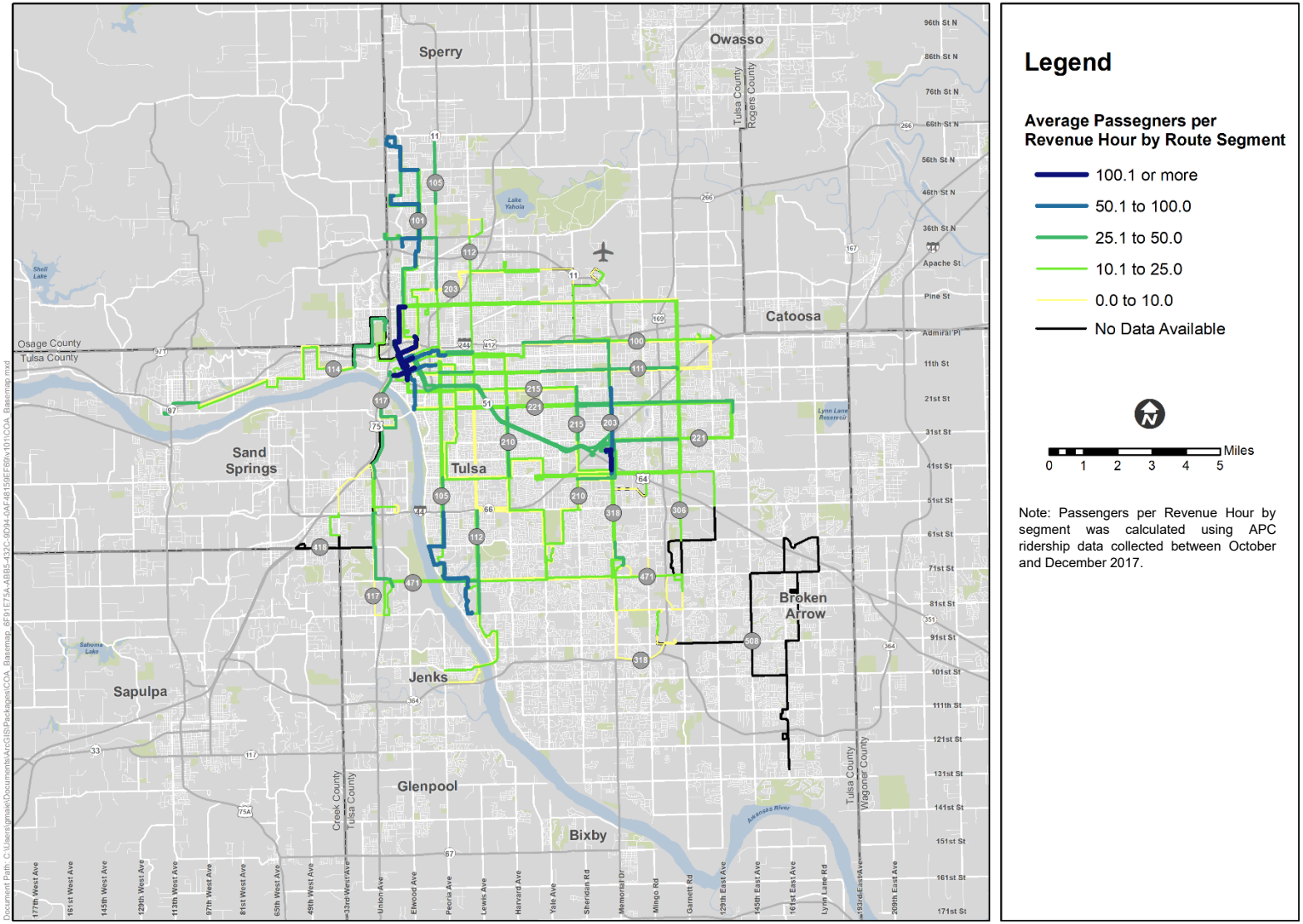


Figure 3-30. Average Passengers per Revenue Mile by Segment

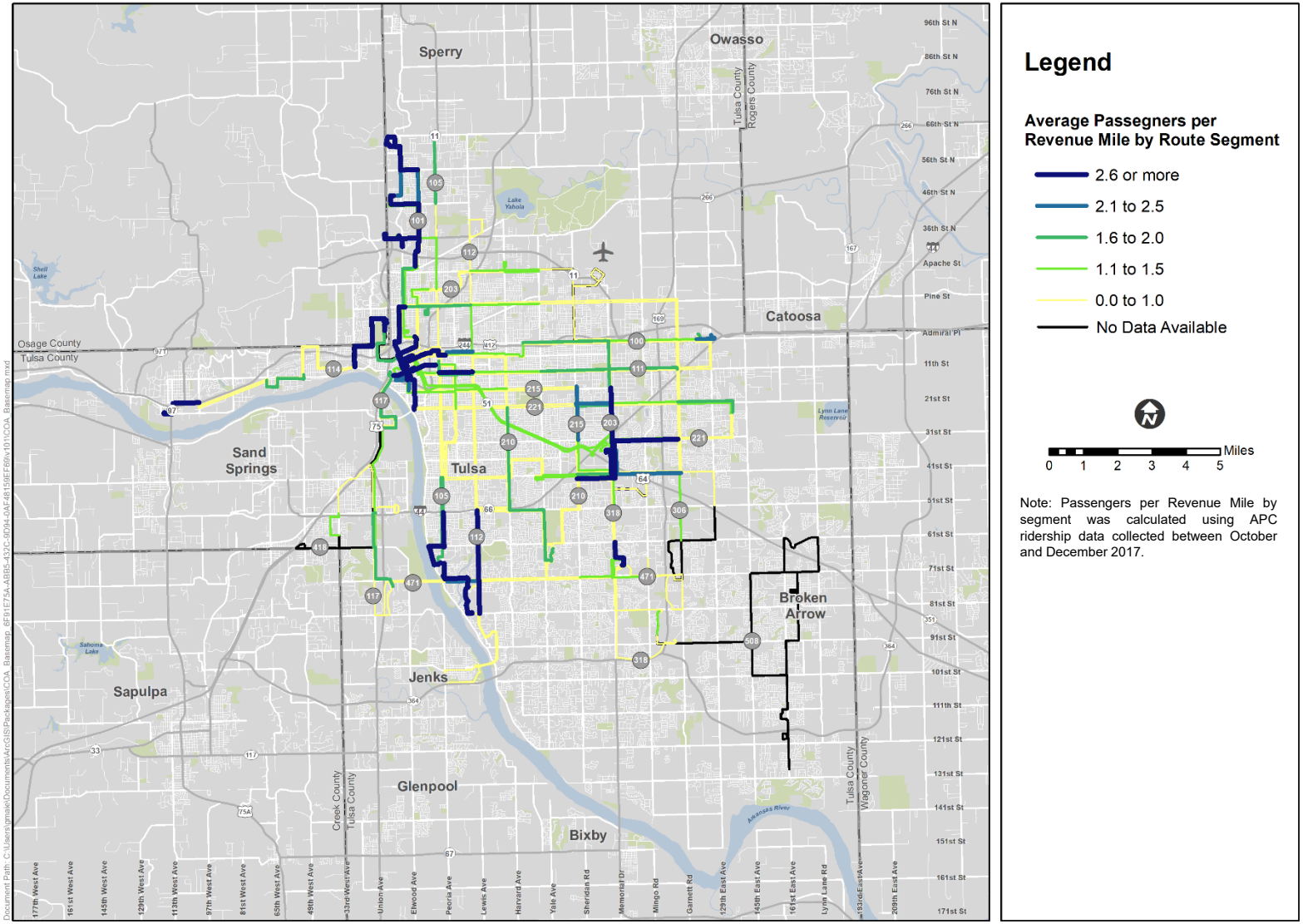
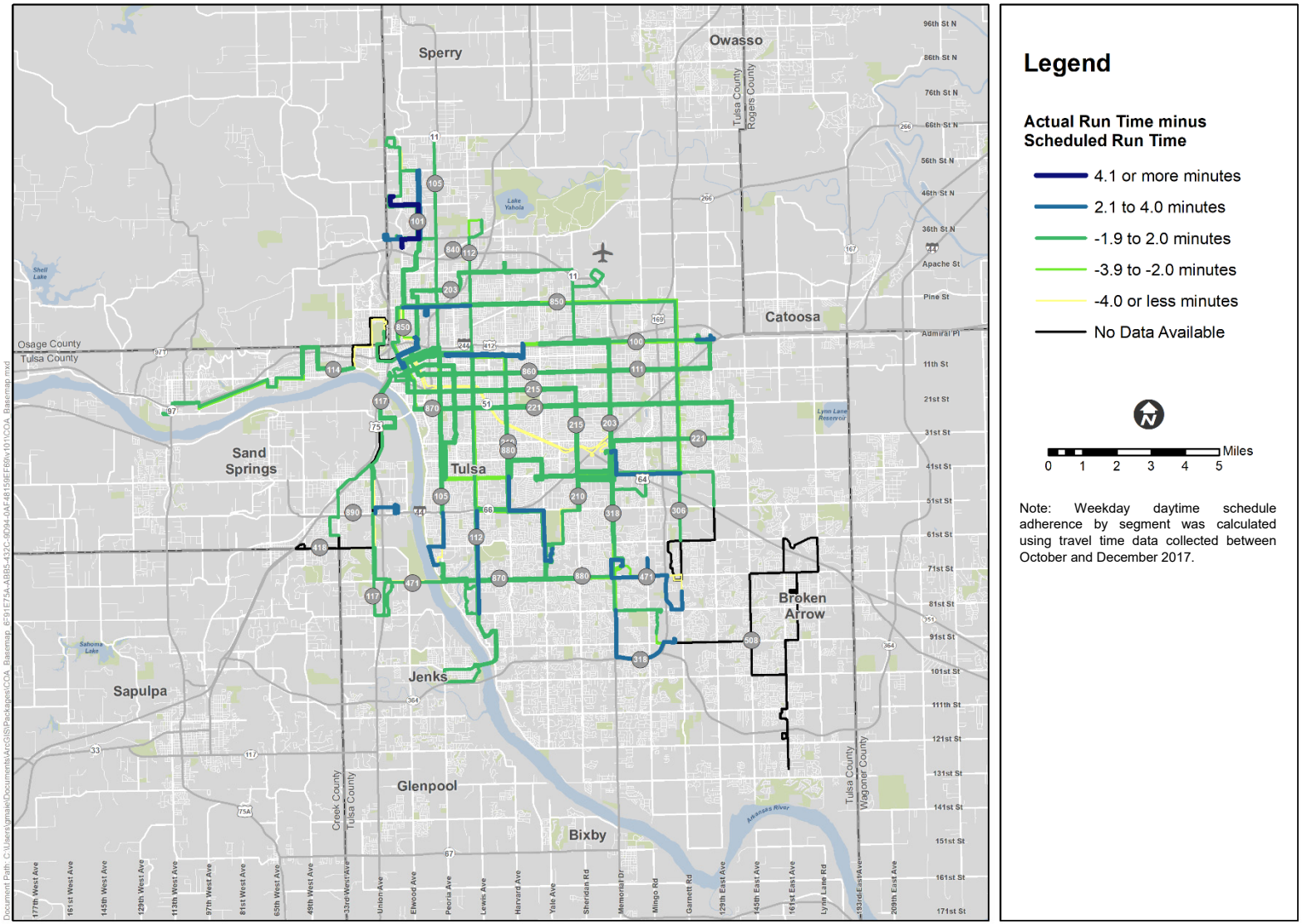


Figure 3-31. Weekday Schedule Adherence by Segment



Weekday Night Productivity Analysis

Segment productivity analysis was also conducted for the six nighttime routes (800-series Nightlines) operated for coverage after 8:00 pm on weekday evenings. Like the weekday daytime routes, the analysis includes maximum passenger loads as well as passenger activity by revenue hour and revenue mile. Overall, system loads and passenger activity appears like daytime routes (albeit with smaller numbers) where there is overlap in route coverage, such as portions of Route 840/850 (daytime route 101) and Route 870 (daytime route 105).

Maximum passenger loads are shown in Figure 3-32, while Figure 3-33 shows passengers per revenue hour, and Figure 3-34 shows passengers per revenue mile. Each map tells a similar story – productivity is highest in the central core of Tulsa, which is logical considering the density and demographic advantages of this area. Outer parts of Route 870 (along Peoria Avenue), Route 860 (along 11th Street); and Route 880 (along 71st Street) have higher than average productivity at night. These findings are strongly correlated with daytime segment productivities presented from Figure 3-28 to Figure 3-30.

Weekday Night On Time Performance

Overall, weekday night routes are adhering to their scheduled run times. Nightline schedule adherence is shown in Figure 3-35. One segment of Route 890 (51st Street), one segment of Route 860 (31st Street between Mingo Road and 129th Avenue), and one segment of 870 (71st Street) are 4 or more minutes behind schedule. Otherwise, most other night segments are scheduled appropriately.

Figure 3-32. Maximum Passenger Load by Segment (Night Service)

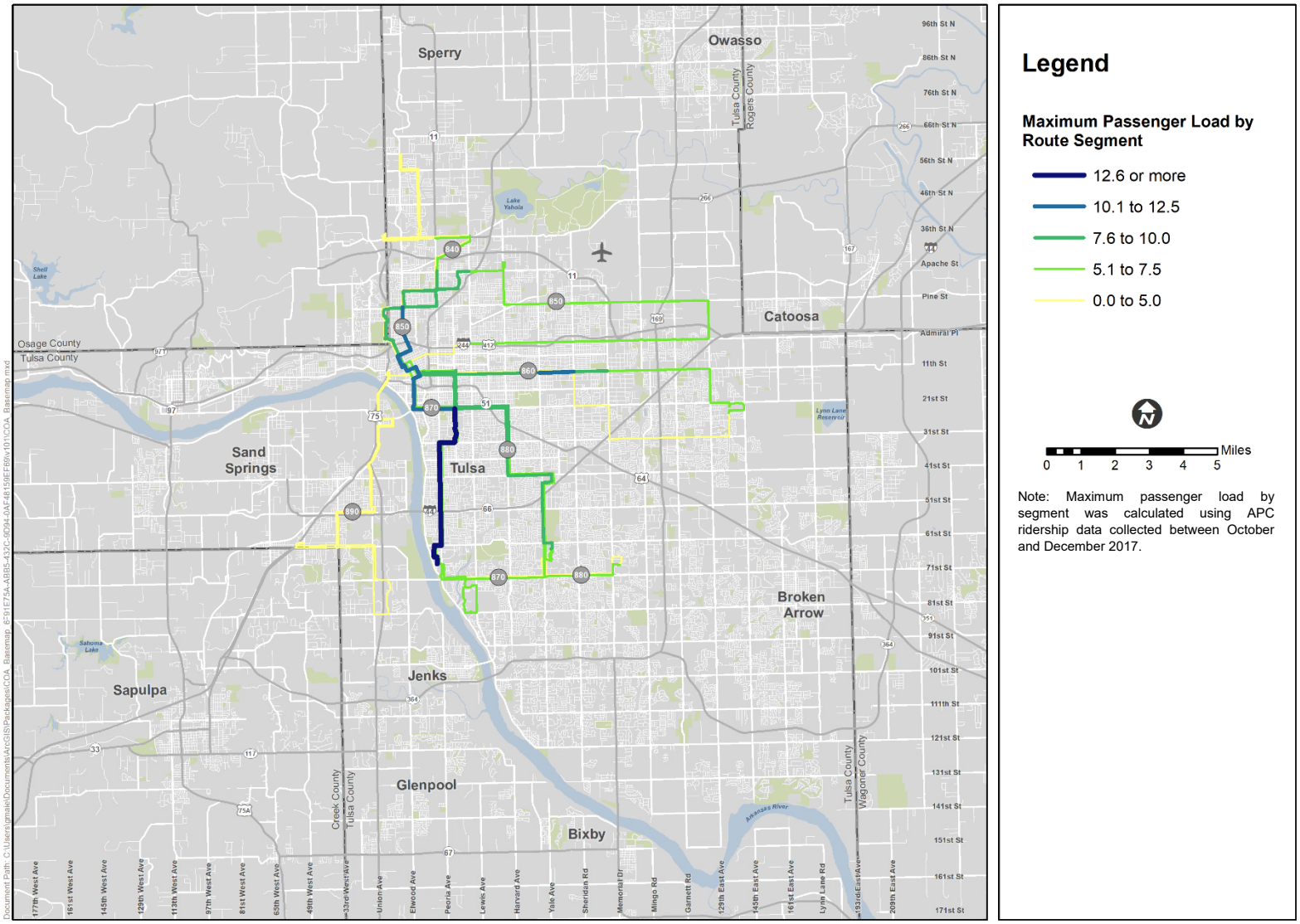


Figure 3-33. Average Passengers per Revenue Hour by Segment (Night Service)

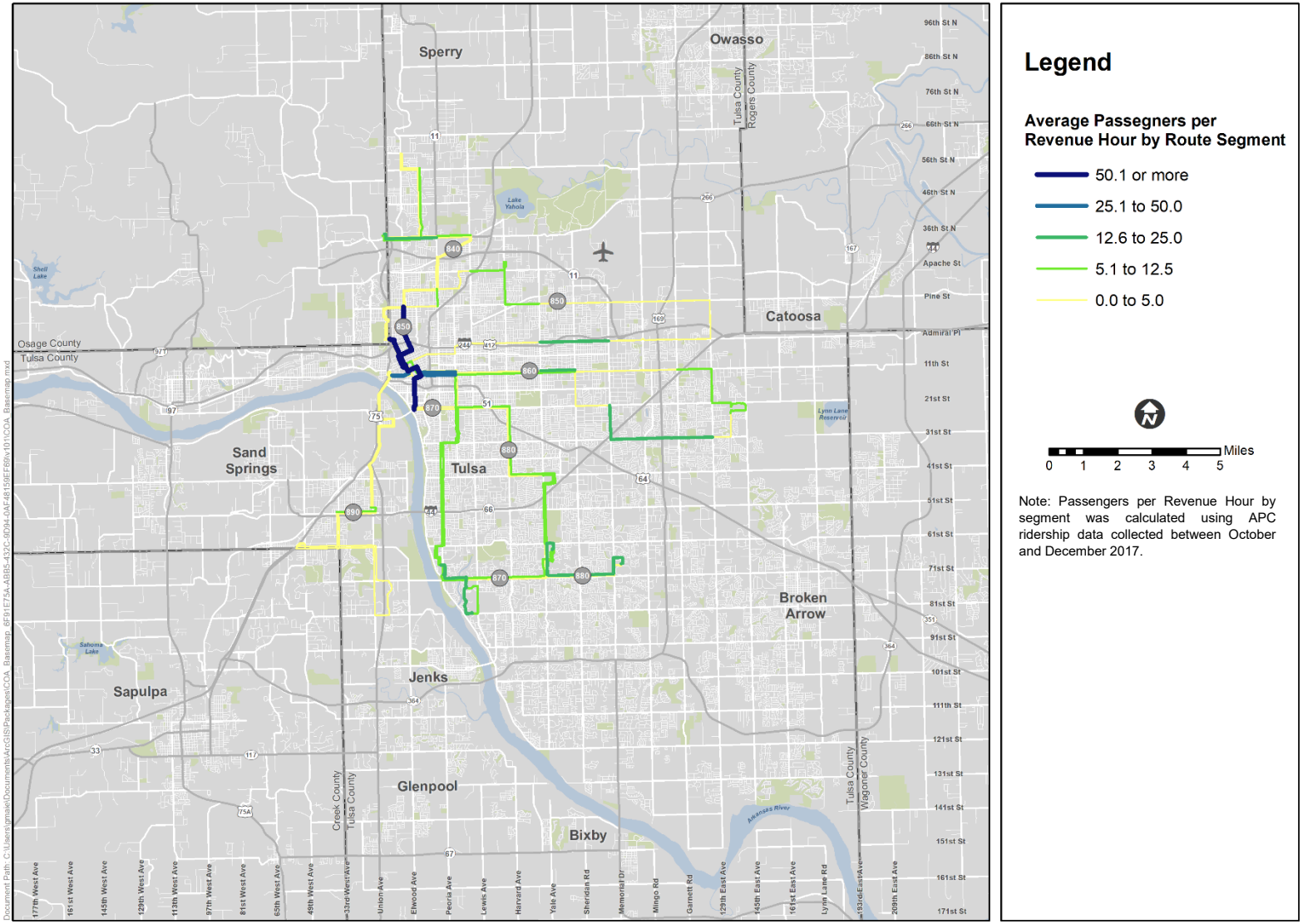


Figure 3-34. Average Passengers per Revenue Mile by Segment (Night Service)

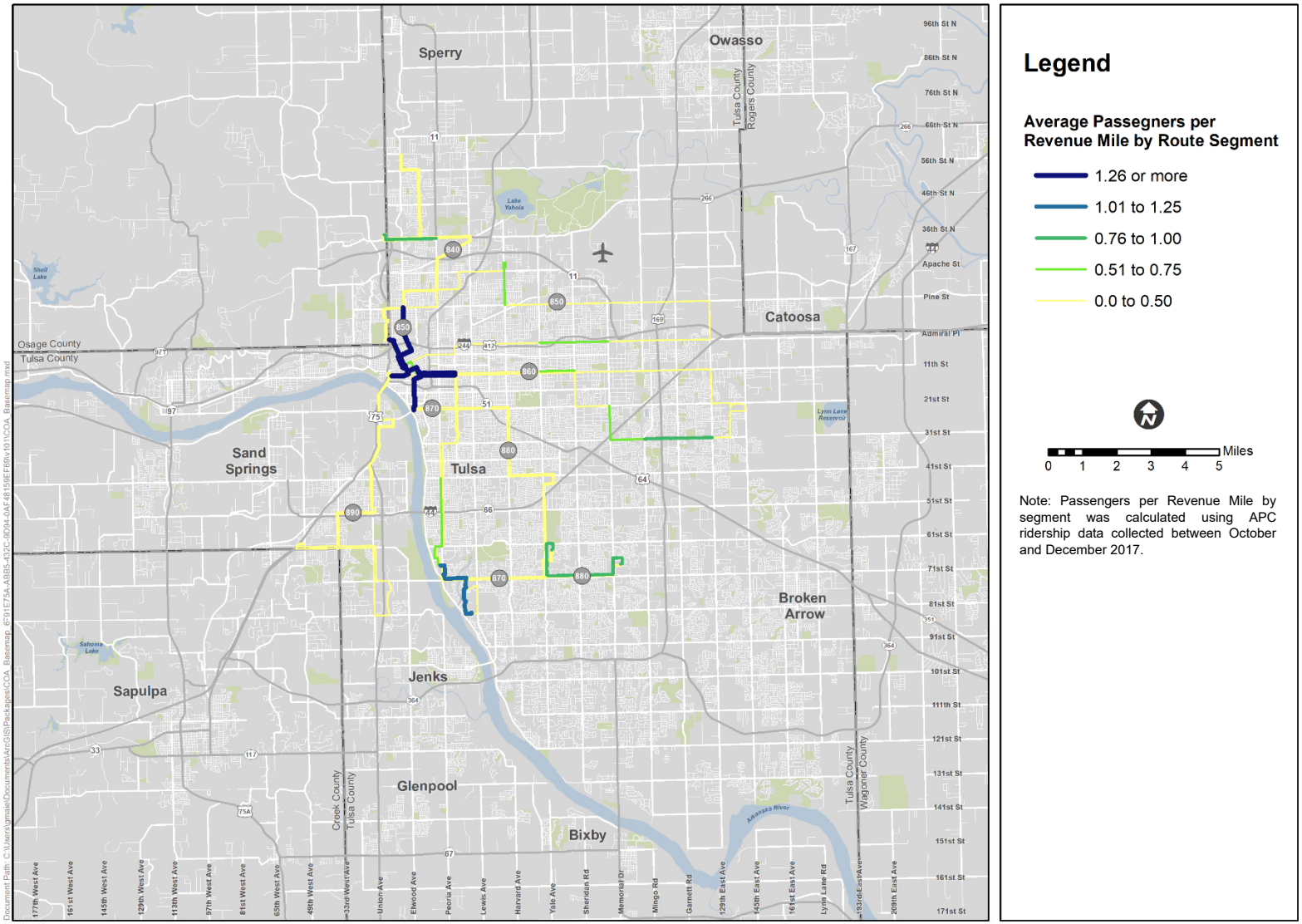
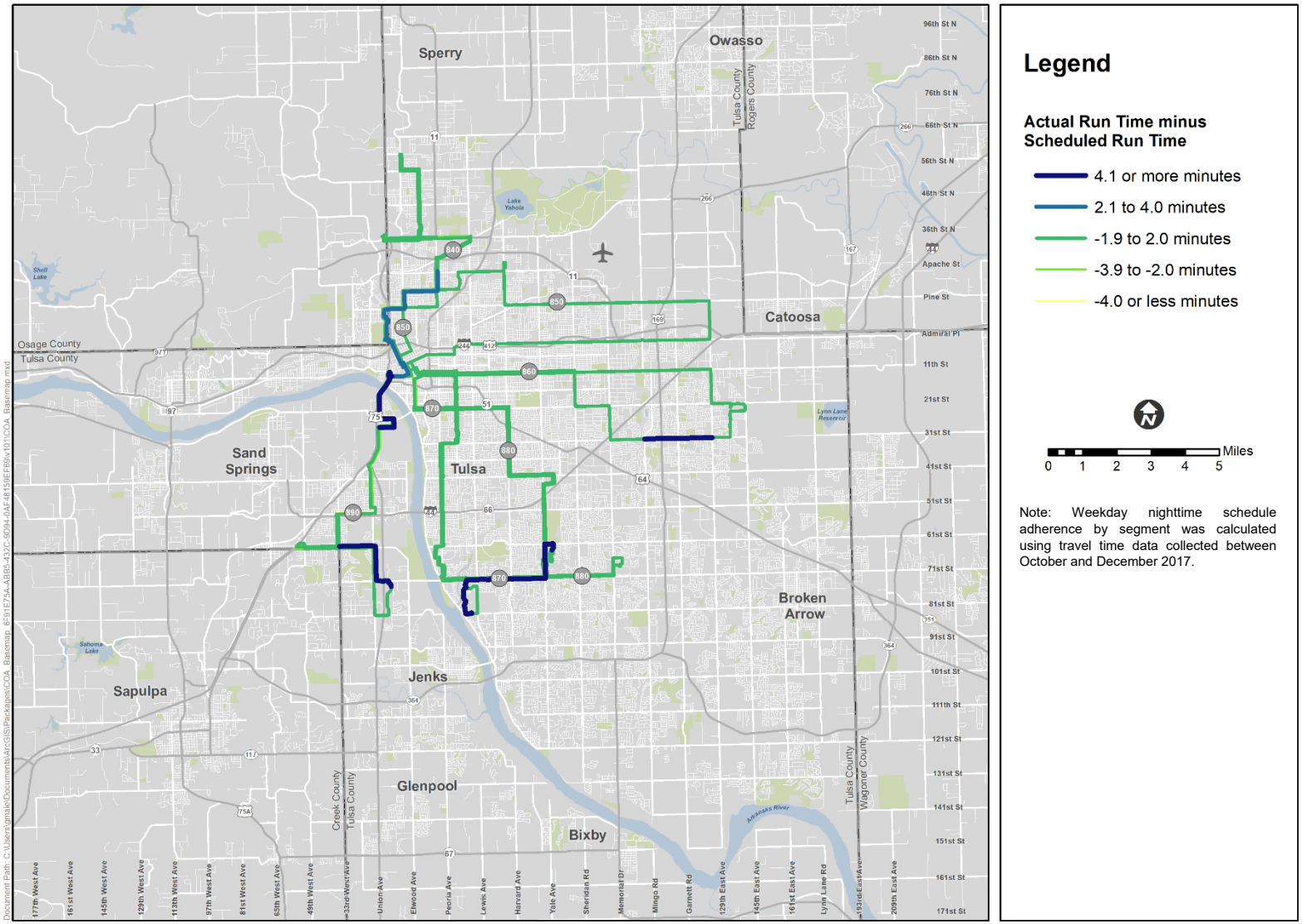


Figure 3-35. Schedule Adherence by Segment (Night Service)



Flag Stop Analysis

Tulsa Transit allows for flag stops, allowing passengers to board or alight the vehicle anywhere along the route alignment regardless of the presence of an official stop. Official agency policy stipulates these locations should be at least one city block away from a marked stop. In reality, flag stops are utilized by passengers in many places, some just feet from marked locations as was determined by the APC data collected in late 2017. While access is improved, flag stops are detrimental in other ways, primarily because they require time in the schedule of each route to accommodate unexpected stops and create greater travel time variability.

A high-level analysis on the impact of flag stops was completed based on data collected in late 2017, shown in Table 3-7. The analysis found that flag stops comprise 31 percent of the total stops and 15 percent of the daily ridership.

Table 3-7. Ridership Activity by Stop Type, 2017

STOP TYPE	TOTAL STOPS	BOARDINGS
Fixed Stop	1,627	5,843
Flag	718	1,748
Total	2,345	7,591
% Flag	31%	23%

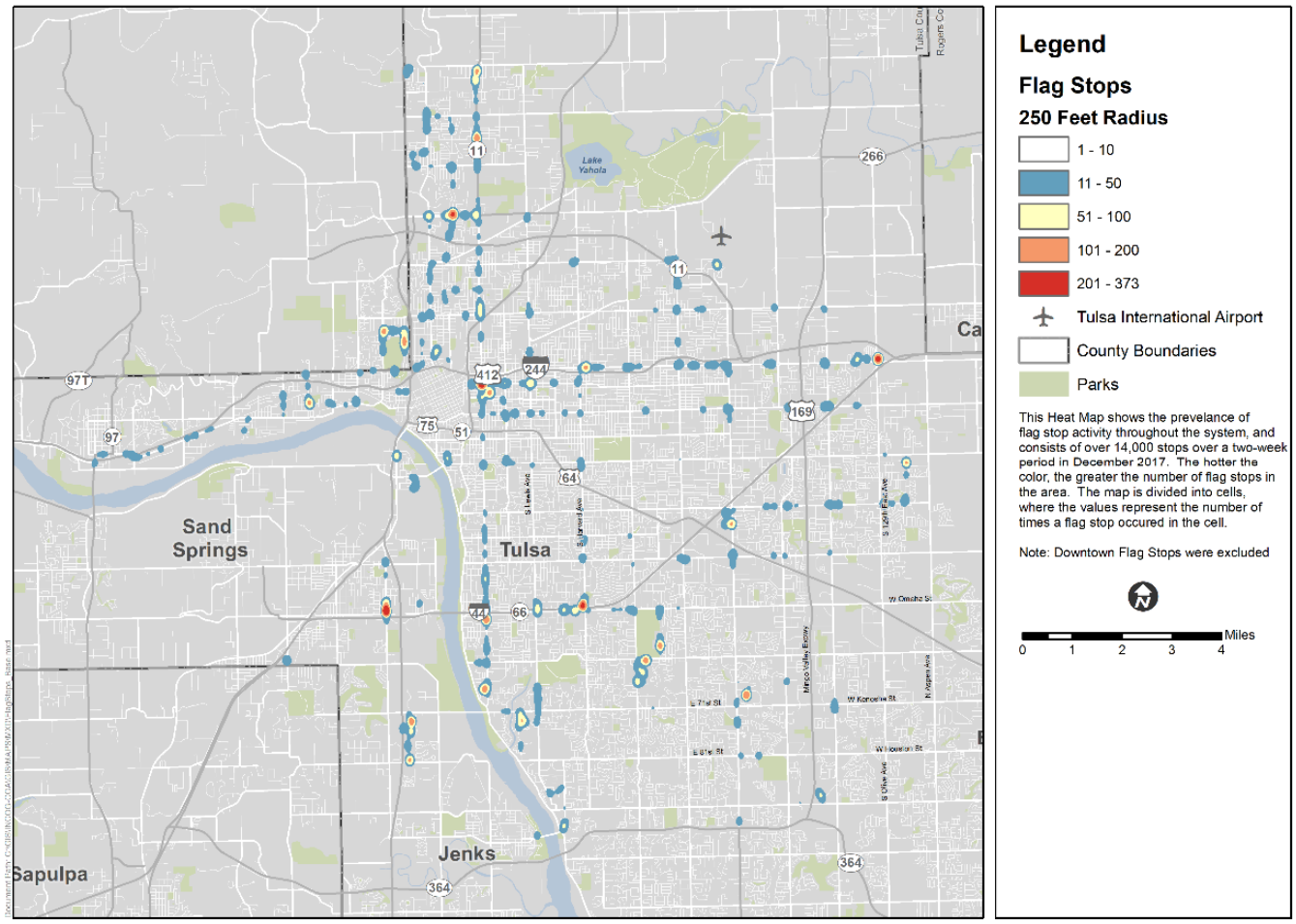
Note: boardings analysis removes activity at DAS and MMS

The 2017 APC data collection effort was able to provide greater detail regarding flag stop usage. Figure 3-36 shows that flag stop activity is prevalent across the system, particularly in locations indicated in red. These locations include:

- Along North 36th Street between Martin Luther King, Jr. Boulevard and Hartford Avenue (Routes 101/105)
- Route 105: end-of-lines, near McLain Village shopping center, at 6th Street, south of Skelly Drive, Inhofe Plaza area, and at 73rd Street
- Route 100: Admiral Place east of Harvard Avenue and at end-of-line
- Route 112: along Lewis Avenue around 71st Street
- Route 114: on the top end of Tulsa Country Club and across from Ziegler Park
- Route 117: Union Avenue at 51st Street
- Route 210: Harvard Avenue at 51st Street
- Route 471: within Tulsa Hills Shopping Center
- Other locations include Woodland Hills Mall, Eastgate Metroplex and just outside the Midtown Memorial Station along Memorial Drive

Most of the places with a concentration of flag stops are already served by one or more marked stops. Flags occur in these places due to sprawl (the location is so large that people choose the most convenient place to be picked up), mobility issues, or unwillingness to walk to the nearest stop.

Figure 3-36. Flag Stop Analysis Heat Map



3.5 Route Level Performance

The ridership data collected in late 2017 allows for a deeper review of ridership, operations and finance performance at the route level. Detailed route profiles have been developed for each of Tulsa Transit's routes and are presented as Appendix 3C of this document. These profiles include a summary table which lists the following key information of each route:

- Operational characteristics by day of week
  - Span of service
  - Peak frequency
  - Peak Buses
- Operating statistics by day of week
  - One-way trips
  - Revenue hours and revenue miles
- On-Time Performance summary
  - Percentage of trips early, on-time or late by day and period (AM Peak, Midday, PM Peak)
- Service Productivities and ranking

    - Average daily riders
    - Riders per revenue hour, revenue mile and trip
- Financial performance and ranking
    - Daily operating cost
    - Cost per rider
    - Farebox recovery ratio
    - Subsidy per rider
- Economic performance and ranking
    - Average daily revenue
    - Revenue per revenue hour, revenue mile and trip
- Weekday ridership by fare type analysis
- Flag stop analysis summary
- A map depicting the current alignment and transit propensity by Census block group of surrounding area

A summary of Tulsa Transit's 26 routes is shown in Table 3-8. Tulsa Transit provides service from approximately 5 am to midnight weekdays, 6:30 am to midnight Saturday, and 8:30 am to 7 pm Sunday and was currently operates 53 vehicles in the weekday peak period.

Table 3-8. Tulsa Transit Route Operational Characteristics

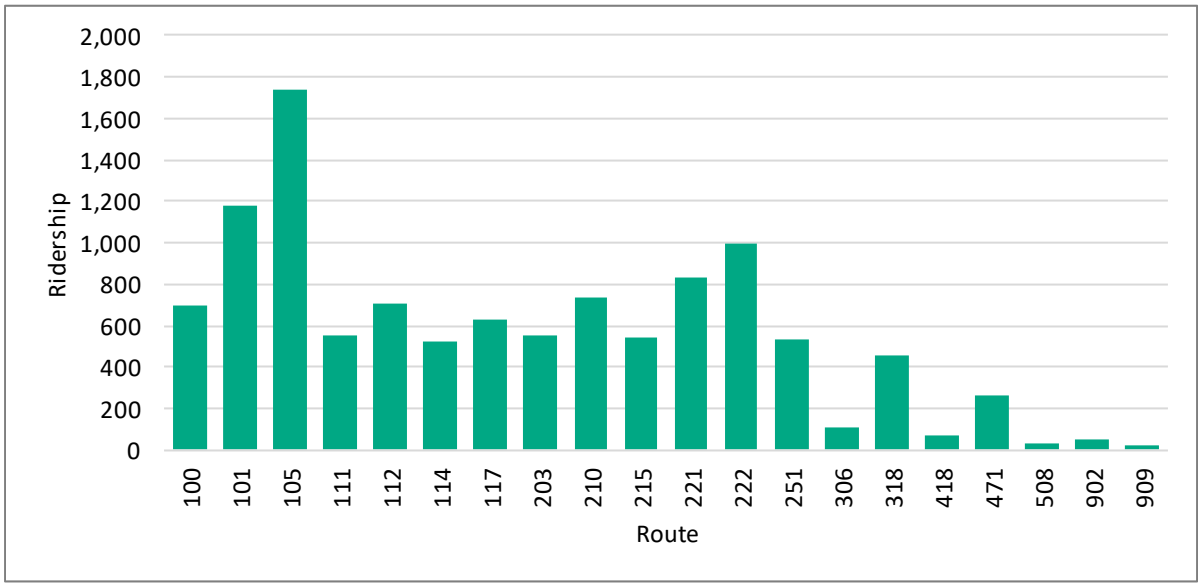
		Weekday			Saturday			Sunday		
Route	Route Name	Span of Service	Headway	Peak Bus	Span of Service	Headway	Peak Bus	Span of Service	Headway	Peak Bus
100	Admiral	5:46 am - 6:45 pm	30	3	7:01 am - 6:05 pm	90	1	-	-	-
101	Suburban Acres	4:47 am - 7:50 pm	30	3	6:47 am - 7:00 pm	45	2	-	-	-
105	Peoria	5:25 am - 8:08 pm	30	6	6:35 am - 6:23 pm	45	3	-	-	-
111	11th Street	5:29 am - 6:10 pm	45	2	6:44 am - 6:04 pm	90	1	-	-	-
112	Lewis/Jenks	5:43 am - 6:39 pm	45	4	7:08 am - 6:07 pm	90	2	-	-	-
114	Charles Page/Sand Springs	5:15 am - 7:10 pm	60	2	6:24 am - 7:04 pm	120	1	-	-	-
117	Union/SW Blvd	5:30 am - 7:08 pm	30	3	7:45 am - 6:30 pm	90	1	-	-	-
203	Airport	5:00 am - 8:00 pm	45-60-75	3	6:54 am - 7:11 pm	60-75	2	-	-	-
210	Harvard	5:10 am - 6:55 pm	30-45	4	7:00 am - 7:10 pm	135	1	-	-	-
215	15th Street	6:00 am - 7:28 pm	45	2	7:00 am - 6:48 pm	90	1	-	-	-
221	21st Street/Eastgate	5:25 am - 7:55 pm	45	3	7:15 am - 5:48 pm	75	2	-	-	-
222	Pine/41st Street	5:15 am - 7:50 pm	45	6	7:00 am - 6:21 pm	60-75	4	-	-	-
251	Fast Track	5:15 am - 7:10 pm	30	2	7:15 am - 6:30 pm	45	1	-	-	-
306	Southeast Industrial	6:30 am - 7:48 pm	75	1	-	-	-	-	-	-
318	Memorial	5:40 am - 7:02 pm	30-45	2	7:00 am - 6:02 pm	90	1	-	-	-
418	West Connector Loop	6:15 am - 6:55 pm	45	1	7:00 am - 6:10 pm	45	1	-	-	-
471	71st Street	5:25 am - 6:25 pm	60	2	7:00 am - 5:25 pm	75-100	2	-	-	-
508	BA Connection	5:55 am - 6:20 pm	60-80	2	-	-	-	-	-	-
902	Broken Arrow Express	Peak Only	3 IB / 3 OB	1	-	-	-	-	-	-
909	Union Express	Peak Only	1 IB / 1 OB	1	-	-	-	-	-	-
840	North	8:00 pm - 12:10 am	2.5 RTs	1	7:40 pm - 12:00 am	2.5 RTs	1	8:45 am - 6:25 pm	45	2
850	Northeast	8:15 pm - 12:15 am	3.0 RTs	1	7:30 pm - 11:40 pm	3.0 RTs	1	8:30 am - 6:55 pm	45	2
860	East	8:15 pm - 11:52 pm	2.5 RTs	1	7:30 pm - 11:50 pm	3.0 RTs	1	8:30 am - 6:03 pm	45 - 60	2
870	South	8:00 pm - 12:27 am	4.0 RTs	2	7:13 pm - 12:27 am	4.5 RTs	2	8:30 am - 6:40 pm	45 - 60	2
880	Southeast	8:05 pm - 12:34 am	2.5 RTs	1	7:40 pm - 12:04 am	2.5 RTs	1	8:30 am - 6:53 pm	45 - 60	2
890	West	8:00 pm - 12:10 am	2.5 RTs	1	7:30 pm - 11:40 pm	2.5 RTs	1	8:30 am - 6:50 pm	45 - 60	2

Note: RTs = round trips

Average Daily Ridership

Route level ridership data from the data collection effort was compiled by day of week. Average daily ridership was charted for all three service days. Eighteen local and two express routes were included in the weekday analysis, the results of which are presented below in Figure 3-37. The top four routes by average daily ridership (in order) are Routes 105, 101, 222, and 221. Routes 306, 418, and 508 carry the least number of riders.

Figure 3-37. Weekday Average Daily Ridership



Note: Route 508 ridership data assessed from December 2016 figures.

Sixteen local routes operate on Saturdays; Routes 306 and 508 do not operate nor do the two 900-series express services. Figure 3-38 below shows average daily ridership for Saturday routes. Route 105 is again the top performer, carrying an average of 913 daily Saturday riders. However, on Saturday Route 222 carries about 50 more riders than Route 101 with both routes carrying over 500 daily riders. Average Saturday ridership drops by an average of 50 percent compared to weekdays, with the sharpest decline of 74 percent occurring on Route 210. Several other routes see reductions of over 60 percent, including Routes 100, 111, 117, 215, 221, and 251. Because Saturday operates less than 50 percent of the weekday service, the drop in ridership is commiserate with service levels.

Six routes (the 800-series) operate on Weekday nights, Saturday nights, and Sundays. Night service is provided Monday through Saturday generally for two to three hours from 8 pm until 11 pm. Sunday service is comparatively more robust, with service between 8:30 am until 6:30 pm. Figure 3-39 charts the average daily ridership for the 800-series for the time periods noted above. Route 870 carries the most weekday nightline riders, followed by Routes 860, 840, and 880 with roughly half the ridership. On Saturdays Routes 870 and 840 carry the most riders. And Sunday service sees the most riders on Routes 870 and 880 followed by Route 860.

Figure 3-38. Saturday Average Daily Ridership

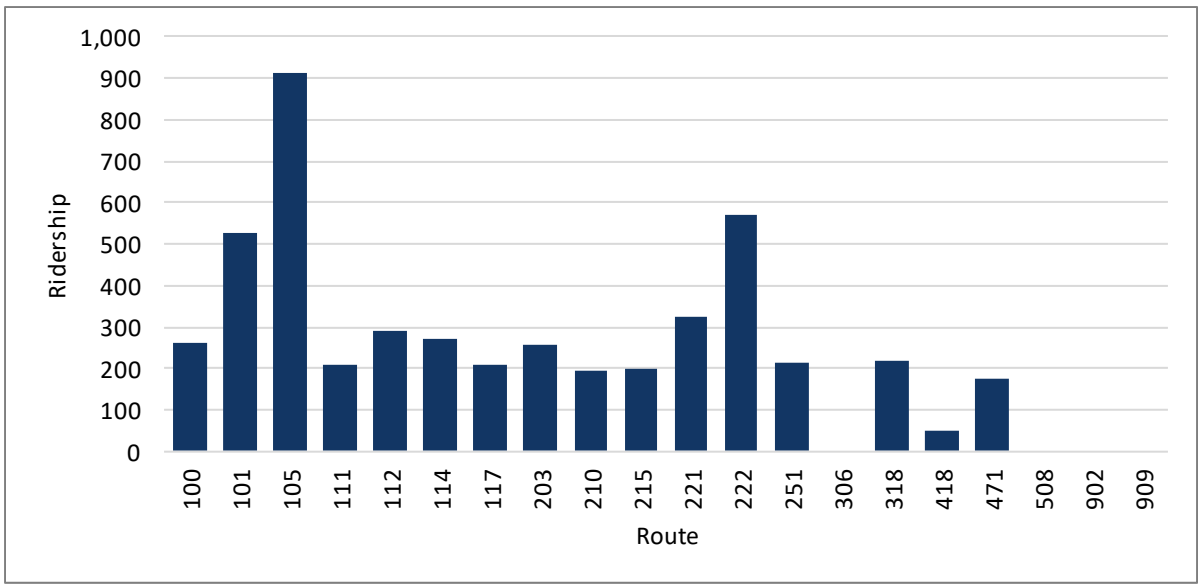
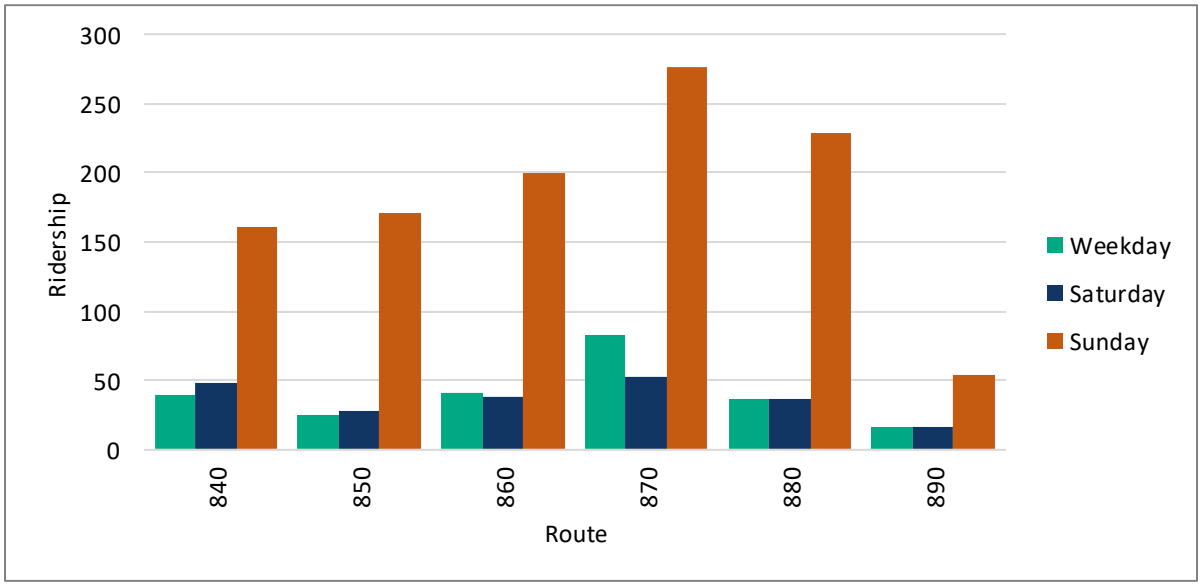


Figure 3-39. Average Nightline Ridership for Weekday Night, Saturday Night, and Sunday



Note: Sunday operates all day, while Weekday and Saturday nights are only a couple hours of service

Ridership Productivity

Although average daily ridership is a good metric for examining overall route performance, controlling for other factors like frequency and route length can provide context beyond average daily ridership. Three common measures used to evaluate route performance are riders per revenue hour, riders per revenue mile, and riders per trip. Table 3-9 summarizes these measures by route for the twenty local and express routes and six nightline routes. The top four and bottom four routes in the daytime routes, and the top two and bottom two for the nightline routes, have been highlighted for each measure.

As the table shows, routes 101 and 105 still rank high on productivity measures. However, routes 221 and 222, which rank high in average daily ridership, perform much lower in riders per revenue hour. These routes benefit from their length, which adds a lot of riders, but requires a lot of resources to operate. Routes 111 and 251 are ranked high on productivity measures.

Routes 306, 318, 418 and 471 tend to perform the lowest of weekday daytime routes for productivity measures. All these routes operate on the lower density periphery of Tulsa and none connect to the Denver Avenue Station downtown. It is important to note that these routes have been developed to serve low density areas with the knowledge that productivity will likely be low. For example, Route 508 operates as a flex route circulator providing lifeline service across the lower density Broken Arrow community. Based on service area and design, it will naturally be less productive than the rest of the local system.

Overall, routes 101, 105, 111, and 221 rank highest when combining ranks; routes 306, 418, 508, and 909 end up at the bottom of average rankings.

Among the nightline routes, 860 and 870 are the top performers in this set while 890 is ranked last in all measures. This is likely due to land use and population density reasons: 890 operates in a lower density and more sparsely populated area of the metro area compared to Routes 860 and 870. Overall, routes 860 and 870 perform the best, and because the other routes tie in average rankings, 850 was ranked lowest with 890 due to its low number of riders.

Saturday and Sunday services were similarly ranked. Only sixteen routes operate on Saturday because Routes 306 and 508 and the two express routes operate weekdays only; Sunday service only includes the 800 series routes.

Table 3-9. Weekday Route Productivities, October-December 2017

Route	Avg. Daily Riders	Rank	Riders per Hour	Rank	Riders per Mile	Rank	Riders per Trip	Rank	Avg. Rank
Weekday Local									
100	696	**7**	21.8	**7**	1.4	**6**	13.6	**11**	**5**
101	1,178	**2**	30.4	**1**	1.8	**1**	21.0	**4**	**2**
105	1,742	**1**	24.9	**3**	1.6	**2**	31.1	**1**	**1**
111	551	**9**	24.9	**2**	1.5	**3**	16.2	**9**	**4**
112	703	**6**	15.3	**13**	1.0	**12**	20.1	**5**	**9**
114	520	**13**	20.6	**8**	1.2	**10**	18.6	**7**	**11**
117	633	**8**	20.2	**9**	1.2	**8**	12.2	**12**	**10**
203	548	**10**	17.0	**12**	1.0	**13**	17.7	**8**	**12**
210	740	**5**	18.3	**11**	1.2	**9**	19.5	**6**	**5**
215	541	**11**	22.4	**6**	1.4	**5**	15.0	**10**	**7**
221	831	**4**	22.6	**5**	1.5	**4**	23.1	**3**	**3**
222	993	**3**	13.4	**15**	0.9	**14**	28.4	**2**	**8**
251	536	**12**	23.4	**4**	1.1	**11**	9.7	**18**	**13**
306	112	**16**	10.7	**18**	0.7	**16**	11.2	**16**	**17**
318	456	**14**	19.5	**10**	1.3	**7**	11.4	**15**	**14**
418	74	**17**	6.5	**19**	0.4	**19**	4.4	**19**	**19**
471	266	**15**	11.3	**17**	0.7	**15**	10.2	**17**	**16**
508	28	**19**	1.5	**20**	0.1	**20**	1.6	**20**	**20**
Weekday Express									
902	47	**18**	15.2	**14**	0.6	**17**	11.8	**13**	**15**
909	23	**20**	13.1	**16**	0.6	**18**	11.5	**14**	**18**
Sys. Avg.	***561***		***17.7***		***1.1***		***15.4***		
Weekday Night									
840	39	**3**	4.5	**6**	0.6	**3**	7.8	**4**	**3**
850	25	**5**	7.1	**4**	0.3	**5**	8.3	**2**	**3**
860	41	**2**	12.6	**1**	0.7	**1**	8.2	**3**	**2**
870	83	**1**	10.9	**2**	0.6	**2**	10.4	**1**	**1**
880	37	**4**	9.1	**3**	0.5	**4**	7.4	**5**	**3**
890	16	**6**	4.8	**5**	0.2	**6**	3.2	**6**	**6**
NL Avg.	***40***		***8.2***		***0.5***		***7.6***		

Table 3-10. Saturday Route Productivities, October-December 2017

Route	Avg. Daily Riders	Rank	Riders per Hour	Rank	Riders per Mile	Rank	Riders per Trip	Rank	Avg. Rank
Saturday Local									
100	262	**7**	27.9	**2**	1.7	**1**	17.5	**6**	**2**
101	525	**3**	23.7	**4**	1.4	**4**	16.4	**7**	**3**
105	913	**1**	30.5	**1**	1.6	**2**	31.5	**1**	**1**
111	207	**12**	21.2	**8**	1.3	**7**	13.8	**11**	**10**
112	293	**5**	14.4	**12**	0.9	**12**	18.3	**4**	**8**
114	271	**6**	26.9	**3**	1.4	**6**	20.8	**3**	**3**
117	210	**11**	23.3	**6**	1.4	**5**	14.0	**10**	**7**
203	257	**8**	11.7	**15**	0.7	**15**	12.2	**13**	**14**
210	193	**14**	16.7	**10**	1.1	**9**	17.5	**5**	**10**
215	200	**13**	19.2	**9**	1.2	**8**	12.5	**12**	**12**
221	323	**4**	16.4	**11**	1.0	**10**	16.2	**8**	**8**
222	571	**2**	13.9	**13**	0.9	**11**	28.6	**2**	**6**
251	212	**10**	21.2	**7**	0.8	**14**	7.1	**15**	**13**
306	-	**-**	-	**-**	-	**-**	-	**-**	
318	218	**9**	23.4	**5**	1.6	**3**	14.5	**9**	**5**
418	51	**16**	5.1	**16**	0.3	**16**	3.4	**16**	**16**
471	177	**15**	12.3	**14**	0.8	**13**	11.8	**14**	**15**
508	-	**-**	-	**-**	-	**-**	-	**-**	
Sys. Avg.	***305***		***19.2***		***1.1***		***16.0***		
Saturday Night									
840	48	**2**	12.8	**1**	0.7	**1**	9.6	**1**	**1**
850	28	**5**	8.0	**4**	0.4	**4**	9.3	**2**	**4**
860	38	**3**	9.6	**2**	0.5	**2**	6.3	**4**	**2**
870	52	**1**	6.1	**5**	0.4	**5**	5.8	**5**	**5**
880	36	**4**	8.8	**3**	0.5	**3**	7.2	**3**	**3**
890	17	**6**	5.1	**6**	0.2	**6**	3.4	**6**	**6**
NL Avg.	***37***		***8.4***		***0.5***		***6.9***		

Table 3-11. Sunday Route Productivities, December 2017

Route	Avg. Daily Riders	Rank	Riders per Hour	Rank	Riders per Mile	Rank	Riders per Trip	Rank	Avg. Rank
Sunday									
840	161	**5**	8.8	**5**	0.6	**4**	8.1	**5**	**5**
850	171	**4**	9.3	**4**	0.5	**5**	13.2	**2**	**4**
860	200	**3**	11.7	**3**	0.8	**2**	9.5	**4**	**3**
870	277	**1**	14.7	**1**	1.0	**1**	15.4	**1**	**1**
880	229	**2**	12.2	**2**	0.7	**3**	10.0	**3**	**2**
890	54	**6**	2.9	**6**	0.2	**6**	2.3	**6**	**6**
Avg.	***182***		***9.9***		***0.6***		***9.7***		

Financial Productivity

This section provides an analysis of financial metrics for Tulsa Transit routes by examining revenues and costs on a per route basis as well as ratios to determine which routes bring in more revenue and which routes cost more to operate.

Metrics included in this analysis include revenue per rider, cost per rider, farebox recovery ratio, and subsidy per rider. Ridership and route ranking, as before, is also included for reference. Revenue per rider estimates the income generated on a per passenger basis based on the average daily revenues and average daily boardings. Revenue comes from fiscal year 2017 fare revenue data supplied by Tulsa Transit. Cost per rider uses an estimated aggregated cost which is determined from estimated cost per mile and cost per hour unit costs as well as a daily administrative cost.[9] Farebox recovery is the ratio of revenue compared to the cost of the route. Finally, subsidy per rider is the difference between cost per rider and revenue per rider.

The following three tables summarize the four financial metrics of each route for weekday, Saturday, and Sunday service. Top and bottom overall rankings are similarly colored as with the route productivities tables: the top four routes are highlighted green while the bottom four are highlighted red; Nightline and Sunday services highlight the top two and bottom two routes. For weekday service, the routes with the highest revenue per rider were Routes 508, 306, 471, and 222. The lowest were Route 418, 251, and the two express routes. In terms of cost per rider, recovery ratio, and subsidy per rider, the top performers in each ratio were Routes 100, 101, 105 and 221 while the bottom four performers were Routes 418, 508 and the two express routes.

Saturday service saw some shifting in rankings compared with weekday service. Routes 112, 203, 221, and 100 brought in the most revenue per rider while Routes 418, 251, and 318 brought in the least. Routes 100, 101 and 105 were again top performers in the other metrics, but Route 114 ranked higher than Route 221 in terms of cost per rider and subsidy per rider.

[9] These costs are derived from 2016 National Transit Database information with a 2017 inflation factor.

Table 3-12. Weekday Financial Performance by Route

Route	Avg. Daily Riders	Rank	Revenue per Rider	Rank	Cost per Rider	Rank	Recovery Ratio	Rank	Subsidy per Rider	Rank	Avg. Rank
Weekday Local											
100	696	**7**	$0.40	**7**	$3.61	**4**	11.1%	**2**	$3.21	**4**	**2**
101	1,178	**2**	$0.26	**16**	$2.51	**1**	10.3%	**4**	$2.25	**2**	**4**
105	1,742	**1**	$0.41	**6**	$2.62	**2**	15.5%	**1**	$2.22	**1**	**1**
111	551	**9**	$0.37	**9**	$3.63	**5**	10.1%	**5**	$3.26	**5**	**5**
112	703	**6**	$0.44	**5**	$4.63	**12**	9.4%	**6**	$4.19	**12**	**6**
114	520	**13**	$0.39	**8**	$4.20	**10**	9.2%	**8**	$3.82	**9**	**10**
117	633	**8**	$0.28	**15**	$3.95	**8**	7.0%	**12**	$3.68	**8**	**11**
203	548	**10**	$0.37	**10**	$4.73	**13**	7.8%	**10**	$4.37	**14**	**12**
210	740	**5**	$0.31	**13**	$3.95	**7**	7.7%	**11**	$3.65	**7**	**8**
215	541	**11**	$0.31	**12**	$3.84	**6**	8.1%	**9**	$3.53	**6**	**9**
221	831	**4**	$0.36	**11**	$3.32	**3**	10.8%	**3**	$2.96	**3**	**2**
222	993	**3**	$0.45	**4**	$4.76	**14**	9.4%	**7**	$4.31	**13**	**6**
251	536	**12**	$0.16	**18**	$4.05	**9**	3.9%	**15**	$3.89	**10**	**15**
306	112	**16**	$0.47	**2**	$11.94	**16**	3.9%	**16**	$11.47	**16**	**16**
318	456	**14**	$0.30	**14**	$4.42	**11**	6.7%	**13**	$4.12	**11**	**14**
418	74	**17**	$0.12	**20**	$18.88	**17**	0.6%	**19**	$18.77	**17**	**19**
471	266	**15**	$0.45	**3**	$7.87	**15**	5.7%	**14**	$7.42	**15**	**13**
508	28	**19**	$0.66	**1**	$63.38	**20**	1.0%	**18**	$62.73	**20**	**17**
Weekday Express											
902	47	**18**	$0.22	**17**	$20.50	**18**	1.1%	**17**	$20.27	**18**	**18**
909	23	**20**	$0.13	**19**	$37.62	**19**	0.3%	**20**	$37.50	**19**	**20**
Avg.	***561***		***$0.34***		***$10.72***		***7.0%***		***$10.38***		
Weekday Night											
840	39	**3**	$0.16	**5**	$9.61	**6**	1.7%	**5**	$9.45	**6**	**5**
850	25	**5**	$0.05	**6**	$6.00	**4**	0.9%	**6**	$5.94	**4**	**5**
860	41	**2**	$0.32	**1**	$3.39	**1**	9.4%	**1**	$3.08	**1**	**1**
870	83	**1**	$0.32	**2**	$3.92	**2**	8.1%	**2**	$3.60	**2**	**2**
880	37	**4**	$0.25	**4**	$4.72	**3**	5.3%	**3**	$4.47	**3**	**3**
890	16	**6**	$0.31	**3**	$8.91	**5**	3.4%	**4**	$8.61	**5**	**4**
Avg.	***40***		***$0.23***		***$6.09***		***4.8%***		***$5.86***		

Table 3-13. Saturday Financial Performance by Route

Route	Avg. Daily Riders	Rank	Revenue per Rider	Rank	Cost per Rider	Rank	Recovery Ratio	Rank	Subsidy per Rider	Rank	Avg. Rank
Saturday Local											
100	262	**7**	$0.47	**4**	$4.85	**3**	9.6%	**2**	$4.38	**3**	**2**
101	525	**3**	$0.32	**13**	$3.81	**2**	8.3%	**3**	$3.49	**2**	**3**
105	913	**1**	$0.43	**6**	$2.76	**1**	15.4%	**1**	$2.34	**1**	**1**
111	207	**12**	$0.43	**5**	$6.30	**9**	6.9%	**8**	$5.87	**9**	**8**
112	293	**5**	$0.52	**1**	$6.43	**10**	8.0%	**6**	$5.92	**10**	**7**
114	271	**6**	$0.39	**10**	$5.04	**4**	7.7%	**7**	$4.65	**4**	**6**
117	210	**11**	$0.38	**11**	$5.99	**8**	6.3%	**9**	$5.61	**8**	**9**
203	257	**8**	$0.48	**2**	$7.79	**14**	6.2%	**10**	$7.31	**14**	**10**
210	193	**14**	$0.39	**9**	$7.15	**13**	5.4%	**12**	$6.76	**13**	**13**
215	200	**13**	$0.36	**12**	$6.64	**11**	5.4%	**11**	$6.28	**11**	**12**
221	323	**4**	$0.47	**3**	$5.70	**6**	8.2%	**4**	$5.23	**6**	**3**
222	571	**2**	$0.42	**7**	$5.16	**5**	8.2%	**5**	$4.74	**5**	**5**
251	212	**10**	$0.18	**15**	$6.82	**12**	2.6%	**15**	$6.64	**12**	**14**
306	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	
318	218	**9**	$0.31	**14**	$5.71	**7**	5.4%	**13**	$5.40	**7**	**11**
418	51	**16**	$0.12	**16**	$25.91	**16**	0.5%	**16**	$25.79	**16**	**16**
471	177	**15**	$0.39	**8**	$8.58	**15**	4.5%	**14**	$8.19	**15**	**15**
508	-	**-**	-	**-**	-	**-**	-	**-**	-	**-**	
Avg.	***305***		***$0.38***		***$7.16***		***6.8%***		***$6.79***		
Saturday Night											
840	48	**2**	$0.17	**5**	$3.35	**1**	5.0%	**3**	$3.18	**1**	**2**
850	28	**5**	$0.03	**6**	$5.35	**4**	0.5%	**6**	$5.33	**4**	**5**
860	38	**3**	$0.31	**2**	$4.45	**2**	7.1%	**1**	$4.14	**2**	**1**
870	52	**1**	$0.48	**1**	$7.04	**5**	6.8%	**2**	$6.56	**5**	**3**
880	36	**4**	$0.23	**4**	$4.85	**3**	4.8%	**4**	$4.62	**3**	**4**
890	17	**6**	$0.25	**3**	$8.39	**6**	2.9%	**5**	$8.14	**6**	**6**
Avg.	***37***		***$0.24***		***$5.57***		***4.5%***		***$5.33***		

Table 3-14. Sunday Financial Performance by Route

Route	Avg. Daily Riders	Rank	Revenue per Rider	Rank	Cost per Rider	Rank	Recovery Ratio	Rank	Subsidy per Rider	Rank	Avg. Rank
Sunday											
840	161	**5**	$0.00	**5**	$4.88	**5**	0.03%	**5**	$4.87	**5**	**6**
850	171	**4**	$0.00	**6**	$4.61	**4**	0.00%	**6**	$4.61	**4**	**5**
860	200	**3**	$0.01	**3**	$3.67	**3**	0.15%	**2**	$3.66	**3**	**2**
870	277	**1**	$0.01	**2**	$2.92	**1**	0.38%	**1**	$2.91	**1**	**1**
880	229	**2**	$0.00	**4**	$3.51	**2**	0.13%	**4**	$3.51	**2**	**1**
890	54	**6**	$0.02	**1**	$14.91	**6**	0.15%	**3**	$14.89	**6**	**1**
Avg.	***182***		***$0.01***		***$5.75***		***0.14%***		***$5.74***		

3.6 Conclusions

Major takeaways for the existing conditions analysis include the following:

Market Analysis

Demographic datasets showed that Tulsa has areas of low-income and minority households on the north, far south, and east sides, all of which surround an affluent and less diverse population in the midtown area of the city. A Transit Propensity Index combines these datasets into an aggregate score with areas scoring highest (greatest transit propensity) on the far east and south parts of Tulsa. These demographics have not changed drastically over the past decade and have been repeated in prior studies, particularly the *Fast Forward Regional Transit System Plan* and prior work by CTG. This outer "doughnut" of demographics is comprised of a population that is generally more apt to utilize transit. Already, Tulsa Transit does an admirable job of broad coverage across the majority of Tulsa's corporate limits, but some areas may need more coverage, higher frequency, or both, based on the findings of the transit propensity index.

Peer Agency Review

Tulsa Transit was compared with five other agencies that were determined to be of similar size, similar service provision, and close geographic proximity. The cities (and transit agencies) selected were Colorado Springs, Colorado (Mountain Metro Transit); Little Rock, Arkansas (Rock Region Metro); Oklahoma City, Oklahoma (Embark); Omaha, Nebraska (Metro); and Wichita, Kansas (Wichita Transit).

Of this selected group of similar peers, the peer analysis found Tulsa Transit to be performing quite well in terms of service delivery. Following drastic cuts to its system early this decade leading out of the recession, since 2011 Tulsa Transit has seen increased revenue hours and decreasing costs per revenue hour as well as steady growth in ridership. However, ridership has stalled in recent years which mirrors what has happened nationwide following steady growth in employment and low gas prices. Tulsa Transit has added operating costs due to additional service and it has seen a marked increase in passengers carried compared to other systems which have also had more costs but not as much ridership growth. Only Colorado Springs saw more growth with less operating cost increases. Overall, Tulsa Transit runs a lean, efficient system and delivers more service to more people than similar systems, which sets it up well for future growth.

System wide Performance

System wide, ridership performance was examined for productivity and schedule adherence. Except for the obvious high passenger volumes at Denver Avenue Station and Midtown Memorial Station, routes 101 and 105 have stops with the highest stop activity in the system.

Routes were also examined at the segment level. Segments with the highest passenger loads were on Route 101 and the south half of Route 105. Moderately high loading can be seen on several east-west routes such as 100, 111, 215, 221, and 210 and the 251 crosstown. Segment analysis of passengers per revenue hour saw similar information but was more oriented to east-west route segments, and on a passenger per revenue mile basis, highest-performing segments were portions of Route 101, 105, 112, 111, 114, 215, 203, and 221. On time performance was also examined. Most routes adhered to scheduled times well. However, some routes may have more slack than necessary. These included Routes 101, 114, 251, and 471. No routes had trips that were measured as later than 4 minutes.

Flag stops were also examined, defined as locations more than 200 feet from a marked stop. A heat map was produced which showed areas of high flag stop activity which included areas along Routes 100, 101, 105, 117, and 210. Elimination of flag stops may address on time performance or safety issues as well as potentially shorter travel times and/or more time for end-of-line recovery or route extensions.

Route Level Performance

Every one of Tulsa Transit's 26 routes (20 daytime and express and 6 Nightline routes) were examined individually in terms of operating characteristics, service productivities (passengers per unit of service delivered), and financial performance as well as ranked against each other. The analysis found that routes 101, 105, and 111 tend to perform the best almost across the board. Different metrics found some shifting of these rankings, but these routes tend to carry the most people for the least amount of resources. Other top performers include routes 251, 221, and 222. The lowest performing routes tend to be the 400-series (westside and 71st Street routes not anchored to a transfer facility), 500-series (Broken Arrow), and 900-series (express) routes. The exception was in revenue per rider where routes 471 and 508 excelled.

The top four routes in terms of:

- Passengers/revenue hour: 101, 105, 111, 251
- Passengers/revenue mile: 101, 105, 111, 221
- Passengers/trip: 101, 105, 221, 222
- Revenue/rider: 222, 306, 471, 508
- Cost/rider, recovery ratio, and subsidy/rider: 100, 101, 105, 221

The bottom four routes in terms of:

- Passengers/revenue hour: 306, 418, 471, 508
- Passengers/revenue mile: 418, 508, 902, 909
- Passengers/trip: 251, 418, 471, 508
- Revenue/rider: 251, 418, 902, 909
- Cost/rider, recovery ratio, and subsidy/rider: 418, 508, 902, 909

Chapter 4 Analysis and Draft Recommendations

Chapter 4 uses the information and feedback from Chapter 2 (Outreach) and Chapter 3 (Existing Conditions) to conduct analysis on the transit system redesign. Section 4.1 provides results from a public community survey which sought feedback on the current transit network as well as on potential improvements. Section 4.2 outlines the overarching restructuring philosophy used for the draft recommendation.

A draft recommendation for restructuring the network is presented in Section 4.3. This section includes two alternatives developed for the Daytime network and a recommendation for the night/Sunday network. Section 4.3 also includes metrics used in evaluation of the draft network.

Finally, Section 4.4 discusses additional analyses important to the operations of Tulsa Transit, including analyses of flag stops, stop amenities, and service performance standards.

4.1 Community Survey Results

An online survey was created to solicit feedback on what transit improvements were most desired and what issues might affect transit users. The survey accepted feedback for a month between March 13 and April 13 and collected 517 surveys. Questions asked respondents to rank improvements such as frequency versus coverage, determine preferences on flag stops versus designated stops, and indicate their impediments to transit use. It was hypothesized that feedback would differ depending on if the respondent was a regular transit user, someone who may be familiar with transit but doesn't utilize it often or someone who knows or is aware of clients or constituents who utilize transit. As such, the survey was set up to allow respondents to indicate whether they were riders, non-riders or representatives of transit stakeholder agencies. Similarly, the questions posed to each of these groups were tailored to their specific needs. For instance, questions on trip type and transfer information were more pertinent to regular users, whereas questions directed at agency representatives examined issues facing their constituents or clients.

Questions on Transit Usage

General public transit users indicated their trip type and whether and where they make transfers. The most common trip purpose was for work (43%) followed by errands (20%). Almost a third of users had no transfers on their trips, 46% had one transfer and the remaining 22% had two or more transfers. The transfer locations were overwhelmingly at Denver Avenue Station (DAS) (43%), with 22% at Midtown Memorial Station (MMS) and 20% elsewhere such as on-street between routes. The survey also inquired whether transit users generally utilized flag stops (16%) or designated stops (84%) and users' predilection for flag stops: if users were forced into an all-designated stop system how would they respond? Nearly 90% of users stated they would be willing to use a designated stop instead of a flag stop but 58% of those said there would be some sort of difficulty in transitioning to a designated stop; around 12% explicitly stated they would not be willing to use a designated stop.

General public non-transit users were also queried on their motivations for using transit. Non-users gave multiple reasons when they would use transit: if it was somehow like driving, such as with comparable trip times (58%), followed by lack of car ownership (48%), more bus amenities/safer (35%) and if there was an economic benefit to them (30%). Non-users also gave multiple factors that were

important to them in choosing transit: convenience (77%), competitive travel times (60%), frequency (52%), safety/security (43%), economic (35%) and passenger comfort (18%).

Agency representatives were polled on what issues they thought their clients or constituents faced. Multiple reasons were allowed and included routes not going where needed (45%), inadequate weekend service (36%), long waits (35%), service ending prematurely (34%), infrequency (30%), slow travel times (20%) and stop amenities/safety (17%).

Tradeoff Questions

Because funding for transit is limited, it is vital to understand what Tulsans desire out of their transit system to prioritize improvements. All users were queried on tradeoffs – a series of questions that gave two choices and asked respondents to choose which one they preferred. Figure 4-1 through Figure 4-7 display the results. Highlights include:

- When comparing frequency versus coverage, existing transit users seemed to value coverage a bit more than non-users who seemed to value frequency slightly more. Agency representatives valued coverage much more.
- When comparing improved frequency to improved span of service, all groups overwhelmingly chose a better span of service, which seems to indicate a desire for either earlier or later service.
- When polling about a preference to improve either weekday or weekend service, users indicated a desire for better weekend service (64% compared to 36%), but non-users and agency representatives were evenly split, possibly indicating a desire to improve both.
- When asking whether improvements should be made to the Nightline 800-series routes or the core weekday network, all groups indicated a preference for the core network, with 68% of users indicating their preference for core network improvements.
- When comparing flag stops to designated stops, 57% of transit users thought flag stops should be allowed but the non-user and agency representative groups were slightly more in favor of designated stops.
- When comparing a hypothetical one-seat ride with transfers but with more frequency, all groups thought transfers were fine if it included more frequency. Over three-quarters of transit users thought transfers with more frequency was okay, compared to 54% of non-users and 58% of agency representatives.
- When addressing bi-directional service compared to large one-way loops, two-thirds of users and nearly as many non-users preferred bi-directional service but agency representatives were evenly split.

Overall, the desired improvements from the survey appear to request extending the span of service; extend daytime routes into evening service, replacing the existing Nightlines; allow for transfers as long as it improves frequency of service; and move toward bidirectional service instead of one-way loops. Some results were mixed, however: there was no clear mandate for either frequency or coverage; improvements could be made to both weekday or weekend service; and the removal of flag stops was not clear based on survey feedback, although it seems there is willingness to eliminate them. Additional details on the community survey results can be found in Appendix 4A.

Figure 4-1. Frequency vs Coverage Trade Off Survey Results

Figure 4-2. Frequency vs Span Trade Off Results

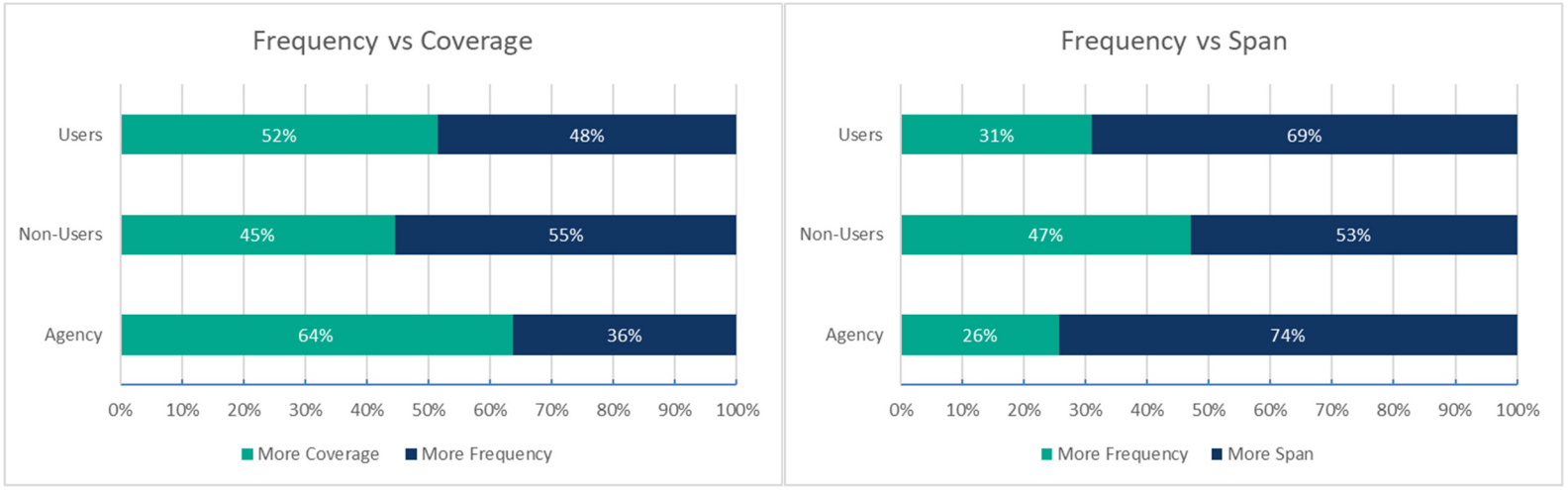


Figure 4-3. Weekday vs Weekend Trade Off Survey Results

Figure 4-4. 800-series Routes vs Daytime Network for Nighttime Service Trade Off Results

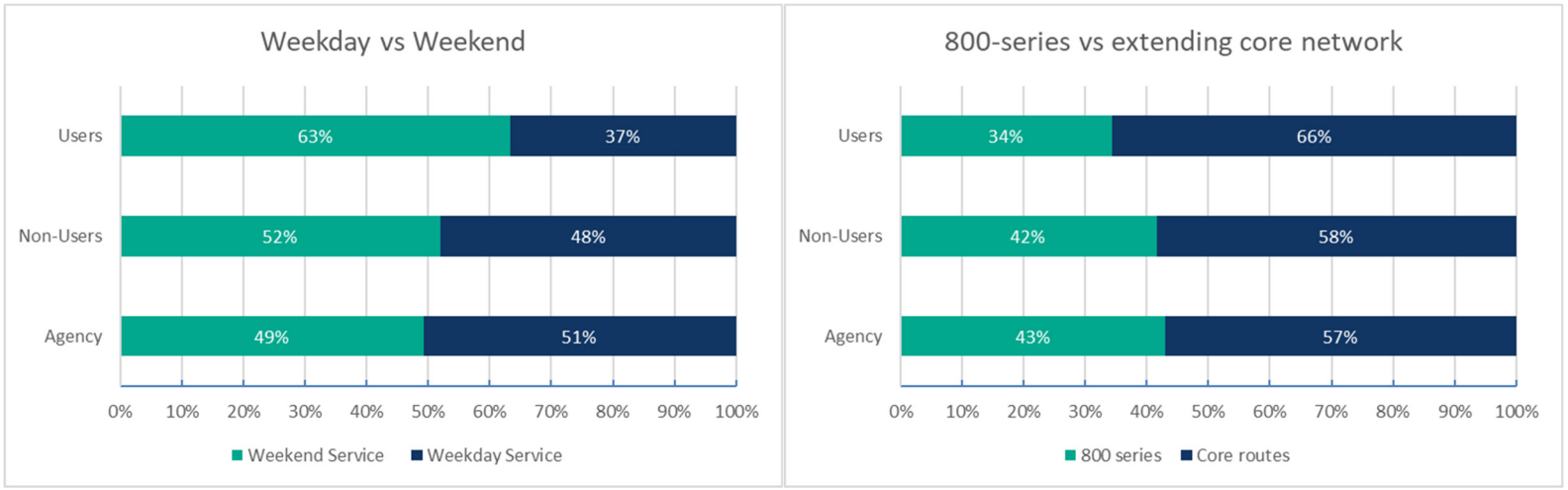
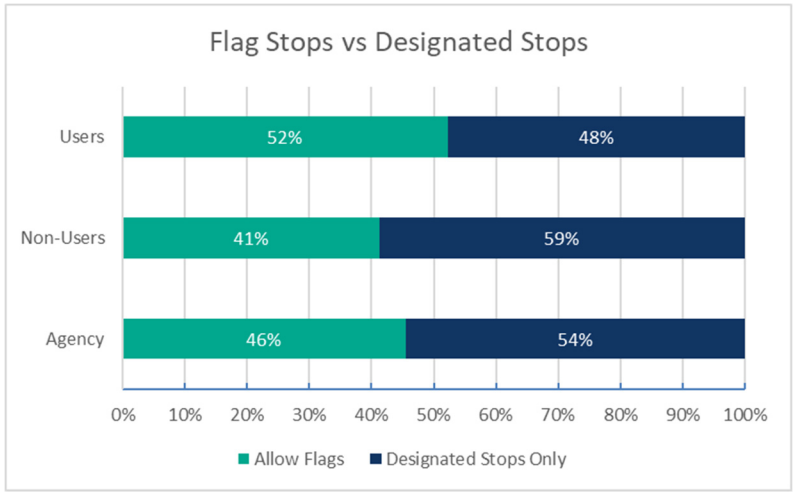


Figure 4-5. Flag Stops vs Designated Stops Trade Off Survey Results

Figure 4-6. One-seat Ride vs Transfers Trade Off Results



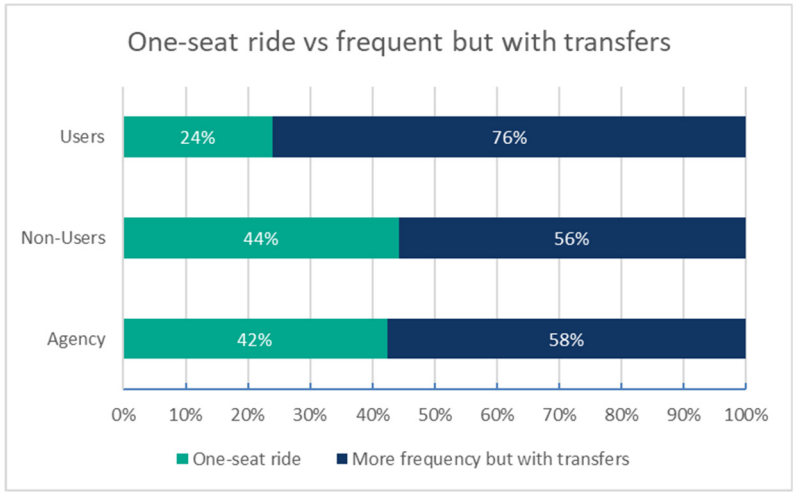
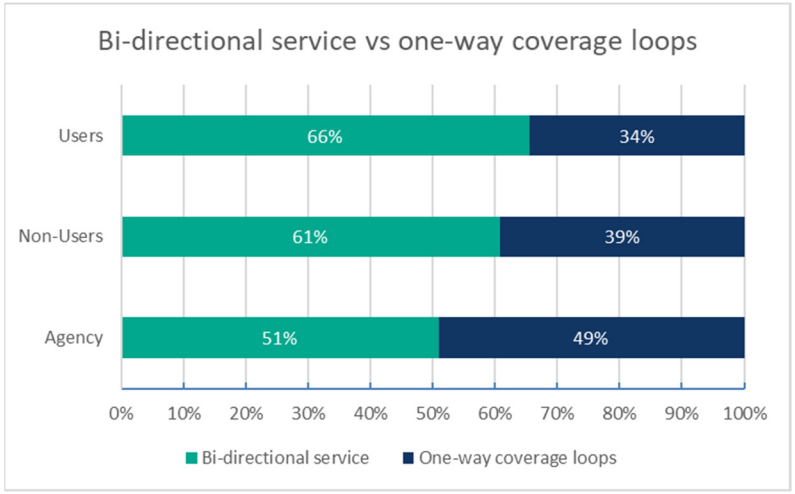


Figure 4-7. Bi-directional Service vs Coverage Loops Trade Off Survey Results



4.2 Restructuring Philosophy

Several topics are important to the overall goals of restructuring the existing Tulsa Transit network to provide more efficient service. These included the format or structure of the network of routes and the purpose behind their reconfigured alignments, use of regular clockface headways for the time between bus arrivals, utilizing the forthcoming AERO BRT service as a foundation for a new Tulsa Transit network, exploration of creative approaches to providing service in lower productivity areas and defining priorities for building a new network. These topics are described in more detail below.

Clean Route Structure

Overall, Tulsa Transit routes should be easy to understand and take advantage of Tulsa's grid network, where possible. While there are multiple ways to structure routes, three main ways are:

- **Radial**: system is designed to converge at a single point, usually in downtown core at a transfer facility. This allows for a single, convenient location for transfers.
- **Grid:** system is designed using north-south or east-west alignments, and connections occur in a regular pattern at main intersections. Routes will not be timed to meet up at every intersection, meaning high service frequency is necessary to facilitate movement across the network.
- **Hybrid Grid**: system is designed to have long north-south or east-west alignments (like a grid), but routes deviate to meet at designated transfer locations which help with negate issues with frequencies and transfers. While hubs can be operated on-street, this route network is best when capital investments allow for off-street hubs to be constructed.

Based on Tulsa Transit's grid, travel patterns, and limited resources, a hybrid grid was determined to be the desired route structure for a revised Tulsa Transit network.

Clockface headways (30 or 60 minutes)

Tulsa currently provides service at varying headways, including routes operating with 30, 45, and 60-minute intervals during weekday daytimes. During nights and Saturdays some routes operate at even higher headways, including 75, 90, and 120-minute intervals.

The headway variance can cause confusion among passengers and requires a schedule in some cases because buses come at different times each hour with a 45, 75, or 90-minute headway.

Clockface headways are frequencies that are divide evenly into the hour (such as every 30 or every 60 minutes). These headways are preferable from a customer standpoint, since schedules will maintain consistent arrival or departure times from hour to hour. For Tulsa Transit operations, clockface headways of 30 or 60 minutes are recommended wherever possible. Not only will this reduce customer confusion, but it will also improve connections because routes will be able to meet at hubs at synchronized intervals.

Peoria AERO BRT service as foundation

The Peoria AERO BRT is a high frequency corridor that will improve connectivity both on Peoria Avenue and the rest of the Tulsa Transit network.

Peoria BRT is proposed to have 15-minute service during peak periods and 20-minute service all other times. While details of the service plan are still being finalized, it will be the first of possibly several corridors with frequent, premium service.

As this network redesign is completed, efforts should be made to connect at many routes as possible to Peoria AERO BRT to take advantage of the benefits of the newly implemented service.

Consider New Ways to Deliver Service in Low Density Areas

Low density areas tend to be less productive with transit service compared to the core of the region. While low density sprawl can include trip generators, they are typically surrounded by large areas with few riders. As a result, buses travel through low ridership areas to reach the high ridership generator.

Creative approaches to continuing to serve these areas are necessary because they free up Tulsa Transit resources for the more productive parts of the network. New service delivery opportunities include partnerships with TNCs (transportation network companies) such as Lyft or Uber, on-demand services that are contracted to a private carrier (purchased transportation), or flexible routing which allows for deviated fixed route service or a flex-service zone.

Redesign Priorities

Based on the above results from both the community survey, the public outreach process including stakeholder review, and a comprehensive route workshop involving Tulsa Transit staff completed in April 2018, priorities for a reorganized transit network include:

- Connect routes to Peoria AERO BRT to take advantage of the speed and frequency improvements in the Peoria Avenue corridor.
- Consider opportunities to move toward a hybrid grid, including the use of hubs at locations other than Denver Avenue Station and Midtown Memorial Station.
- Consider the development of a hierarchy of service types as Tulsa Transit transitions toward an agency providing multiple services: premium BRT, local, express and zone-based services.
- Focus on crosstown trip patterns particularly between areas of high residential density or need and key destinations such as areas of high employment, grocery stores and retail amenities, medical facilities and institutional destinations.
- Provide a balance of coverage in terms of repurposing revenue service from lower to higher productivity areas as well as investing in frequency improvements along key corridors.
- Consider the wholesale elimination of flag stops to reduce safety issues and increase both average vehicle speeds and on-time performance.

4.3 Draft Recommended Networks

Following the public input process and incorporation of study goals as well as close coordination with agency staff, recommendations were developed to revise the Tulsa Transit network, including revised weekday daytime, Saturday daytime, and night/Sunday networks. Network structure was intended to be consistent across all time periods to improve customer understanding and reliability. Alternative service delivery was also considered, particularly for Jenks and Broken Arrow, two lower density destinations on the edge of the metropolitan area.

Weekday Daytime

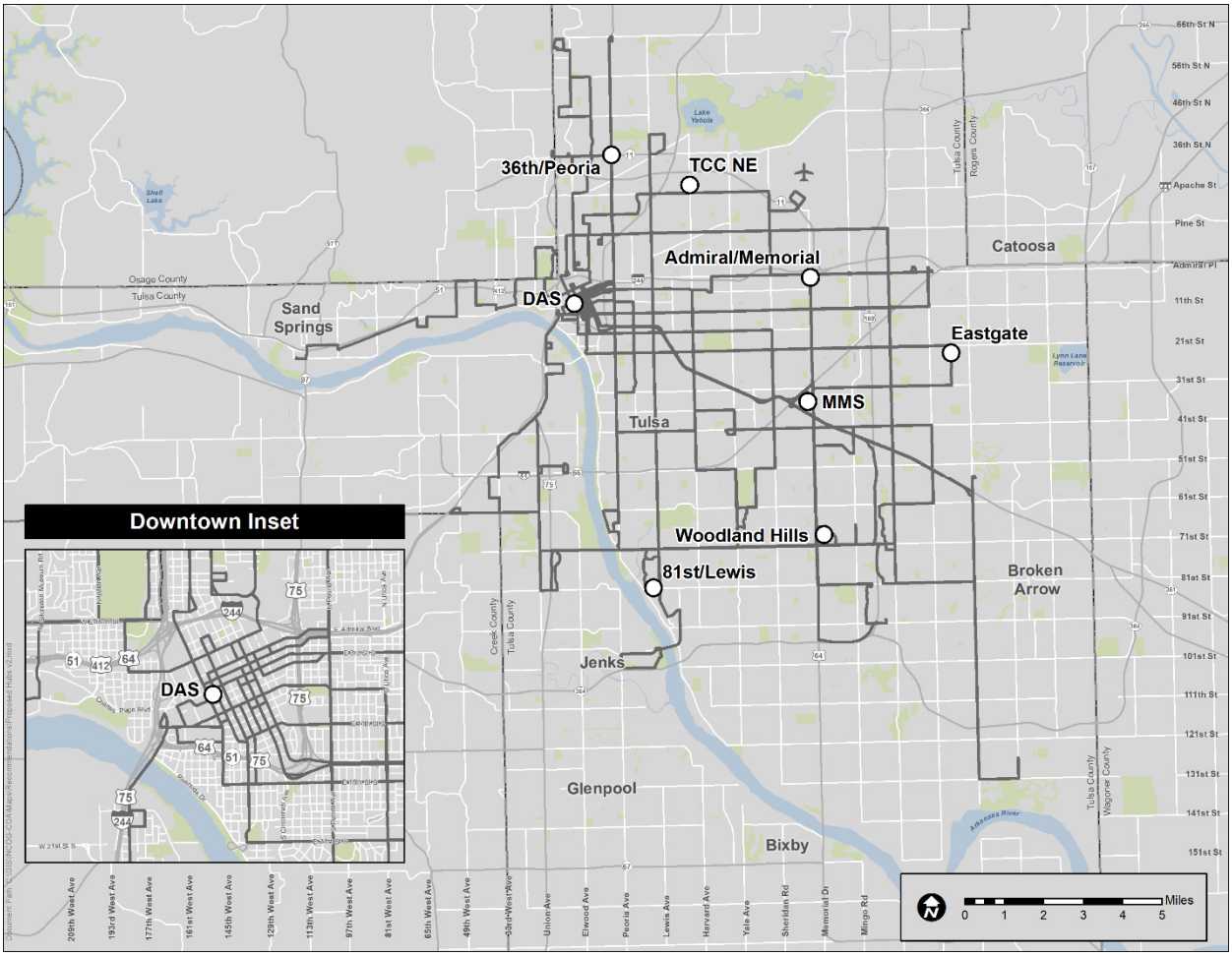
Based on the review of the existing Tulsa Transit weekday network and the restructuring philosophy presented in section 4.2, it was determined that the weekday daytime network should be redesigned.

During the route workshop, staff identified the hybrid grid as the desired route structure. A series of subhubs were identified outside of Denver Avenue and Midtown Memorial stations for potential connections. Those subhubs – strategic locations near desired destinations – include the following:

- 36th Street N and Peoria Avenue
- TCC Northeast (Harvard Avenue and Apache Street)
- Admiral Walmart (Admiral Place and Memorial Drive)
- Eastgate (21st Street N and 137th Avenue)
- Woodland Hills (71st Street S and Memorial Drive)
- 81st Street Walmart (81st Street S and Lewis Avenue)

While exact locations and amenities are to be determined, each subhub is presumed to include an off-street waiting area, one or two shelters and benches, and other amenities like lighting, trash receptacle, bicycle parking, and schedule and route information. Figure 4-8 shows the proposed subhubs within the context of the existing Tulsa Transit network.

Figure 4-8. Proposed Subhubs Within Tulsa



Although an overhaul was desired, certain aspects of the existing network were important to retain. For example, service along key arterials and to major destinations were to be incorporated into the new

design. Locations such as Tulsa Public High Schools, local technical colleges and institutions are expected to continue to be served in the redesigned network. These structural constraints mean alignments often had to remain in some segments but still allowed some flexibility in other locations.

Structural constraints aside, the socioeconomic-demographic data from Chapter 3 indicates service could be reallocated to better serve existing transit riders. For example, frequent (30-minutes or better) east-west service is missing from the existing network between Admiral Place and 71st Street. Additionally, matching service levels to demand was another consideration. As documented in the community survey results, the public indicated a desire to strike a balance between coverage and frequency to best facilitate movement through the network.

The revised network includes the following highlights:

- North Tulsa has been reorganized into two services with a slightly more direct, 30-minute service route (Route 1) providing a connection to the Peoria AERO BRT along with a neighborhood circulator (Route 19) that provides connections to social services, the Osage Casino, the Peoria AERO BRT and TCC NE. Route 1 is also through-routed (interlined) along Southwest Boulevard to serve West Tulsa;
- Service on the Pine and Apache corridors has been reorganized so that North Tulsa has better access to the Admiral/Memorial Walmart, MMS, and Woodland Hills Mall.
- A new route (Route 11) is proposed to follow 11th Street to Yale Avenue and then 21st Street to Eastgate. This alignment follows the proposed Route 66 AERO BRT corridor.
- The 31st Street route (Route 13) would make a direct connection from Peoria AERO BRT to Eastgate subhub while also serving a new social services complex planned for Legacy Plaza (31st Street/Hudson Avenue).
- East-west service (Route 14) connecting Peoria AERO BRT to the Promenade Mall at 41st Street S and Yale Avenue is added.
- Corridor-based service for the Harvard, Yale, Sheridan, and 31st Street corridors is added or enhanced.

Additionally, route structures were simplified or reorganized throughout the network, resulting in the desired hybrid grid network. The new network fosters timed connections at identified subhub locations, allowing for easier movement throughout Tulsa.

During the staff route workshop in April 2018 there was some debate on placement of resources within the network. As a result, two proposed transit networks evolved during the draft recommendations phase: Alternative A Frequency and Alternative B Coverage. Both networks have the same revised base network described above. The major difference is the allocation of resources. Alternative A Frequency puts resources into frequency improvements on key corridors while Alternative B Coverage puts resources into covering new territory in Tulsa. Each alternative is described in more detail below.

Alternative A Frequency

The Alternative A Frequency network prioritizes east-west mobility by creating 30-minute headways on two routes, Route 11 and Route 13. To accomplish this, routes 5 and 6 connect to each other at the Harvard/Admiral intersection. Table 4-1 shows the proposed weekday daytime network for Alternative A.

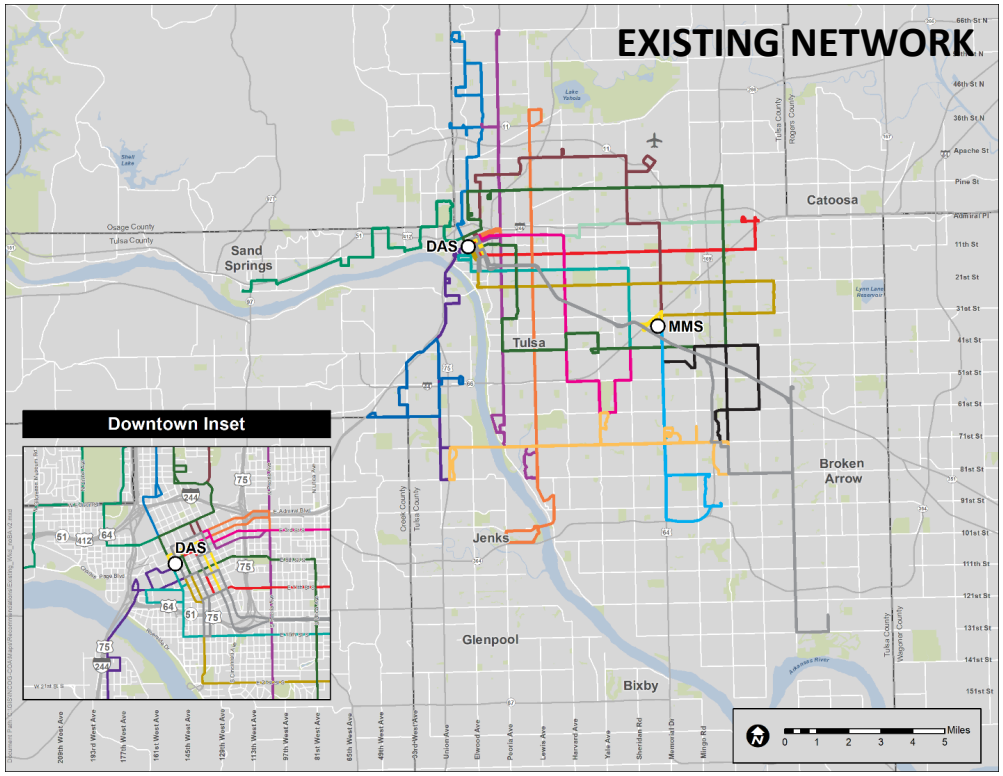
Table 4-1. Alternative A Frequency Route Summary

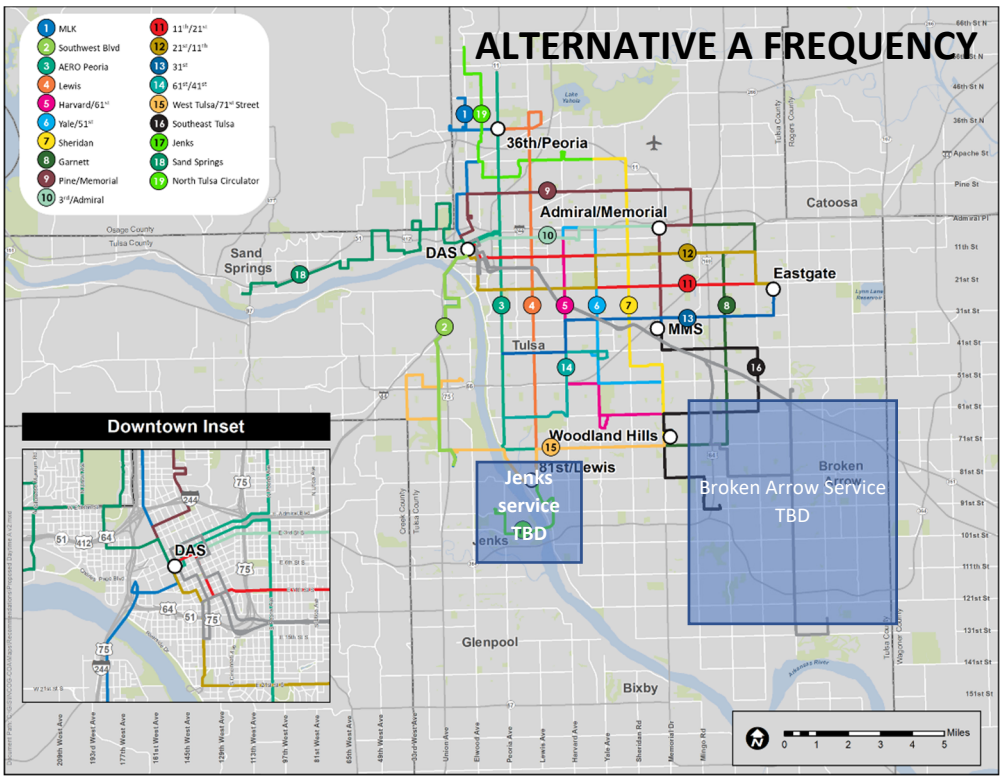
			Weekday Peak		Weekday Offpeak		Saturday	
Number	Name	Description	Headway	Span	Headway	Span	Headway	Span
1	MLK	From Dream Center (46th Street N) to DAS	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
2	Southwest Blvd	From DAS to Tulsa Hills	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	15 min	6 hrs	20 min	8 hrs	20 min	13 hrs
4	Lewis	From 36th Street N/Hartford to 81st Street Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
5	Harvard/61st	From **Harvard/Admiral** to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
6	Yale/51st	From **Harvard/Admiral** to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
7	Sheridan	From TCC NE to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
8	Garnett	From Admiral/Memorial to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
9	Pine/Memorial	From DAS to MMS	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	**30 min**	6 hrs	**30 min**	8 hrs	60 min	13 hrs
12	21st/11th Streets	From DAS to Eastgate	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
13	31st	From 41st/Peoria to Eastgate	**30 min**	6 hrs	**30 min**	8 hrs	60 min	13 hrs
14	61st/41st	From 61st/Peorial to The Promenade Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
15	West Tulsa/71st Street	From 49th/Jackson to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
16	Southeast Tulsa	From Woodland Hills Mall to St Francis Hosp. South	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
17	Jenks Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
18	Sand Springs	From DAS to Sand Springs Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
19	North Tulsa Circulator	From 61st Street N to TCC NE	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
TBD	BA Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
902	BA Express	From B.A. to Downtown Tulsa	4 Trips	-	-	-	-	-
909	Union Express	From Union HS to Downtown Tulsa	2 Trips	-	-	-	-	-

*Descriptions in **red** are different than Alternative B*

A comparison of the existing and Alternative A networks is shown in Figure 4-9.

Figure 4-9. Comparison of Existing Weekday Daytime and Alternative A Frequency





Alternative B Coverage

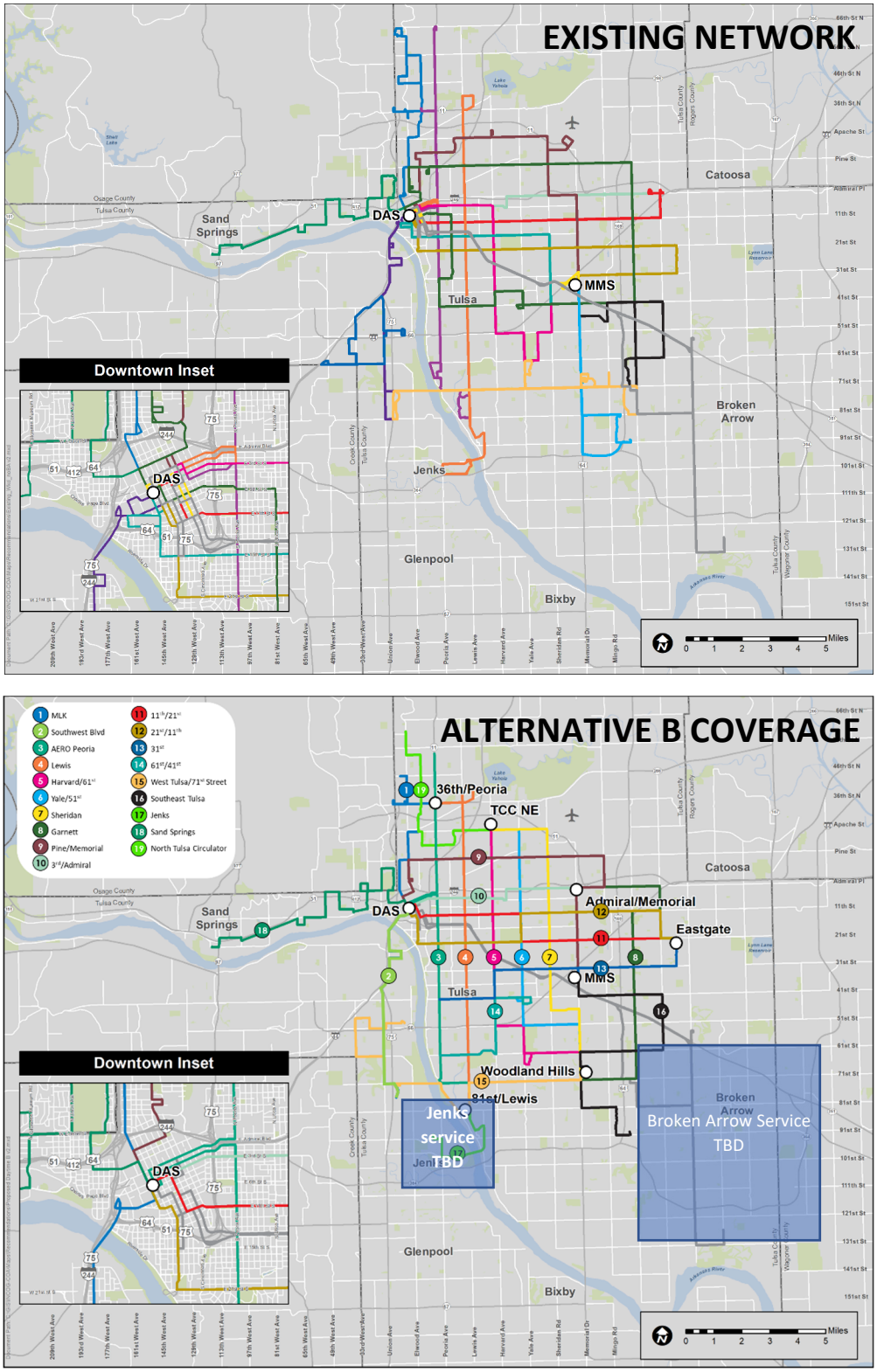
The Alternative B Coverage network prioritizes coverage by extending the Harvard and Yale routes north to TCC Northeast. This establishes a new hub at TCC NE where four routes would meet (routes 5, 6, 7, and 19). To accomplish this, routes 11 and 13 would each have a 60-minute headway. Table 4-2 shows the proposed weekday daytime network for Alternative B.

Table 4-2. Alternative B Coverage Route Summary

			Weekday Peak		Weekday Offpeak		Saturday	
Number	Name	Description	Headway	Span	Headway	Span	Headway	Span
1	MLK	From Dream Center (46th Street N) to DAS	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
2	Southwest Blvd	From DAS to Tulsa Hills	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	15 min	6 hrs	20 min	8 hrs	20 min	13 hrs
4	Lewis	From 36th Street N/Hartford to 81st Street Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
5	Harvard/61st	From **TCC NE** to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
6	Yale/51st	From **TCC NE** to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
7	Sheridan	From TCC NE to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
8	Garnett	From Admiral/Memorial to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
9	Pine/Memorial	From DAS to MMS	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	**60 min**	6 hrs	**60 min**	8 hrs	60 min	13 hrs
12	21st/11th Streets	From DAS to Eastgate	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
13	31st	From 41st/Peoria to Eastgate	**60 min**	6 hrs	**60 min**	8 hrs	60 min	13 hrs
14	61st/41st	From 61st/Peorial to The Promenade Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
15	West Tulsa/71st Street	From 49th/Jackson to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
16	Southeast Tulsa	From Woodland Hills Mall to St Francis Hosp. South	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
17	Jenks Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
18	Sand Springs	From DAS to Sand Springs Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
19	North Tulsa Circulator	From 61st Street N to TCC NE	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
TBD	BA Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
902	BA Express	From B.A. to Downtown Tulsa	4 Trips	-	-	-	-	-
909	Union Express	From Union HS to Downtown Tulsa	2 Trips	-	-	-	-	-

A comparison of the existing and Alternative B networks is shown in Figure 4-10.

Figure 4-10. Comparison of Existing Weekday Daytime and Alternative B Coverage



Saturday Daytime

The proposed Saturday daytime network is based on the weekday daytime network and will have consistent headways across all routes. Current Saturday service headways vary from 45 to 120 minutes. The proposed network will operate all routes at 60-minute headways except for the Peoria AERO BRT, which is assumed to operate every 20 minutes[10]. During the draft recommendations stage the Saturday daytime network was assumed to be Alternative A Frequency. However, a final determination of this network was made with the final recommendation (see Chapter 5).

Night/Sunday

The existing night/Sunday network had several large, one direction loops which are generally inefficient particularly from a customer mobility standpoint. Additionally, these routes only had a few trips and did not generally reflect the same service during the daytime.

The public overwhelmingly supported the idea that the night/Sunday network should reflect the daytime route structure instead of changing to the different routes (the 800-series routes). Using daytime routes has the benefit of making the night/Sunday network easier to understand as riders do not have to memorize a new set of routes to travel at night and on Sundays.

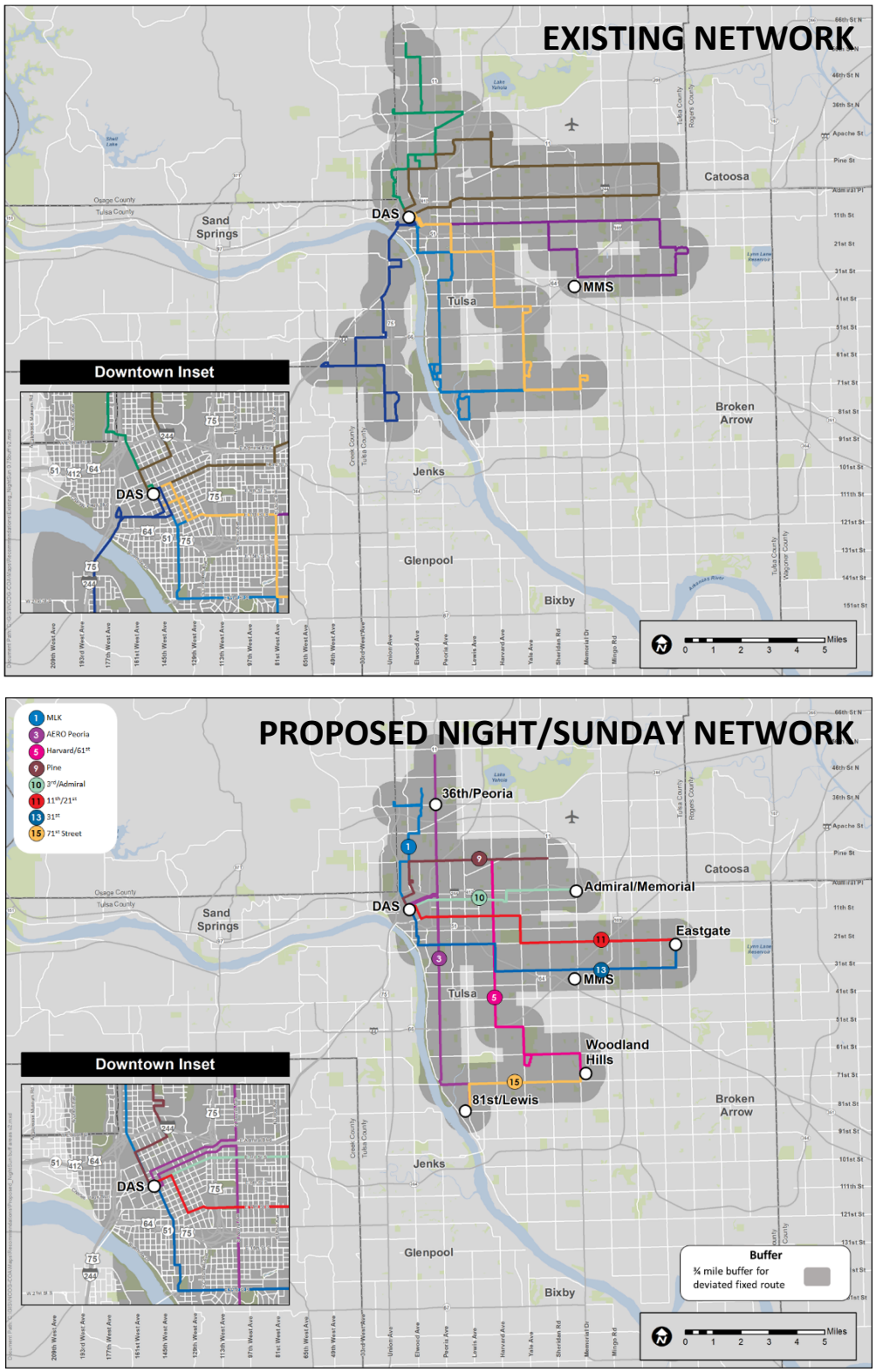
As a result, the revised night/Sunday network uses a limited set of daytime routes, including routes 1, 3, 5, 9, 10, 11, 13, and 15. The proposed network is centered around the new Peoria AERO BRT which will run into the evening with 20-minute frequency service. The remaining routes would operate once an hour for three trips each evening. Users can depend on the same routing at night and on Sundays as they do during other days and times of the week. Further, these routes will now have consistent headways throughout the evening. Finally, the proposed network can scale up with more routes as additional funding is identified. Thus, a long-term goal of Tulsa Transit would be to grow the night/Sunday network to mirror the full daytime network.

Table 4-3. Night/Sunday Route Summary

			Weekday Night		Saturday Night		Sunday	
Number	Name	Description	Headway	Span	Headway	Span	Headway	Span
1	MLK	From Dream Center (46th Street N) to DAS	60	3 hrs	60	3 hrs	60	10 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	20	3 hrs	20	3 hrs	20	14 hrs
5	Harvard/61st	From Harvard/Admiral to Woodland Hills Mall	60	3 hrs	60	3 hrs	60	10 hrs
9	Pine/Memorial	From DAS to Pine/Sheridan	60	3 hrs	60	3 hrs	60	10 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60	3 hrs	60	3 hrs	60	10 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	60	3 hrs	60	3 hrs	60	10 hrs
13	31st	From DAS to Eastgate	60	3 hrs	60	3 hrs	60	10 hrs
15	71st Street	From 81st Walmart to Woodland Hills Mall	60	3 hrs	60	3 hrs	60	10 hrs

[10] Some frequencies for Peoria AERO BRT are yet to be determined. An assumption was made for this document, but it could change as Tulsa Transit gets closer to implementation.

Figure 4-11. Comparison of Existing and Proposed Night/Sunday Network

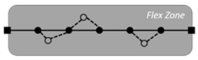
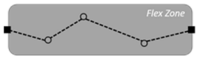
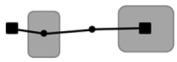
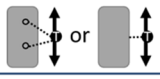
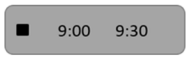
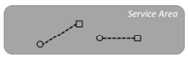
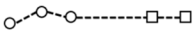
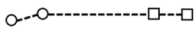


Alternative Service Delivery Options

A review of existing service productivities (see Chapter 3) show some routes on the edge of the metropolitan area suffer from low utilization, particularly in Broken Arrow and Jenks. While these areas are important to serve, the question is whether alternative service delivery beyond fixed route service is possible.

To that end the study team took a detail look at alternative service delivery options, as summarized in Table 4-4. Service to Jenks and Broken Arrow could potentially be satisfied using one or more of the options outlined in the table. Each city pays Tulsa Transit to operate service. Therefore, any change or recommendation to serve these areas would require discussion with local decision makers. As such, no draft recommendations are made within this section of the Connecting Progress Plan.

Table 4-4. Alternative service delivery options

Delivery Model	Illustration	Description
Deviated Fixed Route		Regular schedule operating along path, with or without marked bus stops, deviating to serve on-demand zone
Point Deviation		Serves on-demand requests in a zone, but also serves a small number of stops in the zone, following no regular path
Flexible Route Segments		Conventional fixed route, fixed schedule, but switches to on-demand operation for a limited portion of route
Demand Response Connector		On-demand mode within a zone, with one or more scheduled transfer points to a fixed-route network or rail station
Zone Route		Operates in on-demand mode within a zone with established departure and arrival times at one or more established locations.
Taxi / TNC / Dial-a-Ride		Provides point-to-point on-demand service within a defined zone with no fixed timepoints. Can be operated as sequential or concurrent trip sharing.
Private Shuttles / Microtransit		Traditional private shuttles provide limited stops, only picking up specified riders. Microtransit provides pooled on-demand service within defined zone using dynamic routing based on demand.
Vanpools / Ridesharing / Ridesplitting		Passengers share private trip from common origins to common destinations. Ridesplitting incorporates mobile app to match drivers to passengers.

Evaluation Measures

Once a draft recommendation was identified, the study team evaluated the proposal using several measures to determine how it compares with the existing Tulsa Transit network. These measures included the number of route connections, route frequencies, travel time comparisons, service area coverage and demographic measures.

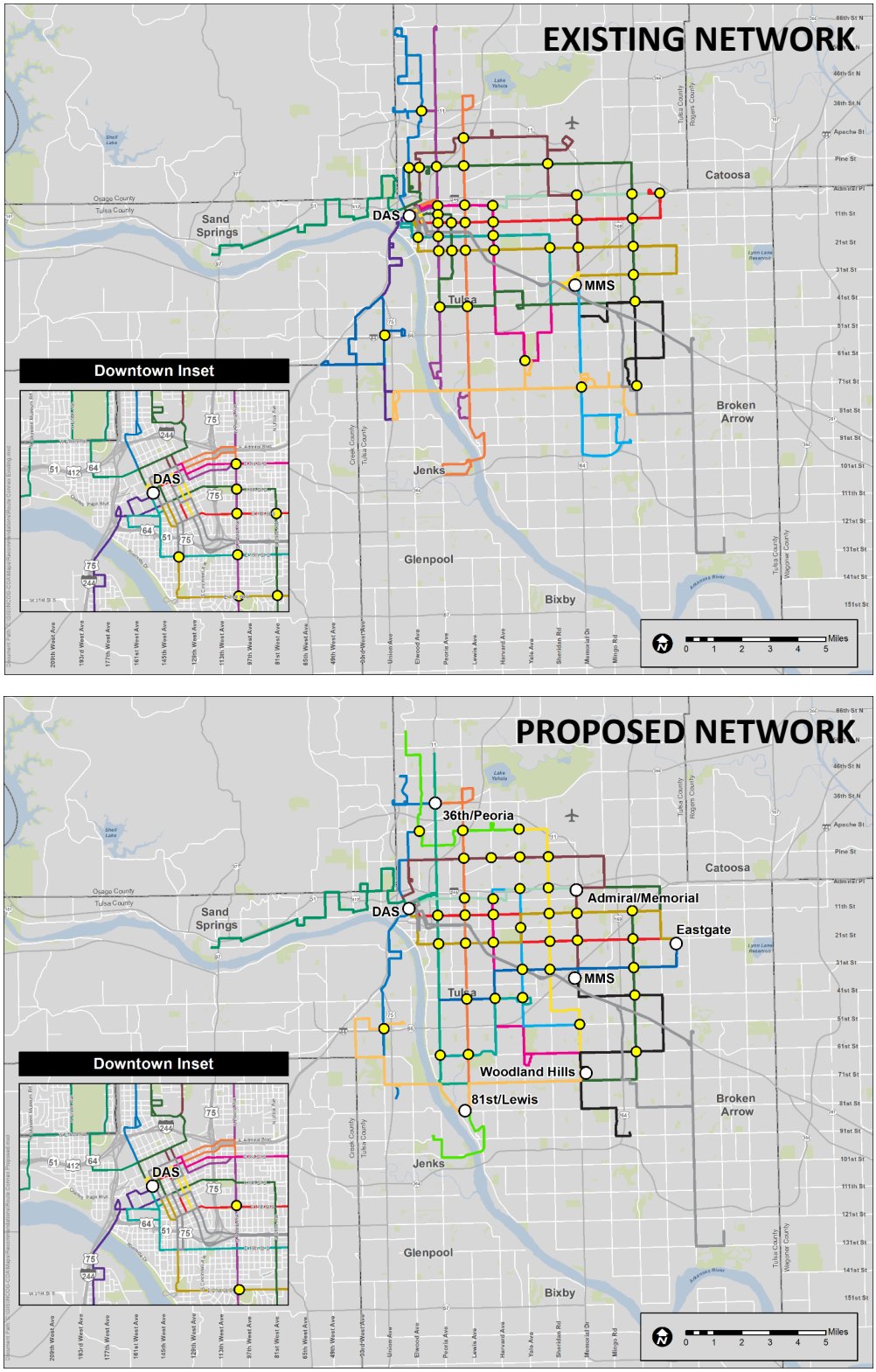
Route Connections

One of the potential benefits of the proposed network alternatives is a decentralized network of connections to other routes possible because of the simplified restructuring of routes along corridors. While most of transfers will occur at DAS, MMS, or one of the other subhubs due to timed connections, the ability to transfer at an intersection will be important to facilitate movement throughout the city.

A comparison of the distribution of transfer locations between existing and proposed can be seen with Figure 4-12. Overall the same number of connections is featured in the existing and proposed networks. The big difference is in location. Route connections for the existing network are grouped primarily in Midtown/Pearl District area of Tulsa because of the number of routes concentrated in this area. So even if riders want to transfer outside of DAS, they still must travel very close to downtown to connect in the existing system.

Conversely, connections for the proposed network (for this evaluation Alternative A is used), are dispersed more evenly and at regular intervals along major arterials. This distribution means riders can be more efficient in their transfer instead of traveling close to downtown, an obvious improvement over existing.

Figure 4-12. Comparison of Existing and Proposed Route Connections



Frequency

Frequency is one of the primary indicators of a rider's ability to move successfully through the network since it determines how soon one can catch a bus or make a connection. The existing weekday daytime network is shown in Figure 4-13. Most of the routes have peak frequencies of every 45 minutes, with routes 100, 101, 105 and 251 operating every 30 minutes.

Frequencies for the proposed weekday daytime networks are shown in Figure 4-14 for Alternative A Frequency and Figure 4-15 for Alternative B Coverage. While most routes have shifted to every 60 minutes (instead of every 45 minutes), the change allows for timed connections at the subhubs and allows for some of the savings to be reallocated into improvements elsewhere in the network.

Existing Saturday daytime frequencies are shown in Figure 4-16 below. Most routes operate with varying frequency (the blue 75-minute to 135-minute category). It is particularly problematic because there is no standard frequency, meaning routes rarely connect in a timed fashion. The highest frequency routes are 101, 105, 418 and 251, each operating every 45-minutes.

Saturday daytime frequencies are proposed to be every 60 minutes across all routes except for the Peoria AERO BRT. This would be a large improvement from existing, providing consistency and timed connections across the network. The proposed Saturday daytime frequency is shown in Figure 4-17 (for Alternative A). Alternative B would have identical Saturday frequency improvements but a slightly different route structure with extensions of the Harvard and Yale routes to TCC Northeast instead of Admiral Place.

Figure 4-13. Peak Frequency for Existing Weekday Daytime Network

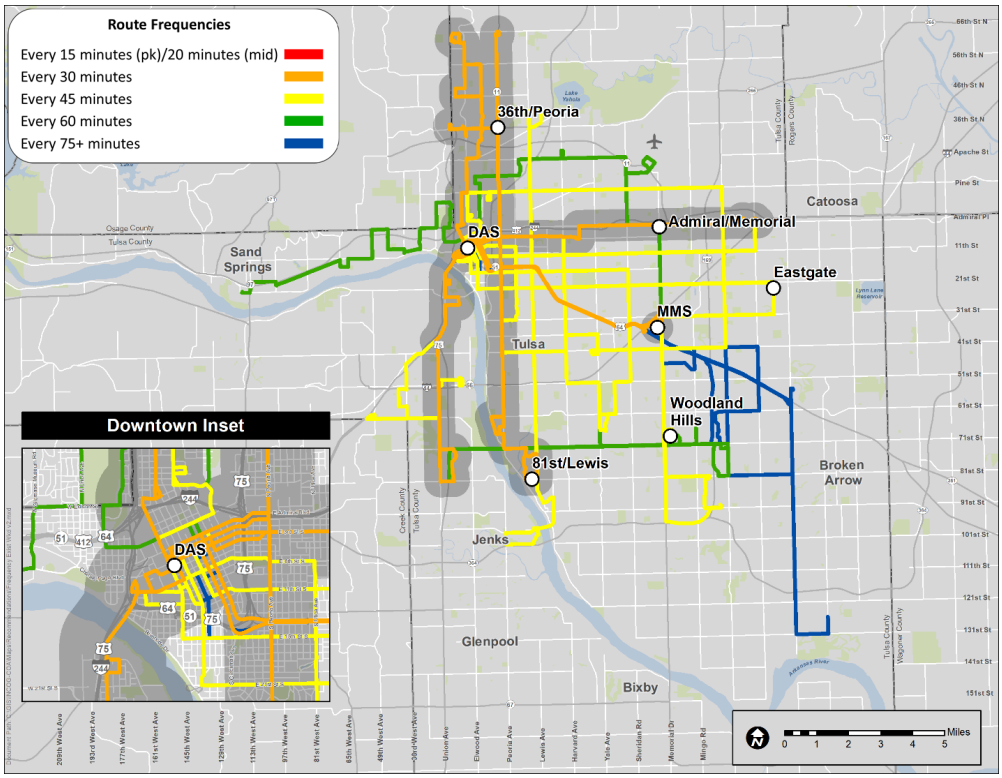


Figure 4-14. Peak Frequency for Proposed Alternative A Frequency Daytime Network

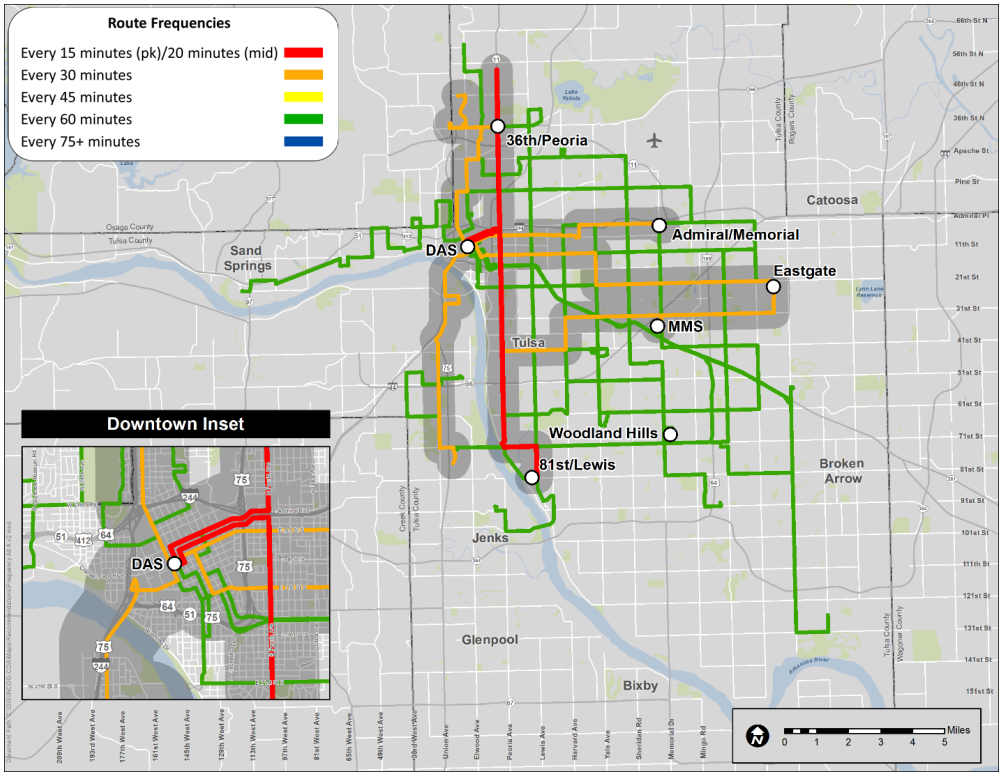


Figure 4-15. Peak Frequency for Proposed Alternative B Coverage Daytime Network

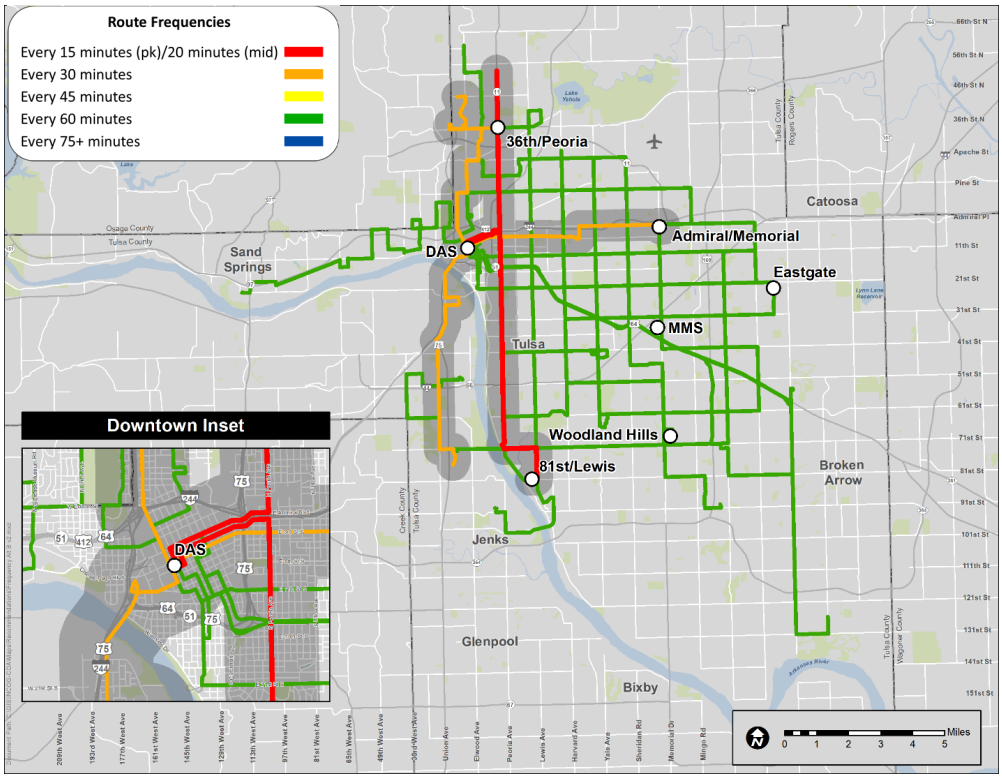


Figure 4-16. Frequency for Existing Saturday Daytime Network

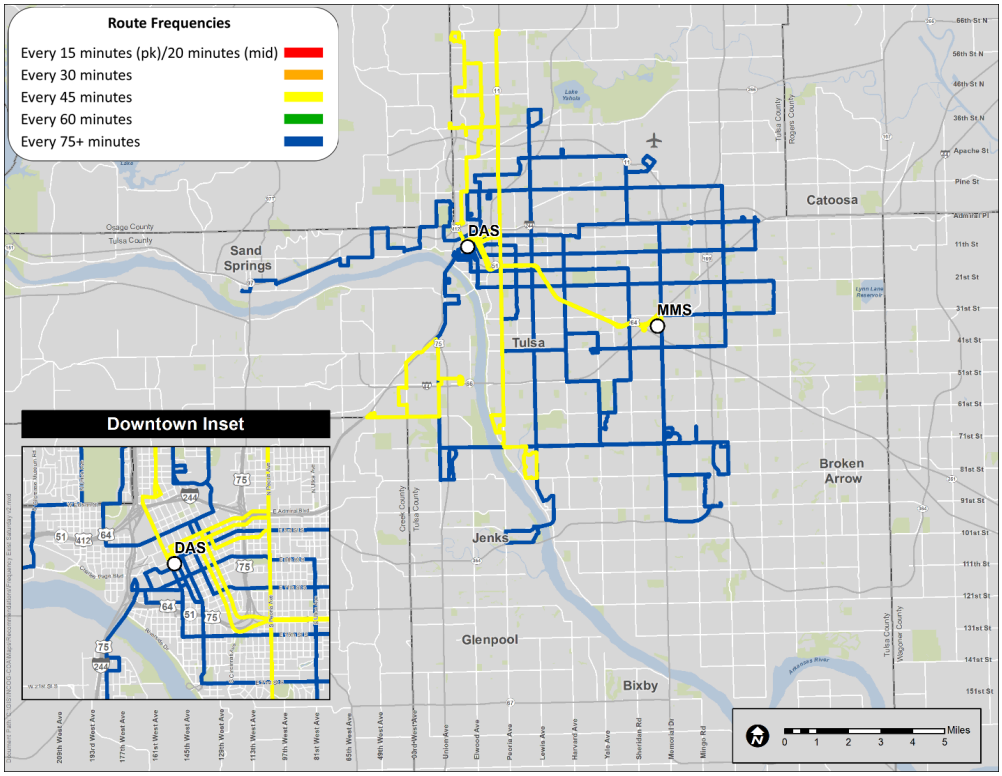
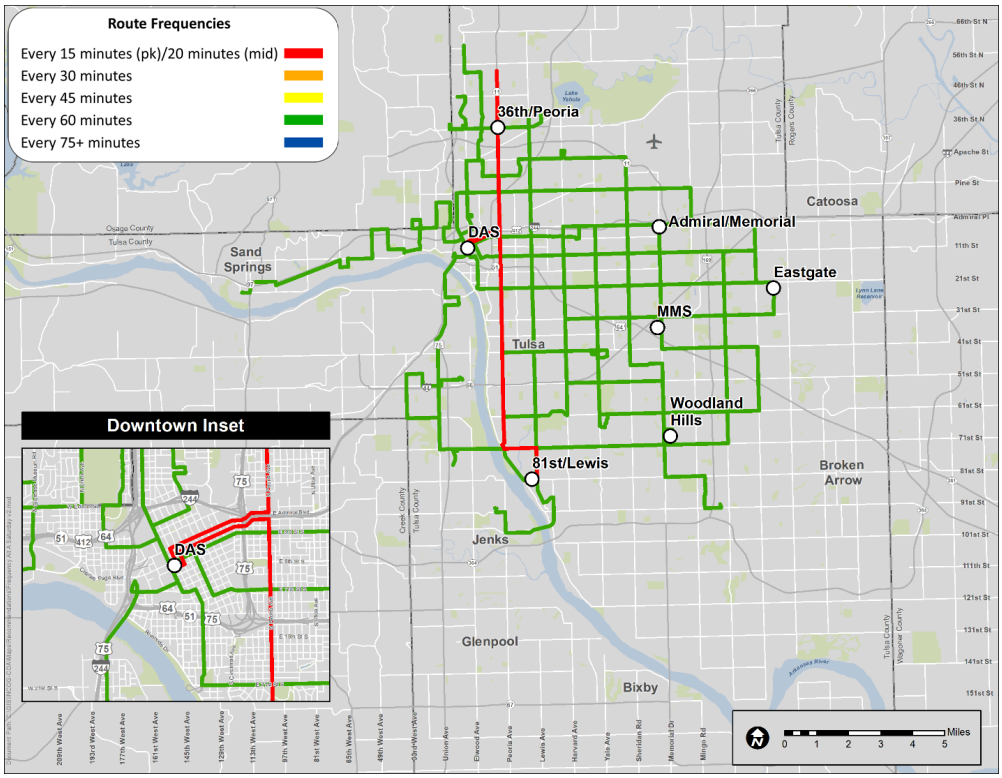


Figure 4-17. Frequency for Proposed Saturday Daytime Network



Note: Alternative A used for this map. Alternative B has the same proposed Saturday daytime frequencies by route.

Travel Time Comparisons

One of the benefits of the restructured network is improvements to frequency and connectivity, which in turn should result in travel time savings for riders. To evaluate this improvement, the study team selected ten important locations (five origins and five destinations) in Tulsa, including:

Origins	Destinations
E. 46th St. N. / Martin Luther King, Jr. Blvd.	E. Admiral Pl. / S. Memorial Dr.
N. Lewis Ave. / E. Pine St.	E. 41st St. / S. Yale Ave.
E. 21st St. / S. Garnett Rd.	Woodland Hills Mall
E. 61st St. / S. Peoria Ave.	E. 11th St. / S. Utica Ave.
W. 61st St. / S. Union Ave.	Tulsa Hills Shopping Center

Travel times were estimated for both existing and proposed conditions to determine the difference and expected improvement with the recommended network. Existing travel times between these locations were determined using Google Maps directions since Tulsa Transit headways and scheduled times are available online and wait and walk times are built into the directions. An 11 a.m. travel time was assumed for existing directions.

For the proposed networks, additional assumptions had to be made to estimate future times. The assumptions included:

- All travel occurs at 11 a.m. on a weekday
- No wait time occurs at beginning (i.e., rider uses schedule before leaving house)
- Average travel speeds were used for in-vehicle travel
- Wait times were assumed to be half of the proposed headway at intersections and 5 minutes for timed transfers at DAS/MMS/subhubs.

A total of 25 combinations were evaluated using all pairs of the origins and destinations listed above. Of the 25 pairs, 22 resulted in travel time savings while three did not. Table 4-5 shows the existing, proposed and difference in travel times for both daytime alternatives. Alternative A Frequency saves 388 total minutes, an average of 16 minutes per one-way trip. Alternative B Coverage is slightly worse (due to less frequent east-west service on 11th/21st and 31st corridors). Nevertheless, Alternative B has a very good improvement over existing, with 358 total minutes saved and an average of 14 minutes per one-way trip.

Service Coverage

Besides service frequency, service coverage is another important issue because riders must be able to connect to destinations in all parts of the metropolitan area. To evaluate the amount of coverage between existing and the proposed networks, a half-mile buffer was created around existing and proposed networks, and the result was mapped. Figure 4-18 and Figure 4-19 show proposed weekday daytime and night/Sunday service coverage areas, respectively. The color scheme shows areas that will continue to be served with the new network (purple), areas that will gain service (blue), and areas that will lose service (red). A fourth color (yellow) represents area served in Alternative B Coverage but not in Alternative A Frequency.

The weekday comparison shows that most of the lost area is on the far fringes of the service area, while gains tend to be along 61st Street, where additional service is added as part of the hybrid grid scheme employed by the daytime network.

The night/Sunday map uses the same color scheme. The night/Sunday network is proposed to lose service area in a few places. West Tulsa would lose service on Southwest Boulevard and Union Avenue, while eastern parts of Pine Avenue and Admiral Plan are also part of lost area. Areas gained include parts of 21st and 31st streets. Because the night and Sunday networks will feature bi-directional service (instead of long one-way segments) the recommended network is expected to be more reliable, consistent for existing and potential riders.

Table 4-5. Travel Time Evaluation

Existing		Destination				
		Admiral/ Memorial	41st/ Yale	Woodland Hills	11th/ Utica	Tulsa Hills
Origin	46th/MLK	60 min	104 min	84 min	76 min	74 min
	Lewis/Pine	45 min	58 min	66 min	31 min	59 min
	21st/Garnett	34 min	36 min	59 min	41 min	107 min
	61st/Peoria	57 min	56 min	40 min	30 min	49 min
	61st/Union	87 min	85 min	96 min	58 min	9 min

Existing		Destination				
		Admiral/ Memorial	41st/ Yale	Woodland Hills	11th/ Utica	Tulsa Hills
Origin	46th/MLK	60 min	104 min	84 min	76 min	74 min
	Lewis/Pine	45 min	58 min	66 min	31 min	59 min
	21st/Garnett	34 min	36 min	59 min	41 min	107 min
	61st/Peoria	57 min	56 min	40 min	30 min	49 min
	61st/Union	87 min	85 min	96 min	58 min	9 min

Alt A Frequency		Destination				
		Admiral/ Memorial	41st/ Yale	Woodland Hills	11th/ Utica	Tulsa Hills
Origin	46th/MLK	85 min	61 min	83 min	43 min	61 min
	Lewis/Pine	25 min	56 min	62 min	28 min	51 min
	21st/Garnett	20 min	51 min	26 min	25 min	58 min
	61st/Peoria	54 min	20 min	38 min	34 min	28 min
	61st/Union	53 min	62 min	45 min	37 min	7 min

Alt B (Coverage)		Destination				
		Admiral/ Memorial	41st/ Yale	Woodland Hills	11th/ Utica	Tulsa Hills
Origin	46th/MLK	85 min	61 min	83 min	43 min	61 min
	Lewis/Pine	25 min	56 min	62 min	28 min	51 min
	21st/Garnett	20 min	51 min	26 min	25 min	58 min
	61st/Peoria	54 min	20 min	38 min	49 min	28 min
	61st/Union	53 min	77 min	45 min	37 min	7 min

Difference (Alt A - Existing)		Destination				
		Admiral/ Memorial	41st/ Yale	Woodland Hills	11th/ Utica	Tulsa Hills
Origin	46th/MLK	25	(43)	(1)	(33)	(13)
	Lewis/Pine	(20)	(2)	(4)	(3)	(8)
	21st/Garnett	(14)	15	(33)	(16)	(49)
	61st/Peoria	(3)	(36)	(2)	4	(21)
	61st/Union	(34)	(23)	(51)	(21)	(2)

Difference (Alt B - Existing)		Destination				
		Admiral/ Memorial	41st/ Yale	Woodland Hills	11th/ Utica	Tulsa Hills
Origin	46th/MLK	25	(43)	(1)	(33)	(13)
	Lewis/Pine	(20)	(2)	(4)	(3)	(8)
	21st/Garnett	(14)	15	(33)	(16)	(49)
	61st/Peoria	(3)	(36)	(2)	19	(21)
	61st/Union	(34)	(8)	(51)	(21)	(2)

Figure 4-18. Service Coverage Change for Weekday Daytime

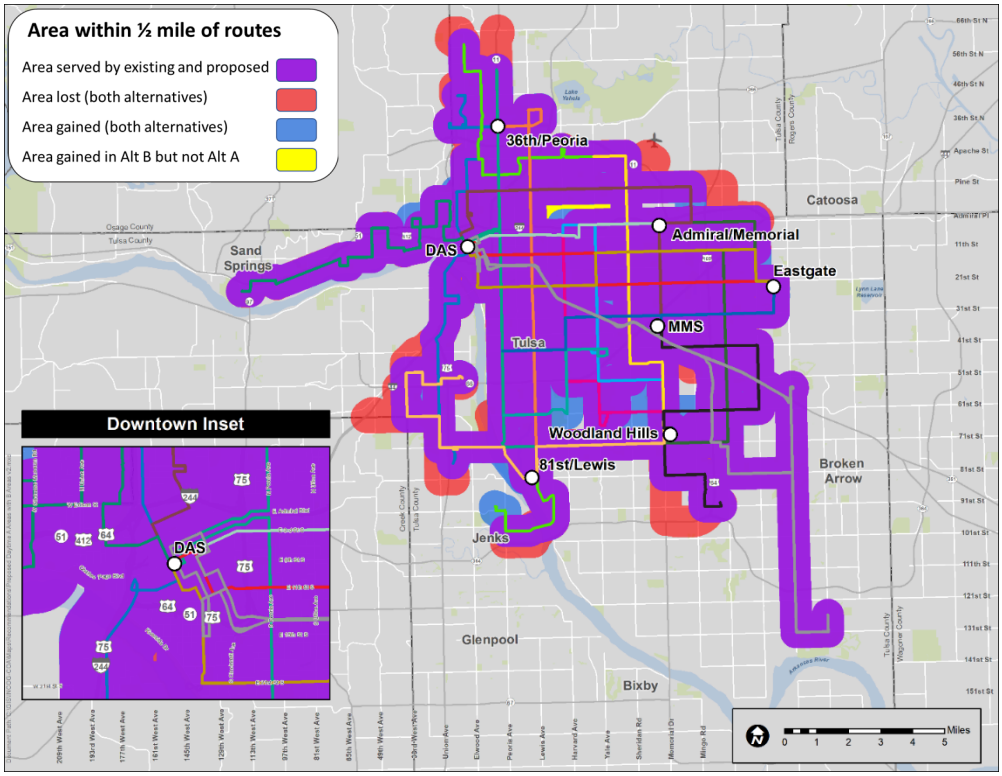
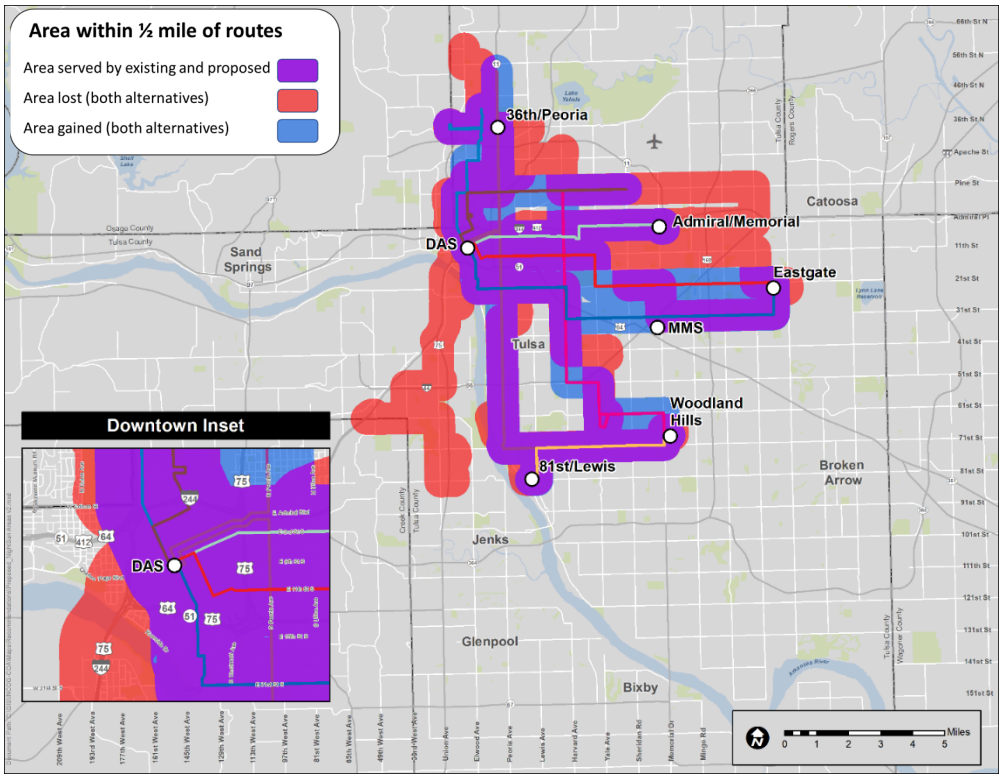


Figure 4-19. Service Coverage Change for Night/Sunday



Evaluation Tables

Evaluation measures (including those discussed in the preceding sections) were assembled into tables to summarize the differences between the existing and proposed networks. Measures included population, employment, service area coverage, ridership served (based on the APC data collection effort of 2017), and the number of corridors with improved frequencies.

Weekday daytime evaluation measures are compiled in Table 4-6. The evaluation shows the draft networks (both Alternative A Frequency and Alternative B Frequency) compare favorably to the existing. While most measures are slightly lower than existing, population, employment, coverage area, and existing ridership still serve 95% or greater of existing. Coupled with the advantages in connectivity and travel time improvement, and the weekday daytime network is an improvement for Tulsa Transit users.

Night/Sunday measures are shown in Table 4-7. The night/Sunday measures show a decrease over existing. While the proposed network only covers 73% of the existing service area, 92% of population is served and 89% of employment is served. As with daytime, the benefits of the revised network coupled with these evaluation measures indicate this network is an improvement for Tulsa Transit users.

Table 4-6. Weekday Daytime Evaluation Summary

		Alt A Frequency		Alt B Coverage	
Weekday Daytime	Existing	Measure	Change from existing	Measure	Change from existing
Service Area (sq mi)	145	138	95%	138	95%
Route Miles	222	214	96%	219	98%
Daily Ridership Served	16,203	16,052	99%	16,052	99%
Total Population Served	372,788	369,043	99%	370,323	99%
Total Employment Served	281,649	273,718	97%	274,021	97%
Average travel time (25 trip pairs)	60 min	44 min	-27%	46 min	-23%
Corridors with 30-minute or better frequency	4	6	50%	4	0%
Population within 1/2 mile of 30-minute or better corridor	106,733	165,071	55%	94,856	-11%

Table 4-7. Night/Sunday Evaluation Summary

Night/Sunday	Existing	Proposed	Change from existing
Service Area (sq mi)	80	59	73%
Route Miles	95	80	84%
Daily Ridership Served	313	256	82%
Total Population	222,568	203,873	92%
Total Employment	174,871	155,798	89%

4.4 Other Analyses

Three related topics – performance standards, flag stops, and stop amenities – were addressed in conjunction with the goals of the study. These topics are examined in this section. Policy recommendations are included in section 5.3 of Chapter 5.

Performance Standards

Transit performance standards help establish a measure of efficiency as well as the level of demand for service that is provided. These standards will help inform Tulsa Transit when making decisions – both to invest in additional service on productive routes or to remove service from routes deemed inefficient or unpopular.

The data that forms the initial baseline performance standards come from the APC data collection effort in late 2017. Five metrics were identified for this analysis. Three are indicators of service productivity, including passengers per revenue hour, passengers per revenue mile, and passengers per trip. The other two, net cost per passenger and farebox recovery, indicate financial productivity.

Each metric was calculated by first taking the average across all routes, then calculating the standard deviation. The identified performance standard is one standard deviation removed from the average. By using this method, the performance measures consider clustering of data. Thus, any route that falls below the identified standard is truly an outlier that needs consideration.

The metrics have been calculated by day and by time, as shown in Table 4-8. Further discussion of a performance standard policy is discussed in Chapter 5.

Table 4-8. Tulsa Transit Proposed Performance Standards

	Weekday Daytime	Saturday Daytime	Weekday Night	Saturday Night	Sunday
Passengers per Revenue Hour	12.9	12.4	4.9	5.7	5.9
Passenger per Revenue Mile	0.79	0.75	0.32	0.28	0.35
Passengers per Trip	9.8	9.1	5.2	4.6	5.2
Net Cost per Passenger	$9.57	$12.37	$8.71	$7.41	$10.29
Farebox Recovery	5.0%	3.8%	2.2%	2.7%	-

Flag Stop Analysis

Current Tulsa Transit policy is that flag stops are allowed. That is, passengers can board or alight the vehicle anywhere along the alignment regardless of the presence of an official designated stop, simply by waving down the approaching bus. Official agency policy stipulates flag stops should be located at least one city block away from a marked stop. In reality flag stops are utilized by passengers in many places, some just feet from marked locations.

A flag stop analysis was performed using ridership data collected in late 2017 and documented in Chapter 3. This data collected included the time bus doors were open as well as the geographic coordinates of each stop. This allowed the consultant team to review the average time doors were open at designated stops as well as at locations more than 250 feet away from a stop which indicated a likely flag stop.

The flag stop heat map for the entire Tulsa Transit service area is shown in Figure 4-20. Downtown Tulsa was excluded from the visualization of this data since flag stops were found to be unusually prevalent in the downtown core.

The evaluation of the flag stop policy is one of access versus operational and safety improvement. The currently policy certainly improves rider access because riders can get on and off closest to their desired location. However, all other arguments are against the policy. First, the policy requires additional time in the schedule of each route to accommodate unexpected stops. Relatedly, flag stops also add greater travel time variability. Flag stops place additional safety demands on operators. Operators must look for flag stop riders (among their other duties). When a flag stop is requested the operator must then find a safe place to stop. There is also the consideration of trailing vehicles who may not be paying attention when the bus halts for a flag stop.

Eliminating the use of flag stops would have the potential benefits of improved driver and customer safety, a more predictable and streamlined customer experience, improved scheduling of bus routes and better on-time performance. An official policy recommendation is part of Chapter 5 of this document.

Stop Amenity Analysis

Tulsa Transit currently has approximately 283 shelters deployed across the service area. As ridership has shifted, some stops may now have underutilized shelters and others may be overwhelmed. Knowing where these locations are will help Tulsa Transit redeploy shelters to where they are most needed, particularly at subhubs expected to have timed transfers.

An analysis on shelter locations and their associated ridership was conducted by matching ridership data with the stop amenity database provided by Tulsa Transit. The result of this analysis is shown in Table 4-9. Stops were divided into six categories using ridership thresholds found in Chapter 3. The analysis shows that the highest ridership stops tend of have shelters, but this percentage decreases with each lower threshold. For example, 94% of stops with more than 75 daily boardings have shelters, but this number drops to 64% for stops with 40-74 daily boardings. Thus, Tulsa Transit and riders could benefit from targeting higher use stops for shelters and removing shelters from stops with fewer than five boardings per day.

Figure 4-21 displays stops with shelters for those stops seeing daily boardings higher than 15 people and Figure 4-22 shows stops with shelters with fewer than 15 daily boardings. Each map shows the distribution of shelters throughout the existing network. An official policy recommendation for shelters is part of Chapter 5 of this document.

Table 4-9. Shelter Analysis by Stop Boardings

Boardings	Shelter	No Shelter	Total	Percentage with Shelter
>75	17	1	18	94%
40-74	7	4	11	64%
15-39	57	49	106	54%
5-14	71	211	282	25%
<5	85	740	825	10%
0	46	691	737	6%

Source: Tulsa Transit, CTG

Figure 4-20. Flag stop heat map analysis

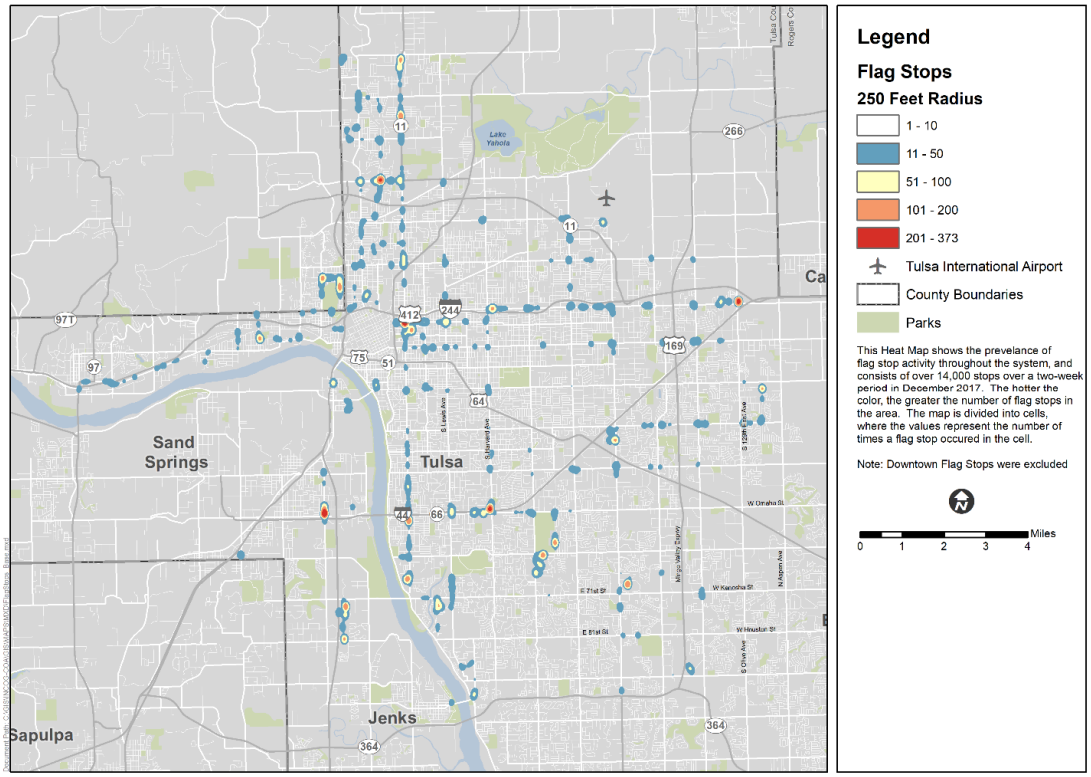


Figure 4-21. Existing shelter locations for stops with 15 or more average daily boardings

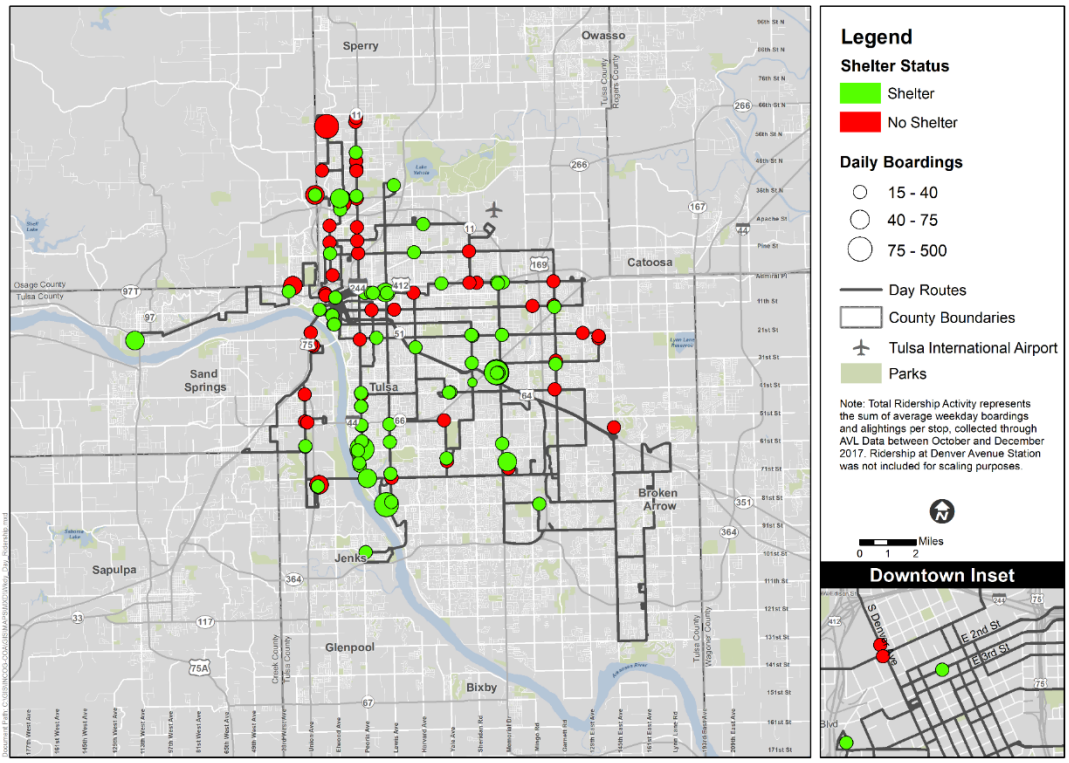
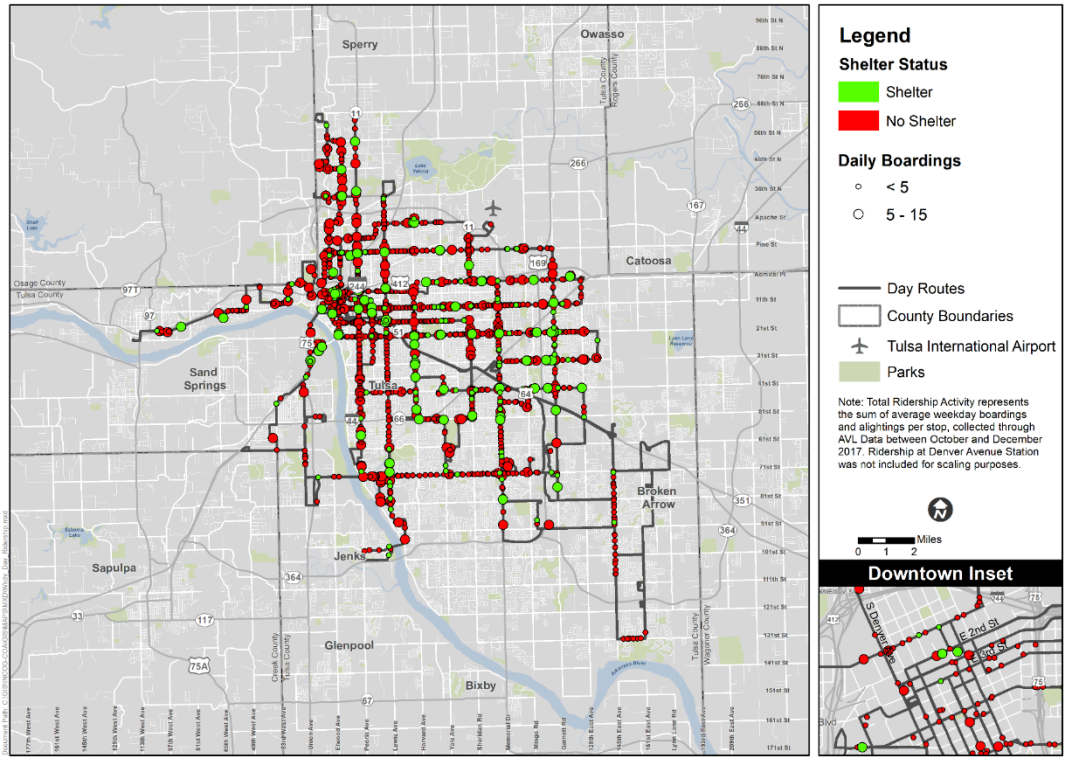


Figure 4-22. Existing shelter locations for stops with 14 or fewer average daily boardings



Chapter 5 Recommended Plan

Chapter 5 presents the Connecting Progress recommended plan for restructuring the Tulsa Transit bus network. The recommendations herein are based on the analysis work completed in Chapter 4 and include updates to recommendations based on public and staff comments. This work led to two main recommendations for the plan: a cost-neutral short-term plan to restructure the route network to be implemented in 2019, and a mid-term service expansion plan to be implemented as funding becomes available. A third section of the recommended plan is additional policy recommendations.

5.1 Short-Term Plan

The short-term plan is the recommended restructuring of the Tulsa Transit network. This plan is cost-neutral, that is, it will cost the same to operate as the existing network. Sections below describe the weekday daytime, Saturday daytime, and night/Sunday recommendations.

Weekday Daytime

After careful review of all public comments, Tulsa Transit staff recommends the final weekday daytime network based on Alternative A Frequency. The ability to provide 30-minute headways on the 11th/21st and 31st corridors was important to the study team and public comments favored this alternative as well. The recommended network will improve travel times for many people traveling east-west within the system.

One adjustment was made to the network for the short-term plan. Alignments for Route 1 MLK and Route 19 North Tulsa Circulator were swapped to make Route 1 more direct, with the circulator picking up the connection to the Dream Center and Route 1 operating on MLK to 61st Street.

Figure 5-1 and Table 5-1 summarize the recommended weekday daytime network. Appendix 5A presents individual route maps for the recommended daytime network.

Saturday Daytime

The Saturday daytime network is based on the weekday daytime network, but with 60-minute headways for all routes except Peoria AERO BRT, which would operate every 20 minutes. The headways are a major improvement over existing Saturday service, as is the operation of all routes, which provides consistency to passengers who are used to Saturday service being a lower priority in the operation. Figure 5-2 and Table 5-1 summarize the recommended Saturday daytime network.

Figure 5-1. Recommended Weekday Daytime Network

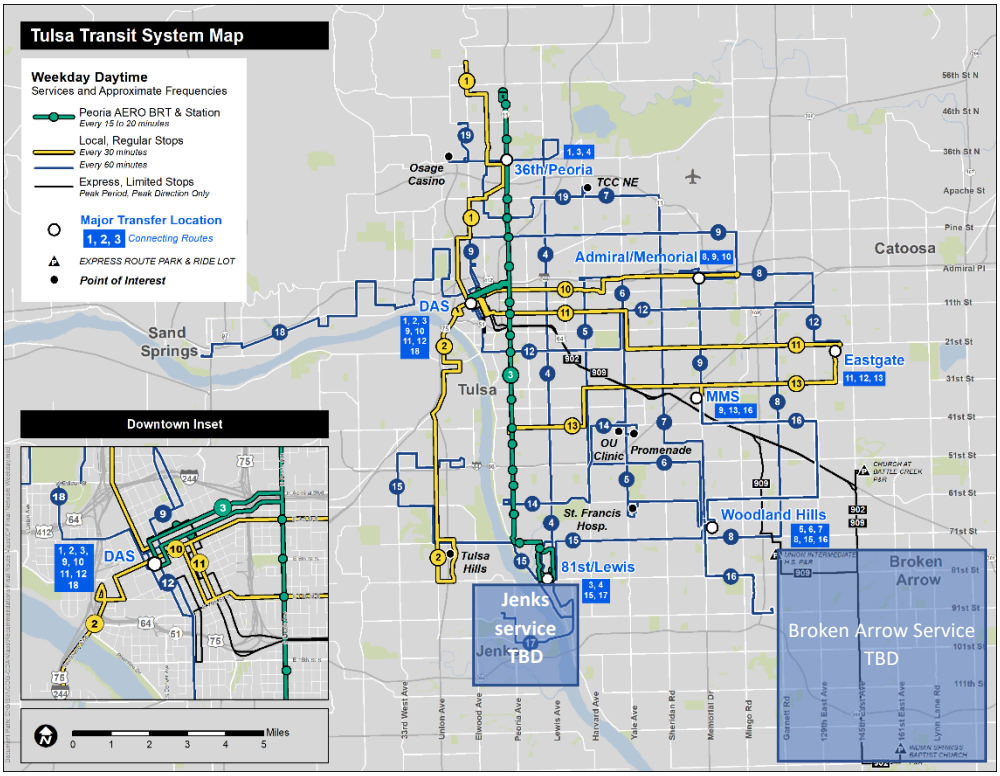
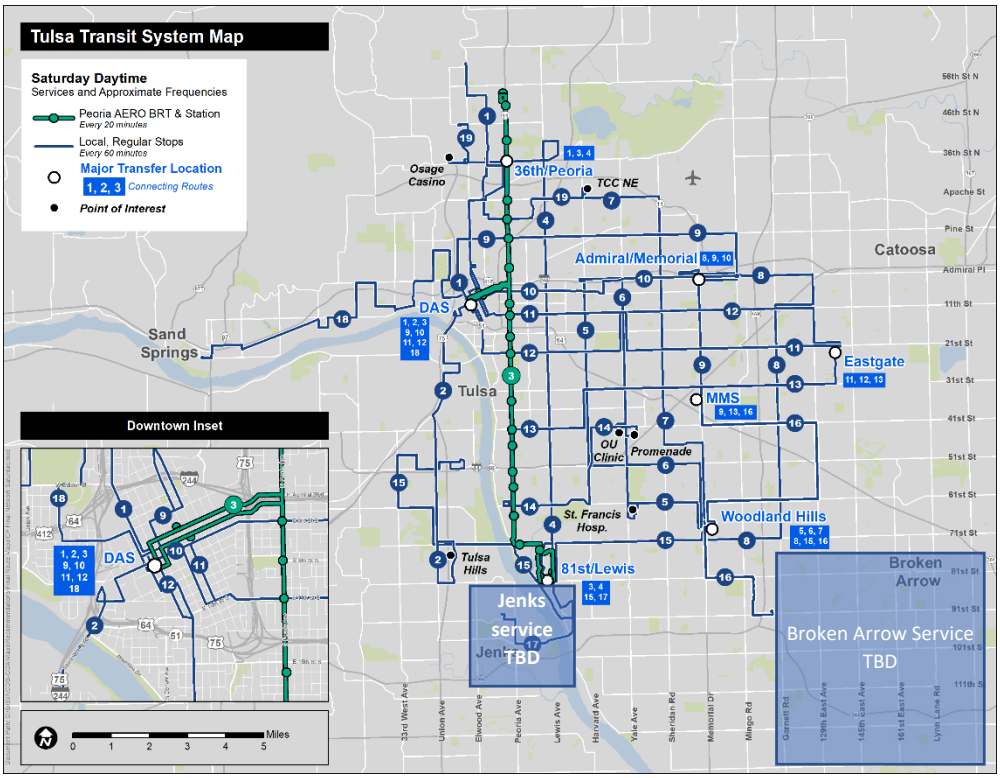


Figure 5-2. Recommended Saturday Daytime Network



Night/Sunday

The recommended night/Sunday network is proposed to operate a limited set of daytime routes in the night and Sunday time periods. Feedback from the public overwhelmingly supported this approach instead of the current operation of different routes (i.e., the Nightline or 800-series routes). The proposed night/Sunday network would operate at 60-minute headways for three hours each weekday and Saturday night, and at 60-minute headways for 10 hours each Sunday. Peoria AERO BRT will serve as a spine throughout all service periods, operating at a higher frequency and facilitating north-south movement through the system.

There are two minor changes to the routes that are different than their daytime counterparts:

- Route 9 would terminate at Pine/Sheridan instead of continuing to MMS
- Route 13 would operate to DAS via 21st Street and Cheyenne/Boulder pair into and out of downtown Tulsa. In addition, Route 13 would not stop at MMS at night because there would be no connecting routes at this location.

Figure 5-3 shows the proposed system map for night/Sunday, while Table 5-2 details the headways and span for each time period.

Figure 5-3. Recommended Night/Sunday Network

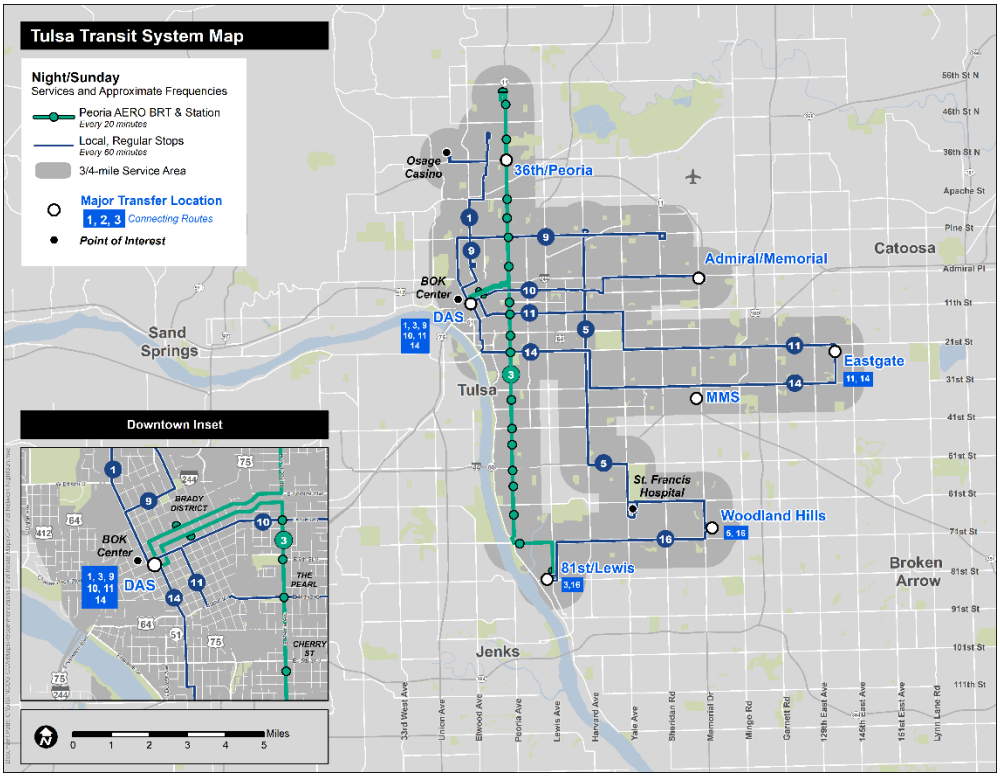


Table 5-1. Daytime Network Summary

Number	Name	Description	Weekday Peak		Weekday Offpeak		Saturday	
			Headway	Span	Headway	Span	Headway	Span
1	MLK	From 61st Street N to DAS	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
2	Southwest Blvd	From DAS to Tulsa Hills	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	15 min	6 hrs	20 min	8 hrs	20 min	13 hrs
4	Lewis	From 36th Street N/Hartford to 81st Street Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
5	Harvard/61st	From Harvard/Admiral to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
6	Yale/51st	From Harvard/Admiral to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
7	Sheridan	From TCC NE to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
8	Garnett	From Admiral/Memorial to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
9	Pine/Memorial	From DAS to MMS	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
12	21st/11th Streets	From DAS to Eastgate	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
13	31st	From 41st/Peoria to Eastgate	30 min	6 hrs	30 min	8 hrs	60 min	13 hrs
14	61st/41st	From 61st/Peorial to The Promenade Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
15	West Tulsa/71st Street	From 49th/Jackson to Woodland Hills Mall	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
16	Southeast Tulsa	From Woodland Hills Mall to St Francis Hosp. South	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
17	Jenks Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
18	Sand Springs	From DAS to Sand Springs Walmart	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
19	North Tulsa Circulator	From Dream Center (46th Street N) to TCC NE	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
20	BA Circulator	TBD	60 min	6 hrs	60 min	8 hrs	60 min	13 hrs
902	BA Express	From B.A. to Downtown Tulsa	4 Trips	-	-	-	-	-
909	Union Express	From Union HS to Downtown Tulsa	2 Trips	-	-	-	-	-

Table 5-2. Night/Sunday Network Summary

Number	Name	Description	Weekday Night		Saturday Night		Sunday	
			Headway	Span	Headway	Span	Headway	Span
1	MLK	From 46th Street N to DAS	60	3 hrs	60	3 hrs	60	10 hrs
3	Peoria AERO BRT	From 56th Street N to 81st Walmart	20	3 hrs	20	3 hrs	20	14 hrs
5	Harvard/61st	From Harvard/Admiral to Woodland Hills Mall	60	3 hrs	60	3 hrs	60	10 hrs
9	Pine/Memorial	From DAS to Pine/Sheridan	60	3 hrs	60	3 hrs	60	10 hrs
10	3rd/Admiral	From DAS to Admiral Walmart	60	3 hrs	60	3 hrs	60	10 hrs
11	11th/21st Steets (future BRT)	From DAS to Eastgate	60	3 hrs	60	3 hrs	60	10 hrs
13	31st	From DAS to Eastgate	60	3 hrs	60	3 hrs	60	10 hrs
15	71st Street	From 81st Walmart to Woodland Hills Mall	60	3 hrs	60	3 hrs	60	10 hrs

Span for Table 5-1 and Table 5-2 are generally assumed to be the following:

- Weekday Peak: 6:00 – 9:00 a.m.; 4:00 – 7:00 p.m.
- Weekday Offpeak: 5:00 – 6:00 a.m.; 9:00 a.m. – 4:00 p.m.
- Saturday Daytime: 6:00 a.m. – 7:00 p.m.
- Weekday Night: 7:00 – 10:00 p.m.
- Saturday Night: 7:00 – 10:00 p.m.
- Sunday: 8:00 a.m. – 6:00 p.m.

Outer Area Alternative Service Delivery

Two areas were identified as being prime candidates for alternative service delivery – Jenks and Broken Arrow. A final recommendation for either is not made within this document because it will ultimately require additional discussion and sign-off from each city. Thus, each is discussed below as a potential recommendation.

Jenks

Route 112 currently serves Jenks , which extends south from the 81st/Lewis Walmart into Jenks. During this study, Tulsa Transit staff indicated a desire to separate Jenks service from the rest of the Lewis corridor. This change would then allow Tulsa Transit to tailor the service to better match Jenks land use and destinations by potentially operating as a deviated fixed route service. Therefore, the proposed service is the Jenks Circulator (Route 17), which would start at the 81st/Lewis Walmart and travel south into the city, across Main Street, and end at the Tulsa Tech Riverside Campus. Additional discussion with

Jenks will be required before a change to service would occur. Jenks pays $27,152 annually for its FY2019 service.

Broken Arrow

Service in Broken Arrow is currently provided by Route 508, a weekday-only deviated fixed route service composed of a bidirectional loop route around central Broken Arrow with three different trip patterns throughout the day as well as a 41-square mile flex zone. This route has low ridership and it struggles to maintain on-time service due to the large area in the flex zone. Another issue is that the route is calculated to cost Tulsa Transit approximately $400,000 annually, but Broken Arrow only provides $232,000 in subsidy.

Therefore, a revised service plan is necessary to improve connections both to and through Broken Arrow. Three options for service include:

- Deviated Fixed Route Service
- Demand Response Zone
- TNC-subsidized service

In addition, Tulsa Transit is recommended to only operate service that matches the subsidy provided by Broken Arrow. A $200,000 annual subsidy is equal to operating one bus for weekdays only at a 60-minute headway for 14 hours a day. Broken Arrow's large service area means one bus would not cover all areas. Therefore, Broken Arrow must decide whether to keep the subsidy as is and cover a smaller area or expand the subsidy and the service area. These details are expected to be worked out after the adoption of the Connecting Progress final plan.

Service options are shown in Table 5-3. All services are expected to connect to the rest of the Tulsa Transit network at St Francis Hospital South, where riders could connect to Route 16 Southeast Tulsa.

Table 5-3. Broken Arrow Options

B.A. Options	Route Miles	Area	Days of operation	Headway	Span	Cost
Fixed Route (1 bus)	7.5	-	255	60 min	14 hrs	$200,000
Fixed Route (2 buses)	15.5	-	255	60 min	14 hrs	$400,000
Call-a-Ride Zone (1 bus)	-	6.0 sq mi	255	60 min	14 hrs	$200,000
Call-a-Ride Zone (2 bus)	-	12.0 sq mi	255	60 min	14 hrs	$400,000
TNC subsidy	-	-	255	-	-	$200,000

Cost Analysis

Because additional funds are not available to expand the network, the short-term plan must be cost-neutral. Thus, it can only cost as much as Tulsa Transit currently has to operate the network. There are caveats to this, though. Peoria AERO BRT is to be funded through a combination of existing Tulsa Transit funds and Vision Tulsa funds. Therefore, the cost-neutral approach assumes Peoria AERO BRT is funded separately.

The cost summary for the short-term plan is shown in Table 5-4. Based on existing operating statistics and reported costs, Tulsa Transit's existing network costs $15,038,000 to operate. By removing the cost of the existing route 105 (which will be used to operate the Peoria AERO BRT) and the Broken Arrow contribution (which will be used as part of a revised Broken Arrow service), the total funds available to Tulsa Transit for the revised network is $13,485,000.

Table 5-4. Short-Term Plan O&M Cost Summary

	Daily Weekday	Daily Saturday	Daily Sunday	Totals	Difference	
					Cost	Percentage
Existing	$51,407	$29,968	$7,126	$15,038,000		
Route 105	$4,651	$2,601	$0	($1,321,000)		
Broken Arrow Contribution				($232,000)		
Baseline Cost				$13,485,000		
Recommended Network	$44,935	$35,239	$5,038	$13,553,000	$68,000	0.504%

Note: all costs shown in FY17 dollars

The operating statistics for the recommended network are shown on the following page in Table 5-5. The daily Weekday, Saturday, and Sunday operations and maintenance (O&M) costs were estimated using a three-variable cost model that was estimated based on FY 2017 reporting to the National Transit Database. Based on those costs, the following unit costs were developed:

- Cost per revenue hour of $33.58
- Cost per revenue mile of $1.33
- Administrative cost per route per day of service (applicable to Weekday and Saturday routes): $853.34

Using the above unit costs and operating statistics, the following formula was used to determine costs:

(revenue hours x cost per revenue hour) + (revenue miles x cost per revenue mile) + (route days x administrative cost per route day of service)

After factoring out the Peoria AERO BRT service, the recommended network is expected to cost $13,553,000, or $68,000 above existing. The small increase in cost (approximately 0.5% above existing) can be considered within the margin of error. Because the cost model assumes all driver blocks operate through the entirety of the time period, it is likely the 0.5% difference will be absorbed once scheduling of the network occurs before implementation.

Table 5-5. Final Network Operating Statistics Summary

WEEKDAY						EARLY				PEAK				OFFPEAK				NIGHT					SUMMARY			
Number	Route Name	One-way Distance [miles]	Speed [mph]	R/T Time [min]	Lay-over [percent]	Cycle Time [min]	Head-way [min]	Span [hrs]	Driver Blocks	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	One-way Distance [miles]	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	Total One-way Trips	Revenue Hours	Daily Revenue Miles	O&M Cost
1+2	MLK/Southwest	17.7	17.1	124	21%	120	60	1	2.0	150	30	6	5.0	150	30	7	5.0	7.4	60	60	3	1.0	30	70.0	1062.0	$3,762
3	Peoria AERO BRT	16.6	17.4	115	18%	140	20	1	7.0	135	15	6	9.0	140	20	7	7.0	16.6	140	20	3	7.0	57	131.0	1892.4	$6,915
4	Lewis	13.6	15.7	104	15%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0						14	28.0	380.8	$1,446
5	Harvard/61st	11.9	16.5	87	4%	120	60	1	2.0	90	60	6	1.5	90	60	7	1.5	12.2	120	60	3	2.0	17	27.5	404.6	$1,461
6	Yale/51st	10.0	16.5	73	24%	120	60	1	2.0	90	60	6	1.5	90	60	7	1.5						14	21.5	280.0	$1,094
7	Sheridan	11.1	15.0	89	2%	120	60	1	2.0	90	60	6	1.5	90	60	7	1.5						14	21.5	310.8	$1,135
8	Garnett	13.3	17.2	93	29%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0						14	28.0	372.4	$1,435
9	Pine/Memorial	14.9	17.2	104	15%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0	7.4	60	60	3	1.0	17	31.0	506.6	$1,714
10	3rd/Admiral	7.5	16.4	55	9%	120	60	1	2.0	60	30	6	2.0	60	30	7	2.0	7.5	60	60	3	1.0	30	31.0	450.6	$1,640
11	11th/21st Steets (future B	11.0	18.0	73	23%	120	60	1	2.0	90	30	6	3.0	90	30	7	3.0	11.0	120	60	3	2.0	30	47.0	660.0	$2,456
12	21st/11th Streets	12.9	15.5	100	20%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0						14	28.0	361.2	$1,420
13	31st	11.3	16.0	85	42%	120	60	1	2.0	120	30	6	4.0	120	30	7	4.0	12.5	120	60	3	2.0	30	60.0	678.0	$2,916
14	61st/41st	6.0	15.0	48	25%	60	60	1	1.0	60	60	6	1.0	60	60	7	1.0						14	14.0	168.0	$693
15	West Tulsa/71st Street	15.1	18.1	100	20%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0	5.6	60	60	3	1.0	17	31.0	513.4	$1,724
16	Southeast Tulsa	14.0	16.4	103	17%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0						14	28.0	392.0	$1,461
17	Jenks Circulator	4.7	17.1	33	81%	60	60	1	1.0	60	60	6	1.0	60	60	7	1.0						14	14.0	132.2	$646
18	Sand Springs	14.1	17.1	99	22%	120	60	1	2.0	120	60	6	2.0	120	60	7	2.0						14	28.0	394.8	$1,465
19	North Tulsa Circulator	9.6	17.1	67	33%	120	60	1	2.0	90	60	6	1.5	90	60	7	1.5						14	21.5	268.8	$1,079
902	BA Express																							3.1	77.0	$206
909	Union Express																							1.8	40.0	$112
DAILY GA COST																										$17,067
TOTALS w/ PEORIA BRT																										$51,850
TOTALS w/o PEORIA BRT																										$44,935

SATURDAY						EARLY				PEAK				OFFPEAK				NIGHT					SUMMARY			
Number	Route Name	One-way Distance [miles]	Speed [mph]	R/T Time [min]	Lay-over [percent]	Cycle Time [min]	Head-way [min]	Span [hrs]	Driver Blocks	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	One-way Distance [miles]	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	Total One-way Trips	Revenue Hours	Daily Revenue Miles	O&M Cost
1+2	MLK/Southwest	16.6	17.1	117	54%	120	60		2.0	180	60	6	3.0	180	60	7	3.0	7.4	60	60	3	1.0	16	42.0	531.2	$2,117
3	Peoria AERO BRT	16.6	17.4	115	22%	140	20		7.0	140	20	6	7.0	140	20	7	7.0	16.6	140	20	3	7.0	48	112.0	1593.6	$5,880
4	Lewis	13.6	15.7	104	15%	120	60		2.0	120	60	6	2.0	120	60	7	2.0						13	26.0	353.6	$1,343
5	Harvard/61st	10.8	15.5	84	8%	120	60		2.0	90	60	6	1.5	90	60	7	1.5	12.2	120	60	3	2.0	16	25.5	345.6	$1,316
6	Yale/51st	10.6	15.5	82	10%	120	60		2.0	90	60	6	1.5	90	60	7	1.5						13	19.5	275.6	$1,021
7	Sheridan	11.1	15.0	89	2%	120	60		2.0	90	60	6	1.5	90	60	7	1.5						13	19.5	288.6	$1,038
8	Garnett	13.3	17.2	93	29%	120	60		2.0	120	60	6	2.0	120	60	7	2.0						13	26.0	345.8	$1,333
9	Pine/Memorial	14.9	17.2	104	15%	120	60		2.0	120	60	6	2.0	120	60	7	2.0	7.4	60	60	3	1.0	16	29.0	476.8	$1,608
10	3rd/Admiral	7.1	16.4	52	15%	60	60		1.0	60	60	6	1.0	60	60	7	1.0	7.1	60	60	3	1.0	16	16.0	227.2	$839
11	11th/21st Steets (future B	11.0	18.0	73	64%	120	60		2.0	120	60	6	2.0	120	60	7	2.0	11.0	120	60	3	2.0	16	32.0	352.0	$1,542
12	21st/11th Streets	12.9	15.5	100	20%	120	60		2.0	120	60	6	2.0	120	60	7	2.0						13	26.0	335.4	$1,319
13	31st	11.3	16.0	85	42%	120	60		2.0	120	60	6	2.0	120	60	7	2.0	12.5	120	60	3	2.0	16	32.0	361.6	$1,555
14	61st/41st	6.0	15.0	48	25%	60	60		1.0	60	60	6	1.0	60	60	7	1.0						13	13.0	156.0	$644
15	West Tulsa/71st Street	15.1	18.1	100	20%	120	60		2.0	120	60	6	2.0	120	60	7	2.0	5.6	60	60	3	1.0	16	29.0	483.2	$1,616
16	Southeast Tulsa	14.0	16.4	103	17%	120	60		2.0	120	60	6	2.0	120	60	7	2.0						13	26.0	364.0	$1,357
17	Jenks Circulator	4.7	17.1	33	81%	60	60		1.0	60	60	6	1.0	60	60	7	1.0						13	13.0	122.7	$600
18	Sand Springs	14.1	17.1	99	22%	120	60		2.0	120	60	6	2.0	120	60	7	2.0						13	26.0	366.6	$1,360
19	North Tulsa Circulator	9.3	17.1	65	38%	120	60		2.0	90	60	6	1.5	90	60	7	1.5						13	19.5	241.8	$976
DAILY GA COST																										$13,653
TOTALS w/ PEORIA BRT																										$41,118
TOTALS w/o PEORIA BRT																										$35,239

SUNDAY						EARLY				PEAK				OFFPEAK				NIGHT					SUMMARY			
Number	Route Name	One-way Distance [miles]	Speed [mph]	R/T Time [min]	Lay-over [percent]	Cycle Time [min]	Head-way [min]	Span [hrs]	Driver Blocks	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	One-way Distance [miles]	Cycle Time [min]	Headway [min]	Span [hrs]	Driver Blocks	Total One-way Trips	Revenue Hours	Daily Revenue Miles	O&M Cost
1	MLK	7.4	17.1	52	15%					60	60	6	1.0	60	60	4	1.0						10	10.0	148.4	$533
3	Peoria AERO BRT	16.6	17.4	115	22%					140	20	6	7.0	140	20	4	7.0	16.6	140	20	2	7	36	84.0	1195.2	$4,410
5	Harvard/61st	12.2	15.5	95	27%					120	60	6	2.0	120	60	4	2.0						10	20.0	244.0	$996
9	Pine/Memorial	7.4	17.2	52	16%					60	60	6	1.0	60	60	4	1.0						10	10.0	148.0	$533
10	3rd/Admiral	7.1	16.4	52	15%					60	60	6	1.0	60	60	4	1.0						10	10.0	142.0	$525
11	11th/21st Steets (future B	11.0	18.0	73	64%					120	60	6	2.0	120	60	4	2.0						10	20.0	220.0	$964
13	31st	12.5	15.5	97	24%					120	60	6	2.0	120	60	4	2.0						10	20.0	250.0	$1,004
15	West Tulsa/71st Street	5.6	18.1	37	62%					60	60	6	1.0	60	60	4	1.0						10	10.0	111.6	$484
DAILY GA COST																										
TOTALS w/ PEORIA BRT																										$9,448
TOTALS w/o PEORIA BRT																										$5,038

5.2 Mid-Term Expansion Plan

The mid-term plan is a list of potential service expansion projects that Tulsa Transit would implement as soon as additional funding is available. The expectation is that these projects would take three to five years to implement. Improvements identified for future consideration include:

Weekday Daytime

- Improve Route 5 - Harvard to operate with 30-minute headways

Saturday Daytime

- Improve Route 1 - MLK to operate with 30-minute headways
- Improve Route 2 - Southwest Boulevard to operate with 30-minute headways
- Improve Route 10 - Admiral to operate with 30-minute headways

Weekday Night

- Operate routes 6, 7, 12, and 19 for three hours on weekday night network
- Add West Tulsa Call-a-Ride zone for three hours on weekday night network
- Add 2 more hours of service to weekday night network (specifically routes 1, 3, 5, 9, 10, 11, 13, 15)

Sunday

- Operate routes 6, 7, 12, and 19 for ten hours on Sunday network
- Add West Tulsa Call-a-Ride zone for ten hours on Sunday network

The above improvements do not include upgrading Route 11 to high frequency Route 66 AERO BRT service. It is assumed this would be funded separately from the Mid-Term Service Expansion plan.

Using the O&M unit costs from the previous section, costs were estimated for each of the above projects, as shown in

Table 5-6. When additional funding is identified, these projects are recommended for incorporation into the Tulsa Transit network.

Table 5-6. Mid-Term Plan O&M Cost Summary

	Annual Revenue Hours	Annual Revenue Miles	Additional Peak Vehicles	Annual O&M Cost
Improve Route 5 Harvard to every 30 minutes on weekdays (includes keeping Route 6 Yale at 60-minute headway)	19,125	240,924	1	$318,000
Improve Route 1 MLK, Route 2 Southwest Blvd, and Route 10 to 30-minute headways on Saturdays	5,044	74,797	-	$113,000
Night West Tulsa Call-a-Ride service	765	15,300	-	$47,000
Add 2 more hours to night service	8,670	140,454	-	$291,000
Add additional daytime routes to night network	6,120	67,167	-	$295,000
Add additional daytime routes to Sunday network	3,380	45,656	-	$175,000
Sunday West Tulsa Call-a-Ride service	2,550	51,000	-	$32,000
Totals	**45,654**	**635,298**	**1**	**1,271,000**

5.3 Policy Recommendations

Based on analysis completed in Chapter 4, three distinct policies are suggested as part of the recommended plan.

Performance Standard Policy

Performance of individual fixed route services operating in the MTTA network should be examined on a regular basis using identified standards. These standards will help identify when routes are underperforming and determine a course of action to monitor, adjust, or eliminate the route.

Five performance metrics are included in the policy:

- Passengers per Revenue Hour
- Passenger per Revenue Mile
- Passengers per Trip
- Net Cost per Passenger
- Farebox Recovery

Based on review of existing data, the following performance standards have been identified:

	Weekday Daytime	Saturday Daytime	Weekday Night	Saturday Night	Sunday
Passengers per Revenue Hour	12.9	12.4	4.9	5.7	5.9
Passenger per Revenue Mile	0.79	0.75	0.32	0.28	0.35
Passengers per Trip	9.8	9.1	5.2	4.6	5.2
Net Cost per Passenger	$9.57	$12.37	$8.71	$7.41	$10.29
Farebox Recovery	5.0%	3.8%	2.2%	2.7%	-

As shown above, these standards are divided into five operational periods. Each period should be monitored individually to allow MTTA flexibility in determining updates and a course of action for each route. In addition, the above service standards should be refreshed with new data at least once every five years.

Monitoring Program

A route-level report is proposed to be generated twice a year for review by the MTTA Board of Trustees. Reports will be provided in January (covering July through December) and July (covering January through June). Each route report will include performance metrics averaged over the time period for the five standards identified in the policy. The report will include five operational time periods for all routes, as applicable since not all routes operate on nights and Sundays.

The report will highlight which reported statistics fall below the adopted performance standard by route and by time period. The report will also note what stage of the monitoring program (if any) the route is in.

A new route is exempt from the monitoring program for two years to build a travel market, although its statistics will be reported for review and comparison purposes.

If a route underperforms in three out of five measures, then it enters the monitoring program, which has three stages:

- **Supervision**: routes that fall below standards after not doing so in the previous reporting period enter the supervision phase. No changes to the route are expected in this phase, but MTTA staff would use the following six months to gather evidence on how to improve performance on the route.
- **Adjustment**: routes that fall below standards in two consecutive reporting periods enter the adjustment phase. MTTA staff will present ridership and farebox data on the route to the Board and include a recommended course of action to update the alignment, frequency, or span, to improve route performance.
- **Resolution**: routes that fall below standards in three consecutive reporting periods enter the resolution phase. At this point the Board of Trustees will determine a course of action for the individual route. Staff is expected to make a recommendation on action for the Board to discuss. Action could include:
    - **Elimination:** the MTTA Board decides to eliminate the route (or the time period of operation) from the network
    - **Continued adjustment**: The MTTA Board leaves it up to MTTA staff to improve the route. For this option the Board would determine how many additional review periods until the route is placed back into the monitoring program.
    - **Exemption**: The MTTA Board determines the route is a valuable part of the MTTA network and should be exempt from performance standards. The Board can make this a permanent or temporary exemption. A temporary exemption should include the number of review periods until the route is placed back into the monitoring program.

Flag Stop Elimination Policy

Based on operational and safety evidence, along with the judgment of MTTA planning staff, supervisors, and drivers, the following policy is proposed for potential adoption by the MTTA Board of Trustees:

Flag stops for boardings or alightings will no longer be served by MTTA buses on [to be determined].

Upon adoption of this policy MTTA staff will work to determine all route alignments that do not currently have regularly established stop locations. Regular stops will be established in these segments with spacing approximately 1,320 feet (1/4 mile) apart, depending on the ability to safely locate each stop. Each new stop shall include a MTTA stop pole and sign. Efforts will be made by MTTA staff to locate all new stops at or near a sidewalk connection.

Shelter Policy

Based on review of existing ridership and shelter data, the MTTA Board of Trustees adopts the following policy for shelters:

MTTA shall provide shelters at all stops with more than 15 daily boardings provided the right-of-way and general topography can accommodate the shelter. Analysis in the Connecting Progress Plan identified 54 locations with greater than 15 boardings without a shelter. MTTA staff shall investigate all 54 locations by [to be determined] and present a progress report to the Board on which locations are available for a shelter.

Conversely, all locations with fewer than 15 boardings are eligible to have shelters removed and reallocated to higher ridership locations within the network.

Stop-level ridership information shall be collected once every two years resulting in an update to the shelter amenity analysis. A report to the Board of Trustees shall be provided once every year on the progress of shelters throughout the system.

5.4 Review of Connecting Progress Goals

Five goals were outlined at the beginning of this study. This section reviews these goals and answers how the recommended plan addresses each one.

Goal 1: Help Tulsa Transit determine how to improve service frequencies and reduce rider travel time without additional operating costs. The recommended plan:

- ✓ Reduces rider travel time by strategic placement of transit subhubs that allow additional timed transfers outside of DAS. Timed connections at these "on-street" or route-to-route transfers results in an average savings of 16 minutes per one-way trip and removes the need to travel downtown to transfer.
- ✓ Provide more continuous corridor-based service (e.g., along Harvard, Yale, and 31st). This results in riders more efficiently being able to access destinations without needing to double back or transfer.
- ✓ Improves the Saturday network, with all routes proposed to operate every 60 minutes.
- ✓ Adds frequency improvement for weekday service on routes 11 (11th/21st Street) and 13 (31st Street).
- ✓ Improves the night network so that routes operate every 60 minutes.

Goal 2: Build network off the Peoria AERO BRT in the short term and Route 66 AERO BRT in the intermediate term. The proposed network:

- ✓ Improves transfers to Peoria AERO BRT, with eleven routes connecting to the Peoria corridor; three of the connecting routes (1, 11, 13) have proposed 30-minute frequency service.
- ✓ Establishes Route 11 on alignment of future Route 66 AERO BRT route. This route is proposed to have 30-minute frequency service which can be scaled up with the introduction of BRT service.

Goal 3: Improve Tulsa Transit's presence in the community through a robust and meaningful public outreach process as well as aligning services with stakeholder goals.

- ✓ A technical advisory committee meeting was established during the beginning of the study and two meetings were held during existing conditions and draft recommendations phases of the study.
- ✓ Stakeholders were identified during the beginning of the study and three stakeholder meetings were held during the existing conditions phase of the work.
- ✓ Open houses were held throughout the study. One open house was held during the existing conditions phase of work. Four more open houses were held during the draft recommendations phase.
- ✓ A community survey was conducted during March/April 2018 to determine desired improvements to the network.

Goal 4: Make recommendations related to Tulsa Transit's "hub and spoke" design while also addressing schedule adherence issues. The proposed network:

- ✓ Established a set of strategically-located transit subhubs on the periphery of Tulsa Transit's service area to facilitate transfers at locations away from DAS. These subhubs decentralize the need for connection at Denver Avenue Station and Midtown Memorial Station.
- ✓ Beyond the subhubs, route-to-route connections are spread more evenly throughout the metropolitan area, which substantially cuts down on out-of-direction travel for riders.
- ✓ The flag stop policy is recommended to be eliminated, which will give routes more time to adhere to their schedules.

Goal 5: Recommend other non-traditional service delivery approaches like private providers, TNCs, and demand response zones, as appropriate.

- ✓ This study considered a variety of non-traditional service delivery approaches, particularly in low-productivity areas of the Tulsa Transit service delivery area.
- ✓ This study recommends the use of alternative services in Broken Arrow and Jenks, subject to discussion with each city.

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Turkey Mountain Master Plan

Preservation — Restoration — Recreation

Michael Van Valkenburgh Associates, Inc.
February 2020

Turkey Mountain Master Plan

Preservation — Restoration — Recreation

Prepared in February 2020 for

George Kaiser Family Foundation

on behalf of

River Parks Authority

by

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Foreword

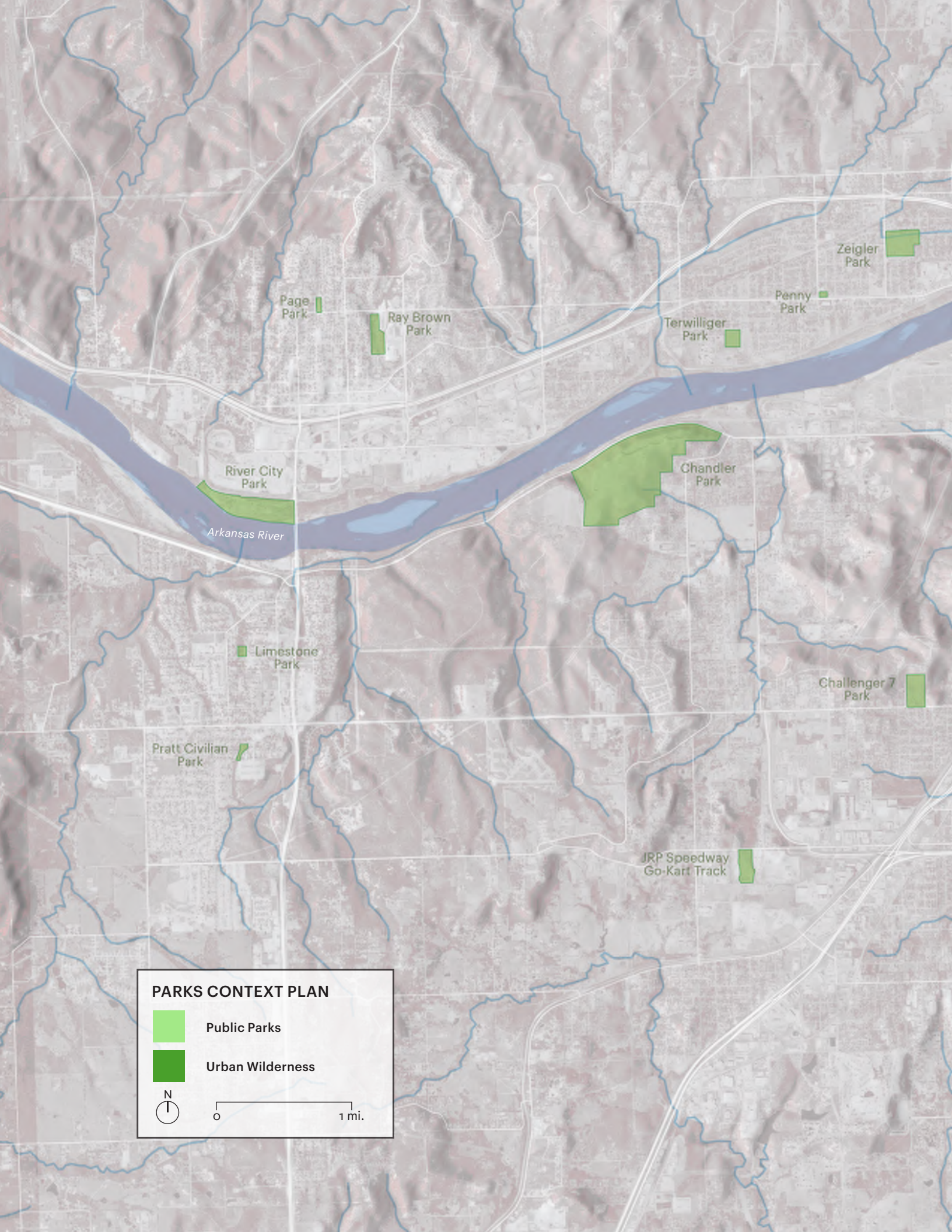
Urban Wilderness for Posterity

The preservation of Turkey Mountain began long before the inception of a master planning process. Since the 1970s, outdoor enthusiasts from the local community who recognized its natural beauty built trails, fought development, and protected the existence of a wild place in Tulsa.

The Master Plan formalizes and builds upon these efforts by outlining a path towards safeguarding this irreplaceable resource in perpetuity while permitting improvement and expansion of recreational facilities.

On behalf of the George Kaiser Family Foundation and the River Parks Authority, Michael Van Valkenburgh Associates has drawn on extensive community input, on-the-ground site analysis, lessons from expert ecologists, engineers, and land managers, and best practices in outdoor and adventure recreation to create an ambitious plan that realizes the full social and ecological potential of Tulsa's urban wilderness for future generations.

—The Turkey Mountain Master Plan Team


Zeigler Park
Penny Park
Page Park
Ray Brown Park
Terwilliger Park
River City Park
Chandler Park
Arkansas River
Limestone Park
Challenger 7 Park
Pratt Civilian Park
JRP Speedway Go-Kart Track
PARKS CONTEXT PLAN
Public Parks
Urban Wilderness
N
0
1 mi.


Grotto Park
Greenwood Playground
Latimer Playground
North Yale Park
Bulette Playground
Crutchfield Playground
Archer Park
Rose Hill Cemetery
Admiral Park
Owen Park
Guthrie Green
Turner Park
Centennial Park
Downtown Tulsa
Joe Station Dog Park
Newblock Park
Braden Park
University of Tulsa Sports Fields
Benedict Park
Creek Nation Council Oak Park
Stickball Park
Maple Park
Pratt Park
West Tulsa Park
Veterans Park
Florence Park
Woodward Park
Cascia Hall Ball Fields
Darlington Park
Gathering Place
Zinc Park
Highland Park
West Bank Soccer Complex
Whiteside Park
Clinton Oak Redford Cemetery
River Parks Disc Golf Course
Edison Prepatory Ball Fields
Reed Park
Langenheim Park
Henthorne Park
Manion Park
Mudd Park Number 2
Heller Park
Bales Baseball Park
Turkey Mountain
Johnson Park
Arkansas River
Graham Park
Minshall Park
Helmerich Park
Johnson Paul Park
Oral Roberts University Ball Fields

Context

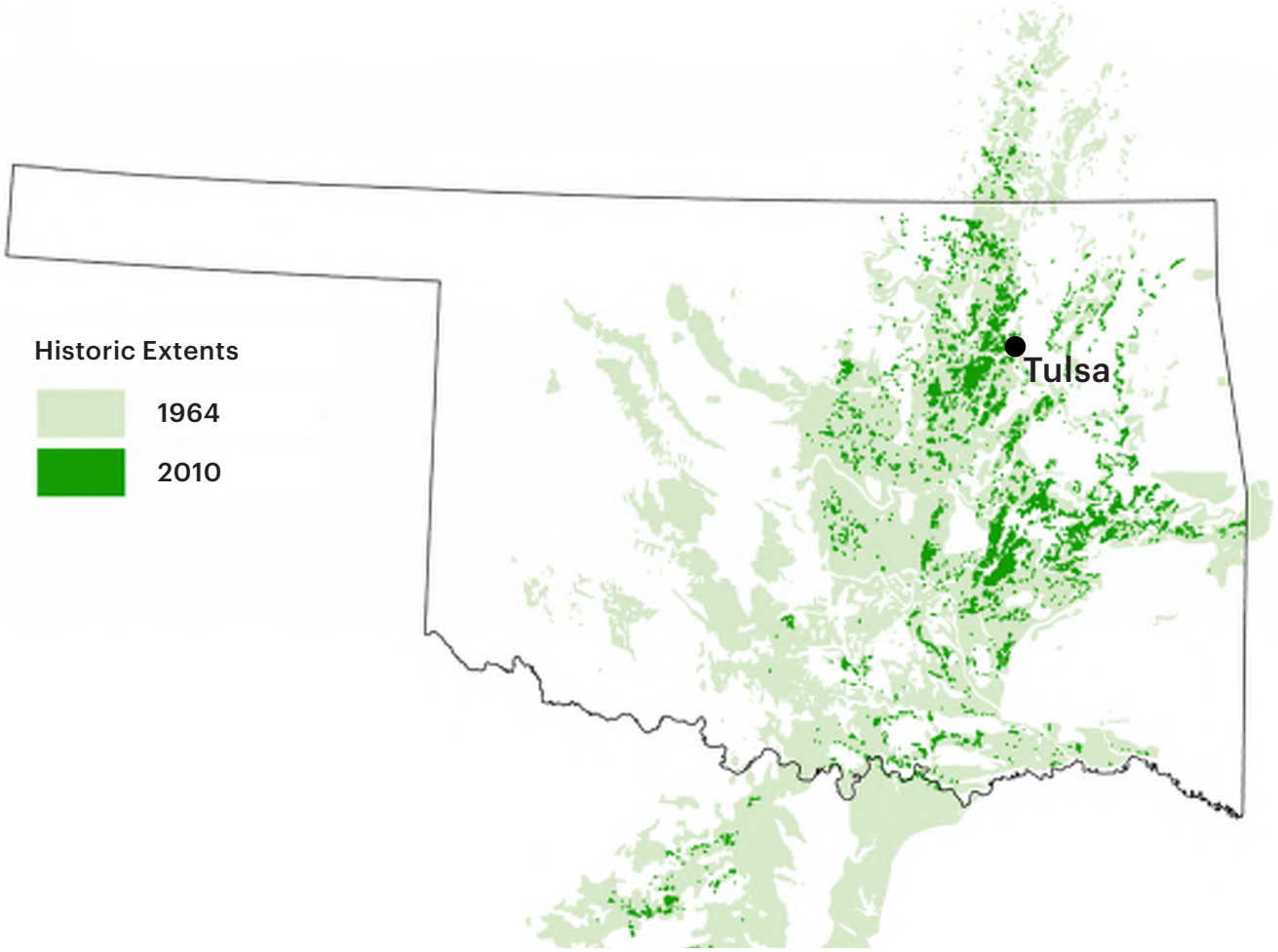
Turkey Mountain was once part of an expansive, unique ecoregion known as the Cross Timbers, where frequent disturbance by fire and cattle grazing helped maintain a delicate equilibrium between competing ecological forces and created a patchwork of landscapes.

Ecologically, the site is now a remnant. It has been fragmented by urban development and bounded by highways, railroad tracks, and channelized waterways, all of which isolate it from the larger forces of disturbance that formerly kept it healthy.

Turkey Mountain's location within the city of Tulsa means it has become extremely well-used. Biking, running, horseback riding, and hiking, as well as the occasional large event like Basecamp, make it an important community resource, but without active management and sustainably constructed trails, Tulsans could love Turkey Mountain to death. Once a regional destination for mountain bikers, as trail conditions have worsened, and new trail systems have been constructed in competing areas, Turkey Mountain has lost its place among the best biking destinations in the Midwest.

The Cross Timbers

An Imperiled, Fire-Dependent Ecoregion



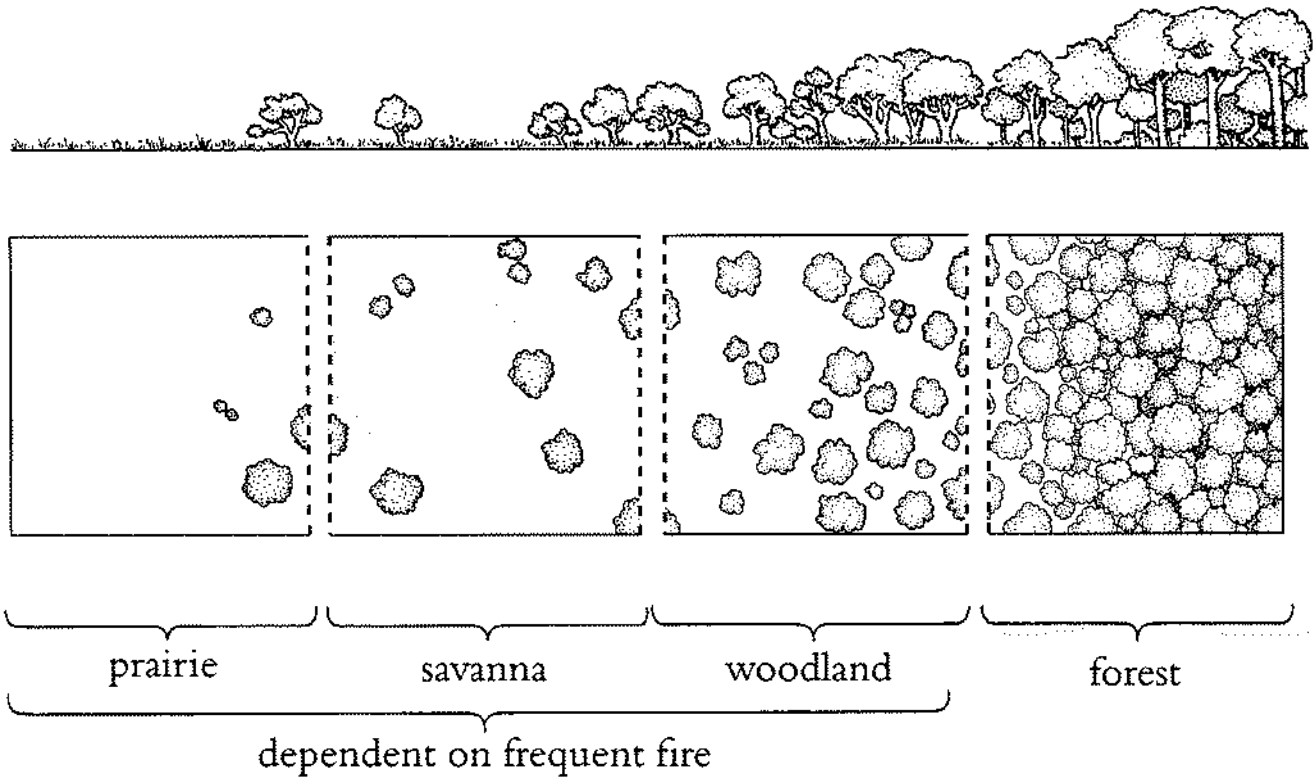
Oklahoma Forestry Services Resource Assessment, 2010

Between Prairie and Forest

Tulsa is located within a unique ecoregion known as the Cross Timbers, where oak-hickory forests of the Ozark Mountains intermingle with Midwest prairie grasses to create a mosaic of forest, woodland, savanna, and prairie.

Oak savanna is the rarest and most endangered landscape of the Cross Timbers mosaic. A contiguous, 50-million-acre band of oak savanna once extended through the Midwestern U.S. from Canada to Mexico. Now only 30,000 acres remain in patches of 100 acres or less.

In 2010, Oklahoma Forestry Services assessed what remains of the Cross Timbers and discovered that much of its former diversity, including oak savanna has disappeared. The map above contrasts the extent of the Cross Timbers in 1964 (in light green) and the remnants that are left today (in dark green). Urban sprawl and the associated fragmentation of formerly open land, inadequate land management, and fire suppression have each contributed to the rapid disappearance of this native Oklahoman landscape.



The Tallgrass Restoration Handbook (1997), edited by Stephen Packard and Cornelia F. Mutel

Fire Adaptation and Dependence

Since the Cross Timbers evolved with periodic fire, its survival now depends on it. Native oaks and hickories have fire-adapted bark that protect them from fire damage and many flowering prairie plants reproduce and flower more extensively in the wake of fires. Frequent fire kills invasive species like lespedeza that lack the fire-adaptation of native plants, and prevents red cedars from encroaching past their native range into the prairies and savannas.



Low-Intensity Control Burn in Oak Savanna

Urbanizing the Wilderness

Oil Drilling and the Growth of Tulsa



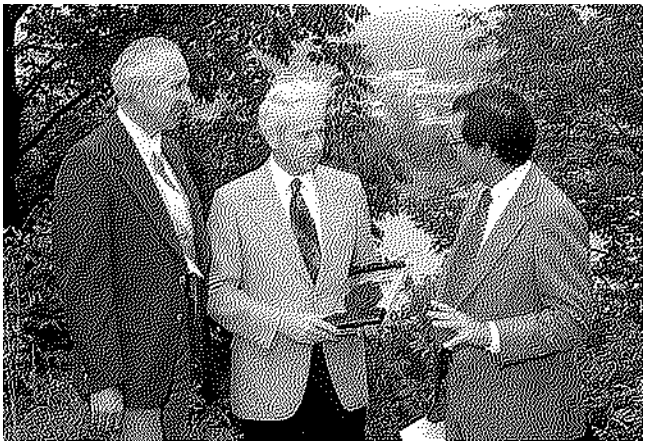
Aero View of Tulsa, 1918 (detail)

A Landscape of Resources

Oil drilling began in the Tulsa region in 1901 and proliferated for the first few decades of the twentieth century. Records show that extensive prospecting and drilling had a significant impact on the Turkey Mountain site. Period aerial renderings and photographs of comparable sites nearby indicate that oil prospectors likely clear cut Turkey Mountain as they erected derricks to extract oil from the shale and sandstone below. As Tulsa urbanized, previously uncultivated land was developed while road and rail infrastructure extended into the surrounding landscape. These newly constructed barriers fragmented the landscape, preventing the spread of natural fires and other types of disturbance that kept the Cross Timbers landscape in healthy equilibrium, marking the start of Turkey Mountain's ecological decline.



Oil Derricks on Arkansas Riverfront, c. 1908



Official Opening Ceremony of Turkey Mountain, 1980



Winter Mountain Bikers



Yoga at Basecamp Festival



Family Hiking from Main Trailhead



Trail Maintenance by Volunteers

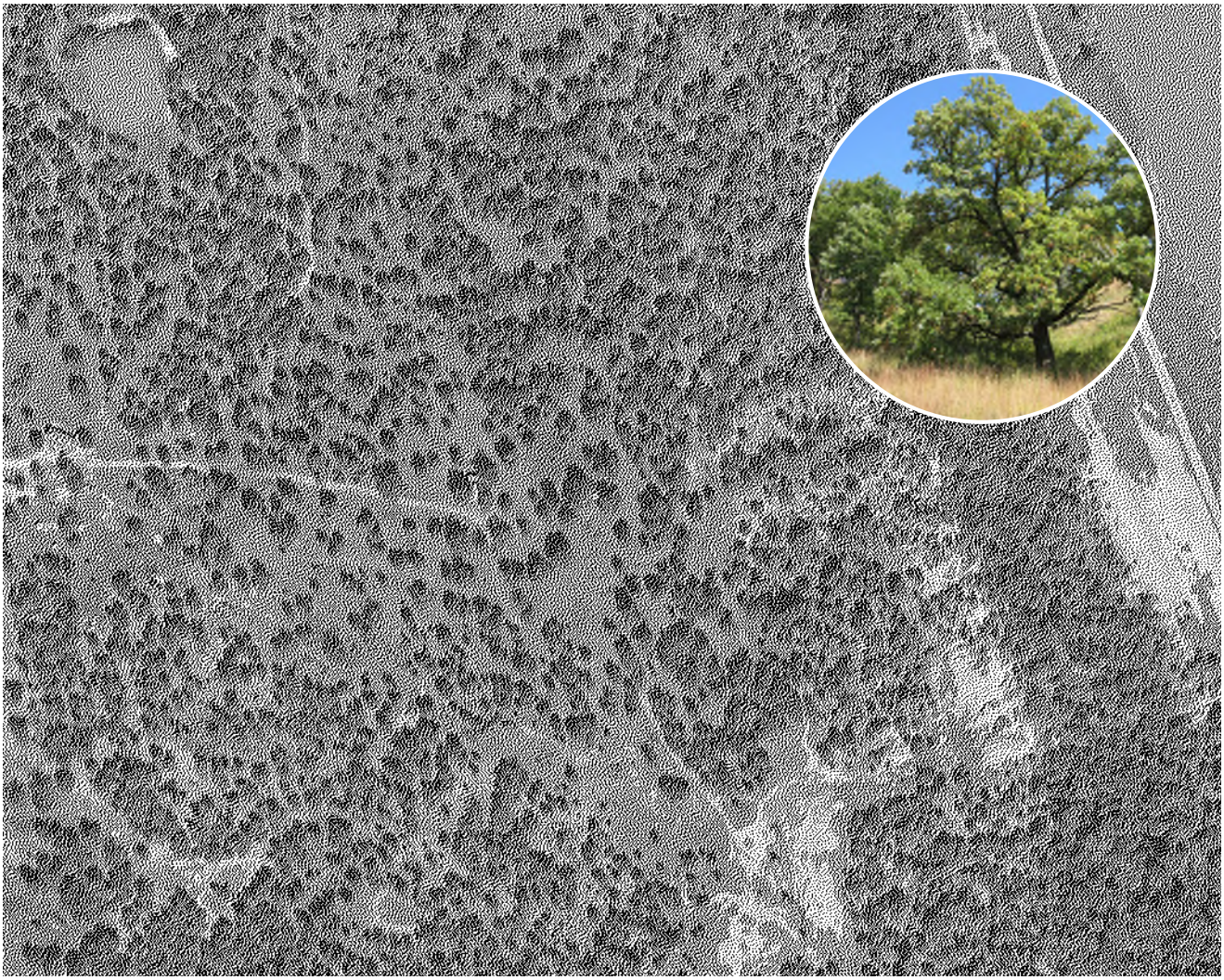
Tulsans Reclaim Turkey Mountain

In the 1970s, a local community of mountain bikers and outdoor enthusiasts recognized the natural resource they had in their back yard and began cutting their own trails throughout the undeveloped land. Since its official opening in 1980, Turkey Mountain has often received philanthropic donations that have put much of this urban wilderness, which was once private land, in the hands of the River Parks Foundation.

The Turkey Mountain Master Plan is the next major step toward restoring this preserved open land and making it accessible and enjoyable for all Tulsans for generations to come.

A Remnant Landscape

The Effects of Fire Suppression



1967 Aerial Photograph of Turkey Mountain

Turkey Mountain in 1967 vs Today

In the absence of regular fires, the prairies and savannas that were once a part of the Turkey Mountain site grew into woodland and eventually forest. Many of the understory species that contributed to this growth are invasive. This absence of land management led to a homogenous landscape, reducing the formerly diverse range of ecologies and experiences of Turkey Mountain to a degraded and monoculture condition.



2016 Satellite Image of Turkey Mountain

Listening to Existing Users

Public Engagement and Feedback



Turkey Mountain Public Meeting #1, March 7, 2019

Many Stakeholders

Turkey Mountain sees tens of thousands of users every month. Mulitple sources—an online survey that received over 3,000 responses, a series of public meetings, stakeholder meetings for groups such as bikers, runners, horseback riders, and nature advocacy groups, and input from the River Parks Authority who operate the site today—made it clear that Tulsans enjoy many different experiences of nature on Turkey Mountain, and more than anything they want to preserve it for future generations.

The Biggest Challenge

Over months of public engagement, MVVA learned that the top priority for existing users was to "keep Turkey Mountain wild." At the same time, the civic-minded Tulsa community wanted to make sure that the land was open and accessible to everyone. The core challenge for the Master Plan was to satisfy these two conflicting desires—"keep it remote," but also "make it accessible".

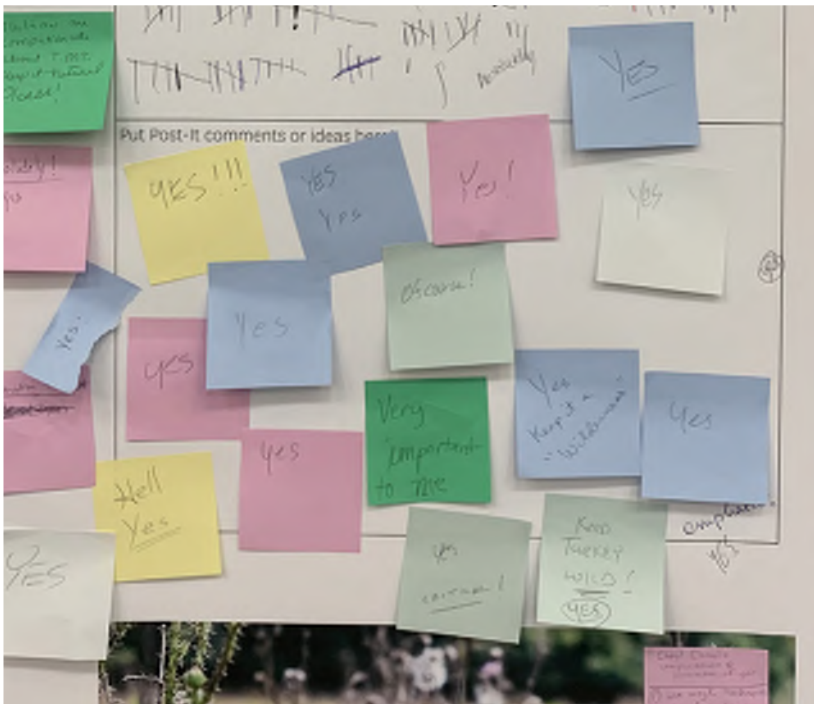

Fast Traffic
No Sidewalk or Bike Lane
W 61st St










Put Post-It comments or ideas here
YES!!!
Yes
Yes!
Yes
Yes
Yes
Of course!
Yes
Very important to me
Yes
Hell Yes
Yes
Yes

Assessing Site Conditions

Analysis with Expert Consultants



Mooser Creek Restoration Assessment



Initial Site Inventory



Biosolids Plant Site Tour



Prescribed Burn Research Facility

On-Site Work

Locals and expert consultants performed on-site assessments and made recommendations. Hiking through Mooser Creek in waders with wetlands engineers who specialize in restoring fish habitat, learning about the sandstone and shale soils from a retired geologist who leads tours, and comparing the effects of various prescribed burn management strategies at Oklahoma State University's research facility nearby in Stillwater, OK each deepened an understanding of Turkey Mountain's challenges and future potential.



Geology Site Walk



Overgrown Understory Prevents Easy Wayfinding



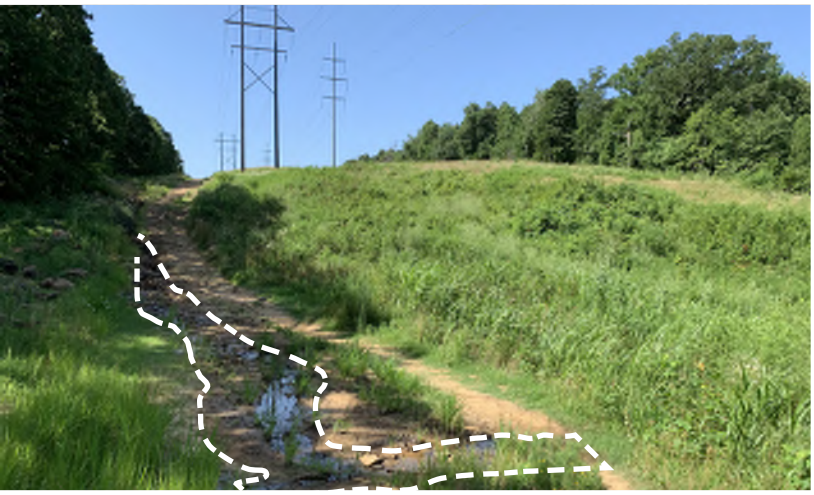
Invasive Species Outcompete Native Oaks



Degraded and Underutilized Sites



Inaccessible Creek



Poor Drainage



Trail Erosion



Trail Widening



Trail Cupping

Visiting Precedents

Lessons from Outdoor Recreation Destinations



Summit Bechtel Reserve, West Virginia

Best Practices in the Outdoors

Research trips across the Midwestern and Eastern United States provided examples of some of the best adventure recreation facilities in the country and their simultaneous urban wilderness management plans.

Interviews with organizations that facilitate collaboration among landowners to preserve urban wildernesses; construction managers who oversee the development of large multi-use sites; the operators of outdoor recreation facilities that serve tens of thousands of users; and consultants who conduct controlled burn management and research, restore creek and wetland habitat, build bike trails, and run equestrian centers, yielded lessons for a future Turkey Mountain urban wilderness.

Key components of the Master Plan were forged from an understanding of the challenges these other sites face, and what makes them work so well.














The Master Plan

The Master Plan prioritizes the reinvigoration of the core Turkey Mountain experience Tulsans have come to love—easy access to a wilderness experience in the city. This means welcoming bikers and pedestrians via new gateways, strengthening and clarifying the trails system, and leveraging both age-old and innovative lessons from applied ecology to restore Turkey Mountain's landscape. This core mission safeguards the character of the site, "keeping Turkey Mountain wild," while laying the groundwork for new programs that invite new users to enjoy Turkey Mountain.

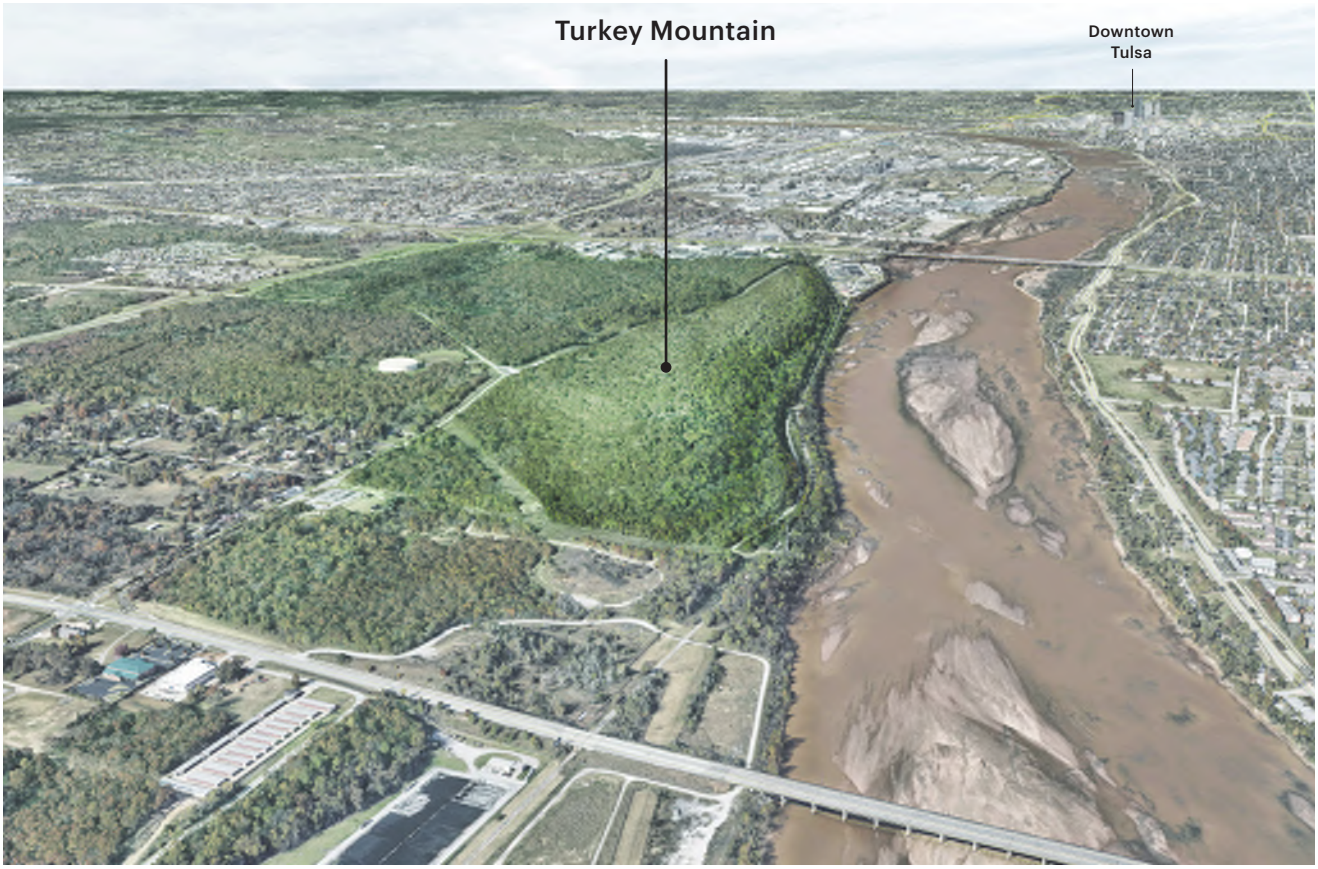
The Master Plan establishes four core principles to guide the future transformation of Turkey Mountain:

1. **Restore Nature**
2. **Maximize Access**
3. **Enhance Trails**
4. **Integrate Program**

An Expanded Vision

Added Sites Make Space for New Program

In order to accommodate both unprogrammed wilderness areas and new opportunities for fun, the Master Plan proposes to expand Turkey Mountain into adjacent sites. These expansion properties at the periphery of Turkey Mountain provide the additional space necessary to incorporate new ways of experiencing the outdoors—access to riparian wetland landscapes, adventure recreation and bike facilities, and spaces for group activities—and connect the core of the site to civic spaces and city parks to robustly integrate outdoors activities into the everyday life of Tulsa. The rustic, wild character of the core Turkey Mountain site would be preserved, while its new extremities could house activities to attract new users. Cooperation between city, state, and private landowners to grant easements and access is essential to expanding and preserving Turkey Mountain.



Existing Turkey Mountain Site Extents



Proposed Turkey Mountain Expansion and Connectivity

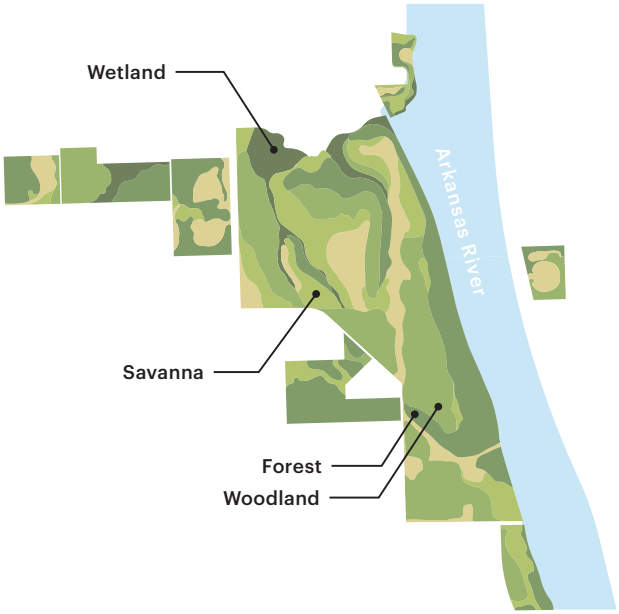

I - 44
W Skelly Dr
Creek Channelized
Mooser Creek Continues
Downtown Views
YMCA
Disconnected Bike Park
Undeveloped Land
Remnant Prairie
US-75
Bales Park
S 33rd W Ave
Underutilized Park
S Union Ave
No West Entrance
W 61st St
No Bike Lane or Sidewalk
US - 75
EXISTING SITE PLAN
Forest
Existing Path Access
Railroad
N
0
400'
1200'

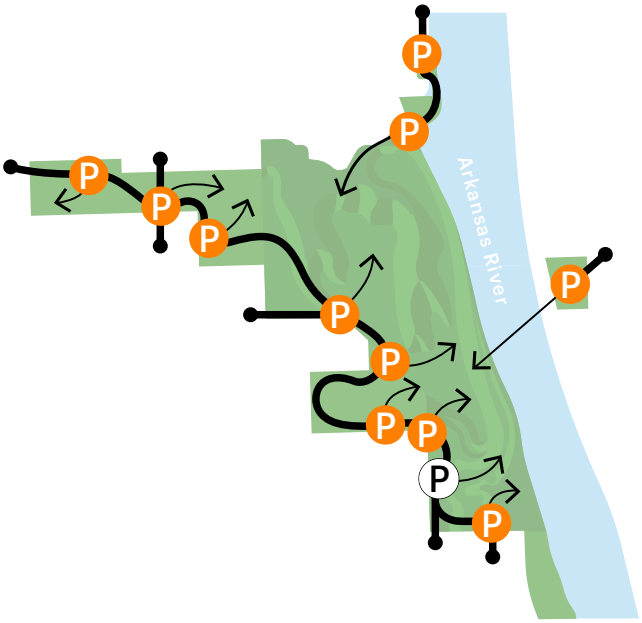

Downtown Tulsa
3.75 miles
I-44
No Bike Lane or Sidewalk
Riverside Dr
No North Entrance
Inaccessible Creek
Confined By Infrastructure
Exposed Pipeline
Poor Wayfinding
Few Connections Over River
Johnson Park
Drainage Issues
Underused Park
Degraded Wetlands
Turkey Mountain
E 61st St
Blind Curve
Dangerous, Fast Traffic
Invasive Species
S Peoria Ave
Inaccessible Trails
River Parks Foundation Property
S Elwood Ave
Significant Erosion
Arkansas River
No Waterfront Access
Insufficient Parking
Degraded Site
Regional Trail Ends
Dangerous Truck Route
No Public Access
W 71st St
E 71st St
No Path To South


I-44
W Skelly Dr
The Hinterlands
Bales Park
S Union Ave
US-75
S 33rd W Ave
W 61st St
US-75
PROPOSED MASTER PLAN
Forest
Woodland
Savanna
Prairie
Riparian Lowlands
Multi-Use Dirt Trails
Regional Asphalt Trail
N
0
400'
1200'


Downtown Tulsa
3.75 miles
I-44 Bridge
I-44
Riverside Dr
Mooser Creek
Johnson Park
Turkey Mountain
Core Site
E 61st St
Riverside Dr
S Peoria Ave
Water Tank Property
Arkansas River
The Bike Park
W 71st St
71st Street Bridge

Four Core Principles



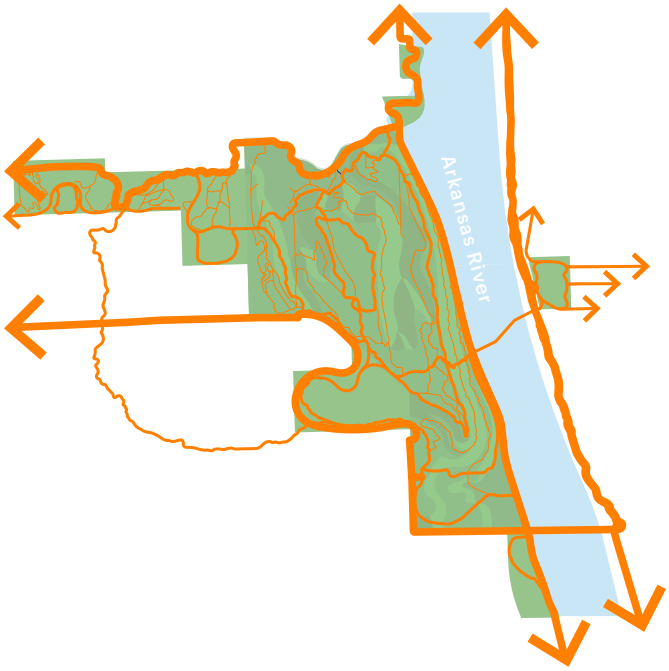


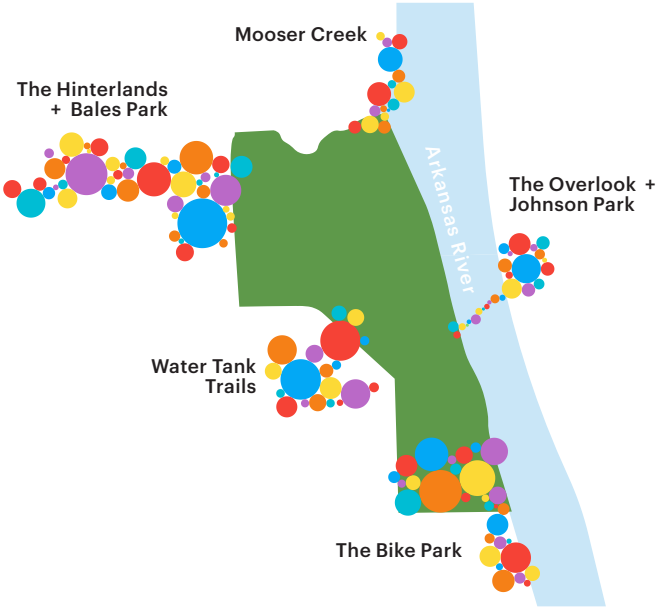
Restore Nature

Revive the native Cross Timbers landscape through active land management regimes encompassing prescribed burning and wetlands bioengineering.

Maximize Access

Make using Turkey Mountain easy for everyone by adding bike and pedestrian connections and new entrances, and expand parking without encroaching on the remote quality of its core.





Enhance Trails

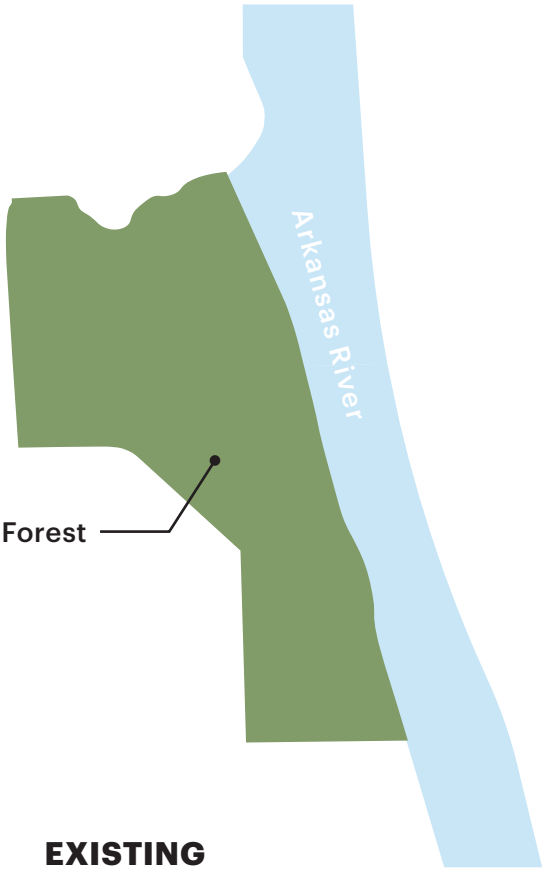
Introduce hierarchy in trail widths and uses to reduce user conflicts, improve wayfinding, and rebuild trails in ways that improve drainage and minimize erosion.

Integrate Program

Group new recreational uses together to minimize their environmental impact and operational cost, while maximizing their accessibility.



1. Restore Nature



EXISTING



PROPOSED

Oak Savanna Restoration Case Study

Pleasant Valley Conservancy, Wisconsin



Butterfly and Wildflower Nature Walk with Audubon Society, Pleasant Valley Conservancy, 2018

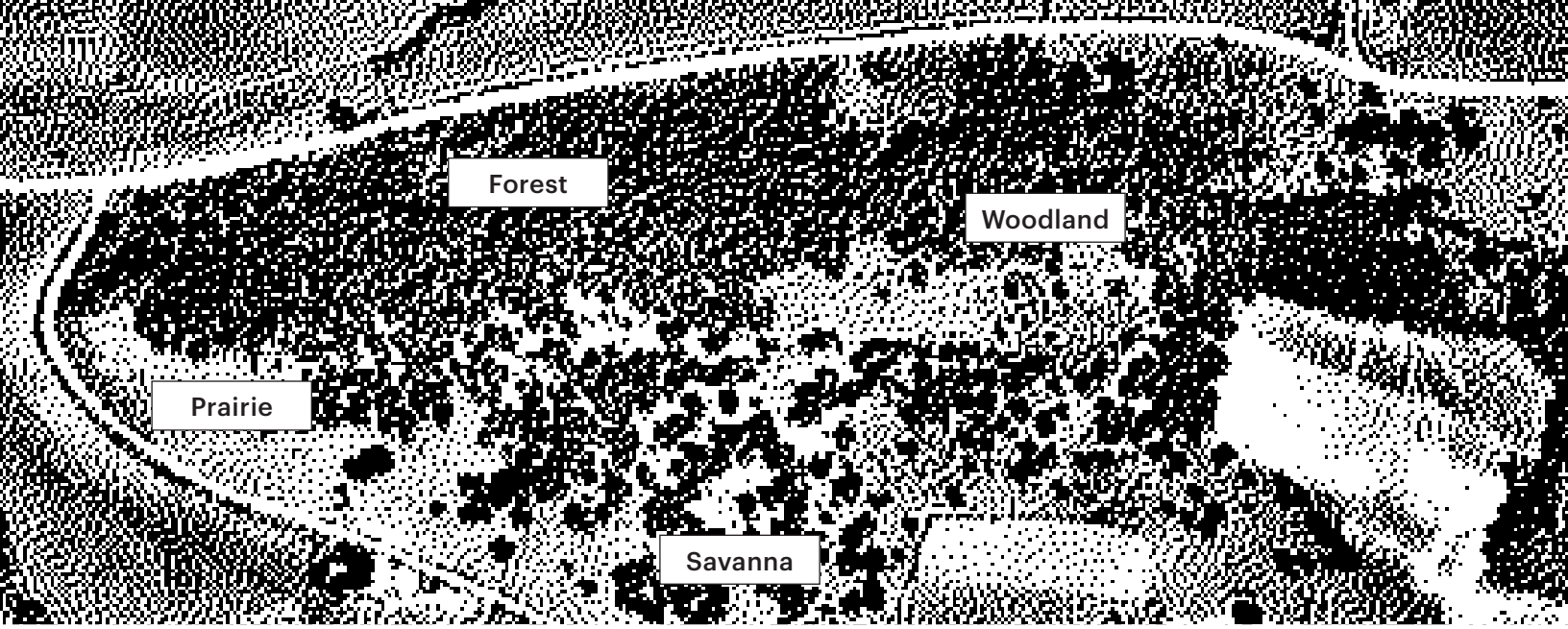
An Actively Managed Landscape

Pleasant Valley Conservancy in Black Earth, Wisconsin, shares a similar site history to Turkey Mountain. Fire and other natural disturbances were suppressed in this remnant landscape resulting in diminished ecological and experiential diversity. Former prairies and savannas became overgrown.

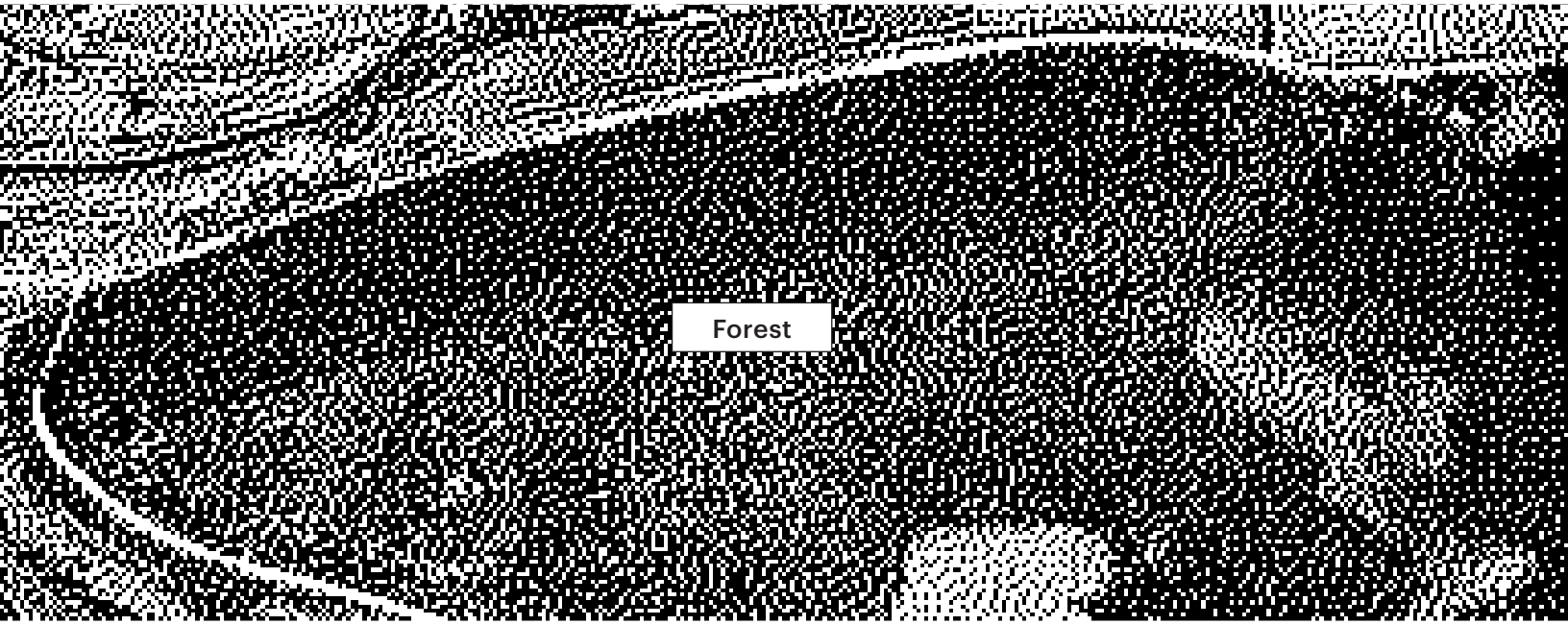
In 1990, the site was assessed and a plan for prescribed burn restoration was created. Careful identification of heritage post oaks and the application of frequent controlled fires, brush-clearing, and prairie plant seeding has brought back the former landscape complexity and beauty.



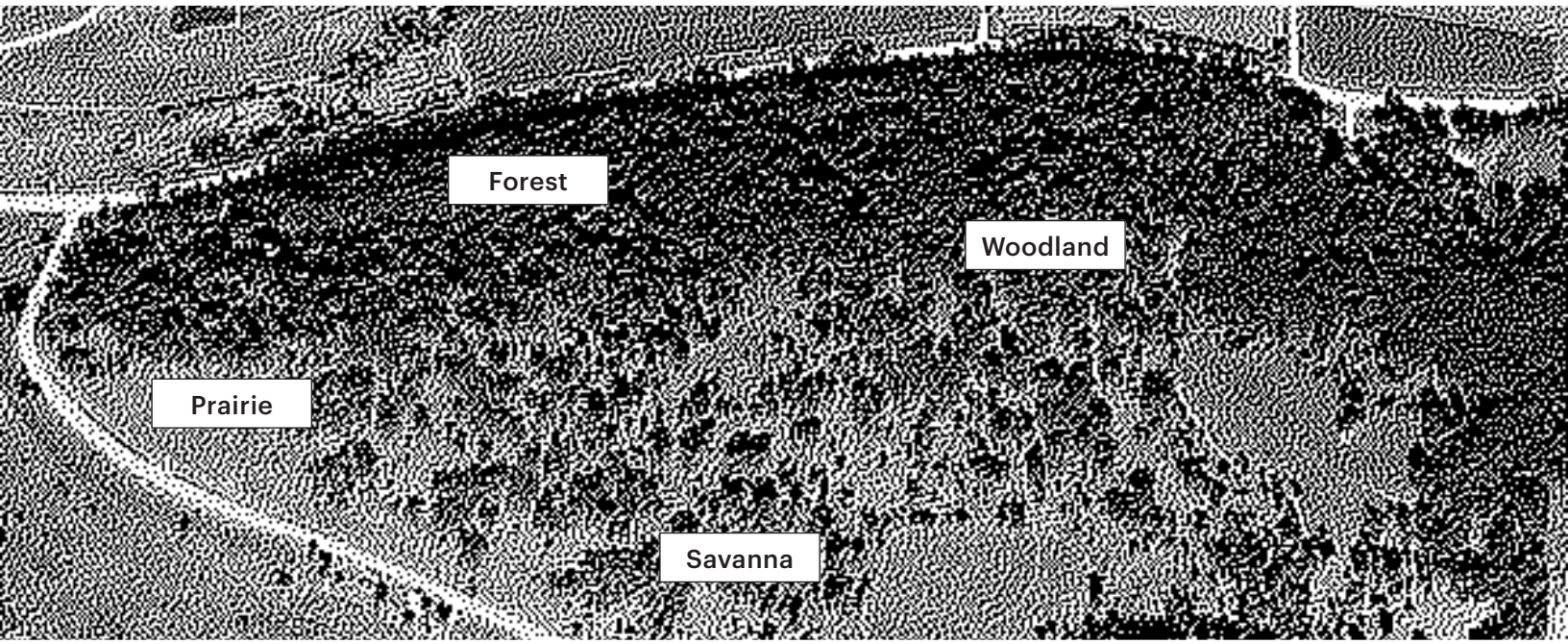
Dormant Season Prescribed Burn



1937—Native Condition of Oak Savanna



1990—Unmanaged, Degraded Site



2007—After Prescribed Burn Restoration

Prescribed Burn Management

Restoring a Cross Timbers Landscape



Long-Term Benefits of Fire

Without regular fires, leaf litter and dead plant matter accumulate, increasing the chances of wildfires. Conducting carefully planned, controlled burns in Turkey Mountain will reduce this accumulation and thus the risk of wildfire. Over time, the necessary burns will become smaller.

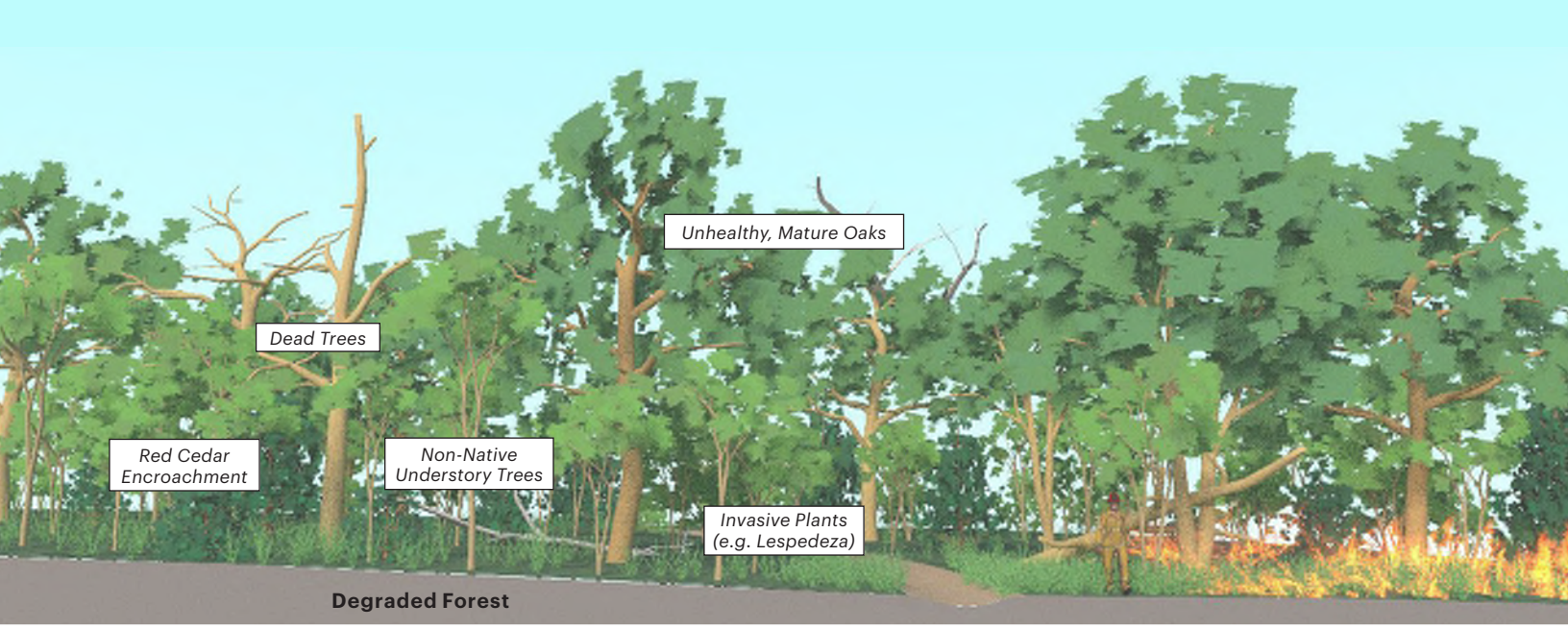
Prescribed burning is the most cost-effective means of managing a site as large as Turkey Mountain. Alternate methods such as herbicides or hand-pruning and removal can cost ten times as much, take longer, require more labor, and lack many of the other benefits of fire. Controlled burns stimulate post oak growth, cause meadow flowers to bloom more vigorously, attract native fauna through the growth of young herbaceous plants, prevent the spread of invasive species such a lespedeza and encroachment of red cedars into prairies and savannas, and reduce tick and chigger populations by reducing their habitats.

Training from Local Experts

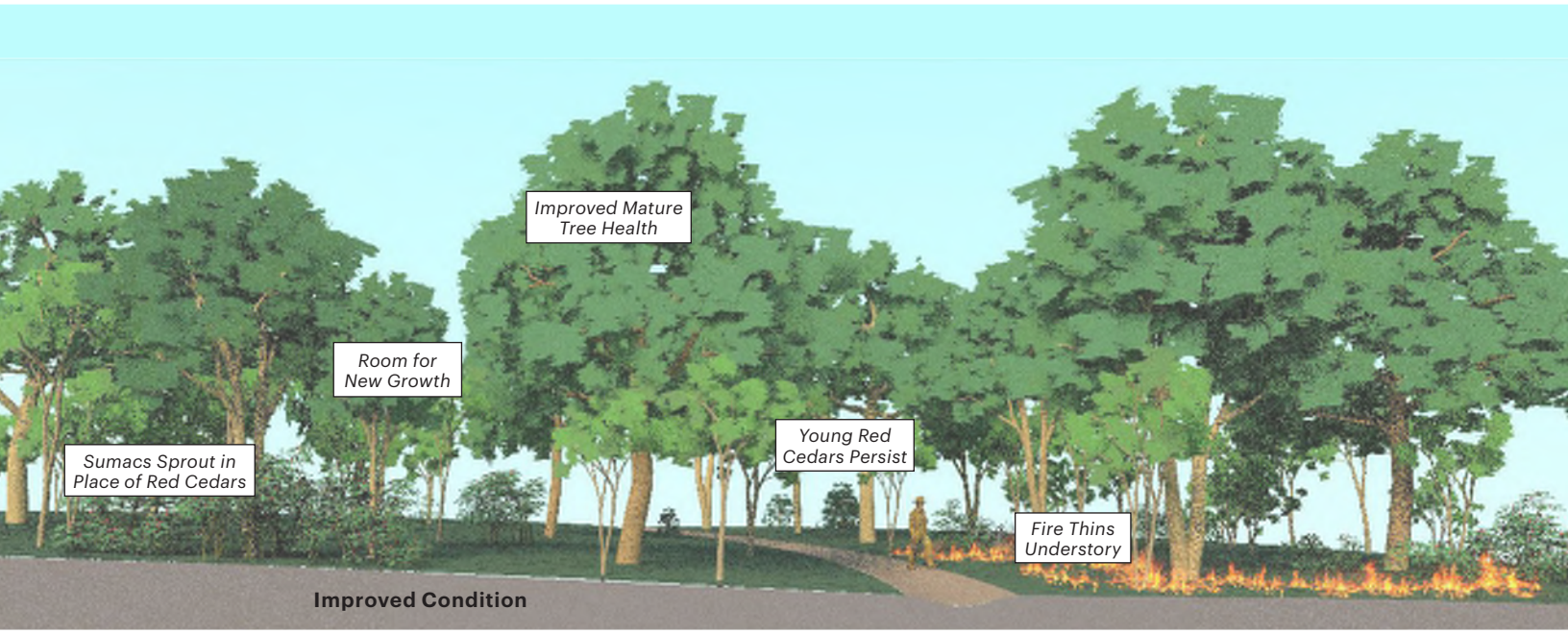
The most cost-effective and reliable strategy for implementing controlled burns at Turkey Mountain is to train a local burn crew led by River Parks staff and aided by members of local fire departments.

To train these crews, the Master Plan looks to John Weir, a practicing burn manager with 25 years' experience in the field, who is head of Oklahoma State University's (OSU) prescribed burn research facility in Stillwater. Weir has conducted extensive training of personnel of the U.S. Army Corps of Engineers, the Bureau of Land Management, state and city agencies, Native American reservations, and private landowners.





Year 1



Year 5



Year 10

Mooser Creek Bioengineering

Creating Riparian Habitat and a Greenway



Stabilizing and Reconnecting the Creek

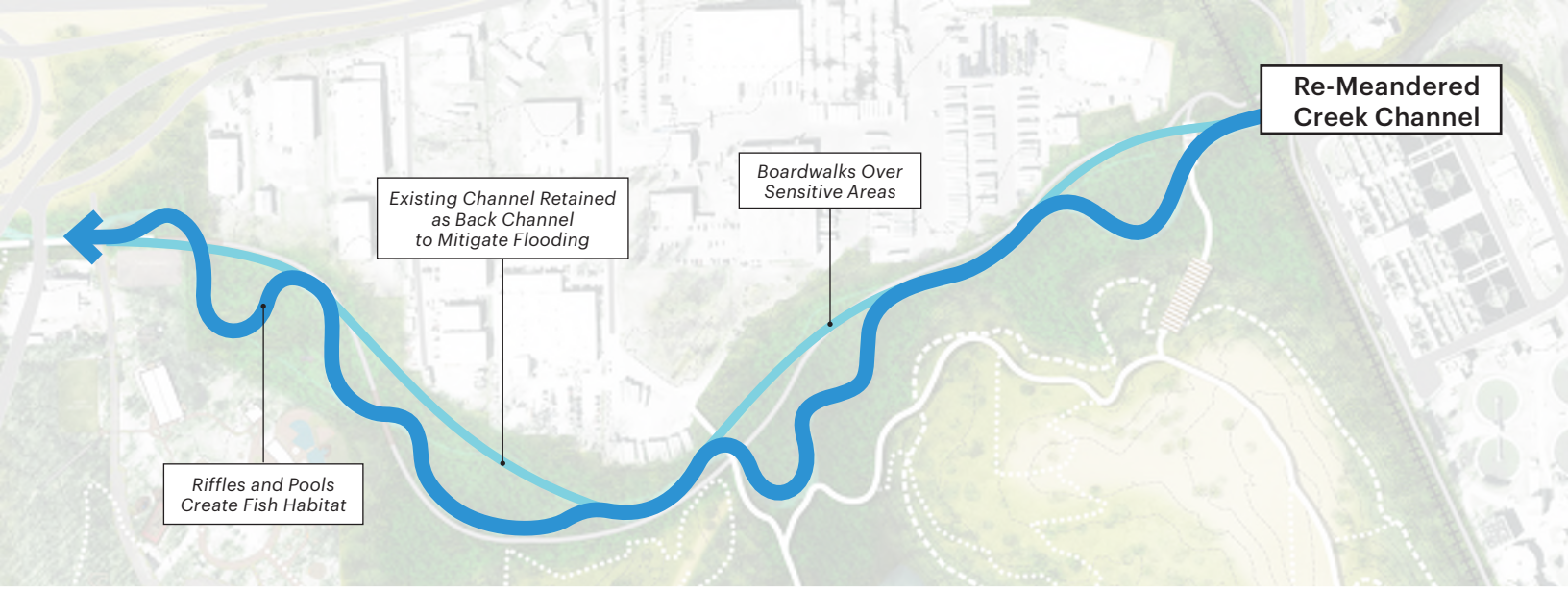
Mooser Creek forms the northern border of Turkey Mountain. Likely straightened and channelized as part of the development of the industrial park to its north, the creek's steep banks are eroding, and it remains largely inaccessible to Turkey Mountain users.

Restoring this riparian corridor has the potential to create fish and bivalve habitat, allow human interaction with the creek, and provide new access to Turkey Mountain from the north through the integration of a proposed bridge. The addition of a regional multi-use path along the top of the riverbank will also connect the River Bank West Trail to West Tulsa.

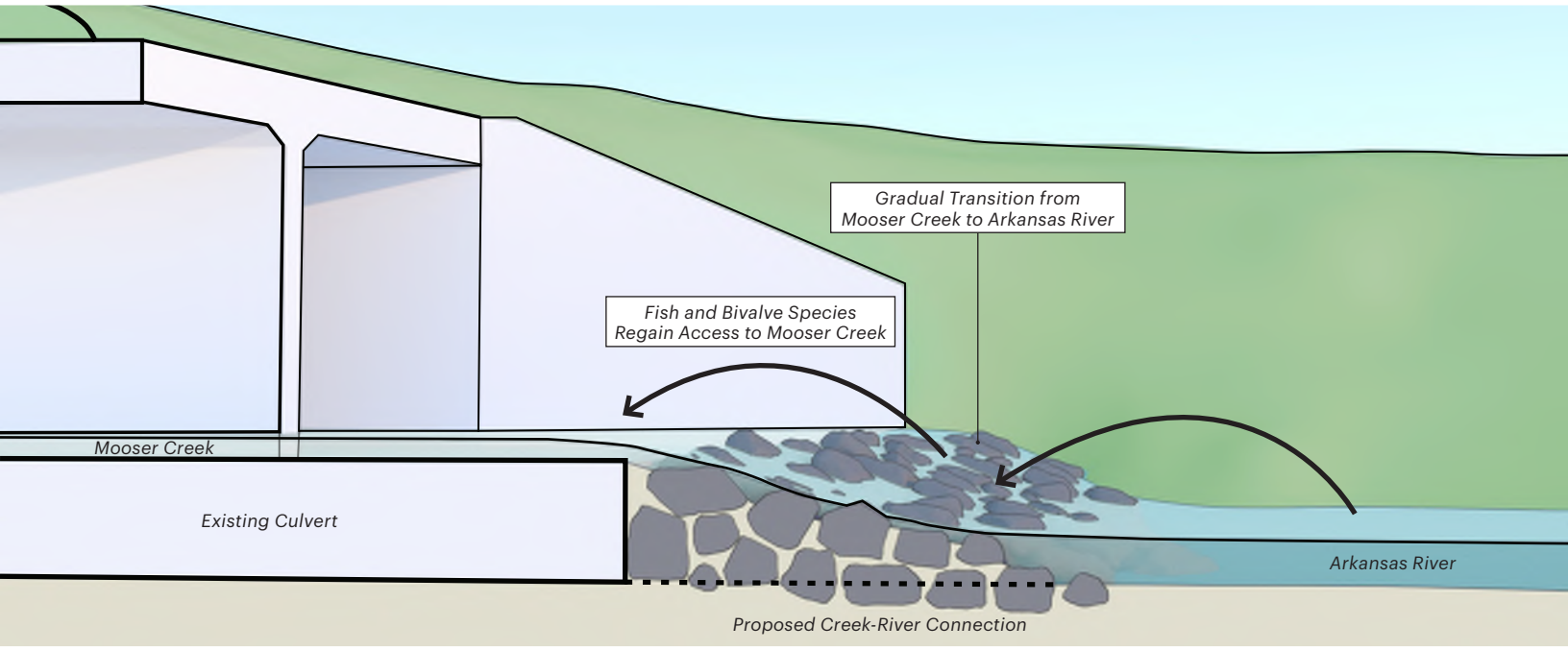


Wetlands Bioengineering Experts

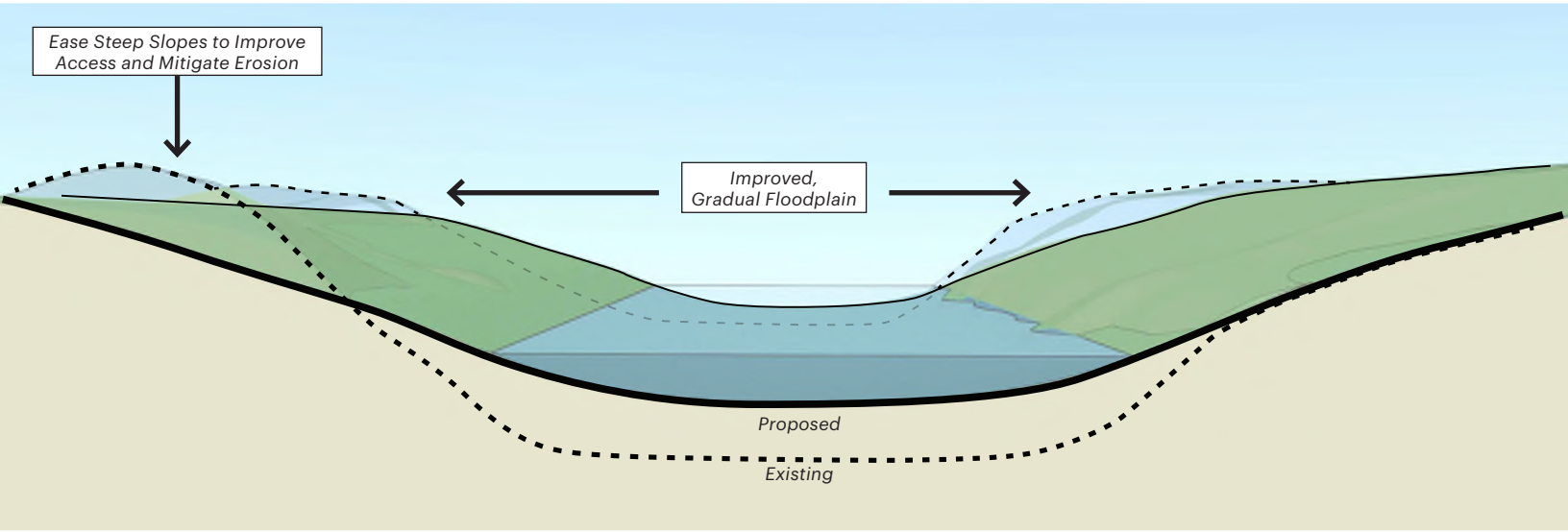
On-site analysis conducted by Inter-Fluve, experts in wetland restoration and bioengineering, indicates that Mooser Creek's channel could be renaturalized, improving its water quality and value as a habitat. Reconnecting the mouth of the creek to the Arkansas River would allow marine fauna to return to the creek. Lessening the steepness of the banks will improve resiliency during flood events and make room for an asphalt path along the top of the bank.



Remeander the Creek



Reconnect to the River



Widen the Floodplain

Turkey Mountain Core Site

Bringing Back Landscape Diversity

Wild Character, in the City

Turkey Mountain is a precious resource—undeveloped, open land—that will only get rarer and rarer as cities like Tulsa continue to expand. The rustic quality and immersive, wild character of Turkey Mountain is extraordinary given its location just four miles from Downtown Tulsa. Any Tulsan, regardless of means, has access to a wilderness experience close to home.

Sameness in the Landscape

The native Cross Timbers landscape is extremely varied—a patchwork of plant families that create microclimates, varying degrees of enclosure, long and short views, and habitats for native fauna. By contrast, the vast majority of Turkey Mountain today has grown into a uniform thicket that provides very few of these ecological or aesthetic benefits.

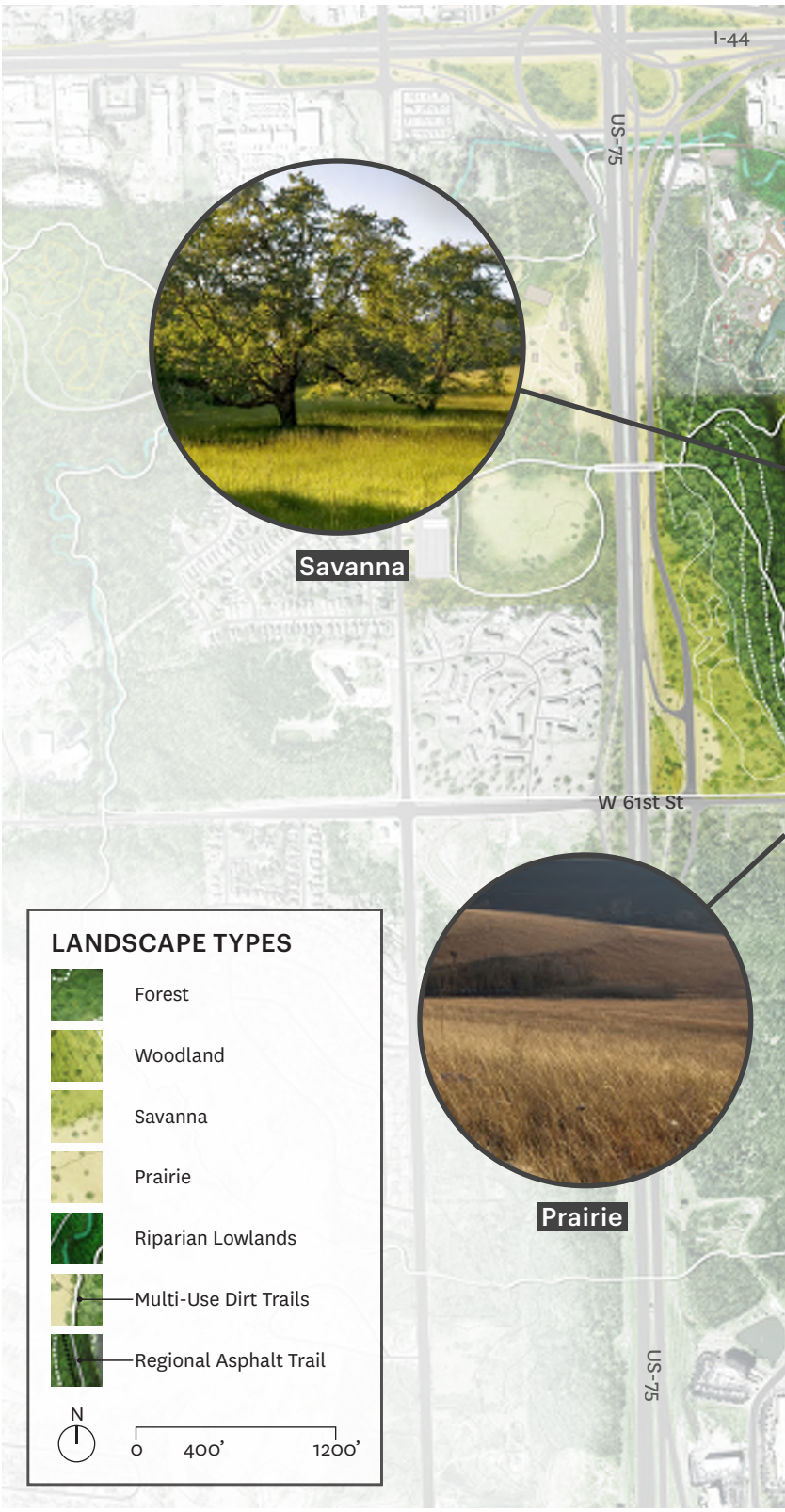
A Window Back in Time

Preserving Turkey Mountain means honoring the character of its native Cross Timbers landscape. Since the health of that landscape depends on forces of disturbance, predominantly fire, active management is necessary to restore Turkey Mountain's ecology.

Reintroducing fire to the site through a regime of prescribed burn management will effectively turn back time, opening a window into what this region of Oklahoma looked like prior to its degradation.



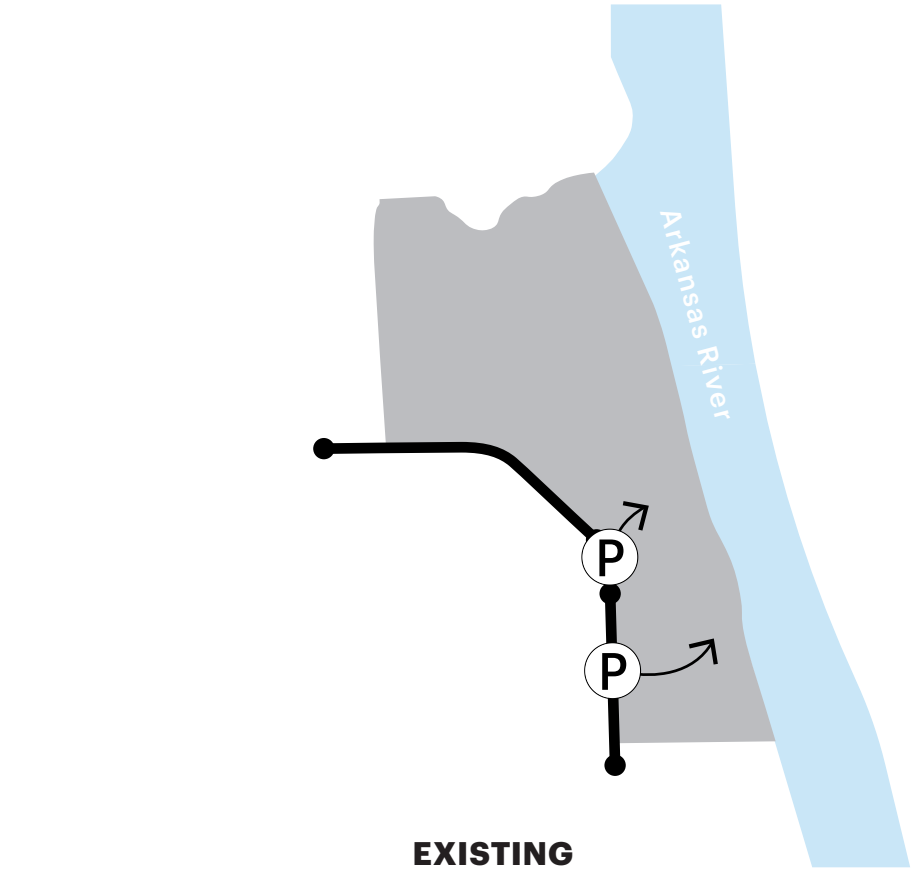
Existing Condition



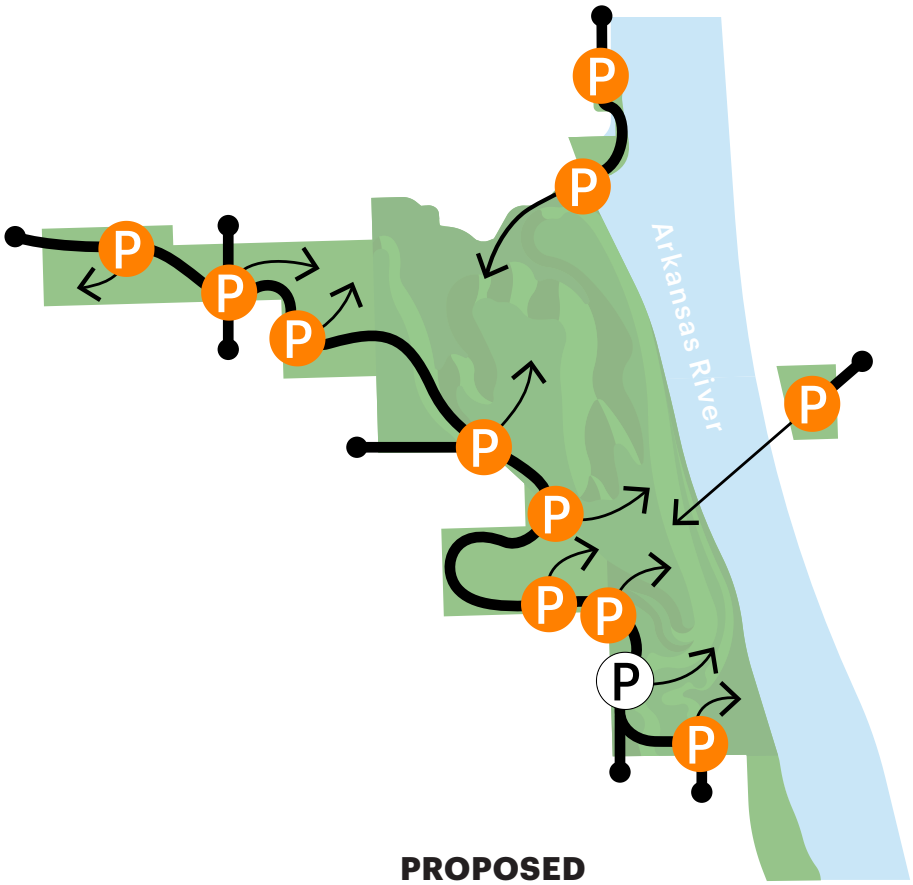

Lowland
Woodland
Forest
S Peoria Ave
E 61st St
S Elwood Ave



2. Maximize Access



EXISTING



PROPOSED

Bridging Across an Expanded Site

New Bike and Pedestrian Access



Bales Bridge

Bales Bridge connects Turkey Mountain directly to Bales Park, taking advantage of its large existing parking lot and providing the primary connection to the proposed western expansion of the park, known as The Hinterlands.



Hinterlands Bridge

Conceived as a rustic timber bridge, the Hinterlands Bridge reinforces the national park-inspired access road connection from West Tulsa through the



Mooser Bridge

Dipping under the Union Pacific rail bridge, the proposed Mooser Creek Greenway connects to the Mooser Bridge, which would facilitate access into Turkey Mountain from the north.

Downtown Tulsa

Gathering Place

Turkey Mountain Core

River Bank West Trail

River Bank East Trail

Johnson Park



Johnson Bridge

The sole bike and pedestrian-only crossing over the Arkansas River to Turkey Mountain, Johnson Bridge would connect directly to Johnson Park and the River Bank Trails without the noise of a freeway, enabling a serene experience over flowing water.

Vehicular Access and Parking

Adding Parking While Minimizing Paving

Existing Parking

The two existing parking lots at Turkey Mountain—the Main Lot and the Upper Lot—together provide only a few hundred parking spaces for the average of 14,000 people who visit every month. Furthermore, both lots are located on the southern side of the site, leaving the northern and western reaches of the park inaccessible to many.

Proposed Actions:

1. Close South Elwood Ave

Traffic along South Elwood Ave, with its blind curves and steep topography, poses a safety risk to pedestrians, cyclists, and motorists alike. The proposed closing of South Elwood Ave grants safe access to the adjacent water tank property, where proposed trails add miles of new terrain for Turkey Mountain users to explore.

2. Add Gravel Access Drives

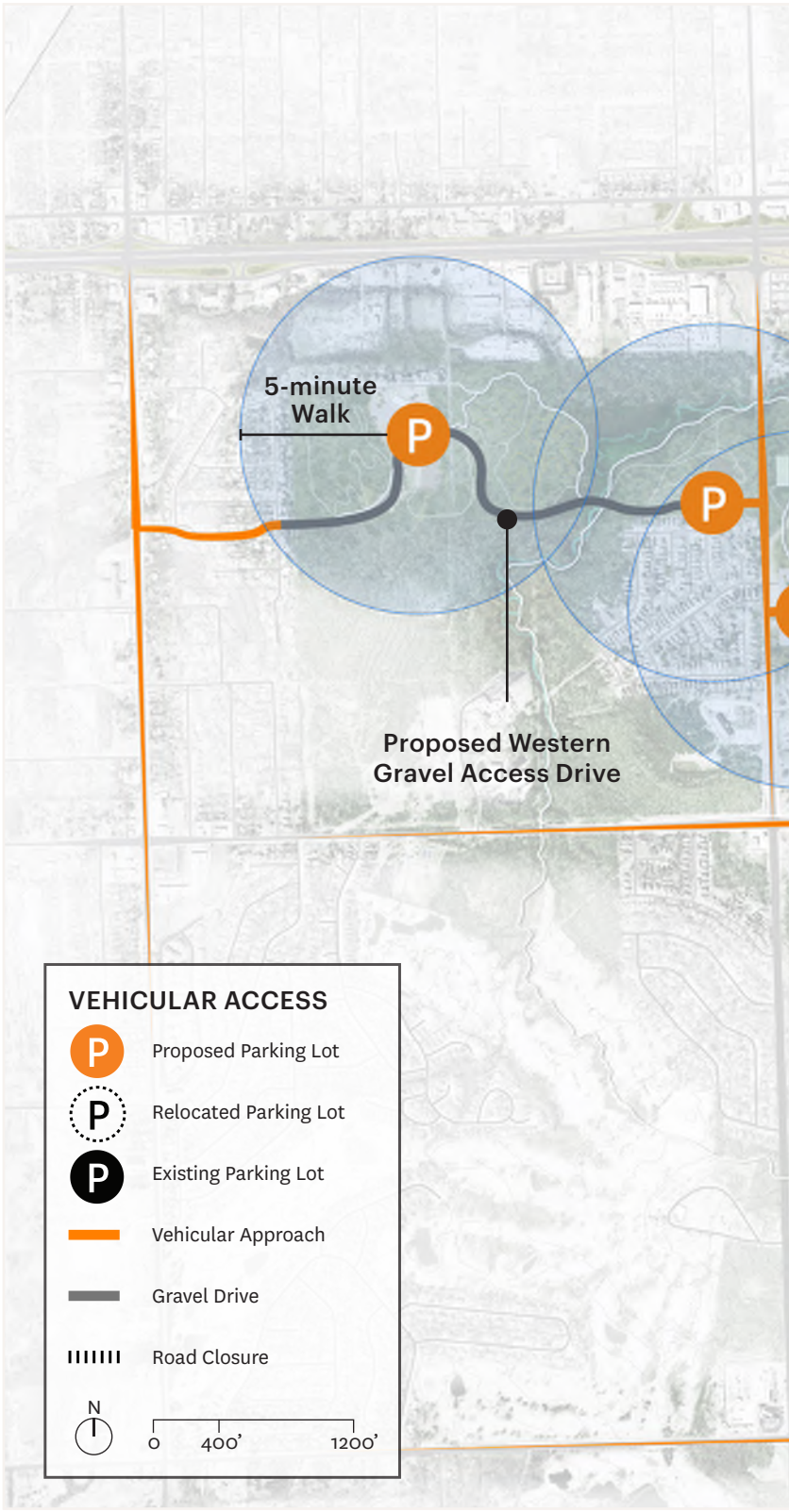
Two short gravel access drives provide access to new parking situated along the periphery of the park. The gravel surface slows traffic, disincentivizing the use of the new drives as shortcuts.

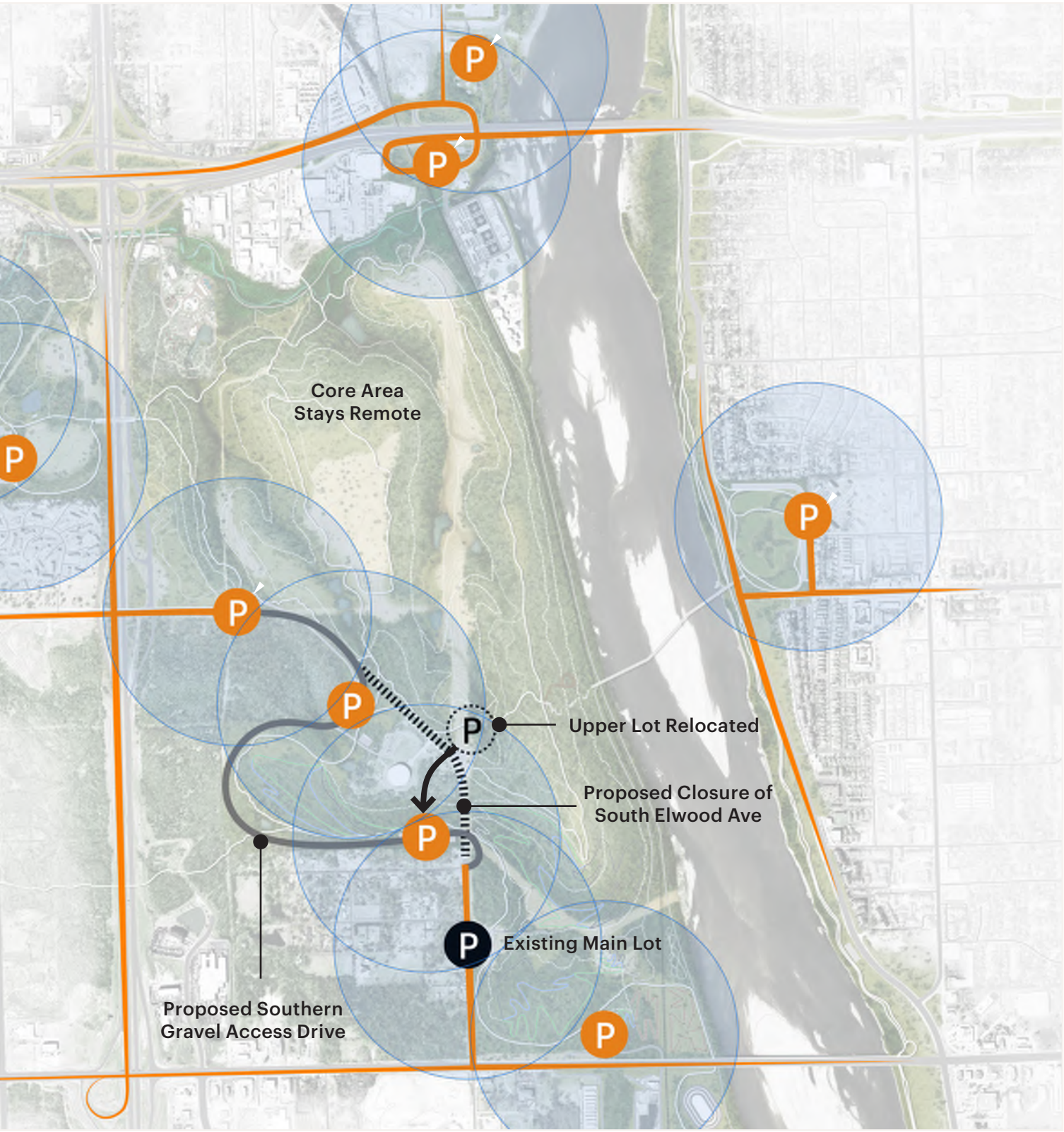
3. Expand Parking

Significantly expanding parking without paving over substantial areas of Turkey Mountain's precious wilderness is achieved through a combination of new connections to existing parking lots in Bales and Johnson Parks, expansion of these off-site lots, and the addition of parking lots along the periphery of the proposed additions to Turkey Mountain.

4. Preserve Remoteness

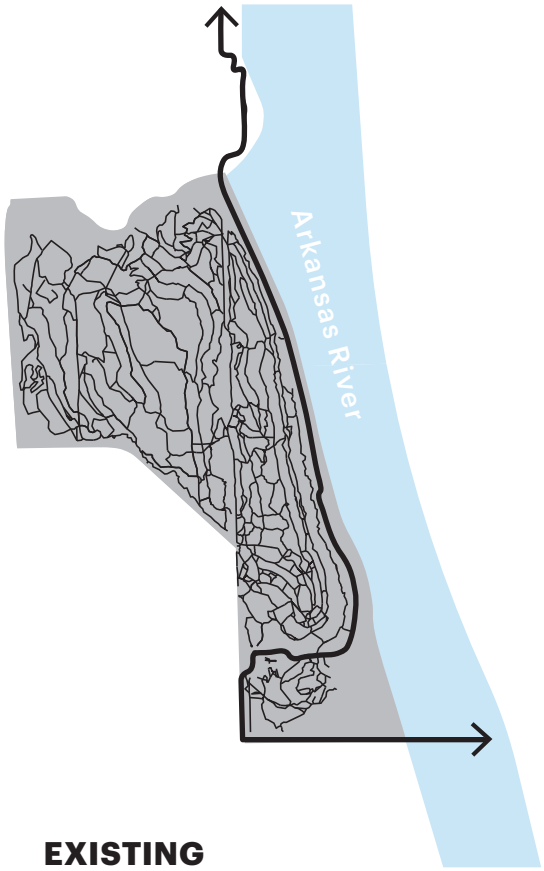
The strategic placement of proposed parking lots distributes over 2,000 parking spots along Turkey Mountain's perimeter to allow users to arrive nearer to their intended destination while preserving the remote character of the core site.




Core Area
Stays Remote
Upper Lot Relocated
Proposed Closure of
South Elwood Ave
Existing Main Lot
Proposed Southern
Gravel Access Drive



3. Enhance Trails



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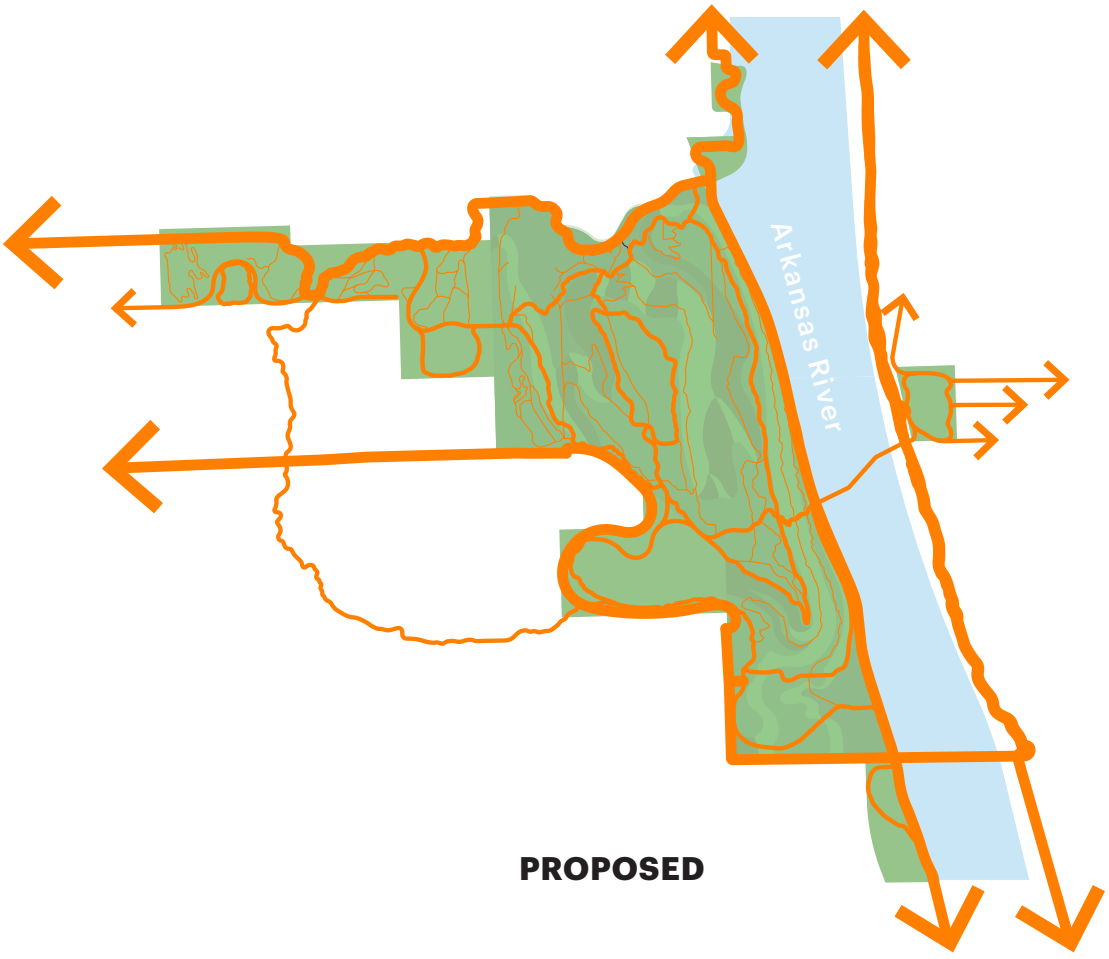


PROPOSED

Establishing a Baseline

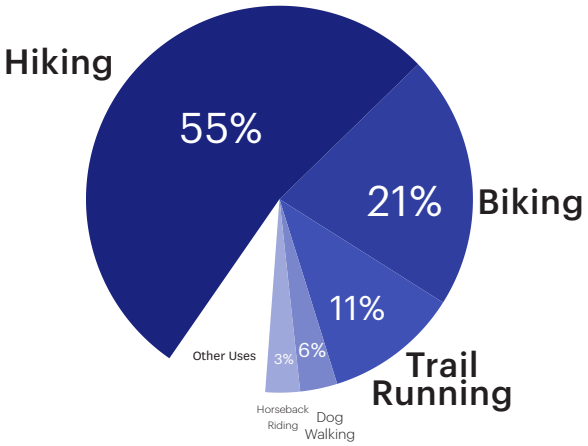
Understanding Trail Use Today

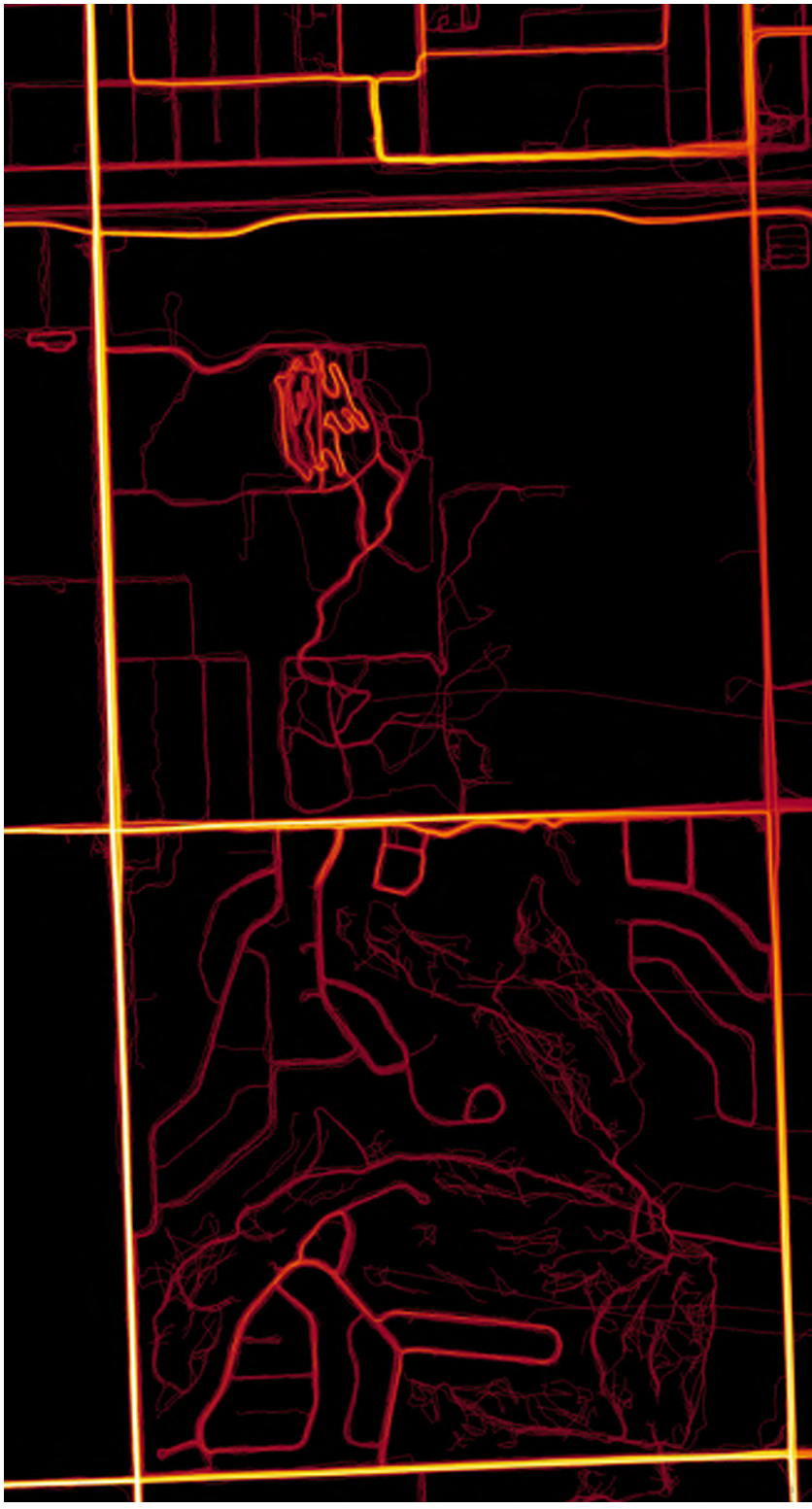
Existing Patterns of Use

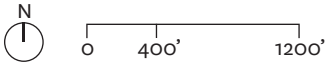
Thousands of users record their paths while biking or running through Turkey Mountain using the social fitness app Strava. The heatmap generated from this data provides a means of understanding the existing patterns of use in Turkey Mountain today—which trails are most-used, which are more popular for biking versus trail running, even the location of many trails that are otherwise unmapped.

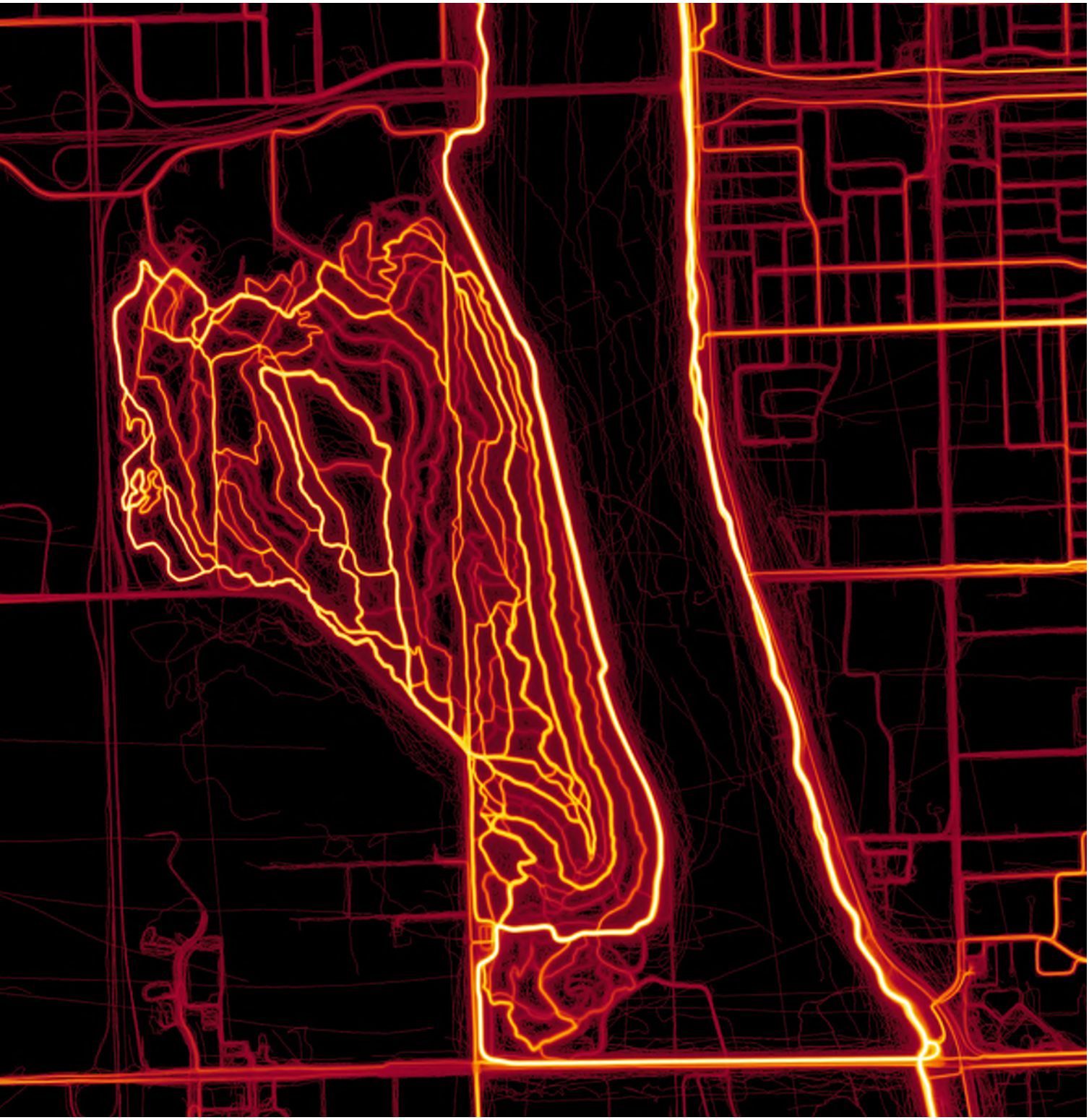
Use Types

There are 12.69 miles of formally mapped trails in Turkey Mountain according to Trailforks, a popular trail mapping website and app. The Master Plan online survey responses indicate the following use types on these trail:









Strava Global Heatmap Running and Biking Data, 2018

A Complementary Set of Trails

Engineered for Use

A Multi-Use Trail Framework

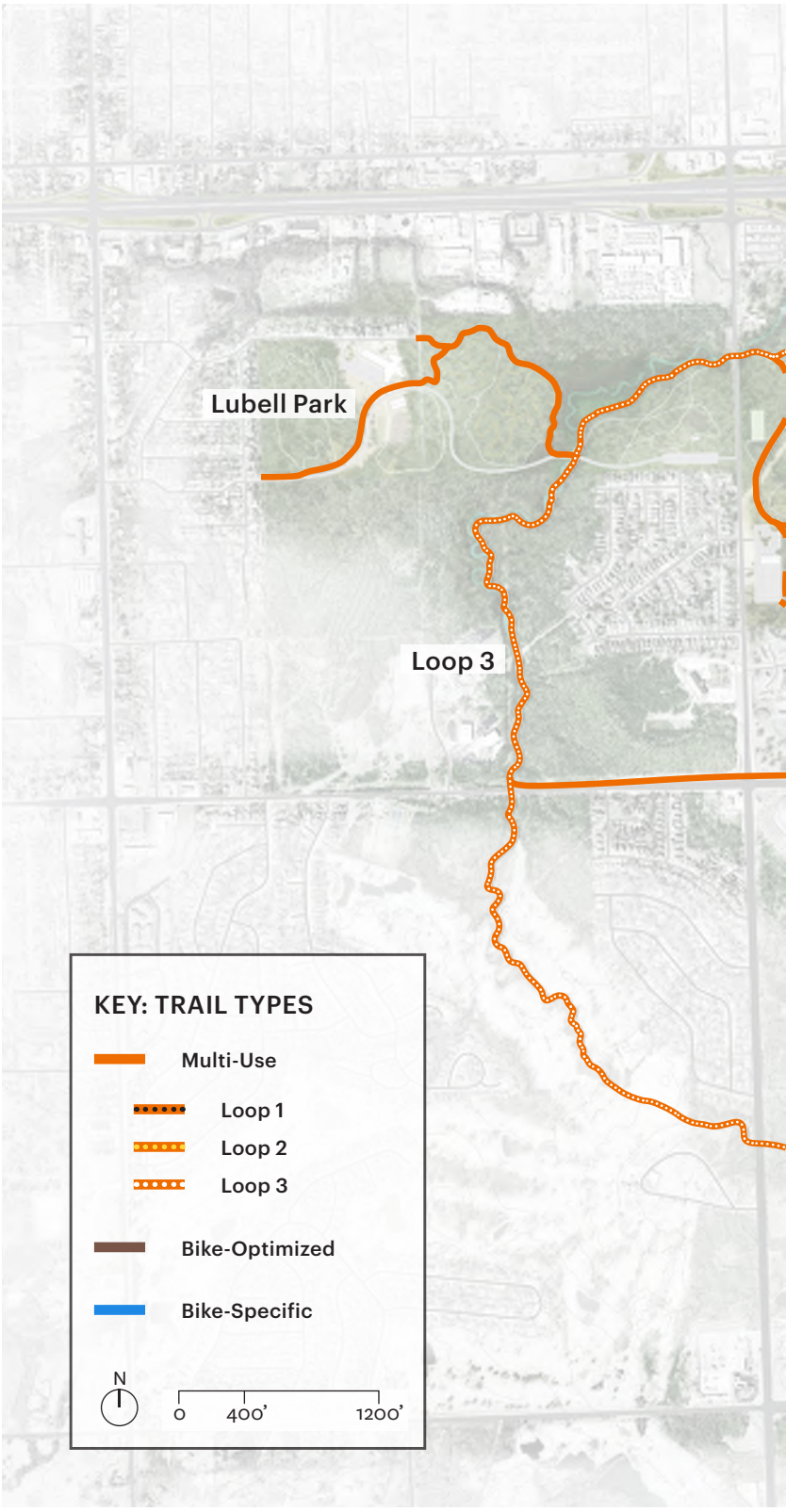
The backbone of the proposed Turkey Mountain trail system consists of wide, two-directional, dirt trails that accommodate all uses. Largely created by enhancing existing high-traffic trails, the multi-use trails form three concentric loops that connect to each other and major entry points. Narrower trails are designed for more specific uses. The system of loops and hierarchy of trail widths will improve users' sense of place—narrow trails lead back to wide trail loops, which lead back to entrances and parking lots—a form of intuitive wayfinding.

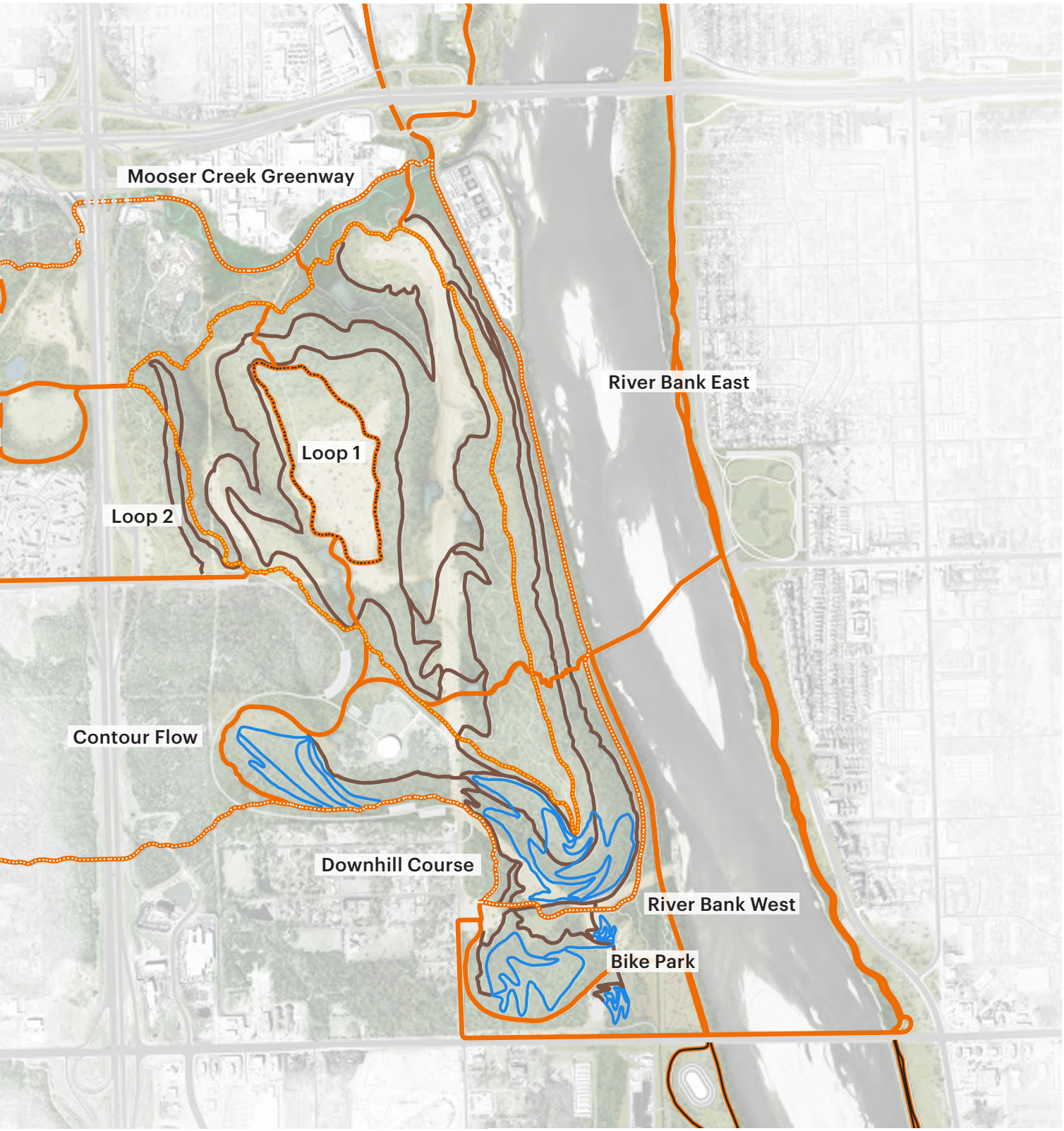
Bike-Optimized Trails Open to All

The narrower, secondary system of two-directional, shared, multi-use dirt trails are safe for all users, but are engineered with bikers in mind. These trails include features such as logs, boardwalks, small obstacles, drops, jumps, and contouring designed for riders, but are always equipped with bailouts and safe paths alongside for runners and hikers to use without conflict.

Bike-Specific Trails

Certain styles of bike trails are unsafe for other users and must be designed as one-directional, bikes-only trails, and clearly marked as such. Turkey Mountain's bike-specific trail system is strategically clustered across the bike park, the steepest terrain on the prow of the mountain, and the property surrounding the water tank in order to reduce conflict with other uses, minimize effort riding between routes and maximize fun for riders.




Mooser Creek Greenway
River Bank East
Loop 1
Loop 2
Contour Flow
Downhill Course
River Bank West
Bike Park

Trail Types

Diversifying Difficulties, Uses, and Users

Trail Types

Turkey Mountain's core program is its trails. The improved quality and range of trail types has the potential to revive Turkey Mountain as a tourist destination. Biking, hiking, trail running, and horseback riding are the four most popular activities at Turkey Mountain according to the Master Plan survey, and today they take place on the same trails. Years of sharing trails have proven that it's possible to do all of these activities on a shared multi-use trail network, but tailoring sections of trail to each mode of use will broaden the range of challenges, experiences, and fun to be had by each user group. Other routes are designed with the appropriate challenges and needs of adaptive sports participants and disabled users in mind—groups who today have little to no access to Turkey Mountain.

Trail Difficulty

The Master Plan proposes trails of progressive difficulty—easy main trails that everyone can use, and intermediate and advanced trails for veteran users. Whether beginner or advanced, trails will encompass a range of challenges that build the various skills required to tackle more difficult routes. An easy trail does not have to be boring, and an advanced trail does not need to be repetitive. Riders prefer to be challenged by a range of demands.

New Users

Diversifying the type and difficulty of trails will attract new users to Turkey Mountain. Beginner trails enable children and novice adult riders to participate, and the improved quality and range of types has the potential to revive Turkey Mountain as a tourist destination for mountain biking.

Hiking



Horseback Riding



Adaptive Sports / Hand Cycling



Trail Running



Biking



Shared Multi-Use



Technical / Rock Garden



ADA Accessible

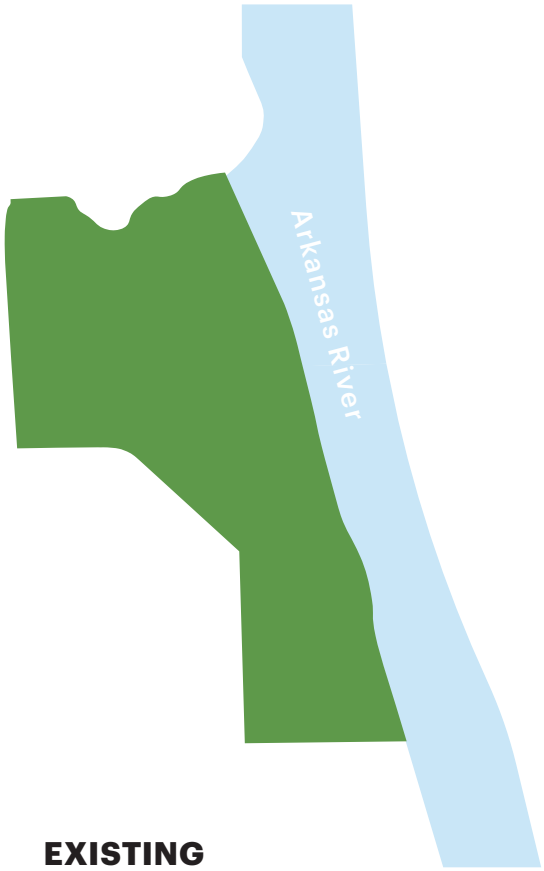


Contour Flow





4. Integrate Program



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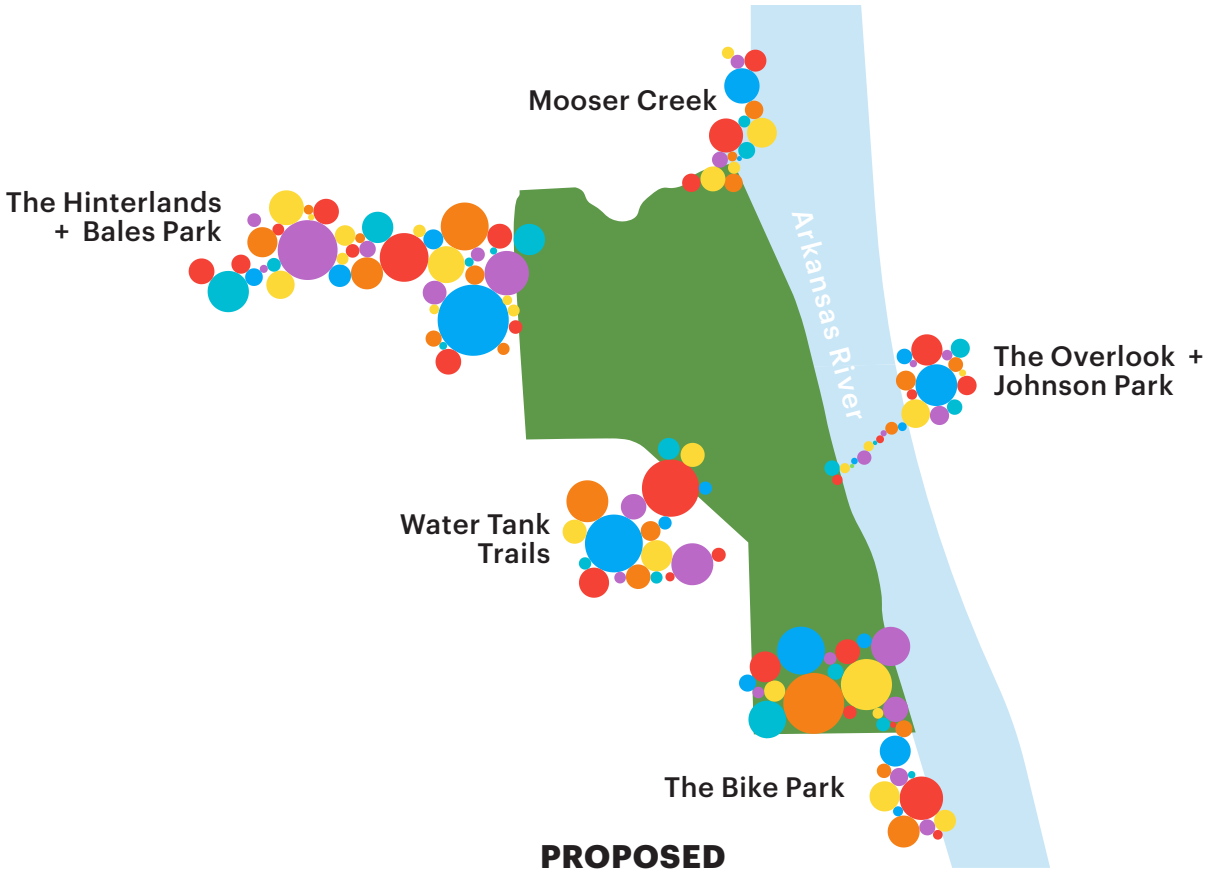


PROPOSED

Mooser Creek and Northern Access

Accessing a Hidden Creek

Greenway and Adaptive Reuse

Restoring the currently inaccessible Mooser Creek corridor with the addition of a multi-use greenway and boardwalks along its length, and a bridge that crosses directly into Turkey Mountain from the north, will provide new access and opportunities to fish and get-downs to experience a lowland riparian landscape that Tulsans have never encountered.

Extending the greenway along the back side of the industrial park to the north has the potential to improve the industrial park site itself. The back of the site could accommodate new facilities that benefit from access to a well-used regional multi-use path.

Northern Approach

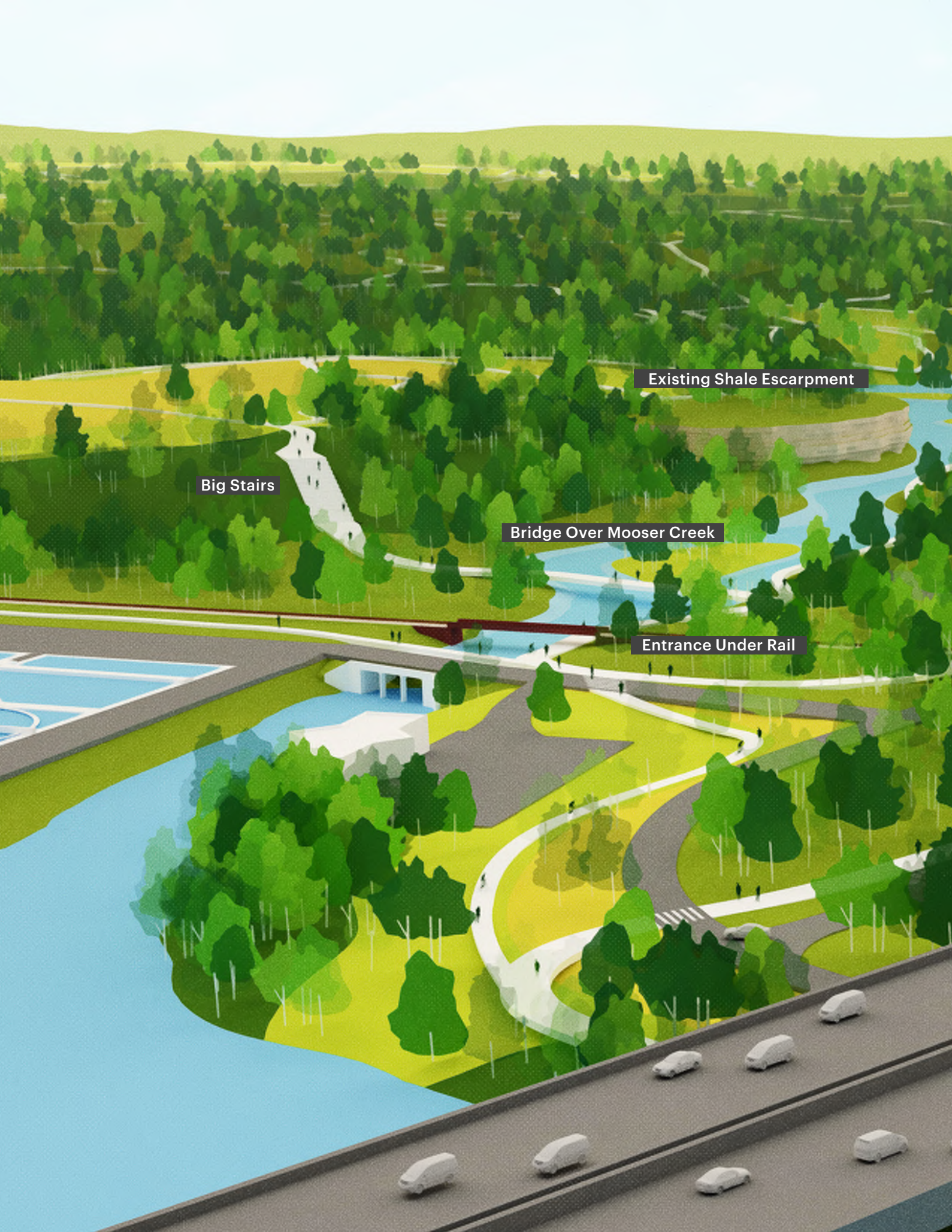
North of the creek, along the River Bank West Trail, additional parking lots open onto riverfront picnic areas and boardwalks, enabling families to experience the Arkansas River up close.

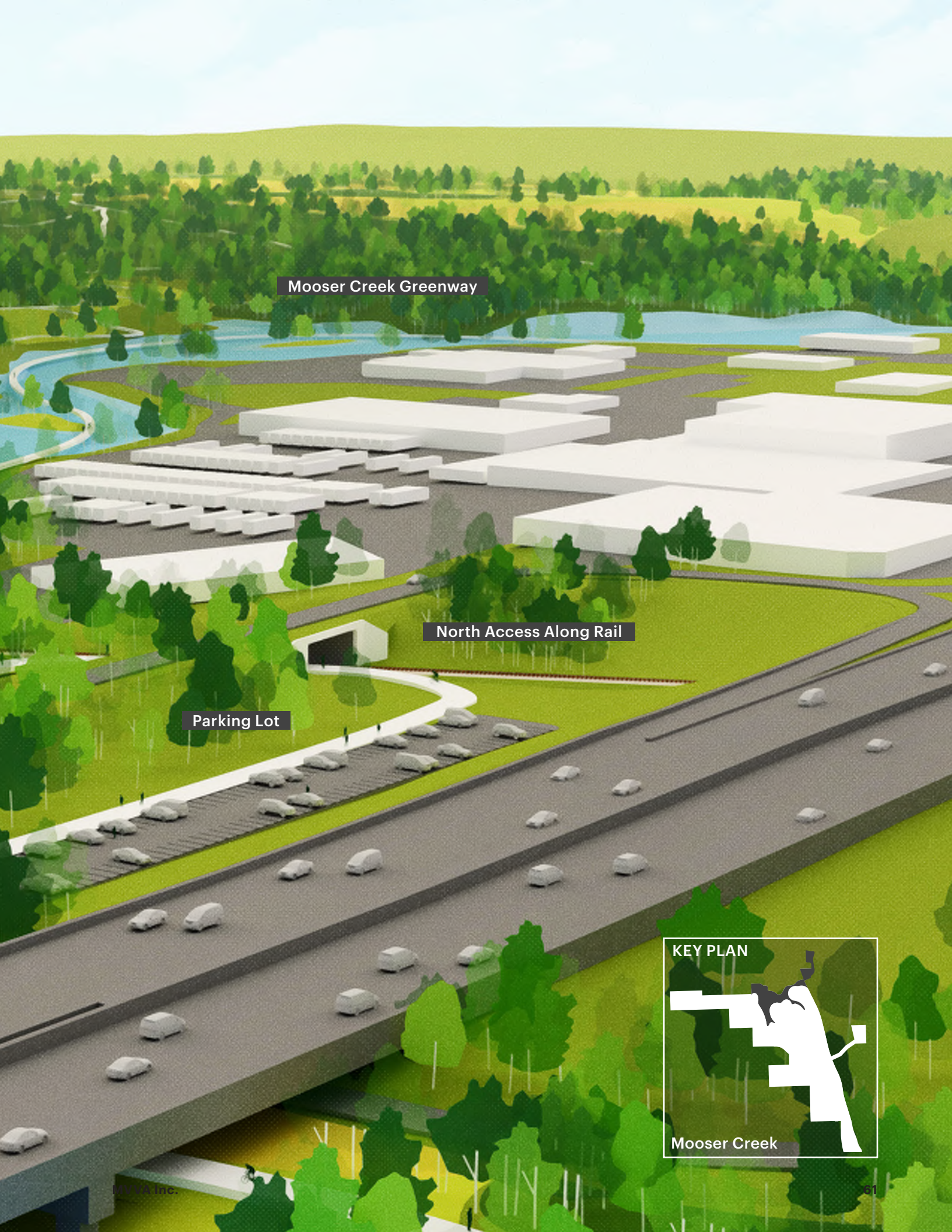


Existing Condition




Restored
Riparian Corridor
Family Picnicking
Boardwalks
I-44
Mooser Bridge
Big Stairs
Existing Shale
Escarpment


Existing Shale Escarpment
Big Stairs
Bridge Over Mooser Creek
Entrance Under Rail


Mooser Creek Greenway
North Access Along Rail
Parking Lot
KEY PLAN
Mooser Creek

The Hinterlands and Bales Park

Adventure Play and Group Activities

Clustering Supervised Programs

Adventure recreation programming, such as a canopy course or planned group camping, require greater staff involvement. These more intensive programs will be clustered in Bales Park and the Hinterlands where they can be easily supervised from the proposed base of operations in the repurposed Remington School. (Remington would also include a trade school with a maker space.) The Aerial Adventure zip lines and ropes course zigzag through the forest canopy beside a team-building agility course. The proposed youth cooperative equestrian center will expose Tulsa youth to horseback riding as well as the responsibility involved in caring for the horses. Wending their way through these facilities, more miles of trail connect Lubell Park in the west to Turkey Mountain.

A City Park for Civic Events

The proposed relocation of city baseball fields from Bales Park to Johnson Park makes way for an "event lawn" and expanded parking lot that will facilitate large gatherings. An interconnected group of tree houses occupies the woods alongside the event lawn. Beyond the tree houses are picnic pavilions that take advantage of the big view of downtown from the high point of the prairie north of the proposed Bales Bridge. Active programs such as the swimming hole and the archery range are strategically sited adjacent to the other supervised programs in The Hinterlands.

Existing Condition






Aerial Adventure
Archery Range
I-44
W Skelly Dr
Group Camping
US-75
Picnic Pavilions
S Union Ave
Swimming Hole
Tree House Village
Flexible Event Space
Gathering Lawn Bowl


Tree House Village
Bales Bridge
Picnic Pavilions
Swimming Hole
Archery Range
Group Camping


Gathering
Lawn Bowl
Flexible Parking
and Event Space
Aerial Adventure
KEY PLAN
The Hinterlands
and Bales Park

The Overlook and Johnson Park

A Route from River to Ridge

Facilitating Easy Visits

For those wanting a brief and easy experience, an ADA-accessible path leads from the water tank parking lot to nearby boardwalks over ponds and then through each landscape—wetland, prairie, savanna, woodland, and forest. These accessible routes then lead to The Overlook, with views of the Arkansas River and Downtown Tulsa. All of this can be experienced in under 30 minutes.

Others approaching from the east and looking for a challenge can enter Turkey Mountain from Johnson Bridge or the River Bank West Trail, climb the Rock Scramble—a steep training feature for runners and a light challenge for the average hiker—and arrive at The Overlook.

Civic Sports Park

The Master Plan positions Johnson Park as a point of entry into Turkey Mountain and as a neighborhood park that is a destination itself. Relocating the baseball fields from Bales Park in conjunction with other new team sports facilities has the potential to remake Johnson Park as a civic sports park capable of holding citywide events. The redesign of Johnson Park would follow a city-led process of public engagement to determine an appropriate mix of sports and other uses.



Existing Condition




Johnson Bridge
E 61st St
Neighborhood Sports Park
Riverside Dr
Rock Scramble


Restored Trails
Johnson Bridge
Neighborhood
Sports Park


The Overlook
Rock Scramble
KEY PLAN
The Overlook and
Johnson Park

The Bike Park and Water Tank Trails

A Destination for Riders

More Bikeable Miles of Trail

The Water Tank Trails area expands the core site and reestablishes multi-use trails where the "Lolli-Pop Trails" once were. Top quality bike-specific trails crisscross southern slopes and connect up to the high point of Turkey Mountain's ridgeline.

Downhill bike trails, cutting through dense forest on the prow of Turkey Mountain's steepest and most prominent slope, flow directly into The Bike Park, which offers a huge variety of bike trails in one place.

A Destination Bike Park

The main multi-use trail extends through the Bike Park connecting no-pedal, no-brake contour trails; a skills area where riders can practice their technical abilities; the "Northshore" boardwalk course packed with elevated wooden tracks; two jumps parks, poised to host races in collaboration with Tulsa-headquartered BMX USA; and the new outdoor velodrome, offering a potential site for NICA races and other large track cycling events. These two major event venues—the jumps parks and velodrome—flank the 71st Street Bridge, making them highly visible, iconic aspects of Turkey Mountain.



Existing Condition




Downhill
Bike Trails
"Northshore"
Boardwalks
Skills Area
Jumps Park
W 71st St
Contour Flow Trail
Outdoor Velodrome


Bike-Optimized Trails
Downhill Bike Trails
Spectator Pavilion
Contour Flow Trail


"Northshore"
Boardwalks
Jumps Park
KEY PLAN
Bike Park and
Watertank Trails

Implementation

The Turkey Mountain Master Plan is a long-term plan to restore, connect, program, and grow a 600-acre site to as large as 1,000 acres. Full implementation may take decades.

The phasing recommendations that follow focus on prioritizing the restoration of the Turkey Mountain Core Site through prescribed burn management, trails construction, and the addition of key access points to enhance Turkey Mountain's essential program—easy access to an experience of wilderness in the city.

Future phases of development are sequenced to provide a contiguous expansion outward from the core site, but their development may proceed in any order without any one impacting the viability of another.

The First Phase

Where to Start

Phase 1 proposes the sequence below for implementing the Master Plan vision for the Turkey Mountain Core Site:

1. Prescribed Burn Restoration

The full impact of prescribed burn management will take years to realize. However, just one season of burns will significantly thin the dense understory, making the work of all other construction projects easier to mobilize.

2. Pond Water Quality Tests

Ponds in Turkey Mountain were likely used in the process of oil-drilling and may therefore be contaminated with heavy metals or other pollutants. Water and sediment analysis would clarify whether fishing and swimming are feasible potential programs.

3. Trails Construction

Trails are the primary means of experiencing Turkey Mountain and are therefore prioritized as the first construction project to be undertaken in the Core Site.

4. Northeast Access Elements

With the construction of the rail underpass at the mouth of Mooser Creek and the Mooser Bridge, bikers and pedestrians would gain access to Turkey Mountain from the River Bank West Trail to the north.

5. South Elwood Ave Closure

South Elwood Ave, if closed, demolished, and removed, would enable access to the adjacent Water Tank Trails area, providing more wild terrain through which users can hike, bike, run, and explore.

6. Bales Bridge

Bales Bridge would connect users to hundreds of additional parking spaces without constructing a new parking lot in Turkey Mountain, and would open a new front door to the site for those arriving from the west.

7. The Overlook and Rock Scramble

The Overlook and Rock Scramble would together create an exciting new feature that could directly connect the peak of Turkey Mountain to the River Bank West Trail, creating a fun new challenge, a singular view, and another corridor of access into the Core Site.


Northeast Access Elements
4
Prescribed Burn Restoration
Bales Bridge
6
1
The Overlook + Rock Scramble
2
7
Pond Water Quality Tests
Trails Construction
5
3
South Elwood Ave Closure
N
0
400’
1200’

Early Expansion

Phases 1 and 2



Phase 1: Restore the Core Site



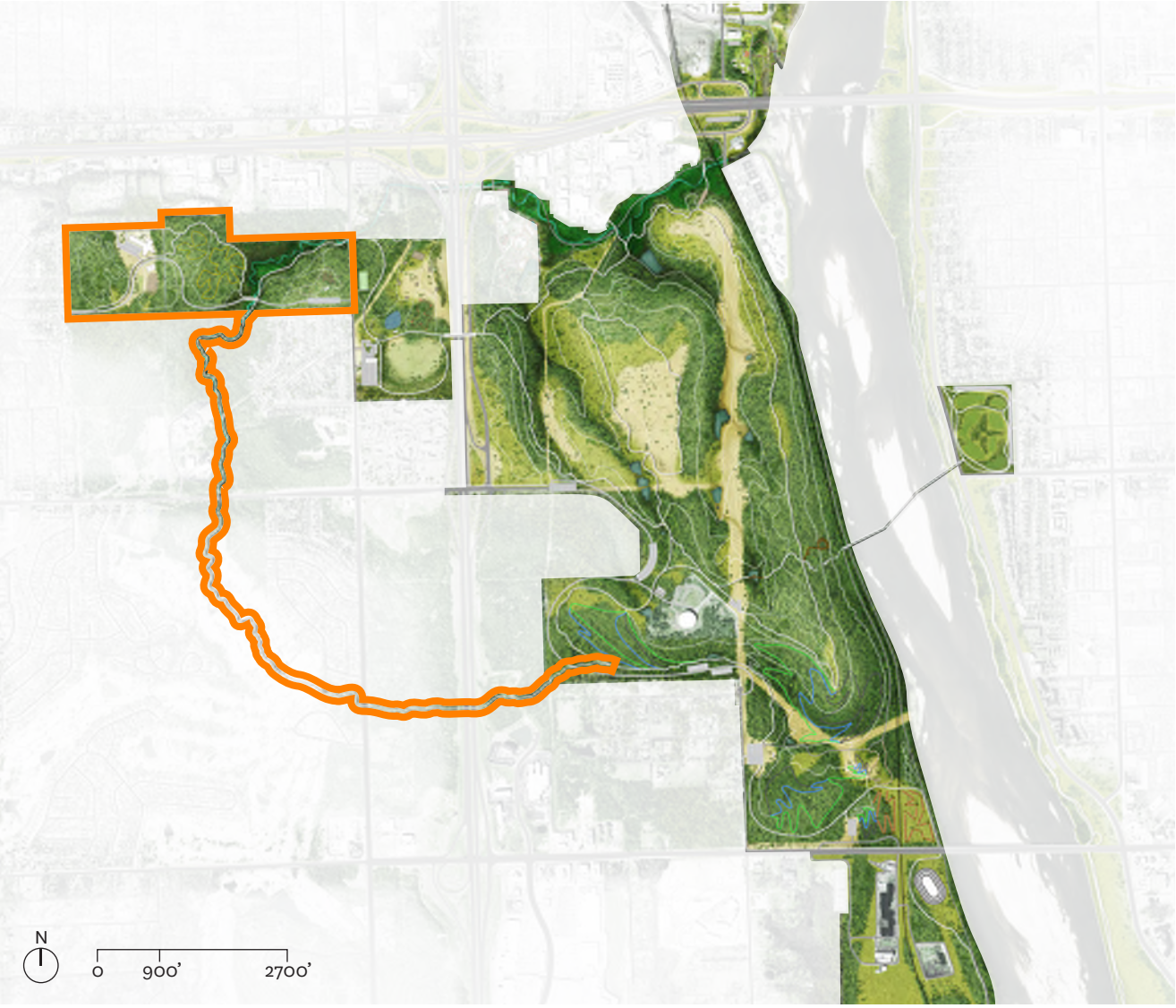
Phase 2: Expand Regional Access

The Long Term Vision

Phases 3 and 4



Phase 3: Integrate City of Tulsa Parks

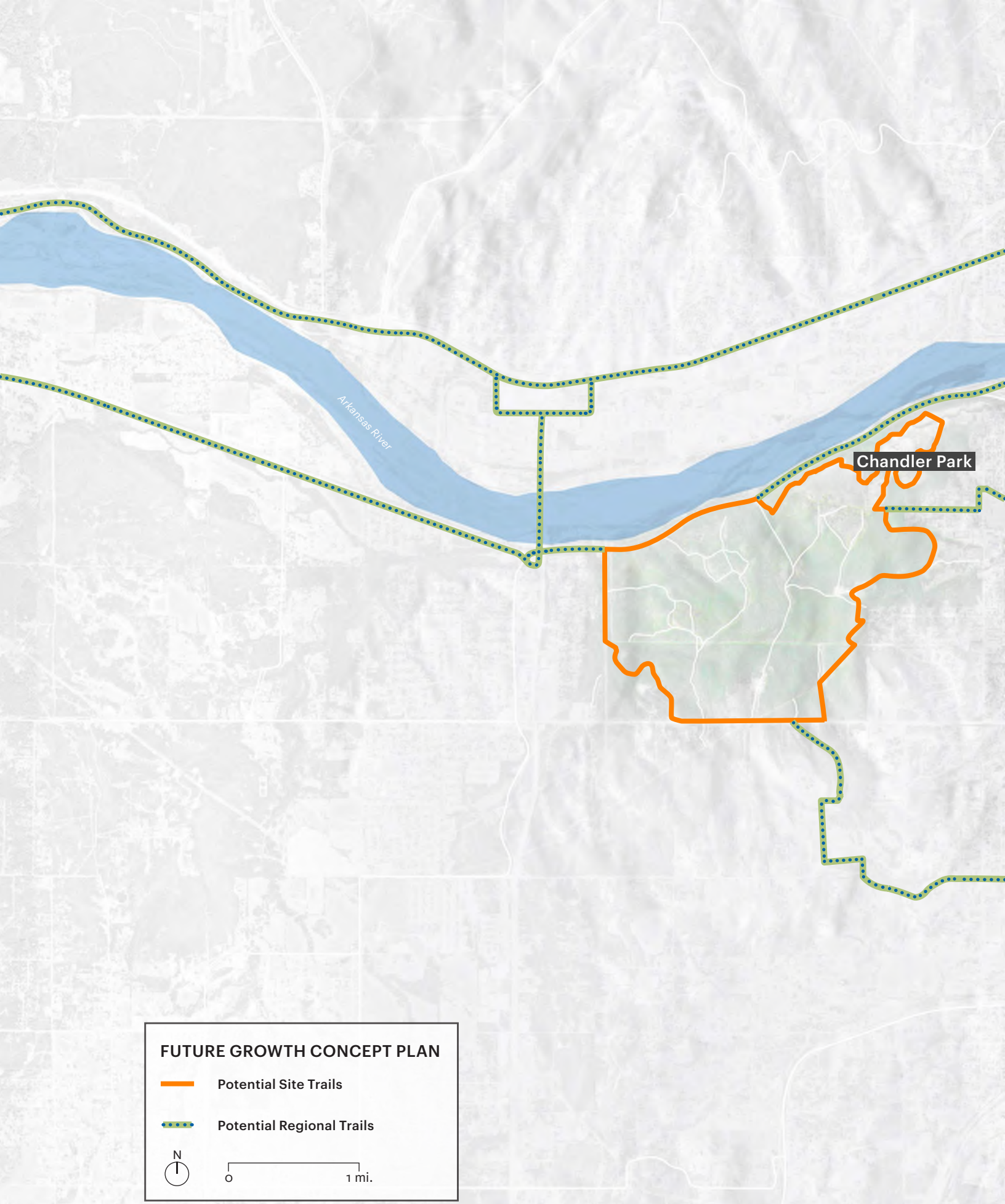


Phase 4: Develop Adventure Center

Turkey Mountain's Legacy

Building stewardship around this much-loved wild space has the power to affect real positive change through the health benefits of the active lifestyles it promotes, the economic benefits of reestablishing Turkey Mountain as a destination for tourism in the region, and civic pride felt by Tulsans for the urban wilderness that is so much part of the city's identity.

Turkey Mountain is something you cannot buy—an irreplaceable resource that can be saved, restored, and enjoyed by future generations to come.


Arkansas River
Chandler Park
FUTURE GROWTH CONCEPT PLAN
Potential Site Trails
Potential Regional Trails
N
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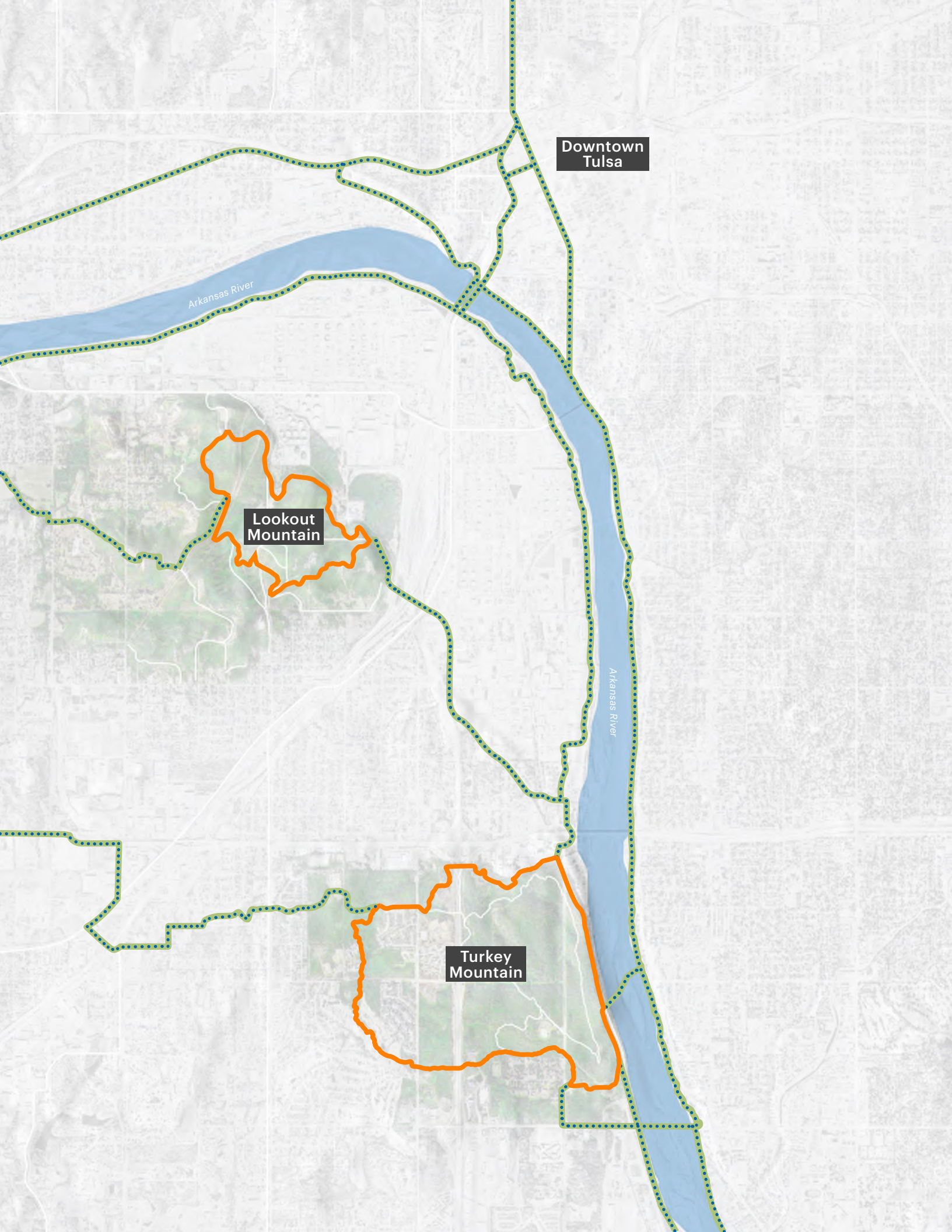
1 mi.


Downtown Tulsa
Arkansas River
Lookout Mountain
Arkansas River
Turkey Mountain

Riverside Drive Multi-Modal Access Project
NEPA Schedule

Step ID	NEPA CatEx Schedule for Riverside Drive Reconstruction	Duration	Start Date	Expected date of Completion	Critical Path	WBS Predecessors	Responsible Party	Comments
1	Initial Coordination with ODOT & City of Tulsa	30	6/1/2014	6/30/2014	Yes		ODOT & COT	
2	NEPA Consultant Proposal & Negotiation	15	6/15/2014	6/30/2014		1		
3	Environmental Scoping Initiated	0	6/30/2014	6/30/2014	Yes	2	ODOT	
4.1	Footprint Study/Approval of Study Footprint	10	7/1/2014	7/10/2014		3	ODOT NEPA PM/Consultant	
4.2	Receive Preliminary Plan in Hand Plans to start Noise Studies	0	6/30/2014	6/30/2014				
4.3	Review Preliminary Plan in Hand with Footprint	15	7/1/2014	7/15/2014				
5.1	Noise Studies	30	8/20/2014	9/20/2014	Yes	4.2	Consultant	Field studies need to wait for 30 days after initiating Tribal Coordination. Begin gathering data as soon as footprint is ready. Long duration due to time required to get traffic data
5.2	Cultural Resources & Tribal Coordination Initiation	10	7/20/2014	8/20/2014	Yes	4.3	Consultant	
5.3	Tribal Coordination 30 day waiting period prior to start of special studies	45	9/7/2014	10/21/2014	Yes	4.3	Consultant	Includes time for Tribal letters to be sent by Specialist
6.1	Cultural Resources Study	30	10/21/2014	11/21/2014		4.3	Consultant	Need to wait for 30 days after initiating Tribbal Coordination to start studies
6.2	Threatened & Endangered Species & Wetland Studies	30	10/21/2014	11/21/2014	Yes	4.3	Consultant	Need to wait for 30 days after initiating Tribbal Coordination to start studies
6.3	Hazardous Waste Studies	30	10/21/2014	11/21/2014		5.3	Consultant	Need to wait for 30 days after initiating Tribbal Coordination to start studies
6.4	Natural Resource Conservation Service (NRCS) Coordination	60	8/28/2014	10/28/2014		5.3	Consultant	Can occur simultaneously with Tribal Coordination waiting period
6.5.1	ODOT Review of Cultural Resources Studies	60	11/21/2015	1/21/2015	Yes	6.1	ODOT Specialists	
6.5.2	ODOT Review of T & E AND Wetland Studies	60	11/21/2015	1/21/2015	Yes	6.2	ODOT Specialists	
6.5.3	ODOT Review of Hazardous Waste Studies	60	11/21/2015	1/21/2015	Yes	6.3	ODOT Specialists	
7.1	USFWS Coordination	45	12/1/2015	1/15/2015	Yes	6.5.1	ODOT Specialists	
7.2	SHPO Coordination	45	12/1/2015	1/15/2015		6.5.2	ODOT Specialists	
7.3	ODOT Review of Noise & Waste Studies	60	11/21/2014	1/21/2015	Yes	5.3,5.2,5.1	ODOT Specialists	
8.1	Receive R/W & Utilitity Mtg Plans	0	12/1/2014	12/1/2014			From Design Contract	
8.2	Review R/W & Utility Mtg Plans with Footprint	15	12/1/2014	12/15/2014				
9.1	DRAFT CE Preparation	10	1/1/2015	1/15/2015	Yes	5.3, 6.5, 7.3, 8.2		
9.2	ODOT Review	10	1/15/2015	1/30/2015	Yes	9.1	ODOT NEPA PM	
9.3	Final CE Preparation	5	2/1/2015	2/5/2015	Yes	9.2	ODOT NEPA PM	
9.4	FHWA Approval of CE/Completion Document	15	2/5/2014	2/28/2015	Yes	9.3	FHWA	

NEPA CatEx Schedule for Riverside Drive Reconstruction		Duration
Step ID		
1	Initial Coordination with ODOT & City of Tulsa	30
2	NEPA Consultant Proposal & Negotiation	15
3	Environmental Scoping Initiated	0
4.1	Footprint Study/Approval of Study Footprint	10
4.2	Receive Preliminary Plan in Hand Plans to start Noise Studies	0
4.3	Review Preliminary Plan in Hand with Footprint	15
5.1	Noise Studies	30
5.2	Cultural Resources & Tribal Coordination Initiation	10
5.3	Tribal Coordination 30 day waiting period prior to start of special studies	45
6.1	Cultural Resources Study	30
6.2	Threatened & Endangered Species & Wetland Studies	30
6.3	Hazardous Waste Studies	30
6.4	Natural Resource Conservation Service (NRCS) Coordination	60
6.5.1	ODOT Review of Cultural Resources Studies	60
6.5.2	ODOT Review of T & E AND Wetland Studies	60
6.5.3	ODOT Review of Hazardous Waste Studies	60
7.1	USFWS Coordination	45
7.2	SHPO Coordination	45
7.3	ODOT Review of Noise & Waste Studies	60
8.1	Receive R/W & Utilitity Mtg Plans	0
8.2	Review R/W & Utility Mtg Plans with Footprint	15
9.1	DRAFT CE Preparation	10
9.2	ODOT Review	10
9.3	Final CE Preparation	5

9.4 FHWA Approval of CE/Completion Document 15

Riverside Drive Multi-Modal Access Project
NEPA Schedule

Start Date	Expected date of Completion	Critical Path	WBS Predecessors	Responsible Party
10/1/2020	10/30/2020	Yes		ODOT & COT
10/15/2020	10/30/2020		1	
10/30/2020	10/30/2020	Yes	2	ODOT
11/1/2020	11/10/2020		3	ODOT NEPA PM/Consultant
10/30/2020	10/30/2020			
11/1/2020	11/15/2020			
12/20/2020	1/20/2021	Yes	4.2	Consultant
11/20/2020	12/1/2020	Yes	4.3	Consultant
1/7/2021	2/21/2021	Yes	4.3	Consultant
2/21/2021	3/21/2021		4.3	Consultant
2/21/2021	3/21/2021	Yes	4.3	Consultant
2/21/2021	3/21/2021		5.3	Consultant
12/28/2020	2/28/2021		5.3	Consultant
3/21/2021	4/21/2021	Yes	6.1	ODOT Specialists
3/21/2021	5/21/2021	Yes	6.2	ODOT Specialists
3/21/2021	5/21/2020	Yes	6.3	ODOT Specialists
4/1/2021	5/15/2021	Yes	6.5.1	ODOT Specialists
4/1/2021	5/15/2021		6.5.2	ODOT Specialists
3/21/2021	5/21/2021	Yes	5.3,5.2,5.1	ODOT Specialists
4/1/2021	4/1/2021			From Design Contract
4/1/2021	4/15/2021			
5/1/2021	5/10/2021	Yes	5.3, 6.5, 7.3, 8.2	
5/15/2021	5/25/2021	Yes	9.1	ODOT NEPA PM
6/1/2021	6/5/2021	Yes	9.2	ODOT NEPA PM

6/5/2021	6/20/2021	Yes	9.3	FHWA

Comments
Field studies need to wait for 30 days after initiating Tribal Coordination. Begin gathering data as soon as footprint is ready. Long duration due to time required to get traffic data
Includes time for Tribal letters to be sent by Specialist
Need to wait for 30 days after initiating Tribbal Coordination to start studies
Need to wait for 30 days after initiating Tribbal Coordination to start studies
Need to wait for 30 days after initiating Tribbal Coordination to start studies
Can occur simultaneously with Tribal Coordination waiting period