Transportation Plan Update

The Kyle Transportation Plan Update is a key component of the Comprehensive Plan. The Transportation Plan Update defines a thoroughfare system that is consistent with the Future Land Use Plan, accommodating the corresponding growth that it anticipates. It also identifies existing congestion hot spots and those segments of the Future Transportation Plan that will need to be either constructed or improved to build that system.

Introduction

The Kyle Transportation Plan Update is a key component of the vision expressed in the Planning Framework produced by resident and property owner participants in the Planning Process. This Plan Update seeks to accommodate future trip demand (target year for trip projections is 2040) in a City-wide thoroughfare system that:

- Links all parts of the City conveniently and safely with the City's urban core
- Makes full use of the economic potential of regional and local traffic flow
- Provides for cross City movement within the local system that is not dependent on the regional system in order to function
- Provides for continuity within the regional system that is not dependent on the local system to function
- Creates an Inner Loop that provides needed relief points and makes cross connections within the City. The Inner Loop provides multiple points of connection for the constrained existing City grid to relieve constraints and discontinuities and connects its end points
- Increases road capacity in the major commercial and industrial areas to accommodate 2040 traffic volumes
- Creates points of nodal "hubbing" about the City core that reinforce the centrality of the core, balance commercial land use, and energize new development
- Establishes a direct connection to growth energy coming south from Austin and north from San Marcos
- Recognizes the City of Kyle in its form and configuration by relieving the growing constriction its existing City grid

As Kyle grows, the existing City grid will continue to experience greater congestion because of:

- Internal discontinuities
- The transference of internally generated and incoming traffic volumes to limited through streets (such as Center Street)
- The lack of needed cross City movement
- Older and undersized streets (relative to emerging demand)

Illustrative Photograph


Illustrative Photograph

Community Goals

This Transportation Plan Update is based on the vision physically represented in the Planning Framework and is intended to provide direction regarding accommodation of future trip demand in Kyle. Community Goals, identified in Workshop #1 in relation to critical issues facing Kyle, are intended to direct the planning process and ensure that the Plan accommodates the input of the citizens. The Community Goals that apply to the Transportation Plan are as follows:

- Goal 3. Connect Downtown Kyle to surrounding neighborhoods.
- Goal 27. Enhance connections between districts using roads, trails, sidewalks, and open spaces.
- Goal 29. Enhance roadway connections to provide more convenient and safer links between neighborhoods, commercial, employment, and civic areas.
- Goal 34. Enhance subdivision connectivity and integration.
- Goal 39. Ensure that transportation plans anticipate future traffic demand in currently undeveloped areas.
- Goal 40. Ensure that land use and transportation plans are complementary, so that future development does not overburden Kyle thoroughfares.
- Goal 45. Improve accessibility for residents to local goods and services.
- Goal 51. Improve crosswalks to make them recognizable for vehicles and pedestrians.
- Goal 72. Provide linkages between Downtown and new commercial centers.
- Goal 74. Reduce current traffic congestion and promote a street identity that remembers Kyle's rural heritage.
- Goal 76. Reduce congestion in the Downtown area by providing alternate routes and improving linkages to other commercial areas.

Kyle Comprehensive Plan Workshop 1

Traffic Analysis

As discussed in the Assessments section, an Existing Traffic Circulation Assessment of Kyle was performed to gain an understanding of current thoroughfare conditions and the encumbrances to efficient circulation facing the City (Figure 1). Figure 1 illustrates those hot spots where congestion most significantly disrupts vehicular circulation. Resolution of these hot spots is key for overall functionality of the transportation system, and is therefore a priority for transportation improvements in Kyle. This informed the Land Use Plan and established the base point for a more detailed Traffic Analysis.

The Assessments and the City's goals served to create a framework, which formed the starting point for developing the proposed functional classification system. In order to develop a functional classification system that considers all of the perspectives in the City, it was necessary to develop mechanisms that facilitated input from all. The proposed functional classification system was created to address three main purposes:

- Accommodate the uses and patterns of development defined in the Future Land Use Plan for Kyle
- Define a coherent system that relieves current limitations and accommodates future growth
- Balance traffic flows through a series of loops and connections

Our analysis followed a traditional four step modeling procedure, which included (1) trip generation, (2) trip distribution, (3) modal split, and (4) traffic assignment as discussed in the following sections. Of note, the City's Comprehensive Plan Districts as defined in the Land Use Plan were used as the traffic analysis zones (TAZs) for this analysis. In addition to Districts 1 through 12, the Super Regional Node was also considered as a TAZ. Other nodes were disregarded due to the fact that they are scattered throughout the City and its ETJ and do not generate significant traffic relative to other

Figure 1. Kyle Hot Spot Assessment Map

Table 1. ITE Trip Generation Rates by Land Use Type

Kyle Land Use Description	Corresponding ITE Land Use and Code	PM Peak Rate	PM-In	PM-Out
Single Family Residential	Single Family Homes - 210	1.01	63%	37%
Multi-Family Residential	Residential Condo / Townhouse - 230	0.52	67%	33%
Retail	Shopping Center - 820	3.37	49%	51%
Other Commercial	Industrial Park - 130	0.86	21%	79%
Employee	General Office - 710	1.49	17%	83%

Note: PM-In and PM-Out trips respectively refer to number of trips into and out of a land use type during the PM peak hour of generator. Retail traffic generators have a different PM peak hour than residential traffic generators.

Source: ITE, 2008

zones. The analysis also examined the year 2040 estimated traffic and its effects on a future roadway system with a proposed loop around the City. This was done to assist the City in prioritizing future roadway improvements (e.g., 2010 through 2040).

Trip Generation

In order to estimate the number of trips generated from each TAZ, the Institute of Traffic Engineers (ITE) Trip Generation Manual (8th edition) was used. It was assumed that the land use categories correlate with the ITE land use descriptions and codes as shown in Table 1. After reviewing the ITE estimated trip generation rates for the AM and PM peak hours, it was determined that the PM peak hour trip generation rates would be used for this analysis. The PM peak as defined by the ITE Trip Generation Manual refers to the PM peak hour of traffic generator (i.e., residential or commercial) and not the traffic PM peak hour (i.e., 4:00-6:00 pm). For example, school-related peak hours often occur earlier in the day versus the commuter peak hours.

Trip Distribution

After determining the correct trip generation rates for this analysis, the year 2040 estimated trips were assigned origin/destination (O/D) percentages within the TAZs based on the ITE trip distribution percentages shown in Table 1 for the PM peak. First, using the ITE trip distribution percentages, the year 2040 estimated traffic trips were divided into PM-In trips and PM-Out trips. Second, it was determined what percentage of PM-In trips and PM-Out trips were work-related trips and what percentage were shopping-related trips. Third, it was decided what percentage of work trips were commuters to/from Austin and San Antonio and what percentage were internal City of Kyle work trips. In general, 60 percent of the work trips into TAZs along I-35 (I-35) and 40 percent of work trips into the other TAZs in the City and its ETJ were assumed to be commuters to/from Austin and San Antonio. Lastly, it was decided what percentage of internal City of Kyle work-related trips were associated with residential, retail, office, and industrial land uses. These determinations/assumptions were based on local knowledge of the City and its ETJ and best professional judgment.

The assumed percentages described above were based on different factors, such as the available services in each TAZ, work opportunities by type in each TAZ, TAZ size, number of residential units in each TAZ, and inter-TAZ distances. This analysis resulted in separate O/D matrices for the different types of land uses by trip purposes. These matrices were combined and later used in the traffic assignment step. However, before applying this O/D matrix in a traffic assignment, a 50 percent overall trip table reduction was applied to eliminate the potential for double counting some traffic trips, trips that may be using different modes of transportation (i.e., buses), and overestimating trips due to using trip generation rates of the traffic generator's PM peak hour which may not match the actual traffic condition's peak hour. The final OD matrix was used as an input into the trip assignment step.

Modal Split

Because of the limited scope of this analysis, a detailed modal split was not performed. However, transit trips (i.e., buses) were accounted for as part of the 50 percent trip table, as discussed above.

Traffic Assignment

As a part of the traffic assignment process, the Consultant Team used the User Equilibrium (UE) traffic assignment method that is embedded within the TransCAD software (Version 4.8, Build 400) with the official Capital Area Metropolitan Planning Organization (CAMPO) roadway network. The CAMPO roadway network was reviewed to ensure it reflected the current roadway configuration within the City and its ETJ. In cases where discrepancies were observed, minor adjustments were performed. For example, FM 1626 from Kohler's Crossing to I-35 is shown as a Major Arterial Undivided when in reality this facility is a Major Arterial Divided. The UE assignment method utilizes the industry standard Bureau of Public Roads (BPR) function to assign traffic to a roadway system and is the preferred traffic assignment method for this analysis. The UE assignment method takes into account the volume dependence of travel times, and results in the calculation of link flows and travel times that are mutually consistent.

Capacities (traffic flow at level of service [LOS] E or worse) used in the UE assignment method were extracted from the Highway Capacity Manual (HCM) 2000's Table 10-7 for urban streets (see Table 2). It was assumed that the Major Arterial, Minor Arterial, and Collector roads functional classification defined by CAMPO (as coded in the TransCAD network) were respectively equivalent to Class I, Class II, and Class III from Table 10-7 in the HCM. None of the studied roadways are equivalent to Class IV.

Table 2. HCM 2000 Table 10-7 for Urban Streets

Lanes	Level of Service Volumes (vehicles per hour)				
	A	B	C	D	E
Class I					
1	N/A	850	920	1,010	1,130
2	N/A	1,710	1,850	2,020	2,280
3	N/A	2,570	2,770	3,050	3,420
4	N/A	3,440	3,700	4,060	4,560
Class II					
1	N/A	N/A	670	840	990
2	N/A	N/A	1,470	1,690	1,770
3	N/A	N/A	2,280	2,540	2,260
4	N/A	N/A	3,090	3,390	3,550
Class III					
1	N/A	N/A	N/A	780	940
2	N/A	N/A	N/A	1,600	1,680
3	N/A	N/A	N/A	2,410	2,530
4	N/A	N/A	N/A	3,220	3,380
Class IV					
1	N/A	N/A	N/A	780	900
2	N/A	N/A	N/A	1,570	1,620
3	N/A	N/A	N/A	2,370	2,430
4	N/A	N/A	N/A	3,160	3,250

Notes: N/A – not achievable given the assumptions in the Class table.
This table was derived from the conditions listed in the Class table (right).

	Class			
	I	II	III	IV
Single Density (sig/ml)	0.8	3	5	10
Free-Flow Speed (mph)	50	40	35	30
Cycle Length(s)	110	90	80	70
Effective Green Ratio	0.45	0.45	0.45	0.45
Adjusted Saturated Flow Rate	1,850	1,800	1,750	1,700
Arrival Type	3	4	4	5
Unit Extensions(s)	3	3	3	3
Initial Queue	0	0	0	0
Other Delay	0	0	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92
% Lefts, % Rights	10	10	10	10
Left-Turn Bay	Yes	Yes	Yes	Yes
Lane Utilization Factor	According to Exhibit 10-23, Default			

Source: HCM, 2000

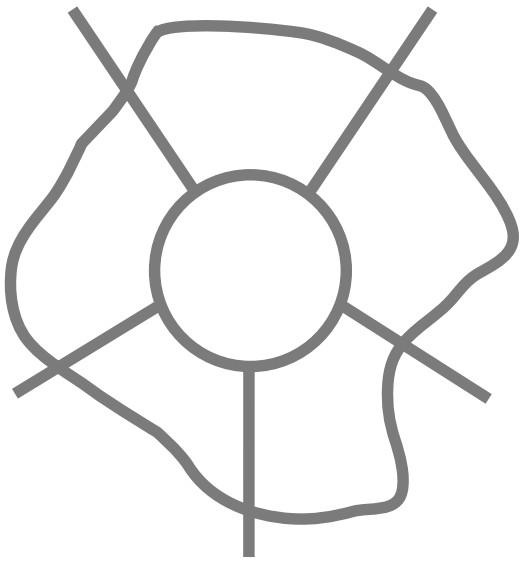
After the appropriate roadway network adjustments were made for the purposes of this analysis, the TransCAD UE algorithm tool was used to perform the traffic assignment based on the OD matrix. The traffic assignment results provide the link level estimated volumes, which were used to calculate the overall volume-to-capacity ratio (v/c ratio) for each analysis roadway within the City and its ETJ. The Highway Capacity Manual defines the LOS of urban streets based on segment average travel time and control delays at intersections (i.e., stop signs or signals), which require conducting a detailed study using an expanded amount of data. However, due to the limited scope of this analysis, all roads with v/c ratio values greater than 1.0 (LOS E or worse) are considered unsatisfactory and listed as needing improvements. The methodology discussed above was deemed appropriate for this level of analysis and scope of work.

Hub and Spoke System

A system with the type of restrictions identified in the Traffic Analysis will reach its capacity well before the City of Kyle fully develops. Therefore, the Transportation Plan Update must seek to create a system that relieves this potential limitation and balances City flow through a series of looping networks. In addition, incremental and project related thoroughfare development (not driven by ultimate trip volumes) has led to a network of streets and thoroughfares with numerous internal discontinuities. The result is another emerging restriction, forcing traffic generated by new development to take increasingly complicated pathways to the few through-streets. These discontinuities and restrictions direct future trip volumes (generated by the build-out population) on too few streets. Therefore, a pass-through system becomes operationally impossible for the City of Kyle at a certain point in its development, without dramatic changes to the existing system. It is therefore necessary to transition to a larger system with greater capacity that is less dependent on Interstate cross over/under points at the few through-streets. Resolution of this emerging impasse is one of the greatest planning challenges facing Kyle as it prepares for future growth.

A system that preserves the operational qualities of Kyle's small town feel should have the potential capacity to accommodate future growth without overburdening neighborhood streets. Therefore, a Transportation Plan Update has been envisioned that will allow portions of the currently restricted pattern to evolve into a more fluid "hub and spoke" system and maintain the historic grid without overburdening its capabilities. The hub and spoke system is an old and commonly used system design in many cities. In a hub and spoke design, the center of the system is linked to a peripheral loop by a network of radiating streets. This type of system will relieve emerging problems in currently developed areas, as well as other parts of the City, because independent loops gather traffic and allow that traffic to return to the City center. This is achieved via an increased number of improved radial connections to the core, Interstate interchanges, couplet streets, and the outward extension of central City streets (now trapped within the railroad/undeveloped land barrier). As a result, all outlying parts of the future City are linked in a way that reinforces the City center. Consequently, the economic forces supported by these roadways converge rather than disperse and thereby create important nodal points within the system. Like major intersections along the beltway around many cities (such as Dallas, Baltimore, Washington, etc.), these points concentrate economic energy and create nodal centers for future development. Without such value differentiations, commercial development will continue to gravitate to I-35 in Kyle.

At a more regional level, the hub and spoke system links neighboring communities in a single pattern of inter-city movement. The hub and spoke system asserts that all routes of travel do not have to have the same level of desirability, which is often the physical implication of the grid. The hub and spoke concentrates development so that desirable routes connect desirable places. The grid disperses development and maintains that desirable routes must also be dispersed. This design ignores the behavioral aspect of travel and gives the form of the City over to operational functions of the street design. By evolving to a hub and spoke system, Kyle will effectively expand its operational capacity without overburdening the existing grid. This is done by by expanding the limited number of pass-through routes and connecting them within a larger system that serves both Kyle and through movement. This pattern will complement Kyle's concentrated land uses with destination significance so that desirable routes connect to desirable places.



Illustrative diagram of a Hub and Spoke System

Mechanics of the Transportation Plan Update

The roadway system envisioned in the Transportation Plan Update is largely based on the creation of two loop roads and a series of street extensions within Kyle. The two loop roads are designated the Inner Loop and the Parkway Loop (Figure 2) and are described in greater detail below. Additionally, improvements to regional roadways and local connectors necessary to support the loop roads and form the hub and spoke system are described.

The roadway system proposed for Kyle is further detailed through the identification of five key roadway types, shown in the Future Functional Classification graphic for Kyle (Figure 2). These roadway types are as follows:

- Parkway: these roads form a wide loop, known as the Parkway Loop, around Kyle to facilitate cross town movement. These roads are anticipated to be four lanes wide in 2040 and six lanes wide at Kyle's full build-out.
- Major Arterial: these roads form a smaller loop, known as the Inner Loop, within Kyle to facilitate cross town movement. These roads are anticipated to be four lanes wide in 2040 and six lanes wide at Kyle's full build-out.
- Arterial: these roads extend beyond the Inner Loop of Kyle to facilitate radial movement. These roads are anticipated to be four lanes wide in 2040 and at Kyle's full build-out.
- Major Collector: these roads tie together streets within a district in order to provide access to Arterials and radial movement. These roads are anticipated to be four lanes wide in 2040 and at Kyle's full build-out.
- Tandem Streets: the use of two separate roadways as a paired system to accommodate increased volumes of traffic in already developed areas. These roads are anticipated to utilize their full existing right of way in 2040 and at Kyle's full build-out.

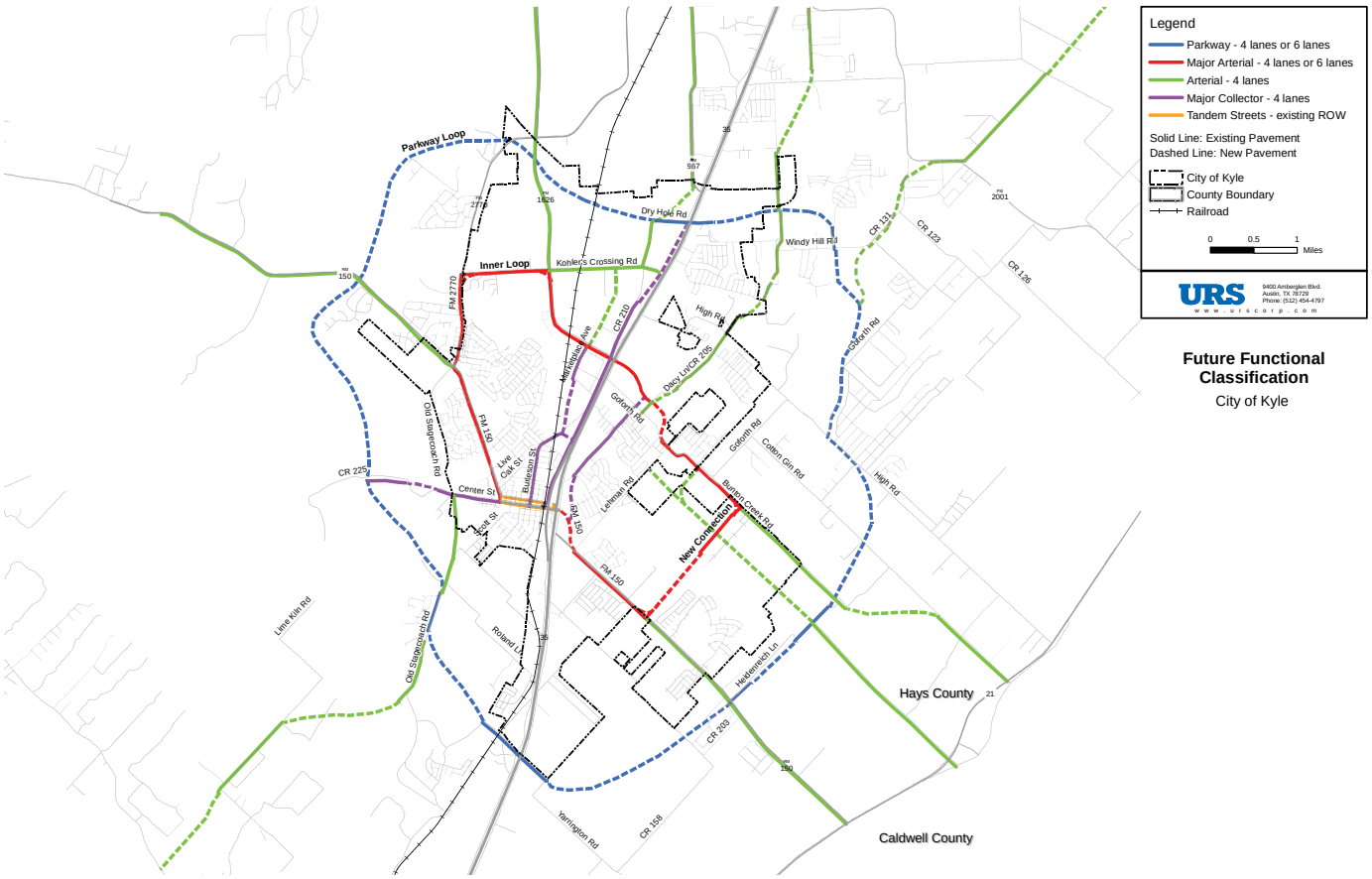


Figure 2: Future Functional Classification

The Inner Loop

The Inner Loop circumscribes Kyle's core on its north, south, east and western sides. This is an important conceptual cornerstone of the proposed Transportation Plan Update, because it provides relief points for older roadways carrying traffic to and from the City core. In this way, the length of roadway from any core area relief point (at downtown throughways) to any Inner Loop relief point is scaled to the potential trip demand it will likely serve in 2040. The Inner Loop will primarily utilize existing roadways, with one key exception. A new roadway is recommended between FM 150 and Bunton Creek Road to make a north/south connection to complete the eastern portion of the Inner Loop (shown in Figure 2 as the New Connection). Right of way should be reserved within new development to ensure creation of this key portion of the Inner Loop. Additionally, the existing connection between West Center Street, FM 150 (west of the downtown core), FM 2770, and Kohler's Crossing to I-35 should be enhanced as the western portion of the Inner Loop.

Because of its traffic gathering and cross movement function, portions of the Inner Loop should reserve enough right of way to accommodate future widening to a 6 lane-divided thoroughfare, necessary for projected 2040 traffic demands. The following street sections are predicted to have this need:

- FM 150 and FM 2770 north of West Center Street and south of Kohler's Crossing.
- FM 150 east of I-35 to the New Connection with Bunton Creek Road.
- CR 130/Bunton Creek Road east of Seton Hospital to the New Connection with FM 150.
- The recommended New Connection between FM 150 and Bunton Creek Road that forms the eastern portion of the Inner Loop.

The Parkway Loop

The Parkway Loop connects distant areas of future development on the outer edges of Kyle to radiating regional connectors. These connectors, in turn, flow to Kyle's core and to I-35, north and south of the core. The Parkway Loop has several main functions:

1. Supplementing the limited capacity of the Inner Loop imposed by an inability to widen narrow sections of the Inner Loop.
2. Gathering traffic from emerging growth areas, both residential and commercial.
3. Offering a variety of operationally comfortable routes into the City core, as well as access to I-35.
4. Carrying trip volumes generated by development to the north so that such volumes do not overload Kyle streets within the existing older areas.

The total acreage of developable land in the Parkway Loop areas of Kyle represents a potential population that would easily overload existing local roadways. This condition will be particularly problematic if this population has to flow through older areas of the City to reach I-35 or the core. Therefore, the Parkway Loop is essential to preserving the small town feel of Kyle and its quality of life. Right of way should be reserved for the Parkway Loop within the Sensitive/Sustainable Development District, Employment District, Heritage District, Farm District, Ranch District, New Town District, and New Settlement District as these areas develop. To accommodate 2040 traffic projections, it is likely that the Parkway Loop will need to be a 6 lane-divided thoroughfare, and right of way should be reserved accordingly.

Regional Roadways

The following street extensions and enhancements are recommended to improve the regional roadway system in Kyle and to support the hub and spoke system:

- Extend downtown West Center Street westward (west of Old Stagecoach Road) along Cypress Street to connect with the future Parkway Loop at a Regional Node, enhance regional connections to Wimberly, Wood Creek, and Dripping Springs, and create a visual identity as a downtown core approachway.

- Extend downtown West Center Street eastward, over I-35, to make a connection with FM 150 and ultimately to Highway 21 (and connecting to SH 183 and Lockhart). This roadway should be designed to create a visual identity as a downtown approachway. This enhanced connection offers great potential to economically benefit Kyle's core because it flows directly into the historic commercial area.
- Enhance and improve the westward extension of FM 150 (west of Old Stagecoach Road) as a major approachway into the downtown core and as a major regional connector.
- Extend FM 1626 eastward over I-35 to connect with CR 130 and make a connection with Bunton Creek Road. This road should ultimately make a regional connection to Highway 21 (and SH 183 and Lockhart via FM 2720) and create a visual identity as an approachway to downtown Kyle. This enhanced connection offers great potential to economically benefit Kyle's core because it flows directly into the Super Regional Node.
- Extend Goforth Road north of CR 130 to make connection with CR 205 and ultimately make a regional connection to the growth areas of southern Austin.
- Reserve right of way for a 4 lane roadway (divided where possible) in the following road sections:
  1. FM 150 to the east and the west of the Inner Loop as a regional connector
  2. Cypress Road between the future Parkway Loop and the Inner Loop
  3. Bunton Creek Road east of the Inner Loop as a regional connector
  4. CR 205 north of the Inner Loop as a regional connector
- Improve the capacity and operational geometry of I-35 interchanges/overpasses, as well as key intersections, at the following locations:
  1. CR 131 (Kyle Crossing) and I-35
  2. Kohler's Crossing and FM 1626
  3. Kohler's Crossing and FM 2770
  4. Yarrington Road and I-35
  5. West Center Street and FM 150 (west of downtown)

Local Connectors

The following street extensions and enhancements are recommended to improve the local roadway connectors in Kyle and to support the hub and spoke system:

- Enhance and improve the northern extension of Burleson Street as an internal connector within the core (created by the Super Regional Node, Old Town, and Core Area Transition Land Use Districts). This roadway should connect to the existing street segment extending south of FM 1626 (east of the railroad track) to create a fluid connection to FM 1626 and the I-35 overpass. This will link Kyle's core to northern sections of the Inner Loop and link the Super Regional Node to southern sections of the Inner Loop.
- Enhance and improve Old Highway 81 between Center Street and FM 1626, linking Kyle's core to northern sections of the Inner Loop and the Super Regional Node to the southern sections of the Inner Loop.
- Enhance and improve Goforth Road from CR 130 to the eastward extension of Center Street and to FM 150. This road will serve as an internal connector within the urban core (created by the Super Regional Node, Old Town, and Core Area Transition Land Use Districts), linking Kyle's core to northern sections of the Inner Loop and the Super Regional Node to the southern sections of the Inner Loop.
- Reserve right of way for a 4 lane roadway (divided where possible) in the following road sections:
  1. The connection of Goforth Road from the Center Street/FM 150 connection to Bunton Creek Road
  2. The connection of Old Highway 81 from Center Street to FM 1626
  3. The connection of Burleson Street from Center Street to FM 1626
- Improve the capacity and operational geometry of I-35 interchanges/overpasses, as well as key intersections, at the following locations:

1. FM 1626 and I-35
2. Center Street/FM 150 and I-35

- Exchange the existing railroad crossing at South Street for a new crossing at Lockhart Street.
- Reconnect streets in the City grid areas of new and infill development and, where possible, in existing development.

Modeling the Transportation Plan Update

As a part of this analysis, a traffic scenario was modeled to determine how the Comprehensive Plan effort would impact the roadway system within the City and its ETJ. The proposed Parkway Loop was assumed to be four-lane divided facility, connecting the proposed Local and Regional Nodes as identified on the Future Land Use Plan (see Figure 3). The Parkway Loop is identified as Loop 1 through 8 on Table 3. Additionally, the traffic scenario included one new roadway connection between the proposed Local Nodes on the east side of I-35. The new roadway connection is necessary to complete the proposed Inner Loop and is identified as New Connection 1 on Table 3. After performing the roadway network adjustments, the traffic assignment was conducted on the modified roadway network using the origin/destination (O/D) matrix prepared in the previous steps.

The traffic scenario analysis did not include an evaluation of the I-35 Frontage Road within the City and its ETJ. Currently, there are four major access points along the I-35 Frontage Road (listed from north to south): CR 131 (Kyle Crossing), FM 1626 (Kyle Parkway), Center Street, and Yarrington Road. The first three intersections are heavily congested during the AM and PM peak travel times under stop-and-go conditions, which are expected to worsen by year 2040 as the City continues to develop. There are no proposed improvements listed in the CAMPO 2030 Mobility Plan at these four intersections, except for the extension and realignment of the FM 150 project discussed below. Careful consideration of any improvement will need to be evaluated as there is limited right-of-way on the I-35 Frontage Road. Protected left-turn lanes and/or dual turning/through-traffic lanes could be added to the I-35 Frontage Road at strategic locations to facilitate the movement of through-traffic. Future right-of-way requirements for the proposed roadway improvements would be based on the City's approved typical sections for the specific roadway functional classification.

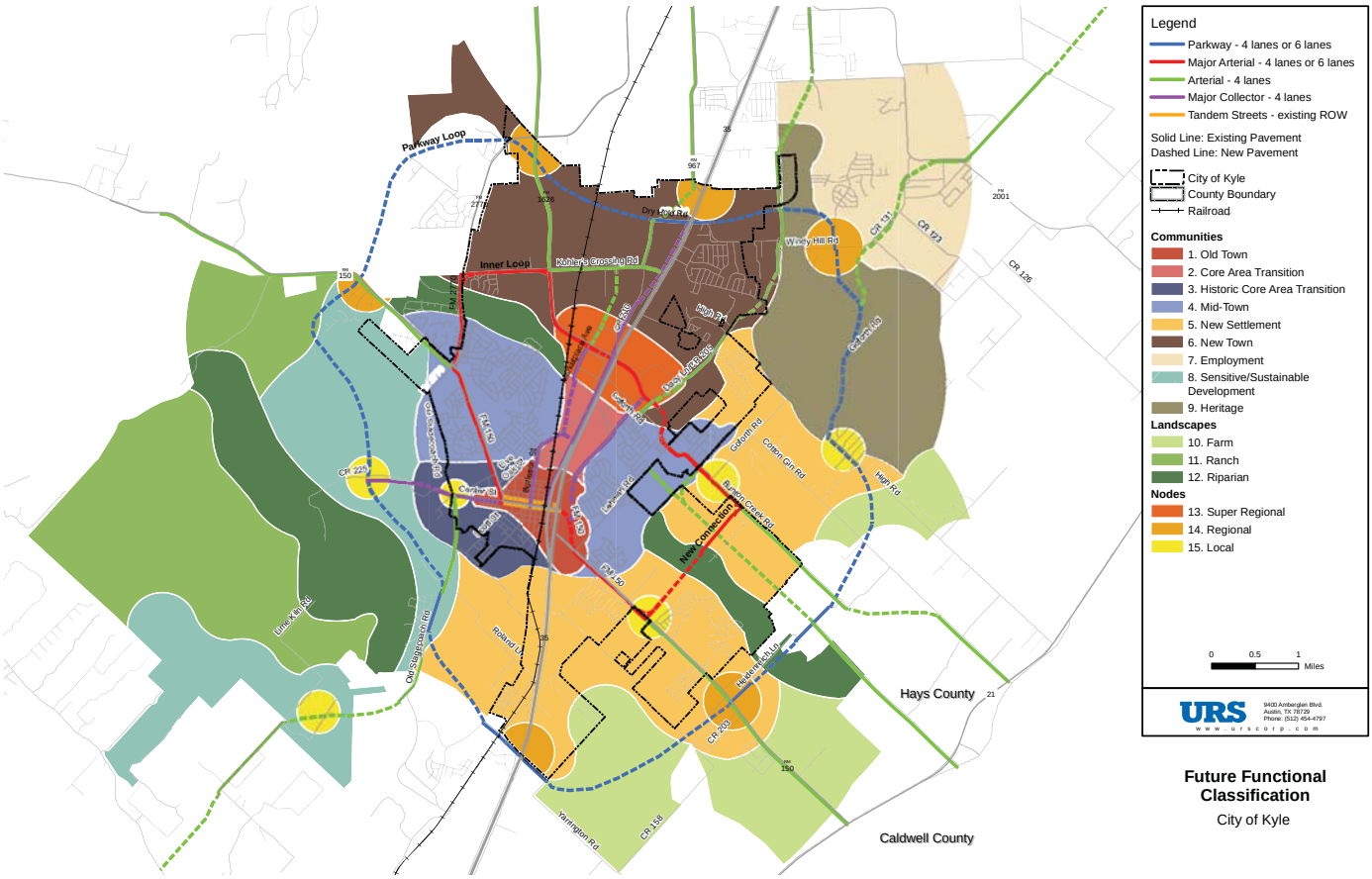
The Comprehensive Plan effort has identified the need for new roadways to form a hub and spoke system to facilitate access to emerging and planned development areas within the City and its ETJ. Therefore, the traffic scenario included an analysis of the existing roadway system with the proposed Parkway Loop around the City and the new roadway connection necessary to complete the Inner Loop. With these loop roads in place, the majority of the roadway segments located away from Kyle's downtown were identified as not needing additional capacity to accommodate the year 2040 land use assumptions. These results were expected since the Parkway Loop would best serve inter-TAZ traffic, especially on the outer edges of the City and its ETJ. See Table 3.

Under the traffic scenario, one roadway segment was identified in Table 3 as a candidate for High Priority Improvements based on the year 2040 land use assumptions, as shown on Figure 3. The portion of Center Street between I-35 and FM 150 does not currently perform at a satisfactory traffic operation level. The Consultant Team proposes to expand this facility to a total of 6 lanes through the creation of a couplet with Lockhart Street. Careful consideration of this improvement will need to be evaluated as there is limited right-of-way and on-street parking constraints. Solutions may include adding and/or eliminating protected left-turn lanes at strategic locations to portions of Center Street and Lockhart Street to facilitate the movement of through-traffic. Specific locations where these treatments could be added is beyond the scope of this analysis.

Under the traffic scenario, six roadway segments were identified in Table 3 as candidates for Moderate Priority Improvements based on the year 2040 land use assumptions, as shown in Figure 3. The Consultant Team proposes to expand these facilities

from two- to four-lanes, except for Burleson Street, which is proposed to expand to six-lanes to mitigate anticipated congestion. Sufficient right-of-way was assumed to construct these improvements, except for Burleson Street, where additional studies need to be performed to address capacity constraints. No roadway segments were identified in Table 3 as candidates for Low Priority Improvements based on the year 2040 land use assumptions.

The traffic conditions on different segments of the Parkway Loop as displayed in Table 3 reflect internal and internal-external trips. Additionally, the alignment of the Parkway Loop as shown in Figure 3 is only appropriate for planning purposes and does not consider or reflect any engineering feasibility or constructability.



Future Functional Classification
City of Kyle

Figure 3: Future Functional Classification with Land Use Communities, Landscapes, and Nodes

Table 3. Existing and Proposed Functional Classification and Year 2040 Roadway Improvements

Roadway Name	From	To	Number of Lanes [6]	Functional Classification [1, 3]	Year 2040 Proposed # of Lanes	2040 Proposed Functional Classification
Windy Hill Rd/CR 131	IH-35	Year 2040 City Limits	2	MAU	2	MAU
CR 123	Windy Hill Rd/CR 131	Goforth Rd	2	MNR	2	MNR
FM 2001	Windy Hill Rd/CR 131	Year 2040 City Limits	2	MAU	2	MAU
Post Rd/CR 140	IH-35	Year 2040 City Limits	2	MNR	2	MNR
CR 210	IH-35	FM 1626	2	COLL	2	COLL
FM 1626	FM 2770	CR 205/Dacy Ln	4	MAD	4	MAD
High Road	IH-35	Goforth Rd	2	MAU	2	MAU
High Road	Goforth Rd	Year 2040 City Limits	2	MAU	2	MAU
Goforth Rd	CR 126	High Rd	2	MNR	2	MNR
Goforth Rd	High Rd	Bunton Creek Rd	2	MNR	2	MNR
Cotton Gin Rd	Goforth Rd	Heidenreich Ln	2	COLL	2	COLL
Goforth Rd	IH-35	Bunton Creek Rd	2	COLL	4	MAU
Bunton Creek Rd	Goforth Rd	Heidenreich Ln	2	COLL	2	COLL
Bunton Creek Rd	IH-35	New Connection	2	COLL	6	MAD
Lehman Rd	FM 150	Bunton Creek Rd/Goforth Rd	2	COLL	4	MAU
FM 150	IH-35	New Connection	2	MAU	6	MAD
FM 150	New Connection	Heidenreich Ln	2	MAU	2	MAU
FM 150	Heidenreich Ln	SH 21	2	MAU	2	MAU
FM 150	IH-35	Lehman Rd	4	MAU	4	MAU
CR 158/CR 203	Yarrington Rd	FM 150	2	COLL	2	COLL
Heidenreich Ln	FM 150	Bunton Creek Rd	2	COLL	2	COLL
Yarrington Rd	IH-35	CR 158	2	COLL	2	COLL
FM 2770	Kohler's Crossing Rd	FM 150	6	MAD	6	MAD
Old Stagecoach Rd	FM 150	Roland Ln	2	COLL	2	COLL
Old Stagecoach Rd	Roland Ln	Year 2040 City Limits	2	COLL	2	COLL
Roland Ln	FM 2770/Old Stagecoach Rd	IH-35	2	COLL	2	COLL
Burleson St [2]	Center St	IH-35	2	MAU	4	MAU
Live Oak St	Burleson St	FM 150	2	COLL	2	COLL
FM 150	Center St	FM 2770/Old Stagecoach Rd	2	MAU	6	MAD
FM 150	FM 2770/Old Stagecoach Rd	Year 2040 City Limits	2	MAU	2	MAU
Scott St	Old Stagecoach Rd	Center St	2	COLL	2	COLL
Center St	FM 150	Old Stagecoach Rd	4	MAU	4	MAU
Center St [4]	FM 150	Burleson St	4	MAU	4	MAU
Center St [2]	IH-35	Burleson St	4	MAU	6	MAU
CR 225/Lime Kiln Rd	Old Stagecoach Rd	Year 2040 City Limits	2	COLL	2	COLL
Kohler's Crossing	CR 210	FM 2770	4	COLL	4	COLL
CR 205/Dacy Ln	Goforth Rd	High Rd	2	COLL	2	COLL
Loop 1 [5]	IH-35 (Southern City Limit)	FM 150	4	MAD	4	MAD
Loop 2 [5]	FM 150 (Eastern City Limit)	High Rd	4	MAD	4	MAD
Loop 3 [5]	High Rd	CR 131	4	MAD	4	MAD
Loop 4 [5]	CR 131	IH-35 (Northern City Limit)	4	MAD	4	MAD
Loop 5 [5]	IH-35 (Northern City Limit)	FM 2770	4	MAD	4	MAD
Loop 6 [5]	FM 2770	FM 150 (Western City Limit)	4	MAD	4	MAD
Loop 7 [5]	FM 150 (Western City Limit)	Center St	4	MAD	4	MAD
Loop 8 [5]	Center St	IH-35 (Southern City Limit)	4	MAD	4	MAD
New Connection [5]	FM 150	Bunton Creek Rd	4	MAD	6	MAD

MAD: Major Arterial Divided

MAU: Major Arterial Undivided

MNR: Minor Arterial

COLL: Collector

No Added Capacity Needed

Moderate Priority Improvements

High Priority Improvements

Notes:

1. Functional classification is defined by the official CAMPO roadway network.
2. To operate at satisfactory traffic operation levels, improvement to 6-lane configuration is needed. However, with limited available right-of-way in the town center area, this proposed improvement may not be feasible.
3. Proposed improvements include High Priority Improvements determined previously in the analysis:
   a. Center St from IH-35 to Old Stagecoach Rd improved from COLL 2 to MAU with 4 lanes.
   b. Burleson St from Center St to IH-35 improved from COLL 2 to MAU with 4 lanes.
   c. FM 2770 from Kohler's Crossing to FM 150 improved from MAU 2 to MAD with 6 lanes.
4. With no capacity added, this segment will operate at satisfactory traffic operational levels but will be very close to capacity. The proposed upgrade is minimal and this segment may need to be upgraded to MAU with 6 lanes. However, with limited available right-of-way, this proposed improvement may not be feasible.
5. This project is part of the proposed Inner Loop for the City of Kyle Plan in year 2040.
6. Number of Lanes as defined by the official CAMPO 2030 roadway network.

Additional Inputs at Workshop #3

As a part of Public Workshop #3, attendees were asked to place a dot on the roadways they thought were most in need of improvement (Figure 4). Red dots corresponded with first priority improvements, while yellow dots corresponded with second priority improvements. Blue dots indicated that improvements were third priority and/or were not important. Table 4 presents a summary of the comments, which are placed in order based on the number of dots. Table 4 also includes comments received from City of Kyle staff review. The public input received at Workshop #3 is incorporated into the recommendations for the Transportation Plan Update, found at the end of this Plan element section.

Table 4. Proposed Functional Classification System Comments

	Public Workshop #3 Comments	City of Kyle Staff Comments
First Priority	Burleson Street – between Interstate Highway (IH) 35 and Center Street	Dacy Lane – between Farm-to-Market (FM) 1626 and Goforth Road
	Dacy Lane –Windy Hill Road/County Road (CR) 131 south to Goforth Road	Kyle Parkway – between Goforth Road and Seton Hays Medical Center
	IH 35/FM 1626 interchange	
	FM 150/FM 2770 intersection	
	FM 150 – Creekside Trail west to IH 35	
	Goforth Road – Lehman High School west to IH 35	
	Marketplace Avenue – FM 1626 north to Kohler's Crossing	
Second Priority	Burleson Street – between IH 35 and Center Street	Marketplace Avenue – FM 1626 north to Kohler's Crossing
	Center Street – IH 35 west to FM 150	
	Goforth Road/Bunton Street –Heidenreich Lane west to Lehman High School	
	Lehman Road – Goforth Road south to FM 150	
	FM 150 – Center Street north to FM 2770	
	Marketplace Avenue – FM 1626 south to Burleson Street	
	IH 35/FM 1626 interchange	
	Goforth Road – Brent Boulevard south to IH 35	
	Proposed Kyle Outer Loop	
	Windy Hill Road – Dacy Lane west to IH 35	
Third Priority and/or Not Important	Center Street – IH 35 west to Old Stagecoach Road	Grist Mill Road – between Lehman Road and State Highway (SH) 21
	FM 150 – Center Street north to FM 2770	Scott Street/FM 150 – between Center Street and Old Stagecoach Road
	FM 150/FM 2770 intersection	
	Scott Street/Rebel Drive – Center Street south to Old Stagecoach Road	
	FM 150 – Creekside Trail west to IH 35	
	Proposed Kyle Outer Loop	

Note: City of Kyle Capital Improvement Program Projects are not included.

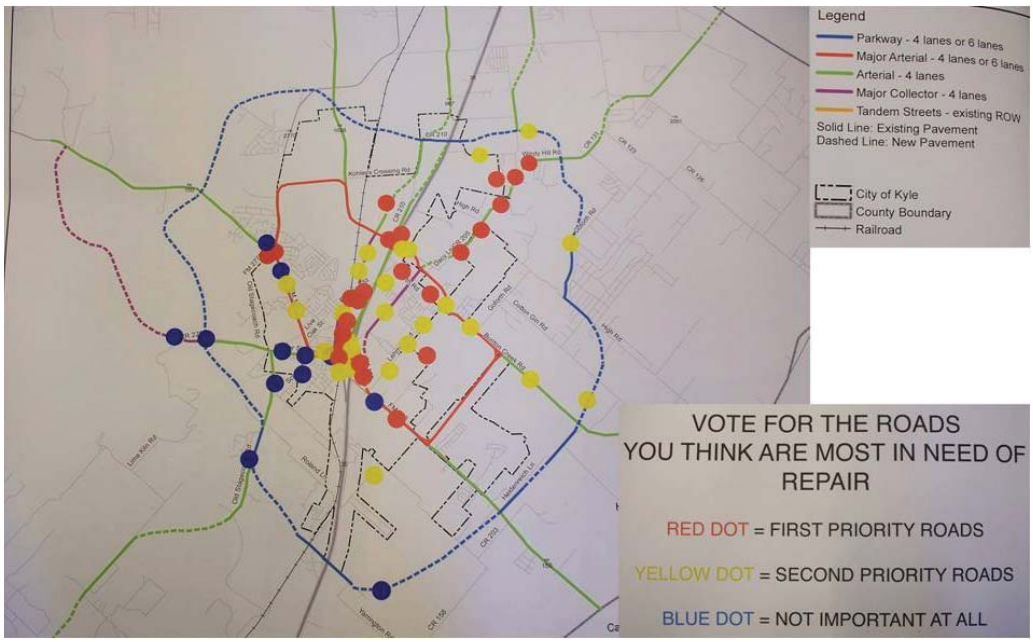


Figure 4. Kyle Public Workshop #3 Inputs.

Rail Station Location Criteria

The goals for a successful transit station in Kyle are detailed below, along with criteria that can be utilized to evaluate each goal. Definitions for the evaluative criteria are found at the end of the goal list.

1. Reduce travel delay
   - Travel time savings
2. Enhance regional mobility
   - Travel time savings
   - Opportunities for intermodal connections at the station
3. Growth in rail transit usage on a cost effective basis
   - Encourage greater passenger mile usage
   - Fare Box Recovery
   - Net cost per passenger
   - Net cost per passenger mile
4. Reduction in auto emissions and improved air quality
   - Vehicles miles traveled
   - Encourages mode shift patterns
   - Non-motorized access to stations
5. Convenient, fast, and seamless service
   - Travel time savings
   - Passenger miles
   - Opportunities for intermodal connections at stations
6. Opportunities for transit oriented development (TOD)
   - Land use designations around the station consistent with TOD
   - Economic value and market conditions at the general station area able to support TOD
   - Street capacities and traffic movement networks position the TOD in a central location
7. Reduction in reliance on single occupancy vehicles
   - Greater convenience in transit use relative to desired destinations
   - Reduction of vehicle miles traveled
   - Encourages modal shift patterns
   - Supports a system of non-motorized access to

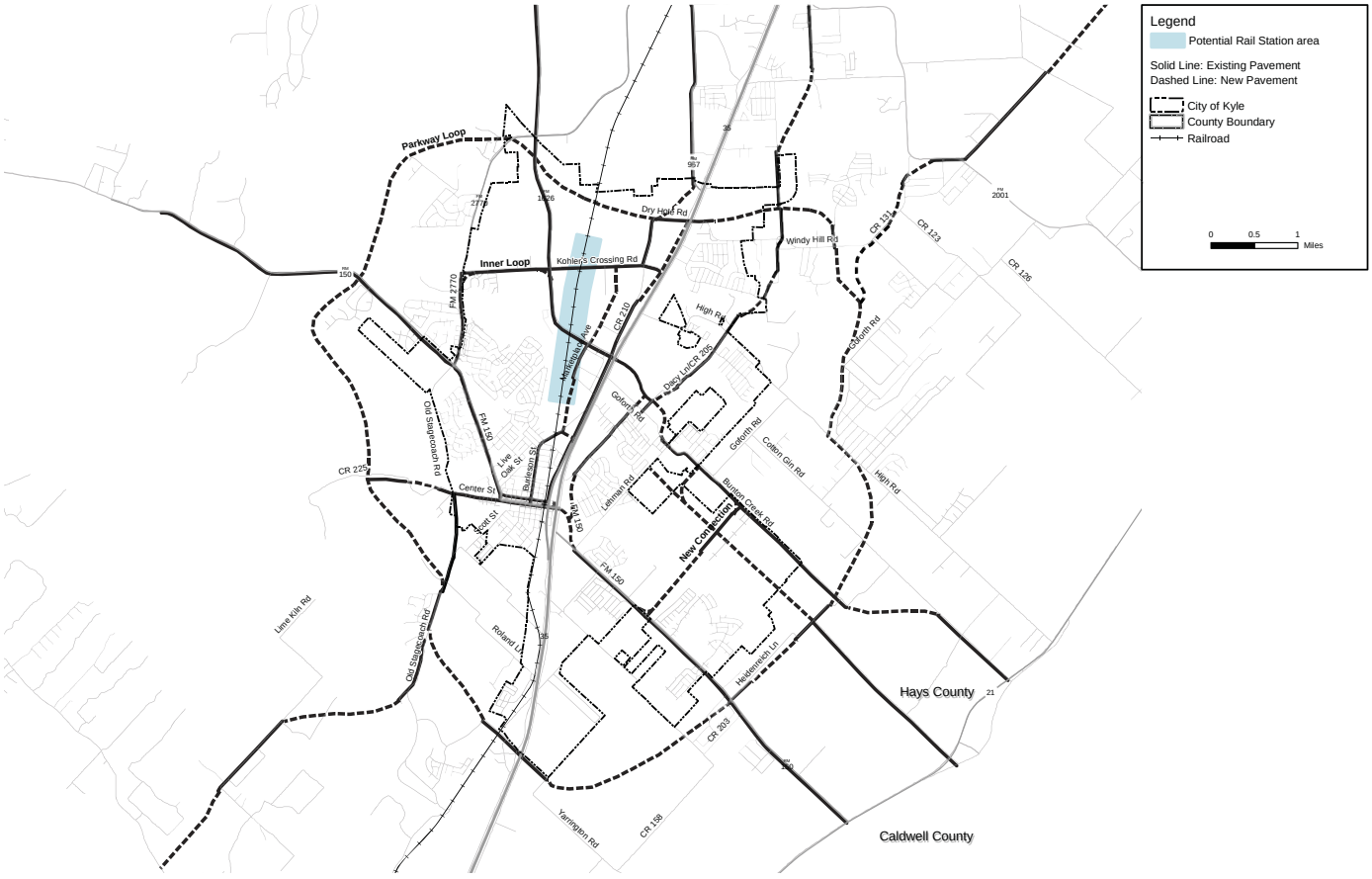


Figure 5: Rail Station Location Criteria map

station location

8. Consistency with restraints of anticipated funding
    - Opportunity to leverage or complement other capital projects and other funded public investment
    - Consistency with local goals and objectives (i.e. land use designations)
9. Opportunities for coordination with other transit
    - Promotes intermodal connections at stations
    - Completes/enhances use of other transit modes (present and planned)
10. Promotion of pedestrian access to work, shopping, and other destinations
    - Maintains walkable distances to primary transit destinations
    - Is connected to a significant and enhanced public domain that encourages pedestrian use and activity at the transit station
11. Reinforce development patterns identified by the City's Comprehensive Plan
    - Promotes nodal densities necessary to attain Kyle's ad valorem base requirements
    - Will be supported by nodal densities at the station location that represent an appropriate portion of Kyle's ad valorem base requirements
    - Encourages nodal growth of non-commercial areas
    - Is supported by the proposed thoroughfare system
12. Integration with City-wide pedestrian movement networks (existing and proposed)
    - Is positioned to be a trail head for pedestrian movement within the City
    - Provides public domain connections to proposed trail connections
13. Attracts greater visits, stays, and spending in the primary commercial areas of Kyle
    - Allows existing and proposed commercial areas to realize greater patronage from out of town visitors as a result of convenience and safety through this means of access
14. Proximity of Parking Availability
    - Potential for shared parking
    - Potential for use of parking as an economic generator in areas where such a generator would be most effective
15. Impact on rail geometrics
    - Required modifications of existing rail geometries
    - Space available to accommodate dual track usage

Criteria

- **Travel time savings:** Measures time traveled by train from one station to another, compared to the same trip done by car or bus.
- **Passenger miles:** Measures the length of all individual passenger trips by train during one year. A rail service with increasing riders, traveling more or less the same number of miles each year, will have increasing passenger miles.
- **Intermodal Connections at Stations:** Defines whether there are potential connections with existing transit services to move riders between home and the rail station, and between the rail station and workplace.
- **Modal Shift:** Measures the percentage of commuters on a given trip opting to change from auto to transit.
- **Vehicles Miles Traveled:** Measures the change in automobile miles traveled that would result from former drivers opting to ride new transit alternatives.
- **Fare Box Recovery:** Measures the percentage of operating costs covered by fare revenue. This is a standard measure of productivity for transit service that is enhanced by serving destinations that people want.
- **Net Cost per Passenger Mile:** Measures the annual required subsidy per passenger carried, regardless of length of trip.
- **Non-motorized Access to Stations:** Identifies whether or not a station location is convenient to reach for pedestrians and/or cyclists.
- **Constraints of Existing Funding:** Pertains to funding that would be available and/or needed, and what can be anticipated to be available for implementation of the selected service options.

Building the Transportation Plan Update

General Policy Recommendations

- Maintain acceptable level of service standards for roadways and intersections
- Improve roadways/intersections at high accident locations
- Identify specific intersection improvement opportunities until roadway capacity is added
- Maximize use of existing pavement for future roadways to limit impacts
- Identify opportunities for bicycle and pedestrian improvements or connections
- Enhance opportunities for transit use
- Identify alternative funding sources for transportation improvements
- Reserve sufficient right of way space for elements of the Transportation Plan Update as development proposals come forward
- Facilitate management of future growth through system improvements consistent with the Transportation Plan Update
- Reinforce a two loop transportation system through enhancement of elements of the Inner Loop and through construction of the Parkway Loop
- Incorporate best management practices to ensure water quality and environmental protection in roadway design and when soliciting bids for transportation projects
- Explore alignment or design alternatives to enhance northward movement along Old Highway 81 toward FM 1626 from Center Street.

Roadway System Improvements

- Improvements should be made to the one roadway segment identified for High Priority Improvements and to the six roadway segments identified for Moderate Priority Improvements (shown in Table 3).

Public Recommendations for Immediate Action

The Kyle community finds the following roadway segments and intersections to be in need of immediate improvements:

- Burleson Street between I-35 and Center Street
- Dacy Lane from Windy Hill Road/CR 131 south to Goforth Road
- The interchange of I-35 and FM 1626
- The intersection of FM 150 and FM 2770
- FM 150 between Creekside Trail West and I-35
- Goforth Road from Lehman High School west to I-35
- Marketplace Avenue between FM 1626 and Kohler's Crossing
- Dacy Lane between FM 1626 and Goforth Road
- Kyle Parkway from Goforth Road and Seton Hays Medical Clinic