Chapter III TECHNICAL FOUNDATION

Population - The most significant drivers of travel demand are population and affluence. According to Kendall County Profile[1], information compiled by the Texas Association of Counties, in 2021 Kendall County had a population 44,279, which results in an overall density of 66.84 people per square mile. This correlates well with the Texas Demographics Center (TDC) website, [2] which shows the population of Kendall County in 2020 was 46,278. This source projects Kendall County to grow to 97,357 by 2040 and 137,844 by 2050.

This density is not uniform throughout the county, with the southeastern parts of the county including the City of Boerne and areas south and east, growing rapidly, and area to the north and west not so much. According to Census Data currently available, Kendall County is divided into nine different census tracts. The area south and east of a boundary formed by the Big Joshua Creek and the Guadalupe River represents 38.4% of the County and contains 85.1% of its population. Population densities in this area range from a low of 53.2 people per square mile west of Interstate 10 to 2,127.7 people per square mile in the 2.8 square miles of Boerne proper. The areas of highest grow pressure have a population density of 314 to 385 people per square mile.

Assuming for a moment the TDC growth projections come to pass, this means Kendall County will add more than 51,000 people in the next nineteen years, more than doubling the population. If they all end up living in the 254.3 square miles south of the Big Joshua-Guadalupe Line, the population of that area would be 88,742 and the density would be approximately 350 people per square mile.

Socio-economic -

Traffic Counts and Travel Demands – The Committee has grappled with traffic counts since its inception. Those on the Committee with transportation planning experience felt strongly that traffic count data was needed early in the process to estimate current and future traffic congestion. Others argued congestion was apparent and data did not need to be gathered to identify congested locations.

TxDOT gathers traffic count data at various locations throughout the County from time to time and publishes that information on its website as part of its Statewide Traffic Analysis and Reporting System (STARS II).[3] Information is widely available for 2019 and 2020, with most of the 2020 data reflecting a lower Average Annual Daily Traffic (AADT), ostensibly due to economic activity suppression related to COVID.

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[1] https://txcip.org/tac/census/profile.php?FIPS=48259

[2] https://demographics.texas.gov/data/tpepp/projections/

[3] https://www.txdot.gov/inside-txdot/division/transportation-planning/stars.html

Analysis of the STARS II data shows that traffic counts measured in 2020 were generally lower than the counts measured in 2019. The obvious and commonly accepted explanation for this is that it reflects reduced traffic arising from the diminished economic and school activity that occurred during much of 2020 in response to the pandemic. Specifically,

- The 2020 traffic counts on Interstate 10 in the Boerne area were consistently 85% of the counts observed in 2019, except for the area north of SH 46, which was 90%. Common sense suggests this reflects traffic related to local traffic using essential services found on SH 46 (HEB, Home Depot, Methodist Hospital, etc).
- The 2020 Main Street traffic counts ranged from 79% to 94.3% of 2019 counts, with an average of 87.8%.
- The 2020 SH 46 traffic counts averaged 87% of the 2019 counts.
- The 2020 FM 1376 traffic counts averaged 90.0% of the 2019 counts.
- The 2020 FM 474 traffic counts averaged 89.9% of the 2019 counts.
- The 2020 FM 3160/3351 traffic counts averaged 83.6% of the 2019 counts.
- The 2020 RM 473 traffic counts averaged 80.9% of the 2019 counts.

As a result, the Committee opted to use traffic counts from 2019 as the most recent valid direct counts. To gain some correlation between population growth and traffic count growth, the committee compared the 2019 STARS II counts to the 2013 STARS II counts to ascertain the increase during that six year period, and equated that back to an average annual growth for traffic on selected segments with the following result:

- Main lane Traffic on Interstate 10 increased an average of 24.3%, or 3.7% per year
- Traffic on US 87 between Comfort and Fredericksburg increased an average of 42.6%, or 6.2% per year
- Traffic on Business 87 in Boerne increased an average of 20.0%, or 3.1% per year
- Traffic on SH 46 East of Boerne increased an average of 33.1%, or 4.9% per year
- Traffic on RM 473 between Comfort and Sisterdale increased 26.3%, or 4.0% per year
- Traffic on RM 473 between Sisterdale and the eastern County Line increased 88.7%, or 11.2% per year
- Traffic on FM 1376 between Boerne and Sisterdale increased 38.0%, or 5.5% per year
- Traffic on FM 474 south of Kreutzberg increased 17.3%, or 2.7% per year
- Traffic on FM 3351 south of SH 46 increased 38.3%, or 5.6% per year
- Traffic on FM 3160/3351 increased 24.8%, or 3.8% per year

Additional traffic count data can be found on TxDOT's Statewide Planning Map. [4] This data was reviewed to glean TxDOT's projected AADT for 2040 at the same locations as the 2013 and 2019 data. These 2040 traffic projections were compared to the measured 2019 AADT. Interstate 10 traffic is projected to increase 100% while traffic on all other TxDOT highways is projected to

[4] https://www.txdot.gov/apps/statewide_mapping/StatewidePlanningMap.html

increase 40% by 2040. The uniformity of these projections suggests they are more likely rough estimates instead of true calculated projections based on specific local circumstances.

In addition, the City of Boerne gathered traffic count data from several locations in 2020 and 2021. That data set included three locations that reasonably correlate to some the TxDOT collection points. The 2021 counts at these locations were compared to TxDOT's 2040 projected counts and to TxDOT's 2019 counts with the following result:

- SH 46 (River Road) east of Main Street – City count of 14,928 correlates very well to TxDOT's 2019 count, increased by the average growth rate of 4.9% for two years, or 14,258.
- FM 1376 north of Business 87 – City count of 3,569 correlates reasonably well with TxDOT's 2019 count, increased by the average growth rate of 5.5% for two years, or 3,277
- FM 474 north of Adler – City count of 6,374 correlates reasonably only roughly with TxDOT's 2019 count, increased by the average growth rate of 2.7% for two years, or 5,397

The City counts also serve to diminish the utility of TxDOT's 2040 projections as the City's 2021 counts are approximately the same as TxDOT's 2040 projected counts.

StreetLight Data – An evolving technology commonly known as "big data" is becoming more and more reliable for not only counting traffic, but also for analyzing traffic patterns. Commercialized as StreetLight[5], the technology has demonstrated good correlation with traditionally collected traffic counts in both the US and Canada. AADT data was retrieved from StreetLight for six of the locations in Boerne where traffic counts are made by TxDOT using traditional methods. That data was compared to the 2019 TxDOT data with the following results:

[5] https://www.streetlightdata.com/aadt-average-annual-daily-traffic-count/

		TxDOT	TxDOT	TxDOT	Streetlight		Streetlight as % of TxDOT	
Roadway/Highway	Location	2013	2019	2020	2019	2020	2019	2020
Main Street	South of EMS	6992	9280	8157	8547	8460	92.1%	103.7%
	North of Cibolo Creek	16171	20687	18205	18656	15266	90.2%	83.9%
	South of Christus	16780	19443	15360	14894	13090	76.6%	85.2%
SH 46	East of IH 10	16680	16670	13524	15188	13679	91.1%	101.1%
	East of Main	12662	12957	10417	12783	11084	98.7%	106.4%
Herff	South of SH 46			15412	17015	15219	N/A	98.7%

Influence of primary and secondary school traffic – Even the most casual observers are aware that traffic congestion eases considerably outside of the normal school calendar. School employees, parents driving students to and from school, and students driving to and from school - more or less at the same time - increase the normal "rush hour" travel demands. Activation of lowered speeds in school zones, school busses stopping traffic intermittently to load and unload passengers, combine with normal school business operations to further increase congestion.

One of the advantages of having local citizens involved in transportation planning is their sensitivity to congestion resulting from seemingly obscure, isolated traffic impediments. The Committee was especially fortunate to access the insights of John Martinez, the Boerne ISD Transportation Director. Mr. Martinez is responsible for school bus operations, and he confirms the presence of a problem that is repeated in many of the larger residential areas within the Boerne Independent School District: "cul-de-sac" developments.

By "cul-de-sac" development, we mean large (say, 100 lots or more) that are constructed adjacent to existing city, county, or state roadways and which do not facilitate a transportation network by connecting to adjacent developments. As a result, parents and school busses delivering students to a school that is situated in an adjacent development must exit their home development and use the city, county, or state roads to travel to the adjacent development to deliver their students. This increases traffic on the existing road network more than necessary. When the pedestrian networks are similarly isolated, it discourages students walking and biking to and from school.

Developers of larger tracts most often decline to connect road networks to adjacent development for economic competition reasons, but in some cases the resistance is related to a desire to control their market identity.

a. Crowd Sourcing Data
b. Economic Development Factors

Chapter IX - Policy Recommendations

As Kendall County evolves, local governments will be confronted by issues that need to be decided and questions that need to be answered. Their decisions and answers will affect both current residents as well as the Kendall County we leave for our children, grandchildren, and future residents. To be sure, State and federal government policies, demographic changes, economic forces, and other factors also play significant roles.

In this Chapter, the Committee offers some suggested transportation and land use policies that, if adopted, would help the County evolve in a manner that is consistent with the general preferences of the current residents of the County. The land use – transportation nexus is well established, though how a specific policy creates a desired outcome is not all that well understood, so we are left with common sense, tradition, and a bit of experience to guide our recommendations.

Downtown Boerne Masterplan – Many of the concerns expressed through the CrowdSource App were focused on the urban core of the City of Boerne. The concerns included pedestrian safety, pedestrian access, parking, the passenger vehicle-truck ratio, and more. Because River Road, Main Street, Bandera Road, and Blanco Road are all TxDOT rights of way, the City's ability to make improvements within them is complicated at best.

The Committee recommends a two-step process for the downtown masterplan development: First, the City of Boerne would evaluate the costs associated with assuming responsibility for some or all of the TxDOT the roadways within its corporate limits. Second, equipped with the clarity of which entity controls the ROW, the City would undertake development of a masterplan for the downtown area of Boerne. In 2008, Boerne invited a national American Institute of Architects/Regional Urban Design Assistance Team (R/UDAT) to study our downtown and make long-term recommendations for its preservation and improvement. That study provides a solid starting point but needs to be updated. Major emphasis should be placed on streetscape, pedestrian accessibility and safety, and parking, and include consideration of a trolley/shuttle with one or more remote parking areas.

Preserving the Hill Country Environment and Character – Many people have moved to Kendall County and other Hill Country counties to be closer to or immersed in the Hill Country environment. Visually this environment is characterized by significant, but not overwhelming topographic relief, drained by a vascular system of small riparian corridors, and covered by a wide variety of flora and fauna. Generally, both temperature and humidity are lower than that in the coastal plain areas of the State, further enhancing the Hill County experience. Geologically, the area is underlaid by limestone formations, interspersed with accumulations of arable soil, mostly along the riparian corridors, amounting to approximately 2% of the surface area. The Glen Rose Limestone covers approximately 78% of the surface area, while the Edwards limestone covers approximately 20%.

The Glen Rose has been divided into the Upper and Lower portions, separated by a one-foot layer of Carbula shells.[6] According to Dr. George Veni, the lower formation is softer and thus more susceptible to the formation of caves, sink holes, and other karst features. Indeed, this is borne out by the significant

[6] https://en.wikipedia.org/wiki/Glen_Rose_Formation
Accessed 11/7/2021

number of sink holes, swallets, caves and at least two major caverns. Veni offered comments via Zoom at the Committee meeting of June 29, 2021, in which he described the Cascade Caverns quadrant as possibly having the most concentrated collection of caves, sink holes, and swallets in all of Texas [suggest we include exact quote from video].

Water supply is a critical factor for any area of human habitation, but it is especially critical for Kendall County. Most of the water used in Kendall County is drawn from wells drilled into the Trinity Aquifer, a ….. This aquifer is recharged by surface water runoff from rainfall. According to the Cow Creek Groundwater Conservation District, 4-6% of the rainfall that falls across the county percolates into the aquifer. [more]

Where roadway illumination is necessary, use International Dark Sky compliant luminaires. - – [to be written]

Preserve trees in ROW outside clear zone -– [to be written]

Use quiet pavement on roadways with posted speeds greater than 45 mph — [to be written]

Transportation system planning and development - Efforts intended to increase the capacity of the transportation system should give preference to the expansion and upgrade of existing facilities over the construction of new alignments in greenfield locations. [combine with section below?]

Preference for acquiring land along existing Rights of Way vs. greenfield alignments – The Committee believes a sufficient number of non-freeway arterial streets and roadways can be developed to facilitate current and future access through Kendall County. The committee acknowledges such a surface transportation system will likely not move traffic through the county at *peak* efficiency, and from time to time, such a system is likely to cause delays and congestion. Nevertheless, the benefits to be gained by promoting more rural- and suburban- scale roadways will be realized in preserving the Hill Country Environment that has attracted many of the people who have come to Kendall County.

To be clear, the Committee also acknowledges that additional, and in many cases, wider roads will be necessary to accommodate the increased level of traffic that is clearly coming. A good place to start developing a rural surface transportation network for Kendall County would be to identify existing county roads that acts as major traffic arteries and up grade those roads to FM standards.

The Farm to Market Roads in Kendall County exist in the both the rural areas and the more densely developed areas. Few, if any, negative comments have reached the Committee about the character of these FM roads overwhelming or otherwise adversely affecting the rural character of the county, and the Committee believes this is indeed indicative of the overall sentiment of County residents. These roads typically provide two lanes that are twenty to twenty- four feet wide. While most county roads also provide two paved lanes, there are significant differences between county roads and FM Roads.

- ROW width – County roads exist in rights of way that are nominally forty to sixty feet wide, while FM Roads exist in rights of way that range from one hundred to one hundred and thirty feet wide. A benefit of the generous ROW width is that it allows bike lanes/shoulders, turning lanes, acceleration and deceleration lanes to be added as the needs arise, generally without acquiring additional ROW.
- Horizontal and Vertical Geometry – FM Roads were typically designed to comply with certain recognized design standards for alignment, grade, sight distance, clear zones, etc. Because

county roads often evolve from historical paths, they often fail to comply with modern design standards.

- Rideability – In addition to designed grades, FM Roads are generally built to more exacting standards than county roads and therefore they provide a traveling surface that facilitates higher speeds than county roads generally allow. Existing FM Roads carry significant amounts of traffic, typically measured as Average Annual Daily Traffic or AADT, in some cases more than 5,000 vehicles per day. (FM 473 in Comfort – 4586, FM 1376 north of School Street – 5847; FM 474, north of Adler – 5117; and FM 3351, south of SH 46 – 5559).

Pursuing this strategy would involve two types of land acquisition:

- Securing additional the additional land to provide a minimum ROW width of 100 feet. This typically would require 20 to 30 feet on both sides.
- Securing additional land needed to facilitate horizontal geometry that conforms to modern roadway design.

While acquiring private land for a public roadway should not be undertaken lightly, widening existing roadways and making limited realignments is a better approach, as it is likely to inflict less harm on the rural character of Kendall County than constructing high capacity highways on new, greenfield alignments.

Major Thoroughfare Planning – From time to time, the City of Boerne adopts a Major Thoroughfare Plan. The purpose of this plan is to guide private land development planning and to establish the basis for requiring dedication of additional right-of-way along certain existing rights of way. The City has the authority to require these dedications outside its corporate boundary but within its extraterritorial jurisdiction (ETJ).

State law requires a county enter into an agreement with each municipality within it that specifies which entity's land development rules govern development in the ETJ and which entity administers those regulations. The three municipalities that have areas within Kendall County are the City of Boerne, the City of Fair Oaks Ranch, and the City of San Antonio. [More]

Consistent Right-of-Way and Roadway Geometric Standards – The three entities sponsoring this report each promulgate certain standards for public rights-of-way and roadway geometry. Currently, the standards vary widely from entity to entity. In addition, the willingness to accept roadways constructed in conjunction with land development varies from entity to entity. The Committee recommends the three entities collaborate to adopt uniform and consistent approach to accepting roadways for maintenance and a consistent set of Right of Way and Roadway Geometric Standards.

Access Management – One strategy to preserve capacity in roadways is to limit the number of intersections and driveways, a strategy known as access management. [more]

Interconnectivity – [to be written]

Residential Density – [to be written]