



**BEXAR COUNTY INSPECTION AND
MAINTENANCE (I/M) PROGRAM
STUDY FINAL REPORT**

Prepared for:
Texas Commission on Environmental Quality
Air Quality Division

Prepared by:
Eastern Research Group, Inc.

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REPORT**

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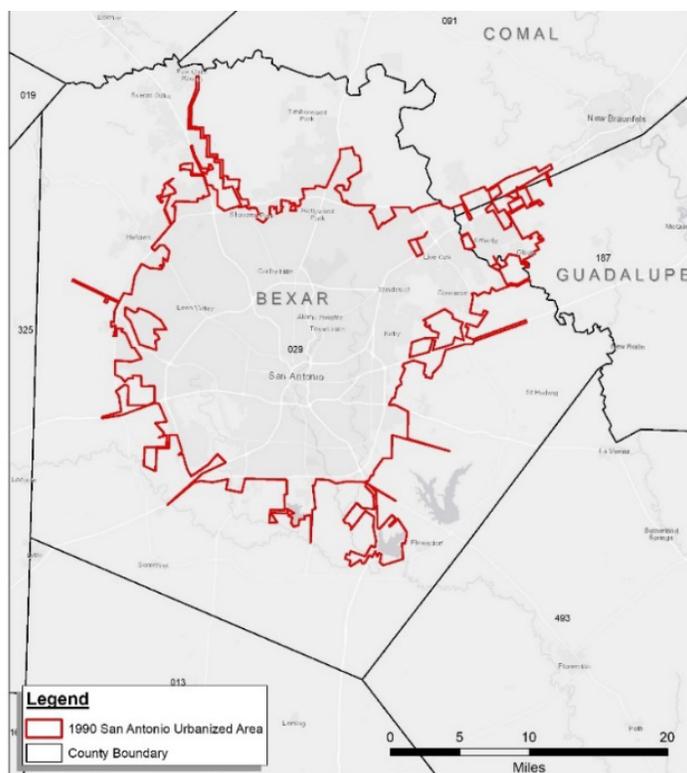
EXECUTIVE SUMMARY

A. BACKGROUND

Due to changes in the U.S. Environmental Protection Agency’s (EPA’s) National Ambient Air Quality Standards, Bexar County has been designated as a nonattainment area for the 2015 8-hour ozone standard. If Bexar County does not meet attainment by the end of 2020, a reclassification could mean that the county would need to implement a motor vehicle inspection and maintenance (I/M) program by 2023.

The Texas Commission on Environmental Quality (TCEQ) tasked Eastern Research Group, Inc. (ERG) with producing this report to evaluate whether implementing an I/M program in only Bexar County would satisfy the requirements in Title 40 of Code of Federal Regulations (CFR) §51.350(b)(2). To determine this, ERG compared the current population and travel information for Bexar County to the 1990 San Antonio Urbanized Area¹—which does not include portions of the outer area of Bexar County, but does include small portions of both Comal and Guadalupe Counties. The 1990 San Antonio Urbanized Area is outlined in red in Figure 1 (including the small part that lies in Comal and Guadalupe Counties, in the upper right quadrant).

Figure 1. San Antonio, Texas, Urbanized Area as Defined Using the 1990 Census



¹ Bexar County is compared to the 1990 San Antonio Urbanized Area because 40 CFR §51.350(b) stipulates that an I/M program must cover the 1990 San Antonio Urbanized Area, but based on the wording of the code, we interpret that an area comparable to the 1990 San Antonio Urbanized Area could have an I/M program and satisfy the CFR requirements.

The TCEQ also tasked ERG to explore the efforts that Bexar County would need to implement for an I/M program, including station costs, the number of stations necessary to adequately test the county's vehicle fleet, and an adequate inspection fee for the program.

B. FINDINGS AND RECOMMENDATIONS

Finding 1: An I/M program in Bexar County alone would satisfy 40 CFR §51.350(b)(2) because it covers an area similar or comparable to the 1990 San Antonio Urbanized Area and exceeds the area's population and emissions.

Finding 2: Upfront fixed costs for a new Bexar County emissions testing station with no pre-existing infrastructure would be \$1,262, while costs to add emissions testing to an existing station would be \$700. Monthly fixed costs are estimated at \$996 (assuming the station rents an analyzer), and variable costs are estimated at \$5.95 per test.

Finding 3: ERG estimates that an I/M program would need 458 stations to adequately test Bexar County's vehicle fleet, based on population, vehicle registrations, and current station data for the other I/M program areas in Texas (see Section III.B of this report). Each station would conduct, on average, 9.75 tests per day.

Recommendation: ERG recommends a single onboard diagnostics (OBD) emissions inspection fee for all program areas between \$18.00 and \$22.00. This is based on research from the TCEQ's 2020 I/M fee survey (ERG, 2020). Bexar County's socioeconomic data justify the same fee range recommendation for Bexar County as the existing Texas I/M program areas.

I. TITLE 40 CFR §51.350(b)(2) INTERPRETATION

In this section, ERG presents its interpretation of 40 CFR §51.350(b)(2) in terms of the analysis necessary for Bexar County to determine if it needs to implement an I/M testing program. The regulations state:

(1) In an ozone transport region, the program shall cover all counties within subject MSAs [metropolitan statistical areas] or subject portions of MSAs, as defined by [the Office of Management and Budget] in 1990, except largely rural counties having a population density of less than 200 persons per square mile based on the 1990 Census and counties with less than 1% of the population in the MSA may be excluded provided that at least 50% of the MSA population is included in the program. This provision does not preclude the voluntary inclusion of portions of an excluded county. Non-urbanized islands not connected to the mainland by roads, bridges, or tunnels may be excluded without regard to population.

(2) Outside of ozone transport regions, programs shall nominally cover at least the entire urbanized area, based on the 1990 census. Exclusion of some urban population is allowed as long as an equal number of non-urban residents of the MSA containing the subject urbanized area are included to compensate for the exclusion.

(3) Emission reduction benefits from expanding coverage beyond the minimum required urban area boundaries can be applied toward the reasonable further progress requirements or can be used for offsets, provided the covered vehicles are operated in the nonattainment area, but not toward the enhanced I/M performance standard requirement.

(4) In a multi-state urbanized area with a population of 200,000 or more that is required under paragraph (a) of this section to implement I/M, any State with a portion of the area having a 1990 Census-defined population of 50,000 or more shall implement an I/M program. The other coverage requirements in paragraph (b) of this section shall apply in multi-state areas as well.

(5) Notwithstanding the limitation in paragraph (b)(3) of this section, in an ozone transport region, States which opt for a program which meets the performance standard described in § 51.351(h) and claim in their [State Implementation Plan] less emission reduction credit than the basic performance standard for one or more pollutants, may apply a geographic bubble covering areas in the State not otherwise subject to an I/M requirement to achieve emission reductions from other measures equal to or greater than what would have been achieved if the low enhanced performance standard were met in the subject I/M areas. Emissions reductions from non-I/M measures shall not be counted towards the OTR [Ozone Transport Region] low enhanced performance standard.

Paragraph (1) of 40 CFR §51.350(b) deals specifically with ozone transport regions (OTR) and is not applicable for the San Antonio area. In 1990, Congress established the OTR in the federal Clean Air Act, Section 184(a), to address air pollution in downwind states that is caused by activities in upwind states. The OTR is essentially a single, 13-state ozone nonattainment area. The original OTR member states are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, parts of Virginia, and the District of Columbia.

Paragraph (2) of 40 CFR §51.350(b) stipulates that the I/M program nominally cover at least the entire San Antonio Urbanized Area based on the 1990 Census. However, because the regulation uses the word “nominally,” the state can make the case that the regulation allows for an I/M program to cover an area similar or comparable to the 1990 San Antonio Urbanized Area. ERG bases this interpretation on the fact that synonyms for “nominally” include “in name only” and “supposedly,” while antonyms for the word include “completely,” “entirely,” “thoroughly,” and “totally.”

Paragraph (3) of 40 CFR §51.350(b) discusses expanding program coverage beyond the 1990 San Antonio Urbanized Area to apply benefits to the reasonable further progress requirements or use them for offsets. This is not an issue for this project.

Paragraph (4) of 40 CFR §51.350(b) discusses multi-state urbanized areas, which also do not apply to this project.

Paragraph (5) of 40 CFR §51.350(b) references paragraph (3) and refers again to an OTR, which does not apply to the San Antonio area.

Finding: An I/M program in Bexar County alone would satisfy the CFR requirements. As outlined in paragraph (2) of 40 CFR §51.350(b), an I/M program that covers an area similar or comparable to the 1990 urbanized area would meet the definition. The exclusion of some portions of the San Antonio Urbanized Area (i.e., those portions in Comal and Guadalupe Counties) is allowable as long as the program compensates for the exclusion by including an equal number of non-urban residents of the MSA that contains the subject urbanized area. Also, the portions of the 1990 San Antonio Urbanized Area that would be excluded are designated attainment/unclassifiable and are not subject to I/M requirements under the federal Clean Air Act, since they are outside Bexar County.

II. POPULATION AND VEHICLE TRAFFIC DATA AND ANALYSIS FOR BEXAR COUNTY AND 1990 SAN ANTONIO URBANIZED AREA

A. POPULATION DATA

To support this analysis, ERG compiled and reviewed multiple data sources to determine if the current population and vehicle miles traveled (VMT) in all of Bexar County equal or exceed the population and VMT in the San Antonio Urbanized Area as defined by the 1990 Census. The following sections outline comparisons to the 1990 San Antonio Urbanized Area (base case) to assess the need for county-level I/M program(s).

Key Findings

Finding 1: The 2019 population of Bexar County was 2,003,554, which is more than twice the population of the 1990 San Antonio Urbanized Area.

Finding 2: The vast majority of the 1990 San Antonio Urbanized area’s population, and 95% of its land, are in Bexar County. Comal and Guadalupe Counties constitute a much smaller part of the population (fewer than 2,000 people) and less than 5% of the land area.

Conclusion: Based on Findings 1 and 2 as well as the regulatory text (i.e., “Exclusion of some urban population is allowed as long as an equal number of non-urban residents of the MSA *containing* the subject urbanized area are included to compensate for the exclusion”), the population data indicate the need for a single I/M program in Bexar County.

Supporting Data and Analysis

40 CFR §51.350(b) references the 1990 San Antonio Urbanized Area boundary, available from the U.S. Census Bureau’s (USCB’s) website and shown in Figure 1. While the 1990 San Antonio Urbanized Area shapefile (USCB, 2013) was available in archives, 1990 population data were generalized and not available in a format suitable for in-depth analysis.

According to the 1990 Census of Population and House Unit Counts (USCB, 1990a), San Antonio, Texas, had a population of 935,933. This report presents the 1990 population data in a few different ways, as shown in Table 1 below. The San Antonio Urbanized Area is also referred to as “San Antonio, Texas, Incorporated Place” and “San Antonio, Texas, MSA (in/not in central city).”

Table 1. 1990 Census Population for the San Antonio, Texas, MSA

Region	1990 Population
San Antonio, TX, Incorporated Place (1990 Urbanized Area)	935,933
San Antonio, TX, MSA	1,302,099
In central city	935,933
Not in central city	366,166
Bexar County	1,185,394
Comal County	51,832
Guadalupe County	64,873

Bexar County accounted for 91% of the total San Antonio, Texas, MSA population; the central city portion of the MSA, which is principally located in Bexar County, accounts for 72% of the total population.

Table 2. Population by Year for City of San Antonio, Texas, and Related Counties

Region	1990 Population (USCB, 1990b)	2019 Population (USCB, 2020a)
Bexar County	1,185,394	2,003,554
Comal County	51,832	156,209
Guadalupe County	64,873	166,847
County Total	1,302,099	2,326,610
City of San Antonio (USCB, 2020b, 2001)	935,933	1,532,233

Table 2 shows the population of each county within the 1990 San Antonio Urbanized Area for 1990 and 2019. The portion of the population within the extensions into Comal and Guadalupe Counties cannot be extracted from the available data. However, a rough estimate based on the surface area of each county that falls within the urbanized area may be helpful. Figure 2 shows how the urbanized area is spread across the three counties, and Table 3 shows the portion of each county that the urbanized area covers.

Figure 2. Surface Area of 1990 San Antonio Urbanized Area by County

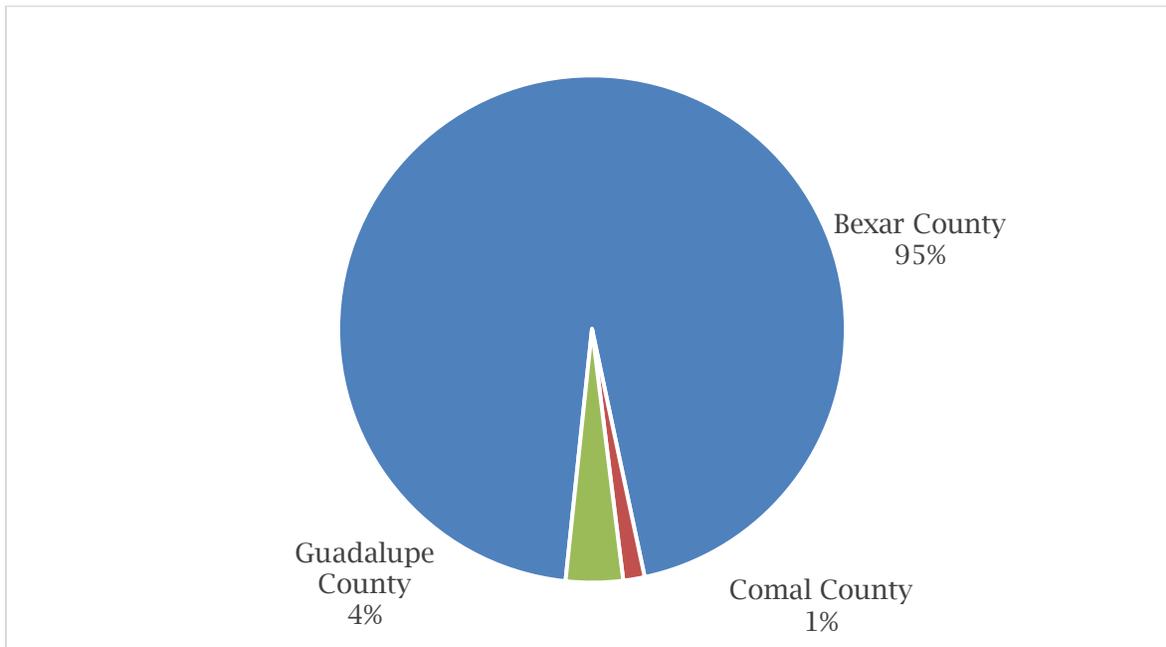


Table 3. County Area Square Miles Within/Outside the 1990 San Antonio Urbanized Area

County Name	Inside Urbanized Area (Square Miles)	Outside Urbanized Area (Square Miles)	Total Area	% of County Within Urbanized Area
Bexar County	430.41	847.09	1,277.50	34%
Comal County	6.17	577.03	583.19	1%
Guadalupe County	16.47	709.15	725.62	2%
Total	453.05	2,133.26	2,586.31	37%

While spatial coverage of the urbanized area within the counties is informative, population distribution can vary greatly within each county. As shown in Figure 3, the population is not evenly distributed throughout the counties. Exact population counts for the portions of Guadalupe and Comal Counties are difficult to obtain because census tracts do not align precisely with the urbanized area boundary.

However, the two large census tracts in Comal County that intersect slightly with the urbanized area (Figure 3) have a total estimated 2019 population of 277. The census tracts that primarily cover the Guadalupe County extension of the urbanized area have a 2019 estimated population of 1,360 (Figure 4). Comparing these estimates with the 7,579 people estimated for those Bexar County census tracts that are outside the urbanized area (Figure 5) seems to indicate that the full county of Bexar would cover a population similar or comparable to the 1990 San Antonio Urbanized Area, as defined in paragraph (2) of 40 CFR §51.350(b). Figure 6 shows the census tracts for all of Bexar, Comal, and Guadalupe Counties, with the 1990 San Antonio Urbanized Area outlined.

Figure 3. Comal Census Tracts That Intersect the San Antonio Urbanized Area

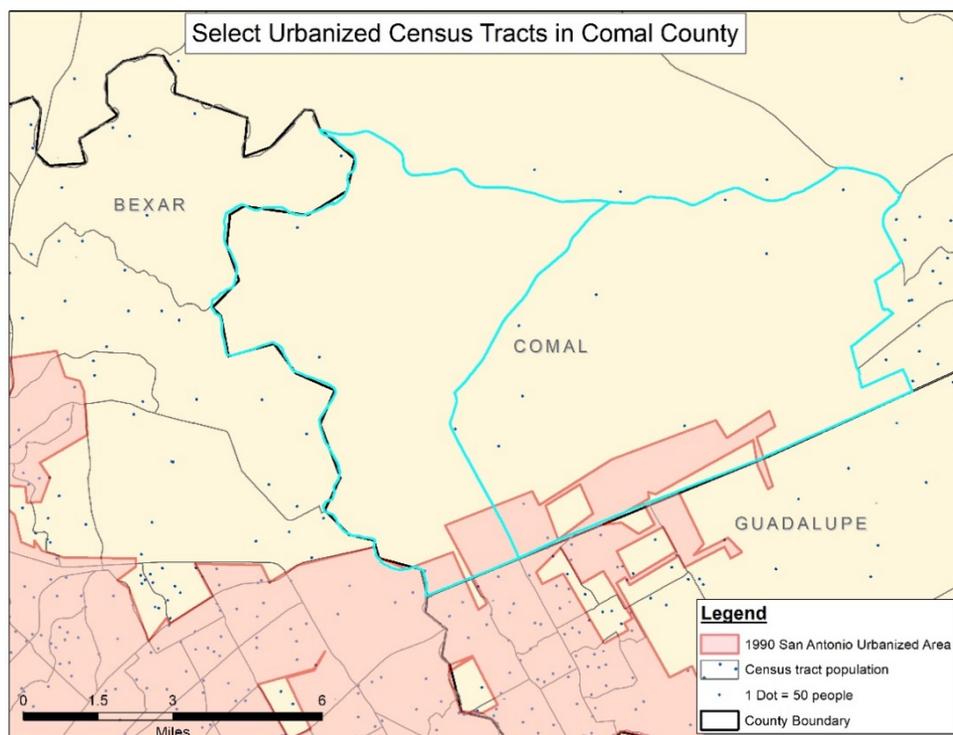


Figure 4. Guadalupe Census Tracts That Intersect the San Antonio Urbanized Area

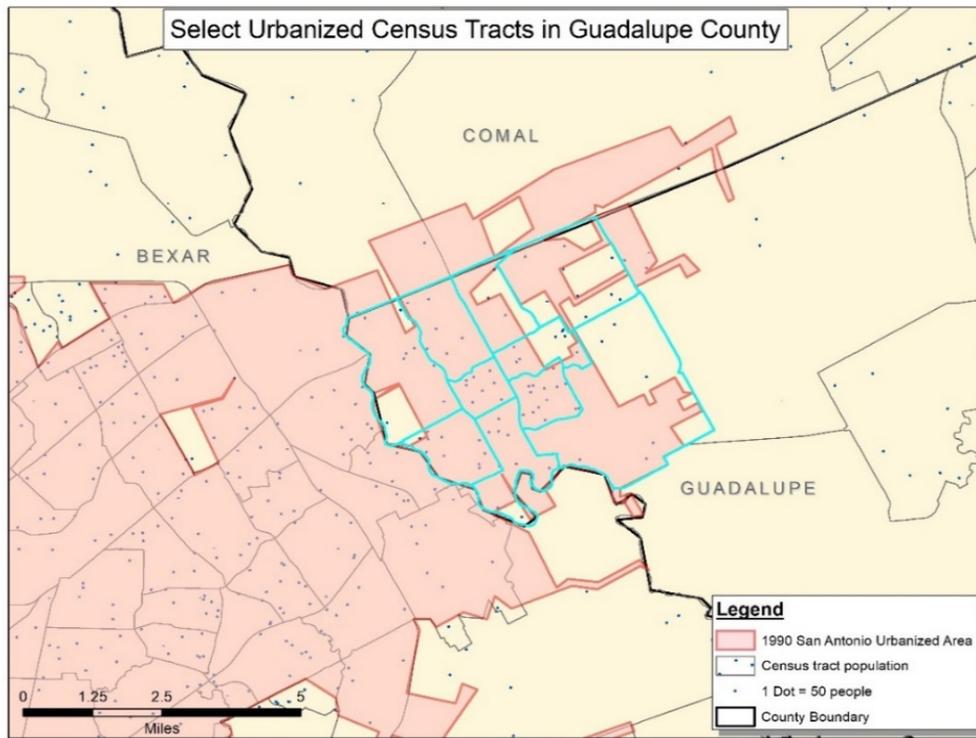


Figure 5. Bexar Census Tracts Primarily Outside the San Antonio Urbanized Area

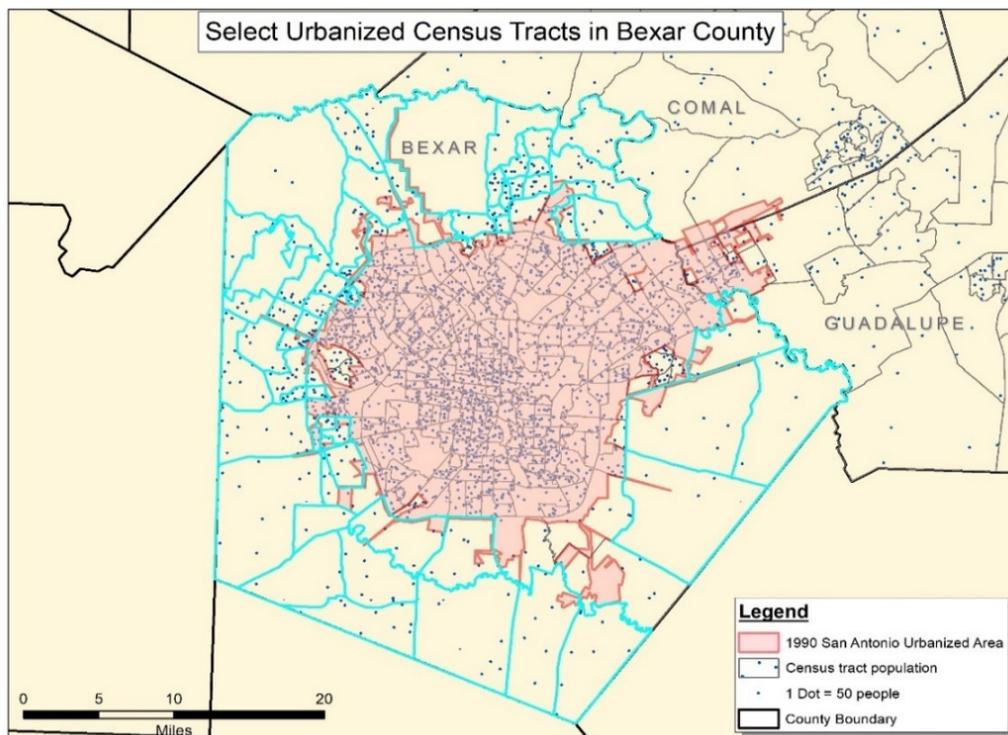
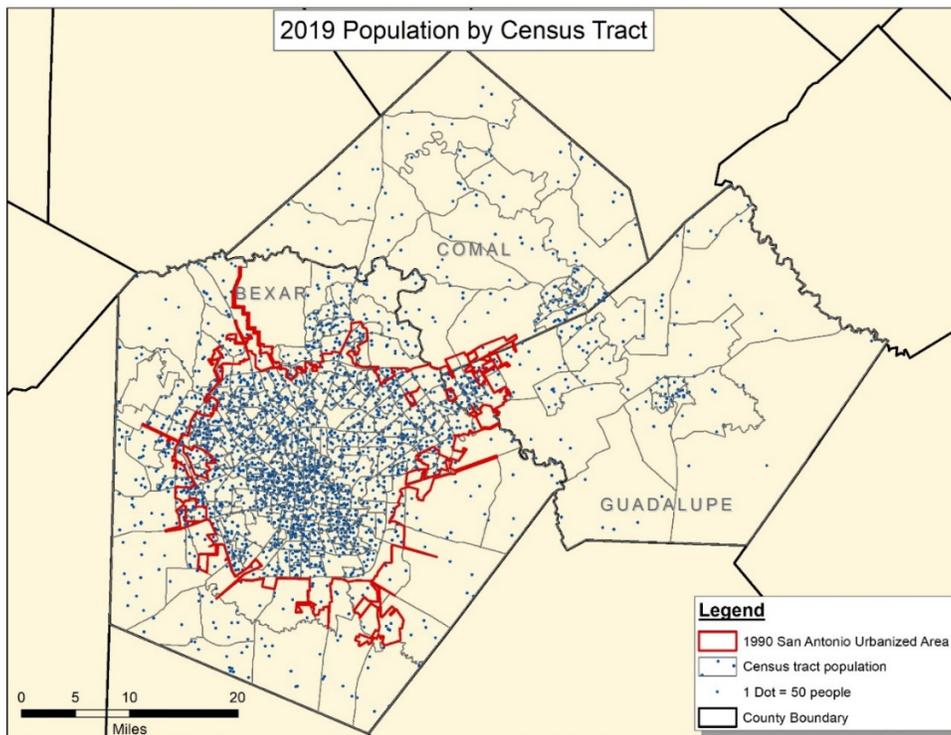


Figure 6. Estimated 2019 Census Tract Population for Bexar, Comal, and Guadalupe Counties



Examining how population, population density, and population growth are distributed spatially throughout the region in 2019 further indicates that Bexar County represents the majority of the region’s population. While population centers are extending somewhat into Guadalupe and Comal Counties, they do not exceed the growth seen in Bexar County, both within and outside the urbanized area.

B. TRAFFIC DATA

Finding 1: Daily VMT in Bexar County in 2018 represent just under 85% of the total VMT from the entire 1990 San Antonio Urbanized Area plus the entirety of Comal and Guadalupe Counties.

Finding 2: Average annual traffic values in Bexar County for 2018 represent just under 85% of the total VMT from the entire 1990 San Antonio Urbanized Area plus the entirety of Comal and Guadalupe Counties.

Conclusion: The above two findings support the conclusion from the population data that there is a need for a single I/M program in Bexar County. Furthermore, from the VMT, traffic, and congestion data, we come to the conclusion that implementing an I/M program in only Bexar County would have at least as high an impact on air quality and emissions reductions as having the I/M program in the 1990 San Antonio Urbanized Area, due to the high percentage of travel from the 1990 San Antonio Urbanized Area occurring in Bexar County.

As with population data, historic traffic data can be difficult to obtain in a format suitable for this analysis. However, ERG identified a few data sources that provide insight on traffic patterns within the urbanized area and related counties.

Firstly, fuel economy standards have changed since 1990. Therefore, while the amount of cars on the road and the total VMT may have changed, determining their impacts on emissions must include context about how car emissions have changed and how they could affect future emissions. Table 4 shows the Corporate Average Fuel Economy (CAFE) standards for passenger cars and light-duty trucks in miles per gallon (MPG) (U.S. Department of Energy, 2013).

Table 4. CAFE Standards Past, Present, and Future

Vehicle Model	1990 MPG	2019 MPG	2025 MPG
Passenger cars	27.5	42.5	55.3
Light-duty trucks	20	30	39.3

As part of its participation in the Federal Highway Administration’s Highway Performance Monitoring System program, the Texas Department of Transportation (TxDOT) publishes an annual roadway inventory (available online) that contains daily VMT for trucks separately and for all vehicles combined with historic data going back to 2005 (TxDOT, 2018a). Table 5 summarizes these data.

Table 5. Total Daily VMT by Year and County

Year	Bexar	Comal	Guadalupe	Total Daily VMT
2005	36,728,777	3,470,851	3,124,882	43,324,509
2018	45,527,674	4,983,347	4,312,924	54,823,945

TxDOT also provides annual average daily traffic data from its Statewide Traffic Analysis and Reporting System for the years 1999–2018. This geographic information system (GIS) dataset represents traffic counts by volume, axle factor, and seasonal factor to reflect a year’s worth of traffic divided by 365 days, thus representing a 24-hour period. These point data combine traffic counts from main lanes and frontage roads into one station displayed on the centerline of the TxDOT-maintained roadway (Figure 7). ERG mapped and summed the point data to counties to obtain the results in Table 6. Note that while one metric examines daily miles and the other examines traffic counts, each county’s contribution to the overall traffic patterns is consistent over time, with Bexar County representing just under 85% of the total area’s traffic.

Table 6. Annual Average Daily Traffic Values for Select Counties and Years

County (TxDOT, 2019)	1999	2018
Bexar	12,315,190	18,639,222
Comal	1,203,950	2,156,526
Guadalupe	1,151,830	2,088,557
Total	14,670,970	22,884,305

Figure 7. Example of TxDOT's Annual Average Daily Traffic Point Data

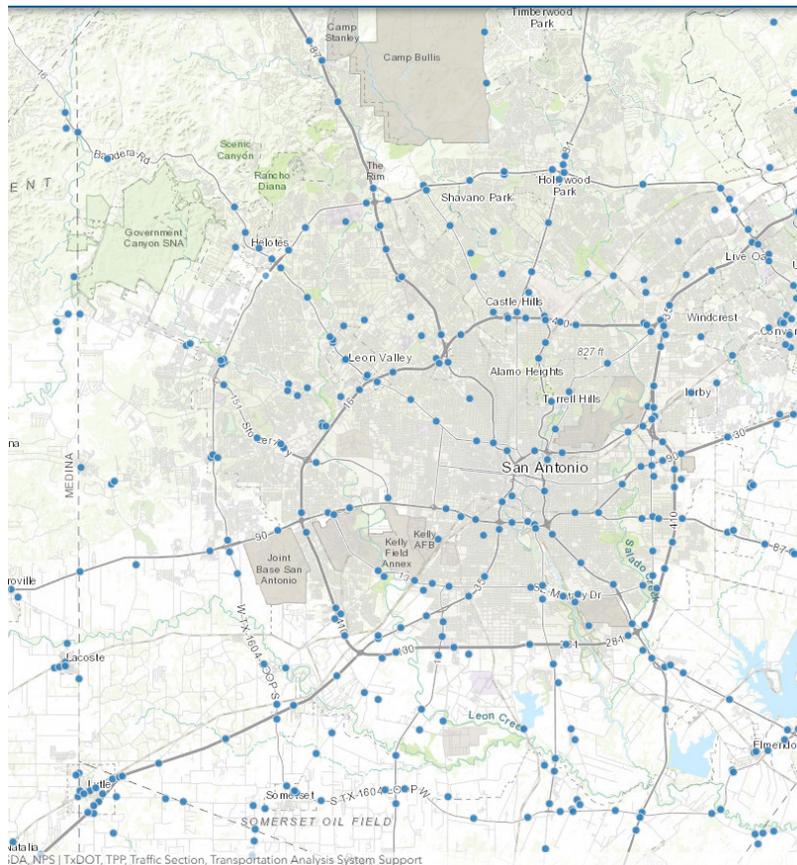


Figure 7 shows that the traffic congestion in Bexar County is not limited to the area inside the 1990 San Antonio Urbanized Area, but also extends to the outer areas of the county.

One final dataset that may be helpful for I/M program planners is a TxDOT forecasted congestion study (TxDOT, 2018b). While background information on this 2-year-old project is slim, the metadata include the following description:

This congestion calculation was performed using a method created by TxDOT referred to as the 'Car Space' method. This method differs from other, more traditional methods, by determining the space between cars in [1-mile] increments. This method factors number of lanes, [annual average daily traffic], and average car length to calculate the space remaining between vehicles for each [1-mile] segment of roadway during the 26th peak hour. The calculated space between cars, or lack thereof, is categorized to illustrate levels of congestion.

The results were categorized as "moderately congested" if there were 175 to 350 feet between cars and "congested" if there were less than 175 feet between cars (Bogle, 2017).

Figure 8 and Figure 9 show the results of the TxDOT Car Space analysis for the base year of 2016 forecasted to 2036. The analysis indicated that current roadway congestion is largely concentrated within the 1990 San Antonio Urbanized Area and that congestion is forecasted to increase both within that boundary as well as on primary routes beyond that boundary.

Figure 8. 2016 Traffic Congestion from TxDOT's Car Space Method

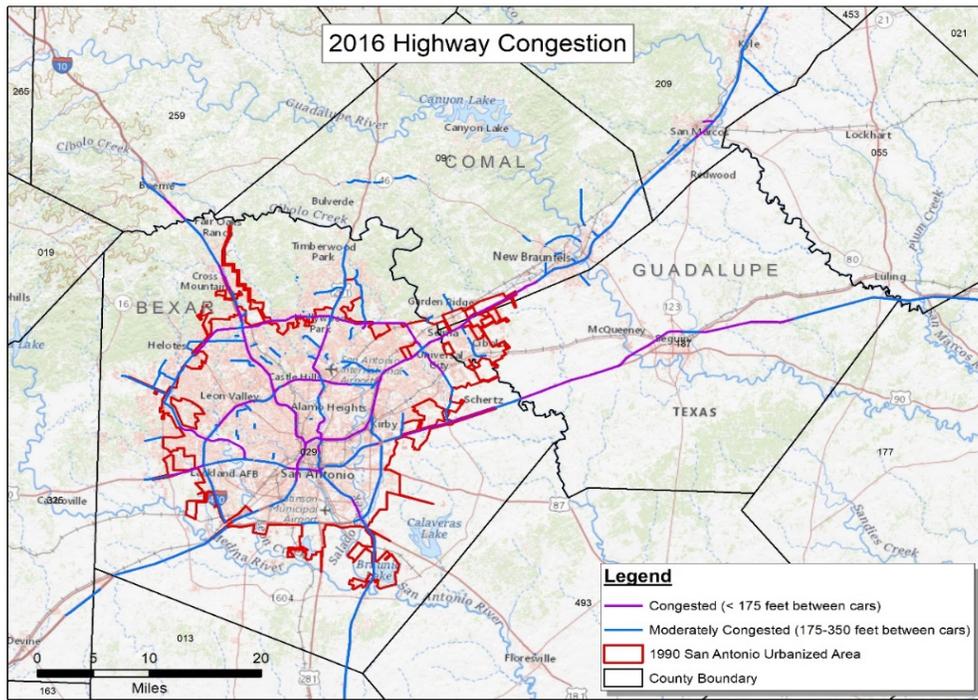
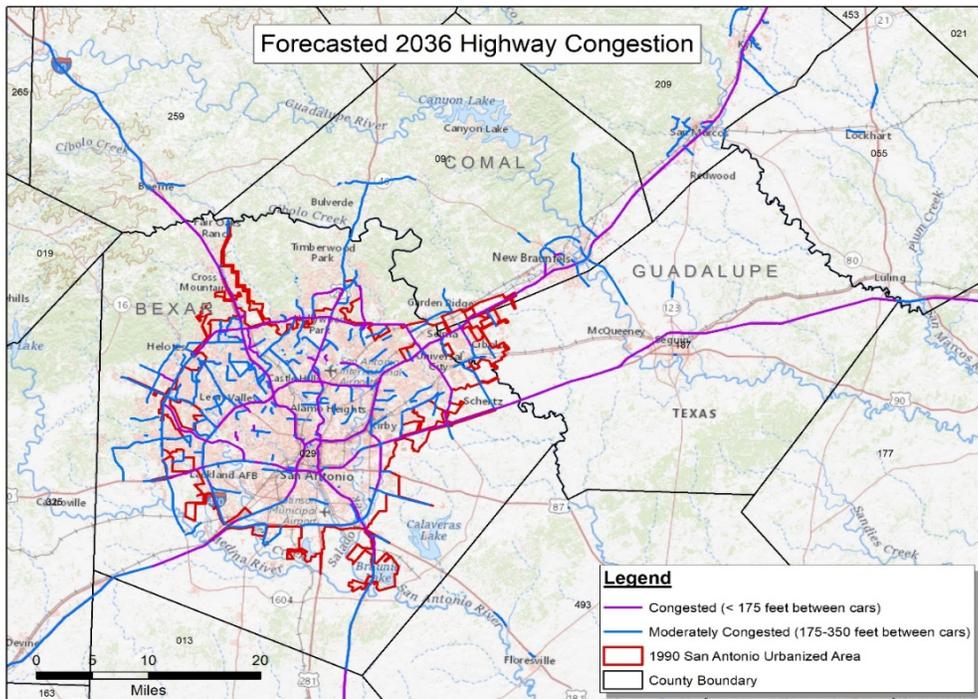


Figure 9. Forecasted 2036 Traffic Congestion from TxDOT's Car Space Method



C. RECOMMENDATION FOR POTENTIAL FUTURE I/M PROGRAM

Using the Bexar County boundary for an I/M program would satisfy 40 CFR §51.350(b)(2) because it represents an area and activities comparable to the 1990 San Antonio Urbanized Area. Table 1 and Table 2 data show that the population of Bexar County exceeds the population of the 1990 San Antonio Urbanized Area, both in 1990 and today. Also, historical and projected population trends (Nowlin, 2019; O'Hare, 2020; Texas Demographic Center, 2019a, 2019b) indicate that Bexar County serves and will continue to serve as the primary driver of population and on-road vehicle activity in the 1990 San Antonio Urbanized Area boundary. At least 80% of the population of Bexar, Comal, and Guadalupe Counties resides in Bexar County. Additionally, two different measures of roadway activity support this determination, showing that 85% of the vehicle activity is within Bexar County. Future projections of vehicle congestion further support the potential impact that a Bexar County-based I/M program could have on the area's air quality and emissions levels.

III. CONSIDERATIONS FOR IMPLEMENTING AN I/M PROGRAM IN BEXAR COUNTY

To help the TCEQ prepare for future implementation of an I/M program in Bexar County, this section answers the following questions:

1. How much will startup costs be for a new testing station in Bexar County?
2. How many testing stations would be necessary to adequately test Bexar County's vehicle fleet?
3. What would be an adequate fee for the I/M program?

To answer these questions, ERG researched several aspects of Bexar County and used various data from the *Vehicle Emissions Inspection Program Test Fee Analysis for AirCheckTexas Program* report (ERG, 2020) in this document. We also analyzed the following I/M programs (listed along with the counties that they cover):

- **Houston-Galveston-Brazoria (HGB):** Brazoria, Fort Bend, Galveston, Harris, and Montgomery Counties.
- **Dallas-Fort Worth (DFW):** Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties.
- **El Paso:** El Paso County.
- **Austin-Round Rock (ARR):** Travis and Williamson Counties.

A. STARTUP COSTS FOR EMISSIONS INSPECTION STATIONS IN BEXAR COUNTY

Finding 1: Startup costs that emissions testing stations would incur before generating revenue from emissions inspections are likely to include their first month of analyzer rental, first month of building rent, and training for inspectors. The startup cost would be \$1,270 per station. For an existing station that already has building space, the startup cost would be \$700.²

Finding 2: For a Bexar County emissions testing station, monthly fixed costs are estimated at \$996, which includes analyzer and building rent, tools and other equipment, maintenance, electricity, paper, and internet.

Finding 3: For a Bexar County emissions testing station, variable costs are estimated at \$5.95 per test and include labor costs, communication with the Vehicle Information Database (VID), and fringe benefits.

There are two cases to consider when estimating startup costs for an emissions inspection station:

- Existing auto repair stations could use their current building space to perform emissions testing; thus, their costs would include equipment, labor, and some other startup fees.

² These costs assume that stations rent analyzers. A stations that purchases an analyzer would incur a one-time up-front cost between \$6,895 and \$7,950. This would increase its up-front fixed costs but decrease its monthly fixed costs, which include monthly analyzer rent costs.

- New test-only or test-and-repair stations could start up by renting space; thus, their costs would also include building costs.

In both cases, we consider upfront fixed costs, monthly fixed costs, and per-fee variable costs.

For context, in 2020, there were 615 safety-only inspection stations in Bexar County that could add emissions testing. These establishments would incur lower startup costs than entirely new establishments without existing building space.

Startup Costs

Upfront costs, described in more detail below, include the following:

- A certified on-board diagnostics (OBD)-only analyzer:
 - Stations can rent one for either \$195 or \$199 per month.
 - Stations can purchase one for \$6,895 to \$7,950.
- Building space:
 - Average monthly cost to rent about 600 square feet in Bexar County is \$570, enough for a 288-square-foot bay space plus some room for related operations.
 - Existing stations would not need to incur this as an upfront cost, as we assume they already have building space.
- Training for new inspectors:
 - Estimated annual cost for inspection training is \$503 total for all inspectors.

The main equipment the I/M program needs for emissions testing is the certified OBD-only analyzer. The two companies that sell and rent the certified analyzers in Texas are Opus Inspection, Inc., and Worldwide Environmental Products, Inc. Both offer multiple models. The cost to buy an analyzer outright ranges from \$6,895 to \$7,950, which includes the option to have an extended service contract that is paid monthly (\$67), quarterly (\$216), or annually (ranging from \$786 to \$1,740). It is also possible to rent the equipment as a service, which costs from \$195 to \$199 per month. Analyzer prices were obtained from the TCEQ *Vehicle Emissions Inspection Program Test Fee Analysis* report (ERG, 2020).

Building rental is another major cost for a new emissions inspection station. Existing stations that add emissions testing are assumed to already have the building space to conduct testing. The average monthly cost per square foot for the current I/M program area is \$1.25 for HGB, \$1.22 for DFW, \$1.11 for El Paso, and \$1.44 for ARR (ERG, 2020). For Bexar County, the average monthly cost per square foot is \$0.95 (Keyvon, 2020). This suggests that the average monthly building cost in Bexar County may be slightly lower than in the existing I/M program areas. If we assume that a station needs 600 square feet of space to cover one 288-square-foot bay plus just over 300 square feet for other inspection-related business, the monthly cost would be \$570 ($\0.95×600 feet).

Another upfront cost is the training of inspectors. The I/M fee survey used to prepare the *Vehicle Emissions Inspection Program Test Fee Analysis* report collects data on annual training costs for inspectors, including inspector training application fees and renewal fees, food costs, lodging and travel costs for employees attending inspector training courses, wages paid to

employees for their time attending inspector training courses, wages paid to employees for their time spent in on-the-job training specific to emissions testing, and other emissions training costs (continuing education, training materials, etc.).

The average annual costs for inspector training at stations in each existing I/M program area are provided below:

- HGB: \$426
- DFW: \$830
- El Paso: \$283
- ARR: \$474

ERG’s Bexar County one time up-front training cost estimate is the average of these four costs: \$503. Note that the I/M fee survey only collects data from existing stations, so the above cost estimates are for the annual costs for training for an existing station. We assume that the one-time startup training costs for a new station would equal the annual training costs for an existing station.

Taking into account the range of analyzer costs, and assuming that stations rent, the total upfront fixed cost for a new station in Bexar County with no pre-existing infrastructure is \$1,270,³ while the total upfront cost for an existing station to add emissions testing is \$700.⁴

Monthly Fixed Costs

Each station incurs many costs every month regardless of the number of tests it performs (see Table 7). The monthly analyzer cost should only be included if the station did not buy the analyzer up front. To estimate monthly fixed costs for a station in Bexar County, ERG averaged the monthly fixed costs from existing I/M program areas using survey response data. The total monthly fixed costs for stations in Bexar County (found by summing the values in the last column of Table 7) is \$996.

Table 7. Monthly Fixed Costs for Stations in Bexar County

Program	HGB/DFW OBD-Only ⁵	El Paso	ARR	Bexar County ⁶
Monthly analyzer rent	Not applicable	Not applicable	Not applicable	\$197.00⁷
Monthly building rent	Not applicable	Not applicable	Not applicable	\$570.00
Median monthly cost for tools and other equipment	\$37.50	\$45.83	\$31.67	\$38.33
Median monthly cost for extra maintenance	\$37.50	\$91.67	\$45.83	\$58.33

³ Sum of first month analyzer rent average (\$197), first month’s rent for building (\$570), and inspection training costs (\$503).

⁴ Sum of first month analyzer rent average (\$197) and inspection training costs (\$503).

⁵ The HGB and DFW numbers are combined.

⁶ Value obtained from the average of other stations, except for the building and analyzer cost, which can be found in the upfront fixed cost section

⁷ Average of the range of monthly costs presented in the upfront fixed costs section. Note that, if analyzers are purchased, this cost will not be incurred each month (but a maintenance cost of \$136.11 would be).

Program	HGB/DFW OBD-Only ⁵	El Paso	ARR	Bexar County ⁶
Median monthly cost for phone line or internet	\$65.00	\$50.00	\$60.00	\$58.33
Median monthly cost for electricity	\$43.40	\$43.40	\$43.40	\$43.40
Median monthly cost for printer paper and ink/toner	\$25.00	\$41.67	\$25.00	\$30.56
Total Bexar County costs				\$995.95

Per-Fee Variable Cost Estimate

Variable costs, dependent on number of tests performed, are also associated with running and maintaining emissions testing stations, including labor costs, communication with the VID, and fringe benefits. While these are not costs that a station would incur to establish the station, it is still good context to know for potential stations and for stations looking to add emissions testing.

For each existing I/M program, ERG estimates a cost per OBD emissions inspection. The estimates for the existing programs are as follows:

- HGB/DFW:⁸ \$6.67
- El Paso: \$4.83
- ARR: \$6.34

ERG estimates the per-test variable costs for Bexar county at \$5.95. This represents an average of the variable costs in existing Texas I/M fee program areas. This calculation is necessary because we do not have throughput data for Bexar County on its own, since an I/M program does not exist for Bexar County. Averaging the other existing I/M area per fee variable costs allows for a reasonable estimate of the costs for a station in Bexar County.

Potential stations may find this estimate useful in determining costs, and in ascertaining how many tests they would need to conduct each month in order to become profitable.

B. NUMBER OF STATIONS NEEDED TO ADEQUATELY TEST VEHICLE FLEET IN BEXAR COUNTY

Finding: Bexar County will need around 458 stations to adequately test its vehicle fleet for an I/M program, with each station conducting on average 9.75 tests per day. This is comparable to the throughput per test in the existing ARR I/M program area, which has the highest average throughput per station among the program areas with existing I/M emissions inspection testing. Fewer than 458 stations would be below the benchmark of any of the existing program areas but could certainly be feasible if Bexar County emissions inspection stations had higher average throughput than other program areas.

⁸ The HGB and DFW numbers are combined.

To determine how many stations Bexar County needs to implement an I/M program, ERG researched population and vehicle registration data for the county and the existing I/M program areas. We also used the concurrent I/M fee survey project to collect data for the existing I/M programs, including 2019 emissions testing throughput and the number of stations operating in each program area (see Table 8). We then estimated the number of stations that Bexar County needs by looking at the ratio of population and registered vehicles to the number of stations in the current I/M program areas.

While these calculations do not use the throughput data, their clear correlation with population and registered vehicles increases the validity of estimating the stations Bexar County needs using those metrics.

Table 8. Data Used to Estimate Bexar County Station Requirements for I/M Program

Program Area	2019 Population (Texas Demographic Center, 2019a)	Number of Registered Vehicles	Emissions Testing Throughput (in Number of Tests) ⁹	Number of Current Emissions Testing Stations ¹⁰
Bexar	1,991,779	1,753,744	1,399,119 ¹¹ (estimate)	N/A
HGB	6,833,416	5,770,473	4,516,021	2,494
DFW	7,314,575	6,565,993	5,091,514	2,494
El Paso	855,623	735,569	586,761	225
ARR	1,832,230	1,592,363	1,278,653	419

Table 9 compares population and vehicle registration data to stations in the current I/M program areas. The number of persons per emissions testing station ranges from 2,740 to 4,373, and the number of registered vehicles per emissions testing station ranges from 2,314 to 3,800.

Table 9. Ratios of Population and Vehicle Registration to Number of Stations in I/M Program Areas

Program Area	Persons per Emissions Testing Station ¹²	Registered Vehicles per Emissions Testing Station ¹³
HGB	2,740	2,314
DFW	2,933	2,633
El Paso	3,803	3,269
ARR	4,373	3,800

⁹ Includes retests. In 2020, the rate of retests was 4.8% for HGB, 4.8% for DFW, 4.5% for El Paso, and 6.5% for ARR.

¹⁰ These figures are a slight overestimation, as they represent the station IDs collected from the I/M fee survey project, and a station sometimes has multiple IDs. However, this does not occur in a way that would significantly alter this analysis. Also note that HGB and DFW report combined station IDs. The number of stations reported here represent half of the total stations for HGB and DFW combined, which is 4,987.

¹¹ Estimated by multiplying the estimated number of stations in Bexar county (the lower bound from Table 10) and the ARR throughput to stations ratio from Table 9 (ARR used as a proxy, as ARR's population and vehicle registration data resembles Bexar County)

¹² Calculated by dividing the population value by the number of stations value from Table 8.

¹³ Calculated by dividing the registered vehicles value by the number of stations value from Table 8.

Table 8 shows that Bexar County’s population is comparable to the ARR program area’s population; the number of registered vehicles is also comparable. Table 10 calculates a lower and upper bound for stations that Bexar County needs to implement an I/M program, using the ARR population and registered vehicles ratios from Table 9.

Table 10. Estimate of Number of Stations Needed to Adequately Test the Vehicle Fleet of Bexar County

	Population ¹⁴	Ratio of Persons to Stations ¹⁵	Number of Stations Needed (Based on Population) ¹⁶	Number of Registered Vehicles ¹⁷	Ratio of Registered Vehicles to Stations ¹⁸	Number of Stations Needed (Based on Registered Vehicles) ¹⁹	Average of Number of Stations Needed ²⁰
Lower bound	1,991,779	4,372.86	455	1,753,744	3,800	461	458
Upper bound	1,991,779	2,740.49	727	1,753,744	2,314	758	742

Table 10 shows that a Bexar County I/M program would need somewhere between 458 and 742 stations to adequately test its vehicle fleet. Given that Bexar County has similar population and vehicle registration data to ARR, ERG recommends that the actual number of stations needed is 458, the number produced in Table 10 using the ARR ratios from Table 9. Therefore, we estimate that each station would conduct on average 9.75 tests per day.²¹

As the previous section notes, in 2020, there were 615 active safety-only inspection stations that could add emissions testing in Bexar County. It is unclear how many of these stations will pursue emissions testing and how many completely new stations can be expected. New stations may be attracted to the potential profits of running an emissions testing station rather than performing less-profitable safety inspections. However, emissions testing requires more space than safety inspections (which do not require a substantial facility), which will make it difficult for stations without the capacity to add emissions testing. Note that stations would be required to conduct both safety and emissions tests rather than remaining safety-only stations (an incentive to join the I/M program).

¹⁴ From Table 8.

¹⁵ Lower and upper bounds taken as the highest and lowest values from the second column of Table 9. Note that the lower bound is a higher value than the upper bound because a higher ratio equates to fewer stations needed.

¹⁶ Calculated by dividing the value in the second column by the value in the third column.

¹⁷ From Table 8.

¹⁸ Lower and upper bounds taken as the highest and lowest values from the third column of Table 9. Note that the lower bound is a higher value than the upper bound because a higher ratio equates to fewer stations needed.

¹⁹ Calculated by dividing the value in the fifth column by the value in the sixth column.

²⁰ Calculated by adding the values in columns four and seven and then dividing by 2.

²¹ This number was calculated by dividing the throughput estimate from Table 8 (1,399,119) by the number of days in a year assuming stations are open 6 days a week (313) by the number of estimated stations needed for Bexar County (458).

C. ADEQUATE INSPECTION FEE FOR BEXAR COUNTY I/M PROGRAM

Finding: Bexar County has socioeconomic data within the same range of other existing I/M program areas; thus, ERG recommends using the same fee recommendation of \$18-\$22 per test for any future Bexar County I/M program.

The *Vehicle Emissions Inspection Program Test Fee Analysis for AirCheckTexas Program* report (ERG, 2020) recommends a single fee for every current I/M program area in Texas. ERG assessed whether that fee would also be adequate for Bexar County by comparing relevant socioeconomic data for Bexar County to data for the counties that constitute the existing program areas.

Table 11 presents 2018 poverty rates and median household income levels for Bexar County and the counties that constitute the HGB, DFW, El Paso, and ARR I/M program areas. ERG obtained data from the USCB’s Small Area Income and Poverty Estimates Program (USCB, 2019).

Table 11. 2018 Poverty Rates and Median Household Income for Bexar County and Other Counties in Existing I/M Program Areas

County	Percentage of People in Poverty	Median Household Income
Bexar	17.2%	\$54,210
Brazoria	10.1%	\$74,225
Fort Bend	7.9%	\$92,310
Galveston	12.1%	\$71,959
Harris	16.5%	\$60,241
Montgomery	9.3%	\$77,598
Collin	6.4%	\$96,936
Dallas	14.2%	\$59,838
Denton	7.3%	\$88,384
Ellis	8.8%	\$76,792
Johnson	10.7%	\$62,635
Kaufman	11.5%	\$67,434
Parker	8.3%	\$73,718
Rockwall	5.1%	\$102,858
Tarrant	12.1%	\$66,059
El Paso	20.5%	\$43,948
Travis	12.0%	\$76,255
Williamson	6.4%	\$87,817

Niche (2020) calculates cost-of-living rankings for each of Texas’s 254 counties. While some counties’ rankings were unavailable, Bexar was ranked similarly to (though slightly lower than) several counties that are part of I/M programs in Texas. Bexar’s 189th ranking was just lower than Brazoria (180), Galveston (185), Kaufman (182), Parker (174), Ellis (173), and El Paso (179) Counties, which all participate in I/M programs. Niche calculated the rankings by considering the following data from the U.S. Census and U.S. Bureau of Labor Statistics:

- **Home-value-to-income ratio:** The ratio of the median home value to the median family income, where lower is considered better.

- **Median effective property tax:** The percent of the median property taxes paid on homes over the median home value.
- **Median home value:** The median home value for the area, where least expensive is considered better.
- **Median rent:** The median rent for an area, where least expensive is considered better.
- **Monthly-housing-cost-to-income ratio:** The ratio of the median monthly housing cost for homeowners to the median monthly household income, where lower is better.
- **Consumer Price Index (CPI) for gas:** CPI of regular-grade, unleaded gas compared to the national average in 2015 (lower is better).
- **CPI for groceries:** CPI of various grocery items compared to the national average in 2015 (lower is better).
- **Rent-to-income ratio:** The ratio of the median monthly rent to the median monthly individual income, where lower is better.

The poverty rates, median household income levels, and cost-of-living rankings, presented earlier in this section, suggest that Bexar County has slightly (but not significantly) lower socioeconomic levels than most counties in other I/M program areas. It is also worth noting that Bexar County had lower poverty rates and higher median income levels than El Paso County. This suggests that the recommended fee for the I/M programs in the *Vehicle Emissions Inspection Program Test Fee Analysis for AirCheckTexas Program* report would also be adequate for an I/M program in Bexar County.

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