100 Most Congested Roadways in Texas

2021 Executive Summary

In response to urban roadway congestion, in 2009 the Texas Legislature mandated that the Texas Department of Transportation annually produce a ranked list of the most congested roadways in the state. This list measures congestion by the number of extra hours of travel time (also called 'delay') experienced by travelers on over 1,800 road sections. Because of the significant delay values in the most congested corridors, and the slow nature of solution implementation to address a congested roadway, the overall list changes little from year to year in most years. However, calendar year 2020 was not a normal year -- the COVID-19 pandemic temporarily changed travel in Texas as it did everywhere. Still, many of the most congested road sections remained near the top of the list, even as congestion dropped across the state overall. While congestion changes in this unusual year were not uniform, heavily traveled and economically important corridors were still among the most congested during the different phases of the pandemic response. There were, however, some new entries for this year, especially into the bottom portion of the Top 100 list.

The 10 most congested road sections for the 2021 report are shown in Exhibit 1. The West Loop (IH 610) in Houston is back on top in the year 2020. Eight of the top 10 roads list from the 2020 report remained in the top 10 for the 2021 report. The two new road sections in the top 10 list are:

- North Fwy / IH 35W / US 287 in Fort Worth - #9 this year, #16 last year
- LBJ Fwy / IH 635 in Dallas - #10 this year, #18 last year

Exhibit 1: 2021 Top 10 Congested Roads in Texas

2021 Report	County	Road segment	From	To	2020 Report
1	Harris	W Loop Fwy/ IH 610	Katy Fwy / IH 10 / US 90	Southwest Fwy / IH 69 / US 59	2
2	Travis	IH 35	US 290 N / SS 69	Ben White Blvd / SH 71	1
3	Harris	Southwest Fwy / IH 69 / US 59	W Loop Fwy / IH 610	South Fwy / SH 288	3
4	Dallas	Woodall Rodgers Fwy / SS 366	US 75	N Beckley Ave	4
5	Harris	Eastex Fwy / IH 69 / US 59	SH 288	IH 10	5
6	Harris	Gulf Fwy / IH 45	IH 10 / US 90	S Loop E Fwy / IH 610	7
7	Dallas	US 75	LBJ Fwy / IH 635	Woodall Rodgers Fwy / SS 369	9
8	Dallas	Stemmons Fwy / IH 35E / US 77	John W Carpenter Fwy / SH 183	Tom Landry Fwy / IH 30	8
9	Tarrant	North Fwy / IH 35W / US 287	SH 183	IH 30	16
10	Dallas	LBJ Fwy / IH 635	Stemmons Fwy / IH 35E / US 77	US 75	18

Full results and multi-year comparisons of almost 10,000 miles on more than 1,800 road segments can be found in the full spreadsheet at (https://mobility.tamu.edu/texas-most-congested-roadways/).

While congestion is often a by-product of desirable economic growth, for individuals attempting to navigate a congested roadway it is simply "a problem." TxDOT is already seeking solutions to many of these problem sections and the Texas Transportation Commission accelerated those solutions for

several road segments through the Texas Clear Lanes program, a 2015 initiative spurred by Texas Governor Greg Abbott to provide relief at major chokepoints across the state. Many of the Texas Clear Lanes projects are in or near some of the most congested sections in the top 100 list.

THE PANDEMIC EFFECT

The 2021 Texas 100 Most Congested Road Sections data is from **calendar year 2020 (the pandemic year).** The pandemic had major effects on traffic volumes and travel patterns across the state; some of the causes for the changes in ranks are discussed below.

The *2021 Urban Mobility Report* was released by the Texas A&M Transportation Institute in June 2021 with mobility statistics for all 494 U.S. urban regions and observations from 1982 through the 2020 pandemic year (1). Several of these national observations were also seen in Texas in 2020.

- There were four congestion years in one:
    - First couple of months were "regular".
    - The shutdown period happened in March to May.
    - The initial recovery began in the summer when traffic and congestion began to return.
    - The "closer to normal" period hit in the fall when "shorter-than-2019" rush hours returned.
- Truck traffic volumes did not decline nearly as much as passenger car travel due to increases in at-home delivery of essential goods and services.
- Congestion levels were more indicative of early 1990's levels during shutdown and early 2000's levels later in the year.
- There was a shift to more travel in the middle of the day and a larger percentage of travel on the streets.
- Around the U.S., employment was down about 9 percent while traffic volume was down 18 percent.

The *2021 Texas 100 Most Congested Road Sections* list was affected by the pandemic in different ways across the state. Some of the causes for these differences exist in almost every Texas 100 list while others are linked to the pandemic effects. Due to economic activity during the pandemic year, sections in the different urban regions across the state were affected by:

- The composition of the local job market – essential workers had to report to work, office-based workers had more options, and students worked and studied from home.
- Influence of trucking in the corridor – trucks had to keep hauling what the state needed and truck volumes did not drop like auto volumes and in some cases climbed in some corridors due to increases of at-home deliveries.
- Most jobs (63 percent) cannot be accomplished at home per a U.S. Bureau of Labor Statistics study last year. The remaining jobs can be performed entirely from home (2).

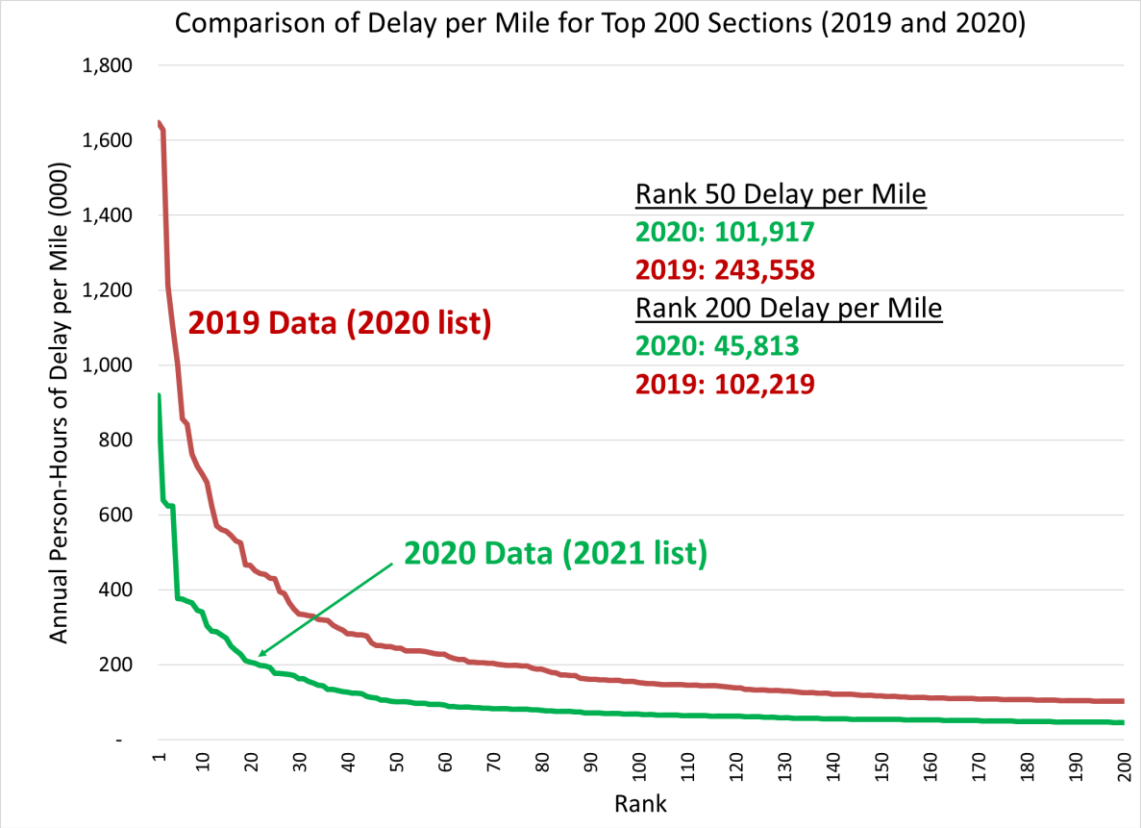
As with any year of tracking the bottleneck ranks, the following factors affect the rank in a given year but could have been higher or lower relative to other sections due to pandemic changes to traffic:

- Auto and truck volume changes (2019 to 2020), up or down
- Road construction on the specific road section of interest

- Road construction on a nearby road section that often encourages some traffic to shift to a different facility or different time

Exhibit 2 shows a comparison of travel delay per mile (the amount of yearly extra travel time for each roadway mile) for the Top 200 ranked road sections and demonstrates the dramatic changes between congestion in calendar years 2019 and 2020. There are a few sections each year (usually the same ones) where congestion is much worse than on other roads; the roads to the left of the diagram are among the most congested in the U.S. The 2019 curve shows large differences from one ranked section to the next in the highest rankings; the 2020 curve has a similar but lower shape. The 2019 line does not flatten out much before the 75 to 100 rank area; the 2020 curve flattens out by about rank 50. Road sections ranked better than 50 in the 2020 data year have similar congestion levels making it easier to change ranks with a few more vehicles added or subtracted, a nearby construction project, or even that the section did not lose traffic during the pandemic as much as some of its peers. Large shifts in ranks can happen more easily and more often in a flatter curve.

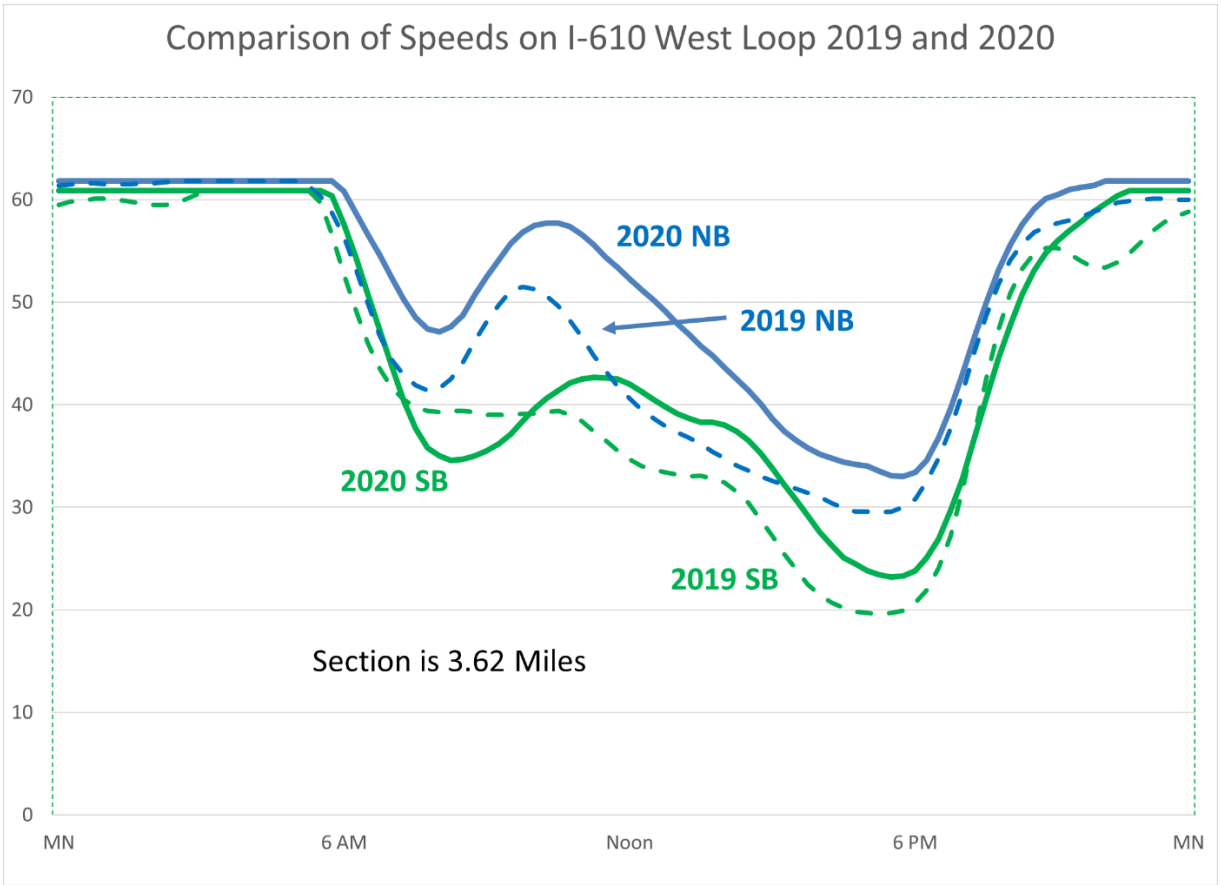
Exhibit 2. Changes Between 2020 and 2021 Texas 100 in Top 200 Sections



What has not changed since its beginning in 2009 is the goal of the Texas 100 ranking: to use traffic volume and speed data to arrive at a measure of traffic congestion and the frustration that travelers and shippers experience. The primary measure quantifies how much more time it takes to travel a mile on a congested road than it does to travel that same mile of road during uncongested conditions.

The comparison of speeds in Exhibit 3 on IH 610 West Loop in Houston show the 2020 speeds to be 5 to 10 mph faster almost all day in each direction as compared with 2019. With 2020 vehicle traffic volume at 85 percent of 2019 levels, it is easy to see how the delay reduction happened. It is important to point out that a 5 to 10 mph savings does not have the same effect at all speed ranges. The difference between 20 and 30 mph is about 1 minute per mile and between 30 and 40 mph it is about half a minute per mile. Every traveler that comes through this 3.6 mile long road section at various times of the day can be saving 30 to 60 seconds per mile because of the 2020 speed increase.

Exhibit 3. Speed Changes between 2019 and 2020 on Houston's West Loop



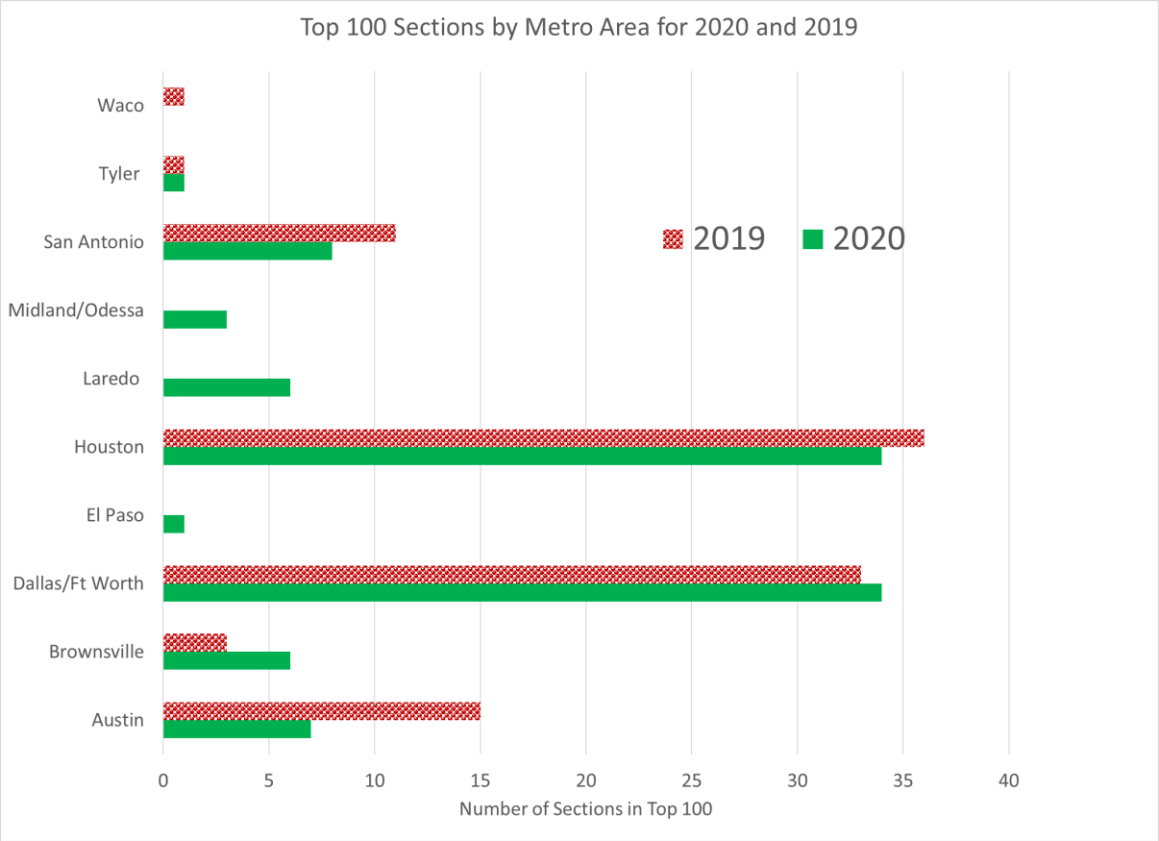
WHAT'S ON THE LIST

Congestion is widespread, but its relevance can be subjective – what is very congested in small cities might be considered acceptable in larger cities. In an effort to demonstrate these contextual differences, this study tracks roughly 1,800 road sections across the state, in urban and suburban areas, including at least 18 sections (60 miles) in each of the 25 Texas metro areas (see map on the TTI website (https://mobility.tamu.edu/texas-most-congested-roadways/) for the urban regions). The resulting database is useful in tracking statewide congestion and can be used to help prioritize projects that address congestion problems in each metro area.

The 2021 Top 100 list contains 30 sections that were not in the 2020 Top 100 list; this is up from 17 new sections from the 2019 to 2020 list. More arterial street sections were included in the Top 100 list in 2021 than in the 2020 list (33 sections in the 2021 top 100 compared with 28 in the 2020 list). Both freeways and streets experienced more delay outside of the peak periods in 2020 than in 2019, likely due to higher work-at-home levels and schools doing remote learning. Peak period freeway delay fell from 66 percent to 63 percent of all freeway delay. Peak period arterial street delay fell from 42 percent to 40 percent of all arterial street delay. Midday and weekend delay rose from 48 percent to 51 percent of all annual delay.

Exhibit 4 displays a comparison of the number of road sections in the Top 100 list in the 2019 and 2020 data. Houston and Dallas/Fort Worth had about the same number of sections in the Top 100 while Austin and San Antonio had less in the 2020 data than 2019. Several areas—El Paso, Midland/Odessa, and Laredo—only had sections in the Top 100 in the 2020 data while Waco did not have a Top 100 section in the 2020 data.

Exhibit 4. Top 100 Sections in 2020 and 2021 Texas 100 by Metro Area



The majority of the congested roads on the list are in the four largest metro areas of the state: Austin, Dallas/Fort Worth, Houston, and San Antonio:

- The 18 most congested roadways are in these four metro regions, and 24 of the top 25.
- 83 of the top 100 congested sections are in these four metro regions (95 in 2019).

- 163 of the top 200 are in the four largest metro regions (174 in 2019).

WHAT ARE THE INFLUENCING FACTORS THAT PUT ROADS ON THE LIST?

COVID-19 Pandemic

COVID-19 changed traffic patterns across Texas in 2020. It changed when or if trips were made, where they were made, how they were made, and had large impacts on trucking and goods movement. All these factors affected each road section in the list differently. Some road sections did not experience the large delay reductions as some of their peers because of how these changing traffic patterns affected them.

Economic Prosperity

The most enduring trend since 2009 has been growth – in population, jobs, travel demands, traffic volume – everything except road and transit capacity necessary to accommodate the growth. Traffic congestion may be an inevitable result of growth, but the congestion growth rate is not seen as reasonable.

Land Use

Land use changes along or near a corridor can have a dramatic impact on that corridor. In urban areas that are developing densely, thousands of trips may be added to a corridor very quickly when people move into newly available housing units or take advantage of new offices, retail stores or restaurants. For example, recent high-density development along Westheimer Road in Houston between SH-6 and IH-610 is one reason that this segment of road is ranked at #49 on the 2020 list. That kind of change can send a roadway to a higher position on the list in a short period of time. However, this section fell to #237 on the list in 2021 primarily due to work from home along the very developed corridor.

Construction

Construction on a road – or on a nearby road - can be the reason for congestion changes. Big construction projects often cause congestion on the road where the project is being built. In smaller cities, even short-term and smaller projects like pavement overlays, re-striping, traffic signal work at a single intersection or right-turn additions can affect annual congestion statistics.

Projects on nearby or connecting roads can also cause congestion on a road where there would otherwise be none. When the road under construction becomes congested, backed-up traffic shifts to connecting roads and they become congested as well. For example, recent construction on Brownsville's Boca Chica Blvd created congestion on other nearby roadways (E 14 St, International Blvd, E Price Rd, and Paredes Line Rd) when traffic along Boca Chica was slowed due to construction.

Congestion Outside the Peak Period

Congestion outside the normal peak traffic periods is another frequent condition that moves a road up on the congested list. These roads "where it's always rush hour" not only see regular congestion, but also see more intense problems from traffic crashes and stalled vehicles. This is the case with I-35 through Central Austin, or I-610 West in Houston.

Off-peak period delay can also be significant on arterials, or high-capacity urban thoroughfares, whose traffic lights are timed to serve all travel directions at smaller cross street intersections, rather than prioritizing the major street peak direction, causing delay on the bigger arterial streets. During rush hour, however, the arterials are prioritized and their delay time is lessened.

Weather

Even an exceptionally bad weather year can cause a road segment to appear in the congestion data. Heavy rains can slow traffic, regular flooding can block it, and high winds can deposit debris on the roads or down signs that obstruct traffic until removed or repaired. Extreme weather, especially high heat followed by excessive rains, can accelerate roadway damage, creating large cracks that worsen with the weight of traffic. That kind of damage can slow traffic, and the effort to repair the problem can also obstruct a road and cause congestion.

WHAT ARE THE LASTING EFFECTS OF COVID-19 ON TRANSPORTATION?

It is not yet clear what the lasting effect of the COVID-19 pandemic will be on urban transportation systems. The mix of strategies that are deployed in Texas will continue to be different for each region — better traffic operations; more travel options; more highways, streets, and public transportation; new land development styles; advanced technology will all play a role. Working from home, long an underappreciated solution, will certainly have a much bigger role after the pandemic experience (1).

The changes in travel and congestion levels during the 2020 COVID-19 pandemic were massive. The declines in congestion were unprecedented. With 2020 congestion at levels about half of the 2019 levels, the "congestion recovery" may take a few years, but it also seems clear that some aspects of the problem and the solutions may have changed forever. But if we try to use that experience to make decisions about the future, it is difficult to know what has been learned from the past year.

- How soon will the employment market bounce back?
- To what extent will office workers continue to work from home?
- How does the type of jobs in the travel corridor affect the congestion patterns, and which mobility solutions will work best for that job mix?
- Will trip departure times remain similar — fewer auto trips in the normal rush hours, and more travel in the midday and early evening?
- Will public transportation ridership rebound?
- Will construction projects fast-tracked during the pandemic have an effect?
- What are the effects of transportation and land use changes given where people choose to work, live, shop, go to school, and recreate?
- How will the shift in where businesses and people locate affect how, where, and when goods are moved?

On some level, congestion analysis of 2020 data will never be relevant again; the conditions are not likely to be repeated. On the other hand, the conditions are like some of those in the past. The connection between the economy and congestion has been very solid. The great recession in 2008/9 caused a national reduction in traffic congestion, and other regional recessions have also caused congestion reductions. Early 2021 suggests that the economy and congestion are rebounding, but the answers to the above questions will go a long way toward determining the mobility problems and

solutions in the next decade. All the potential congestion-reducing strategies should be considered, and there is a role and location for most of the strategies:

- The COVID-19 pandemic reaction has convinced employers and workers that many more tasks can be accomplished remotely. This will not be the same everywhere for every job. Some employers might require in-person attendance. Some may allow full-time, not-in-an-office work schedule. Some will encourage telework for a few days each week or even just a few hours each day.
- In growth corridors, there also may be a role for additional road and public transportation capacity to move people and freight more rapidly and reliably.
- Rapidly clearing crashes and stalled vehicles, efficiently timing the traffic signals, getting reliable information to travelers so that they can plan their trip — all of these are ways to get the "best bang for the buck" productivity out of the existing road and public transportation systems.
- Some areas are seeing renewed interest in higher density living in neighborhoods with a mix of residential, office, shopping, and other developments. These places can promote shorter trips that are more amenable to walking, cycling, or public transportation modes.

CONCLUSION

The 2020 pandemic year was full of surprises when it came to changes in traffic patterns and travel behavior. The 100 Most Congested Roadway Sections report provides a birds-eye view of congestion in Texas and captured the changes in travel due to the pandemic. Total delay in 2020 data was down 58 percent from 2019 levels in the 1,800 plus sections of tracked roadways; truck delay was down 43 percent from 2019 levels. In a typical Top 100 list, between 15 and 20 road sections may jump up into the Top 100 for at least a year; in the 2021 list this number was 30 sections. There was a larger proportion of the Top 100 sections outside of the four large metro regions in 2020 - 17 compared with five in 2019. As noted, there are many potential reasons for these changes in a pandemic year whether it is due to local labor markets, truck traffic, or work-from-home effects as well as many others.

The detailed data in this report does not show what specifically is causing the congestion on a given roadway, nor identify specific solutions. The data can give analysts some insight into what strategies might be effective. It is clear with the growth that Texas has experienced and is projected to experience in the coming decades that many different solutions will be needed to address the future of transportation in Texas. Programs like Texas Clear Lanes will continue to play a key role in addressing some of the major chokepoints in the transportation system in Texas.

SOURCES

1. *2021 Urban Mobility Report*. Texas A&M Transportation Institute. June 2021.
2. U.S. Bureau of Labor Statistics. https://www.bls.gov/opub/mlr/2020/article/ability-to-work-from-home.htm

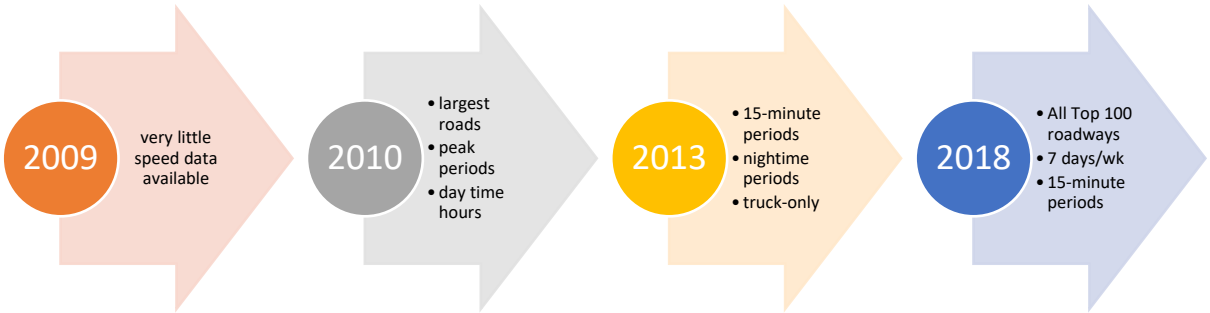
APPENDIX A. METHODOLOGY & DEFINITIONS

How has the Methodology Changed Over the Years?

Eleven years of this project have seen changes to road use in Texas. There have also been changes to speed data availability since the first year of this report, both for the time periods and the number of roadways for which it was captured. In 2009, the study's first year, there was very little directly collected speed data so speeds were estimated using traffic volume and number of roadway lanes. Since 2010, however, speed data has continued to improve in both temporal and spatial coverage. In that year, private sector companies were supplying hourly speed data for only the state's largest roadways, generally during higher traffic periods, and during most daytime hours. However, by year four of the report, speeds were available for 15-minute periods, including many overnight periods. As of the 2017 reporting period, speed data was available for over 95 percent of the 15-minute periods for all seven days of the week on all the Texas 100 roadway sections.

In addition, data collection companies who once collected only truck or fleet data now collect passenger vehicle data from anonymized sources like cell phones and in-dash devices. As of the 2019 report, connected vehicles became a large portion of the probe vehicles reporting roadway performance information to the private sector companies. The result is that the reporting has become more accurate both in terms of the timeframes and vehicle types they measure.

Exhibit A-1: Timeline Showing Changes to Speed Data Availability



Annual Hours of Delay

The annual measure of delay is the starting point for calculating all of the congestion measures below. To arrive at this measure, researchers must first acquire four data elements:

- Actual travel speed
- Free-flow travel speed
- Vehicle volume (passenger vehicles and trucks)
- Vehicle occupancy (persons per vehicle) to calculate delay in person-hours

Researchers use the traffic volume and traffic speed data for each section of road to create the large dataset that contains each of the Texas 100 reporting segments. For example, on a given point on a roadway, researchers gather the travel speed and traffic volume for each 15-minute time period of the average week. This means that data is gathered for 672 discreet periods of each week for each segment. They can then compare this data with free flow speeds to determine the difference between a congested period and a free flowing one. By factoring in vehicle occupancy, they are then able to calculate the delay time per person for each roadway. For details about the methodology used and any changes made since the prior year, see *100 Texas Congested – 2021 Method (final)*.

Definitions of Measures

DELAY	
Annual Delay	The sum of the extra travel time in the peak period, off-peak period, and weekend.
Annual Delay Per Mile	Annual hours of delay divided by segment length so that comparable values are obtained.
Peak Period Delay	The hours of delay that occur during the 6:00am-9:00am and 4:00-7:00pm timeframe on weekdays.
Off-Peak Period Delay	The hours of delay that occur on weekdays outside of the peak period.
Weekend Delay	The hours of delay that occur on weekends.
Texas Congestion Index	Score indicating the relationship between the peak-period, average travel time and the free-flow travel time. The score is arrived at by dividing the congested travel time by the free flow travel time. For example, for a segment where a free-flow trip takes 30 minutes, and a trip during peak periods takes 36 minutes, the TCI score would be 1.2.
Planning Time Index	A travel time reliability measure indicating the amount of time that should be planned to arrive on-time for 19 trips out of 20. A value of 2.50 means that for a 30 minute trip in light traffic, 75 minutes should be planned.
Commuter Stress Index	Score indicating the relationship between the peak period, average travel time for the morning and evening peak travel direction and the free-flow travel time for the peak direction of travel only.
VOLUME, SPEED & FUNCTIONAL CLASS	
Peak Period Average Speed	The average speed during the 6:00am-9:00am and 4:00-7:00pm timeframe.
Average Uncongested Speed	The average operating speeds during light traffic conditions, typically during overnight hours.
Functional Class	Coding system for road segments for purposes of analysis. 1=interstates and freeways, 3=major and minor arterial streets.
TRUCKS	
Annual Truck Delay	The portion of annual delay from trucks.
Annual Truck Delay Per Mile	Annual hours of truck delay divided by the segment length
Peak Period Truck Delay	The hours of truck delay that occur during the 6:00am-9:00am and 4:00-7:00pm timeframe on weekdays.
Off-Peak Period Truck Delay	The hours of truck delay that occur in non-peak periods on weekdays.
Weekend Truck Delay	The hours of truck delay that occur on weekends.
Annual Truck Congestion Cost	The portion of annual congestion cost from trucks.
Peak Period Average Truck Speed	The average truck speed during the 6:00am-9:00am and 4:00-7:00pm timeframe.
Average Uncongested Truck Speed	The average truck operating speeds during light traffic conditions, typically during overnight hours.
CONGESTION COST, EXCESS FUEL & ADDITIONAL EMISSIONS DUE TO CONGESTION	

Annual Congestion Cost	The cost of wasted time and fuel associated with congestion.
Excess Fuel Consumed	Additional gallons of fuel consumed due to congestion.
Excess Truck Fuel Consumed	The portion of excess fuel consumed by trucks due to congestion.
Additional CO2 Produced	Pounds of additional carbon dioxide produced because of congestion.
Additional Truck CO2 Produced	Pounds of additional carbon dioxide produced by trucks because of congestion.