100 Most Congested Roadways in Texas

2022 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 2021 was not a normal year -- the COVID-19 pandemic was still affecting travel in Texas. Despite this, many of the most congested road sections remained near the top of the list, even as congestion remained lower across the state overall. While congestion changes in 2021were 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 throughout the Top 100 list.

The 10 most congested road sections for the 2022 report are shown in Exhibit 1. The West Loop (IH 610) in Houston is at the top of the list in the year 2021. Eight of the top 10 roads list from the 2021 and 2020 reports remained in the top 10 for the 2022 report. The two new road sections in the top 10 compared with the 2021 list are:

- IH 345 / US 75 / IH 45 in Dallas – #7 this year, #12 last year
- N Loop W Fwy / IH 610 in Houston - #8 this year, #14 last year

Exhibit 1: 2022 Top 10 Congested Roads in Texas

2022 Report	County	Road segment	From	To	2021/2020 Report
1	Harris	W Loop Fwy / IH 610	Katy Fwy / IH 10 / US 90	Southwest Fwy / IH 69 / US 59	1 / 2
2	Dallas	Woodall Rodgers Fwy / SS 366	US 75	N Beckley Ave	4 / 4
3	Travis	IH 35	US 290 N / SS 69	Ben White Blvd / SH 71	2 / 1
4	Harris	Eastex Fwy / IH 69 / US 59	SH 288	IH 10	5 / 5
5	Harris	Southwest Fwy / IH 69 / US 59	W Loop Fwy / IH 610	South Fwy / SH 288	3 / 3
6	Tarrant	North Fwy / IH 35W / US 287	SH 183	IH 30	9 / 16
7	Dallas	IH 345 / US 75 / IH 45	US 75	SM Wright Fwy / US 175	12 / 24
8	Harris	N Loop W Fwy / IH 610	North Fwy / IH 45	Katy Fwy / IH 10 / US 90	14 / 6
9	Dallas	US 75	LBJ Fwy / IH 635	Woodall Rodgers Fwy / SS 366	7 / 9
10	Harris	Gulf Fwy / IH 45	IH 10 / US 90	S Loop E Fwy / IH 610	6 / 7

All-vehicle delay in the complete list of road sections was up 72 percent from 2020 but remained 28 percent below 2019 delay levels. Truck delay was up 53 percent in 2021 when comparing against 2020 levels but was still 13 percent lower than truck delay experienced in 2019.

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 2022 Texas 100 Most Congested Road Sections data is from **calendar year 2021 (the first pandemic recovery year).** The pandemic continued to have significant effects on traffic volumes and travel patterns across the state; some of the causes for the changes in ranks are discussed below.

The *2022 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 2021 post-pandemic year, sections in the different urban regions across the state were affected by:

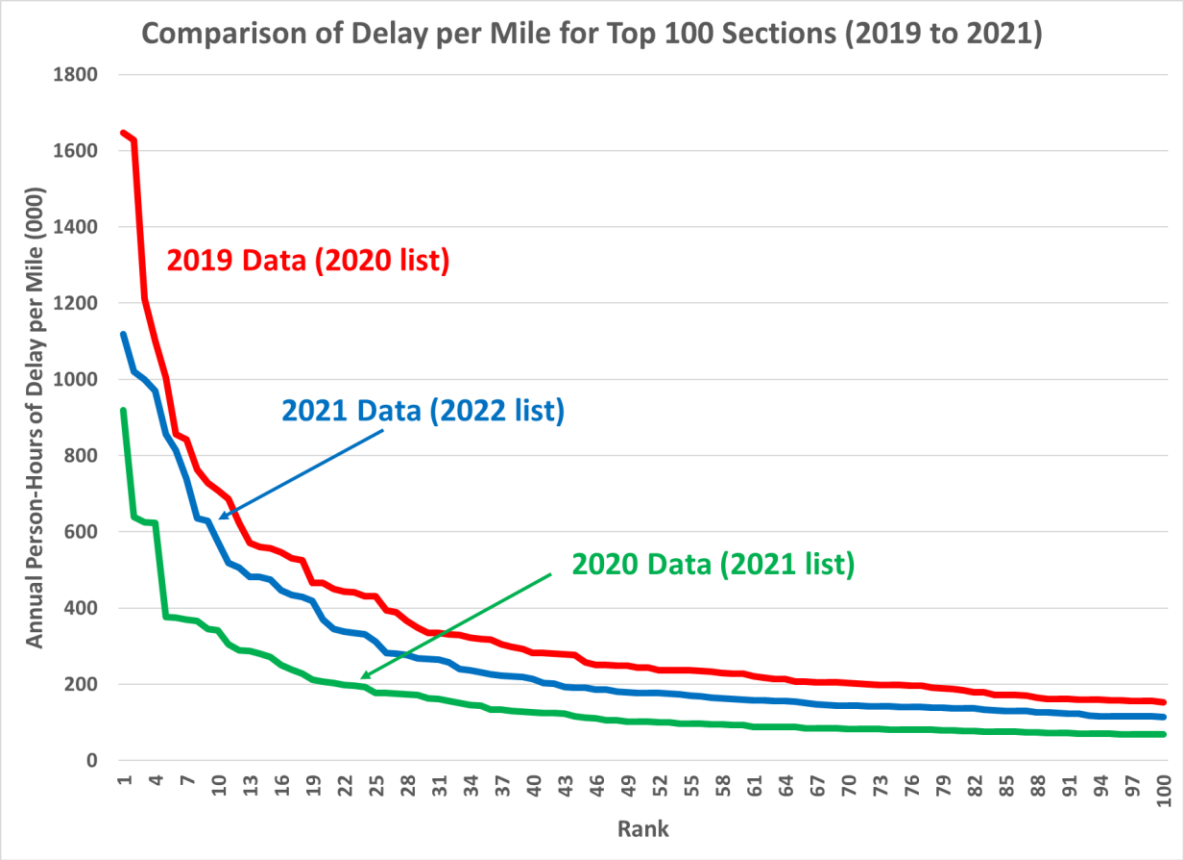
- The composition of the local job market – essential workers had to report to work, office-based workers had more options, and students studied from home for at least part of the year. Most jobs (63 percent) cannot be accomplished at home per a U.S. Bureau of Labor Statistics study last year. The remaining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

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 post-pandemic changes to traffic:

- Auto and truck volume changes (2019 to 2021), 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 100 ranked road sections and demonstrates the dramatic changes between congestion in calendar years 2019, 2020, and 2021. As Texas began the process of recovery from the pandemic the 2021 data shows to be sandwiched between 2019 and 2020 demonstrating that congestion is returning but has not returned to pre-pandemic levels. As the curves flatten around rank 50 in each year, road sections can easily slide along the curve due to occurrence such as a few more vehicles added or subtracted or a nearby construction project affecting travel patterns. Large shifts in ranks can happen more easily and more often in flatter sections of this curve.

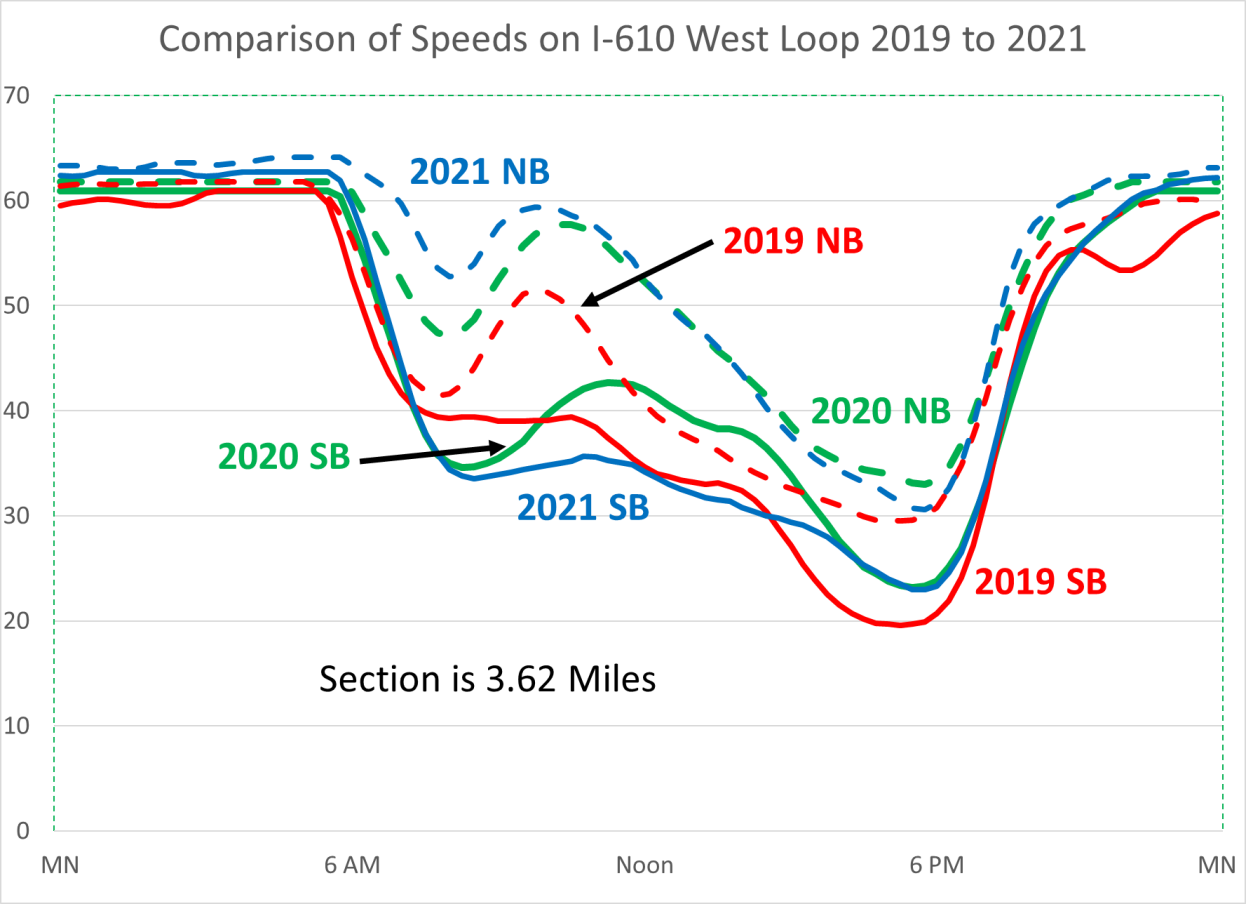
Exhibit 2. Changes Between 2020 and 2022 Texas 100 in Top 100 Sections



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 and 2021 speeds to be 5 to 10 mph faster almost all day in the northbound direction as compared with 2019. The southbound direction shows that the speeds have varied across the three years and some of this could be due to the construction at the IH69/IH610 interchange on the southern end of this road section. 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 could be saving 30 to 60 seconds per mile because of the 2021 speed increase.

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



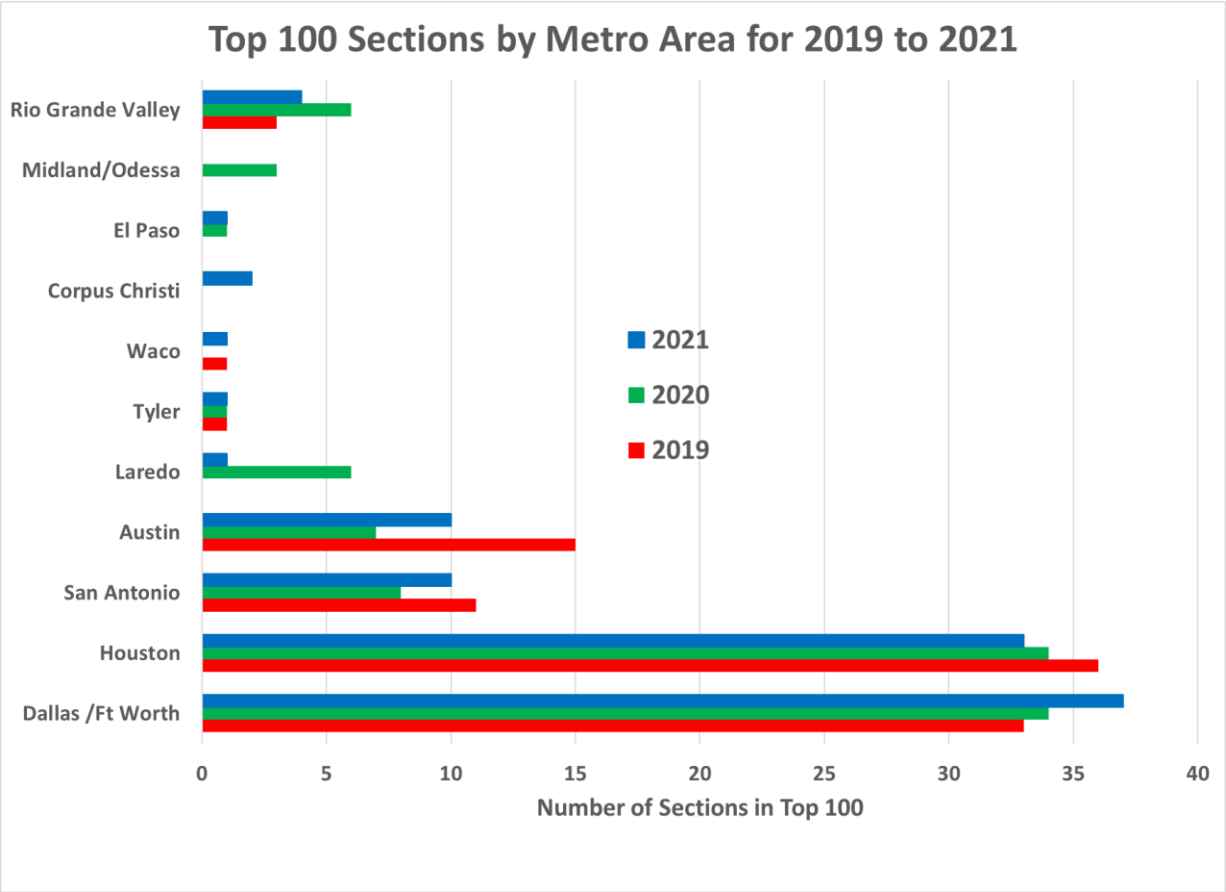
WHAT'S ON THE LIST

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 2022 Top 100 list contains 43 sections that were not in the 2021 Top 100 list. The mix of freeway and arterial street sections remained about the same with 70 of the Top 100 list being freeway sections in 2021 versus 67 in 2020. Both freeways and streets experienced more delay outside of the peak periods in 2021 than in the 2019 pre-COVID year, likely due to higher work-at-home levels and schools doing remote learning. Peak period freeway delay fell from 66 percent to 56 percent of all freeway delay. Peak period arterial street delay fell from 41 percent to 39 percent of all arterial street delay. Midday and weekend delay rose from 48 percent in 2019 to 54 percent of all annual delay in 2021.

Exhibit 4 displays a comparison of the number of road sections in the Top 100 list in the 2019 through 2021 data. Dallas/Fort Worth has added a few more sections since 2019 while Houston has lost a few in the Top 100. Austin has had the greatest loss in Top 100 section with 5 fewer in 2021 than 2019. Only one area, Corpus Christi, had a section in 2021 but not the earlier year. Midland/Odessa did not have a section in the Top 100 in 2021.

Exhibit 4. Top 100 Sections in Texas 100 by Metro Area for 2019 to 2021



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 34 most congested roadways are in these four metro regions, and 45 of the top 50.
- 90 of the top 100 congested sections are in these four metro regions (83 in 2020, 95 in 2019).
- 165 of the top 200 are in the four largest metro regions (163 in 2020, 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 and this carried over into 2021. 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, high-density development that has occurred along Westheimer Road in Houston between SH-6 and IH-610 is one reason that this segment of road is ranked in the top 25 on the 2021 list. That kind of change can send a roadway to a higher position on the list in a short period of time.

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 such as 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.

The changes in travel and congestion levels during the 2021 COVID-19 pandemic recovery year were massive and varied tremendously from corridor to corridor and region to region. The "congestion recovery" to pre-pandemic levels may take a few years in many of the corridors, 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?
- How will freight travel patterns change in a post-pandemic world? How will that impact congestion and traffic flow going forward?

Congestion analysis of 2021 data shows the return of 2019 congestion levels occurring but at different rates across corridors and regions. In some ways, 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 2022 data suggests that the economy and congestion continue to rebound,

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 2021 pandemic recovery 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. Travel was back to pre-pandemic levels in 45 of the Top 100 road sections and delay per mile was nearing 2019 levels in many of the most congested section.

All-vehicle delay in the complete list of road sections was up 72 percent from 2020 but remained 28 percent below 2019 delay levels. Truck delay was up 53 percent in 2021 when comparing against 2020 levels but was still 13 percent lower than truck delay experienced in 2019.

In a typical Top 100 list, about 15 to 20 road sections may jump up into the Top 100 for at least a year; in the 2021 list this number was 27 sections when compared with 2019 and 43 sections when compared with 2020. There were fewer of the Top 100 sections outside of the four large metro regions in 2021 – 10 compared with 17 in 2020 and five in 2019. As noted, there are many potential reasons for these changes in a pandemic recover year whether it is due to local labor markets, truck traffic, or work-from-home effects as well as many others. Temporal and spatial traffic patterns were still adjusting in 2021 compared to the 2019 pre-pandemic year.

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

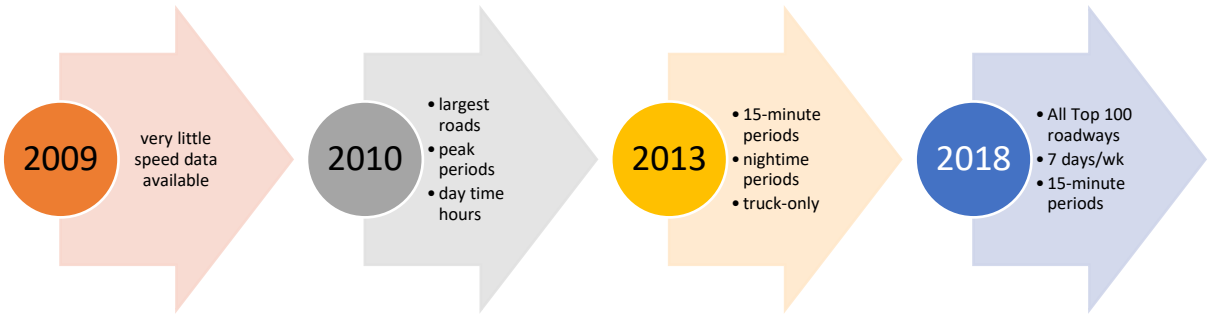
APPENDIX A. METHODOLOGY & DEFINITIONS

How has the Methodology Changed Over the Years?

Twelve 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 – 2022 Method*.

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.