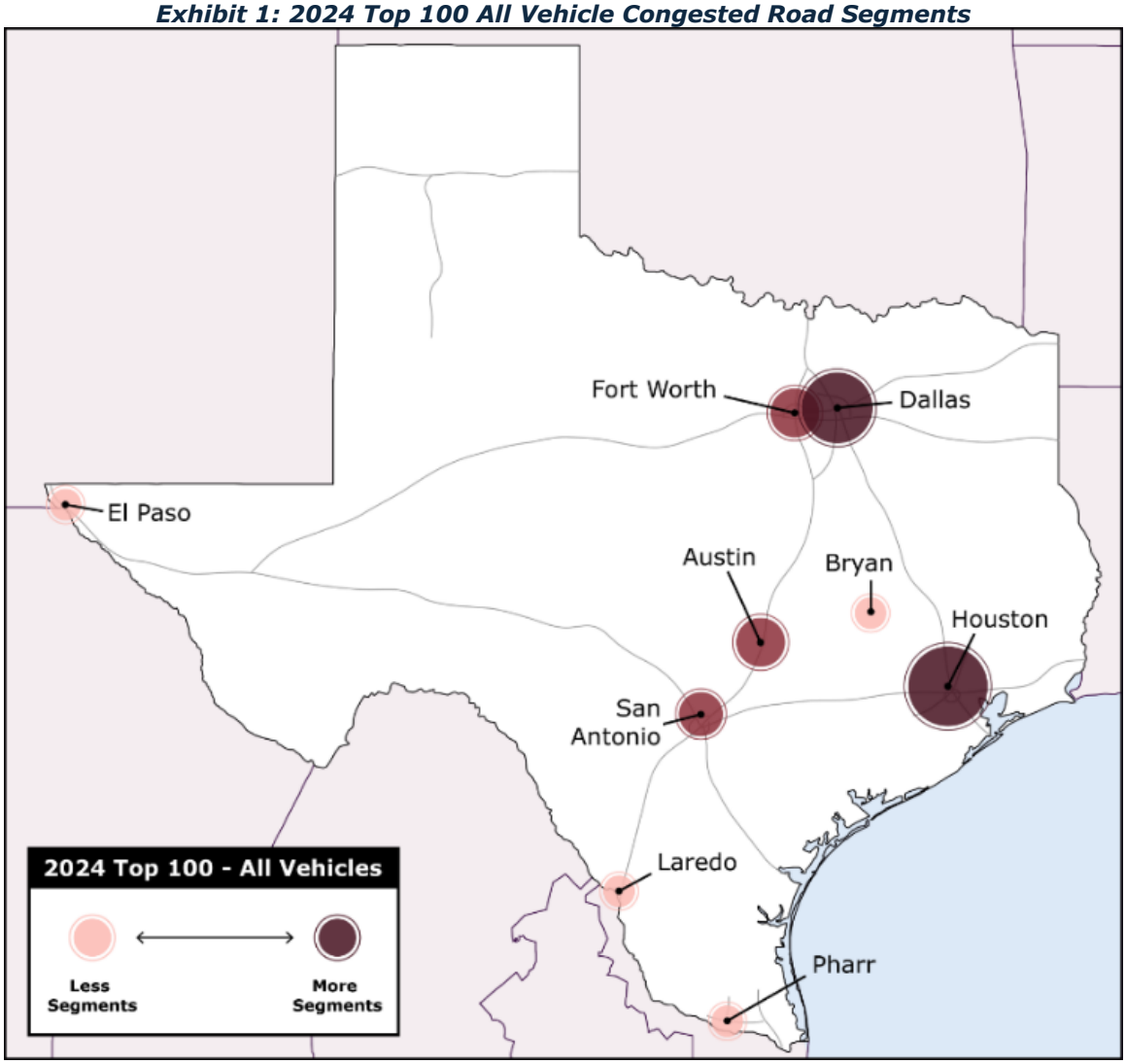
2024 Top 100 Congested Road Segments

Introduction/Summary

In response to urban roadway congestion, in 2009, the Texas Legislature mandated that the Texas Department of Transportation (TxDOT) annually produce a ranked list of the most congested road segments in the state. Since that time, the goal of the Top 100 Congested Road Segments analysis has been 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 used in the Top 100 Congested Road Segments ranking quantifies how much additional 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 analysis evaluates the number of extra hours of travel time (also called 'delay') travelers experience on more than 2,100 road segments covering over 10,000 miles. The 2024 Top 100 Congested Road Segments reports on 2023 calendar year conditions. Overall, vehicle (e.g., autos, trucks, buses, etc.) congestion across all monitored road segments was 21% higher in 2023 compared to 2022, and vehicle miles traveled (VMT) was up by 5%. Truck delay across all monitored segments was up 8% during that time.

The 2024 Top 100 Congested Road Segments Report is a list of all 2,100 monitored road segments ranked by delay per mile, while the "top 100" refers to the 100 highest ranked road segments on this list. As shown in Exhibit 1, heavily traveled and economically important corridors in the metropolitan areas are still among the most congested. In fact, 94 of the top 100 all vehicle segments are in Austin, Dallas-Fort Worth, Houston and San Antonio. Because of the significant delay values in the most congested segments and the time it takes to implement solutions to address a congested roadway, the overall list changes little from year to year. There were some changes in rankings this year due to re-segmenting of road segments that took place at the request of districts due to changes in traffic patterns. Re-segmentation is discussed in more detail later in this report. Overall, vehicle congestion was up about 8% across the top 100 segments in 2023, VMT was up about 5%, and truck delay was down 5%.

Exhibit 1: 2024 Top 100 All Vehicle Congested Road Segments



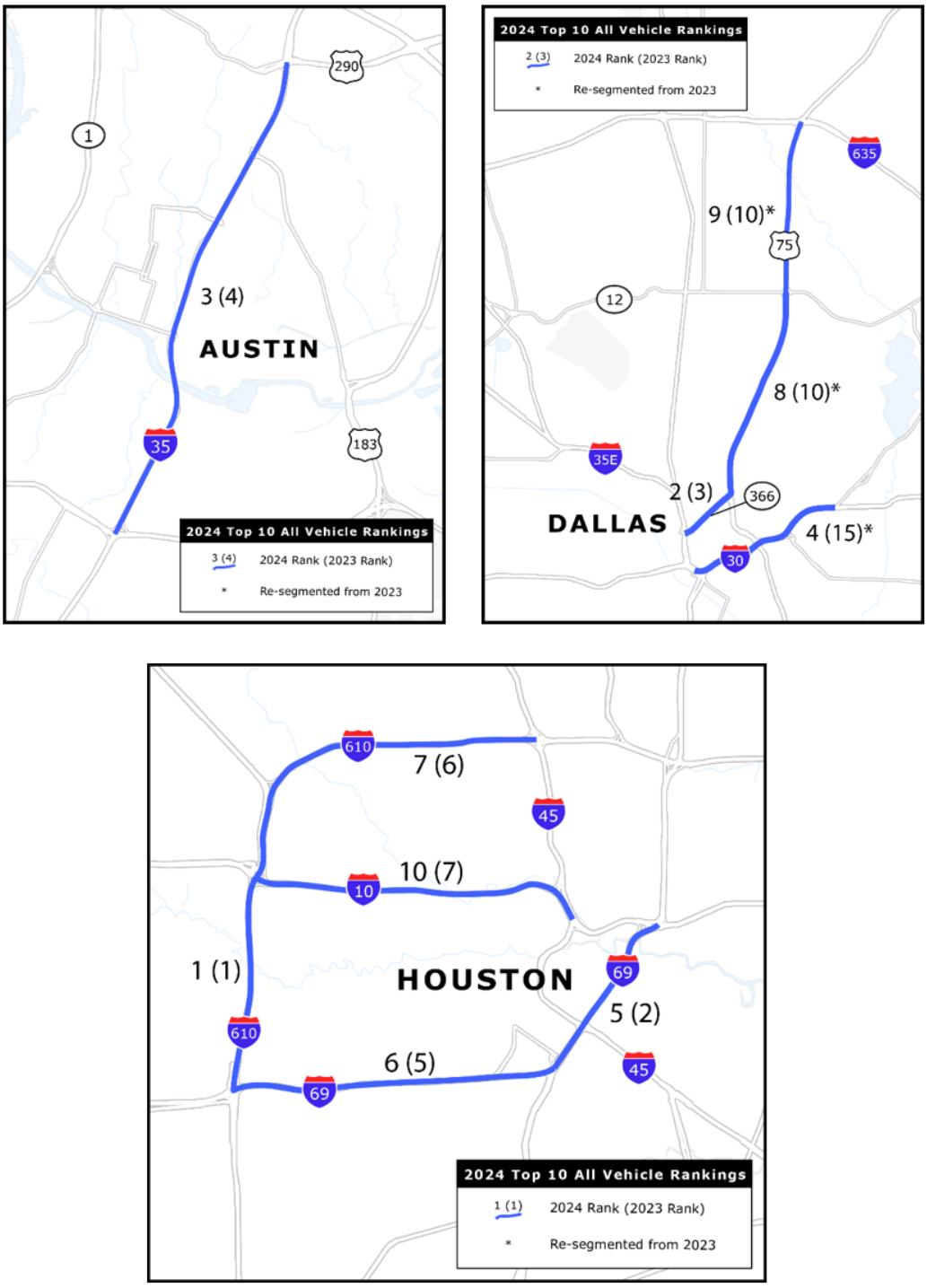
The 10 most congested road segments for the 2024 report are listed in Exhibit 2 and shown in Exhibit 3. The West Loop (Interstate [I] 610) in Houston is at the top of the list again this year. Eight of the top 10 roads from the 2023 Top 100 Congested Road Segments Report and seven from the 2022 Top 100 Congested Road Segments Report remain in the top 10 for the 2024 report. U.S. 75 in Dallas has been in the top 10 for seven years and occupies two spots on the list this year after being re-segmented. The new road segment in the top 10 compared with last year's list is E R. L. Thornton Freeway (Fwy)/I-30/U.S. 67 in Dallas, ranked #4 this year; this road segment was ranked #15 last year, although this was a corridor that was re-segmented since the 2023 Top 100 Congested Road Segments Report. Two segments that saw significant improvement in delay and dropped out of the top 10 are North Fwy/I-35W/US 287 from SH 183 to I-30 in Fort Worth and Gulf Fwy/I-45 from I-10/U.S. 90 to S Loop E Fwy/I-610 in Houston.

Exhibit 2: 2024 Top 10 All Vehicle Congested Road Segments

2024 Rank	County	Road Segment	From	To	23/22/21 Rank
1	Harris	W Loop Fwy/I-610	Katy Fwy/I-10/ U.S. 90	Southwest Fwy/ U.S. 59/I-69	1/1/2
2	Dallas	Woodall Rodgers Fwy/State Highway Spur (SS) 366	U.S. 75	N Beckley Ave	3/2/4
3	Travis	I-35	U.S. 290N/SS 69	Ben White Blvd/State Highway (SH) 71	4/3/2
4	Dallas	E R.L. Thornton/ I-30/U.S. 67	Jefferson Viaduct	East Grande Ave/SH 78	15/11/13[#]
5	Harris	Eastex Fwy/ I-69/U.S. 59	SH 288	I-10	2/4/5
6	Harris	Southwest Fwy/ I-69/U.S. 59	W Loop Fwy/I-610	South Fwy/SH 288	5/5/5
7	Harris	N Loop W Fwy/ I-610	North Fwy/I-45	Katy Fwy/I-10/ U.S. 90	6/8/14
8	Dallas	U.S. 75	Northwest Hwy/State Highway Loop (SL) 12	Woodall Rodgers Fwy/SS 366	10/9/7[#]
9	Dallas	U.S. 75	Lyndon B. Johnson Fwy/I-635	Northwest Hwy/ SL 12	10/9/7[#]
10	Harris	Katy Fwy/I-10/ U.S. 90	W Loop N Fwy/ I-610	North Fwy/I-45	7/13/16

[#]Re-segmented in 2024, prior rankings for segment that included this segment.

Exhibit 3: 2024 Top 10 All Vehicle Congested Road Segments



The top 10 congested road segments for trucks in the 2024 report are listed in Exhibit 4 and shown in Exhibit 5. I-35 in Austin reclaims the top spot, up from third last year after being at the top in 2021 and 2022. Nine of the top 10 road segments remained in the top 10 from the previous report. The new road segment in the 2024 top 10 congested roads for trucks is Airport Fwy/SH 121 from Airport Fwy/SH 183 to NE Loop 820/I-820, which was re-segmented. One segment that saw significant

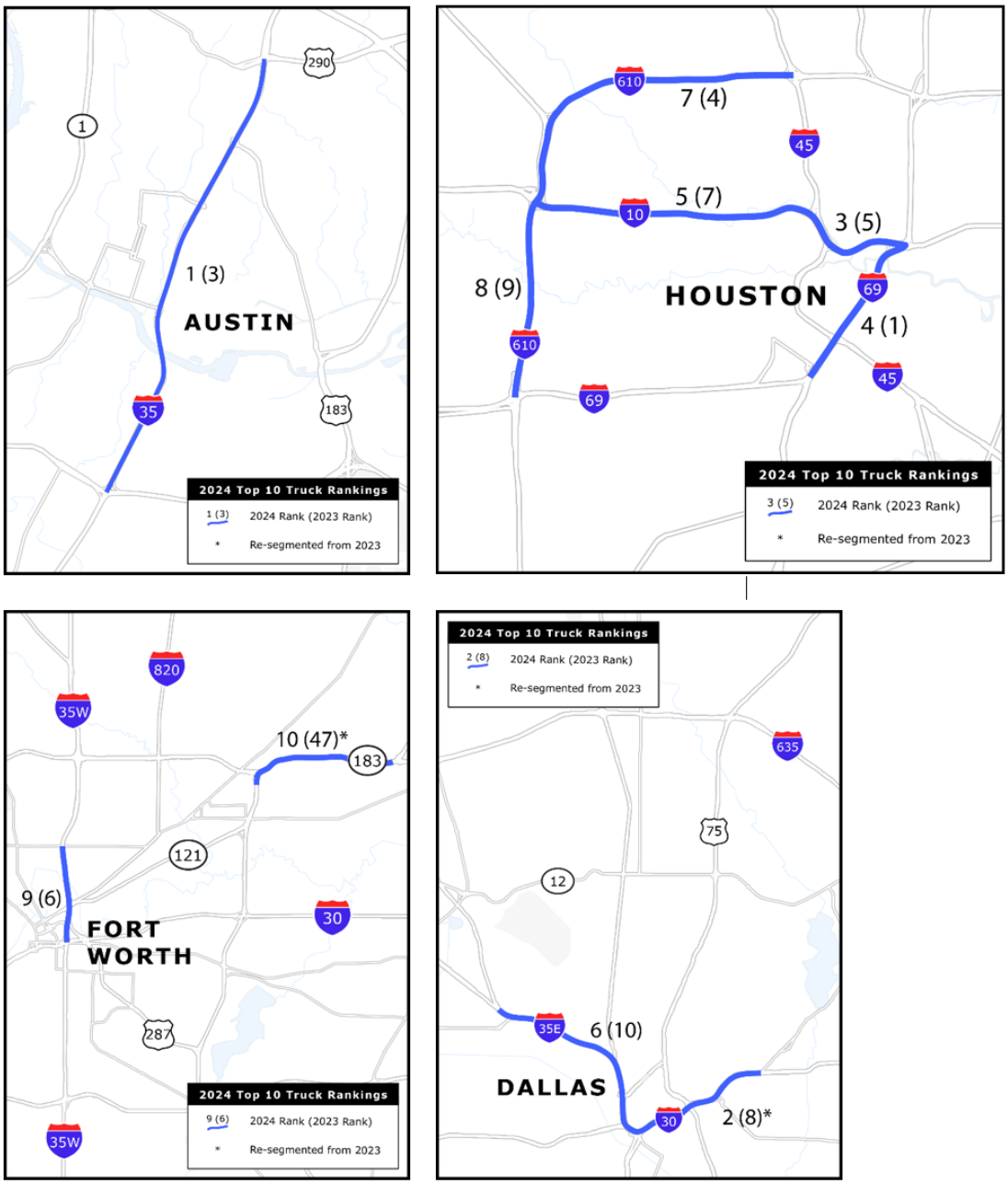
improvement in delay and dropped out of the top 10 was Mines Road/FM 1472 from Pan American Blvd to Bob Bullock Loop/SL 20 in Laredo.

Exhibit 4: 2024 Top 10 Truck Congested Road Segments

2024 Rank	County	Road Segment	From	To	23/22/21 Rank
1	Travis	I-35	U.S. 290N/SS 69	Ben White Blvd/ SH 71	3/1/1
2	Dallas	E RL Thornton Fwy/I-30/ U.S. 67	Jefferson Viaduct	East Grande Ave/ SH 78	8/9/15[#]
3	Harris	I-10/U.S. 90	North Fwy/I-45	Eastex Fwy/I-69/ U.S. 59	5/8/12
4	Harris	Eastex Fwy/ I-69/U.S. 59	SH 288	I-10	1/2/4
5	Harris	Katy Fwy/I-10/U.S. 90	W Loop N Fwy/ I-610	North Fwy/I-45	7/4/22
6	Dallas	Stemmons Fwy/ I-35E/U.S. 77	John W. Carpenter/SH 183	Tom Landry Fwy/I-30	10/14/7
7	Harris	N Loop W Fwy/ I-610	North Fwy/I-45	Katy Fwy/I-10/ U.S. 90	4/6/10
8	Harris	W Loop N Fwy/ I-610	Katy Fwy/I-10/ U.S. 90	Southwest Fwy/ I-69/U.S. 59	9/7/3
9	Tarrant	North Fwy/ I-35W/U.S. 287	SH 183	I-30	6/3/2
10	Tarrant	Airport Fwy/ SH 121	Airport Fwy/SH 183	NE Loop 820/I-820	47,106/ 123[#]

[#]Re-segmented in 2024, prior rankings for segment that included this segment

Exhibit 5: 2024 Top 10 Truck Congested Road Segments



Top 100 Congested Road Segments Network Re-Segmentation

Prior to the generation of the 2024 Top 100 Congested Road Segments Report, TxDOT districts were provided an opportunity to request re-segmentation of existing segments within their district. A total of 15 such requests were received from districts. Considering time constraints of finalizing the 2024 top 100 congested road segments, segments that could potentially impact the list were reviewed and considered for re-segmentation prior to completion of the 2024 Top 100 Congested Road Segments Report. Remaining requests will be considered for re-segmentation in preparation for the 2025 Top

100 Congested Road Segments Report. Detailed information about re-segmentation is included in Appendix C.

What Are the Influencing Factors That Put Road Segments on the List?

Economic Vitality

The most enduring trend since 2009 has been growth in population, jobs, travel demands and traffic volume. Traffic congestion may be an inevitable result of growth, but the increase in delay and travel time may not be considered reasonable by the traveling public.

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. That kind of change can send a roadway to a higher position on the list in a short period of time.

Construction

Of the top 100 most congested segments, 46 experienced at least two months of construction in 2023. Construction on a road, or on a nearby road, can impact congestion. Large construction projects often cause congestion on the road where the project is being built and nearby roadways. 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, traffic shifts to connecting roads and they become congested.

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 is 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-610W 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

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 traffic, 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.

All Vehicle Trends

Congestion is widespread, but its relevance can be subjective. What is considered very congested in small cities might be considered acceptable in larger cities. To demonstrate these contextual differences, this study tracks roughly 2,100 road segments across the state, in urban and suburban areas, including at least 18 segments (60 miles) in each of the 25 Texas metro areas.[1] 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 2024 top 100 road segments list contains 12 segments that were not in the 2023 top 100 list. More arterial street segments entered the list this year, with 75 of the top 100 list being freeway segments in 2024 compared to 85 in 2023. Freeways experienced more delay during the peak periods in 2023 than in 2022. Peak period freeway delay rose from 62% to 69% of all freeway delay. Peak period arterial street delay also rose from 44% to 50% of all arterial street delay. Weekend delay as a percentage of total delay increased for arterial streets and stayed the same for freeways in 2023.

Exhibit 6 displays a comparison of the number of road segments in the top 100 in the 2019–2023 data years by district. Of the top 100 congested segments, 94 are in the major metro area districts. Dallas and Fort Worth have added segments since 2019. Houston gained some segments that were lost last year but has fewer than 2019. Austin has fewer in 2023 than it did in 2022 or 2019. Corpus Christi, Odessa and Waco have had segments drop in and out of the top 100 list over the last five years. Bryan is new to the list this year.

[1] *See map on the Texas A&M Transportation Institute website (https://mobility.tamu.edu/texas-most-congested-roadways/) for the urban regions.*

Exhibit 6: Top 100 Segments by District from 2019 to 2023

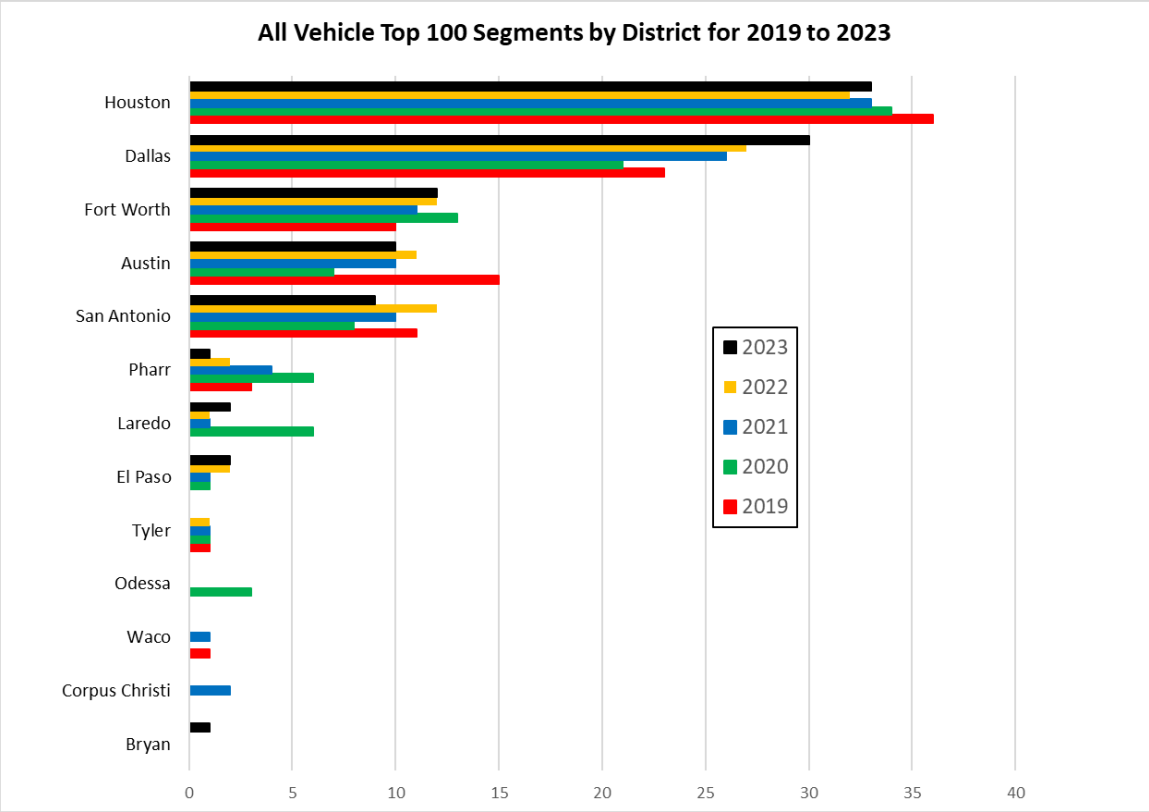


Exhibit 7 shows the top 100 road segment delay per mile for the years 2019 through 2023. As the curves in the exhibit flatten on the right side of the graph and the rank increases, road segment rankings can easily shift due to small changes such as traffic volume changes, speed variations, or road construction on the segment or nearby roadways.

Exhibit 7: 2024 All Vehicle Delay per Mile for Top 100 Segments

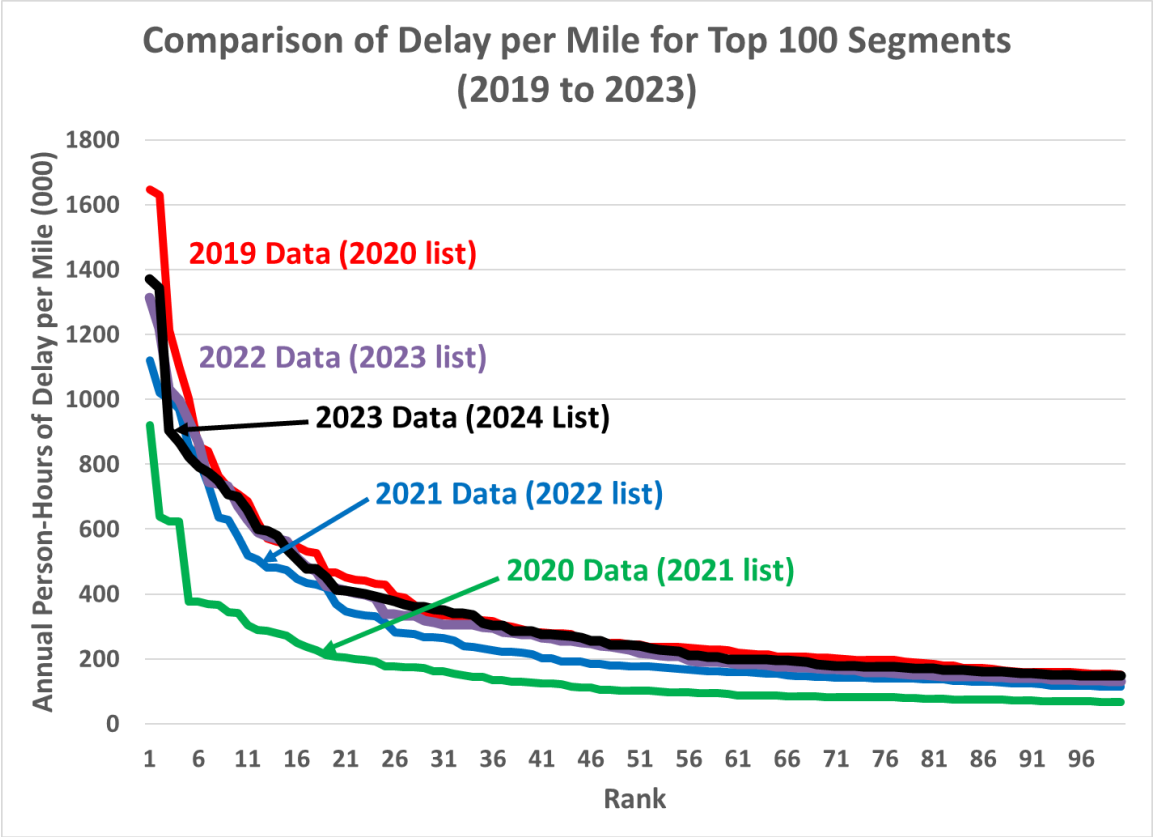


Exhibit 8 shows a comparison of annual person-hours of delay and average daily VMT on all monitored road segments and demonstrates the changes between congestion in calendar years 2017 through 2023. The 2023 data show that delay and VMT are increasing but have not returned to peak 2017 levels.

Exhibit 8: 2024 All Vehicle Trends for All Monitored Segments

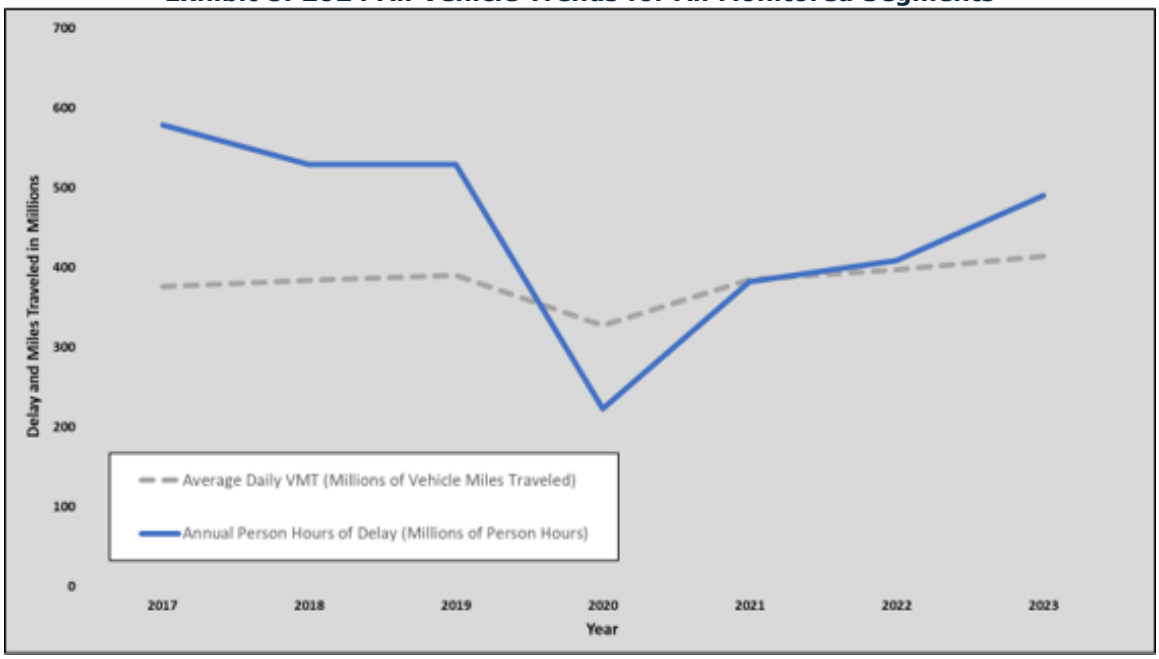


Exhibit 9 includes a comparison of the 2019 and 2023 VMT and delay, and how this equates congestion costs in total and to individual commuters. This analysis shows that across all monitored segments commuters are spending less time in traffic than they did in 2019. In looking at all monitored roadway segments, VMT was up 7% from 2019, and delay was down 7%. There is a similar trend for most districts throughout the state. District VMT increases ranged from 3% to 16% since 2019, while most districts saw a decrease in delay during that time. Dallas District (up 1% since 2019) and Fort Worth District (up 22% since 2019) are the only districts that have seen an increase in delay, but both districts have seen double digit increases in VMT during that time.

Across the state, on average, a commuter making a 20-mile commute saw a decrease of $125 in fuel and vehicle operating costs compared with 2019. The cost per commuter ranged from a decrease of $323 per commuter per year in Austin to an increase of $39 per commuter per year in Fort Worth.

Exhibit 9: Comparing 2019 and 2023 Conditions for All Vehicles

Area	Vehicle – Miles of Travel	Annual Hours of Delay	Total Annual Hours of Delay (M Hours)	Congestion Cost Savings ($M)	Annual Savings per Commuter[1]
Top 100	+7%	−1%	−1.5	+$39	+$117
Austin District[2]	+6%	−21%	−14.6	$387	+$323
Dallas District[2]	+13%	+1%	+1.3	−$35	+$99
Ft Worth District[2]	+9%	+22%	+8.8	−$234	−$39
Houston District[2]	+3%	−9%	−16.1	+$426	+$151
San Antonio District[2]	+4%	−12%	−5.5	+$145	+$129
Other Districts[2]	+4%	−11%	−8.5	+$225	+$93
All Monitored Segments[2]	+7%	−7%	−34.5	+$915	+$125

[1] *Assumes a 20-mile commute, five days a week.*

[2] *Includes all monitored road segments.*

The 2023 data also show significant decreases in delay and annual savings to commuters at the individual project level. Exhibit 10 shows three key Texas Clear Lanes (TCL) projects that benefitted four top 100 segments, with changes in VMT, delay and dollars saved per commuter. Delay was significantly decreased for all impacted top 100 segments because of these projects; in cases where VMT decreased, delay decrease was much greater. On these segments commuters saved between $115 and $660 per year in fuel and vehicle operating costs.

Exhibit 10: Comparing 2019 and 2023 Conditions for Significant Projects on Top 100 Segments

TCL Project/ Top 100 Segment	District	TCL Project	Top 100 Rank, [highest prior rank]	Top 100 Segment Length (mi)	Vehicle – Miles of Travel	Annual Hours of Delay	Annual Savings per Commuter [1]
Southern Gateway/ I-35E – I-30 to U.S. 67[2]	Dallas	2	312, [17]	4.6	+17%	−60%	$115
Southern Gateway/I-30 – SL 12 W to Jefferson Viaduct[3]	Dallas	2	224, [11]	6.4	−9%	−47%	$129
U.S. 281 Phase 2/ U.S. 281– Borgfield Road to Stone Oak Pkwy[2]	San Antonio	6	2084, [44]	4.3	−23%	−100%	$660
I-35–U.S. 79 to SH 45 SB/ I-35–1431 to SH 45[2]	Austin	7	70, [19]	5.5	−6%	−54%	$271

1 Assumes commute through the corridor both directions, five days a week.

2 Direct benefit from improvement on segment.

3 Indirect benefit from improvement near segment.

Truck Top 100 Road Segments

Exhibit 11 shows a comparison of truck travel delay per mile (the amount of yearly extra travel time for each roadway mile) for the truck top 100 ranked segments and shows the changes between delay per mile in calendar years 2019 to 2023. There are a few segments each year (usually the same ones) where congestion is much worse than on other roads; the roads on the left side of the graph are among the most congested in the country. The 2023 curve remains at or above the 2019 curve after the few highest ranked segments, indicating that the truck delay for 2023 surpassed the 2019 values. The 2023 curve closely mirrors the 2022 curve after about the first 15 segments, but it is below the 2022 curve near the top of the list. Road segments ranked above 50, to the right in the graph, have similar congestion levels, making it easier to change ranks with a few more vehicles added or subtracted, a nearby construction project starting or finishing, or even because the segment did not

lose as much traffic during the pandemic as similar roads in other cities. As in Exhibit 3, large shifts in ranks can happen more easily and more often in the flatter part of the curve.

Exhibit 11: Changes in Delay per Mile from 2019 to 2023 in Truck Top 100 Segments

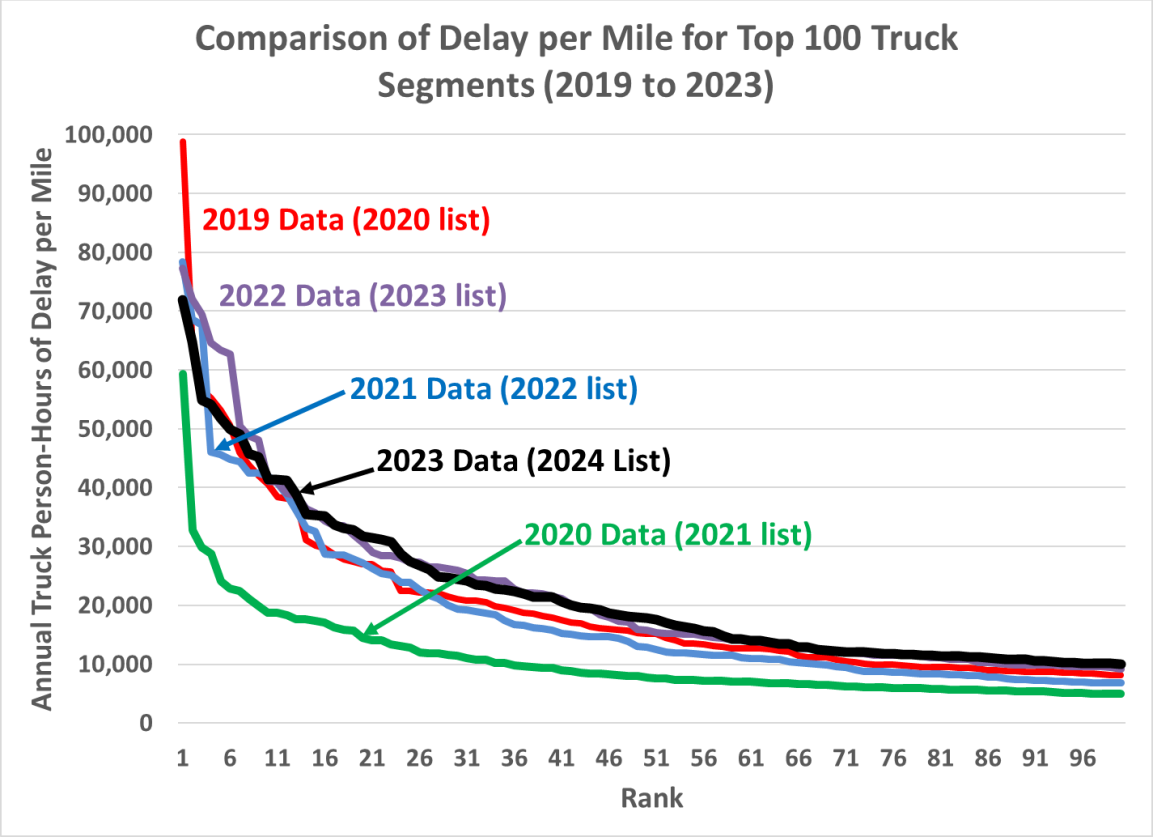
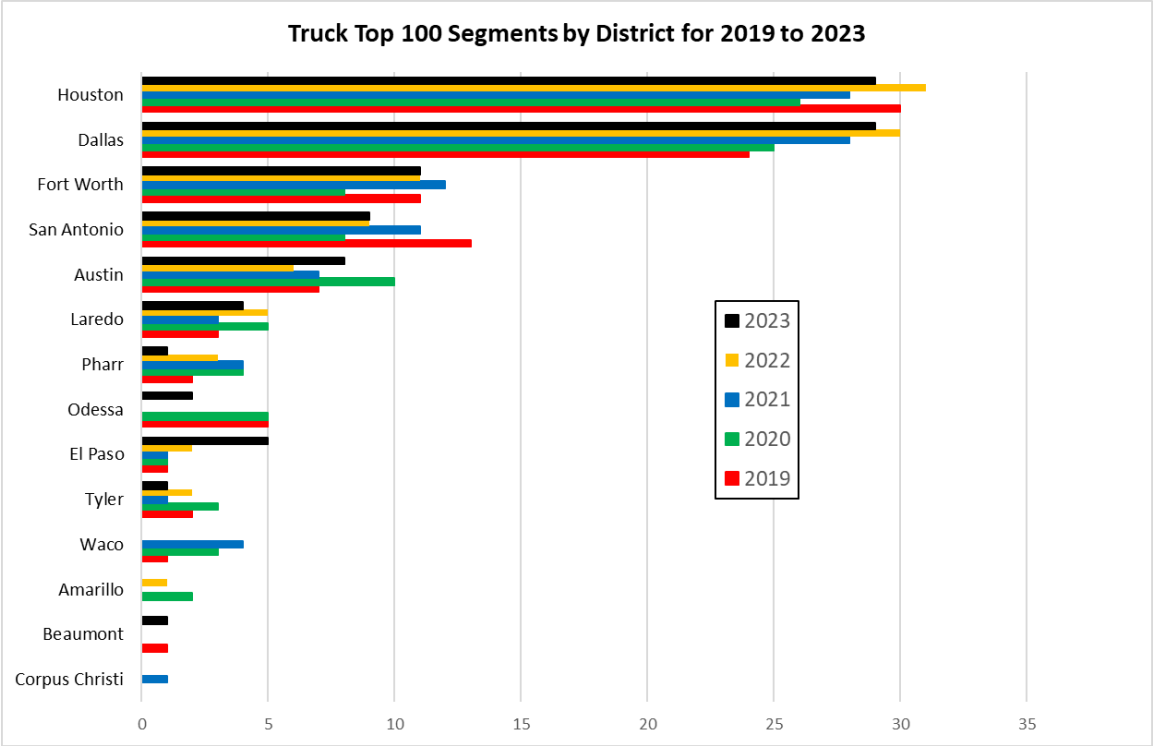


Exhibit 12 displays a comparison of the number of road segments per district in the truck top 100 between calendar years 2019 and 2023. Of the top 100 congested segments, 85 are in the major metro area districts. Dallas and Houston have fewer truck top 100 segments in 2023 than in 2022. San Antonio and Fort Worth remained the same, while Austin gained three segments compared to 2022. One area, Beaumont, was new to the truck top 100 in 2023. Corpus Christi, Amarillo and Waco did not have a truck top 100 segment in 2023, but had at least one segment ranked in the top 100 at one time in the previous four years.

Exhibit 12: Truck Top 100 Segments from 2019 to 2023 by District



Conclusion

The 2024 Top 100 Most Congested Road Segments Report adds another important year of data that provide an overview of the congestion trends on Texas' most congested roads. The data collected in 2023 indicate that traffic and delay are increasing.

All-vehicle delay was up 21% across the 2,100 monitored segments of the state compared to last year and up 8% for the top 100 road segments. Truck delay was up 8% over last year but was down 5% for top 100 road segments. In a typical top 100 list, about 15 to 20 road segments may jump up into the top 100 for at least a year; in the 2024 Top 100 Congested Road Segments Report, this number was 12. As was the case last year, six of the top 100 segments were outside of the four large metro regions in 2023 — compared with 10 in 2021, 17 in 2020 and five in 2019. As noted, there are many potential reasons for these changes.

Levels of delay for trucks were lower in the truck top 100 road segments by 5% from 2022. Overall truck delay in the complete list of road segments monitored throughout the state was up 8% in 2023 when compared with 2022 levels.

Annual delay is still well below peak levels from 2017 to 2019 even though VMT is higher than it was at that time. Therefore, more traffic is on the road with less delay than five to seven years ago due to efforts such as TCL and measures that districts are taking to mitigate delay on their roadways.

The detailed data in this report neither show what specifically is causing the congestion on a given segment 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 TCL will continue to play a key role in addressing some of the major chokepoints in the transportation system in Texas.

Sources

1. U.S. Bureau of Labor Statistics. https://www.bls.gov/opub/mlr/2020/article/ability-to-work-from-home.htm

Appendix A: Additional Details for a Few Selected Road Segments

This appendix shows examples of changes in travel speed throughout the day for select segments of road that experienced changes in delay per mile between 2023 and 2024 Top 100 Congested Road Segments reports.

An example of a freeway segment that saw an increase in delay was the segment of Stemmons Fwy/I-35E/U.S. 77 from John W. Carpenter/SH 183 to Tom Landry Fwy/I-30.

Exhibit A-1 shows the average speed by hour of the day for Stemmons Fwy/I-35E/U.S. 77 for both northbound and southbound directions for 2022 and 2023. Looking at the speed curves, there is a noticeable decrease in the peak hour speeds on average compared to last year for the southbound direction during the morning and midday periods. There is a TCL project planned to expand this segment of Stemmons Fwy. Exhibit A-2 depicts the annual values for delay per mile and the cost of congestion over the last four years, showing an approximately 19% increase in delay from 2022 to 2023.

Exhibit A-1: Speed Profile for Stemmons Fwy/I-35E/U.S. 77 from John W. Carpenter/SH 183 to Tom Landry Fwy/I-30

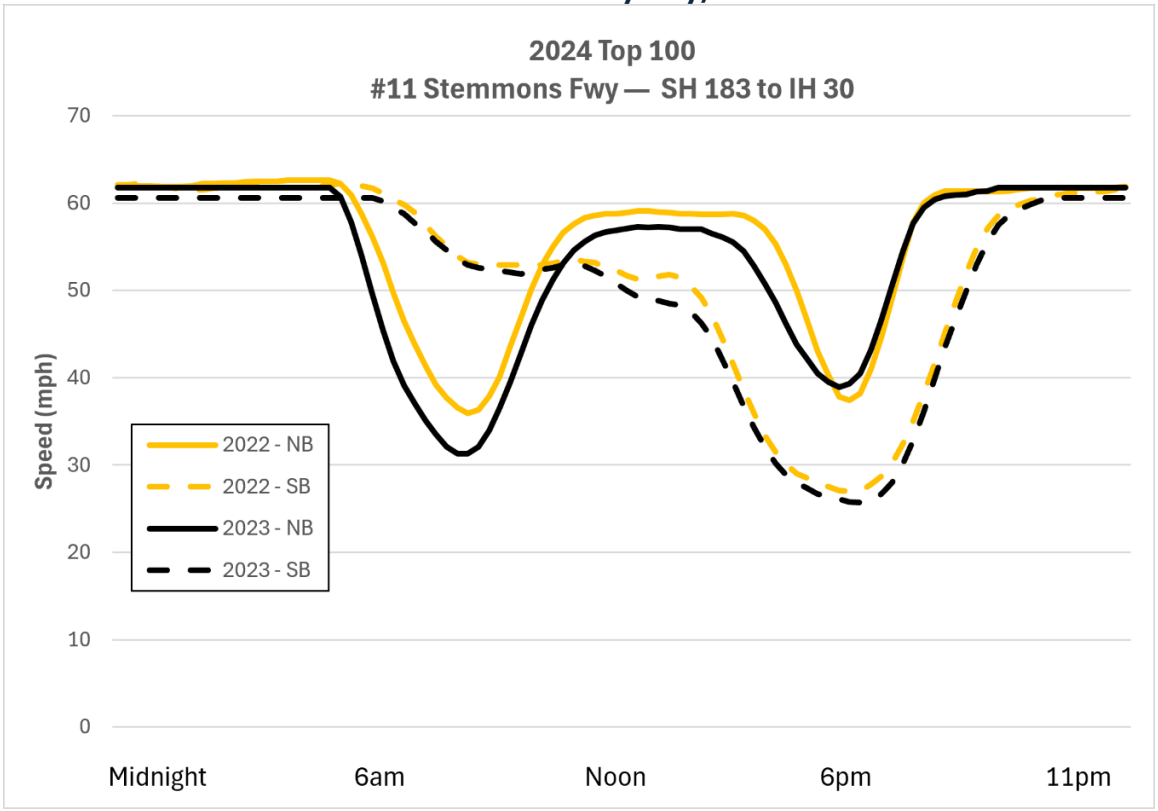


Exhibit A-2: Annual Values for Stemmons Fwy/I-35E/U.S. 77 from John W. Carpenter/SH 183 to Tom Landry Fwy/I-30

Year	Delay per Mile (All Vehicles)	Delay per Mile (Trucks)	All Congestion Cost ($)	Truck Congestion Cost ($)
2023	699,603	49,842	$102,662,683	$18,620,692
2022	588,990	41,046	$84,798,397	$14,144,293
2021	506,012	33,075	$69,487,246	$10,971,154
2020	365,539	22,440	$42,097,099	$6,063,562

An example of a freeway segment that dropped in the rankings this year was the Austin segment of I-35 from Ranch to Market (RM) 1431 to Louis Henna Boulevard. I-35 dropped from #20 to #70.

Exhibit A-3 displays the daily speed profiles for I-35 from 2022 and 2023. Throughout the entire day there was a significant increase in southbound speeds, especially during the middle of the day. Exhibit A-4 depicts the annual values for delay per mile and the cost of congestion over the last four years, which includes an over 50% reduction in delay and congestion costs from 2022 to 2023.

Exhibit A-3: Speed Profile for I-35 from RM 1431 to SH 45/Louis Henna Blvd

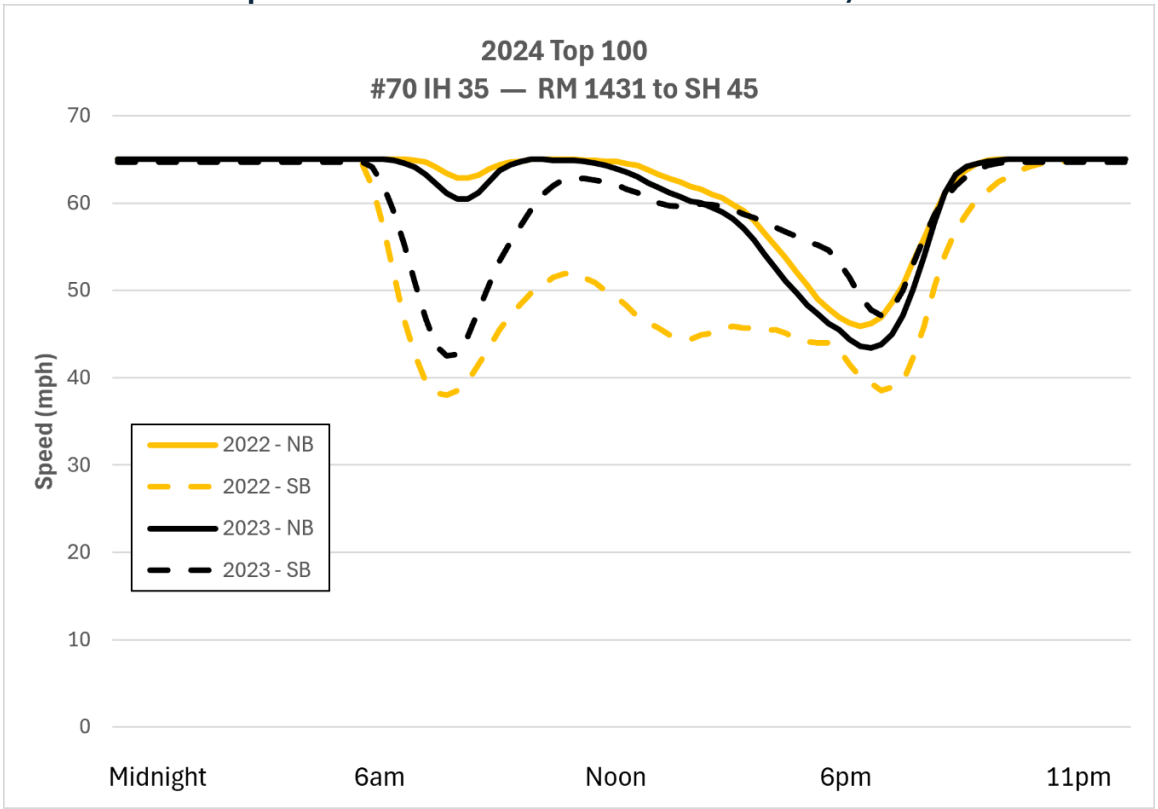


Exhibit A-4: Annual Values for I-35 from RM 1431 to SH 45/Louis Henna Blvd

Year	Delay per Mile (All Vehicles)	Delay per Mile (Trucks)	All Congestion Cost ($)	Truck Congestion Cost ($)
2023	193,915	18,353	$29,668,500	$6,846,945
2022	417,822	40,910	$63,324,543	$14,040,477
2021	417,726	35,975	$59,079,261	$11,682,381
2020	162,152	17,663	$20,096,434	$4,696,900

Some arterial roads also had significant delay time changes in 2023. Mines Road in Laredo is an example. Last year this segment was ranked #25, and it moved down to #63. Exhibit A-5 presents the average daily speed profiles in 2022 and 2023 for Mines Road between Pan American Boulevard and Bob Bullock Loop. While this southbound direction was mixed throughout the day, comparisons between 2022 and 2023 northbound speeds were noticeably higher for most of the day. Exhibit A-6 depicts the annual values for delay per mile and the cost of congestion over the last four years, which shows a reduction in delay of more than one-third.

Exhibit A-5: Speed Profile for Mines Rd Between Pan American Blvd and Bob Bullock Loop

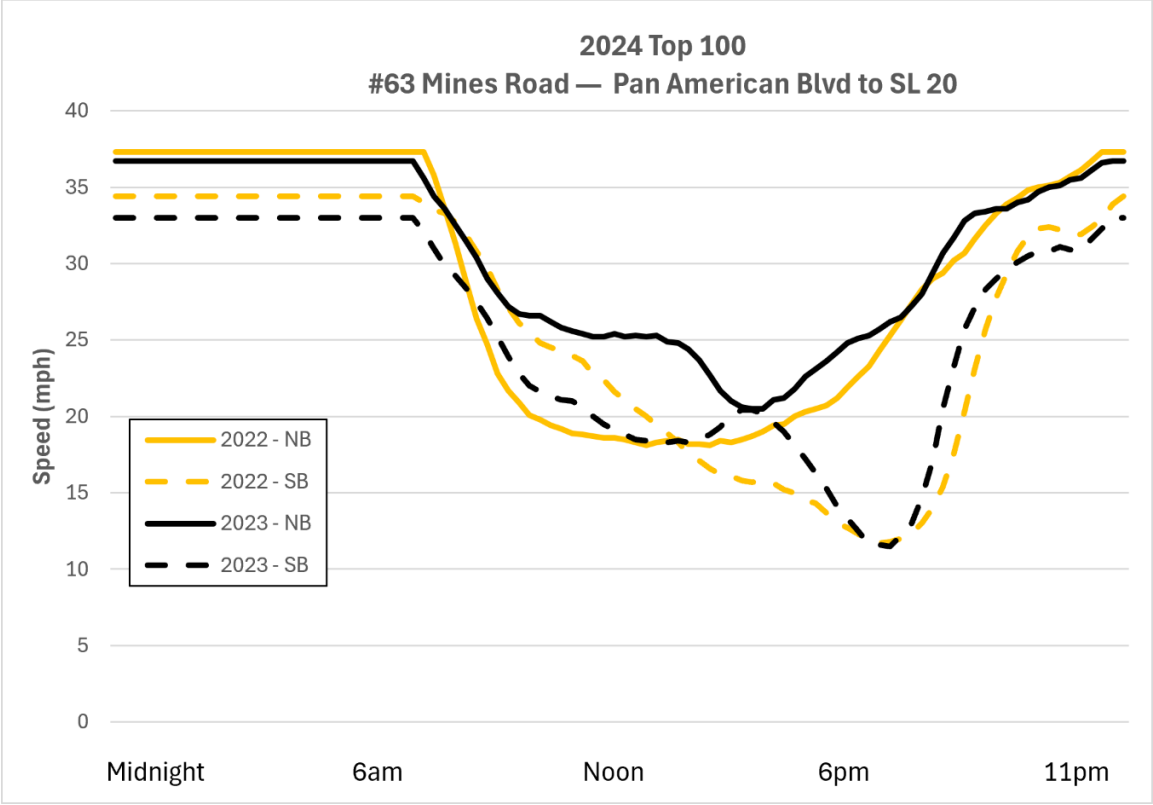


Exhibit A-6: Annual Values for Mines Rd from Pan American Blvd and Bullock Loop

Year	Delay per Mile (All Vehicles)	Delay per Mile (Trucks)	All Congestion Cost ($)	Truck Congestion Cost ($)
2023	199,341	41,355	$16,056,948	$6,901,122
2022	337,907	72,102	$26,414,026	$10,865,577
2021	213,331	28,640	$14,308,294	$4,038,747
2020	133,925	21,138	$7,418,127	$2,349,638

Exhibit A-7 shows average daily speed profiles in 2022 and 2023 for an arterial road that moved into the top 100 this year. Potranco Road/Farm to Market (FM) 1957 between Talley Road and Raymond E. Stotzer Fwy/SH 151 was ranked #108 last year and has moved up to #72 this year. This corridor showed a decrease in average speed from 2022 to 2023 throughout the entire day. Exhibit A-8 depicts the annual values for delay per mile and the cost of congestion over the last four years, which shows an almost 50% increase between 2022 and 2023.

Exhibit A-7: Speed Profile for Potranco Rd/FM 1957 from Talley Rd to Raymond E. Stotzer Fwy/SH 151

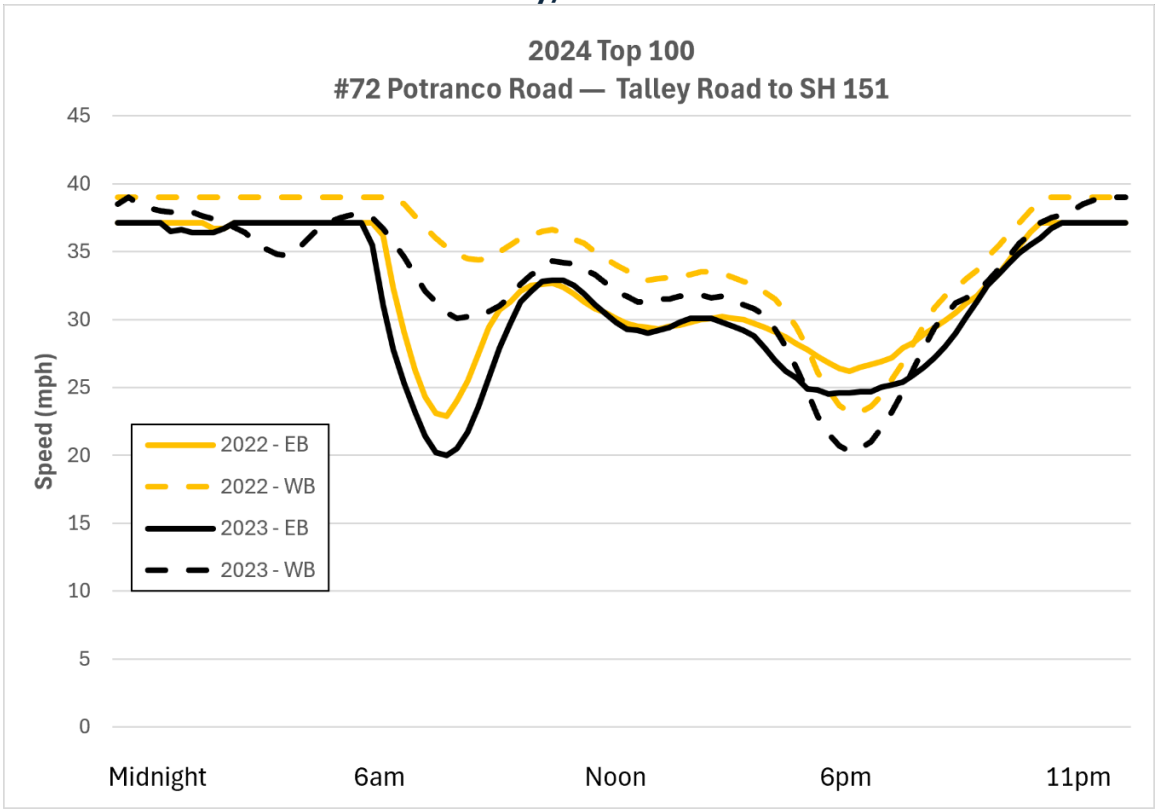


Exhibit A-8. Annual Values for Potranco Rd/FM 1957 From Talley Rd to Raymond E. Stotzer Fwy/SH 151

Year	Delay per Mile (All Vehicles)	Delay per Mile (Trucks)	All Congestion Cost ($)	Truck Congestion Cost ($)
2023	182,081	8,893	$25,092,313	$3,227,225
2022	123,340	4,968	$16,722,026	$1,672,536
2021	98,258	2,984	$12,485,536	$948,311
2020	22,755	1,888	$2,799,127	$519,635

Exhibit A-9 shows the average speed by hour of the day for both eastbound and westbound directions of I-20 from I-35W to U.S. 287 for 2022 and 2023. Looking at the speed curves, there is a noticeable decrease in average speeds from 2022 to 2023 throughout the day. There is a TCL project planned on the eastern portion of this segment to help alleviate congestion. Exhibit A-10 depicts the annual values for delay per mile and the cost of congestion over the last four years for trucks and all vehicles, which shows that delay has more than tripled between 2022 and 2023.

Exhibit A-9. Speed Profile for I-20 Between I-35W and U.S. 287

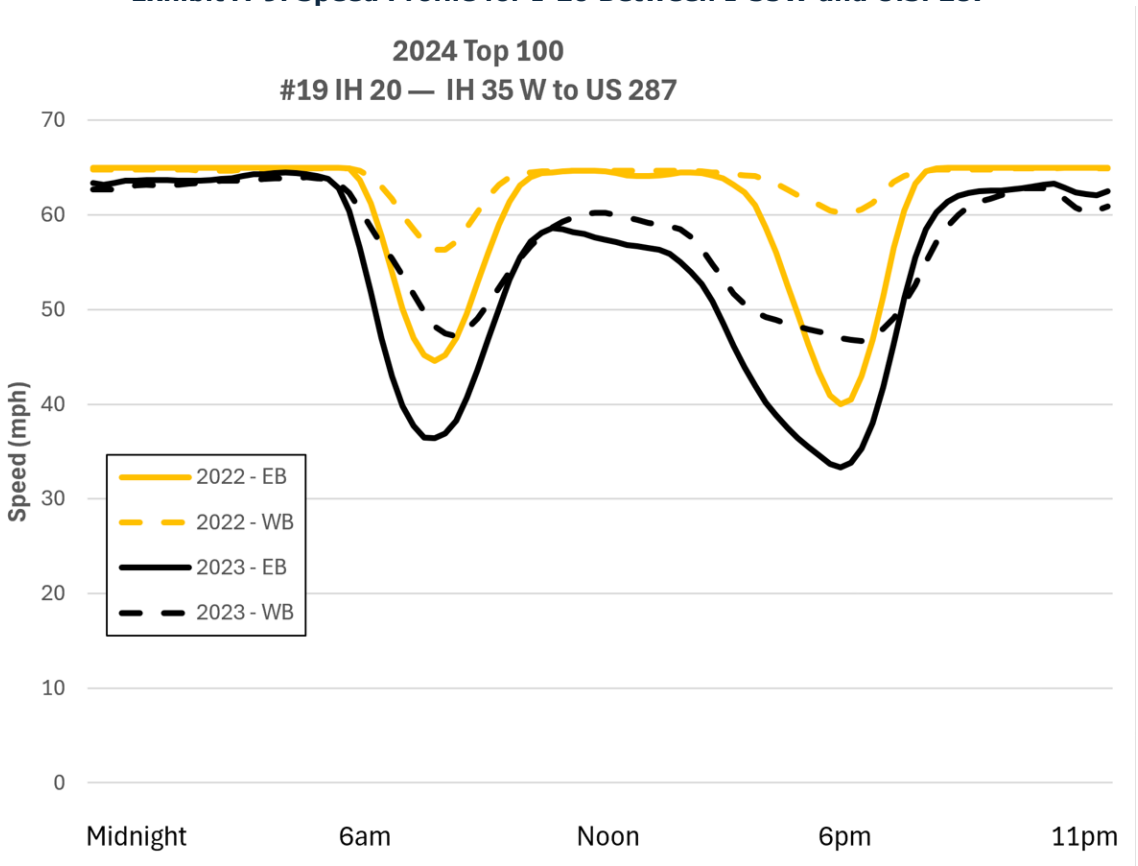


Exhibit A-10. Annual Values for I-20 Between I-35W and U.S. 287

Year	Delay per Mile (All Vehicles)	Delay per Mile (Trucks)	All Congestion Cost ($)	Truck Congestion Cost ($)
2023	451,987	33,081	$78,530,179	$14,546,695
2022	131,698	11,156	$22,589,090	$4,363,818
2021	77,163	5,470	$12,198,489	$1,986,849
2020	60,951	5,405	$5,193,061	$1,002,998

The segment of SH 114 from I-35W to Precinct Line Road/FM 1938 dropped in the rankings. This segment of road was #32 in the truck rankings last year and is now ranked #83. Exhibit A-11 displays the daily speed profiles from 2022 and 2023. The average speed increased noticeably throughout the day in 2023 in the westbound direction. The eastbound direction also showed a noticeable increase in speed for most of the day. A recently completed TCL project was key to the delay reduction in this area. Exhibit A-12 depicts the annual values for delay per mile and the cost of congestion over the last four years for trucks and all vehicles, which shows a delay reduction of greater than 50% from 2022 to 2023.

Exhibit A-11. Speed Profile for SH 114 from I-35W to FM 1938

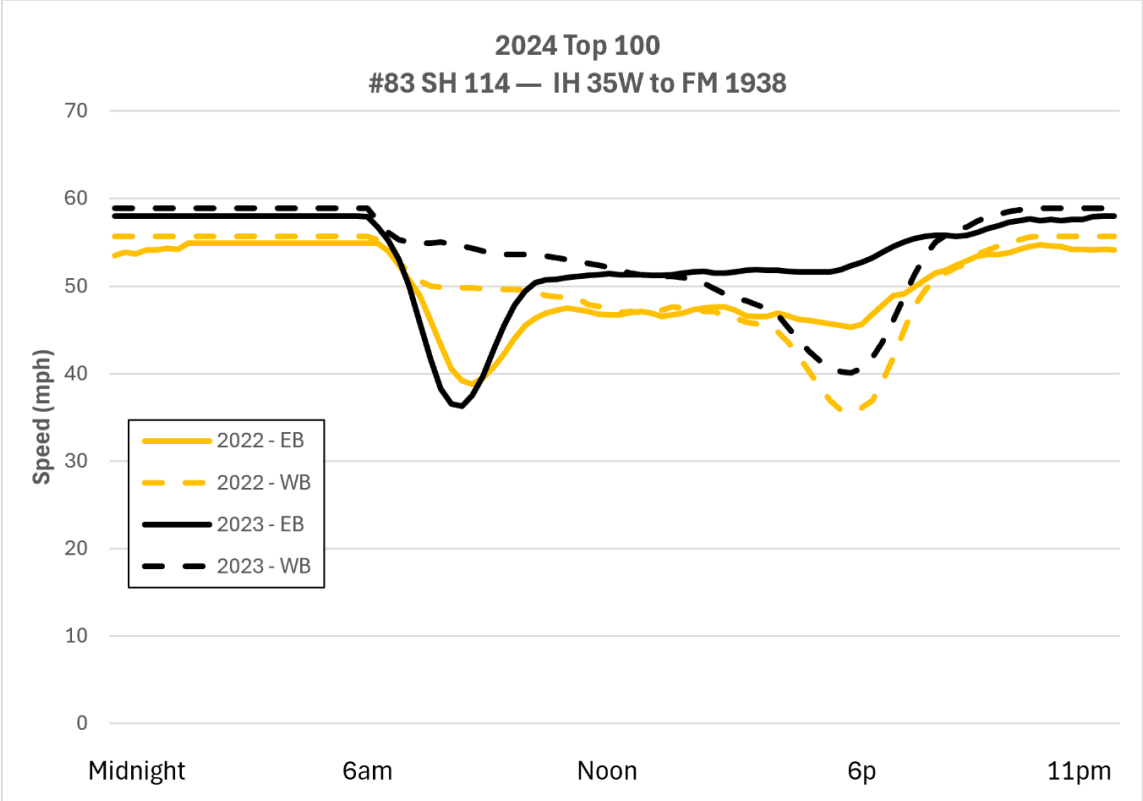


Exhibit A-12: Annual Values for SH 114 from I-35W to FM 1938

Year	Delay per Mile (All Vehicles)	Delay per Mile (Trucks)	All Congestion Cost ($)	Truck Congestion Cost ($)
2023	288,167	214,584	$16,482,768	$4,977,432
2022	602,751	464,381	$33,718,189	$9,818,523
2021	357,824	446,869	$24,883,842	$7,353,504
2020	122,358	98,551	$5,943,979	$1,269,836

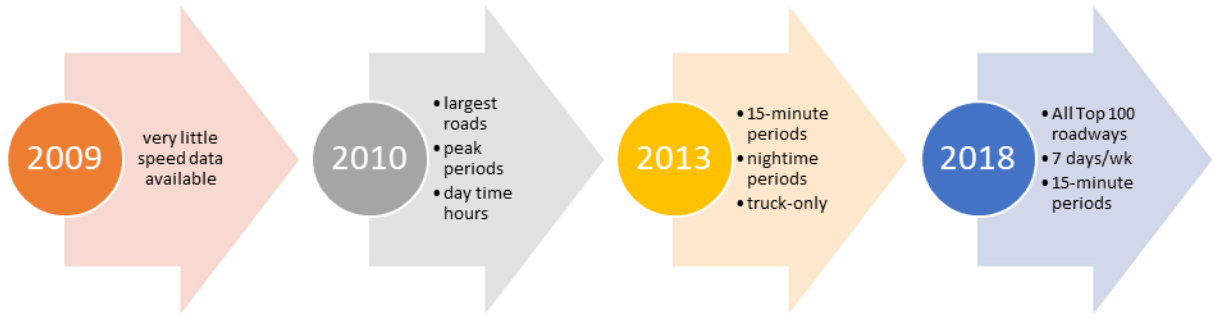
Appendix B: Methodology and Definitions

How Has the Methodology Changed Over the Years?

Thirteen years of this project has seen changes to road use in Texas. There have also been changes to speed data availability since the report's first year, both for the time periods and the number of roadways for which they were 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 have 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 the report's fourth year, speeds were available for 15-minute periods, including many overnight periods. As of the 2017 reporting period, speed data were available for over 95% of the 15-minute periods for all seven days of the week on all the top 100 roadway segments.

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 measured. Exhibit A-13 shows these changes in speed data availability through time.

Exhibit A-13: 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 segment of road to create the large dataset that contains each of the top 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 are gathered for 672 discreet periods of each week for each segment. Researchers can then compare these 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 the Texas 100 Most Congested Roads 2024 Methodology (final).

Definitions of Measures

Shown in Exhibits A-14 through A-16 are definitions of performance measures related to the following areas:

- Delay, volume, speed, and functional class.
- Trucks.
- Congestion cost and additional emissions.

Exhibit A-14: Delay, Volume, Speed, and Functional Class Definitions

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 6:00 a.m.–9:00 a.m. and 4:00–7:00 p.m. 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 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 Texas Congestion Index 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.

Peak Period Average Speed	The average speed during the 6:00–9:00 a.m. and 4:00–7:00 p.m. 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, and 3 = major and minor arterial streets.

Exhibit A-15: Truck Definitions

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 6:00–9:00 a.m. and 4:00–7:00 p.m. 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 6:00–9:00 a.m. and 4:00–7:00 p.m. timeframe.
Average Uncongested Truck Speed	The average truck operating speeds during light traffic conditions, typically during overnight hours.

Exhibit A-16: Congestion Cost and Emissions Definitions

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 CO_2 Produced	Pounds of additional carbon dioxide produced because of congestion.
Additional Truck CO_2 Produced	Pounds of additional carbon dioxide produced by trucks because of congestion.

Appendix C: Re-Segmentation

Exhibit A-17 includes a summary of requests that were re-segmented for the 2024 Top 100 Congested Road Segments analysis, and Exhibit A-18 identifies requests that were not incorporated in the 2024 Top 100 Congested Road Segments analysis and initial determinations made regarding these requests.

Exhibit A-17: Re-Segmenting Requests Incorporated into 2024 Top 100 Congested Road Segments

District	Segment	2023 Rank	2024 Rank Before Change	2024 Rank After Change	Length (Miles)	Notes
Dallas	U.S. 75–LBJ Fwy/I-635 to Woodall Rodgers Fwy/SS 366	10	7	8, 9	9.2	Split segment
Dallas	E R. L. Thornton Fwy/I-30/U.S. 67–Jefferson Viaduct to Buckner Blvd/SL-12E	15	9	4, 17	8.0	Split segment
Dallas	I-35E/U.S. 77–Business State Highway (BS) 121H to LBJ Fwy/I-635	41	41	37, 501	7.7	Split segment
Fort Worth	Airport Fwy/SH 121–SH 26 to NE Loop 820/I-820	43	N/A — Already Changed	15, 192	12.6	Re-segmented in 2024 TxDOT Roadway Inventory Files, included
Dallas	I-20–SH 360 to Marvin D. Love Fwy/U.S. 67	52	97	92, 107	11.0	Split segment
Pharr	I-2–U.S. 281 to S 23rd St	59	52	41	4.6	Moved segment end point
Fort Worth	North Fwy/I-35W/U.S. 287–U.S. 81/ U.S. 287 to 28th St/SH 183	64	N/A	57, 181	6.4	Re-segmented in 2024 TxDOT Roadway Inventory Files, split segment
Dallas	Walton Walker Blvd/SL-12W–I-35E to I-30	85	86	88, 91	7.6	Split segment
Amarillo	SL-335–W Amarillo Blvd/I-40B to Hollywood Rd/FM 2186	113	89	1358	0.3	Combined with an adjacent segment
Dallas	Sam Johnson Hwy/U.S. 75–Sam Rayburn Tollway/SH 121/ SH 399 to President George Bush Turnpike/SH 190	132	88	52, 272	11.4	Split segment

Exhibit A-18: Re-Segmenting Requests for Future Consideration

District	Segment	2023 All Delay Rank	2024 All Delay Rank	Length (Miles)	Notes
Dallas	I-345/U.S. 75/I-45–U.S. 75 to S. M. Wright Fwy/U.S. 175	13	19	2.4	Requested to split 2.4-mile segment, which would create two very short segments, not included
Austin	I-35–Ben White Blvd/SH 71 to Slaughter Ln	24	23	4.0	Requested to combine with segment to south, which would create long segment (8.1 miles), not included
Pharr	I-2–FM 1423 to U.S. 281	95	526	6.2	Dropped outside top 500 with completion of construction — deferred
San Antonio	U.S. 90–Research Pkwy/ SH 211 to Connolly Loop W/I-410	401	256	7.2	Outside 2024 Texas 200 (Rank 253) — deferred to next year
Atlanta	Richmond Rd/FM 559–N King Hwy/FM 989 to I-30/U.S. 59	435	502	2.5	Too short to segment
Austin	FM 1460–I-35 (Near Leander Dr) to Vision Dr/FM 1825	623	893	14.4	Ranked low — deferred to next year
Austin	RM 1826–U.S. 290 to RM 150	1322	1569	12.4	Ranked low — deferred to next year