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## In-Depth Analysis of the 2016 Texas Transportation Poll

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### Executive Summary

This analysis provides insight into qualitative questions asked in the 2016 Texas Transportation Poll. Additionally, this analysis establishes a baseline process for researchers to conduct further qualitative analyses that will inform future quantitative studies, including the next Texas Transportation Poll.

The 2016 Texas Transportation Poll asked the following open-ended questions:

1. “What is the most significant transportation issue affecting you personally in your region?”
2. “What do you think the State of Texas should change to make the transportation system work better for you?”

These questions elicited about 4,000 independent responses. Using qualitative analysis software, researchers identified common themes within the responses and then categorized, or coded, the text into themes in order to answer the following research questions:

- What are the most common transportation issues reported by Texans?
- Are their sentiments on these issues positive or negative?
- How do the most common transportation issues and sentiments compare to the responses of the 2014 poll?
- Are citizens giving insight into what transportation policy makers should do to address transportation issues?

### *Frequently Cited Transportation Issues*

Researchers found that Texans who responded to “What is the most significant transportation issue affecting you personally in your region?” most frequently identified the following issues that affected them, in order of most frequently cited to least frequently cited:

1. Congestion.
  2. Maintenance.
  3. Construction.
  4. Public transportation.
  5. Truck traffic.
  6. Operations.
  7. Drivers.
  8. Planning.
  9. Gas price.
  10. Toll roads.
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11. Safety.
  12. Bicycles and pedestrians.
  13. Cost of transportation.

Researchers provided insight into the top five issues that respondents to the poll most frequently cited.

### ***Congestion***

Texans most frequently cited congestion in both the 2014 and 2016 polls. This underscores the findings from the 2014 in-depth analysis of the Texas Transportation Poll that the public is likely to support policies and practices that mitigate rural and urban traffic congestion. In rural areas, Texans are affected by changes in freight traffic, such as growth in mineral extraction in certain locations. Drivers see the link between growth in industry and how it impacts their use of the roadway system. In urban areas, people see congestion as related to limited options for passenger travel. They recognize that the roadway systems are burdened with both local and through-traffic needs, and several mentioned support for investments in alternatives to driving—such as bus or rail transit.

### ***Maintenance***

Texans also frequently referred to roadway maintenance as an issue in the 2014 and 2016 polls; however, in the 2016 poll, maintenance jumped from the fifth to the second most frequently cited issue. This indicates a rising concern among Texans about the need for increased maintenance on the existing road infrastructure.

### ***Construction***

In the 2014 and 2016 Texas Transportation Polls, construction was the third most frequently cited transportation issue. Most respondents indicated that construction takes too long, and they would like to see projects completed more quickly.

### ***Public Transportation***

Public transportation was the fourth most frequently cited transportation issue in both the 2014 and 2016 polls. This consistent level of concern from Texans means the public would continue to receive well policies aimed at identifying specific transit needs and improving transit services. Respondents to the Texas Transportation Poll mentioned issues with transit in both rural and urban contexts.

### ***Truck Traffic***

The fifth most cited transportation issue in the 2016 poll was truck traffic, an issue that was not identified as significant in the 2014 poll. Respondents expressed concerns about increased truck traffic due to the oil and gas industry and the increased damage to roads.

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### *Frequently Cited Transportation Solutions*

Texans who responded to “What do you think the State of Texas should change to make the transportation system work better for you?” most frequently identified the following topics, in order of most frequently cited to least frequently cited:

1. Public transportation.
2. Increase roadway capacity.
3. Maintenance.
4. Improve signal timing.
5. Toll roads.
6. Funding.
7. Increase enforcement of existing traffic laws.
8. Separate trucks from the rest of traffic.
9. Transportation demand management.
10. Improved transportation access for the mobility challenged.
11. Educate drivers.
12. Increase bikability.
13. Lower gas prices.
14. Improve walkability.

Researchers provided insight into the five most frequently mentioned topics.

#### ***Public Transportation***

The most frequently cited change was to improve public transportation. Most respondents cited the lack of service and believe providing new service/expanding service is an important aspect of improving the transportation system. Respondents also had significant interest in improving existing services (e.g., more frequent service and better amenities).

#### ***Increase Roadway Capacity***

Increasing roadway capacity was the second most frequently cited solution to improve the transportation system. This correlates with congestion being the most frequently cited transportation issue in both the 2014 and 2016 polls.

#### ***Maintenance***

The majority of respondents felt that increasing the amount of maintenance performed on roadways would make the transportation system work better. Some respondents indicated that finishing maintenance projects more quickly is important as well.

#### ***Improve Signal Timing***

Improving signal timing was a fairly straightforward solution respondents frequently cited.

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## ***Toll Roads***

Toll roads were the fifth most frequently mentioned solution. The majority of respondents suggested removing tolls from toll roads. However, a significant number of respondents also indicated that building more toll roads would benefit them. In addition, many respondents suggested removing tolls for trucks in order to get them off the other local highways. This wide range of sentiments on toll roads confirms that toll roads remain a controversial topic in Texas.

## **Introduction**

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This analysis provides insight into qualitative questions asked in the 2016 Texas Transportation Poll. Additionally, this analysis establishes a baseline process for researchers to conduct further qualitative analyses that will inform future quantitative studies, including the next Texas Transportation Poll.

This policy brief contains the following sections:

- Discussion of the most significant transportation issues reported in the 2016 Texas Transportation Poll and comparison to issues reported in the 2014 poll.
- Discussion of the most commonly cited suggestions on how to make the transportation system work better for respondents.
- Findings and conclusions on perceived transportation issues and solutions.
- Limitations and next steps.

## **Transportation Issues**

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Evaluating the volume, content, and overall sentiments of the comments received from the open-ended question “What is the most significant transportation issue affecting you personally in your region?” in the 2016 Texas Transportation Poll reveals issues that are important to the public and can provide unique insights into public opinion.

This section provides the results of the qualitative and sentiment analysis for the 2016 responses, as well as a comparison to comments received in the 2014 poll.

## **Frequency Analysis and Categorization of Topics**

Researchers began the evaluation of the open-ended question “What is the most significant transportation issue affecting you personally in your region?” by conducting a word frequency query to determine the most frequently mentioned words in the data set. Figure 1 provides two word clouds that compare the most frequently mentioned words for the open-ended question from the 2014 and 2016 polls.

Similar to the results of the word frequency analysis conducted on the 2014 poll, the most frequently mentioned topics were roads, traffic, congestion, and construction. The frequency analysis showed that the volumes of the most commonly mentioned issues for the 2014 and 2016 polls were similar.



**Figure 1. Word Clouds That Display Word Frequency for Responses to the Open-Ended Question “What Is the Most Significant Transportation Issue Affecting You Personally in Your Region?” for the 2014 and 2016 Texas Transportation Polls.**

To begin the analysis, researchers sampled the responses and identified topics. Each response was coded by topic. Researchers approached the codification of responses for the 2016 poll using the following two steps:

1. Code responses from the 2016 poll using topics identified in the 2014 poll.
2. Create new codes based on new topics identified during the 2016 analysis.

The purpose of using the topics identified in the 2014 poll to code the 2016 poll was to allow researchers to gauge how public perceptions on the most significant issues have changed over the past two years.

The topics identified in the 2014 poll were:

- Bicycles and pedestrians.
- Congestion.
- Construction.
- Drivers.
- Gas price.
- Maintenance.
- Planning.
- Public transportation.
- Safety.

- Toll roads.

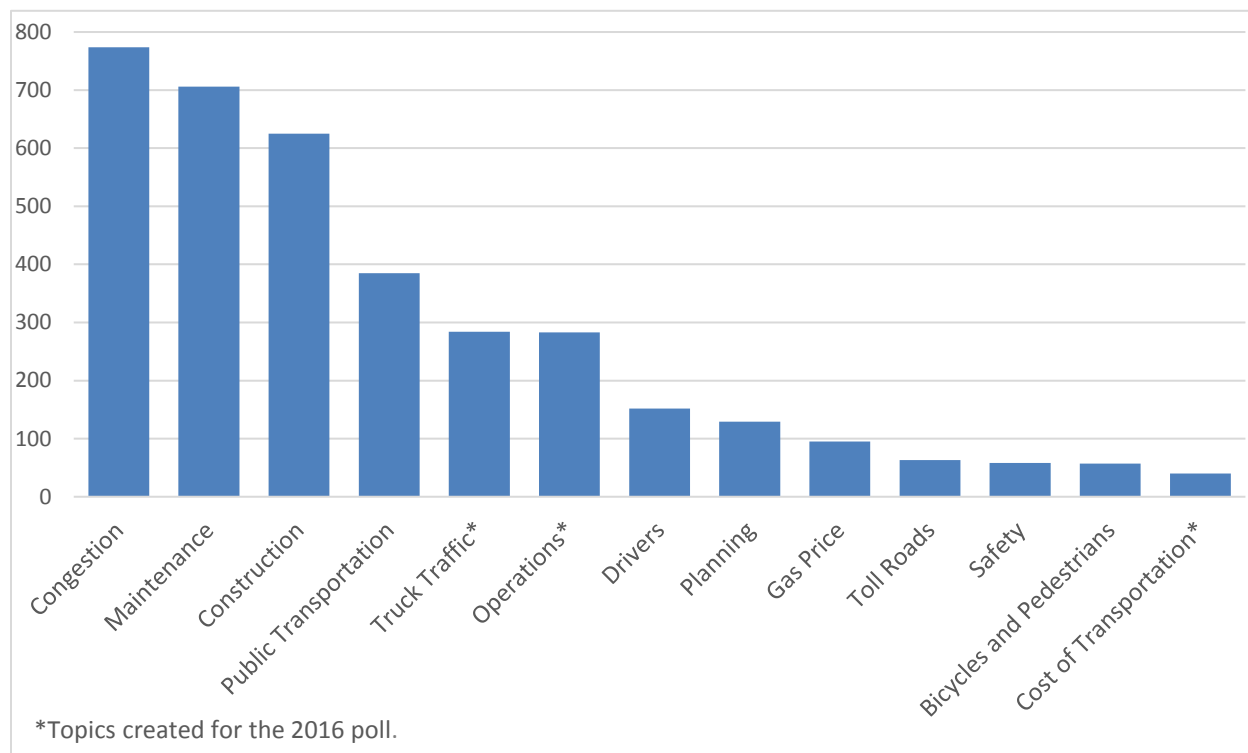
To establish consistency when coding the 2016 poll, researchers developed a codebook. The codebook provides a detailed description of the topic and examples of what a potential response looks like. The codebook established a consistent set of parameters to use when evaluating the 2016 poll data so that reasonable comparisons could be made to the results of the 2014 poll. Using NVIVO software, two researchers, working separately, manually coded a random sample of 400 responses from the 2016 poll (roughly 10 percent of the total data set). In addition to coding responses using codes identified in the 2014 poll, researchers created new codes as they identified new topics during the manual coding of the 2016 random sample of responses, as shown in Table 1.

**Table 1. Codebook Providing Definitions and Examples for Topics Identified in the 2014 and 2016 Texas Transportation Poll.**

Short Description	Detailed Description	Examples
<b>Codes Identified during Analysis of 2014 Poll</b>		
Bicycles and pedestrians	Respondents refer to bicycles or pedestrians either in terms of their experience using these two modes or their observation of others using these two modes. Respondents may also refer to bicycles or pedestrians as impediments to their mode of transportation or, conversely, as a potential solution to an identified transportation issue.	“Not enough crosswalks or bike lanes.” “Bicyclists ride in the road and create dangerous conditions for drivers.”
Congestion	Respondents refer to traffic congestion as being a transportation issue in their region.	“I wait too long in traffic.” “There are not enough lanes, so there is too much traffic.”
Construction	Respondents refer to construction projects being an issue in their region. Respondents may refer to the time it takes for construction projects to be completed (too long) or the times of day that construction is being performed.	“Construction should be performed in the middle of the night, not during rush hour.” “Why isn’t the construction on I-35 completed yet?”
Drivers	Respondents refer to driver error as being a transportation issue in their region.	“People need to obey the speed limit.”
Gas price	Respondents refer to the fluctuation of gas prices as impacting their decision making on transportation mode.	“Gas prices are too high.”
Maintenance	Respondents refer to maintenance of infrastructure as being a transportation issue in their region. This likely refers to the need for maintenance or poor execution of maintenance projects on roadways that respondents regularly use.	“There are too many potholes on my road!” “My road was repaved, but it still has unsafe areas.”

Short Description	Detailed Description	Examples
Planning	Respondents refer to the need for planning to accommodate for identified transportation issues in respondents' regions. This could refer directly to or allude to the need for improved planning to address transportation issues.	"The city needs to plan better facilities for our pedestrians."
Public transportation	Respondents refer to any form of public transportation (e.g., bus, rail, streetcar, demand responsive, or vanpool) as being a transportation issue in their region. Respondents may be referring to the service provided not being able to meet their needs or may refer to the lack of service altogether.	"We need better public transportation to provide access to the mall."
Safety	Respondents refer to an aspect of the transportation system that they deem unsafe. Respondents may directly refer to infrastructure that they feel is unsafe or may refer to other users operating their modes of transportation (car, bike, etc.) in an unsafe manner.	"The speed limit is too high on my road." "There are sightline issues near my house."
Toll roads	Respondents refer to toll roads as being a transportation issue in their region.	"Why are there toll roads in my area? I already pay taxes!"
<b>New Codes Identified during Analysis of 2016 Poll</b>		
Cost of transportation	Respondents refer to the cost of gaining access to transportation as being an issue in their region. Respondents may refer to the cost of owning a car, the cost of public transportation, or other indirect costs of using the transportation system.	"The cost of the bus is too high." "I can't afford a car, so I can't get where I need to go."
Operations	Respondents refer to the operational aspects of the transportation system being an issue in their region. This includes signal timing, lane design, stop signs, etc.	"The lights take forever near my house." "The timing of the lights is screwed up."
Truck traffic	Respondents refer to truck traffic as being a transportation issue in their region. Respondents may refer to trucks as being factors contributing to congestion, lack of safety for other motorists, or damage to the roadway.	"There are so many trucks on the road that it causes congestion." "Truck traffic needs to be in a separate lane from cars." "Trucks drive too fast." "In my region, trucks are tearing our roads apart."

Once researchers coded the random sample of responses, the remaining responses were coded within each of the topics shown in Table 1 using the auto-code function in NVIVO. This identified which topics were most frequently mentioned in the open-ended question, as shown in Figure 2.

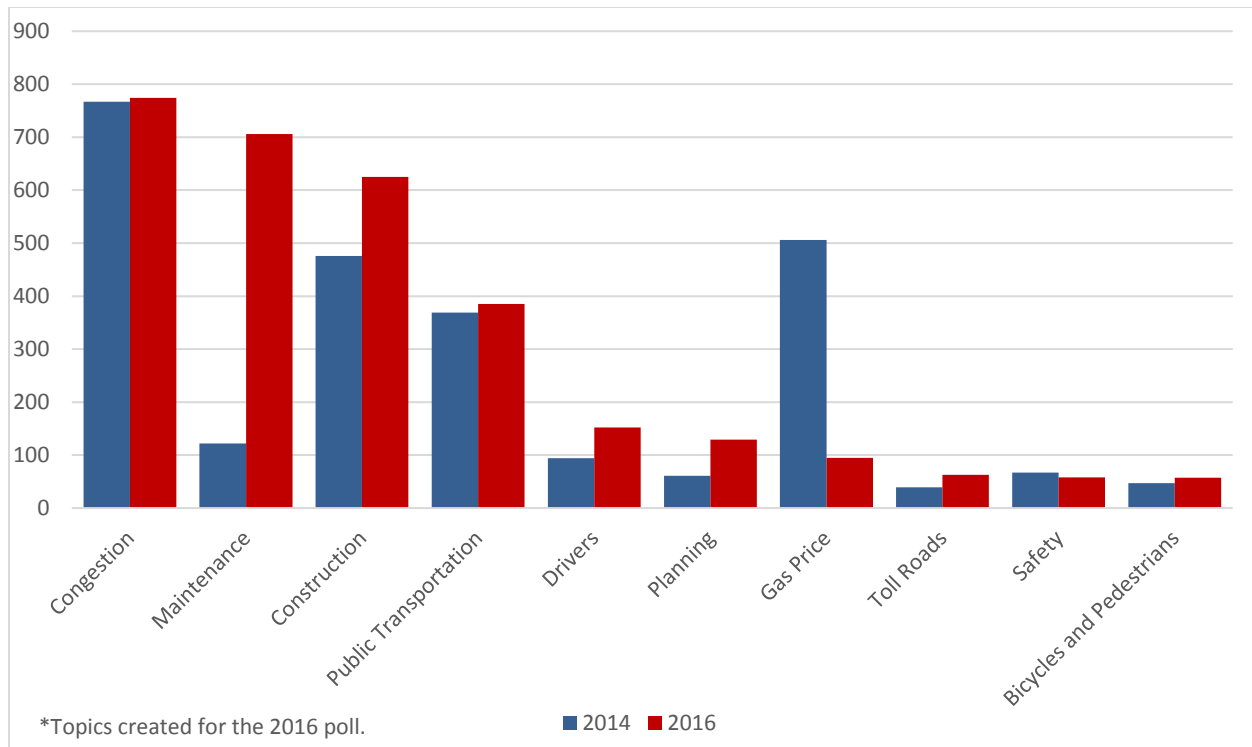


**Figure 2. Frequency of Topics Mentioned in Response to the Open-Ended Question “What Is the Most Significant Transportation Issue Affecting You Personally in Your Region?” for the 2016 Texas Transportation Poll.**

Congestion, maintenance, and construction were the three topics respondents cited most frequently. Figure 3 provides a comparison of the results of the frequency analysis for the most commonly cited transportation issues in the 2014 and 2016 polls.

As shown in Figure 3, congestion was the most frequently cited transportation issue in both the 2014 and 2016 polls. Maintenance was the second most frequently cited transportation issue for the 2016 poll, though it was only the fifth most frequently cited issue in the 2014 poll, behind gas price, construction, and public transportation. This change could be due to the perception that based on increased transportation funding, such as Proposition 7, funding is now available to address maintenance issues. Finally, gas price, which was the second most frequently cited transportation issue in the 2014 poll, was far less frequently cited in the 2016 poll (ninth most frequently cited, as shown in Figure 2). This makes sense based on the decrease in gas prices since the 2014 poll was conducted.





**Figure 3. Comparison of Most Frequently Cited Responses to the Open-Ended Question “What Is the Most Significant Transportation Issue Affecting You Personally in Your Region?” for the 2014 and 2016 Texas Transportation Polls.**

## Accuracy Testing

Since qualitative data coding is a subjective process, researchers conducted accuracy testing, which measures the level of agreement between researchers performing the coding. This process also assesses how consistently the codes can be applied. To evaluate this consistency, or the inter-rater reliability, two researchers coded the same random 400 entries of the 2016 Texas Transportation Poll responses to the question “What is the most significant transportation issue affecting you personally in your region?” Researchers used all topical codes used in analysis of the 2014 Texas Transportation Poll, shown in Table 1. Across all topics, the researchers’ codes were over 99 percent in agreement. This means that the codebook and methods that the research team used were extremely consistent and reliable.

However, some amount of inter-rater coding could be expected to be the same through chance. Some sources consider Cohen’s Kappa coefficient to be a more accurate measure of inter-rater reliability than the percentage of agreement since Cohen’s Kappa coefficient takes the possibility of chance into account. A Kappa coefficient representing perfect agreement would be 1, and no agreement (other than by chance) would be 0. The results are as follows:

- The most frequent codes in this sample, including construction, drivers, public transportation, and maintenance, all scored a Kappa coefficient of over 0.74, which is generally excellent inter-rater reliability.

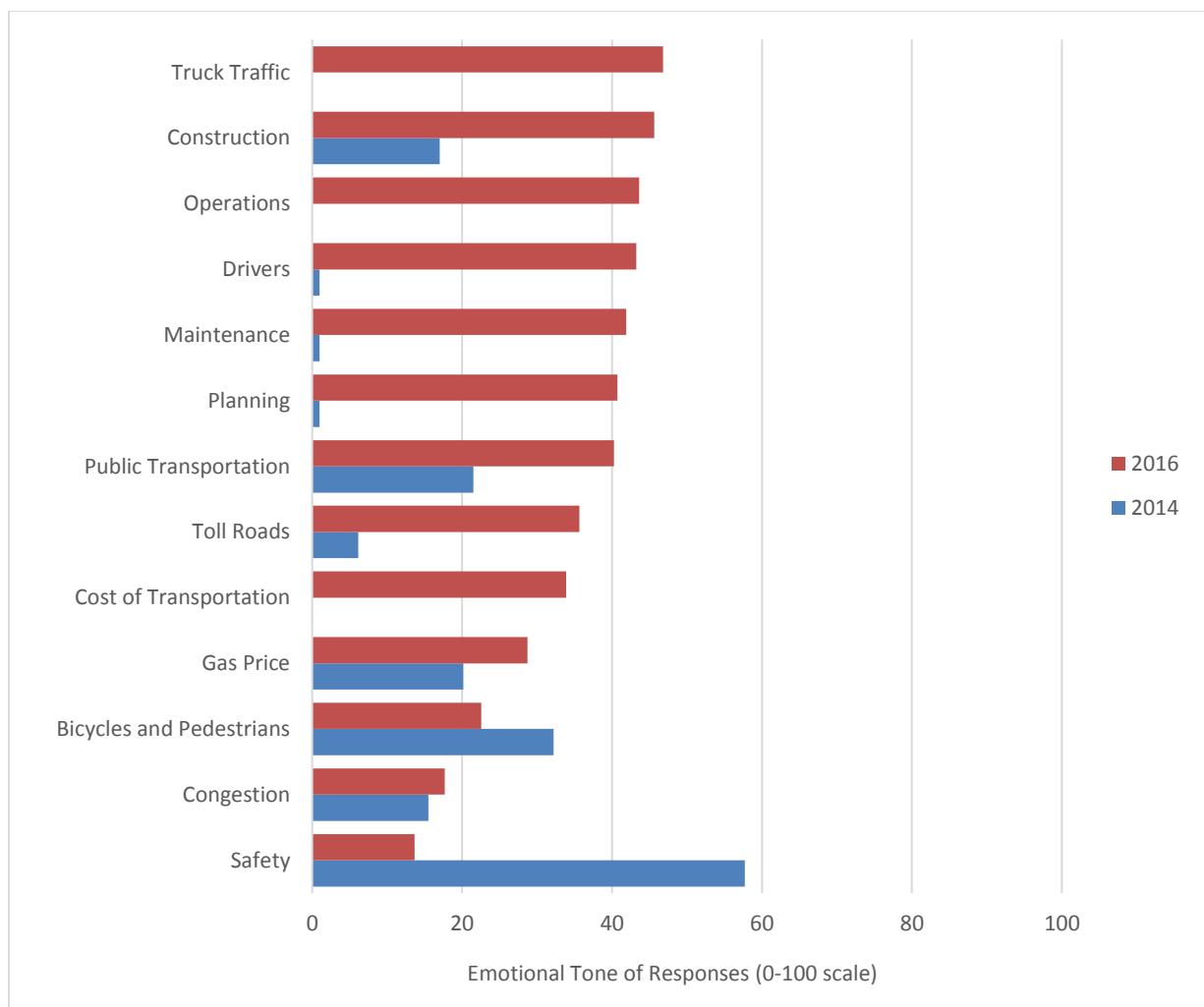
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- The topic of rail had a Kappa coefficient of 0.49, which is considered fair agreement.
  - The topics of planning and bus had Kappa coefficients of 0.27 and 0.18, respectively, which are considered poor agreement, but were also infrequently mentioned by respondents.

Though all codes can be considered reliable in terms of the agreement between the coders, the topics of planning and bus may be viewed more skeptically.

## **Sentiment Analysis of Transportation Issues**

The tone of words people use when they discuss a topic suggests a sentiment about the issue. Again using the major topics in Texans’ responses to the open-ended question “What is the most significant transportation issue affecting you personally in your region?” this section uses computerized text analysis to systematically compare the tone of responses from the 2014 and 2016 Texas Transportation Polls. Focusing on the language component of *tone*, Figure 4 ranks the topics from the least positive tone to most positive, using a revised method to re-analyze the 2014 data in the same way as the current poll. Researchers revised the method to leverage an update to the linguistics analysis software used—the new composite measure of *tone* summarizes other emotional linguistic dimensions and is expected to offer greater precision. Both the 2014 and 2016 data were analyzed in the same way for an appropriate comparison.

Figure 4 graphs the emotional tone of responses from the 2016 poll across 13 transportation issues and also includes the 10 issues identified in the 2014 poll for comparison, in blue. The newly identified topics in the 2016 poll, including rail, truck traffic, operations, cost of transportation, bus, and access to transportation, included small total amounts of text. Therefore, the assessment of tone in Figure 4 could be disproportionately affected by a small number of respondents. Similarly, the topics of drivers and planning were infrequently mentioned, so the sentiment changes in this graph may appear large, but the actual number of people discussing the topic was small.



**Figure 4. Sentiment Comparison of Coded Responses to the Open-Ended Question “What Is the Most Significant Transportation Issue Affecting You Personally in Your Region?” for the 2014 and 2016 Texas Transportation Polls. Higher Scores Reflect A Higher Proportion of Words Using a Positive Tone.**

Maintenance was a topic that people mentioned more frequently and more positively in 2016 than 2014. The following two examples of responses show how emotional tone can be mixed on maintenance issues and how important roadway condition is to drivers. They recognize that road work impacts traffic flow in the short term, but that works of large and small scales are nonetheless needed.

“The construction on highway 59, they are redoing all that and it has it tied up really bad but I like seeing it” (male, 65+).

“Potholes. The conditions of the roads could be a lot better than they are. Maybe better maintenance I guess” (male, 25-34).

Respondents used language that is much more positive concerning toll roads in 2016, as compared to the 2014 poll. However, this finding may highlight a limitation of computerized sentiment analysis. One example of a response discussing toll roads using positive language is:

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“Construction. Road construction. There’s been a tollway improvement, there’s been highway expansion, and things like that. I’m sure it’ll help in the end but right now it’s kind of slowing things down” (male, 25-34).

Safety is another topic with a large change in tone and whose number of responses has decreased in 2016. This respondent and many others connected the role that collisions have in traffic congestion, linking several concepts with largely negative words:

“I live near and use the 610 loop daily. First, there are many accidents that tie up traffic. I’ve never seen a policeman on the 610 or 59. I think the biggest problem is the influx of people” (female, 65+).

The concern over safety is also tied to the real costs that crashes impose on lives. One respondent noted the well-known challenge of alcohol use with driving:

“DWIs and vehicle collisions cause too many deaths” (female, 65+).

Texans’ responses to the 2016 poll offered a range of issues, reflecting a wide variety of sentiments. This analysis suggests the tone of language by respondents could be indicative of topics that may be shifting and could warrant further analysis—particularly maintenance, toll roads, and safety. The topics planning and drivers are also of interest but were mentioned less frequently.

## **In-Depth Analysis of Most Significant Transportation Issues**

Figure 3 identifies the most frequently mentioned transportation issues for the question “What is the most significant transportation issue affecting you personally in your region?” This section reviews a purposive sampling of actual quotes from the responses. Many of the responses were simple responses answering the question, but the ones provided in this section provide more insight or context to the lived experience of Texans and the transportation issues that matter to them. Congestion, maintenance, construction, public transportation, and truck traffic were the most frequently mentioned topics.

### *Congestion*

Traffic issues continue to remain important to Texans. Quite a few responses offered insight into how congestion affects them. Though traffic is often described as costing businesses, it also takes a toll on families:

“The congestion affects the time I spend with my family” (female, 35-44).

Texans see traffic as taking time away from productive and enjoyable endeavors, and experiences vary in terms of local causes and solutions. Many mentioned the need for other solutions:

“The congestion of the number of cars and lack of efficient and effective options as you travel. Too many people in their cars and not enough alternatives” (female, 35-44).

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“Traffic congestion in Austin and the lack of many planned solutions to that problem. Austin has also under-invested in urban rail, which would be a fantastic solution as evidenced by the success of the rail system in Dallas” (male, 45-54).

Of course, some areas also experience locally specific problems with congestion. In addition to challenges with traffic caused by construction issues, economic development, such as increases in oil production, were mentioned as well:

“I think the congestion comes from traffic caused by oil fields in the areas” (female, 55-64).

### *Maintenance*

Roadway repair was a common issue cited by respondents and their comments reveal concerns about priorities, impact on safety, and relationship with the economy. Some responses were quite general, suggesting some areas need an emphasis on roadway maintenance over other issues.

“The streets are rather in bad shape. They need to repair the streets. Nothing else” (male, 55-64).

“Potholes, they're everywhere. Infrastructure maintenance, pothole issues. They aren't being fixed and it causes accidents. They are getting fixed but it's causing a chronic problem” (female, 45-54).

However, commenters rarely mentioned which roadways in their area needed attention or which agencies should address them. One respondent, as noted below, did distinguish between which entities may be responsible.

“LACK OF MAINTENANCE ON COUNTY ROADS” (male, 25-34).

Economic issues also play a role in maintenance. Some respondents relate the topic to changing freight pressures, and others cite the general financial priority to emphasize maintenance.

“I guess just oil field traffic. I think that's all. Roads are in poor repair due to such heavy oil field traffic” (female, 65+).

“The quality of roads is terrible. We need to spend more money. Maintenance is bad, like potholes, et cetera” (female, 45-54).

### *Construction*

Projects to solve transportation problems also create issues for drivers, including temporary congestion and potential safety impacts. Most of the comments on this topic mentioned how construction causes congestion in their area, including the impact of multiple simultaneous projects.

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“Construction. They close down streets where they know it's the busiest. I understand that they're doing construction, but that's what gets it backed up the fast (sic). Especially when they're in the busy areas” (female, 25-34).

“All the construction that is supposed to help in the future is a pain currently” (female, 35-44).

Respondents were also concerned about the role that construction projects may have on safety. This commenter recommended retaining room for a vehicle to avoid rapid slow-downs through a construction project. This could have the most relevance on high-speed roadways.

“The ongoing construction and lack of safety escape lanes. We have too many accidents due to construction and people have no way to get around and have to shut down the highways” (female, 55-64).

Others connected construction projects with rapid growth in their area. This respondent feels the projects fail to fully address traffic congestion.

“Nearly constant road construction with little to know (sic) noticeable improvement in traffic congestion” (male, 25-34).

### *Public Transportation*

Most discussion about transit focuses on a perceived lack of service. This can pertain to no or limited access to transit or the frequency of transit service. This respondent is an example of a person concerned with the frequency of bus service, which affects the convenience of the mode:

“I think the public transportation is inconvenient for students here. If we miss one of them, we wait for a long time” (female, 35-44).

Transit issues are also related to non-motorized modes since most public transportation trips are accessed via walking or biking:

“The fact that there is no public transportation to speak of. The fact that you can't ride in the state of Texas without people running you over because there are no bike lanes. Heck, my city doesn't even have sidewalks” (male, 25-34).

The equity of access is also a concern. The cost of transportation affects people differently, and this respondent notes limited transportation options:

“Everywhere else I've been there has been transportation but not here, and if we did ride the bus it costs an arm and a leg. At my age I'm 100% disabled. I'm not asking you to feel sorry for me but there are other people that need transportation” (female, 65+).

### *Truck Traffic*

Most respondents who mentioned truck traffic referred to their perceived impact on traffic congestion or safety. Many of them referred to increases in oil and gas work in their regions, and also mentioned wear and tear on the roads.

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“The big 18 wheelers from the oil fields. In the morning the highways are bumper to bumper with the 18 wheelers going to Corpus. In the last two years the traffic congestion tripled” (male, 65+).

“The 18 wheelers, oil trucks, and rig trucks. How they can effect (sic) the wear and tear down on the roads. They just are always in a big hurry to get to their destination because I know what their job is, and it would be nice if they had their own roads” (female, 35-44).

However, highway systems are designed to carry freight as well as people, and truckers share commuters’ challenges with congestion in urban areas.

“I’m a truck driver, the biggest thing for me is making it through cities” (male, 35-44).

## **Transportation Solutions**

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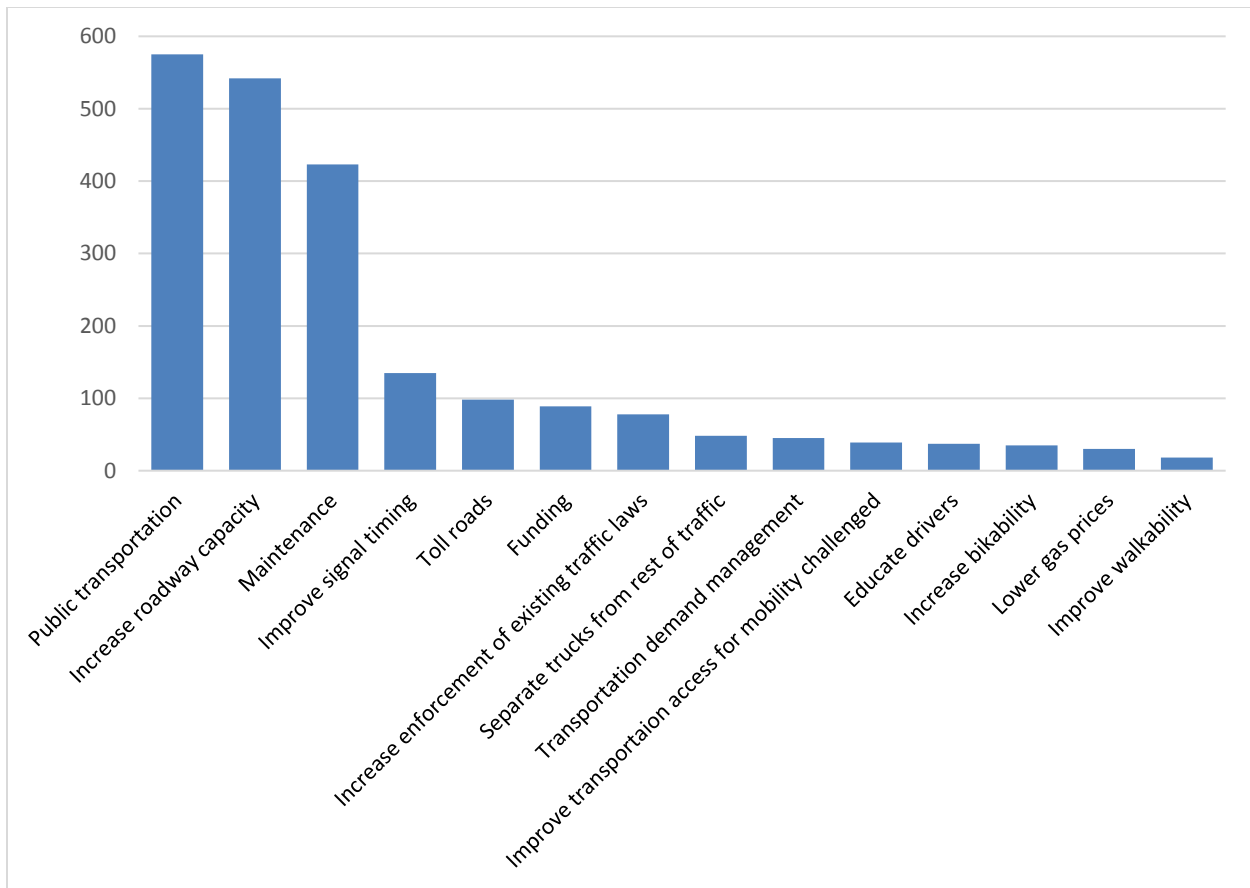
The 2016 Texas Transportation Poll asked an additional open-ended question, “What do you think the State of Texas should change to make the transportation system work better for you?” Researchers conducted an analysis similar to that for the first open-ended question to identify some of the most commonly cited solutions provided by respondents of the poll.

### **Frequency Analysis and Categorization of Topics**

As with the first open-ended question, researchers began the evaluation by conducting a word frequency query to determine what the most frequently mentioned words in the data set were, illustrated in Figure 5. The words most frequently used were roads, transportation, better, think, public and need.







**Figure 6. Frequency of Solutions Mentioned in Response to the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?” for the 2016 Texas Transportation Poll.**

Public transportation, increase roadway capacity, and maintenance were the three topics that respondents most frequently mentioned as solutions to transportation issues in their region. In fact, the frequency of other topics mentioned drops significantly after public transportation (575), increase roadway capacity (542), and maintenance (423). In comparison, the fourth most frequently mentioned topic (improve signal timing) was mentioned only 135 times.

## **Second-Level Coding for Transportation Solutions**

Researchers conducted a deeper analysis into the open-ended question “What do you think the State of Texas should change to make the transportation system work better for you?” to determine if further analysis of the key themes shown in Figure 6 would identify more detailed solutions provided by respondents. To conduct this analysis, researchers performed second-level coding. Second-level coding is accomplished by reviewing a random sample of responses within each of the key themes that has already been identified and coded. For example, researchers looked at the responses that were auto-coded by the topic public transportation and determined that within that topic, respondents provided four specific solutions. After the random sample identified the solutions within the themes, the auto-code function was used for the rest of the

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responses. This provided researchers with the number of times each of the more detailed solutions was mentioned within each of the key themes shown in Figure 6.

While conducting second-level coding, researchers found that a deeper dive into some topics did not reveal more detailed solutions. For example, when reviewing a random sample of the responses that were coded *increase roadway capacity*, researchers found that all solutions were similar (e.g., add more lanes or build new roads). Therefore, no further analysis was conducted.

Second-level coding revealed more detailed solutions for half of the topics identified in Figure 6. These topics were:

1. Public transportation.
2. Maintenance.
3. Toll roads.
4. Funding.
5. Transportation demand management.
6. Improve transportation access for the mobility challenged.
7. Educate drivers.

The following subsections provide a detailed overview of the results of the second-level coding process for topics that revealed more detailed solutions:

- The first subsection provides the results of the second-level coding for the topics that were the most frequently mentioned (public transportation and maintenance).
- The second subsection discusses the results of the second-level coding for the topics that were mentioned less frequently.

### *Second-Level Coding Results for Most Frequently Mentioned Topics*

Public transportation (575), increase roadway capacity (542), and maintenance (423) were the most frequently mentioned topics provided by respondents on how the transportation system could be improved to work better for them. Second-level coding revealed more detailed solutions for public transportation and maintenance. The following subsections provide the results of this more in-depth analysis.

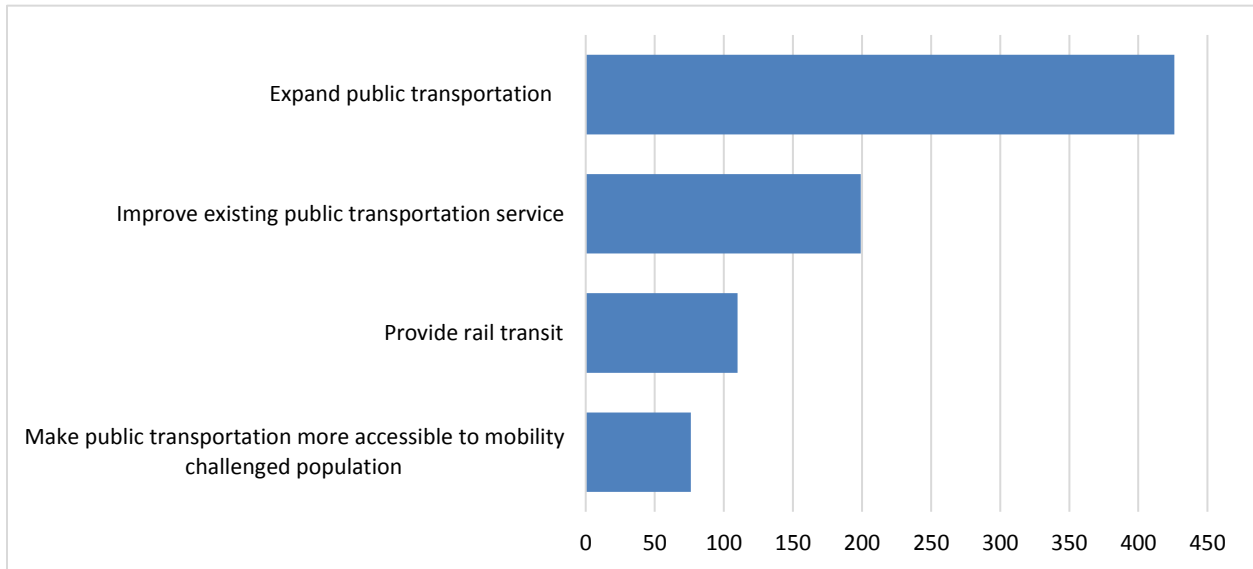
#### ***Public Transportation***

Researchers reviewed a sample of the 575 responses that were auto-coded *public transportation* and found the following four suggestions from respondents about public transportation that would make the transportation system work better for them:

- Expand public transportation.
- Improve existing public transportation service.
- Provide rail transit.
- Make public transportation more accessible to the mobility challenged population.

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Figure 7 provides the frequency that these solutions were mentioned within the public transportation topic.



**Figure 7. Frequency of Solutions Identified through Second-Level Coding of the Public Transportation Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

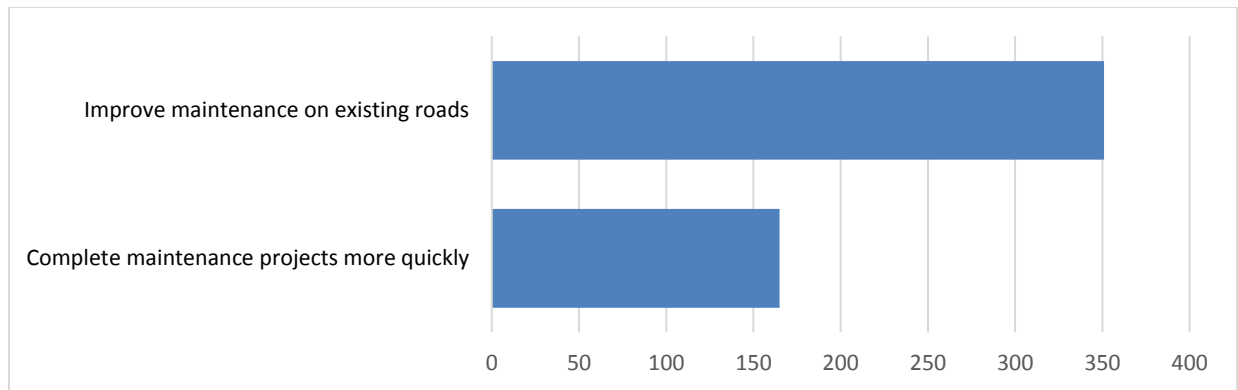
The majority of respondents indicated that they do not currently have access to public transit and would like to see public transportation service expanded to where they work and live. Improving existing public transportation service, such as increasing the number of buses and stops, is also an area where numerous respondents indicated that public transit could be improved to better serve their needs. Seventy-six respondents noted more access to public transportation was needed for the mobility challenged population (elderly and disabled).

### ***Maintenance***

Upon reviewing a sample of the 423 responses that were auto-coded *maintenance*, researchers identified two specific areas that respondents felt would improve the transportation system for them:

- Improve maintenance on existing roads.
- Complete maintenance projects more quickly.

Figure 8 provides the frequency that these solutions were mentioned within the maintenance topic.



**Figure 8. Frequency of Solutions Identified through Second-Level Coding of the Maintenance Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

Most respondents said that improving maintenance on existing roads would improve the transportation system for them, but a significant number of respondents (165) indicated that the pace that current maintenance projects are completed should be improved. This indicates that while those respondents are satisfied with the projects that are underway, they feel as though the projects could be completed more efficiently.

#### *Second-Level Coding Results for Less Frequently Mentioned Topics*

The following subsections provide the results of second-level coding for topics that were identified by researchers but were mentioned less frequently than the previously discussed topics (public transportation and maintenance).

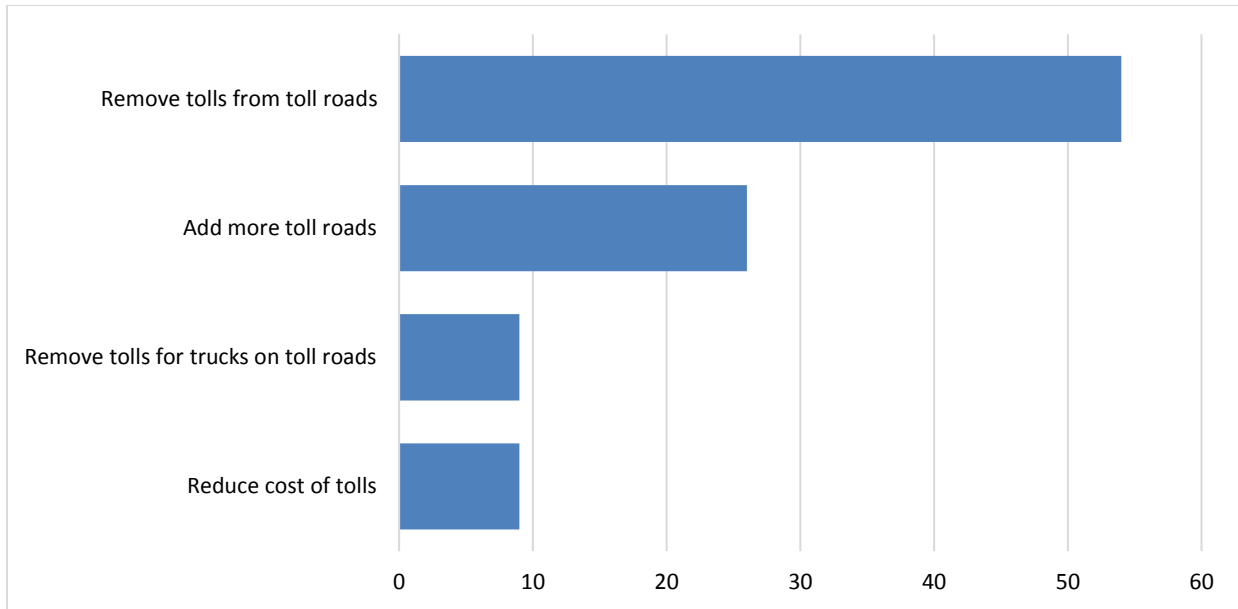
##### ***Toll Roads***

Researchers looked at the 98 responses that were auto-coded *toll roads* and identified four specific solutions that respondents felt would improve the transportation system for them:

- Remove tolls from toll roads.
- Add more toll roads.
- Remove tolls for trucks on toll roads.
- Reduce the cost of tolls.

While toll roads were the fifth most commonly referenced topic for the second open-ended question, the frequency that respondents mentioned toll roads is far less than the previous two topics discussed in this section (public transportation and maintenance).

Figure 9 provides the frequency that these four solutions were mentioned within the toll roads topic.



**Figure 9. Frequency of Solutions Identified through Second-Level Coding of the Toll Roads Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

Many of the responses that were auto-coded *toll roads* were comments indicating a desire to remove tolls from all Texas roads. However, of the 98 responses that were auto-coded *toll roads*, 26 suggested that building more toll roads would improve the system for them, indicating that some Texans see toll roads as a solution that can help the Texas transportation system.

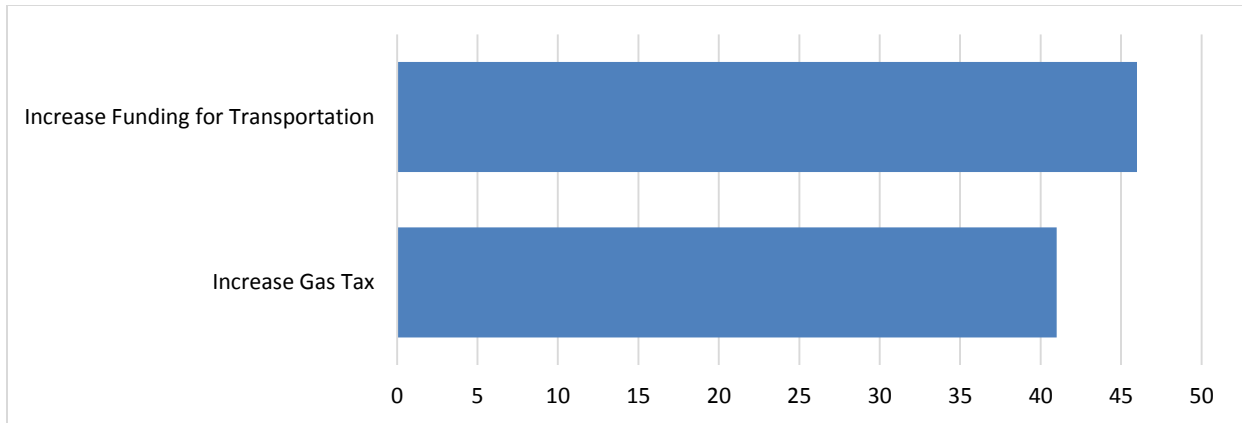
### ***Funding***

Eighty-nine responses were auto-coded *funding*. Upon further analysis, researchers identified two specific solutions that respondents felt would improve the transportation system for them:

- Increase funding for transportation.
- Increase the gas tax.

Figure 10 provides the frequency that these solutions were mentioned within the funding topic. Similar to comments auto-coded *toll road*, the number of responses auto-coded *funding* was far less than *public transportation* and *maintenance*.

Of the 89 comments that indicated that funding was an area that could help improve the transportation system for the respondent, many simply acknowledged the need for increased funding, though 41 comments specifically indicated that increasing the gas tax would best improve the transportation system for them.



**Figure 10. Frequency of Solutions Identified through Second-Level Coding of the Funding Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

***Transportation Demand Management***

Forty-five comments were auto-coded in the transportation demand management topic, which led researchers to the following two specific solutions provided by respondents:

- Improve carpooling options.
- Provide more options to work remotely to reduce congestion.

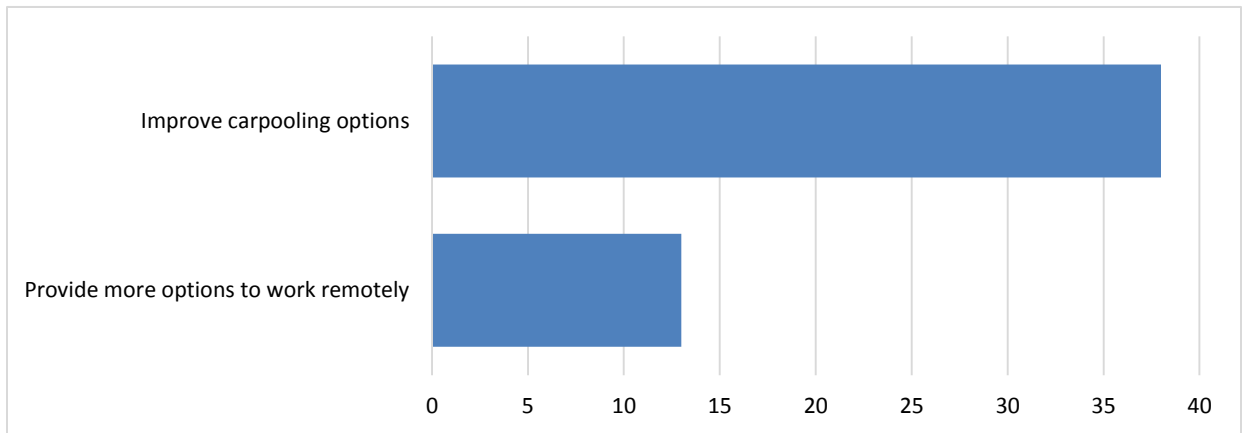
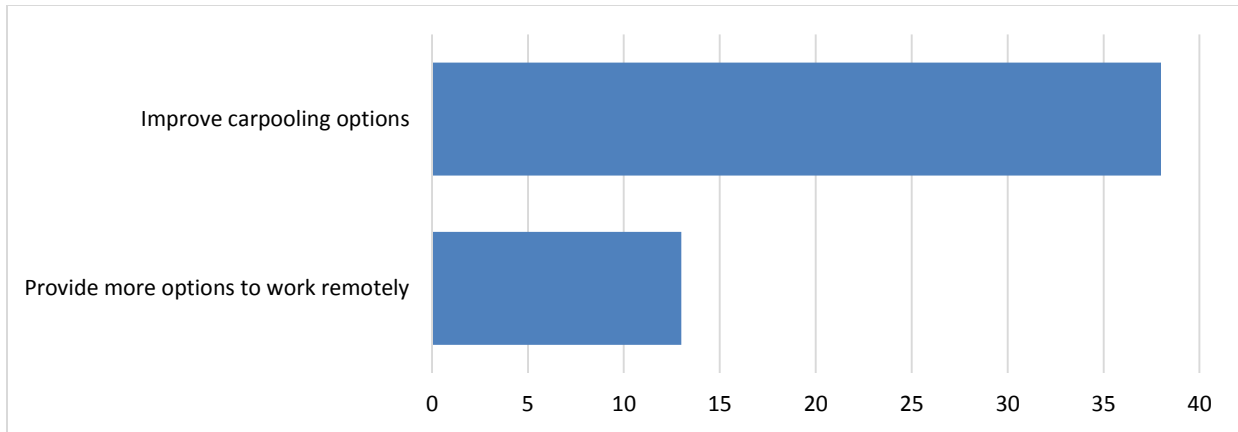


Figure 11 provides the frequency that these solutions were mentioned within the transportation demand management topic.



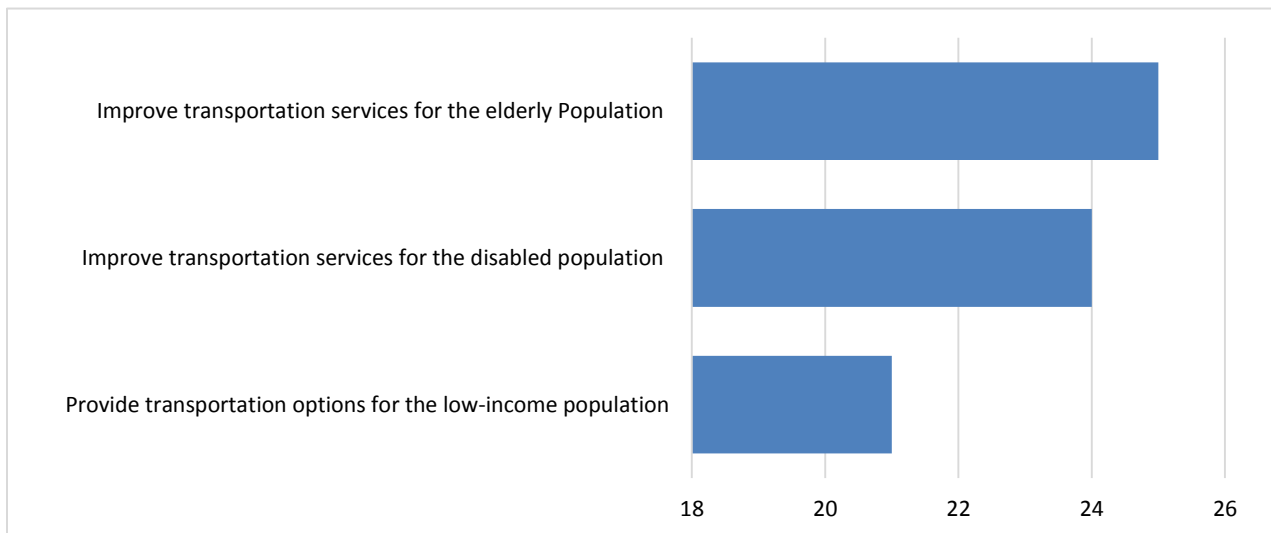
**Figure 11. Frequency of Solutions Identified through Second-Level Coding of the Transportation Demand Management Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

***Improved Transportation Access for the Mobility Challenged***

When reviewing the 39 comments that were auto-coded *improved transportation access for the mobility challenged*, researchers identified the following three specific solutions:

- Improve transportation services for the elderly population.
- Improve transportation services for the disabled population.
- Provide transportation options for the low-income population.

Figure 12 provides the frequency that these solutions were mentioned within the improved transportation access for the mobility challenged topic.



**Figure 12. Frequency of Solutions Identified through Second-Level Coding of the Improved Transportation Access for the Mobility Challenged Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

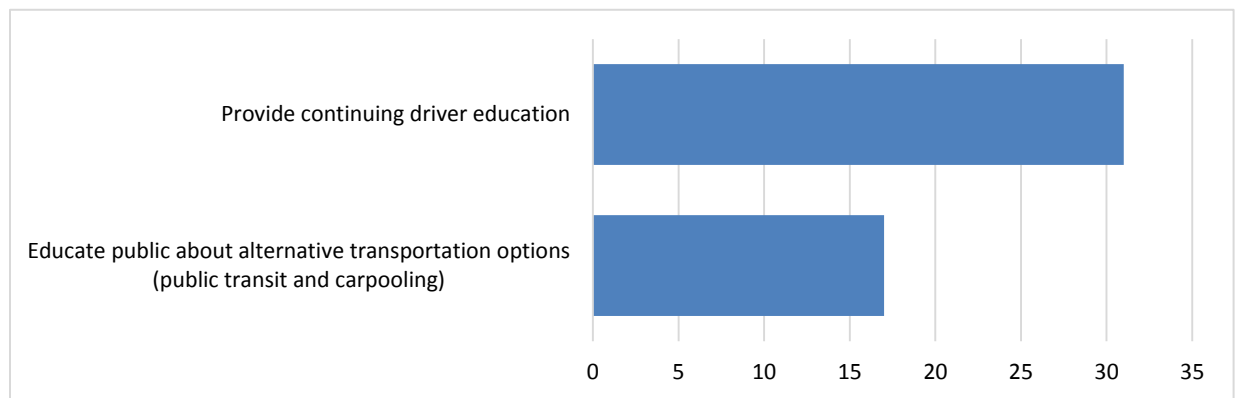
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### *Education of Drivers*

Thirty-seven comments were auto-coded *education of drivers*. Upon reviewing these comments, researchers identified two solutions that respondents felt would improve the transportation system for them:

- Provide continuing driver education.
- Educate the public about alternative transportation options (public transit and carpooling).

Figure 13 provides the frequency that these solutions were mentioned within the education of drivers topic.



**Figure 13. Frequency of Solutions Identified through Second-Level Coding of the Education of Drivers Topic for the Open-Ended Question “What Do You Think the State of Texas Should Change to Make the Transportation System Work Better for You?”**

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## **Findings and Conclusions**

Evaluating the responses from the open-ended questions gathered in the 2016 Texas Transportation Poll provides insight into transportation policy in Texas. The findings of this analysis are meant to provide context about what Texans feel are the most significant transportation issues affecting them and what solutions they believe will make the transportation system work better for them.

### **Most Significant Transportation Issues**

This section focuses on the five most significant transportation issues based on the in-depth analysis of the open-ended question “What is the most significant transportation issue affecting you personally in your region?” from the 2016 Texas Transportation Poll.

#### *Congestion*

Texans most frequently cited congestion in both the 2014 and 2016 polls. This underscores the finding from the 2014 in-depth analysis of the Texas Transportation Poll that the public is likely to be supportive of policies and practices that mitigate rural and urban traffic congestion.



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Results from this study show that Texans see traffic congestion as taking away time from other activities they value, and that some see multiple potential ways to mitigate the problem. In rural areas, Texans are affected by changes in freight traffic, such as growth in mineral extraction in certain locations. Drivers see the link between growth in industry and how it impacts their use of the roadway system. In urban areas, people see congestion as related to limited options for passenger travel. They recognize that the roadway systems are burdened with both local and through-traffic needs, and several mentioned support for investments in alternatives to driving—such as bus or rail transit.

### *Maintenance*

Texans also frequently referred to roadway maintenance as an issue in the 2014 and 2016 polls; however, in the 2016 poll, maintenance was the second most frequently cited transportation issue, as compared to the fifth most cited issue in the 2014 poll. This indicates a rising concern among Texans about the need for increased maintenance on the existing road infrastructure.

The perception of increased availability of transportation funding through sources such as Proposition 7 might lead Texans to be more interested in seeing increased maintenance because they may perceive that maintenance is delayed or substandard when resources are limited.

### *Construction*

In the 2014 and 2016 Texas Transportation Polls, construction was the third most frequently cited transportation issue. Most respondents indicated that construction takes too long, and they would like to see projects completed more quickly. Texans would receive well policies that aim to increase the efficiency of roadway construction completion. When considering policies that would help with Texans' concerns about construction, the number-one issue is congestion, and construction is likely being conducted to improve congestion issues.

### *Public Transportation*

Public transportation was the fourth most frequently cited transportation issue in both the 2014 and 2016 polls. This consistent level of concern from Texans means that the public would continue to receive well policies aimed at identifying specific transit needs and improving transit services.

Respondents to the Texas Transportation Poll mentioned issues with transit in both rural and urban contexts. Aging populations are likely to have increasing interest in paratransit services—flexible routes using vans, taxis, or other wheelchair-equipped vehicles serving people who cannot drive to get to medical appointments and other key destinations. In urban areas, respondents mention increasing needs for public transportation.

### *Truck Traffic*

The fifth most cited transportation issue in the 2016 poll was truck traffic, an issue that was not identified as significant in the 2014 poll. Respondents expressed concerns about increased truck traffic due to the oil and gas industry and the increased damage to roads. In addition, many

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members of the public indicated that they were concerned about the safety hazards associated with truck traffic.

## **Transportation Solutions**

This section provides conclusions and findings on the five most frequently cited transportation solutions based on the in-depth analysis of the open-ended question “What do you think the State of Texas should change to make the transportation system work better for you?” from the 2016 Texas Transportation Poll.

### *Public Transportation*

Respondents cited public transportation as a significant issue in both the 2014 and 2016 polls, and this carried into suggestions for potential solutions to the transportation system. The most frequently cited change that Texans would like to see in order to improve the transportation system for them was to improve public transportation. A more in-depth analysis of this solution provided four main suggestions (ordered from most to least frequently mentioned):

- Expand public transportation.
- Improve existing public transportation service.
- Provide rail transit.
- Make public transportation more accessible to for the mobility challenged population.

This analysis should be helpful in providing policy makers with additional context to understand how constituents are interested in seeing public transportation improved throughout the state. Most respondents cited the lack of service and believe providing new service/expanding service is an important aspect of improving the transportation system. Respondents also had significant interest in improving existing services (e.g., more frequent service and better amenities). While not as many respondents indicated that they are specifically interested in rail or that public transportation needs to be more available to the mobility challenged population (e.g., elderly and disabled), these specific solutions were provided.

### *Increased Roadway Capacity*

Increasing roadway capacity, whether it be adding new lanes or building new roads, was the second most frequently cited solution to improve the transportation system. This correlates with congestion being the most frequently cited transportation issue in both the 2014 and 2016 polls. This underscores that the public will receive well policies focused on increasing capacity in Texas to mitigate congestion.

### *Maintenance*

Respondents provided two separate specific solutions for maintenance. The majority of respondents indicated that increasing the amount of maintenance performed on roadways would make the transportation system work better. However, a number of respondents did indicate that finishing maintenance projects more quickly is an important solution to address their concerns

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with the transportation system. Though maintenance work tends to be very visible to the public, the timing and cost of projects are not always transparent. As noted previously, policies that improve the efficiency with which maintenance projects are completed could alleviate concerns that Texans have about maintenance.

### *Improved Signal Timing*

Improving signal timing was a fairly straightforward solution respondents frequently cited.

### *Toll Roads*

Toll roads were the fifth most frequently mentioned solution that respondents provided as a way to make the transportation system work better for them. The majority of respondents suggested removing tolls from toll roads. However, a significant number of respondents also indicated that building more toll roads would benefit them. In addition, many respondents suggested removing tolls for trucks in order to get them off the other local highways. This wide range of sentiments on toll roads confirms that toll roads remain a controversial topic in Texas, but this analysis does provide some areas where policy makers may consider using toll roads to meet their constituents' needs.

## **Limitations and Next Steps**

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This qualitative study offers some insights into what people think about transportation topics, reflecting their own language to help convey both feelings and specifics about transportation topics important to Texans. However, this brief analysis should be considered a bridge to looking for solutions, rather than offering conclusive evidence. The main limitations of this study include the brevity of the responses, the potential for the linguistic software to mischaracterize sentiments, and the amount of researcher time needed to evaluate the accuracy of coding and sentiments. Many of the actual responses are quite brief, even if some are nonetheless useful. Single-word responses can establish a topic of concern but do little to offer insight concerning issues of *who*, *where*, *why*, or *how*. The computerized methods of linguistic analysis in this study are the very latest available, but many subtleties of language cannot be captured. The use of irony, for instance, tends to use words associated with a tone that might be the opposite of its true meaning. Additional researcher time on this data set would likely result in more accurate and full understanding of the results.

Next, this qualitative study should be evaluated against the quantitative results from the same poll, the coding should be evaluated through more of the data, and the process should be replicated using similar methods in other states. The multiple-choice formatted questions in the Texas Transportation Poll provide a strong quantitative basis for understanding opinions and attitudes, but researchers could gain understanding of differences between the quantitative and qualitative results provided in the open-ended responses through further analysis. Additionally, the manual coding performed by two researchers covered only a small portion of the full data set. This provides an estimate of coding accuracy, but more extensive analysis may reveal additional

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valuable issues and subtopics. Also, replication of this study's methods should be performed in other states to provide insight into how opinions and attitudes may differ.

## **Authors**

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## **Date Published**

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January 2017