



ENSURING DRIVABILITY: CHALLENGES AND SOLUTIONS FOR AMERICA'S ROADS

A SURVEY OF PAVEMENT OFFICIALS AND THE DRIVING PUBLIC

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EXECUTIVE SUMMARY

The nation's roads and highways are critical to social and economic mobility; however, years of deferred maintenance and underinvestment have left the country with a road network that does not meet drivers' expectations for a safe, smooth, comfortable ride. This neglect has direct costs for drivers in terms of vehicle wear-and-tear and it has broader economic costs connected with the slowed delivery of goods and services.

To better understand the expectations and experiences of road users and owners alike, Edelman Berland, on behalf of the Asphalt Pavement Alliance, a partnership of the Asphalt Institute, the National Asphalt Pavement Association, and the State Asphalt Pavement Associations, conducted a series of interviews and surveys with pavement specifiers and drivers.

The surveys found that drivers understand the connection between poor road conditions and underinvestment in infrastructure. They see that departments of transportation and public works agencies do not have the resources needed to properly maintain roads at a level of good ride quality, and they are willing to see user fees increase if it means money goes into maintaining and improving roads.

It was discovered that the attributes pavement engineers associate most closely with asphalt match up best with what drivers want from their roads: a smooth surface that's easy to maintain with minimally disruptive roadway work zones.

Specifically, the survey of drivers and commercial truckers found that:

- ▶ 84% of drivers and 73% of commercial truckers want well-maintained roads without the inconvenience of roadway shutdowns by having maintenance performed during off-peak hours and the road open for rush hour.
- ▶ Most drivers, 69%, said they are willing to accept periodic maintenance delays if it means they get to enjoy a smooth driving experience. Smooth, well-maintained roads are more comfortable for drivers; they also cause less wear-and-tear on vehicles, reducing operating costs.
- ▶ 86% of drivers and 78% of commercial truckers feel spending priorities should focus on the maintenance and repair of existing roads, rather than on building new roads.
- ▶ A majority, 51% of drivers and 52% of truckers, support new or additional funding mechanisms to ensure adequate funding for roadway maintenance and construction.

It is a tall order for DOTs and other pavement decision makers to fill, but they do have widespread public support across the country for increased funding when it is devoted to transportation maintenance and improvement projects.

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INTRODUCTION

Whether it's for a cross-country road trip or just the morning commute to work, when Americans hit the road, they demand a few simple things — that they get to their destination safely and that the roads enable them to get there quickly and comfortably without detours or delays.

Unfortunately, all too often, our nation's roads are not meeting drivers' expectations.

The American Society of Civil Engineers reports that 42% of America's major urban highways are congested (ASCE 2013); researchers at Texas A&M Transportation Institute calculate the economic cost at an estimated \$121 billion in wasted time and fuel annually (Schrank et al. 2012). The American Transportation Research Institute found that congestion, primarily in urban areas, costs the trucking industry more than \$9.2 billion (ATRI 2014), adding to the costs of goods and services even in walkable and bikeable transit-oriented communities (Bassok et al. 2012).

But, as every federal, state and local highway official or public works director understands, bringing America's aging roadway infrastructure up to a level of good ride quality will cost more than today's limited budgets can support.

According to the Federal Highway Administration (FHWA), 49.4% of vehicle miles traveled (VMT) on the Federal-Aid Highway System failed to meet the standard of "good ride quality" in terms of smoothness and 18% failed to reach the less stringent "acceptable" level (DOT 2014). This increases wear-and-tear on vehicles, increases repair costs (TRIP 2013), and can impact travel time and even crash rates (Jiang et al. 2014). Well maintained roads also improve the delivery of goods to market, increasing efficiencies and reducing costs (Shatz et al. 2011).

America depends on strong, safe roads. Our economy relies on the timely delivery of commercial goods. Commuters rely on the nation's roads to get to and from work. Parents need safe roads to transport their children to and from school.

As our nation's infrastructure ages, smart decisions need to be made for our future. Over the past year, Edelman Berland has gathered data about what drivers look for in a road, as well as the landscape for pavement decision makers. From these interviews and surveys with pavement decision makers and drivers, it was discovered that the attributes pavement engineers associate most closely with asphalt match up best with what drivers want from their roads: a smooth surface that's easy to maintain with minimally disruptive roadway work zones.

The survey also found that drivers understand the connection between poor road conditions and underinvestment in infrastructure. They see that DOTs and public works agencies do not have the resources needed to properly maintain roads at a level of good ride quality, and they are willing to see user fees increase if it means money goes into maintaining and improving roads.

METHODOLOGY

Starting in 2013, the Asphalt Pavement Alliance (APA), a partnership between the Asphalt Institute, the National Asphalt Pavement Association (NAPA) and the State Asphalt Pavement Associations (SAPAs), commissioned Edelman Berland to conduct a series of qualitative and quantitative surveys to better understand the current decision landscape for state department of transportation (DOT) officials and engineers, public works agencies, private developers, and other key stakeholders. Subsequent surveys were also conducted to understand what drivers want from their roadways.

For the DOT and Pavement Stakeholders Survey, 20 in-depth interviews were conducted with pavement decision makers from June to August 2013. Additionally, 221 pavement engineers, architects, developers, toll way owners and concessionaries, and other key stakeholders participated in an online survey Aug. 8–23, 2013. It has a margin of error of $\pm 6.6\%$ at the 95% confidence interval.

For a December 2013 driver survey, 1,000 U.S. drivers, 18+, who drive more than 50 miles per week, participated in an online survey Dec. 5–17, 2013. It has a margin of error of $\pm 3.1\%$ at the 95% confidence interval.

For a 2014 driver survey, 3,085 U.S. drivers, 18+, participated in an online survey March 7–13, 2014. It has a margin of error of $\pm 1.8\%$ at the 95% confidence interval. To detect regional variations, an oversampling of 1,152 U.S. drivers, 18+, was included in the survey. The regional results have a margin of error ranging from $\pm 3.9\%$ to $\pm 4.3\%$ at the 95% confidence interval. An oversampling of 376 commercial truck drivers was also included. The trucker results have a margin of error of $\pm 5.9\%$ at the 95% confidence interval.

ABOUT EDELMAN BERLAND

Edelman Berland is a global, full-service market research firm that provides corporate, consumer, non-profit, and government clients with insights to make their engagements with the world the smartest they can be. The company specializes in qualitative and quantitative research, measurement, tracking, and analysis in reputation, branding, and communications. www.EdelmanBerland.com



ABOUT THE ASPHALT PAVEMENT ALLIANCE

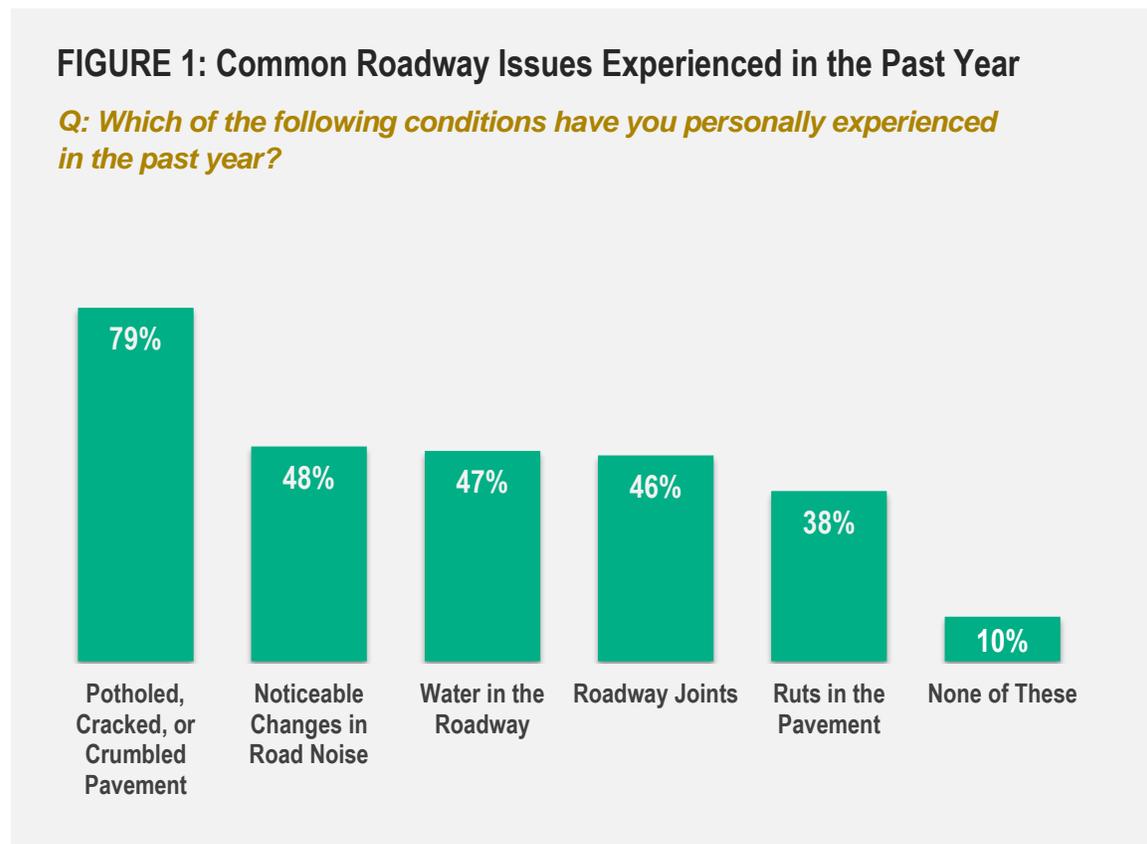
The **Asphalt Pavement Alliance** is a partnership of the Asphalt Institute, National Asphalt Pavement Association, and the State Asphalt Pavement Associations. www.DriveAsphalt.org



WHAT MATTERS TO DRIVERS?

In December 2013 and March 2014, Edelman Berland surveyed 4,085 drivers across the United States to understand what matters most to them about the roads they drive on.

In general, drivers were frustrated by the state of our nation's aging infrastructure and understood the need to invest public funds in the maintenance and upkeep of roads and bridges. Pavement deterioration associated with a lack of maintenance, such as potholed, cracked or crumbling pavement, was identified as the most common roadway problem encountered (Figure 1).



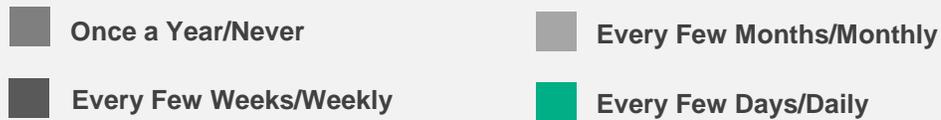
It is worth noting that the survey was conducted at the tail-end of a harsh winter that had many DOTs struggling to keep pace with winter maintenance tasks, including patching roadways. A search using Dow Jones Factiva database found a 204% increase in news reports about winter-damaged pavements during the first quarter of 2014 compared to the same time period in 2012. This may have affected the sensitivity of drivers to maintenance-related pavement deterioration, although potholed, cracked or crumbling pavement was noted as a major frustration (cited by more than 79% of respondents) in all regions of the country.

Other roadway problems that drivers noted encountering included noticeable changes in road noise (48%), water in the roadway (47%), roadway joints (46%), and ruts in the pavement (38%).

When asked how frequently each of these situations was encountered, nearly three-quarters of drivers reported dealing with maintenance-related pavement deterioration on a daily or weekly basis. By comparison, water in the roadway was a more seasonal occurrence; only 11% said it was encountered daily (Figure 2).

Figure 2: Common Roadway Issues, Frequency Encountered

Q: And thinking again about these different roadway conditions, how often do you tend to experience them in the roads you drive on most frequently?



Finally, of these roadway conditions, the most frustrating for both drivers in general and for truckers were maintenance related. Again, the timing of the survey in late winter may have increased respondents' sensitivity to the problems. However, about two-thirds of all respondents also expressed frustration with rutted pavement, which can indicate problems with traffic loading or the design of a road but can also be addressed through a pavement maintenance program. Nearly half of respondents (45% of all drivers; 48% of truckers) expressed frustration with driving over poor transverse joints, which are often noticed as a regular “thumping” sound encountered on concrete pavements (Figures 3 and 4).

Figure 3: Roadway Conditions, Driver Frustration

Q: How frustrating are each of these to you personally when you are driving?

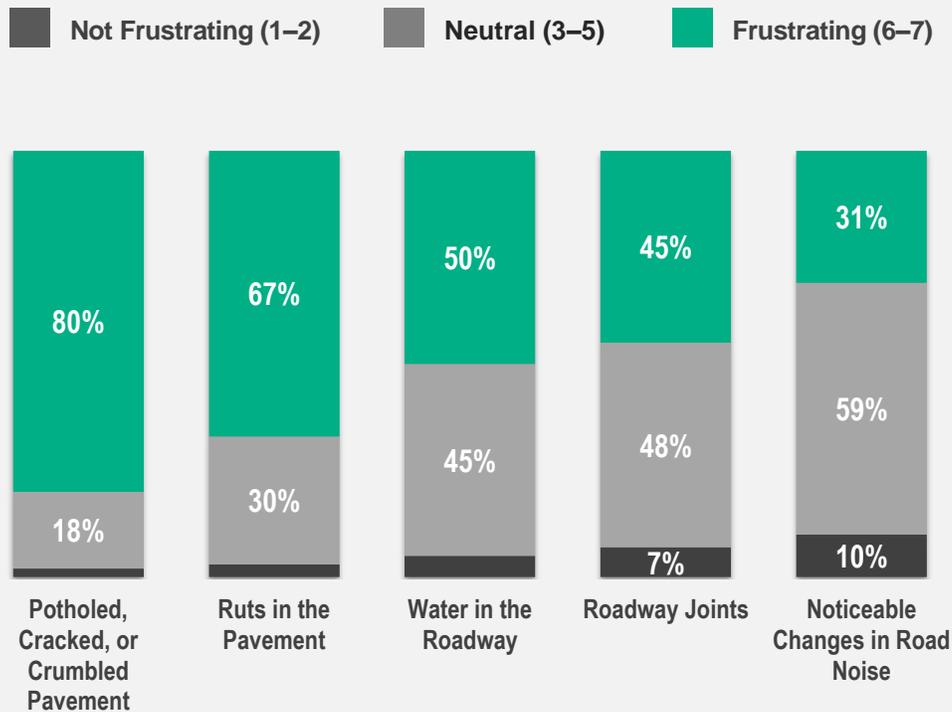
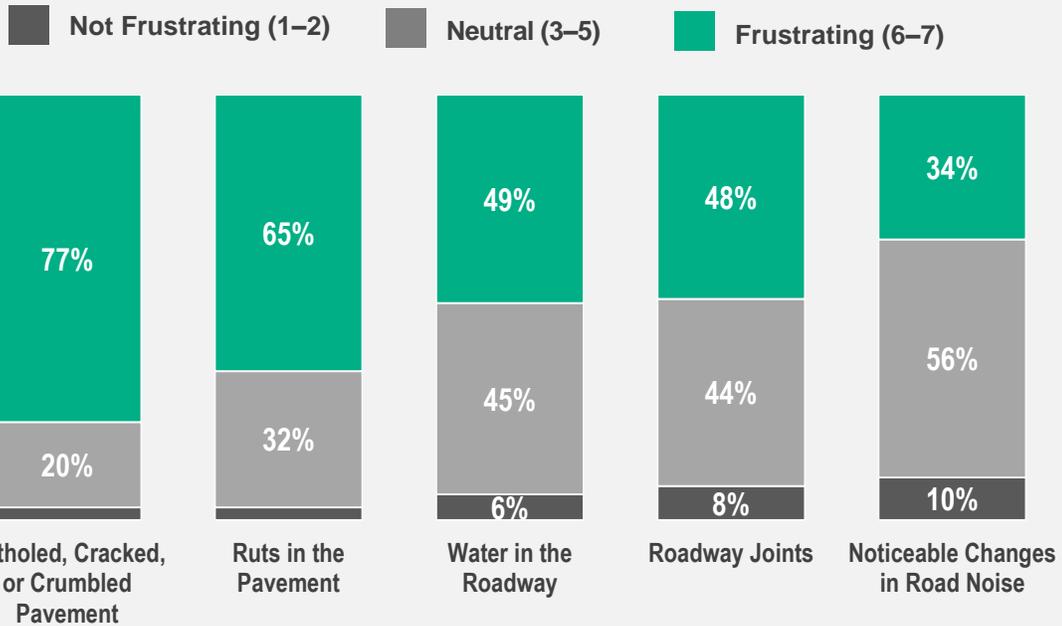


Figure 4: Roadway Conditions, Trucker Frustration



Q: How frustrating are each to you personally when you are driving?



Drivers noticed differences in the noise level of pavements, but, except for noise associated with roadway joints, didn't rate it as a major source of frustration while driving. When asked to think about how they experience road noise while at home (as opposed to while driving), however, the importance of quiet pavements became more apparent. More than half of those surveyed said that road noise, not including sirens or other intermittent sources of noise, was at least a mild nuisance when they were in their yard (Figure 5a). And 81% of homeowners said they'd be willing to pay more for a comparable house if road noise was less audible (Figure 5b), which is in line with previous research into the relationship between road noise and home values (Nelson 2007).

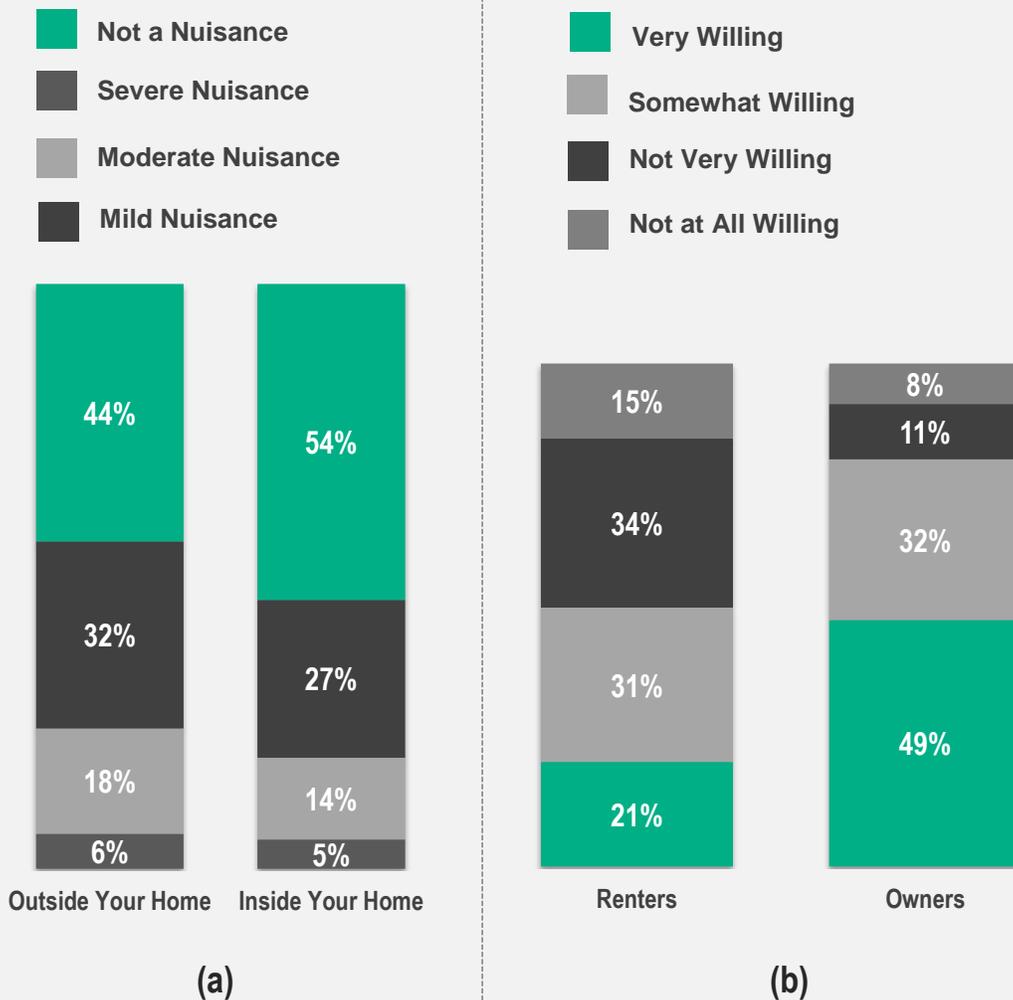
Figure 5: (a) Road Noise Near the Home

Q: When in your yard or another location outside your home, how much of a nuisance is the normal road noise from the streets around your home, not including sirens or other sporadic noises?

Q: When in your home, how much of a nuisance is the normal road noise from the streets around your home, not including sirens or other sporadic noises?

Figure 5: (b) Willingness to Pay More for Less Road Noise

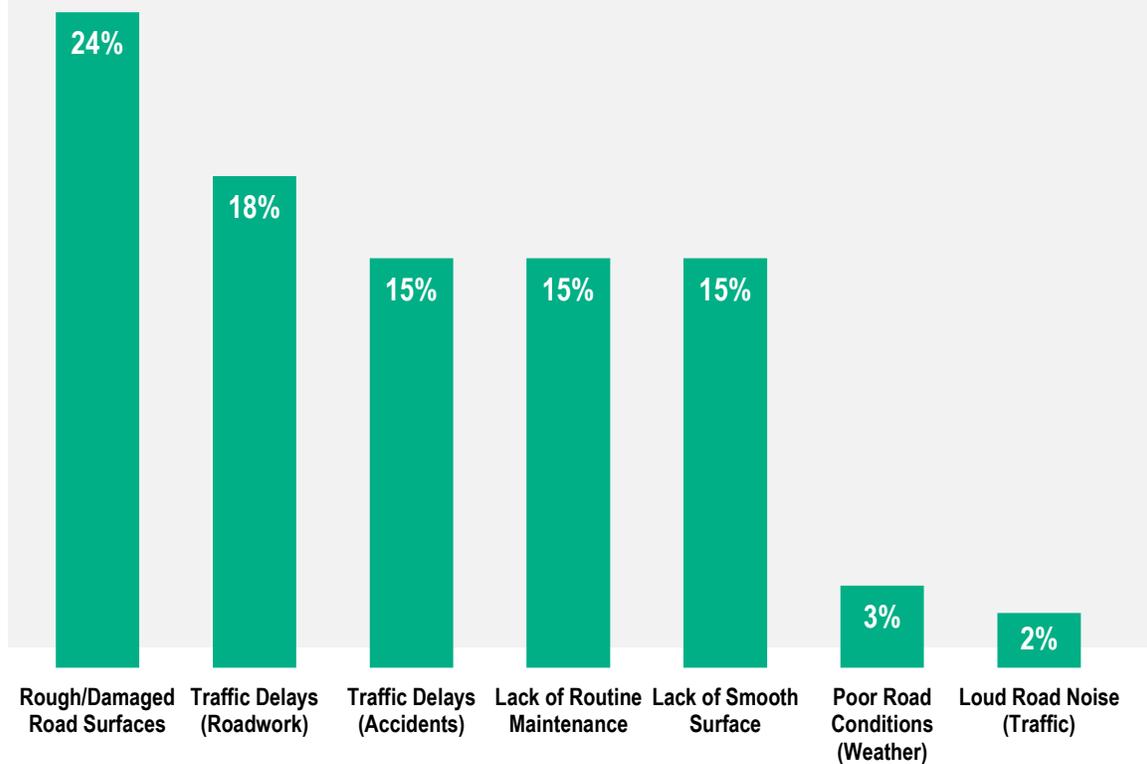
Q: How willing would you be to pay more for your home/pay a higher rent if noise for the same amount of traffic were half as loud as it currently is?



Putting it all together, drivers' greatest frustrations while driving are connected to pavement aspects that can be addressed through maintenance. Maintenance that keeps pavements smooth and safe also can help mitigate roadway noise. However, while drivers want to see roads well maintained, they don't want to be inconvenienced by detours and extended roadwork delays (Figure 6).

Figure 6: Biggest Road Complaints

Q: Which TWO of the following would you say are your biggest complaints about the type of road you most often drive on? (Congestion-related responses removed)

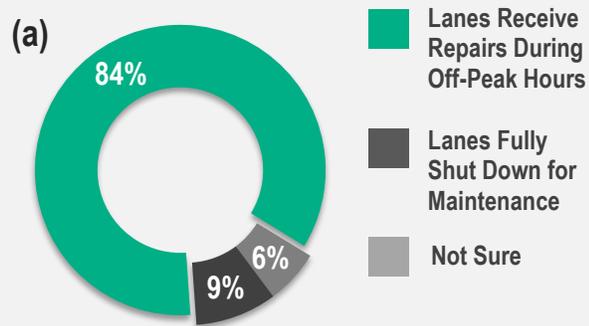


To better understand what tradeoffs drivers were willing to make between maintaining and improving roads or dealing with road construction, we asked a series of questions about maintenance preferences. More than two-thirds of those surveyed were willing to encounter periodic construction delays if it meant a more consistently smooth road (Figure 7b). A similar number of drivers said they would prefer a road that is resurfaced as often as every 10 years but lasts indefinitely to one that may receive less maintenance but may need to be replaced after 30 to 40 years (Figure 7c). However, 84% of the driving public and 73% of truckers wanted roadwork to be conducted during off-peak driving hours so that roads could remain fully open to traffic during rush hours (Figure 7a).

The issue of maintenance is very important to drivers. Fifty-eight percent of participants said they want agencies to place an emphasis on building roads that are designed to last with regular maintenance. They also want roads that can be repaired quickly (42%). Thirty-one percent of truckers and 28% of drivers listed a smooth road surface as one of their top priorities (Figure 8).

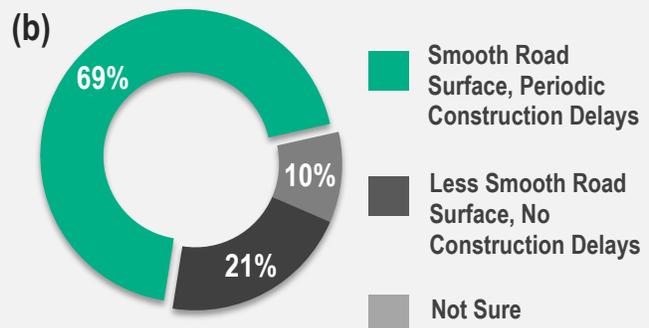
Figure 7: Maintenance Preferences

Q: Which of the following do you prefer?



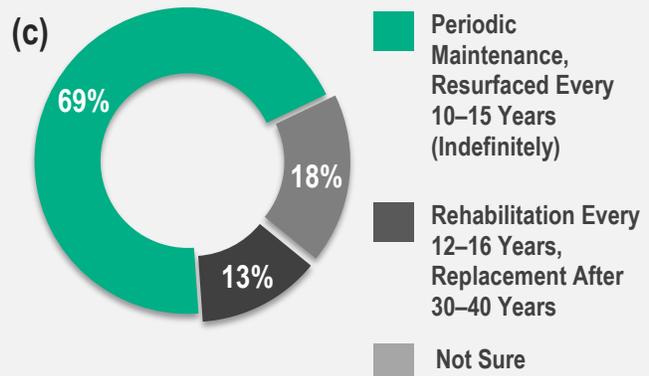
Truckers

Off-Peak Repairs (73%)
Fully Shut Down (20%)
Not Sure (6%)



Truckers

Smooth/Construction (65%)
Less Smooth/No Construction (26%)
Not Sure (9%)

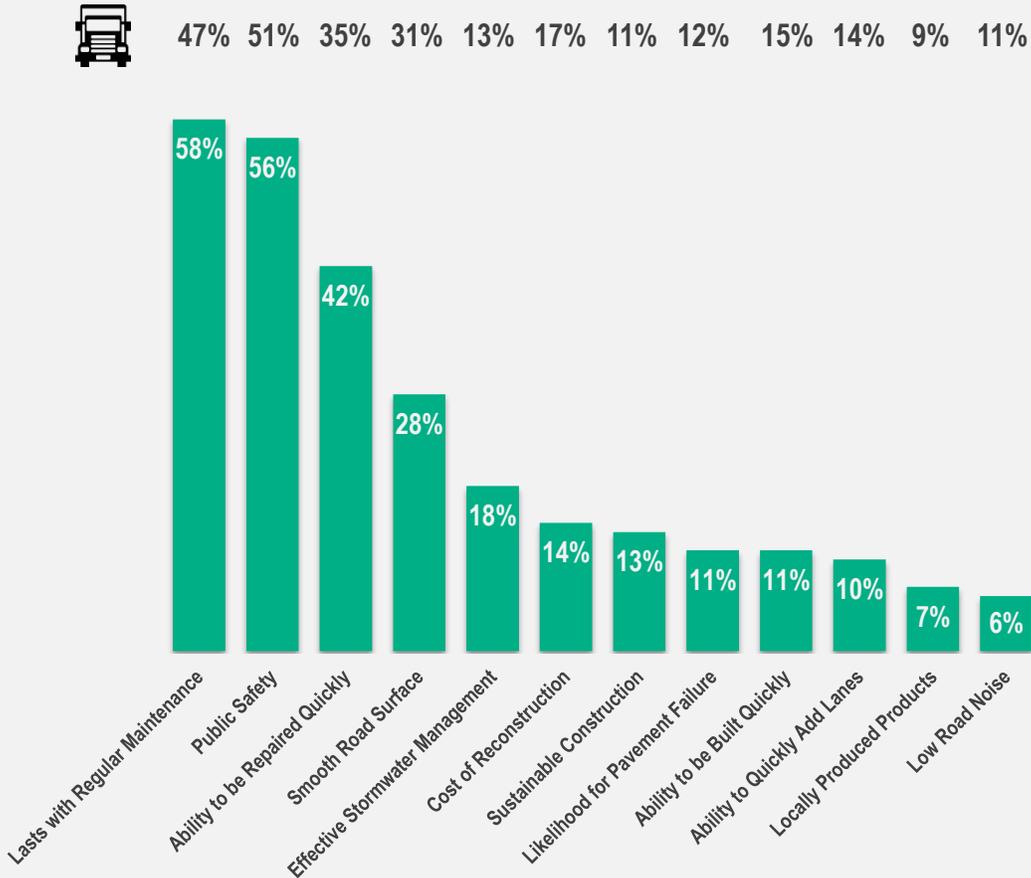


Truckers

Periodic Maintenance (60%)
Rehab & Replacement (26%)
Not Sure (14%)

Figure 8: Priorities for Building or Rebuilding a Road

Q: What would you say are the three most important factors officials should consider when building or rebuilding a road?



WHAT MATTERS TO PAVEMENT DECISION MAKERS?

In research conducted from June through August 2013, Edelman Berland spoke with 20 executive-level pavement decision makers and fielded a quantitative survey with another 221 transportation engineers, architects, developers and other key stakeholders at state DOTs and private entities. Not surprisingly, the pavement decision makers revealed that maintaining infrastructure with a shrinking funding stream was the top issue facing their agencies. Almost half of those surveyed (48%) identified transportation funding as their top challenge (Figure 9).

With most transportation budgets funded by user fees, primarily in the form of taxes on vehicle fuel sales paid at the pump, increased vehicle fuel economy and changing driving habits have combined with inflation and fluctuations in the price of materials, equipment, and labor to reduce the amount of money DOTs have to invest in road construction and maintenance. At the federal level, the fixed per-gallon user fees have not increased since 1993 and efforts to raise money at the state level for infrastructure investment have been mixed. The result is budgets have grown ever tighter as years of deferred maintenance come to a head and as many pavements in the national highway system approach the end of their design life.

Given these pressures, pavement decision makers are paying close attention to ways they can most efficiently deliver and maintain a consistent level of service to drivers. To this end, they are placing an emphasis on pavement durability, life-cycle costs, and the performance of the pavement — how well it provides drivers with a consistent level of service and availability (Figure 10).

Figure 9: Challenges to Meeting Priorities

*Q: What are the challenges to meeting your top three priorities?
[Shown: Coded open-ended response]*

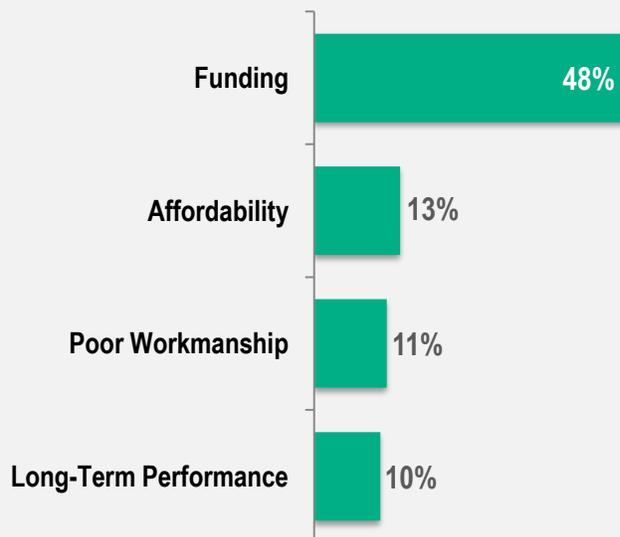
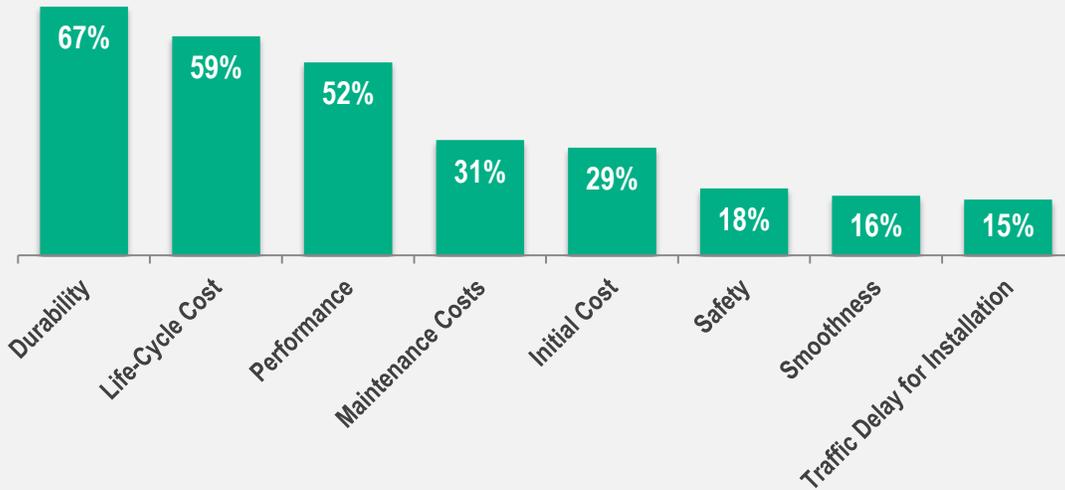


Figure 10: Top Three Priorities

Q: What are the challenges to meeting your top three priorities?
[Shown: Coded open-ended response]



When it comes to durability, officials are looking to ensure that roads offer a high level of performance over an extended period of time, and they understand that proper maintenance is part of ensuring durability. Pavement structures that remain strong without the need for eventual complete reconstruction provide the level of durable performance officials are seeking. Periodic resurfacing of a durable pavement structure provides the public a like-new driving experience at the fraction of a cost of a fully reconstructed road (Newcomb et al. 2010). Along with durability, agencies look at how much it will cost over a pavement’s service life to build, maintain, and ultimately replace the road, if necessary. To help balance these concerns, DOT officials interviewed reported relying upon the expertise of local engineers and pavement design methods that take into account locally available materials, expected traffic patterns and loading, and desired performance characteristics, as well as life-cycle cost and maintenance considerations.

While pavement decisions are made through engineering processes, DOTs and agencies also note that in an age of social media they are increasingly concerned about public opinion. They are engaging with the public to explain construction decisions and to assure taxpayers that transportation funds are being well spent. All of the DOTs responding to AASHTO’s 2013 Social Media survey reported at least one person on staff dedicated to public communications and more than a third of the respondents had dedicated social media managers on staff (AASHTO 2013).

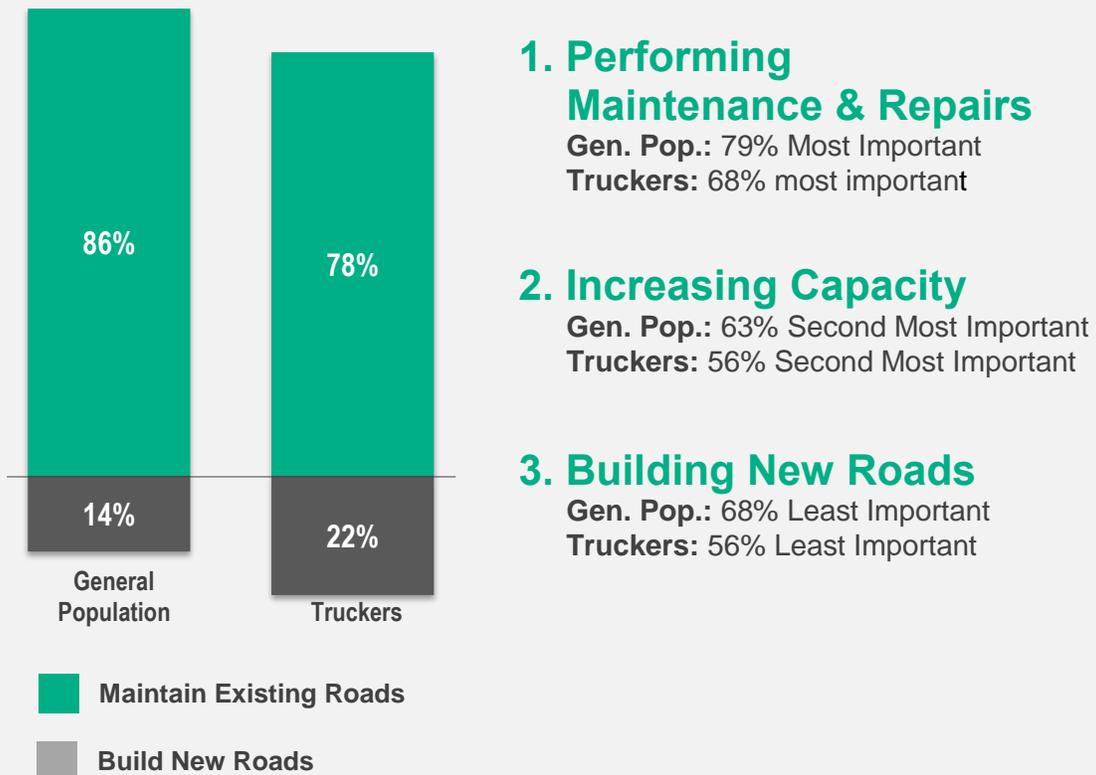
THE FUNDING CHALLENGE

The positive news for DOTs and public works agencies is that drivers understand state and local budget constraints and the difficult jobs that state and local DOTs face every day. However, drivers were clear in expressing their preference for focusing spending on maintaining existing roadways (86%) rather than new road construction (14%). Increasing capacity, through the addition of lanes to an existing road to relieve congestion, was considered by most drivers (63%) and truckers (56%) as the second-most important priority for transportation spending (Figure 11). This is in line with other surveys that show public support for prioritizing roadway maintenance and improvement ahead of new construction (ETC Institute 2012; SGA & TCS 2014).

Figure 11: Roadway Spending Priorities

Q: When thinking about investments in roadways, do you believe the spending priority should be building new roads or maintaining and improving existing roads?

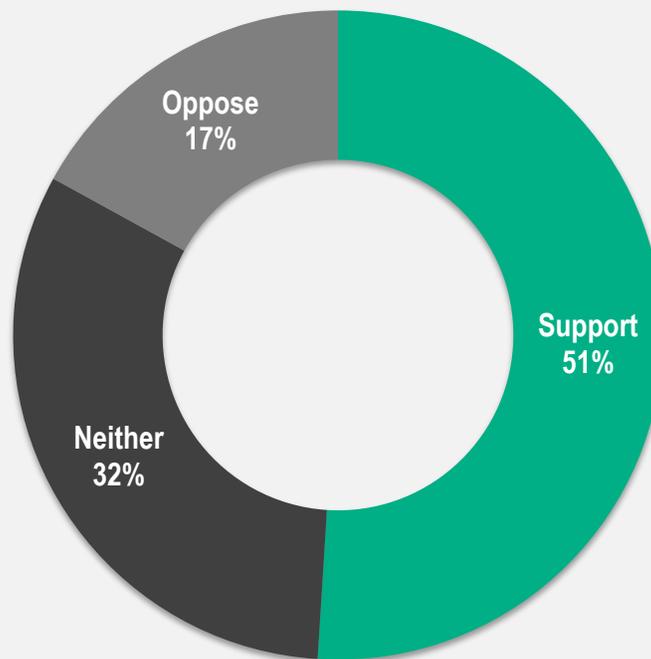
Q: Thinking about public roads, how would you prioritize spending?



To ensure that roads are well maintained, more than half of those surveyed said they were in favor of new and/or additional funding mechanisms for transportation projects (Figure 12). Support for specific funding options varied, but increasing vehicle registration fees and increasing tolls and taxes received the support of more than a fifth of those surveyed (Figure 13).

Figure 12: Support for New Funding for Roadway Maintenance and Construction

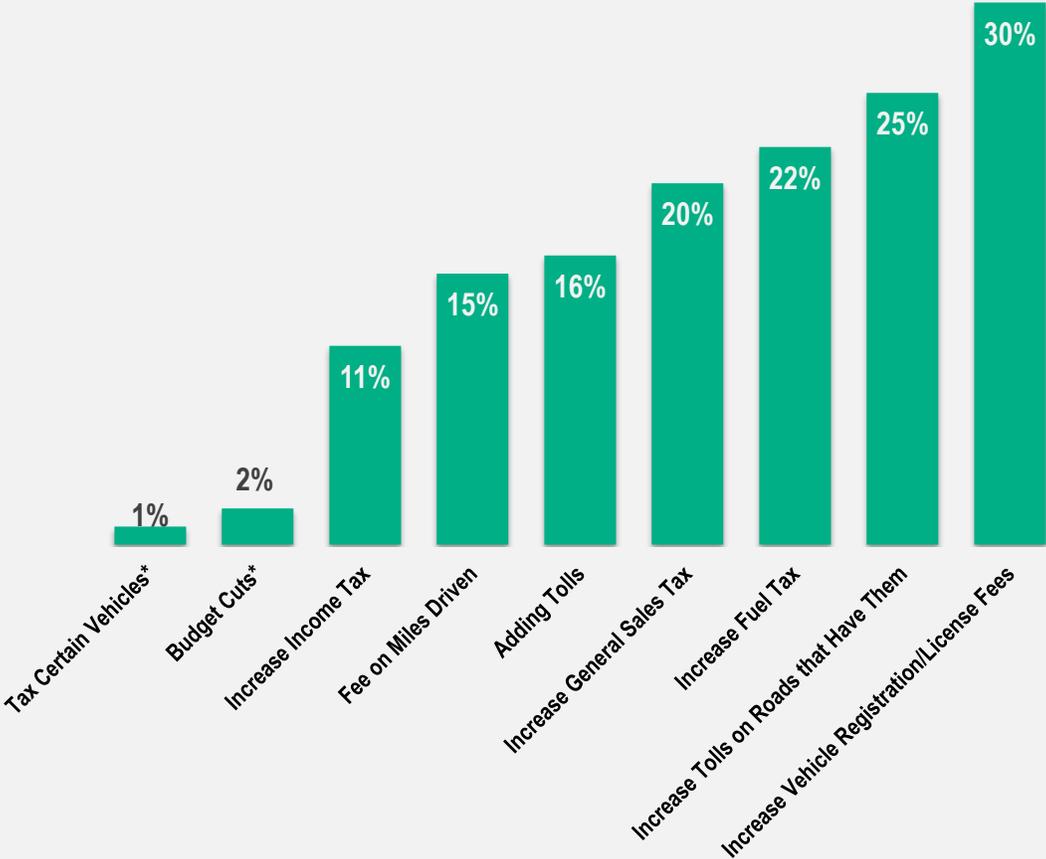
Q: How strongly would you support or oppose another funding mechanism to ensure adequate funding for roadway maintenance and construction?



52% of Truckers Support a New Funding Mechanism

Figure 13: Support for New Funding for Roadway Maintenance and Construction

Q: Which of the following funding mechanisms would you support if you were assured that the funds would be dedicated to building and maintaining roadways? (Respondents could pick more than one.)



*Answer Volunteered by Respondents

There was little regional variation in support for specific new and additional funding mechanisms, although the only region with notable support for a fee on miles driven was the Pacific Northwest (Figure 14). Given that Oregon has trialed vehicle miles travelled (VMT) projects since 2007 and is currently implementing a volunteer per-mile road usage charge program (Whitty 2013), it is likely that regional familiarity with VMT programs helped increase interest in that funding option.

Figure 14: Funding Preferences by Region

Q: Which of the following funding mechanisms would you support if you were assured that the funds would be dedicated to building and maintaining roadways?

Pacific Northwest & Rocky Mountains

Registration/License Fees (33%)
Fuel Tax (22%)
Fee on Miles Driven (21%)

Upper Midwest

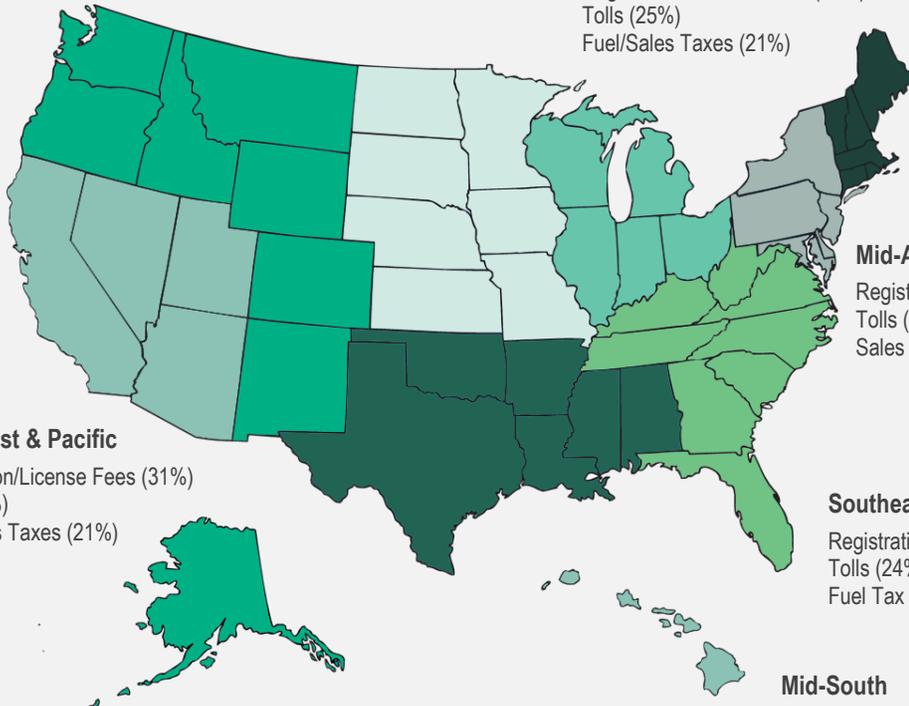
Registration/License Fees (33%)
Sales Tax (25%)
Tolls (23%)

New England

Tolls (30%)
Registration/License Fees (24%)
Fuel Tax (22%)

Great Lakes

Registration/License Fees (28%)
Tolls (25%)
Fuel/Sales Taxes (21%)



Mid-Atlantic

Registration/License Fees (30%)
Tolls (25%)
Sales Tax (20%)

Southwest & Pacific

Registration/License Fees (31%)
Tolls (27%)
Fuel/Sales Taxes (21%)

Southeast Atlantic

Registration/License Fees (27%)
Tolls (24%)
Fuel Tax (23%)

Mid-South

Registration/License Fees (35%)
Tolls (27%)
Fuel Tax (23%)



Truckers

Registration/License Fees (30%)
Sales Tax (28%)
Fuel Tax (26%)

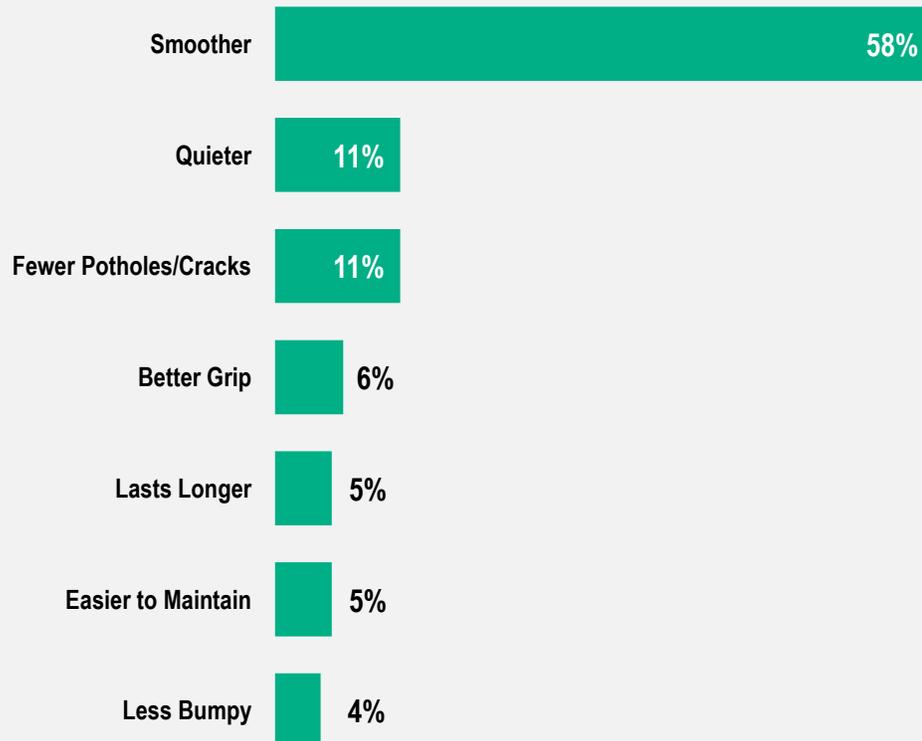
DELIVERING DRIVABILITY

Given that the public is willing to support increased funding so long as it goes to ensuring that roads are kept in a good state of repair, how can DOTs and other public agencies ensure they are delivering the level of drivability the public wants?

When drivers were asked why they preferred one road surface over another, 58% cited smoothness (Figure 15). This validates FHWA's findings that pavement smoothness is the key factor in determining highway user satisfaction (FHWA 2002).

Figure 15: Driver's Preferred Pavement Attributes

*Q: For what reasons do you prefer this type of pavement surface?
Please be as specific as possible.*

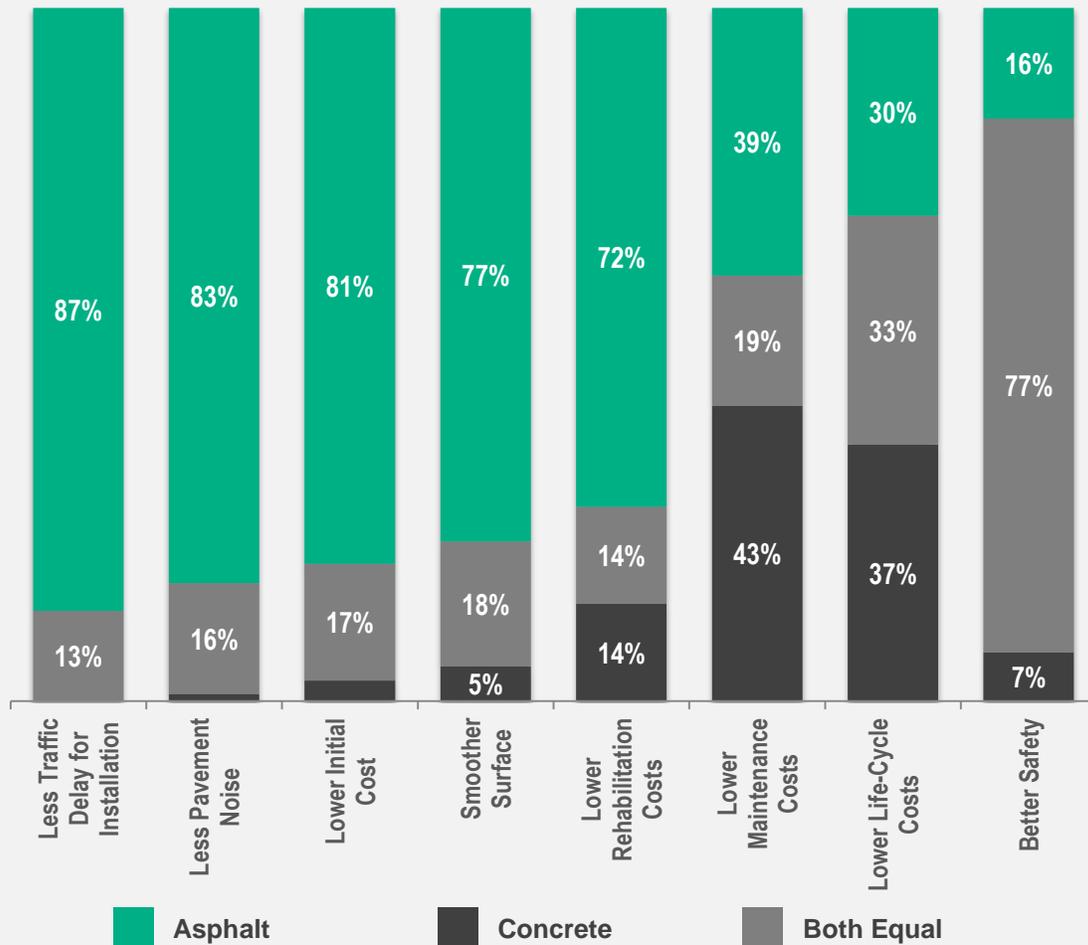


A focus on pavement smoothness — both building an initially smooth pavement and maintaining it to ensure smoothness over time — has multiple benefits for DOTs. Smoothness is an indicator of quality construction and a road that is built smooth is more likely to remain smoother longer (Perera & Kohn 2002), and to require less maintenance over time (Smith et al. 2002).

When asked specifically about pavement types, 77% of DOT officials, engineers and pavement designers said that asphalt pavements provide the smoother surface (Figure 16).

Figure 16: Pavement Attributes Associated With Drivability

Q: In your opinion, thinking about the many types of roadway projects you are responsible for — and considering each of these items — would you say asphalt has the advantage, concrete has the advantage, or are they both equal?



Other attributes respondents associated with asphalt pavements aligned well with the priorities cited by drivers. Eighty-seven percent of respondents said that there were fewer traffic delays due to construction with asphalt pavements, and 72% noted that asphalt has lower rehabilitation costs than concrete. No clear advantage was seen for maintenance costs or life-cycle cost considerations, as responses fell within the margin of error.

In interviews with DOT officials, asphalt's ease of maintenance and speed of construction with the ability to minimize driver inconvenience was cited as a significant benefit of asphalt pavements.

There is a clear alignment between the attributes pavement designers know are associated with asphalt pavements and those they associate with a well-maintained road that provides a high level of drivability.

CONCLUSION

Across America, roads are aging and in need of maintenance and repair; but, available transportation funding cannot keep pace with the need. Drivers want to see their roads receive periodic resurfacing to ensure a consistent level of drivability; however, they want public agencies to minimize the disruption of extended roadway work zones.

It is a tall order for DOTs and other pavement decision makers to fill, but they do have widespread public support across the country for increased funding when it is devoted to transportation maintenance and improvement projects.

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