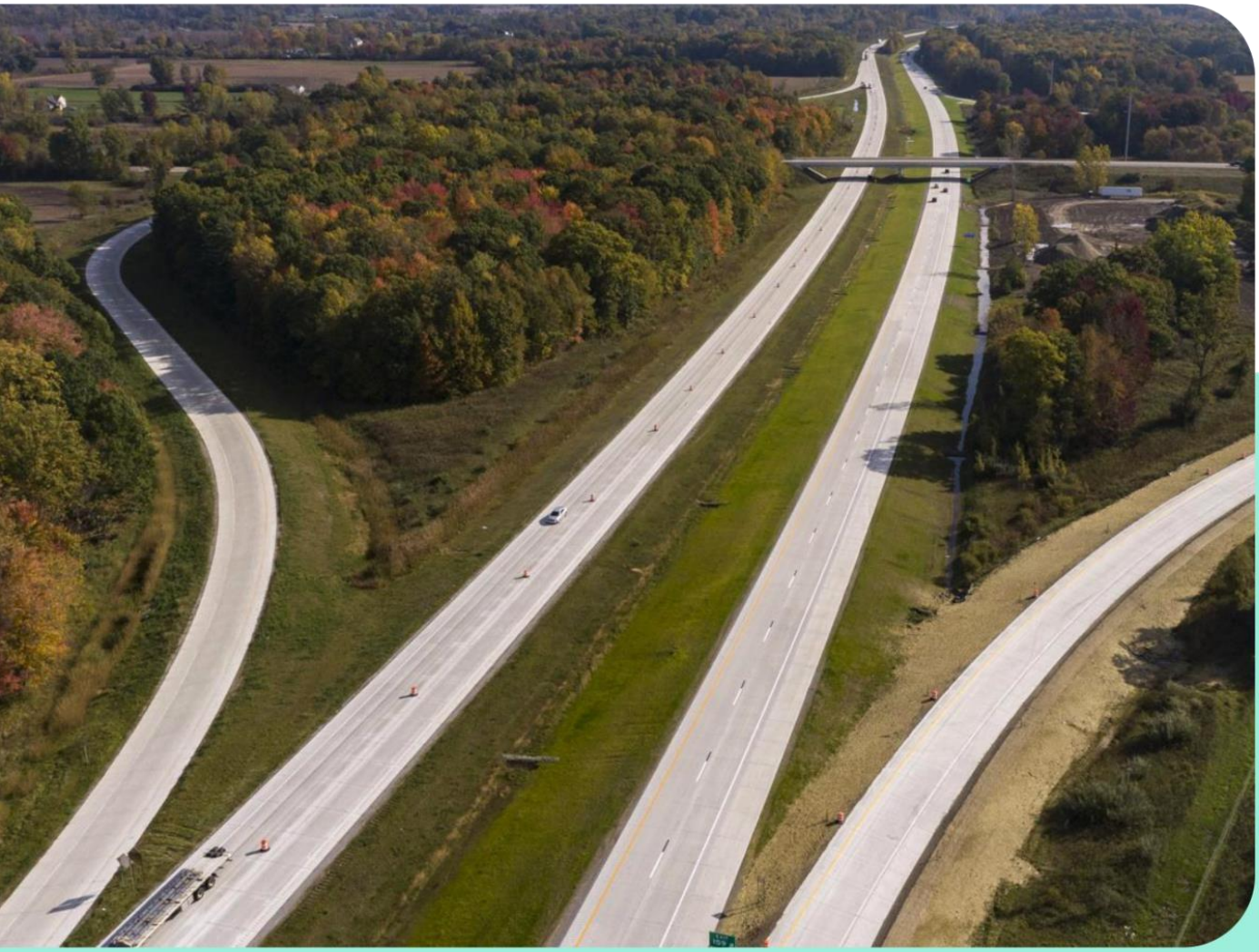
# Michigan RUC Study
# Public Perception Survey Results

Prepared for the Michigan Department of Transportation

**August 2024**



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# Executive Summary

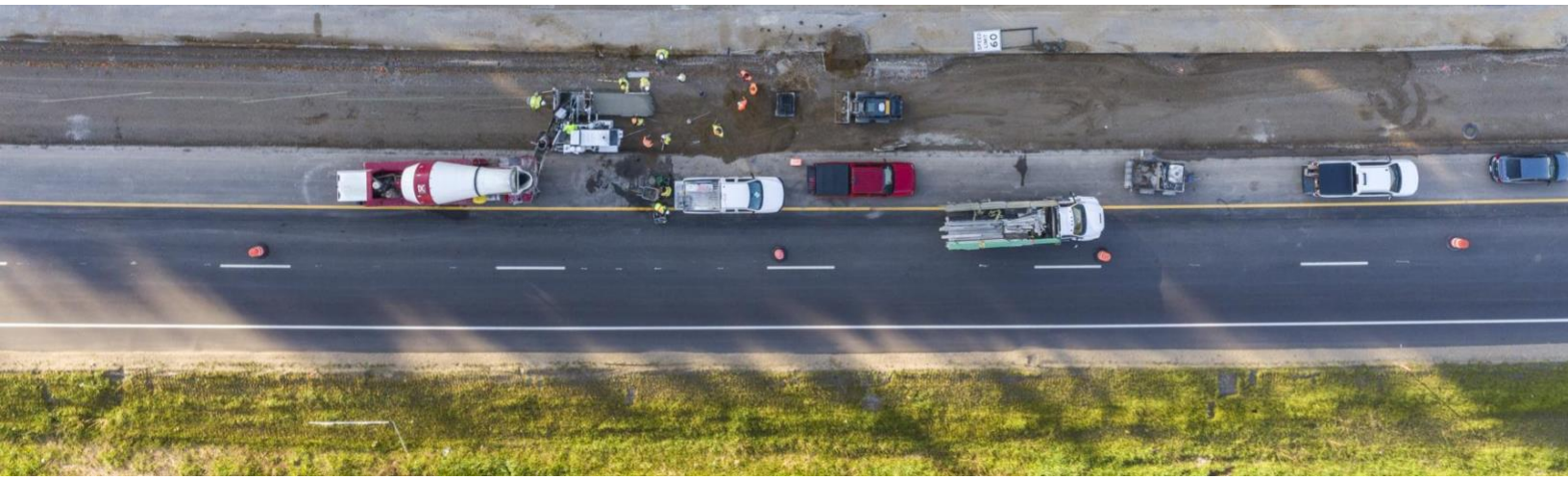
Michigan's gas tax currently supports the construction and maintenance of most of the state's transportation infrastructure, in addition to public transit operations. The amount of revenue generated by the gas tax is expected to fall in the coming years, while the gap between available funding and costs is expected to rise.

A road usage charge (RUC) is an alternative funding source that could potentially replace or supplement the gas tax where drivers pay a flat fee per mile they drive, regardless of the way their vehicle is powered. Any funding source changes would need to be proposed and ultimately approved by the state Legislature and governor.

## Survey Background and Goals

To begin evaluating if this approach is a good fit for Michigan, MDOT engaged Via, a firm specializing in using new technologies to develop and operate public mobility systems, to conduct a statewide survey on public perceptions of RUC. The survey was led by Via's consulting team, Via Strategies. The survey had four main goals:

- Obtain between **10,000 and 20,000 responses** from Michigan residents.
- Understand **Michiganders' current perceptions** of RUC, and how those perceptions change after learning more about the approach.
- Educate respondents about the need for alternative funding sources for surface transportation in Michigan.
- Assess Michiganders' **willingness to share different levels of data** required for an RUC system.



## Survey Findings

### 01 More than half of respondents are unhappy with the current quality of road infrastructure in Michigan.

A majority (57 percent) of respondents were unsatisfied or very unsatisfied with the current quality of road infrastructure in Michigan, about three times larger than the group who were satisfied or very satisfied.

### 02 Respondents who are currently happy with road quality are twice as likely to support increased funding in the future.

Share of respondents willing to pay more for better transportation infrastructure:

| *If currently satisfied:* | *If currently unsatisfied:* |
|---|---|
| **53%** | **27%** |

More than half of respondents who were currently satisfied with road quality supported paying more for better roads, compared to only 27 percent of respondents who were unsatisfied with current quality.

### 03 Most respondents know what they pay for gas each month, and more than half know the approximate value of the Michigan gas tax.

***Monthly Spend:*** Four out of five respondents knew approximately how much they pay a month for gasoline. The middle 50 percent of respondents reported spending between $100 and $220 per month.

***Gas Tax:*** When asked how much the current Michigan gas tax is, about 55 percent of respondents input a value within 10 cents of the current rate (30 cents per gallon).

## 04 Respondents were more positive about RUC after learning more about how it works in practice.

Before viewing the educational video, about 43 percent of respondents held a negative or slightly negative opinion of RUC, while 37 percent held a positive or slightly positive opinion. After the video, the share of respondents with a negative or slightly negative perception of RUC dropped to 34 percent, while the share of respondents with a positive or slightly positive opinion increased to 43 percent.

Share of respondents with a positive opinion of RUC:

| *Before video:* | *After video:* |
|---|---|
| **37%** | **43%** |

Share of respondents with a negative opinion of RUC:

| *Before video:* | *After video:* |
|---|---|
| **43%** | **34%** |

## 05 Future messaging around RUC should emphasize fairness and address concerns about spending, data privacy and accuracy.

To better understand sentiment around RUC and inform future communications, respondents were asked to select their top benefits and concerns from a list of options.

***Perceived Benefits:*** When asked what benefits they saw with an RUC system, respondents most commonly selected that RUC was "more fair than the gas tax because it is based on how much you use the roads." A similar percentage indicated that they did not see any benefits in an RUC system.

***Perceived Concerns:*** When asked about concerns, 44 percent of respondents were "not confident that [an RUC system] will result in improved roads." This result aligns with overall sentiments around existing road quality obtained earlier in the survey. Other concerns selected by more than 30 percent of respondents include worries about data privacy and how the total number of miles driven would be assessed.

# 1. Introduction

Michigan's state gas tax currently supports the construction and maintenance of most of the state's transportation infrastructure (roads, bridges and tunnels), as well as the operation of public transit systems around the state. As of January 2024, the state gas tax is $0.30 per gallon. After factoring in a separate 6 percent sales tax (which does not directly fund transportation or infrastructure), Michigan residents pay about $0.48 in state taxes per gallon of gasoline.[1]

The amount of revenue generated by the state gas tax is expected to fall in the coming years as internal-combustion vehicles become more fuel efficient and electric vehicles become more prevalent. At the same time, the gap between available funding and required upkeep costs is expected to rise.

A road usage charge (RUC) is an alternative funding source that could potentially replace or supplement the gas tax where drivers pay a flat fee per mile they drive, regardless of the way their vehicle is powered. Any funding source changes would need to be proposed and ultimately approved by the state Legislature and governor. To begin evaluating if this approach is a good fit for Michigan, the Michigan Department of Transportation (MDOT) engaged Via, a firm specializing in using new technologies to develop and operate public mobility systems, to conduct a statewide survey on public perceptions of RUC. The survey was led by Via's consulting team, Via Strategies, under the direction of MDOT staff. Together, Via Strategies and MDOT form the Project Team.

The statewide public perception survey (the Survey) was available from Jan. 30 to March 8, 2024. This report summarizes the results of the survey and describes the key lessons learned from the process.

[1] United States Energy Information Administration, State-by-state fuel tax data (January 2024). https://www.eia.gov/petroleum/marketing/monthly/xls/fueltaxes.xlsx

## 1.1. Goals and Objectives

With the Survey, the Project Team looked to accomplish the following goals:

- Obtain between **10,000 and 20,000 responses** from Michigan residents.
- Understand **Michiganders' current perceptions** of RUCs and how those perceptions change after learning more about the approach.
- Educate respondents about the need for alternative funding sources for surface transportation in Michigan.
- Assess Michiganders' **willingness to share different levels of data** required for an RUC system.

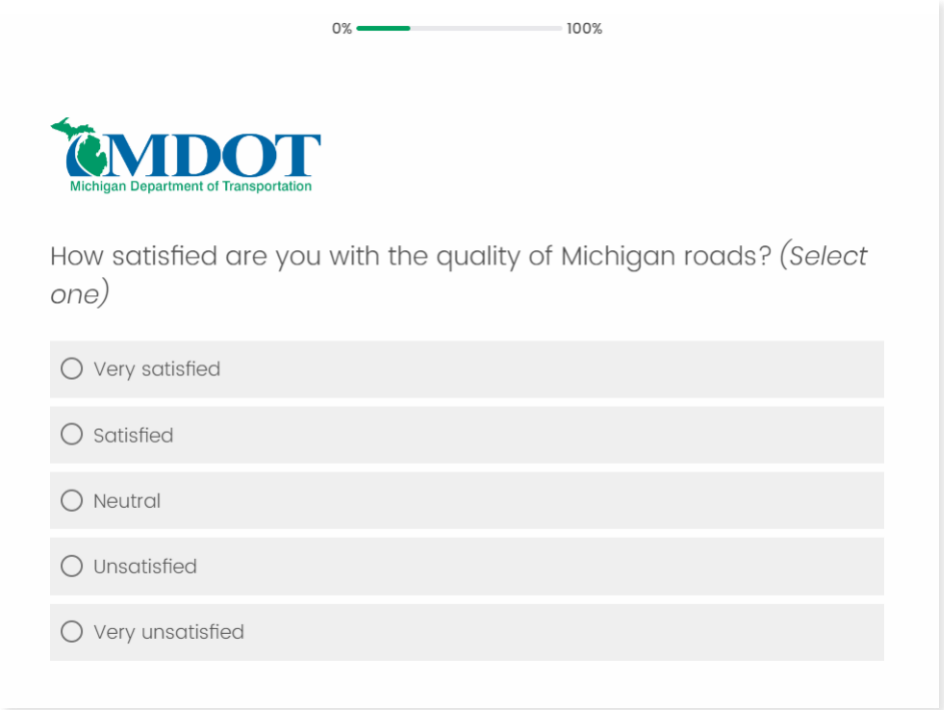
# 2. Methodology

The following chapter describes the Project Team's approach to administering, promoting and evaluating the survey. All key decisions were confirmed with MDOT staff in the months prior to launching the survey.

## 2.1. Survey Administration

The administration process for the survey is detailed below.

- **Access:** All promotional materials directed potential respondents to the study's webpage (Michigan.gov/MIRoadCharge). This page serves as a central repository for information about the broader project and will continue to be updated into 2025 as the project progresses into upcoming stages. During the live period for the survey, respondents were directed from this site to the survey webpage.
- **Platform:** The survey was administered through Qualtrics. This platform was selected for its industry-leading quality assurance features, including robust bot-flagging algorithms. For more information on how bots and other fraudulent responses were removed from the results dataset, refer to *2.3. Results Processing*. An example survey question viewed in Qualtrics is provided below.




- **Availability:** The survey was launched on Jan. 30, 2024, and was live until March 8, 2024.

- **Accessibility:** The survey was available in four languages: English, Spanish, Arabic, and Mandarin Chinese. As shown in **Table 1,** more than 99 percent of verified respondents completed the survey in English. For respondents with visual impairments, a video walkthrough of the survey in American Sign Language was produced.

  **Table 1.** Language Used for Verified Survey Responses

| Language | Responses | Percent of Total |
|---|---|---|
| English | 19,080 | 99.6% |
| Mandarin (Chinese) | 67 | 0.3% |
| Arabic | 8 | <0.1% |
| Spanish | 6 | <0.1% |
| **Total** | **19,161** | **100%** |

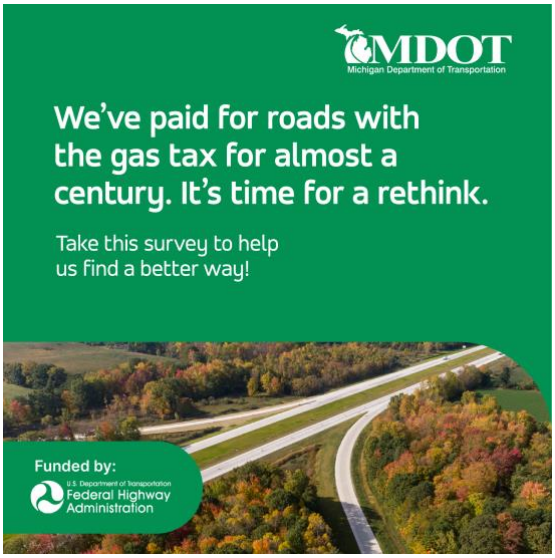
  Respondents who needed additional accommodations, such as live translation to another language or completing the survey over the phone, could contact MDOT's Title VI Office to request help as needed.

- **Incentives:** Participants who completed the survey were awarded a $10 gift card to one of 11 popular retailers. Gift cards were sent by the Project Team to respondents using the Tremendous digital rewards platform. Due to an extremely high response rate early in the survey period, issuance of gift cards was suspended on Feb. 1, 2024. Between the launch of the survey and this award cutoff, more than 12,500 validated responses were received. Responses continued to be accepted though the survey close date on March 8, although submissions received after Feb. 1 did not receive a completion incentive.

## 2.2. Survey Promotion

The survey was promoted through different channels to reach as many Michiganders as possible.

- **News Release:** MDOT issued a news release announcing the survey and giving context on why RUCs were being studied. Once released, this informed dozens of news stories around the state, including local news segments featuring interviews of MDOT staff involved with the study.
- **MDOT Social Media:** Several social media posts were developed to share on MDOT feeds. Two example posts are reproduced below.


- **Community Outreach:** MDOT engagement staff worked with local organizations to disseminate information about the survey to underrepresented groups, particularly in the MDOT Metro Region (Wayne, Oakland and Macomb counties).

## 2.3. Results Processing

The Survey offered both broad eligibility (open to all Michigan residents aged 18 or over) and a $1O gift card for completion. These factors combine to make the survey an attractive target for fraudulent responses generated using online bots and people outside Michigan. To combat this, a multi-step data-cleaning process was implemented to preserve the quality of survey responses.

About **56 percent of responses received in Qualtrics were removed** by the data-cleaning procedure described below. Out of 44,100 responses received, 19,200 passed all quality checks.

Each step in the data-cleaning process is described below. Steps were performed sequentially, creating a funnel that removed obviously fraudulent responses first. Low-quality responses (which require more human intervention to identify) were removed in the later steps.

1. **Completion Check:** All incomplete responses were removed from the dataset. To be considered "complete," a response needed to include answers for all required questions. Aside from ZIP code and age (which were needed to verify eligibility), all demographic questions were optional. All questions that asked for personal information (email address, home address and the address of a frequent destination) were also optional.
2. **Bot Check:** The Qualtrics survey platform uses Google's reCAPTCHA v3 system to identify suspicious survey responses. The system runs in the background while the user is completing the survey, returning a score alongside the completed survey response. The score represents the system's level of confidence that the response was submitted by an actual human. Responses with low confidence levels were removed from the dataset.
3. **Duplicate Check:** The Qualtrics survey platform assesses respondent metadata to identify duplicate responses from the same person. By assessing multiple factors together, multiple responses from the same person can be flagged without affecting legitimate responses (such as multiple employees responding from the same office WiFi network). Suspected duplicates in the dataset were removed.
4. **Minimum Duration Check:** The survey included about two dozen questions, in addition to a video that took two to three minutes to watch (depending on language). To maintain response quality, submissions with a start-to-finish duration less than five minutes were removed since it was not realistically possible to complete the survey in less than this time.

5. **IP Address Screen:** All IP addresses recorded by Qualtrics were geolocated to latitude and longitude pairs. Locations outside the United States were removed from the dataset. Responses from IP addresses in other states were allowed since the survey was conducted in the winter when a large number of residents could be traveling.
6. **Manual E-mail Review:** E-mail addresses were included in the vast majority of responses since this information was required to receive a survey incentive. As a final check, e-mail addresses were manually screened by the Project Team. Responses were removed when the provided e-mail address (1) appeared multiple times in the dataset, (2) appeared to be a random string of letters and/or numbers, and (3) ended in four or more consecutive numbers. Recent research indicates that these traits are associated with bot-generated addresses and Gmail bulk account creators available online.[2]

   Respondents who felt their response was screened out in error were able to contact the Project Team via e-mail to request a reevaluation. If the respondent was able to show a valid state-issued Michigan ID, the response was marked as validated and a gift card was issued. Approximately 20 responses were verified using this method, about 0.05 percent of the total number of verified responses. This rate indicates that a very low number of responses were incorrectly removed in the data cleaning process.

[2] Griffin, M., Martino, R., LoSchiavo, C. (2021). Ensuring Survey Research Data Integrity in the Era of Internet Bots. https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=2252&context=bb_pubs

# 3. Respondent Characteristics

To ensure the results of the Survey reflect the opinions of Michiganders as closely as possible, the Project Team tracked the ZIP code and age of every survey respondent. Respondents had the option of answering several other demographic questions. This chapter evaluates how well the respondent group reflects Michigan as a whole.

## 3.1. Geographic Distribution

To provide an approximation of response rate across Michigan, the Project Team used MDOT's seven service regions. A map of these regions is provided in **Figure 1**.

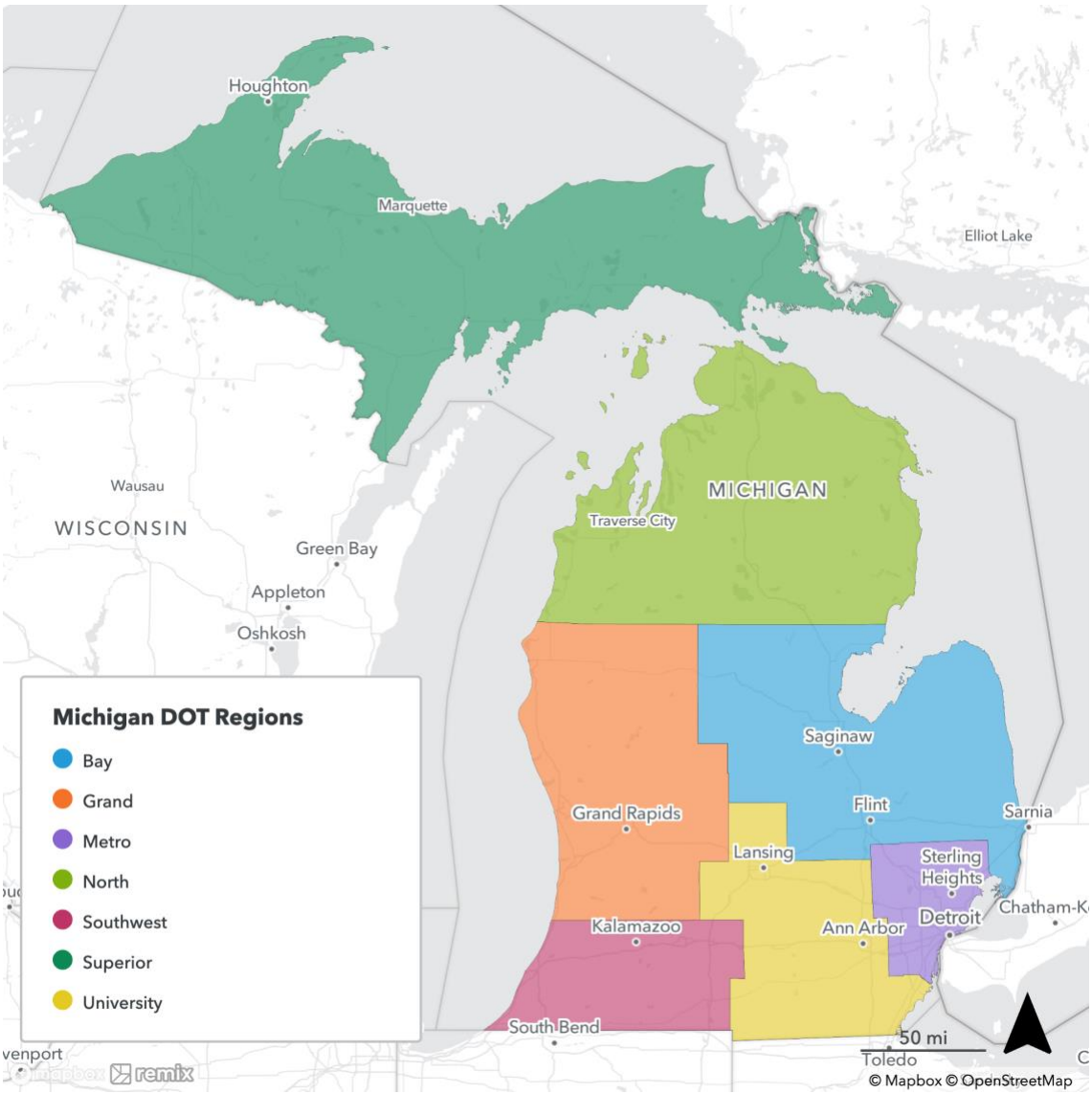



**Figure 1.** Michigan DOT Regions

### 3.1.1. Regional Distribution of Respondents

To convert ZIP codes (collected during the respondent eligibility verification process) into regional totals, the Project Team used ZIP Code Tabulation Areas (ZCTAs). ZCTAs are the closest available representation of the area covered within a ZIP code. Each ZCTA in Michigan was grouped into the overlapping MDOT region, allowing for regional response totals to be tracked.[3] The final breakdown of responses received by region is summarized in **Table 2**.

**Table 2.** Respondents by MDOT Region

| Region | Population Centers in Region | Response Share | |
|---|---|---|---|
| | | Target | Actual |
| Bay | Flint, Midland, Bay City | 14% | 15% |
| Grand | Grand Rapids | 16% | 23% |
| Metro | Detroit | 39% | 29% |
| North | Traverse City, Mackinaw City | 5% | 7% |
| Southwest | Kalamazoo | 8% | 7% |
| Superior | Marquette | 3% | 3% |
| University | Lansing, Ann Arbor | 15% | 16% |

As shown in Table 2, the Metro Region was underrepresented in the respondent group, while the Grand Region was overrepresented. Response totals from all other regions were closely aligned with the target values. These shares were tracked weekly while the survey was live to inform targeted advertising buys on Facebook. For more information on this process, refer to *2.2. Survey Promotion*.

[3] ZCTAs that fell in more than one region were grouped into the region containing the largest area share.

### 3.1.2. Local Distribution of Respondents

The number of validated responses received from each Michigan ZCTA is shown in **Figure 2**. At least one response was received from more than 97 percent of Michigan ZCTAs.

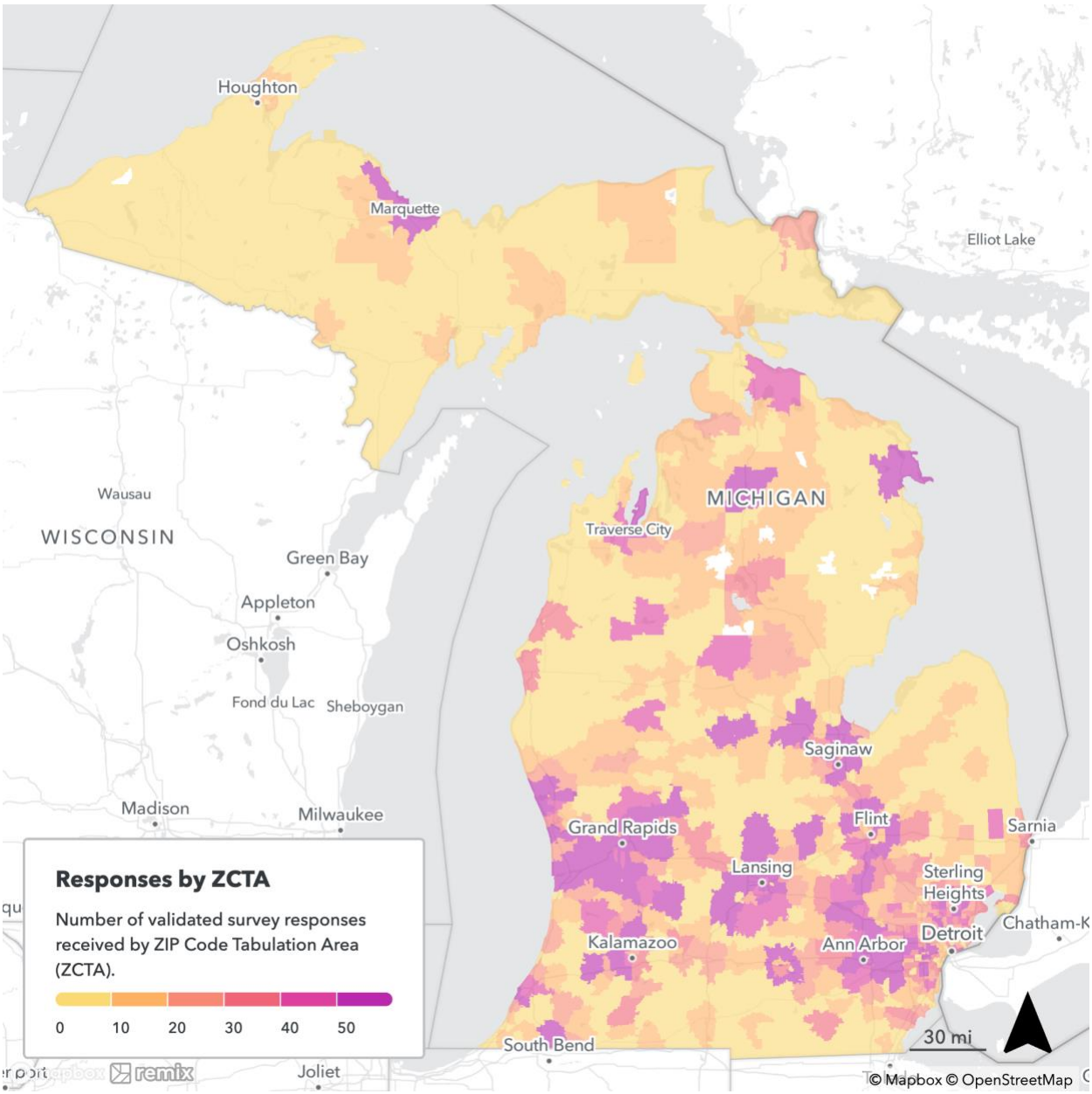



**Figure 2.** Responses Received by ZIP Code Tabulation Area (ZCTA)

The population living in each ZCTA is mapped in **Figure 3**. Comparing population with respondent distribution (Figure 2) shows a clear alignment. Essentially, the most populated areas of the state are the areas with the most validated survey responses. This match is an indication that the survey results accurately represent the views of all Michiganders.

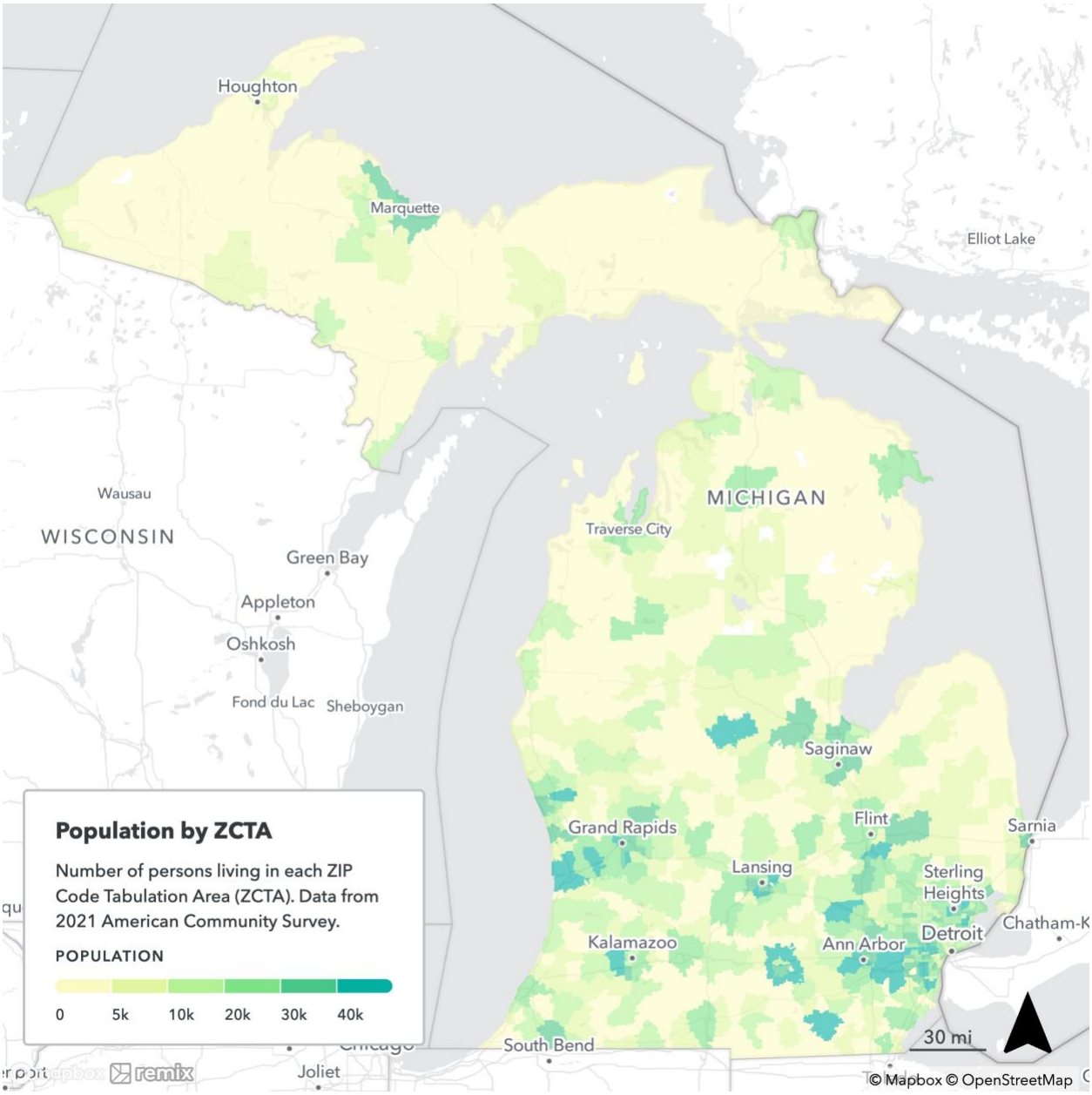



**Figure 3.** Population Living in Each ZIP Code Tabulation Area (ZCTA)

## 3.2. Demographic Factors

The following section compares demographic information collected from survey respondents to statewide targets established using American Community Survey (ACS) estimates for the state of Michigan. The source table for each statewide target is listed below. All targets were established using 2018-2022 ACS Five-Year Estimates.

- **Age:** Table S0101
- **Gender:** Table B01001
- **Race:** Table B03002
- **Ethnicity:** Table B03002
- **Household Income:** Table S1901
- **Educational Attainment:** B15002

### 3.2.1. Age and Gender

The distribution of respondents across age cohorts is shown in **Figure 4**. Residents aged 18 – 24 and 75-plus were underrepresented in the dataset, with all other cohorts similar to or slightly above statewide averages. Since this question was required to determine eligibility for the survey, no "Prefer not to say" responses were recorded.

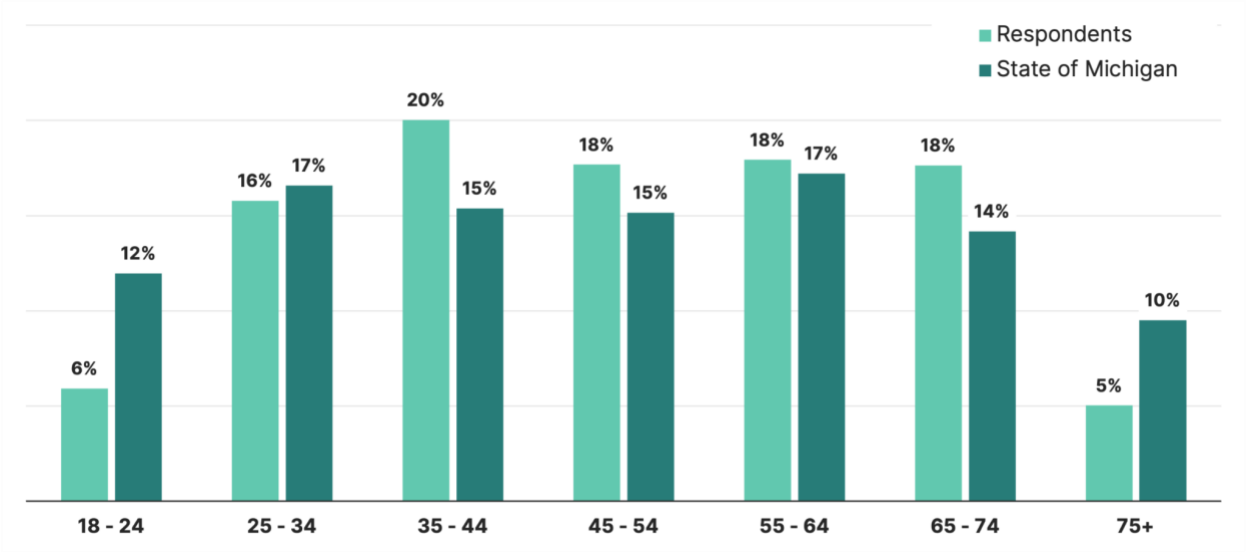



**Figure 4.** Survey Respondents by Age Cohort

As shown in **Figure 5**, male respondents were overrepresented in the dataset relative to the statewide population. Female respondents were correspondingly underrepresented.

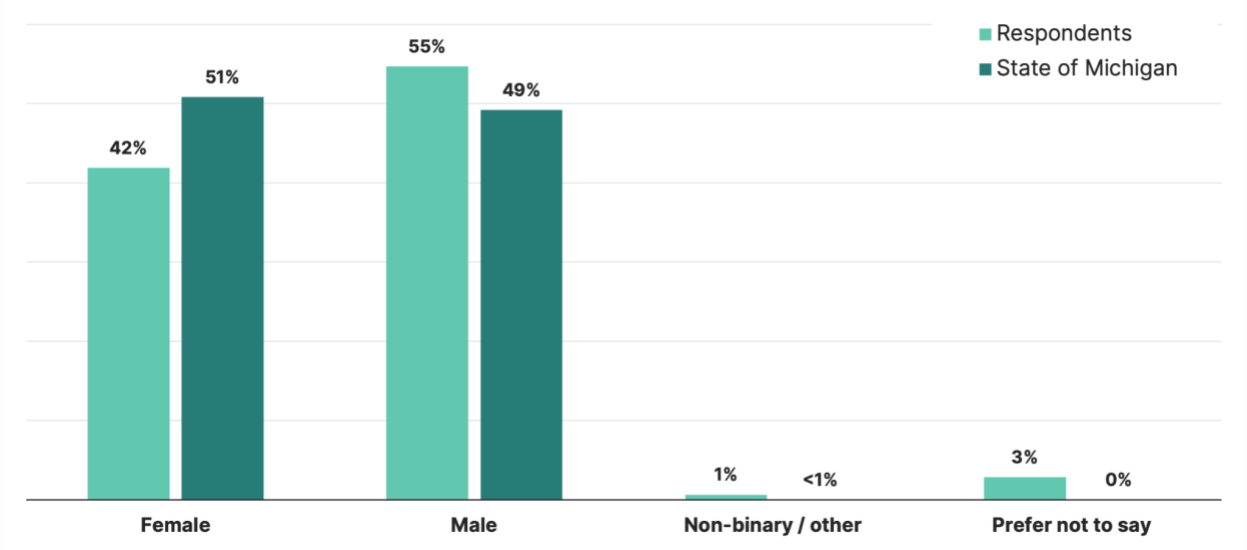



**Figure 5.** Survey Respondents by Gender Identity

### 3.2.2. Race and Ethnicity

As shown in **Figure 6**, Black respondents are underrepresented in the dataset, while white respondents are slightly overrepresented. About 1 in 12 respondents selected "Prefer not to say" for this question.

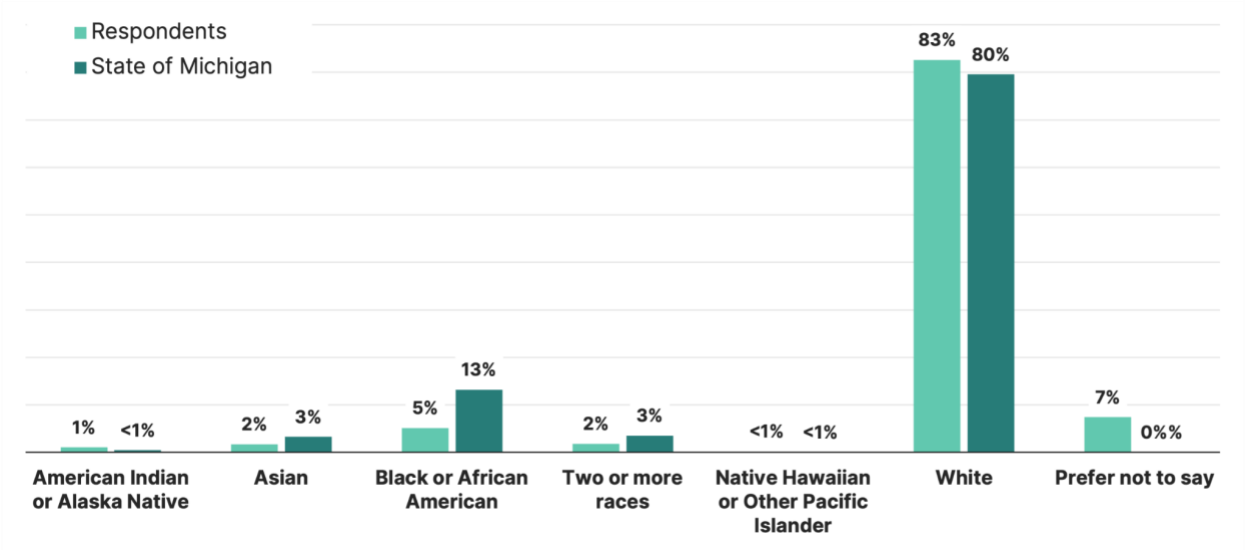



**Figure 6.** Survey Respondents by Race

The U.S. Census Bureau considers Hispanic/Latino origin an ethnicity evaluated separately from race. As shown in **Figure 7**, both Hispanic and non-Hispanic respondents are both slightly underrepresented due to 1 in 10 respondents selecting the "Prefer not to say" option.

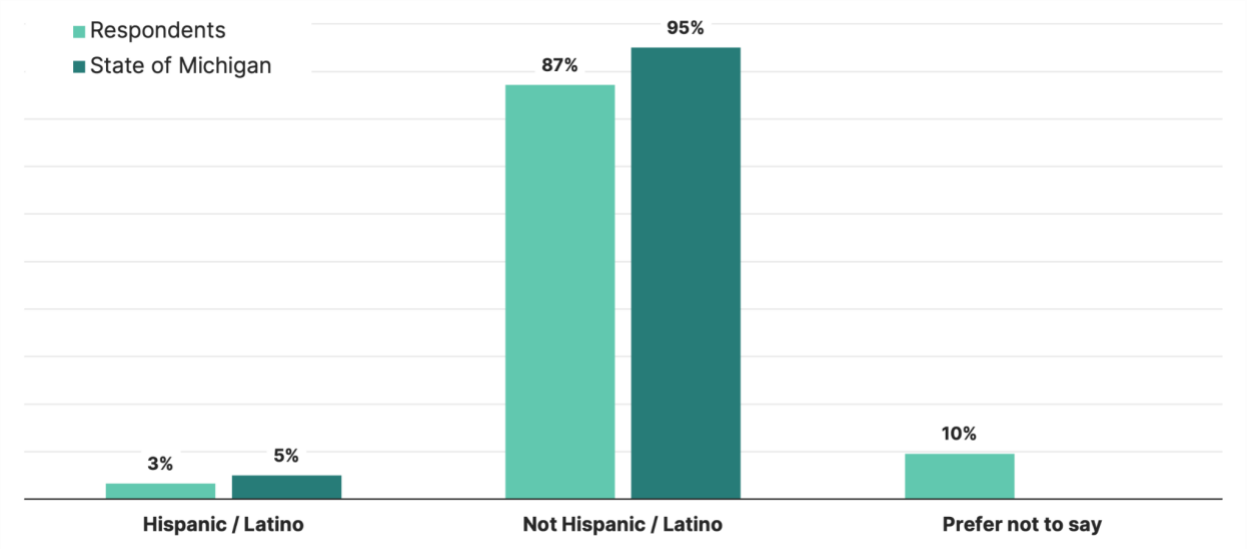



**Figure 7.** Survey Respondents by Hispanic/Latino Ethnicity

### 3.2.3. Household Income

As shown in **Figure 8**, household income among survey respondents closely matched the statewide population, with the exception of the under $25,000 bracket.

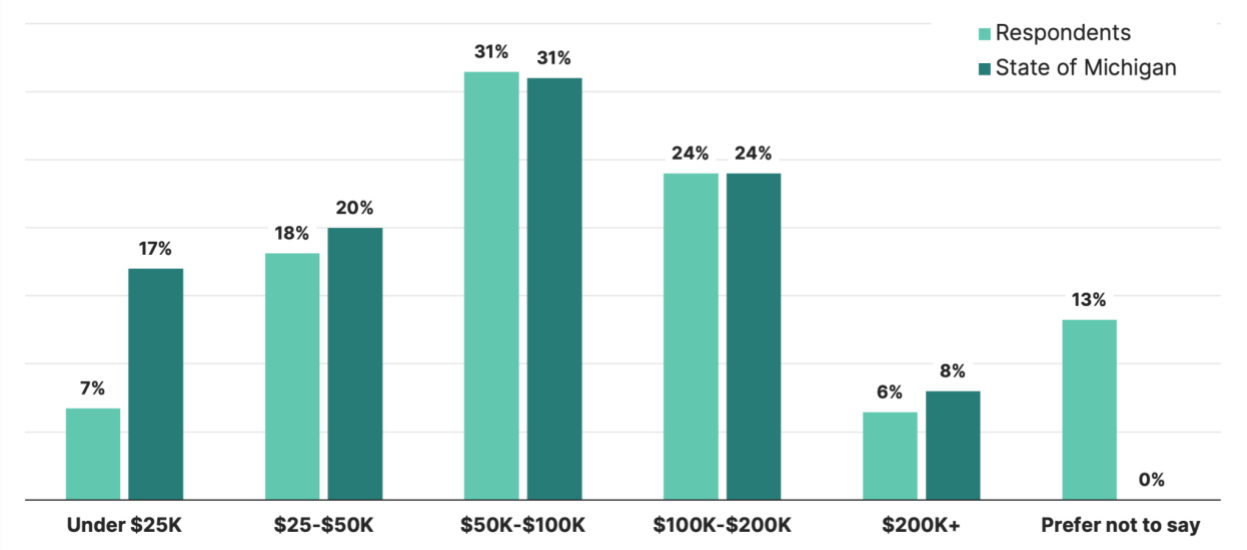



**Figure 8.** Survey Respondents by Household Income

### 3.2.4. Educational Attainment

As shown in **Figure 9**, respondents as a group held more advanced degrees than the statewide population.

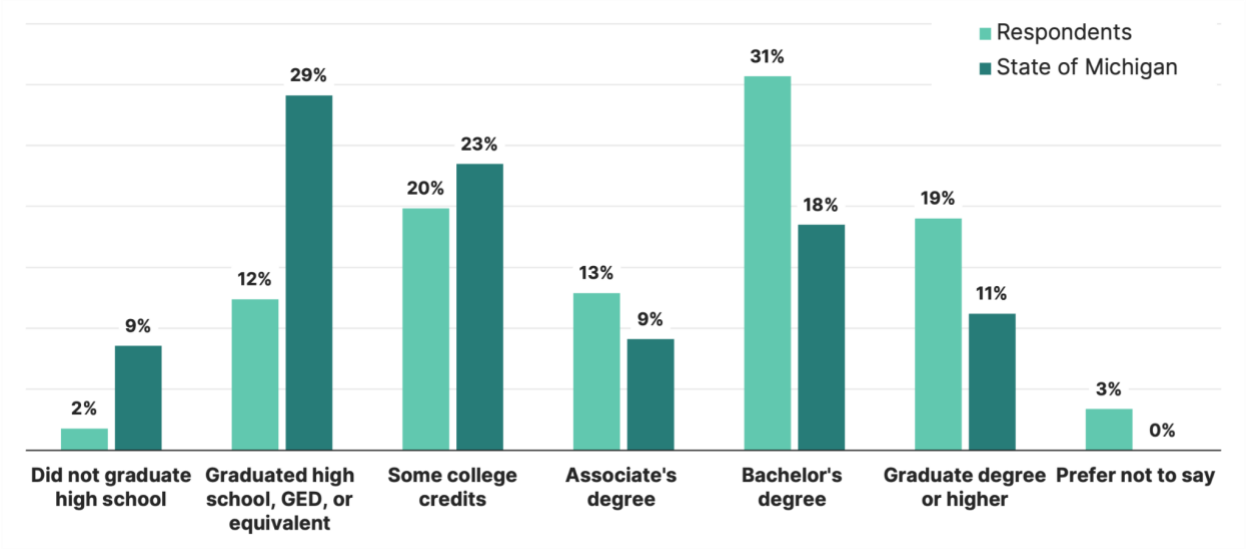



**Figure 9.** Survey Respondents by Educational Attainment

## 3.3. Response Weighting

In general, respondent data aligned well with statewide targets. However, no survey will perfectly match population-level targets. To account for this, the Project Team weighted responses based on MDOT region, age, gender, race, ethnicity, household income, and level of educational attainment. The weighting process elevates the aggregate impact of respondents from underrepresented groups to match their overall level of prominence within Michigan.

Responses were weighted to account for differences between the respondent pool and statewide population characteristics. This process **generalizes answers from respondents to represent all Michiganders**.

The weighting process corrects for potential sampling biases encountered during survey administration, including the following potential concerns:

- **Lower promotional visibility among underrepresented groups:** Underrepresented groups like younger residents, lower-income households and those without a high school

diploma may be less likely to follow MDOT social media feeds where the Survey was publicized.

- **Nonresponse bias among underrepresented groups.** There may be differing levels of willingness to answer demographic questions across groups. For example, a 2020 paper from the Cooper University Hospital indicates that higher-income (greater than $140,000 per year) households responded to survey requests at nearly three times the rate of lower-income (less than $25,000 per year) households.[4]
- **Language barrier:** Although the actual survey was available in four languages, social media posts and press releases were provided in English. This could limit reach among the non-English speaking population.
- **Poor structuring of demographic questions:** The Project Team used demographic questions that match the reporting structures used by the U.S. Census Bureau. However, recent research suggests that these structures do not provide identity categorizations that feel accurate to all groups. In a 2021 report, the Pew Research Center noted that only half of Hispanic adults felt the census questions captured their identity well.[5] Respondents who do not feel that the questions allow them to accurately represent themselves are less likely to complete the optional demographic questions.

[4] Roberts, B. W., Yao, J., Trzeciak, C. J., Bezich, et. al. (2020). Income Disparities and Nonresponse Bias in Surveys of Patient Experience. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7351907

[5] Cohn, D., Brown, A., Lopez, M. (2021). Black and Hispanic Americans See Their Origins as Central to Who They Are, Less So for White Adults. https://pewrsr.ch/3uNnVFX

# 4. Survey Analysis

Question-by-question results are presented in the following chapter. Both unweighted and weighted responses are presented where possible. For more information on why responses were weighted, refer to *3.3. Response Weighting*.

## 4.1. Reading Survey Results

The standard format for the results in this chapter is illustrated below. For each survey result, three values are reported: unweighted values, weighted values and the confidence interval.


- **Unweighted result:** This value represents the percentage of survey respondents who chose a specific answer when completing this survey. No adjustments were made to the data. Unweighted results are shown as **dark blue dots** on each chart.
- **Weighted result:** Even though the Project Team heard from more than 19,000 Michiganders during the survey, the demographics of respondents do not exactly match the state as a whole. This value represents the percentage of survey respondents who chose a specific answer after adjusting for demographic factors. Weighted results are shown as **teal bars** and percentages on each chart.
- **Confidence interval:** There are 7.9 million Michiganders age 18 or over. If everyone in this group was surveyed, there is a 95 percent chance that the collective result would fall in the range. The difference between two answer choices is statistically significant when the confidence intervals do not overlap. The upper and lower confidence interval bounds are shown as **dark teal brackets** on each chart.

## 4.2. Results by Question

Responses to each survey question are reported and analyzed in the following section. Results are presented in the same order as the survey to the greatest extent possible. In select places, the order of results is adjusted to create before/after comparisons and facilitate deeper analysis.

### 4.2.1. Satisfaction with Current Funding System

This section evaluates if a respondent's current level of satisfaction with Michigan roads is correlated to support for changing funding levels. Results indicate that **users who are currently satisfied with road quality are significantly more likely to support increased funding** in the future.

**Question: How satisfied are you with the quality of Michigan roads?**

As shown in **Figure 10**, a majority (57 percent) of respondents were unsatisfied or very unsatisfied with the current quality of road infrastructure in Michigan. This group is about three times the size of the group who were satisfied or very satisfied with current road quality.

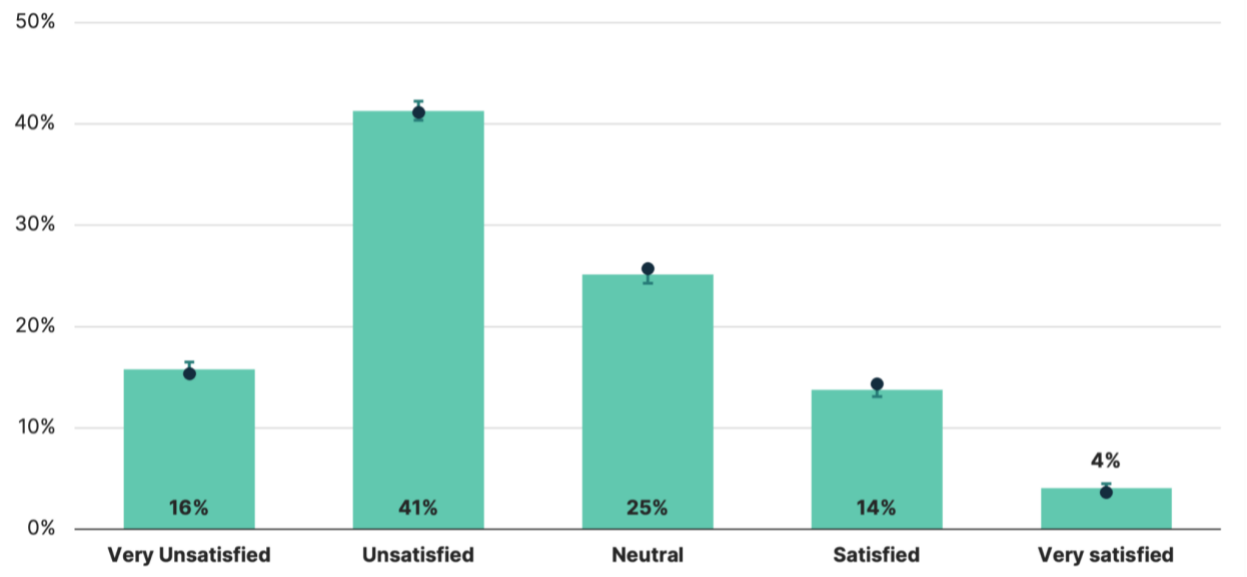



**Figure 10.** Satisfaction with Current Road Quality

**Question: Would you be willing to pay more for better transportation infrastructure such as roads?**

Respondents did not exhibit a strong consensus on their willingness to pay more for improved transportation infrastructure. Although **Figure 11** shows that a larger group answered "Yes" than "No," this result was not statistically significant. A significant portion of respondents were undecided, with more answering "Unsure" or "It depends" than "Yes." When viewed alongside the overall low levels of satisfaction with current road quality, this trend potentially speaks to a lack of confidence that additional funding would result in improved infrastructure.

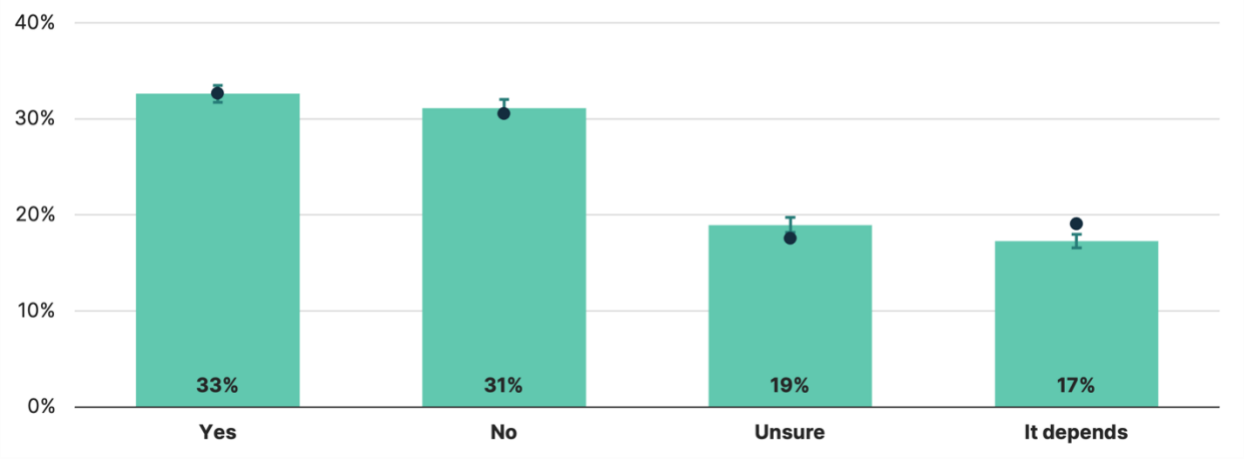
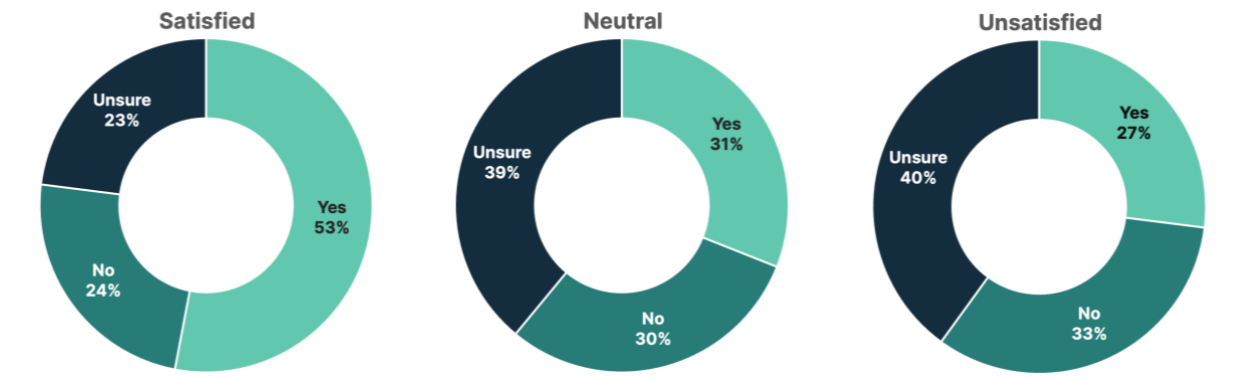



**Figure 11.** Willingness to Pay More for Improved Transportation Infrastructure

Although a strong consensus is not visible in the overall results, current satisfaction with road quality is a strong indicator of willingness to pay more for better transportation infrastructure. As shown below, more than half of respondents who were satisfied with the current quality of roads supported paying more for improved roads.[6]




[6] For visual readability, respondents who answered "Unsure" and "It depends" were grouped into the same category.

### 4.2.2. Familiarity with Current Funding System

Most Michiganders know approximately how much they pay a month for gasoline, but **opinions on the fairest funding system are split**. A plurality of respondents think General Fund dollars are the most equitable way to pay for roads, greater than the share who prefer either the gas tax or an RUC system.

**Question: Off the top of your head, do you know how much you spent last month for your cars' gasoline?**

As shown in **Figure 12**, more than 80 percent of respondents indicated they knew (or thought they knew) how much they spent on gasoline in the previous month.

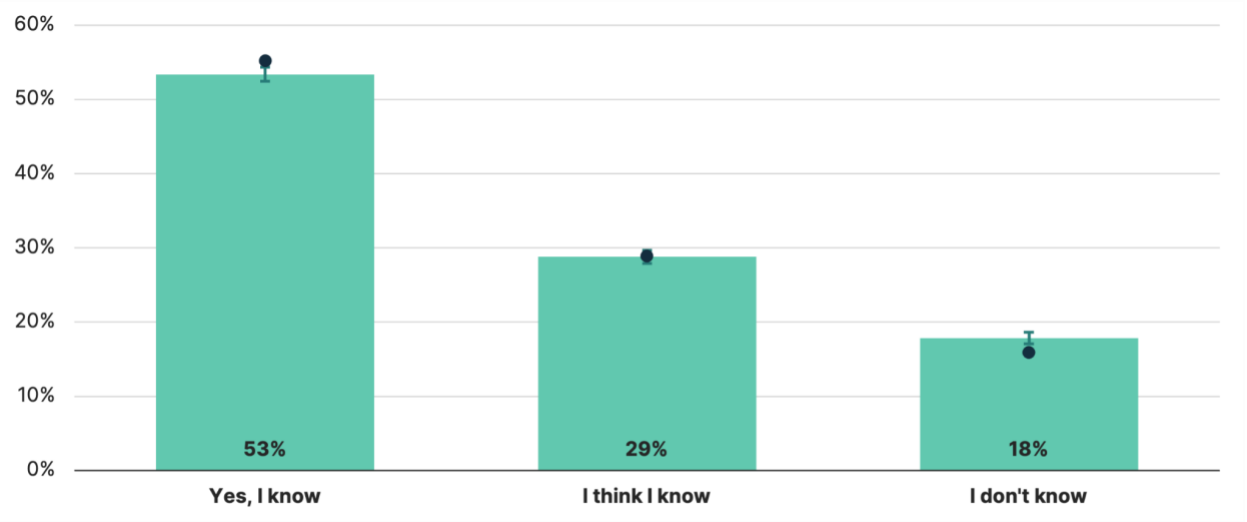



**Figure 12.** Knowledge of Monthly Gas Spend

**Question: Approximately how much did you spend on your car's gasoline last month?**

Respondents who indicated that they knew (or thought they knew) how much they spent on gas in the previous month were asked to input a value between $0 and $400. The distribution resulting from this exercise is shown in **Figure 13**. About 50 percent of respondents spent between $100 and $220 on gasoline in the months preceding the survey.

No significant correlation was visible between monthly gas spend (essentially, how much a respondent uses the Michigan road network) and satisfaction with road quality.


**Figure 13.** Monthly Gas Spend Distribution

**Question: The average price of gas is $3.00 in Michigan. Off the top of your head, how much of that is the Michigan state gas tax? Don't include federal taxes or sales taxes.**

As of January 2024, Michigan levies a $0.30 per-gallon tax on gasoline. Slightly more than 55 percent of respondents input a value between $0.21 between $0.40, demonstrating relatively widespread knowledge of current taxation rates.[7] The distribution of respondent answers is shown in **Figure 14**.

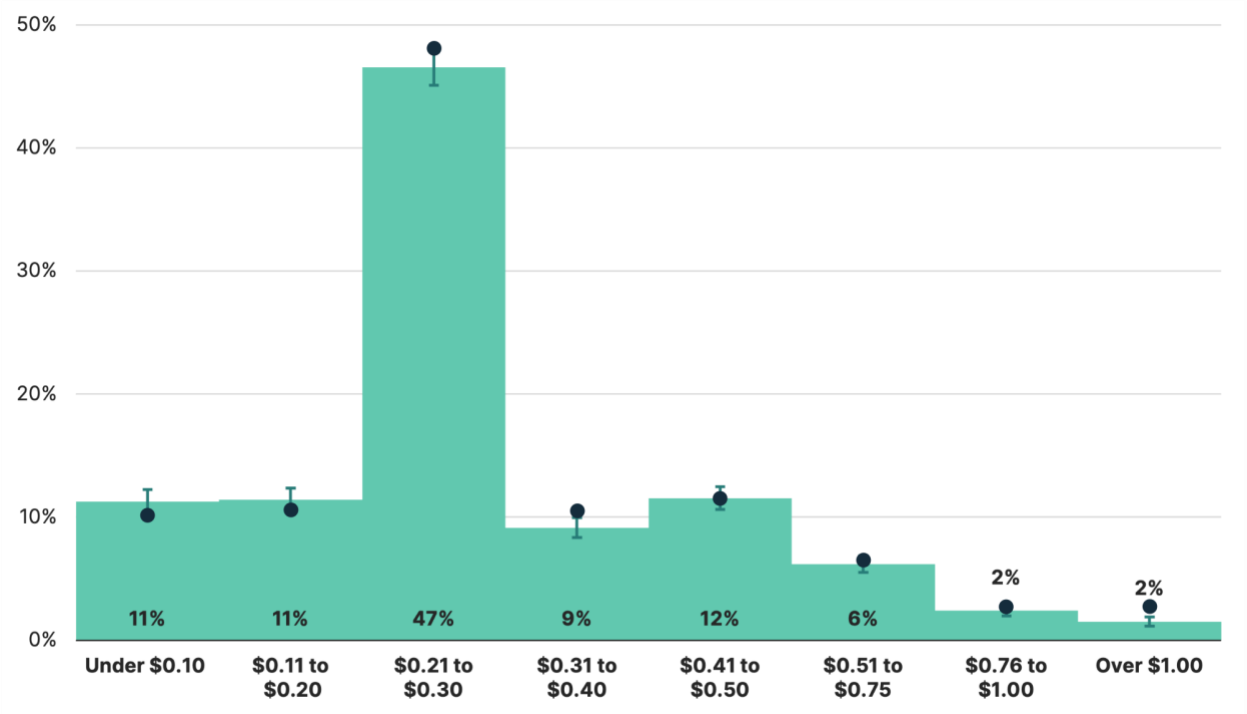



**Figure 14.** Perceived Per-Gallon Levy for Michigan Gas Tax (Excluding Sales Tax)

A slight uptick in respondent selections is also visible in the $0.41 to $0.50 per gallon range. This is likely due to some residents including the $0.18 per gallon sales tax Michigan charges on gasoline (for a total state levy of $0.48 per gallon). Since sales tax revenue does not directly fund MDOT or its transportation projects, the question was framed to ask only about the gas tax.

[7] Per MCL Section 207.1008, the state gas tax is indexed to the Consumer Price Index (CPI). The 2023 rate was set at $0.286 per gallon.

**Question: Gas tax is currently based on the number of gallons used. In Michigan, you pay around $0.48 per gallon, including both state and federal gas taxes. We are exploring different ways to fund our roads. Select the road tax that you think is most fair. Note: this would be instead of the gas tax, not in addition to the gas tax.**

When asked to pick the fairest funding option among several ideas, a statistically significant plurality of respondents indicated that they think road funding should come from Michigan's General Fund (**Figure 15**). The survey data does not allow for conclusions to be drawn about the motivation behind selecting the General Fund option. Respondents could have selected this option due to its greater level of abstraction from the day-to-day costs of operating a motor vehicle.

About half of respondents indicated that they thought the fairest funding system was either the gas tax (the current system) or miles driven (an RUC program). A slight but statistically significant majority among this subgroup thought basing fees on miles driven was more fair than the gas tax.

One in seven respondents selected "Other" for this question. Subgroup members who provided additional context on their answers expressed preference for a mixed approach with more than one funding source, taxing by vehicle weight, toll roads, or increasing fees paid by electric vehicle (EV) and hybrid drivers.

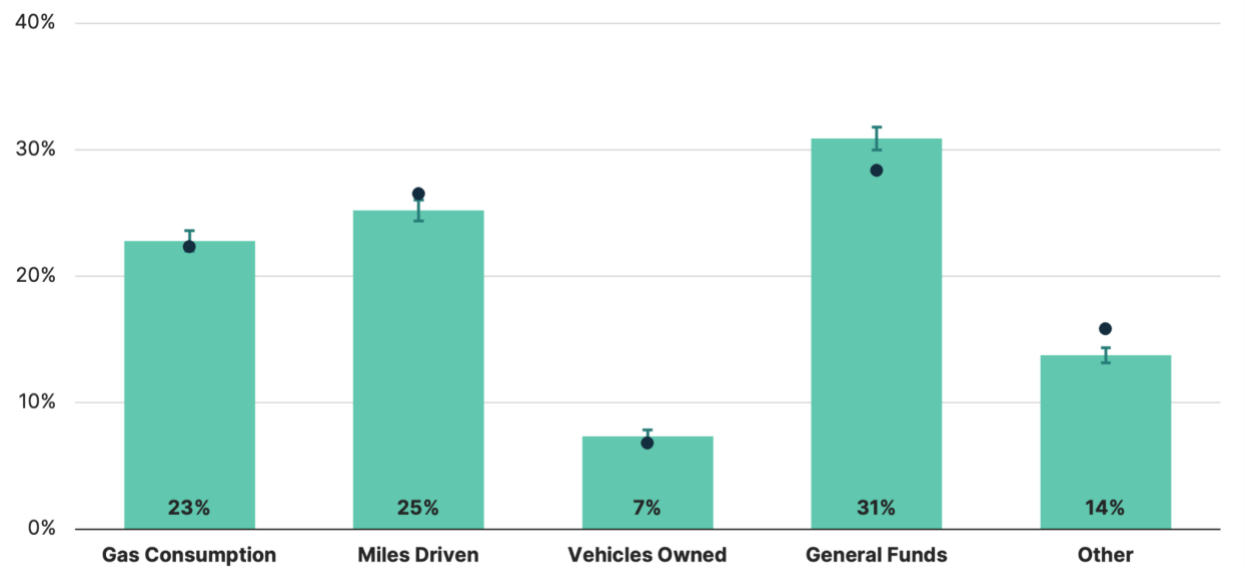



**Figure 15.** Preferred State Funding Source for Transportation Infrastructure

### 4.2.3. Attitudes Toward Road Usage Charges

This section gauges sentiment around RUC before and after viewing an educational video. Before viewing the video, a plurality of respondents had a negative or slightly negative view of road usage charges. After the video, the share of respondents with a negative or slightly negative perception of RUC dropped from 43 to 34 percent, while the share of respondents with a positive or slightly positive opinion increased from 37 to 43 percent.

Pre-Video Baseline

**Question: Are you familiar with the concept of road usage charges? This concept is also referred to as mileage-based user fees, vehicle miles traveled fees and distance-based fees.**

Before viewing the video, about 60 percent of respondents indicated that they were familiar with the RUC concept (**Figure 16**).

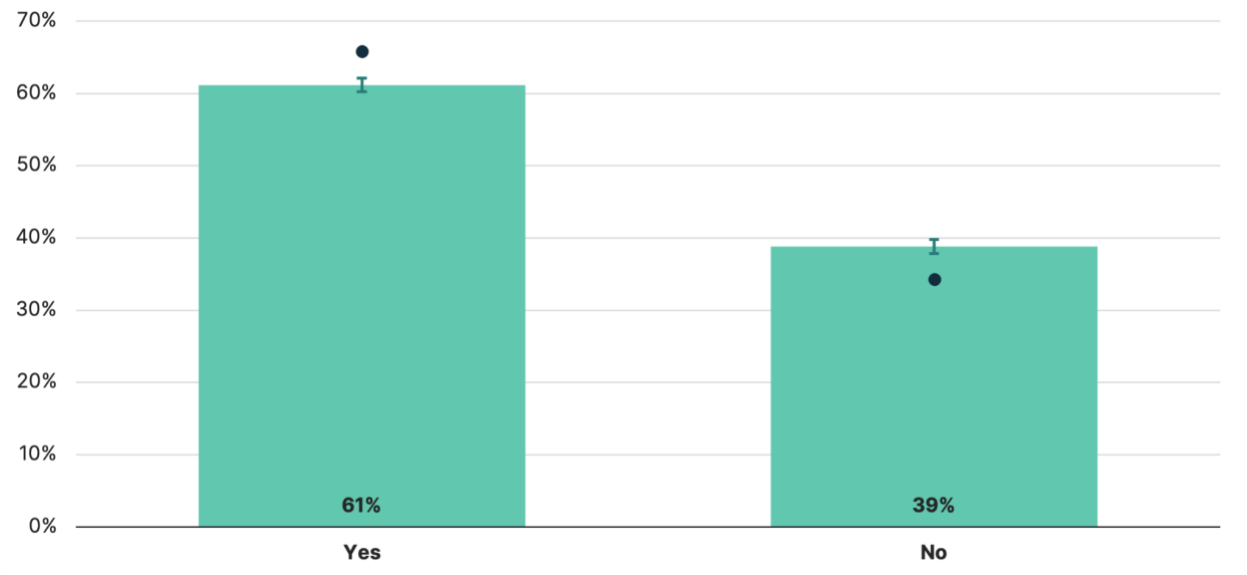



**Figure 16.** Pre-Video Familiarity with RUC Concept

**Question: How do you feel about road usage charges instead of a gas tax?**

The 60 percent of respondents who indicated that they were familiar with RUCs in the previous question were asked about their opinion of the concept. The results of this question are shown in **Figure 17**. About 43 percent of this group held a negative or slightly negative opinion of the RUC approach, while 37 percent held a positive or slightly positive opinion. The remaining fifth of the group had a neutral opinion.

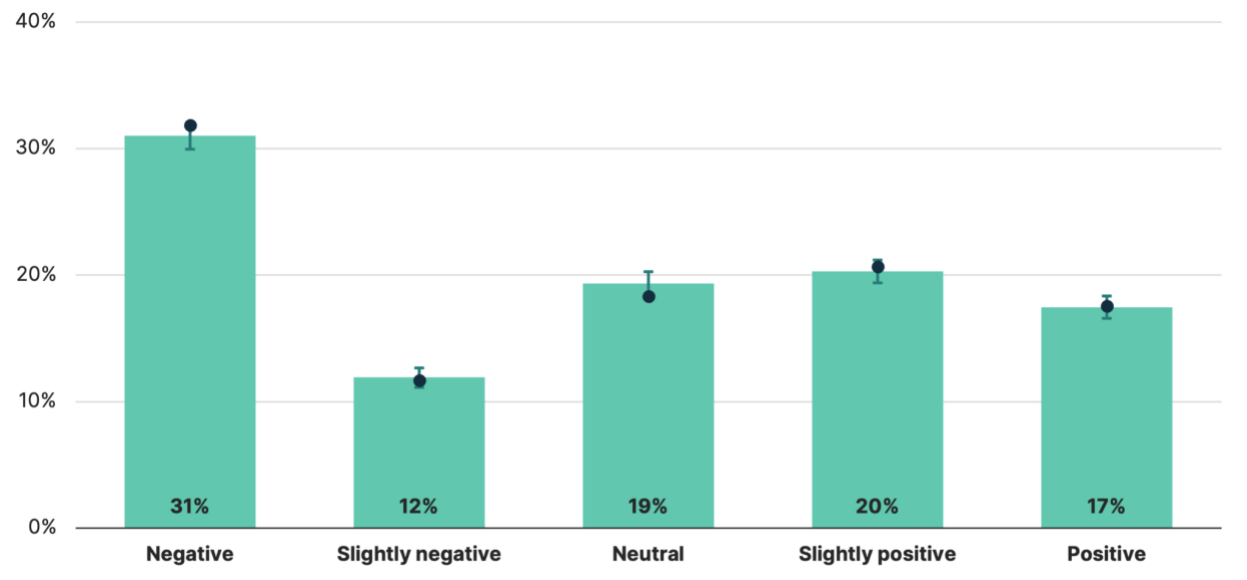



**Figure 17.** Pre-Video Perceptions of RUC Concept

At this point in the survey, **all respondents viewed a two to three-minute educational video** produced by MDOT that explored three key questions:

- How is transportation funded today?
- Why are we studying funding?
- What is road usage charging?

## Post-Video Results

**Question: After learning more about road use charging, do you understand the concept now?**

After viewing the educational video, 97 percent of respondents said they understood or somewhat understood the concept of road use charging (**Figure 18**). This result represents a substantial increase from the pre-viewing baseline, where only 60 percent of respondents were familiar with the concept.

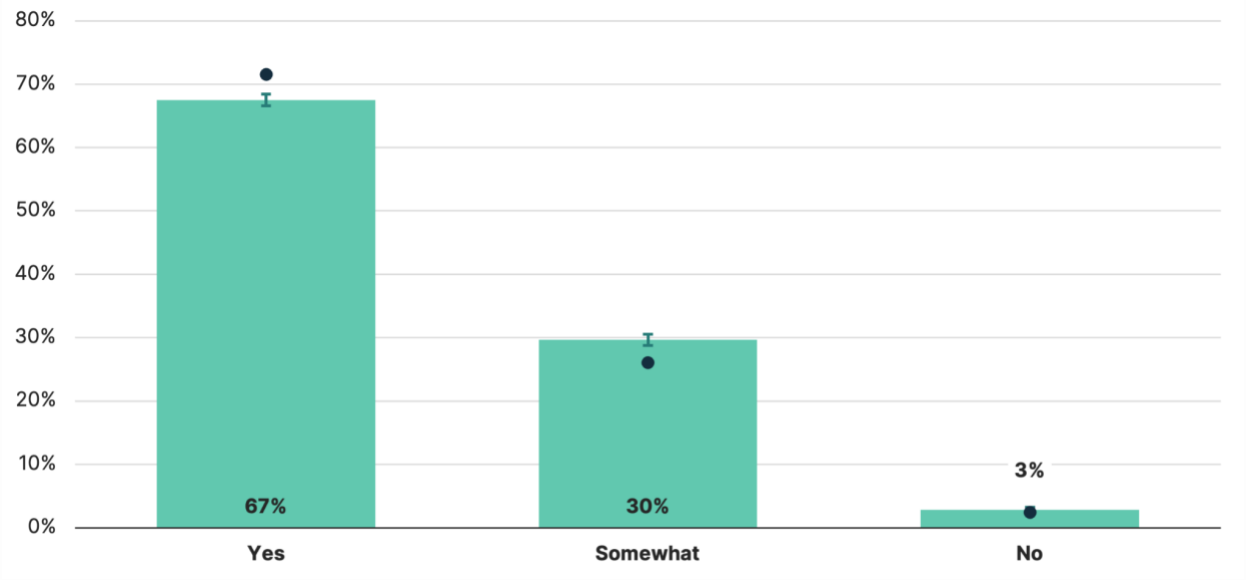



**Figure 18.** Post-Video Understanding of RUC Concept

**Question: How do you feel about changing from the current system (a gas tax) to road usage charges (a tax based on how many miles you drive)?**

Before viewing the educational video, about 60 percent of respondents were familiar with the RUC concept. Less than 43 percent of these respondents held a negative or slightly negative opinion of RUC, while 37 percent held a positive or slightly positive opinion. After viewing the video, the total share of respondents with a negative or slightly negative perception of RUC dropped from 43 to 34 percent, while the share of respondents with a positive or slightly positive opinion increased from 37 to 43 percent. The share of respondents with a neutral opinion increased from 19 to 23 percent. Pre- and post-video sentiments are summarized in **Figure 19**.

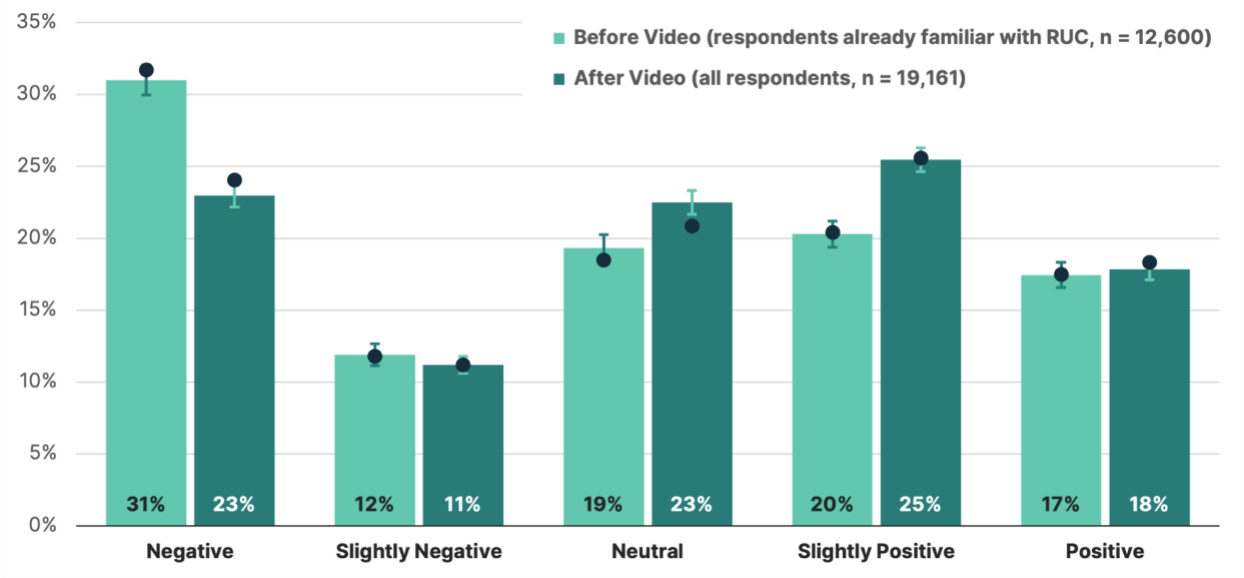



**Figure 19.** Comparison of RUC Perceptions Before and After Video

As shown in **Table 3**, the video appears to have been particularly effective in reducing negative opinions of RUC. After viewing the video, the share of respondents with a negative opinion dropped by one-quarter. The neutral and slightly positive categories also registered statistically significant increases.

**Table 3.** Change in RUC Perceptions After Viewing Video

| Opinion of RUC | Share Before Video | Share After Video | Change |
|---|---|---|---|
| Negative | 31% | 23% | **-8%** |
| Slightly Negative | 12% | 11% | **-1%** |
| Neutral | 19% | 23% | **+4%** |
| Slightly Positive | 20% | 25% | **+5%** |
| Positive | 17% | 18% | **+1%** |

Opinions of Road Usage Charges by Region

Post-video responses to this question are grouped by MDOT region in **Figure 20**, allowing for a comparison of sentiments around the state.[8]

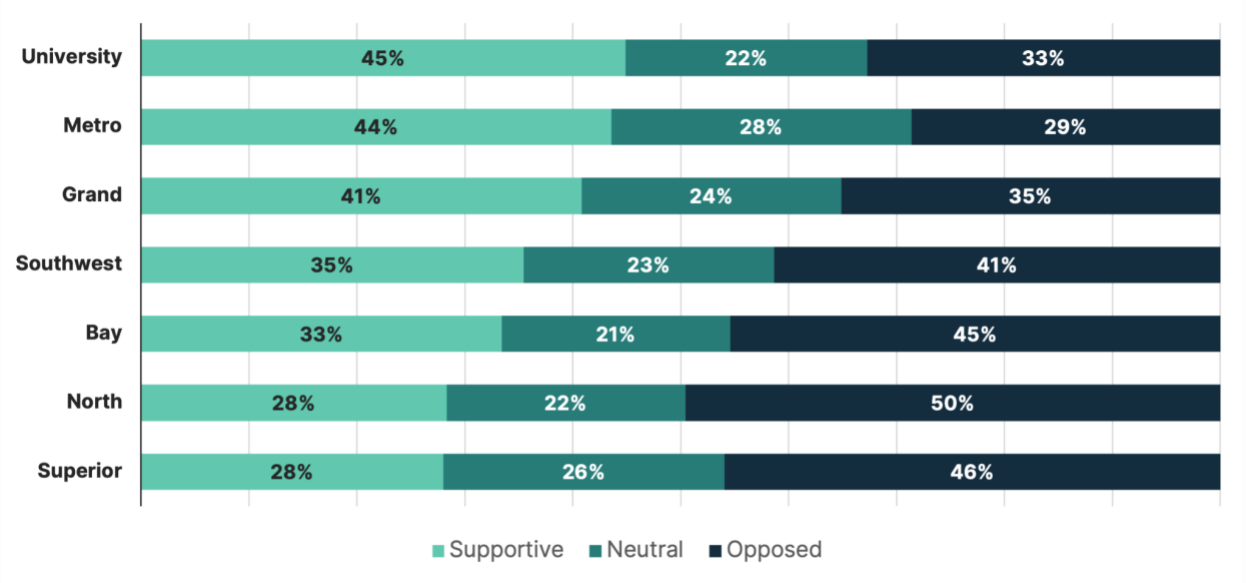



**Figure 20.** Post-Video Perception of RUC Concept by MDOT Region (Percentage View)

As shown in Figure 20, about 45 percent of respondents from the University and Metro regions support a potential transition, well above the 28 percent of North and Superior region respondents who feel similarly.[9] Similarly, half of North region respondents were opposed to a potential transition, much higher than the 29 to 35 percent rate of opposition among respondents from the more urbanized Metro, Grand and University regions.

[8] MDOT divides Michigan into seven regions for administrative purposes. For a map of the regions and the major population centers in each region, refer to *3.1. Geographic Distribution*.

[9] All values in this section are weighted to correct for respondent sampling errors. Unadjusted values not shown.

As shown in **Figure 21**, MDOT's more urbanized regions (where people typically travel fewer miles to reach essential destinations) tend to be more supportive of a potential transition away from the gas tax than predominantly rural regions. In the figure, the percentage of respondents supportive of a potential shift to RUC is mapped against underlying population density. Regions in the top right are more densely populated and more supportive of RUC, while regions in the bottom left are less populated and less supportive.

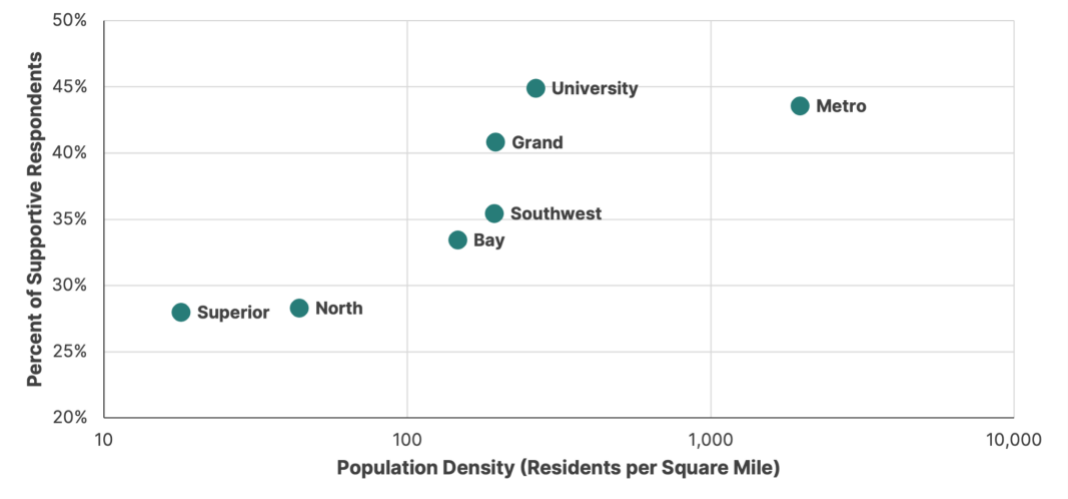



**Figure 21.** Percent of Supportive Respondents by Average Population Density of MDOT Regions

Although regional views are helpful in understanding perspectives around the state, overall opinions on RUC were still more positive than negative. This is shown in **Figure 22,** where supportive respondents alone from the Metro Region exceeded the total number of respondents from three other regions.

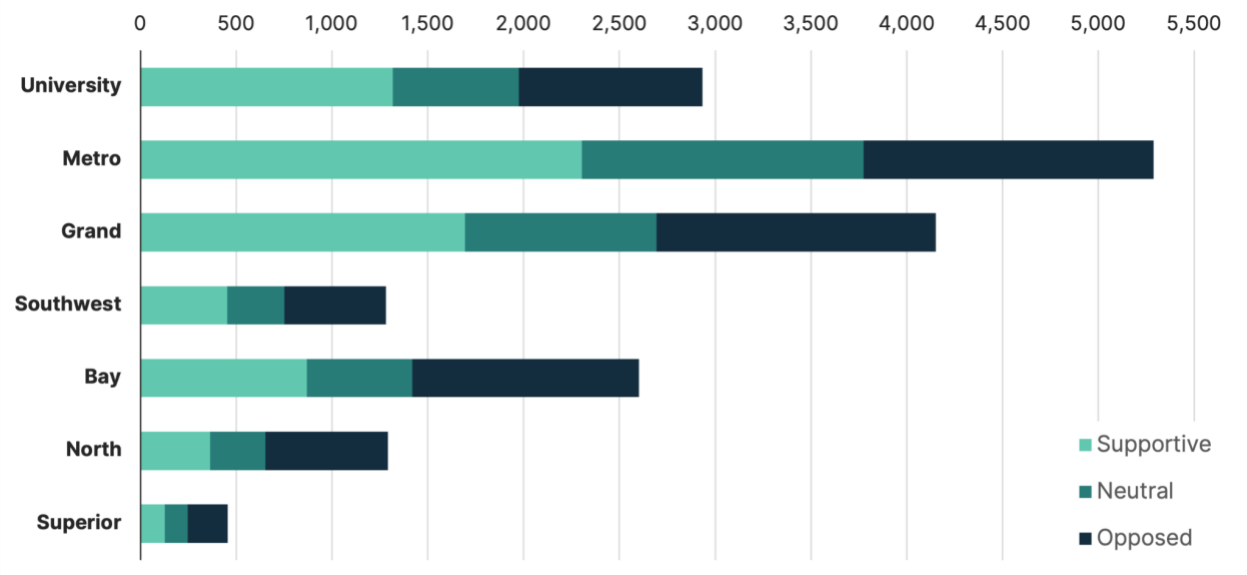



**Figure 22.** Post-Video Perception of RUC Concept by MDOT Region (Absolute View)

*Opinions of Road Usage Charges by Monthly Spending on Gasoline*

Post-video sentiments on the RUC concept are broken down by monthly spending on gasoline in **Figure 23**. Respondents who typically spend $100 to $200 per month (close to the median spend among respondents) are notably more likely to support a potential transition to an RUC system. Support drops among those who spend much less or much more on gasoline than the average respondent.

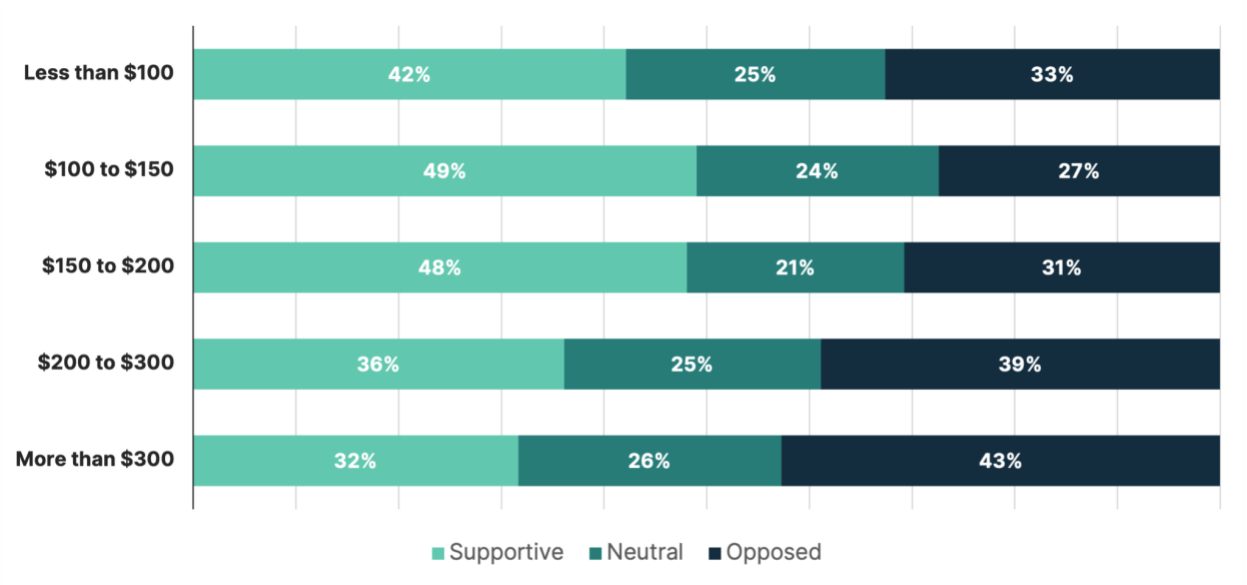



**Figure 23.** Post-Video Perception of RUC Concept by Monthly Gas Spend

**Question: Which sounds more fair to you: gas taxes or road usage charges?**

After viewing the video, all respondents were asked if charging by miles driven (RUC approach) or gas consumption (current gas tax approach) sounded the most fair. A statistically significant plurality of respondents (about 43 percent of the total) selected miles driven as the fairest option (**Figure 24**). A further 34 percent of respondents thought charging by gas consumption was the fairest, while the remaining quarter of respondents preferred another method.

Respondents who answered "Other" to this question had the opportunity to provide additional detail. Responses in the other category include preferences for toll roads, using general funds, or statements that neither option is fair.

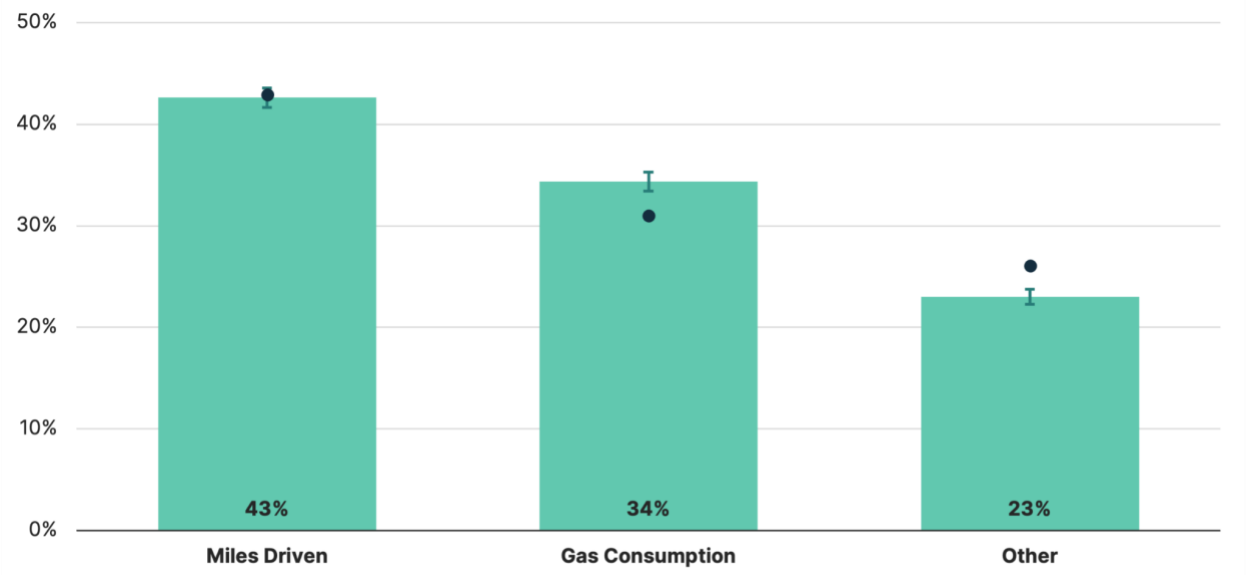
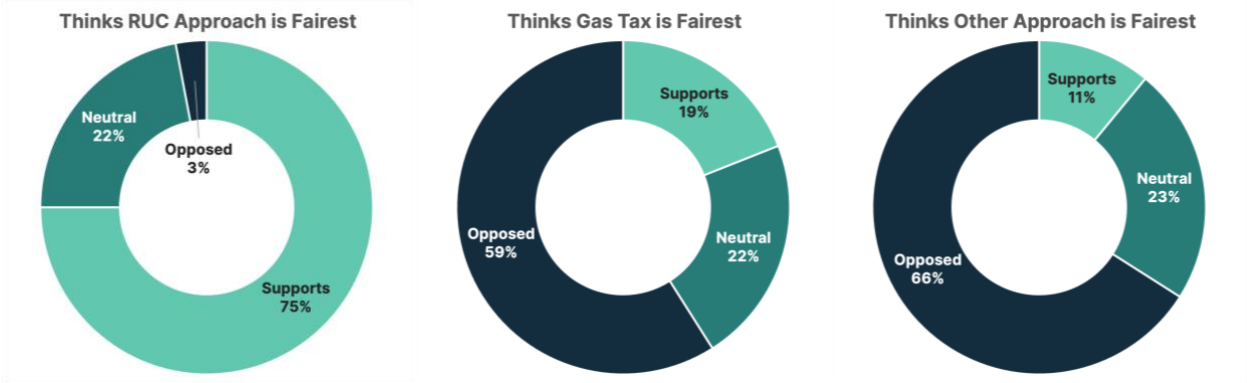



**Figure 24.** Fairest Funding Source for Transportation Infrastructure (Post-Video)

To gauge the strength of the respondent sentiment, the Project Team cross-referenced respondent support for switching to an RUC system (measured in the previous question) with the funding method respondents thought was fairest. As expected, respondents who thought it fairest to tax by miles driven were generally supportive of switching to an RUC system.



### 4.2.4. Perceived Benefits and Concerns

This section identifies the most common benefits and drawbacks respondents see with RUCs. Results can help inform future MDOT messaging around the concept, particularly with the concerns that messaging should address.

**Question: What do you see as the greatest benefits of road usage charges?**

Based on a literature review of similar studies in other jurisdictions, the Project Team developed a list of benefits commonly associated with RUC systems. Respondents were able to pick up to three options, or to select an "I do not see any benefits" option.

As shown in **Figure 25**, the most commonly selected benefit was that RUC was "more fair than the gas tax because it is based on how much you use the roads." The second-most selected option was that RUC did not provide any benefits to respondents, although the difference between this option and the most-selected option is very slight and within the margin of error. A clear separation between the two most-selected options and the rest of the potential benefits is visible.

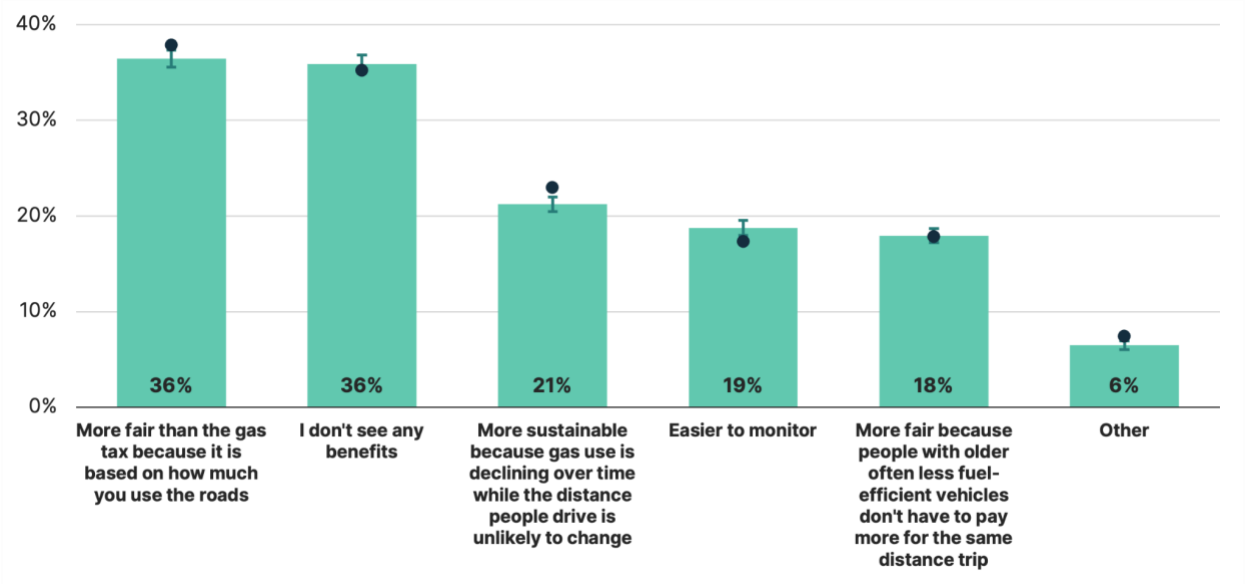



**Figure 25.** Perceived Benefits of RUC Concept

**Question: What are your main concerns regarding road usage charges?**

The Project Team completed a similar review to identify a range of concerns commonly associated with RUC systems. As with benefits, respondents could select up to three concerns or an "I don't have any concerns" option.

As shown in **Figure 26**, the most commonly selected concern was that respondents were "not confident that it will result in improved roads." This result aligns with overall sentiments around existing road quality obtained earlier in the survey, where 57 percent of respondents were either dissatisfied or very dissatisfied with Michigan's transportation infrastructure.

Other concerns selected by more than 30 percent of respondents include worries about data privacy and how the total number of miles driven would be assessed. Notably, only 6 percent of respondents had no concerns about RUC, while 36 percent saw no benefits (see previous question).

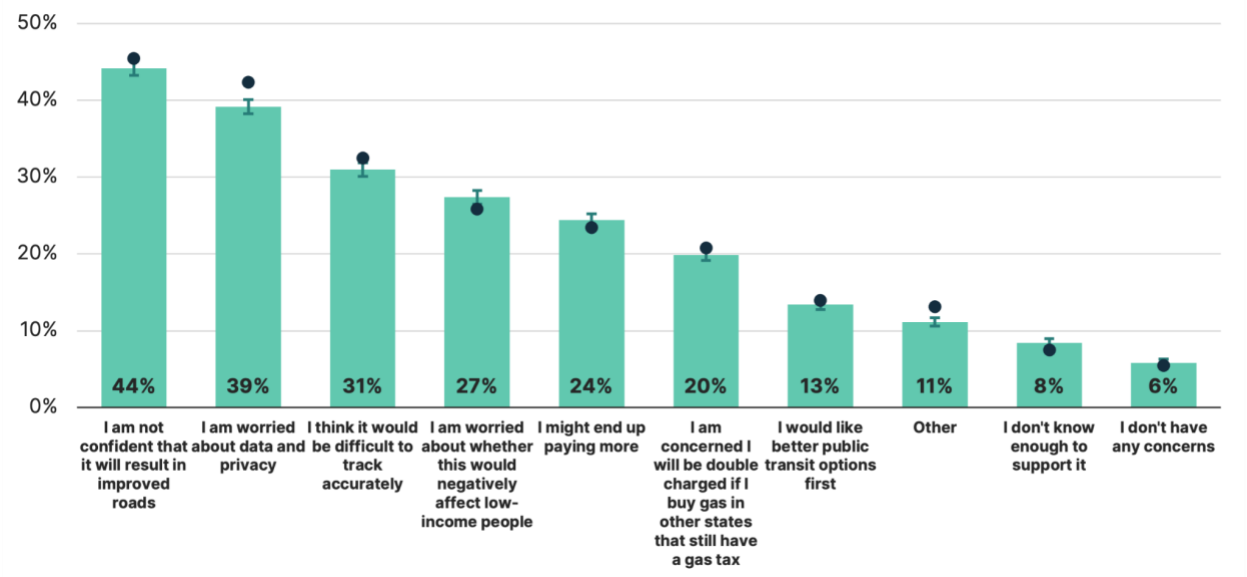



**Figure 26.** Perceived Concerns with RUC Concept

### 4.2.5. Data Collection and Billing

This section evaluates where consensus may exist on the structure of a future RUC program. **Results indicate generally divided opinions among respondents**, with a consistent 15 to 20 percent of respondents strongly opposed to the RUC concept.

**Question: Road usage charges may require data to be collected (for example, how far you have driven). Who are you more comfortable with collecting this data?**

A common concern with the implementation of RUC schemes is data handling and privacy. To gauge public sentiment in this area, the Project Team asked respondents what type of agency they would like to see collecting and handling data (**Figure 27**). Although a plurality of respondents preferred a nonprofit, opinions were sharply divided, with no option garnering the support of more than 40 percent of respondents.

Respondents who selected "Other" were given the opportunity to provide additional context alongside their answer. Two-thirds of the answers in this group (totaling 16 percent of all responses) expressed preferences for no data collection and/or general opposition to the RUC concept.

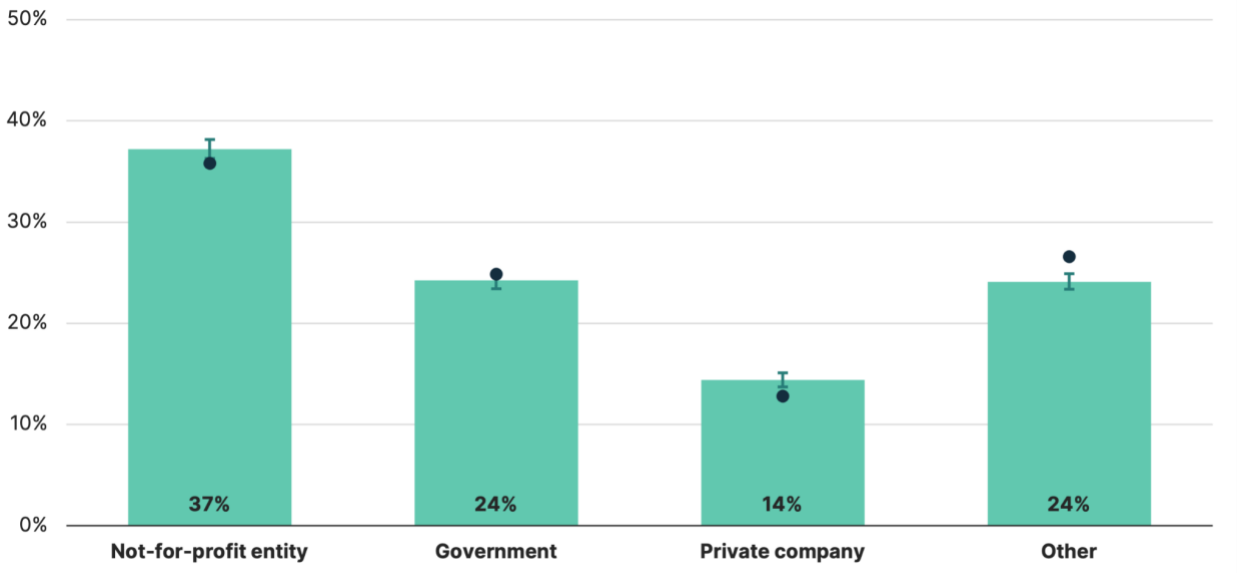



**Figure 27.** Preferred Entity Collecting Data for Future RUC Implementations

**Question: If you needed to provide data (like how many miles you have driven), how would you prefer to report it?**

As shown in **Figure 28**, respondents demonstrated a general split between those who preferred automatic data collection (via an installed device or onboard vehicle telematics, about 35 percent of respondents) and those who preferred having a degree of manual control over the data submission process (manual data upload and app-based submission, about 45 percent of respondents).

Similarly to the previous questions in this survey, slightly less than one-quarter of respondents selected "Other." The majority of this subgroup (totaling 17 percent of all responses to this question) indicated that they would refuse to provide mileage data and were opposed to RUC as a whole.

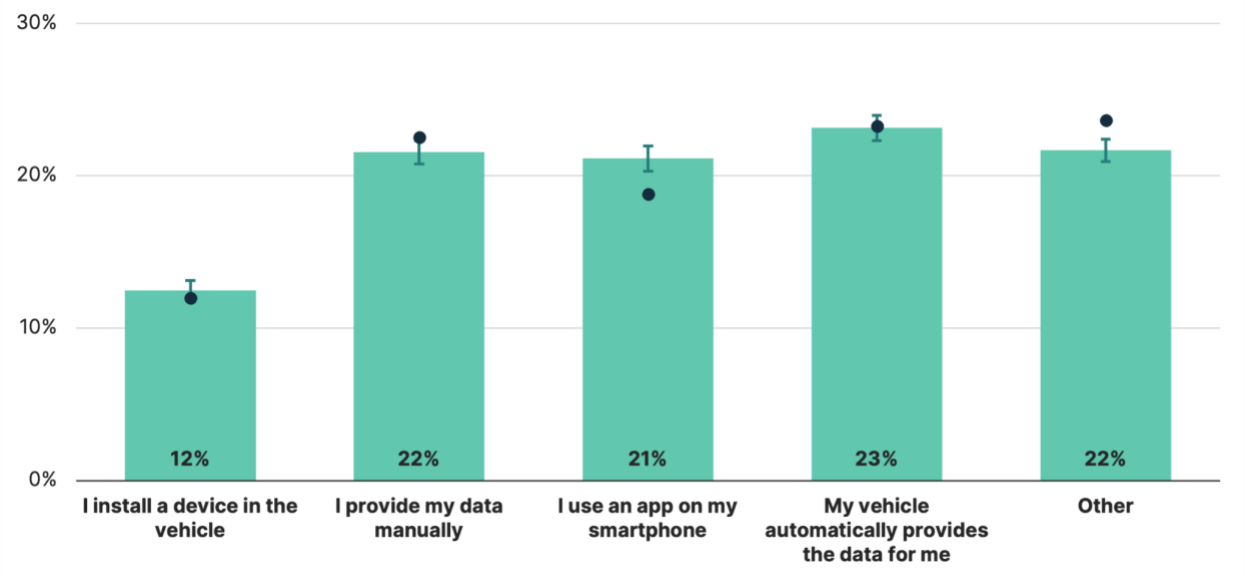



**Figure 28.** Preferred Data Collection Method for Future RUC Implementations

**Question: To avoid having a lot of small bills to pay, your road usage charges would be added up into larger invoices. How often would you like to pay for your road usage charges?**

As shown in **Figure 29**, only 5 percent of respondents preferred a prepaid option, with a slim majority (51 percent of respondents) preferring semi-frequent payments due either monthly or quarterly.

Similarly to the previous questions in this survey, about one-quarter of respondents selected "Other." The majority of this subgroup (totaling 17 percent of all responses to this question) reiterated their general opposition to the RUC concept.

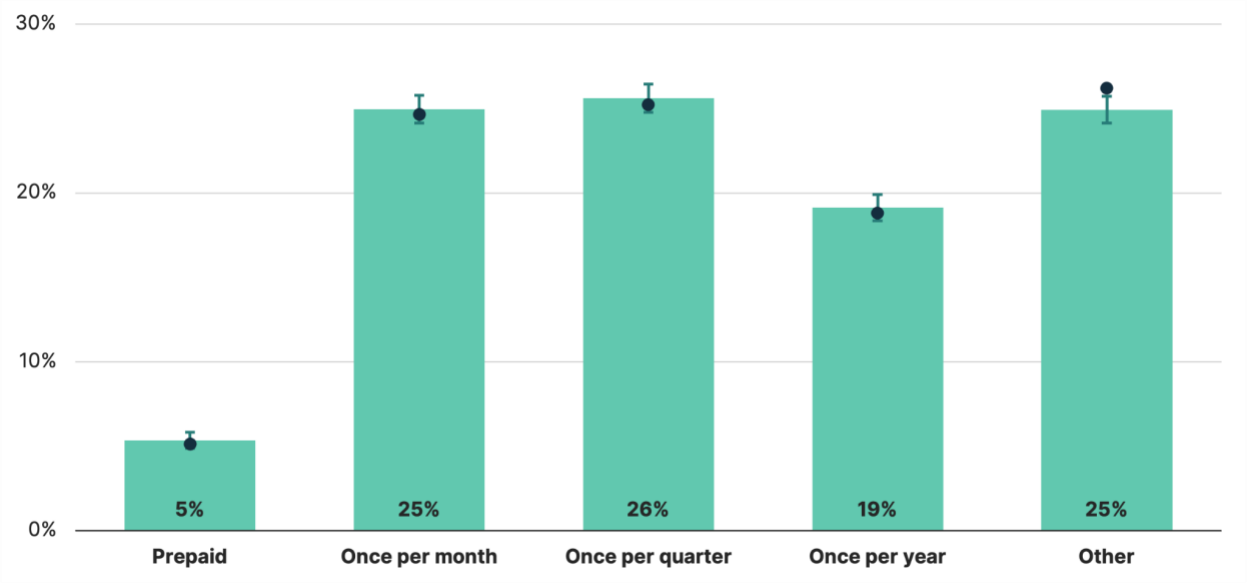



**Figure 29.** Preferred Payment Frequency for Future RUC Implementations

# 5. Conclusions

As shown in **Table 4**, the Survey achieved all targets outlined in *1.1. Goals and Objectives*.

**Table 4.** Survey Performance and Learnings Relative to Study Goals

| Study Goal | Outcome |
|---|---|
| Obtain between 10,000 and 20,000 responses from Michigan residents. | **Achieved.** A total of 19,160 valid responses were received from across Michigan. At least one response was received from more than 97 percent of Michigan ZIP codes. |
| Understand Michiganders' current perceptions of RUCs, and how those perceptions change after learning more about the approach. | **Achieved.** Before viewing the video, a statistically significant plurality of respondents had a negative or slightly negative view of road usage charges. After the video, the share of respondents with a negative or slightly negative perception of RUC dropped from 43 to 34 percent, while the share of respondents with a positive or slightly positive opinion increased from 37 to 43 percent. |
| Educate respondents about the need for alternative funding sources for surface transportation in Michigan. | **Achieved.** Before learning about RUC, 60 percent of respondents were familiar with the concept. After watching the video included in the Survey, 97 percent of respondents said they understood or somewhat understood the concept. |
| Assess Michiganders' willingness to share different levels of data required for an RUC system. | **Achieved, but further work is needed.** Answers on implementation-focused questions revealed split opinions from Michigan residents. When asked who they wanted collecting and processing the data required to maintain an RUC program, no option garnered more than 37 percent support. Opinions were similarly divided when asked about the mechanics of how data should be reported. Any future RUC implementations will likely need to include multiple ways for users to report data. |

## 5.1. Key Takeaways

Outcomes from each section of the survey are summarized below:

- **Satisfaction With Current Funding System:** A majority (57 percent) of respondents were unsatisfied or very unsatisfied with the current quality of road infrastructure in Michigan, about three times larger than the group who were satisfied or very satisfied.

  Results indicate that users who are currently satisfied with road quality are significantly more likely to support increased funding in the future. More than half of respondents who were currently satisfied with road quality supported paying more for better roads, compared to only 27 percent of respondents who were unsatisfied with current quality.

- **Familiarity With Current Funding System:** Most Michiganders said they know approximately how much they pay a month for gasoline, with the middle 50 percent of respondents spending between $100 and $220 per month. However, opinions are split on the fairest way to fund transportation projects. About 31 percent of respondents think General Fund dollars are the most equitable way to pay for roads, greater than the share who prefer either the state gas tax (23 percent) or an RUC system (25 percent).

- **Attitudes Toward RUC:** Before viewing the educational video, about 43 percent of respondents held a negative or slightly negative opinion of RUC, while 37 percent held a positive or slightly positive opinion. After the video, the share of respondents with a negative or slightly negative perception of RUC dropped to 34 percent, while the share of respondents with a positive or slightly positive opinion increased to 43 percent.

- **Perceived Benefits and Concerns:** When asked what benefits they saw with an RUC system, respondents most commonly selected that RUC was "more fair than the gas tax because it is based on how much you use the roads." A similar percentage indicated that they did not see any benefits in an RUC system.

  When asked about concerns, 44 percent of respondents were "not confident that [an RUC system] will result in improved roads." This result aligns with overall sentiments around existing road quality obtained earlier in the survey. Other concerns selected by more than 30 percent of respondents include worries about data privacy and how the total number of miles driven would be assessed.

- **Data Collection and Billing:** Results indicate generally divided opinions among respondents, with a consistent 15 to 20 percent of respondents strongly opposed to the RUC concept.

# Appendix A:

# Process for Analyzing Free-Response Answers

Several questions in the Survey included free-response fields (e.g., "Why did you select this answer?") or fields where respondents selecting "Other" could add additional context. With more than 19,000 total respondents, each free-response question generated thousands of individual answers. As a result, manual review and processing of each response was impractical.

To accurately categorize respondent sentiment and identify the key themes listed in *4.2. Results by Question*, the Project Team used an advanced natural language processing model. The methodology underpinning this process is described below:

1. **Embedding Free Text Answers:** OpenAI's *text-embedding-3-large* model was used to map individual responses into a high-dimension vector space. This process, known as embedding, converts the qualitative sentiment of an individual response into a mathematical representation of 3,072 vectors. The value of each vector represents where the response falls along the range of a specific sentiment. For example, if a vector is measuring respondent sentiment from "great road quality" to "poor road quality," responses that include the phrase "the roads are fine" would score close to the middle of the numerical range. When repeated across all 3,072 vectors, this process creates an accurate representation of respondent sentiment.
2. **Clustering With K-Means:** The K-Means clustering algorithm was used to group the vector representations of each response into different clusters based on how similar the scores of each vector were. This machine learning process continued until the answers in each cluster were more similar to each other than to those in other clusters.
3. **Determining Optimal Clusters:** To determine the optimal number of response clusters, the Project Team plotted the variability in each response cluster (difference in vector scores) against the number of clusters established for the question. The amount of variability in each individual cluster decreased as the total number of clusters increased, since each cluster had to cover a smaller range of values. This pattern continued up to a point where adding additional clusters did not meaningfully decrease the variability within each cluster. This point represents the best balance between granularity and interpretability.
4. **Cluster Naming With GPT-4:** Once clusters were identified and the number of clusters for each question was finalized, the name for each cluster was generated using OpenAI's *chat-*

*completion* function in the GPT-4 model. Descriptive names were generated based on the original survey question and the content of the responses grouped into the cluster.

5. **Manual Quality Assurance and Review:** As a final stage, a manual quality assurance process was completed to ensure that response clusters and their names accurately reflected the content and context of the individual responses contained in the cluster.