

April 10, 2024

## Michigan Ranks 40th in Road Pavement Quality Assessment

### In a Nutshell

- A novel method provides a multi-factorial index score to evaluate statewide pavement conditions across multiple metrics.
- Michigan ranks 40th nationally, and tenth in an eleven-state peer group for overall pavement quality.
- This analysis can help to evaluate funding adequacy, as well as identify inefficiencies in current

A multi-factorial index was created to compare the quality of Michigan’s roads to peer states and the national system. Notwithstanding limitations of the data, we found Michigan’s road quality to rank 40th nationally and tenth among a peer grouping of 11 states. We plan to continue this research to evaluate adequacy of funding levels, as well as policy changes regarding revenue allocations and investment strategies.

This post assesses road pavement quality in Michigan by comparison to these peer states as well as national rankings.

Evaluating pavement quality for a statewide public road network is not straightforward. Pavement condition is reported using a variety of metrics applied to a variety of road types. Data collection practices may vary, with states using different types of equipment or manual methods, leading to differences in data quality. Reporting in some states is less complete than others, resulting in data gaps and reduced confidence that the reported data accurately reflects the condition of the network. Further, there is often an extended lag in reporting. For some categories, the most recently available data reflects conditions as far back as five years.

Notably, there is no data available for all public roads in Michigan or any other state. The federal government collects and reports data only for roads that are eligible for federal aid, which excludes those classified as local roads or rural minor collectors.

### The Federal Aid Eligible System

The Federal Highway Administration (FHWA) reports pavement condition on the federal aid eligible (FAE) system, which is the broadest road classification for which state-comparable pavement data is available. Michigan’s FAE network covers about a third of the 120,115-mile statewide public road network. This includes routes classified by function as expressways, arterials, and collectors. The entirety of the state-owned trunkline system is FAE eligible, but many locally-owned roads are also included. In Michigan, 53,291 miles of FAE roads (67 percent of the FAE network) are under the jurisdiction of local road agencies.

Unfortunately, the data available for the FAE network is not particularly reliable or easy to interpret. States report pavement condition on the FAE system using four individual pavement condition metrics: roughness, cracking, rutting, and faulting.

Not every mile of road is assessed; much of the system condition is estimated using statistical sampling. Some states have provided incomplete data even allowing for sampling. Further, the most recently available data for the entire FAE system was collected in 2020—now rather dated. Michigan, uniquely, did not collect pavement

condition data in 2020 and thus Michigan's most recently available FAE pavement data was collected in 2019. It can be expected that Michigan's FAE system has improved since 2019 with increases in state and federal road funding, as well as the "Rebuilding Michigan" bond program.

With such caveats in mind, it is worthwhile to include the FAE pavement condition data as a component of a broader evaluation of statewide pavement conditions. Without this component, any evaluation would only reflect the more limited National Highway System (NHS). Cross-checking this data against other sources suggests that in most cases it is consistent and thus judged to accurately reflect relative pavement conditions on the FAE system, and likely correlates to general conditions statewide.

**Roughness.** Pavement roughness is a measurement of deviation from a perfectly smooth surface, most often assessed by the international roughness index (IRI). IRI values typically reflect underlying failures in the pavement – but not necessarily, as it is possible for rough pavement to be in structurally good condition. Some states report roughness for some routes not by IRI, but by an alternative metric called present serviceability rating (PSR). While both metrics reflect pavement roughness, and thus perceived ride quality, they derive the measurement by different methods. Generally, whether measured by IRI or PSR, a roughness rating of poor would be experienced by drivers as perceivably rough pavement.

Michigan reported that 21.7 percent of the FAE system was in poor condition by IRI/PSR. Michigan ranks 30th nationally and eighth among our 11-state peer grouping.

**Cracking.** Image shows asphalt pavement exhibiting severe alligator cracking.

The cracking metric reflects visible cracking on a pavement surface. As with IRI, the cracking metric may reflect pavement in some state of failure—but not necessarily so. Some pavement cracking occurs naturally with age, and may not be problematic so long as the cracks are appropriately sealed and maintained. That said, when visible cracking becomes so prevalent that the road surface is gauged in poor condition, it likely reflects pavement that is in some state of failure.

Michigan reported 18.3 percent of the FAE network in poor condition by the cracking metric. This ranks 45th nationally, and 10th of 11 among peer states.

**Rutting.** Pavement rutting occurs on flexible asphalt pavements exhibiting structural failure of either the pavement surface or subsurface base layers. Rutting may not impact perceived ride quality but is often a precursor to more noticeable distresses such as cracking and potholes. Rutting itself can be a safety hazard in wet conditions, as water or ice may accumulate in the ruts. A pavement section is considered to be in poor condition when the average depth of rutting is greater than 0.4 inches.

Michigan reported 1.1 percent of FAE asphalt pavements were in poor condition by rutting. This ranks 26th nationally, and 8th of 11 compared to peer states.

**Faulting.** Faulting is a failure mode specific to jointed concrete pavements (JCP) and is simply a direct measurement of the vertical difference in pavement surface elevation at the joint. Roadway segments are



Image: Asphalt Pavement in Poor Condition by Cracking Metric (Source: Sable Asphalt)



Image: Asphalt Pavement in Poor Condition by Rutting Metric (Source: G.H. Shafabakhsh (2014))



Image: Jointed Concrete Pavement in Poor Condition by Faulting Metric

Table 1: Percentage of Federal Aid Eligible Pavement in Poor Condition by Metric for Michigan and Peer States, Listed Alphabetically (2019/2020 Data)

State	Roughness	Cracking	Rutting	Faulting
Georgia	7.2	13.2	0.2	0.3
Illinois	19.8	32.1	1.2	7.9
Indiana	18.3	16.6	0.3	1.4
MICHIGAN	21.7	18.3	1.1	11.7
Missouri	24.3	8.6	3.0	2.3
North Carolina	10.5	6.2	0.4	11.3
Ohio	15.8	9.0	0.7	0.1
Pennsylvania	27.7	4.7	2.3	1.3
Tennessee	5.4	17.6	0.5	2.6
Virginia	13.2	0.8	0.3	67.6
Wisconsin	25.2	4.4	0.5	6.9

considered in poor condition by faulting when the average fault is greater than 0.15 inches. State-by-state comparisons of pavement faulting are difficult because JCP construction is much less common than asphalt pavements, and some states have very little of this pavement type. For example, while Virginia reports that 67.6 percent of the state’s FEA JCP pavement is in poor condition by faulting, it has only 104 miles of this pavement, compared to 2,306 miles on the FAE system in Michigan.

Michigan reported that 11.7 percent of FEA JCP pavement was in poor condition by faulting. This ranks 35th nationally and 10th of 11 among peer states.

Due to questionable data quality and the limited utility of each individual metric, we should

be cautious in the interpretation of this data. However, looking across the metrics reveals a consistent trend. Michigan’s FAE pavement condition ratings tend to be slightly below average to well below average, both nationally and compared to peer states.

## The National Highway System

Comparatively better data is available on the National Highway System (NHS), which is a subset of the FAE system. The NHS includes all Interstate routes and expressways, as well as other major routes determined to be of national importance. While the NHS includes only about 5.3 percent of Michigan’s public road network by route mile, it does cover the most strategically important and high-traffic routes. In Michigan, 4,376 miles of NHS roads (20 percent of the NHS network) is under the jurisdiction of local road agencies.

The most comprehensive pavement condition on the NHS is available through the FHWA Transportation Performance Management (TPM) program. This program was initiated to encourage states to adopt strategic data-based approaches to asset management.

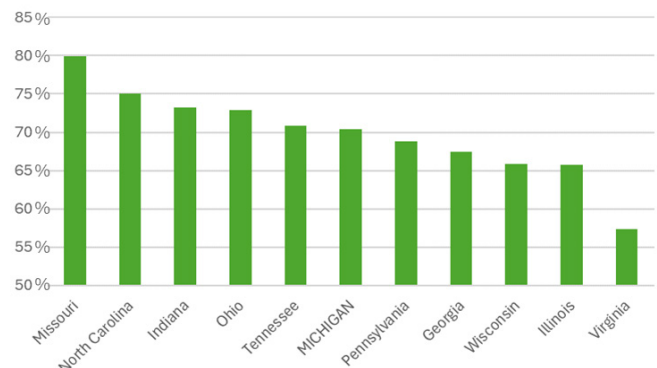
States report the percentage of NHS lane miles in good, fair, and poor condition using the standardized federal pavement condition metric (PCM). The PCM is based on a combination of the fundamental pavement condition metrics previously introduced (IRI, cracking, rutting, and faulting). All underlying metrics must be found to be “good” for the resulting PCM score to be good. If two or more metrics are ranked “poor,” the resulting PCM for that pavement is determined poor. Otherwise, the pavement is judged to be in fair condition.

TPM data is reported separately for Interstate and non-Interstate NHS routes.

**Interstate Routes.** Michigan reported that 70.4 percent of Interstate pavement was in good condition by PCM. This ranks 18th nationally and places Michigan as the median state (6th of 11) among peer states.

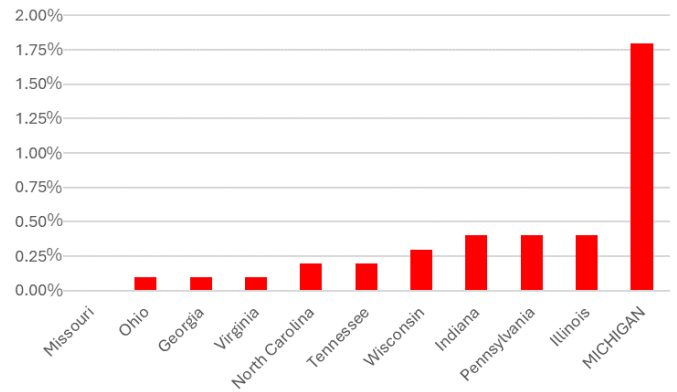
While Michigan ranks relatively high in Interstate pavement in good condition, the state ranks low in Interstate pavement in poor condition. Interstate routes tend to be relatively well-maintained, and because two or more individual metrics must be ranked poor to derive an overall score of poor, a very low percentage

Chart 1: Percentage of Interstate Lane-miles in Good Condition by PCM (2021 Data)



of Interstate pavement is rated in poor condition by PCM. Only 1.8 percent of Michigan’s Interstate pavement is in poor condition. Yet, this results in the state ranking lowest among peer states and 44th nationally.

Chart 2: Percentage of Interstate Lane-miles in Poor Condition by PCM (2021 Data)



**Non-Interstate NHS Routes.** Non-Interstate NHS pavements tend not to be maintained in as good condition as Interstates. Only 41.6 percent of Michigan’s non-Interstate NHS pavement was reported in good condition. However, this is above the median state performance; Michigan ranks 22nd nationally by this metric, and 5 of 11 compared to peer states.

As with Interstate routes, Michigan reports a notable discrepancy in good vs. poor ranking on non-Interstate NHS pavements. For non-Interstate NHS in poor condition, Michigan ranks 47th nationally and last among peer states with 8.9 percent in poor condition.

Chart 3: Percentage of Non-Interstate NHS Lane-miles in Good Condition by PCM (2021 Data)

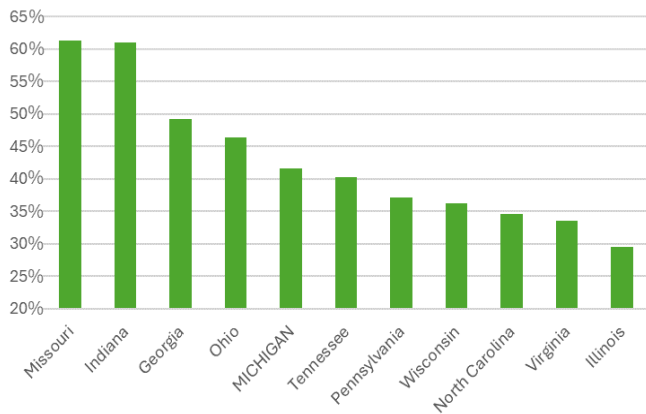
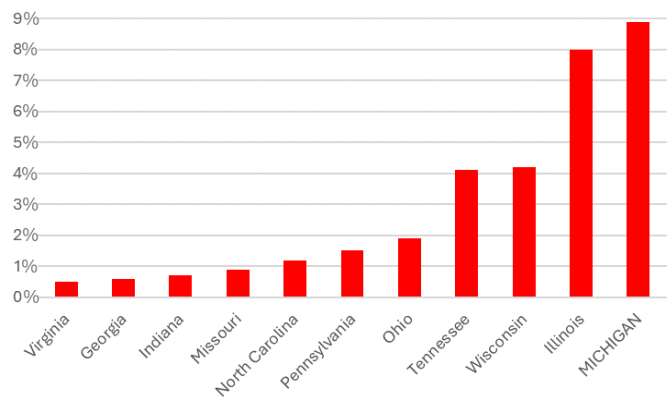


Chart 4: Percentage of Non-Interstate NHS Lane-miles in Poor Condition by PCM (2021 Data)



**NHS Bridge Surface.** The TPM program also provides data on NHS bridge surface conditions. Notably, this data reflects only the condition of the bridge riding surface and is not an overall structural assessment of the bridge (which includes foundations, substructures, support beams, and more). A bridge surface can be rated in good condition while other elements of the structure are found to be deficient. Alternatively, a bridge with a rough riding-surface rated in poor condition may otherwise be structurally sound. A more comprehensive structural assessment of bridge condition is provided by the National Bridge Inventory (this data has not been included in this evaluation).

Per TPM reporting, 22.1 percent of Michigan’s NHS bridge surface pavement was in good condition. This ranks 40th nationally and is last among peer states. Michigan reports 7.0 percent of NHS bridge surfaces in poor condition resulting in a national ranking of 41st and a peer-state ranking of 9th of 11.

### A Novel Multifactorial State Pavement Condition Index

As previously discussed, it is difficult to draw conclusions from any individual measure of pavement condition. Each metric reflects a limited aspect of pavement condition and may be otherwise subject to data quality and reliability issues. To address this complication, we have developed a multifactorial statewide pavement condition index based on 17 individual metrics across various road classifications. In addition to the findings discussed above, we have incorporated pavement roughness data as provided by the 2022 FHWA Highway Statistics Series (tables HM-63, HM-64, HM-47, and HM-47A).

For each of the 17 metrics, the percentage of pavement in good or poor condition is first converted to an individual index score based on the range of reported data across all 50 states. For example, North Dakota has the highest percentage of Interstate pavement in good condition by PCM, with 82.9 percent. The lowest-ranked state is Louisiana, with 17.1 percent. When converted to the index, North Dakota scores as 100, and Louisiana scores as zero (0). Michigan reports that 70.4 percent of Interstate pavement is in good condition. The difference between Michigan and Louisiana's percentage-good data is 81 percent of the difference between North Dakota and Louisiana  $[(70.4-17.1)/(82.9-17.1) = 0.81]$ . Thus, Michigan is assigned an index score of 81 for this category.

Table 2: Summary Results of the Multifactorial Pavement Index (Michigan and Peer States Rendered in Bold)

System Data Year	Federal Aid 2020				Functional 2022			NHS 2022				NHS (TPM Data) 2021						Sum Weights		Rank
	Weight	0.2	0.2	0.2	0.3	0.4	0.3	0.2	0.4	0.8	0.6	1.0	0.8	1.0	0.8	1.0	0.8	1.0	10	
Metric	FAE - JCP Faulting/Poor	FAE - Cracking/Poor	FAE - HMA Rutting/Poor	FAE - IRI/PSR/Poor	Expressways Poor - IRI	Arterials Poor - IRI	Collectors Poor - IRI+PSR	NHS - IRI Good	NHS - IRI Poor	NHS - ADT/IRI Good	NHS - ADT/IRI Poor	Interstate - PCM Good	Interstate - PCM Poor	Non-Interstate PCM Good	Non-Interstate PCM Poor	NHS Bridge Good	NHS Bridge Poor	Unweighted Average	Weighted Average (Index Score)	
State	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
Georgia	99	59	99	96	95	90	82	85	98	86	97	76	97	63	96	100	98	89.3	90.6	1
North Dakota	99	100	98	99	99	94	88	92	97	83	90	100	97	90	100	51	87	92.0	90.5	2
Nevada	92	96	98	79	96	83	58	97	99	71	86	97	92	98	98	57	94	87.9	89.0	3
Kansas	95	77	98	86	94	96	89	99	98	84	93	75	92	78	89	88	85	89.2	88.5	4
Indiana	97	48	98	70	90	95	97	89	99	83	98	85	90	86	95	59	87	86.2	87.1	5
South Dakota	98	96	99	81	97	85	69	81	95	83	92	98	100	100	100	19	80	86.7	86.6	6
Florida	100	85	80	85	96	83	62	84	96	84	94	81	82	60	92	74	98	84.4	85.2	7
Minnesota	99	83	100	91	96	93	81	86	98	83	100	82	85	86	97	31	65	85.7	83.5	8
New Hampshire	na	63	87	71	100	75	59	93	93	100	100	69	100	56	87	70	74	81.0	83.0	9
Kentucky	98	66	99	95	93	85	82	93	95	84	90	75	77	81	91	27	77	82.9	80.6	10
Ohio	100	72	96	76	86	62	74	66	79	72	77	85	97	58	86	74	88	79.3	79.9	11
North Carolina	77	81	98	88	91	73	77	68	92	75	89	88	95	35	92	52	83	79.7	79.6	12
Missouri	97	73	82	56	92	65	41	84	93	82	87	95	100	86	94	25	57	77.0	79.2	13
Nebraska	98	96	95	96	86	90	86	69	77	51	47	92	97	76	83	69	88	82.1	79.0	14
Idaho	76	98	70	90	95	91	92	90	97	91	97	62	92	46	95	16	78	81.0	79.0	15
Utah	93	92	0	66	96	82	48	72	97	63	90	77	95	63	94	27	100	73.8	78.6	16
Alabama	39	0	94	91	89	100	99	100	100	92	95	83	69	39	81	25	98	76.1	77.5	17
South Carolina	99	22	87	93	93	83	59	66	92	73	91	89	95	43	89	41	74	75.8	77.4	18
Tennessee	95	45	97	100	93	86	85	81	89	84	88	82	95	46	69	32	70	78.7	76.2	19
Texas	90	94	97	60	87	59	50	58	79	48	69	72	97	68	91	57	94	74.7	76.0	20
Oklahoma	87	55	99	98	84	81	86	61	82	64	79	78	72	52	80	55	96	77.0	75.6	21
Montana	48	97	79	83	98	92	66	82	95	85	92	59	92	49	90	16	72	76.3	75.6	22
Oregon	88	58	87	94	94	90	86	74	88	74	79	62	97	33	79	3	94	75.3	72.8	23
Arizona	97	71	96	60	88	61	38	62	82	67	79	50	77	32	82	69	95	70.9	71.7	24
Wyoming	94	78	93	99	93	97	89	90	99	83	92	37	46	49	92	17	69	77.5	71.3	25
Virginia	0	98	99	82	92	78	52	53	87	58	78	61	97	33	97	29	82	69.1	71.3	26
Delaware	79	72	99	75	70	72	65	59	82	55	73	70	82	60	95	17	84	71.1	71.0	27
Iowa	97	59	91	92	92	81	0	52	78	54	77	63	90	41	73	57	86	69.5	70.8	28
Mississippi	65	46	93	51	88	64	29	62	76	69	76	82	82	41	69	66	75	66.7	69.6	29
Arkansas	90	83	83	43	81	89	96	64	81	63	70	73	67	35	60	49	79	71.0	67.3	30
West Virginia	91	69	92	39	86	81	100	54	79	68	83	86	90	58	94	0	15	69.6	66.3	31
Maine	na	76	26	64	99	75	56	87	86	91	90	21	95	51	61	22	57	66.1	66.3	32
New Mexico	87	72	81	33	85	47	12	74	85	76	81	56	56	39	81	38	86	64.0	66.1	33
Wisconsin	86	86	97	54	84	43	49	39	61	38	49	74	92	38	69	60	85	65.0	64.6	34
Connecticut	na	82	99	36	91	36	20	40	73	67	81	78	95	41	87	6	53	61.5	64.2	35
Pennsylvania	97	86	86	48	80	55	31	45	64	48	50	79	90	40	89	25	74	63.9	63.9	36
Vermont	na	51	2	68	94	78	0	86	86	87	85	4	74	37	44	53	80	58.0	61.7	37
New Jersey	39	66	99	32	77	77	99	36	40	60	51	89	97	48	64	16	60	61.8	60.2	38
Maryland	92	53	70	48	77	40	30	56	48	66	56	58	85	27	53	21	85	56.8	57.1	39
MICHIGAN	77	43	93	62	82	60	62	66	77	58	61	81	54	48	33	17	58	60.8	57.0	40
Colorado	85	68	99	61	69	54	43	45	73	32	51	40	0	44	77	41	80	56.6	52.5	41
Alaska	na	87	49	68	64	52	39	42	49	62	74	20	77	17	43	38	61	52.7	51.5	42
Illinois	84	0	93	66	85	55	57	45	64	49	51	74	90	25	40	18	25	54.2	51.5	43
Washington	91	95	75	46	80	45	37	41	62	53	57	44	51	8	69	33	47	55.0	50.9	44
Massachusetts	na	95	82	48	83	14	98	22	21	58	31	83	100	0	0	9	26	48.1	40.5	45
California	95	70	97	35	68	33	2	14	17	22	17	46	44	14	49	53	63	43.4	39.5	46
New York	41	28	94	52	50	37	52	30	39	19	0	43	72	5	43	22	31	38.7	34.6	47
Hawaii	88	83	94	19	0	37	2	1	31	0	5	2	0	19	72	22	89	33.2	29.6	48
Louisiana	67	33	9	58	50	45	39	23	49	28	27	0	15	0	4	40	67	32.6	29.0	49
Rhode Island	na	48	84	0	80	0	20	0	0	43	15	56	97	7	0	9	0	28.6	26.3	50

The 17 individual index scores are then combined into a weighted average that reflects perceived criticality to system pavement condition, data timeliness, and potential data quality issues. No individual metric is weighted more than 10 percent, thus the summary index score overwhelms outlier figures and reflects broad trends. This provides a valuable metric by which to compare pavement quality on a state-by-state basis.

Each individual score, as well as the combined weighted index score, is provided for all 50 states, (see Table 2).

Using this method, Michigan ranks 40th nationally with a weighted average index score of 57.0. This is 10th of 11 compared to peer states, with only Illinois ranking lower.

Michigan's highest individual score (93) reflects the percentage of FAE routes in poor condition by rutting. This is one of the categories where the data is not only dated but is of questionable reliability due to approaches in data collection and statistical sampling. Considering that, the category is de-weighted, contributing only 2 percent of the summary index score.

Michigan's second-highest score reflects pavement roughness (IRI) on expressways. This includes interstates as well as non-Interstate limited-access highways. Michigan reports 4.2 percent of expressways in poor condition by IRI, translating to an index score of 82. While this is a relatively high score with respect to all categories, it is somewhat related to the scoring methodology and the "long tail" distribution of the underlying data for this metric. Specifically, the scores are skewed by Hawaii reporting 23.8 percent of expressways in poor condition by IRI. For reference, the median state index score for this category is 88.

Michigan also scores high in Interstate lane-miles in good condition by PCM (81). This is a bright spot in Michigan's evaluation, as this is a fairly reliable, pertinent metric, and places Michigan as 18th best among all states. This category contributes 8 percent of the overall index score.

In other categories, Michigan tends to rank from about average to moderately below average.

Michigan's lowest score (17) reflects the percentage of NHS bridge surface area in good condition. Michigan's second-lowest score (33) reflects the percentage of non-Interstate NHS pavement in poor condition by PCM. Low scores in these categories were influential on Michigan's overall index score, as they are weighted relatively highly (8-10 percent each).

**Caveats.** The statewide pavement condition index represents a novel approach to infrastructure analysis.

Development of the index required engineering and analytical judgments that may not be optimal. There are many more available metrics that could be incorporated into a summary score. Our method generally emphasizes metrics that are as broad in scope as the data allows while limiting redundancy, but may have overlooked important elements.

While five of the metrics reflect pavement in good condition, the majority of categories and subsequent weighting emphasize pavement in poor condition. This approach was adopted because it was deemed more important for a state to prevent pavement from failing into poor condition than it is to provide new pavement in good condition. An alternative approach that emphasizes pavement in good condition may result in different conclusions.

As previously stated, there are data reliability issues within several of the individual categories. We have addressed this issue by combining multiple categories, as well as color-coding the table to allow for the identification of outlier data that may not be representative.

Another issue is that the most recently available data for any category was collected in 2022. Data on the FAE network is even more dated – 2019 for Michigan and 2020 for other states. Increases in state and federal funding, as well as the bonding proceeds, have likely improved many aspects of pavement condition in recent years, so these categories and resulting index may be better considered as a recent historical baseline as opposed to representing current conditions.

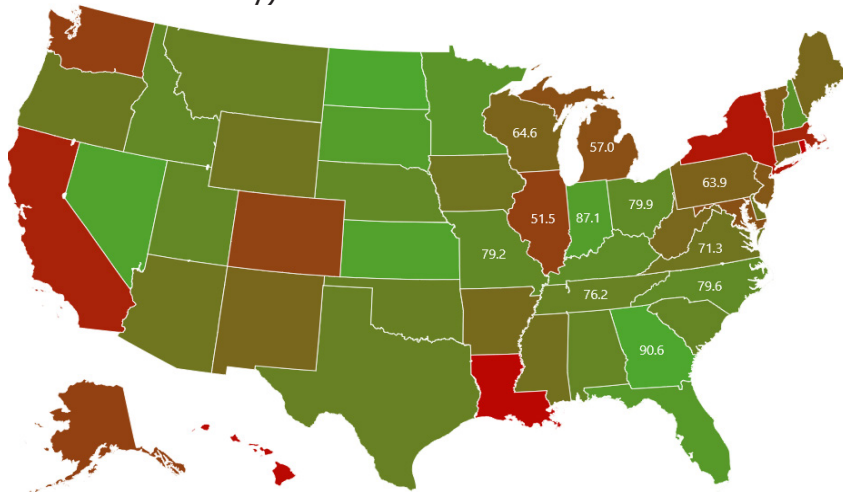
Finally, there is no nationally comparable data available on local roads. The data does capture the most strategically important and high-traffic routes but omits the local roads and residential streets that make up much of a state's public road system by mileage (about two-thirds in Michigan). While county and municipal road agencies have benefited from increases in state and federal funding, they have not benefited from the bonding for state roads.

## Discussion and Potential Research Directions

This analysis provides a novel multifactorial pavement condition metric that can be used to assess overall pavement quality for the road systems analyzed across states with reasonable confidence. Michigan's national rank of 40 and peer state rank of 10 (out of 11 states) supports the conventional wisdom that Michigan's roads tend to be in relatively poor condition.

While the level of analysis presented here is fairly topical, the underlying data can be further evaluated and broken down to derive meaningful insights.

Map 1: State Pavement Condition Index Scores (Data Labeled for Peer States Only)



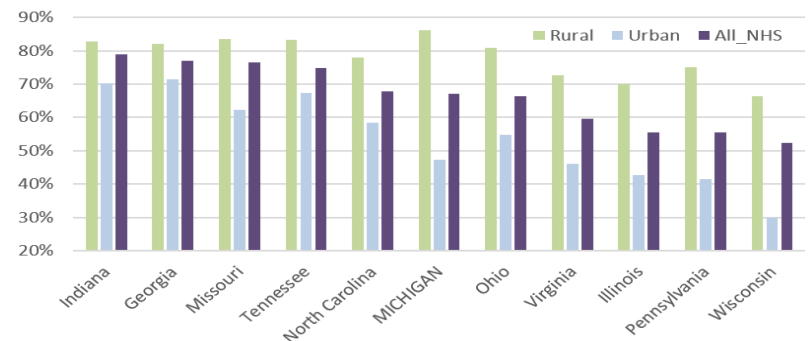
Several potential factors could explain why Michigan's roads tend to be in poorer condition than a typical state. This may include factors that are typically outside of the scope of policy and administrative practices to affect, such as traffic, climate, and geology. However, the range of pavement quality across the 50 states often does not obviously correlate with such factors, suggesting that influenceable aspects such as funding levels and management approaches are more controlling.

The map demonstrates that pavement conditions across the states do not obviously correlate with climate or geology, supporting additional analyses that other policy factors are more influential.

The distribution of good and poor pavement across Michigan often deviates somewhat from national and peer-state trends. Identifying discrepancies may provide insightful details on the condition of Michigan's roads.

For instance, many of the available tables allow for pavement condition data to be broken down into rural and urban portions of the system. By pavement roughness (IRI), Michigan reports that 67.0 percent of the statewide NHS system is in good condition, ranking 24th nationally. However, when broken down into components, 86.2 percent of rural NHS pavement is reported in good condition; this ranks 7th nationally and is top among peer states. The overall statewide NHS ranking is brought down by urban NHS pavements, which are 47.4 percent good by IRI, ranking 35th nationally.

Chart 5: Percentage of Rural, Urban, and All NHS Routes in Good Condition by IRI (2022 Data)



Such analyses may help identify specific categories of pavement conditions that contribute to Michigan's reputation for poor roads, and point to subsequent policy recommendations. In the above example, policymakers may consider reallocating resources from rural NHS pavements to more critical and highly trafficked urban pavements.

Several of Michigan's peer states might serve as models on which to inform Michigan's approach to road funding and pavement management. Five of Michigan's peer states rank within the top 15 nationally. Georgia and Indiana perform especially well, ranking #1 and #5 respectively.

We are conducting ongoing research to better understand how various factors are correlated to the pavement condition data and summary index scores presented in this analysis. A future post is planned that will evaluate historic and current financial data. The findings of such research can help determine the extent to which Michigan's poor roads are related to funding deficiencies as opposed to other policy and management approaches.

## ABOUT THE AUTHOR

### **Eric Paul Dennis, PE - Research Associate, Infrastructure & Environment**



Eric joined the Citizens Research Council in 2022 as an expert in civil infrastructure policy. Previous to his position with the Research Council, Eric spent nearly ten years as a transportation systems analyst, focusing on the policy implications of emerging technologies such as autonomous vehicles, connected vehicles, and intelligent transportation systems. Eric has been a Michigan-licensed professional engineer (PE) since 2012. As a practicing engineer, Eric has design and project experience across multiple domains, including highways, airfields, telecommunications, and watershed management. Eric received his Bachelor's degree in civil engineering from Michigan State University in 2006. Eric also holds Masters degrees in environmental engineering and urban/regional planning, both from the University of Michigan.

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