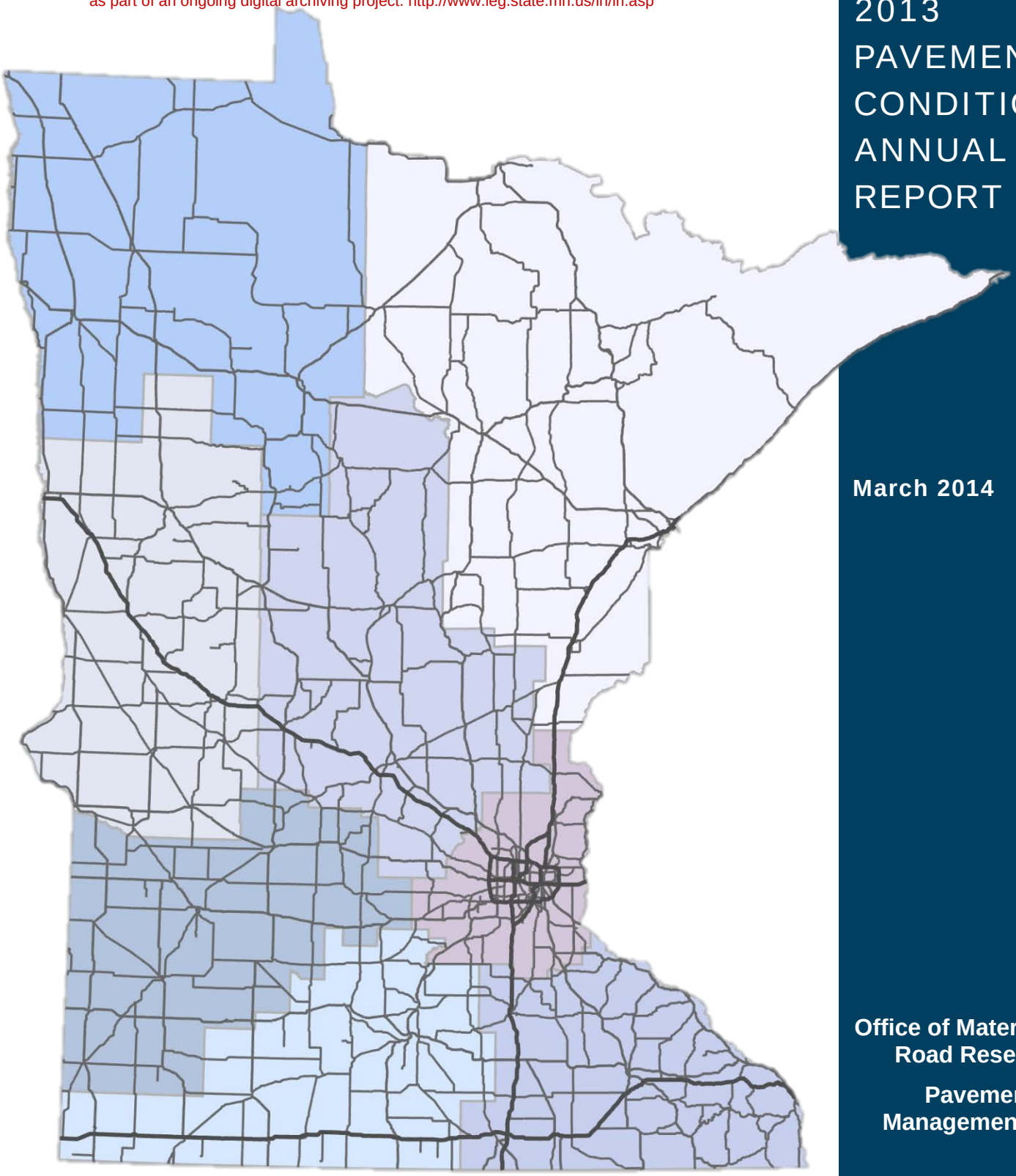
2013 PAVEMENT CONDITION ANNUAL REPORT



March 2014

Office of Materials and Road Research

Pavement Management Unit

We all have a stake in A 10 B

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INTRODUCTION

This report is prepared annually by the Minnesota Department of Transportation (MnDOT) Pavement Management Unit to provide information concerning trunk highway pavement performance. It discusses statewide performance trends compared with established targets and compares performance between the eight Area Transportation Partnerships (ATP).

BACKGROUND

MnDOT's trunk highway system consists of approximately 12,000 centerline miles of pavement. This system consists of bituminous, concrete, and composite pavement with a wide range of condition, age, and performance. Each year, the Pavement Management Unit collects pavement roughness and digital image data on the entire trunk highway system, in both directions, and calculates surface distress quantities on approximately 60% of the system. Condition data has been collected on the trunk highway network since the late 1960's.

DATA COLLECTION

The pavement roughness and surface distress data are collected using a sophisticated digital inspection vehicle (shown below). The van is driven over every mile of trunk highway annually, in both directions. This van is equipped with two cameras to collect images for the Video Log. For pavement distress and rutting measurements, a scanning laser, and a 3D laser/camera system are used to provide images of the pavement surface, from which the type, severity, and amount of cracking can be determined. The van is also equipped with laser height sensors that measure the longitudinal pavement profile, from which pavement roughness is calculated.

Pavement condition data is used to monitor the performance of the system, to aid in project selection, and to identify future pavement maintenance or rehabilitation.

INDICES AND MEASURES

MnDOT's pavement condition data is reduced to several indices for reporting the statewide pavement performance measures in MnDOT's 20-year Transportation Plan: Ride Quality Index (RQI), Surface Rating (SR), Pavement Quality Index (PQI), and Remaining Service Life (RSL). Each index captures a different aspect of the pavement's health and can be used to rank pavement sections and predict the need for future maintenance and rehabilitation. They are each briefly described below.

RQI: Ride Quality Index

The RQI is MnDOT's ride, or smoothness, index. It uses a zero to five rating scale, rounded to the nearest tenth. The higher the RQI, the smoother the road is. The RQI is intended to represent the rating that a typical road user would give to the pavement's smoothness as felt while driving his/her vehicle. Most new construction projects have an initial RQI above 4.0. Pavements are normally designed for a terminal RQI value of 2.5. When a road has reached its terminal RQI value it doesn't mean the road can't be driven on, but rather that it has deteriorated to the point where most people feel it is uncomfortable and a major rehabilitation is likely needed.

The RQI is calculated from the pavement's longitudinal profile, measured by the front mounted lasers on the digital inspection vehicle. A mathematical simulation, called the International Roughness Index (IRI), is then run to estimate the amount of vertical movement a standard vehicle would experience if driven down the road. The IRI is the roughness index used by every state DOT in the U.S. as well as most countries in the world. In the past, MnDOT has taken a rating panel of 30 to 40 people out in the field and driven them over hundreds of test sections to get their perception of the smoothness of various pavement sections. Following right behind them was the digital inspection vehicle. This provides us with a direct correlation between the IRI, as measured by the van, and the perceived roughness, as felt by the rating panel.

SR: Surface Rating

Pavement distresses are those defects visible on the pavement surface. They are symptoms, indicating some problem or phenomenon of pavement deterioration such as cracks, patches and ruts. The type and severity of distress a pavement has can provide great insight into what its future maintenance and/or rehabilitation needs will be.

MnDOT uses the SR to quantify pavement distress. The distress identification procedure used to determine the SR is done by technicians using computer workstations in the Pavement Management Unit of the Office of Materials and Road Research, located in Maplewood, MN. The workstations allow the technicians to view and analyze the digital images captured by the van. The van captures several images that are shown on monitors simultaneously. The front, side and down views help the technicians determine the type, severity, and amount of each defect.

Because of the time involved determining the SR, MnDOT does not conduct continuous distress surveys. Instead, the first 500 feet of each mile and section are rated (≈10% sample). On undivided roadways, only the outside lane in the increasing direction (north or east) is rated when the SR is measured. On divided routes, the outside lane in both directions is rated.

The percentage of each distress in the 500-foot sample is determined and multiplied by a weighting factor the get a weighted distress value. The weighting factors are higher for higher severity levels of the same distress and higher for distress types that indicate more serious problems exist in the roadway such as alligator cracking and broken panels. The weighted distresses are then combined to determine the SR. The SR ranges from 0.0 to 4.0, and is reported to the nearest tenth. A higher SR means better condition. A road with no defects is rated at 4.0. A road in need of major rehabilitation or reconstruction will generally have an SR near or below 2.5.

PQI: Pavement Quality Index

The PQI is a composite index, equal to the square root of the product of RQI and SR. As such, it gives an overall indication of the condition of the pavement, taking into account both the pavement smoothness and cracking. The PQI is the index used to determine if the state highway system is meeting performance thresholds established for the Government Accounting Standards Board, Standard 34 (GASB 34).

RSL: Remaining Service Life

The RSL is an estimate, in years, until the RQI will reach a value of 2.5, generally considered the end of a pavement's design life. Most pavements will need some type of major rehabilitation when the RQI has reached this value. The RSL is determined from pavement deterioration curves. A regression curve is fit through the historical RQI data for each pavement section and the year the RQI will reach 2.5 is estimated. If there is insufficient historical data to make this calculation, default models, based on statewide pavement performance, are used. Rehabilitation activities with long service lives will add a considerable number of years to the RSL of a pavement. Short-term fixes, such as patching, may increase the pavement smoothness for a short time, but do not result in many additional years of RSL.

Each year, the RSL is calculated for all highway segments. From these values, a length-weighted Average Remaining Service Life (ARSL) is calculated for the entire trunk highway system as well as for each ATP. Service life is added when some type of maintenance or rehabilitation is done on a pavement section. Service life is lost when the condition of a pavement section deteriorates due to aging. The ARSL of the highway system increases if the projects being done add more life to the system than sum of the deterioration of all the other sections.

PERFORMANCE CATEGORIES

MnDOT currently categorizes pavement condition, as measured by the RQI, into five equal categories as shown in Table 1. When reporting performance measures, the top two and bottom two categories are combined and referred to as "Good" and "Poor," respectively. These terms will be used for the remainder of this report.

Table 1. Ride Quality Index (RQI) Performance Categories

Descriptive Category	RQI Range	Performance Measure Category
Very Good	5.0 – 4.1	**Good**
Good	4.0 – 3.1	
Fair	3.0 – 2.1	
Poor	2.0 – 1.1	**Poor**
Very Poor	1.0 – 0.0	

PERFORMANCE TARGETS

The federal authorization bill Moving Ahead for Progress in the 21st Century Act (MAP-21), was signed into law July 6, 2012. MAP-21 places added emphasis on the performance of the National Highway System (NHS). To comply with MAP-21, pavement conditions will be tracked by the following categories: Interstate, Non-Interstate NHS, and Non-NHS.

Minnesota's trunk highway system mileage is comprised of 13% Interstate, 40% Non-IS NHS and 47% Non-NHS. ATP-2 and ATP-8 do not have any roads on the Interstate system.

Performance targets for the Interstate system will be established by the FHWA and published at a later date. Until such time, MnDOT is using a target for the Interstate system of 70%, or more, in Good condition and 2%, or less, in Poor condition. Each state is to set targets for the Non-IS NHS. For 2013, the performance targets on the NHS are 65%, or more, in Good condition and 4%, or less, in Poor condition, as shown in Table 2. MnDOT has not formally established targets for the Non-NHS category, but will monitor the Non-NHS system for compliance with previously established GASB 34 requirements.

RQI targets are based on the percent of miles in the "Good" and "Poor" categories as shown in Table 2. These are statewide targets. It is recognized that some ATP's pavements will be better than these and some will be worse. However, it is desirable to have the ATP's pavements in somewhat similar conditions so that the public will not encounter drastic differences as they drive around the state.

Table 2. Ride Quality Index (RQI) Targets by System

System	Ride Quality Index (RQI)	
	"Good" RQI Target	**"Poor" RQI Target**
Interstate	70% or more	2% or less
Non-Interstate NHS	65% or more	4% or less
Non-NHS	***	***

******No target established to date***

STATEWIDE HISTORICAL RQI TRENDS

Statewide, the smoothness of all three systems, Interstate, Non-IS NHS and Non-NHS, improved in 2013, with either the same or fewer miles in the "Poor" category and more miles in the "Good" category compared to 2012.

2004 - 2017 "Good" RQI Trend (Figure 2)

From 2012 to 2013, the percent of statewide miles on the Interstate System in "Good" condition increased from 72.9 percent to 75.2 percent, the Non-IS NHS system increased from 68.1 percent to 71.0 percent, and the Non-NHS system increased from 61.7 percent to 62.5 percent. Overall, this means there are approximately 235 more miles in "Good" condition statewide in 2013 compared to 2012.

Based on the planned projects in the 2014-2017 State Transportation Improvement Program (STIP), the percent of miles in "Good" condition on the Interstate System is expected to increase from its current value of 75.2 percent to 77.7 percent by 2017. The percent of miles in "Good" condition is expected to decrease on the Non-IS NHS from its current value of 71.0 percent to 67.2 percent by 2017. The Non-NHS is expected to remain around 62 percent through 2017.

2003 - 2017 "Poor" RQI Trend (Figure 3)

From 2012 to 2013, the percent of miles in "Poor" condition on the Interstate system remained the same at 2.4 percent, the Non-IS NHS dropped from 4.3 percent to 2.9 percent, and the Non-NHS decreased from 7.5 percent to 6.8 percent. Overall, there are about 136 fewer miles in "Poor" condition statewide in 2013 than there were in 2012.

Based on the 2014-2017 STIP, the Interstate system is expected to improve slightly with a reduction in the percent of miles in the "Poor" RQI category from 2.4 percent in 2013 to 2.0 percent in 2017. The condition of the Non-IS NHS system is expected to decline with an increase in the percent of miles in "Poor" condition, from 2.9 percent to 4.7 percent. The condition of the Non-NHS system is also expected to decline, with an increase in "Poor" from 6.8 percent to 9.7 percent.

Statewide, this is an expected increase of about 287 miles of "Poor" roads in four year. Once a pavement falls into the "Poor" category it normally will require major rehabilitation or reconstruction to restore any meaningful amount of service life. These types of repairs are expensive, thus making it much harder with a limited budget to recover once the amount of miles in this condition becomes very high.

RQI COMPARISON BY ATP

Most ATPs showed some improvement in 2013 compared to 2012.

"Good" RQI Comparison (Figures 4, 6, 7 and 8)

On the Interstate system, all six ATPs with Interstate pavement had an increase in the percent of miles in "Good" condition compared to 2012. The ATPs had an increase, ranging from 0.4 to 12.0 percent. ATP-3 had the largest increase in percent of miles on the Interstate system in "Good" condition (12.0%) followed by ATP-1 (2.3%). This is shown in Figure 4 and Figure 6.

On the Non-IS NHS system, seven of the eight ATPs had an increase in the percent of miles in "Good" condition compared to 2012. ATP-7 had the largest increase (5.9%) followed by ATP-3 (5.8%) and ATP-4 (5.6%). While the percent of miles in "Good" condition in ATP-2 declined in 2013, they continue to have highest percent of their roads in "Good" condition (83.2%) compared to the other ATPs. This is shown in Figure 4 and Figure 7.

On the Non-NHS system, five of the eight ATPs had an increase in the percent of miles in "Good" condition ranging from 0.7 to 5.1 percent. ATP-6 had the largest increase (5.1%) followed by ATP-1 (4.1%). ATP-2, ATP-3, and ATP-7 had a decline in the percent of miles in "Good" condition. This is shown in Figure 4 and Figure 8.

"Poor" RQI Comparison (Figures 5, 9, 10, and 11)

On the Interstate system ATP-1, 3, and Metro decreased their percent of miles in "Poor" condition. However, this was offset by an increase in ATP-6 and 7 resulting in no statewide change from 2012. In 2013, ATP-3 and ATP-4 had no Interstate roads in "Poor" condition. This is shown in Figure 5 and Figure 9.

On the Non-IS NHS, seven out of the eight ATPs decreased their percent of miles in "Poor" condition. Only ATP-4 had an increase, albeit a small one (+0.3%). This is shown in Figure 5 and Figure 10.

On the Non-NHS system, five ATPs showed a decrease in the number of miles in "Poor" condition. Only ATP-2, 3 and 8 increased the number of miles in "Poor" by 0.2%, 0.8% and 0.4%, respectively. This is shown in Figure 5 and Figure 11.

AVERAGE REMAINING SERVICE LIFE (ARSL)

The Average Remaining Service Life (ARSL) is defined as the number of years until the RQI reaches a value of 2.5 or less. This is the point where most people begin to complain that a road's roughness is objectionable and some type of major rehabilitation is likely needed.

2004 - 2013 ARSL Trend (Figure 12)

The 2013 ARSL was 12.2 years on the Interstate system, 10.1 years on the Non-IS NHS system, and 8.0 years on the Non-NHS, all of which are slightly higher than the 2012 values.

ARSL Comparison (Figure 13)

By ATP, the ARSL ranges from 6.6 to 18.5 years on the Interstate system, from 9.0 to 12.0 years on the Non-IS NHS, and from 5.8 to 11.3 years on the Non-NHS.

ATP-4 has the highest Interstate ARSL, ATP-3 has the highest Non-IS NHS ARSL, and ATP-2 has the highest ARSL on the Non-NHS.

ATP-7 has the lowest ARSL on both the Interstate and Non-NHS system while ATP-8 has the lowest ARSL on the Non-IS NHS system.

PREDICTED PAVEMENT CONDITIONS AND ACCURACY

Future year's pavement conditions are predicted using the pavement management system. These predictions are used to provide managers with insight into the impact different funding scenarios will have on pavement conditions. The accuracy of these predictions is reviewed yearly to reassure management that the pavement management system is operating correctly, therefore making it a reliable tool for predicting future needs.

The prediction of future pavement conditions relies on regression curves built into the pavement management system. The curves are either based on section specific historical data or statewide data. If there is adequate historical data since the last rehabilitation on a section, a regression curve is fit through the data and used to predict the RQI. If there is inadequate historical data for the section, or if the regression through the historical data results in an unrealistic curve, then a default curve is used to predict the future RQI. Default curves were developed for all pavement fixes in the pavement management system in the mid-1980's and subsequently updated in 1992 and 2008. The default curves are based on historical statewide performance.

For pavement sections scheduled for work during the STIP, default regression curves are used to predict future conditions. Additionally, an adjustment is made to the construction year to better predict the timing of the expected results. Since data collection cannot wait until all projects are complete, some projects will not have begun, some will still be under construction, and some will be completed when the van is in the area collecting data. This adjustment is made to the construction year of proposed STIP projects to reflect the estimated completeness at the time of data collection.

Districts, 6, 7, and Metro are typically driven in the early part of the construction season before few, if any, projects are completed. Therefore, the construction year for all pavement projects listed in the STIP is increased by one year since it won't be until the following year that the impact of this work is measured.

Districts 1, 2, and 8 are driven around mid-construction season when about half of their pavement projects will be completed. Since there is no way to predict which projects will be complete when the van is there and which ones will not, half of the projects are randomly chosen and the construction year is increased by one year.

District 3 and 4 are normally driven in late summer or fall when most of their pavement projects are complete. No changes are made to the construction year for projects in the STIP. Thus, the van will likely drive on the new, improved, surface and the impacts of the pavement work will be captured.

Using the above adjustments, predictions of next year's pavement conditions are made. Table 3 compares the predicted 2013 pavement conditions, using 2012 data, with the actual 2013 measured conditions. A total of 14,331 miles were rated in 2012. A total of 14,339 miles were rated in 2013. This gain in miles is attributed to the expansion of 2-lane highways to 4-lane highways. Table 4 and 5 compare the difference in performance and miles on a statewide level.

Table 3. Comparison of Predicted 2013 versus Actual 2013 RQI by System

Interstate System RQI Category	Actual 2012 Data	Predicted 2013 Data *	Actual 2013 Data	Difference Predicted vs Actual
Good RQI (RQI > 3.0)	72.9%	72.2%	75.2%	3.0%
Poor RQI (RQI ≤ 2.0)	2.4%	2.5%	2.4%	(0.1%)
Non-IS NHS System RQI Category	**Actual 2012 Data**	**Predicted 2013 Data ***	**Actual 2013 Data**	**Difference Predicted vs Actual**
Good RQI (RQI > 3.0)	68.1%	69.2%	71.0%	1.8%
Poor RQI (RQI ≤ 2.0)	4.3%	3.5%	2.9%	(0.6%)
Non-NHS System RQI Category	**Actual 2012 Data**	**Predicted 2013 Data ***	**Actual 2013 Data**	**Difference Predicted vs Actual**
Good RQI (RQI > 3.0)	61.7%	60.5%	62.5%	2.0%
Poor RQI (RQI ≤ 2.0)	7.5%	8.1%	6.8%	(1.3%)

*****Predictions based on the 2012-2016 STIP by 2012 M-Records

Table 4. Statewide Comparison of Predicted 2013 versus Actual 2013 RQI, Percent

Statewide RQI Category	Actual 2012 Data	Predicted 2013 Data *	Actual 2013 Data	Difference Predicted vs Actual
Good RQI (RQI > 3.0)	65.7%	66.0%	67.6%	1.6%
Poor RQI (RQI ≤ 2.0)	5.5%	5.6%	4.7%	(0.9%)

*****Predictions based on the 2012-2016 STIP by 2012 M-Records

Table 5. Statewide Comparison of Predicted 2013 versus Actual 2013 RQI, Miles

Statewide RQI Category	Actual 2012 Data	Predicted 2013 Data *	Actual 2013 Data	Difference Predicted vs Actual
Rated Roadway Miles	14,331	14,331	14,339	8
Good RQI (RQI > 3.0)	9,418	9,452	9,687	235
Poor RQI (RQI ≤ 2.0)	793	807	671	(136)

*Predictions based on the 2012-2016 STIP by 2012 M-Records

The actual 2013 conditions are better than the predicted 2013 conditions, using last year's data and project list, particularly the Non-NHS system. On a statewide level there are 235 more miles in "Good" condition and 136 fewer miles in "Poor" condition than expected. The difference between the predicted 2013 condition and the actual 2013 condition can be attributed to one of the following:

1. Construction projects being advanced, reducing Poor and increasing Good
2. Construction projects not completed, keeping Poor from becoming Good
3. Maintenance work, keeping roads from falling into Poor or out of Good
4. A change in a roads rate of deterioration (either faster or slower)
5. Unforeseen funding or projects, such as the IDIQ program, improving the road.

GOVERNMENT ACCOUNTING STANDARDS BOARD, STATEMENT 34 (GASB 34)

The Government Accounting Standards Board (GASB), a private, nonprofit organization, was established in 1984 by the Financial Accounting Foundation. The Foundation oversees GASB, provides funding, and appoints the members of GASB's board. The Foundation has a similar relationship with GASB's sister organization, the private-sector, standard-setting Financial Accounting Standards Board. GASB's span of influence covers over 84,000 state, county, and other local governmental units. Also impacted by GASB's financial reporting standards are organizations such as public utilities, municipal hospitals, and state universities. GASB, which does not impact the federal government, establishes concepts and standards that guide the preparation of external financial reports. GASB establishes generally accepted accounting principles that are utilized by auditors charged with evaluating state and local government financial statements.

In June 1999, GASB established a new financial reporting standard that fundamentally changed the way state and local governments report their financial results. Among other provisions, GASB Statement 34 (GASB 34), "Basic Financial Statements—and Management's Discussion and Analysis—for State and Local Governments," requires that major infrastructure assets acquired or having major additions or improvements in fiscal years beginning after June 15, 1980, be capitalized in financial statements. In addition, the cost of using the assets must be reflected. (Source: U.S. Department of Transportation, Federal Highway Administration, Office of Asset Management, Primer: GASB 34 (November 2002).

One of the primary purposes of GASB 34 is to demonstrate to the public, and others, that the agency is maintaining its infrastructure in an acceptable condition and does not have any undisclosed liabilities looming in the future.

In terms of determining the cost of using the assets, GASB 34 allows governments to report either a depreciation expense or to apply an alternative modified/preservation approach. Governments may use the modified approach in lieu of depreciating their assets if they have a systematic approach to managing their assets that, at a minimum, meets the following four requirements:

- Having a current inventory of eligible assets
- Documenting the condition of those assets via a reproducible assessment procedure
- Demonstrating that assets are being preserved at a level predetermined by the government
- Estimating the actual cost to maintain and preserve the assets.

MnDOT has chosen to use the modified/preservation approach since it can meet all the requirements listed above. For the purposes of GASB 34, MnDOT established that the state highway system will be maintained, at a minimum, at the following levels:

- Principal Arterial System: Average PQI of 3.0 or higher
- Non-Principal Arterial System: Average PQI of 2.8 or higher

Figure 12 shows how actual and predicted pavement conditions, based on the 2013-2016 STIP, compare with the established GASB 34 levels. Although MAP-21 requires states to report the condition of the Interstate routes separate from the other NHS routes for the purposes of GASB 34 Minnesota will continue with reporting by PA and NPA.

ADDITIONAL INFORMATION

Additional information about the condition and performance of the state highway system, including color-coded maps of the most recent indices, can be obtained from the Pavement Management Unit's website:

http://www.dot.state.mn.us/materials/pvmtmgmt.html

Or by contacting:

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Figure 1. MnDOT's Area Transportation Partnership (ATP) Boundaries

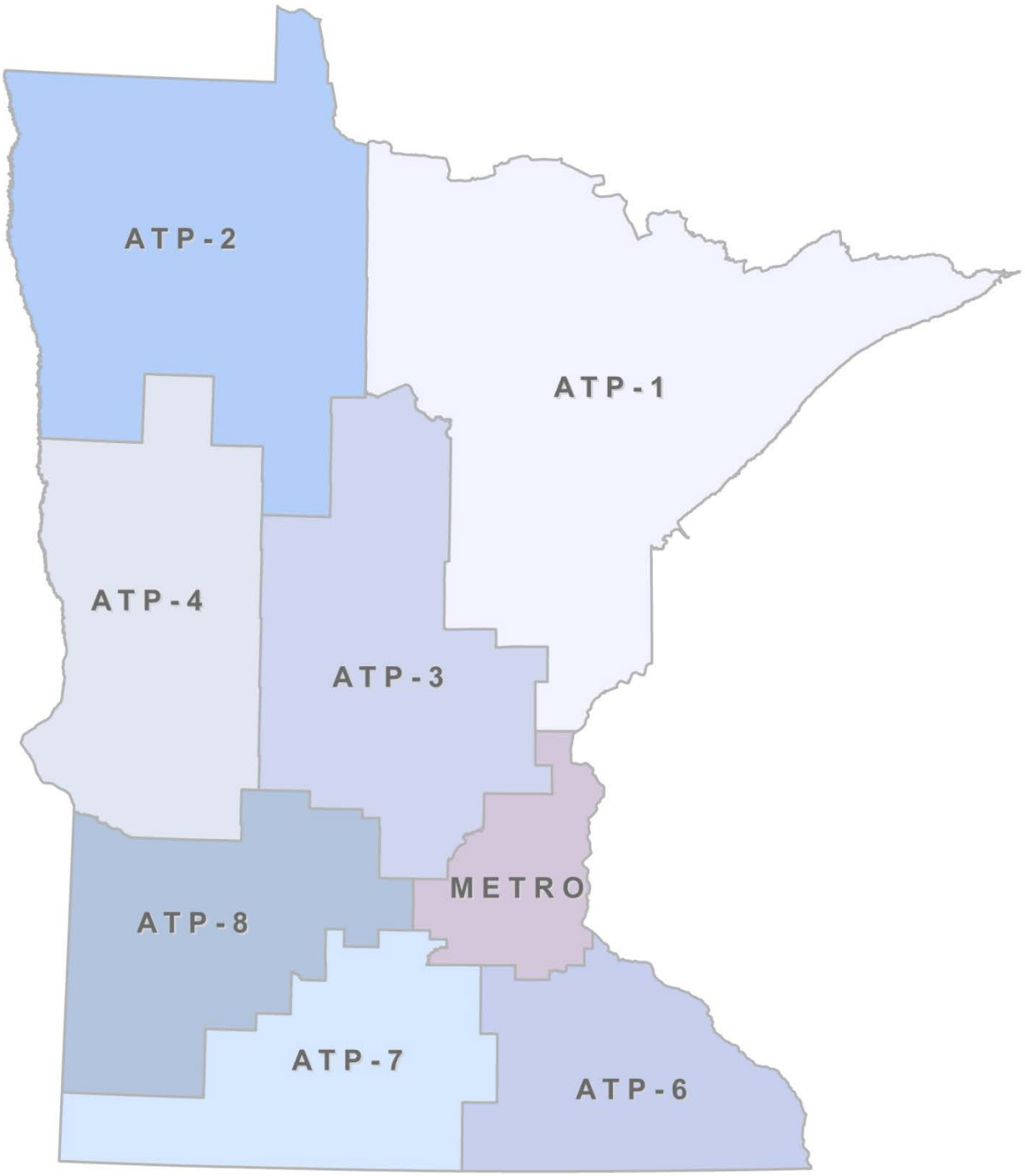
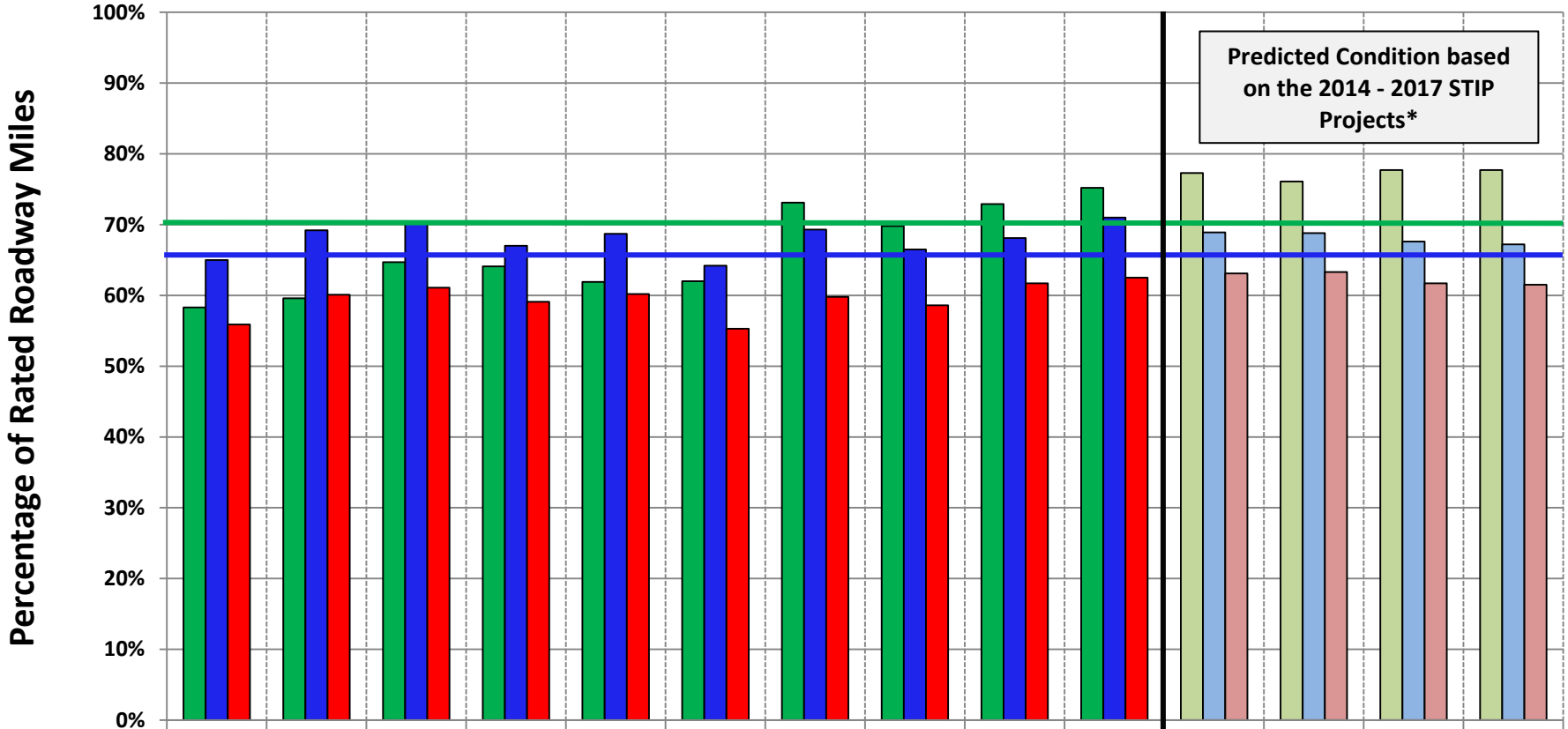


Figure 2

Statewide "Good" Ride Quality Index

(miles with an RQI greater than 3.0)

Actual 2004 - 2013, Predicted 2014 - 2017



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Interstate	58.3%	59.6%	64.7%	64.1%	61.9%	62.0%	73.1%	69.8%	72.9%	75.2%	77.3%	76.1%	77.7%	77.7%
Non-Interstate NHS	65.0%	69.2%	70.3%	67.0%	68.7%	64.2%	69.3%	66.5%	68.1%	71.0%	68.9%	68.8%	67.6%	67.2%
Non-NHS	55.9%	60.1%	61.1%	59.1%	60.2%	55.3%	59.8%	58.6%	61.7%	62.5%	63.1%	63.3%	61.7%	61.5%

Interstate Target = 70 percent or more

Non-Interstate NHS Target = 65 Percent or more

No Target Established for Non-NHS

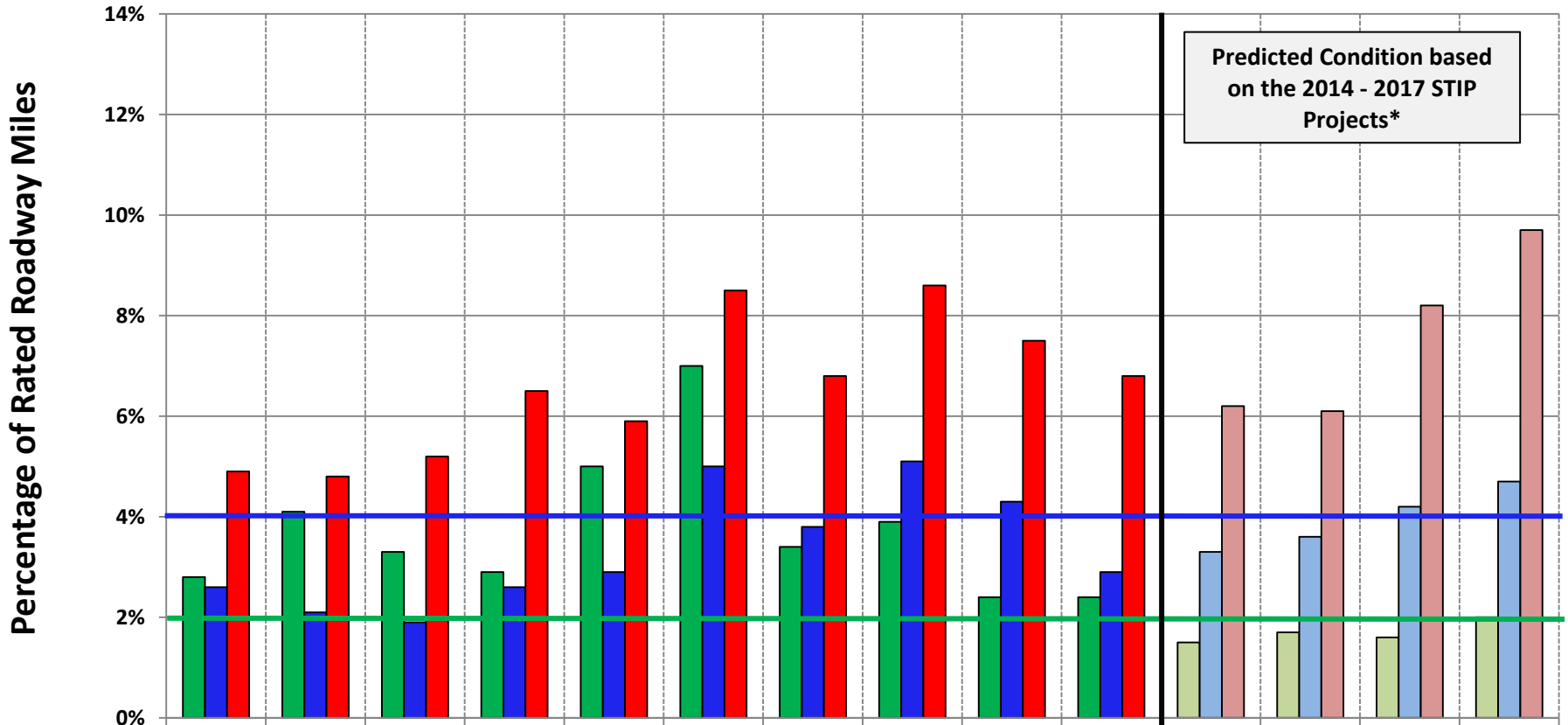
*2013 M-Records with '14-'17 STIP + PPM

Figure 3

Statewide "Poor" Ride Quality Index

(miles with an RQI of 2.0 or less)

Actual 2004 - 2013, Predicted 2014 - 2017



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Interstate	2.8%	4.1%	3.3%	2.9%	5.0%	7.0%	3.4%	3.9%	2.4%	2.4%	1.5%	1.7%	1.6%	2.0%
Non-Interstate NHS	2.6%	2.1%	1.9%	2.6%	2.9%	5.0%	3.8%	5.1%	4.3%	2.9%	3.3%	3.6%	4.2%	4.7%
Non-NHS	4.9%	4.8%	5.2%	6.5%	5.9%	8.5%	6.8%	8.6%	7.5%	6.8%	6.2%	6.1%	8.2%	9.7%

Interstate Target = 2 percent or less

Non-Interstate NHS Target = 4 percent or less

No Target Established for Non-NHS

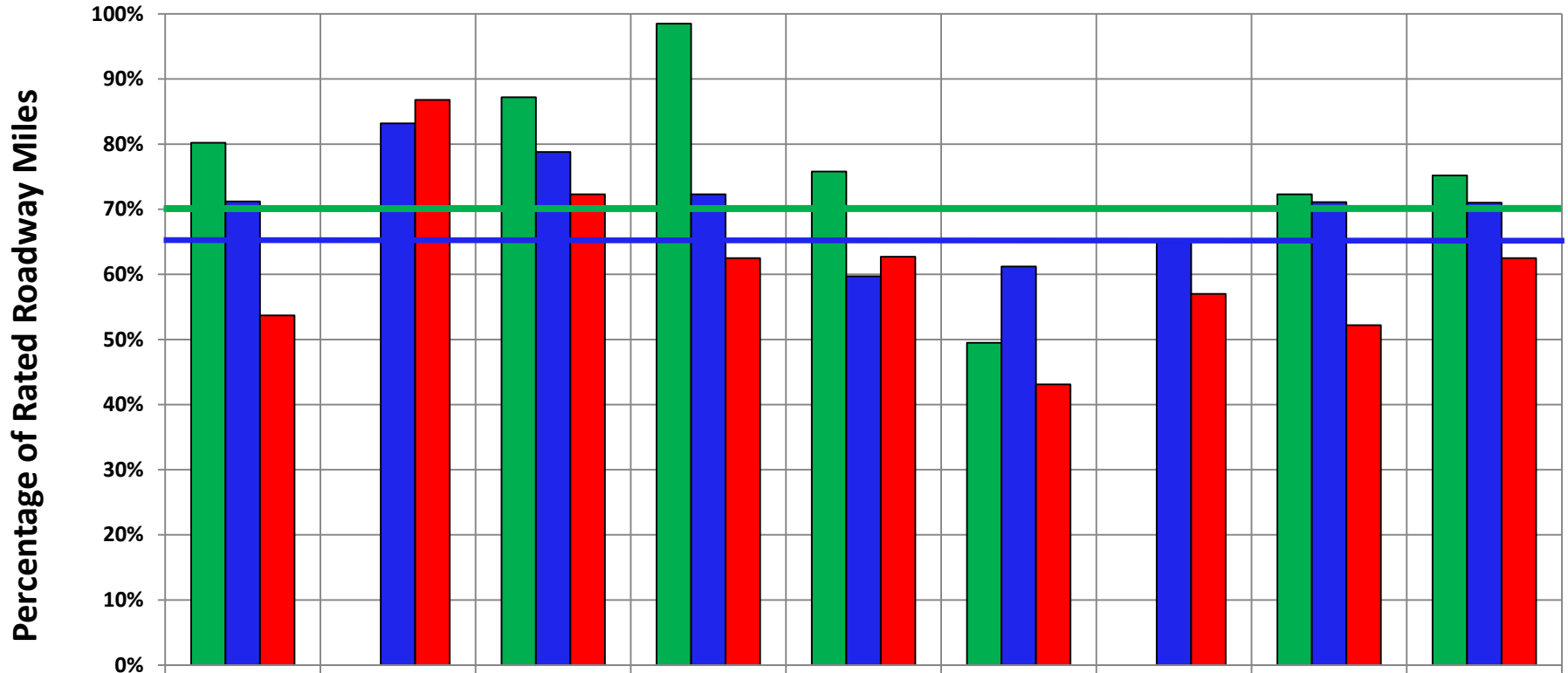
*2013 M-Records with '14-'17 STIP + PPM

Figure 4

"Good" Ride Quality Index

(miles with an RQI greater than 3.0)

Comparison of 2013 Data by ATP



	ATP-1	ATP-2	ATP-3	ATP-4	ATP-6	ATP-7	ATP-8	Metro	State
Interstate	80.2% ▲		87.2% ▲	98.5% ▲	75.8% ▲	49.5% ▲		72.3% ▲	75.2% ▲
Non-Interstate NHS	71.2% ▲	83.2% ▼	78.8% ▲	72.3% ▲	59.7% ▲	61.2% ▲	64.9% ▲	71.1% ▲	71.0% ▲
Non-NHS	53.7% ▲	86.8% ▼	72.3% ▼	62.5% ▲	62.7% ▲	43.1% ▼	57.0% ▲	52.2% ▲	62.5% ▲

▲ = Better than 2012 ■ = Same as 2012 ▼ = Worse than 2012

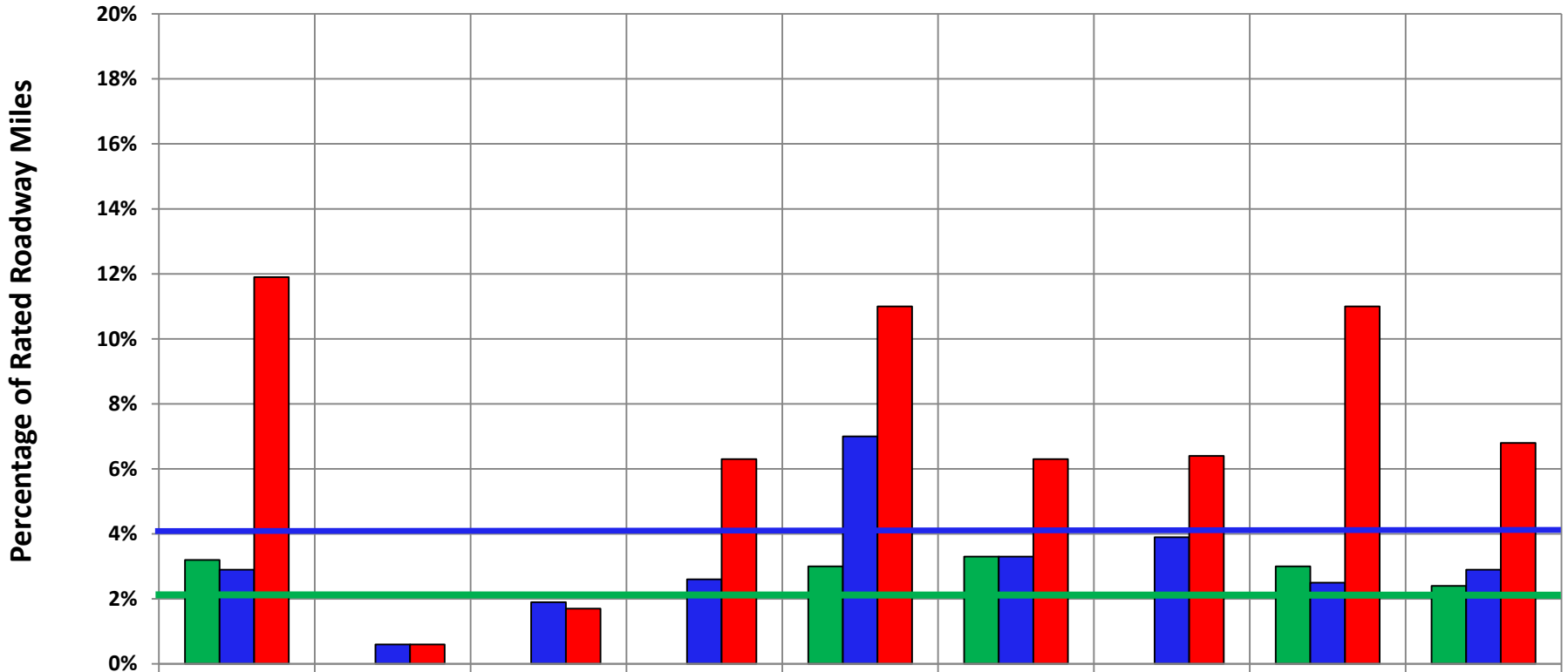
Interstate Target = 70 percent or more
Non-Interstate NHS Target = 65 Percent or more
No Target Established for Non-NHS

Figure 5

"Poor" Ride Quality Index

(miles with an RQI of 2.0 or less)

Comparison of 2013 Data by ATP



	ATP-1	ATP-2	ATP-3	ATP-4	ATP-6	ATP-7	ATP-8	Metro	State
Interstate	3.2% ▲		0.0% ▲	0.0% ■	3.0% ▼	3.3% ▼		3.0% ▲	2.4% ■
Non-Interstate NHS	2.9% ▲	0.6% ▲	1.9% ▲	2.6% ▼	7.0% ▲	3.3% ▲	3.9% ▲	2.5% ▲	2.9% ▲
Non-NHS	11.9% ▲	0.6% ▼	1.7% ▼	6.3% ▲	11.0% ▲	6.3% ▲	6.4% ▼	11.0% ▲	6.8% ▲

▲ = Better than 2011 ■ = Same as 2011 ▼ = Worse than 2011

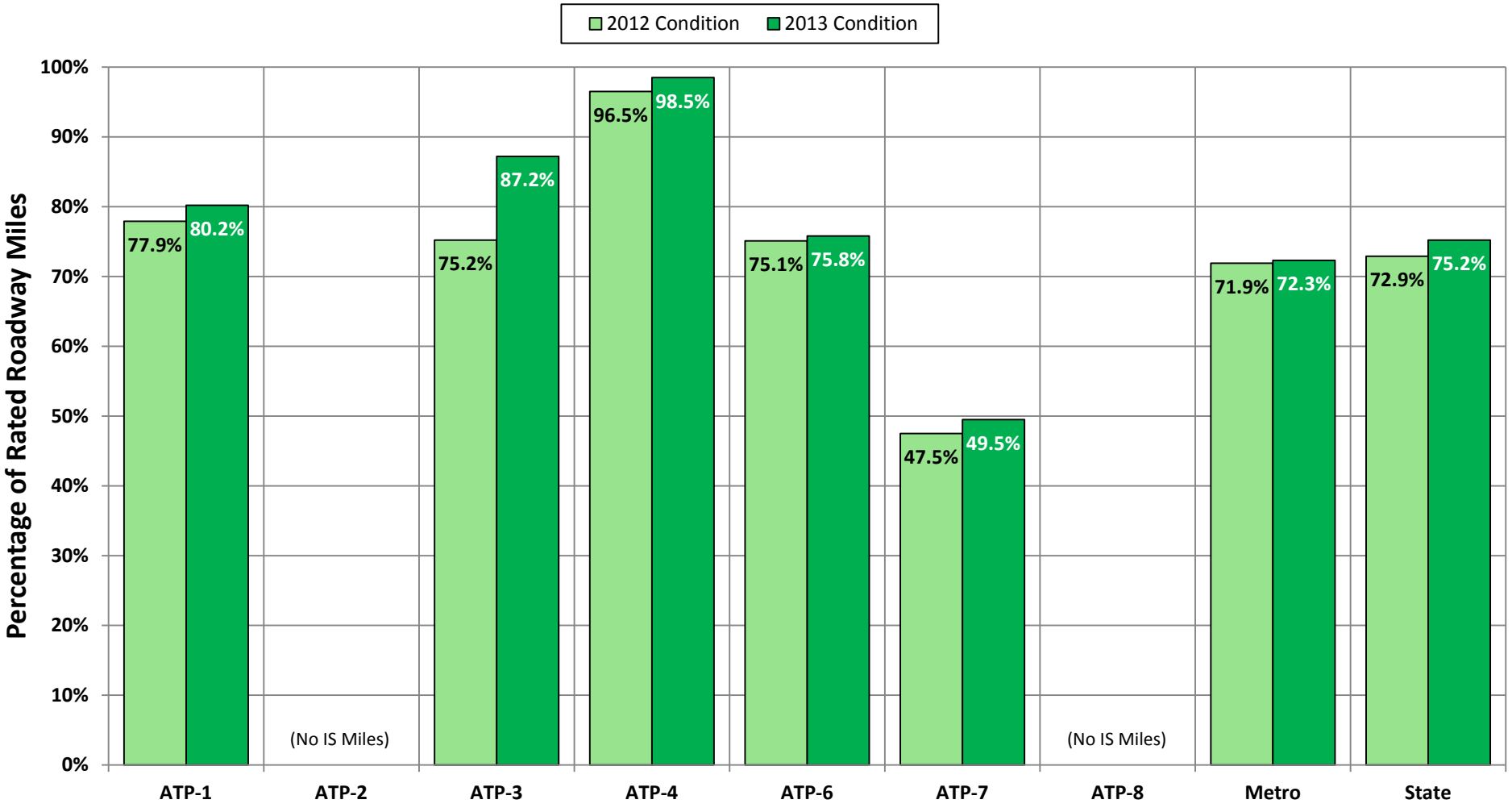
Interstate Target = 2 percent or less
Non-Interstate NHS Target = 4 percent or less
No Target Established for Non-NHS

Figure 6

Comparison of "Good" Ride Quality Index

(miles with an RQI greater than 3.0)

Interstate System, 2012 – vs – 2013 Condition



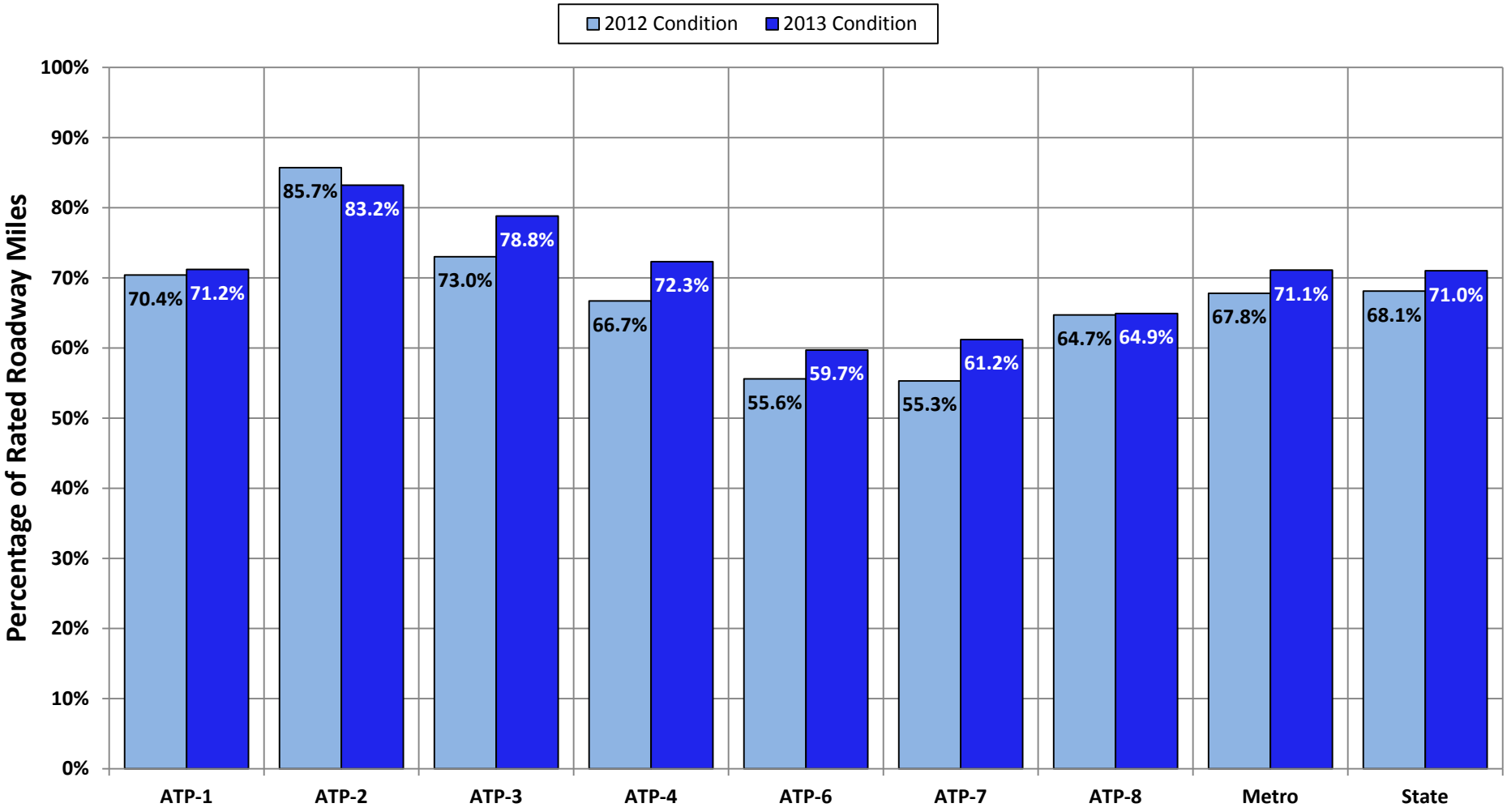
Interstate Target = 70 percent or more

Figure 7

Comparison of "Good" Ride Quality Index

(miles with an RQI greater than 3.0)

Non-Interstate NHS System, 2012 – vs – 2013 Condition



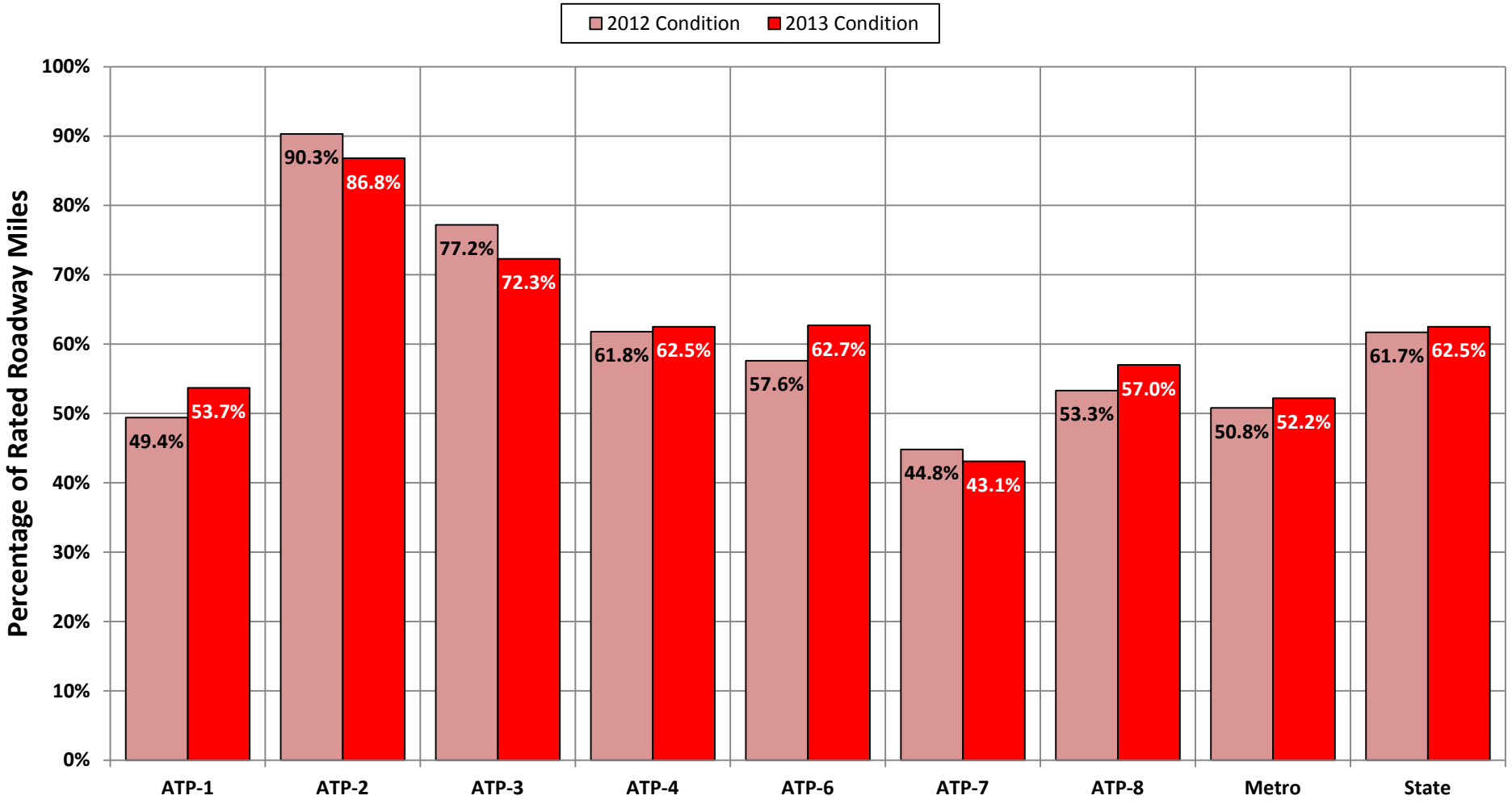
Non-Intersate NHS Target = 65 percent or more

Figure 8

Comparison of "Good" Ride Quality Index

(miles with an RQI greater than 3.0)

Non-NHS System, 2012 – vs – 2013 Condition



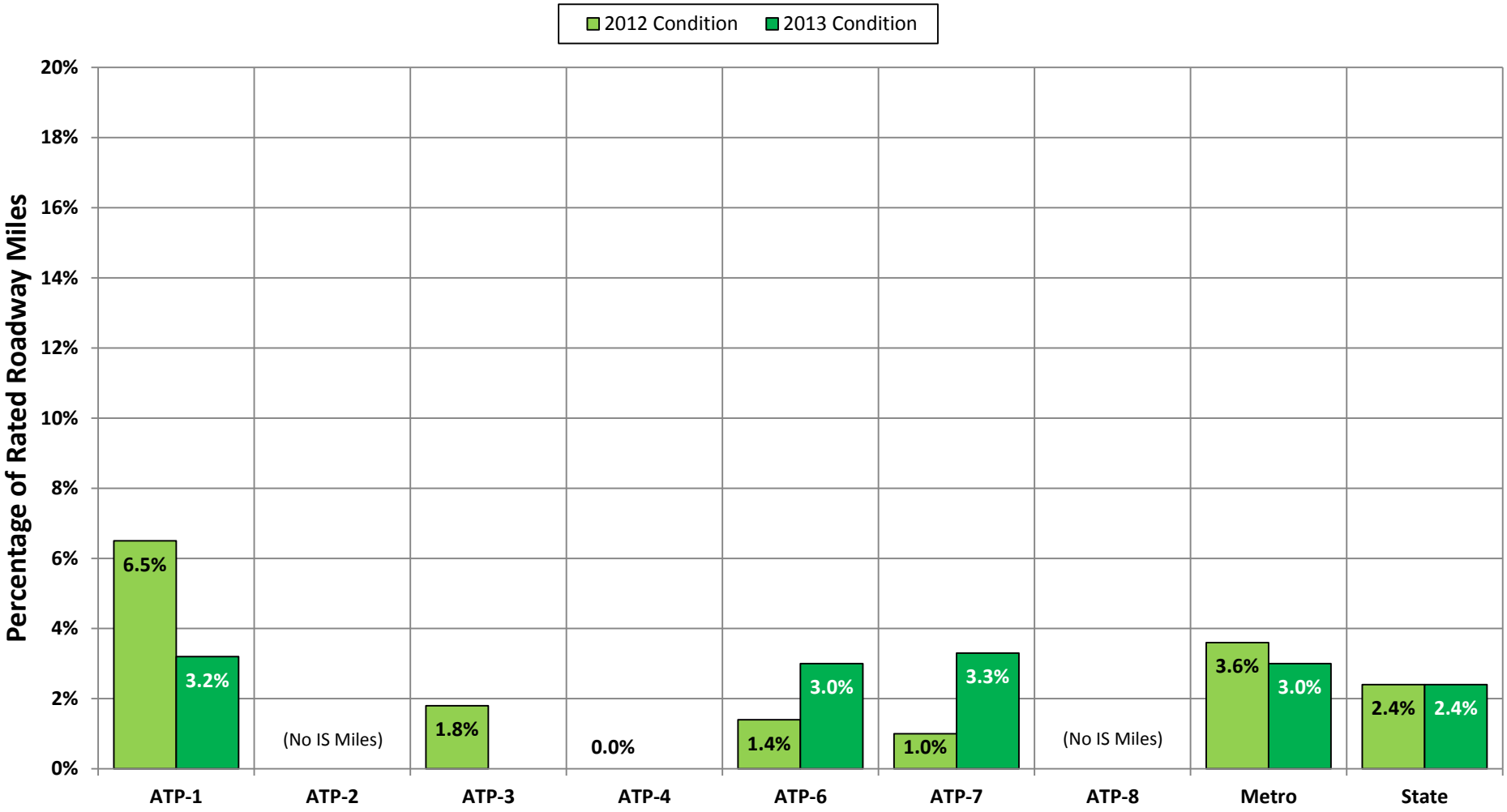
No official targets have been established for Non-NHS

Figure 9

Comparison of "Poor" Ride Quality Index

(miles with an RQI of 2.0 or less)

Interstate System, 2012 – vs – 2013 Condition



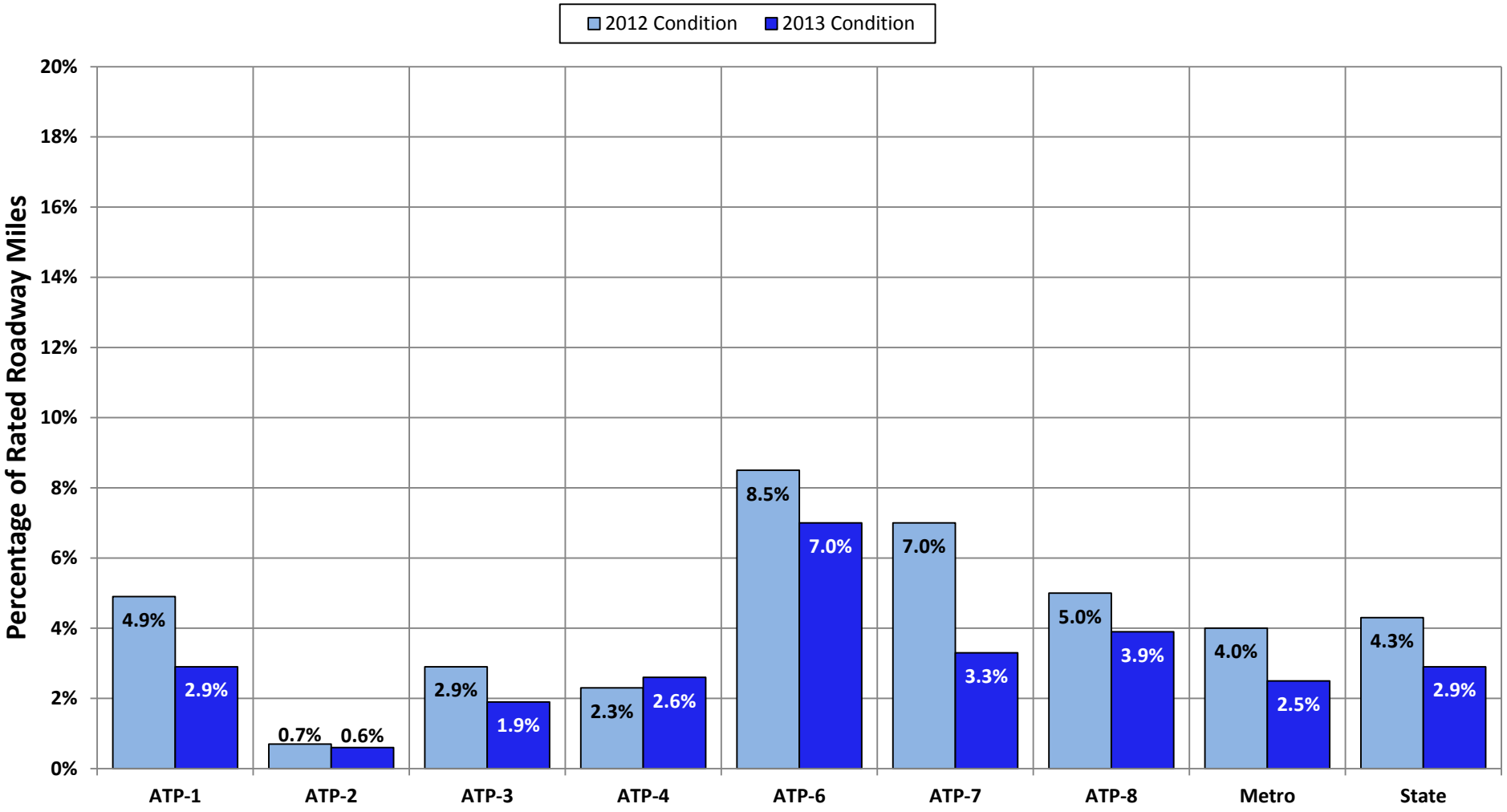
Interstate Target = 2 percent or less

Figure 10

Comparison of "Poor" Ride Quality Index

(miles with an RQI of 2.0 or less)

Non-Interstate NHS System, 2012 – vs – 2013 Condition



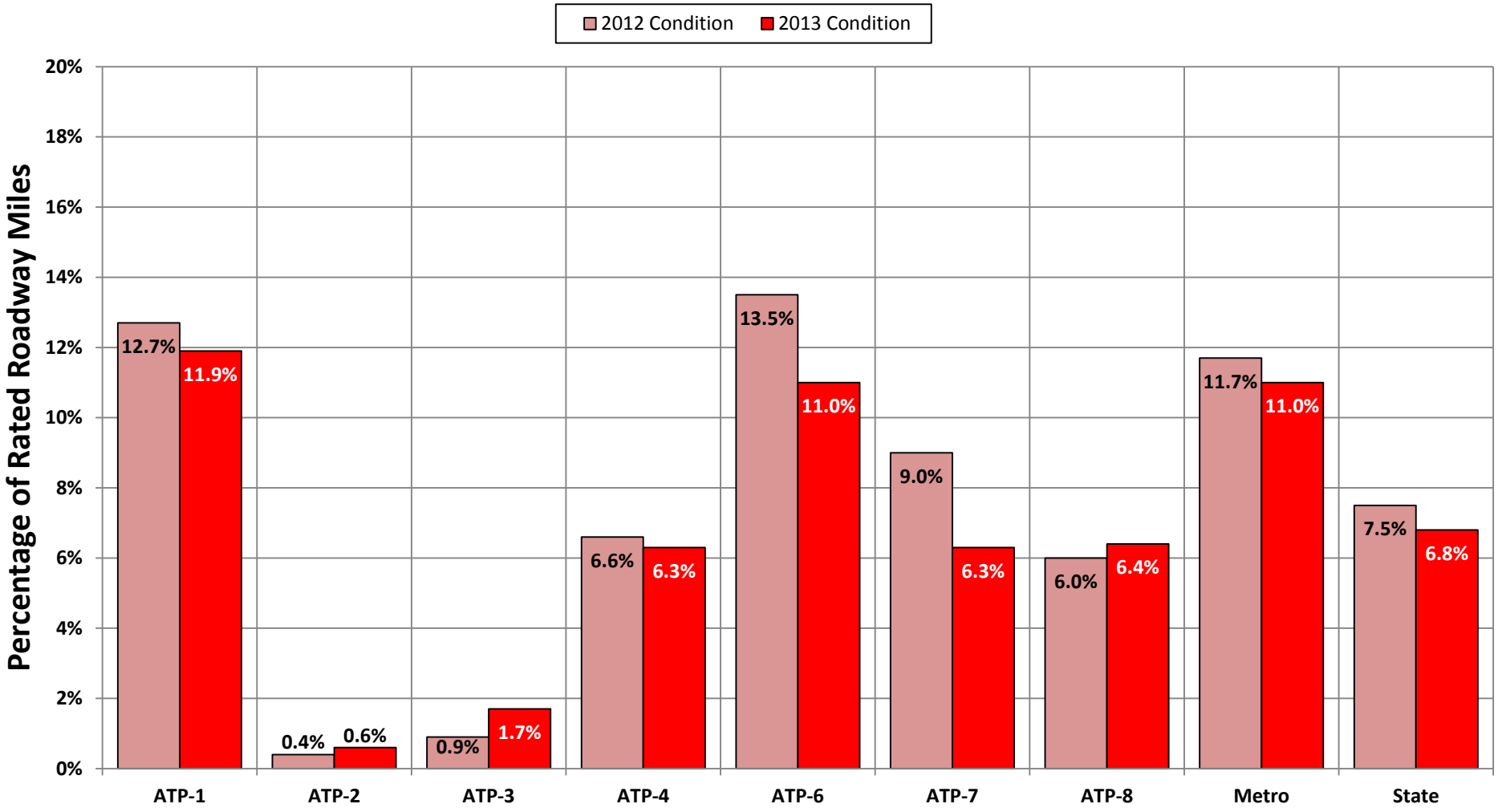
Non-Interstate NHS Target = 4 percent or less

Figure 11

Comparison of "Poor" Ride Quality Index

(miles with an RQI of 2.0 or less)

Non-NHS System, 2012 – vs – 2013 Condition



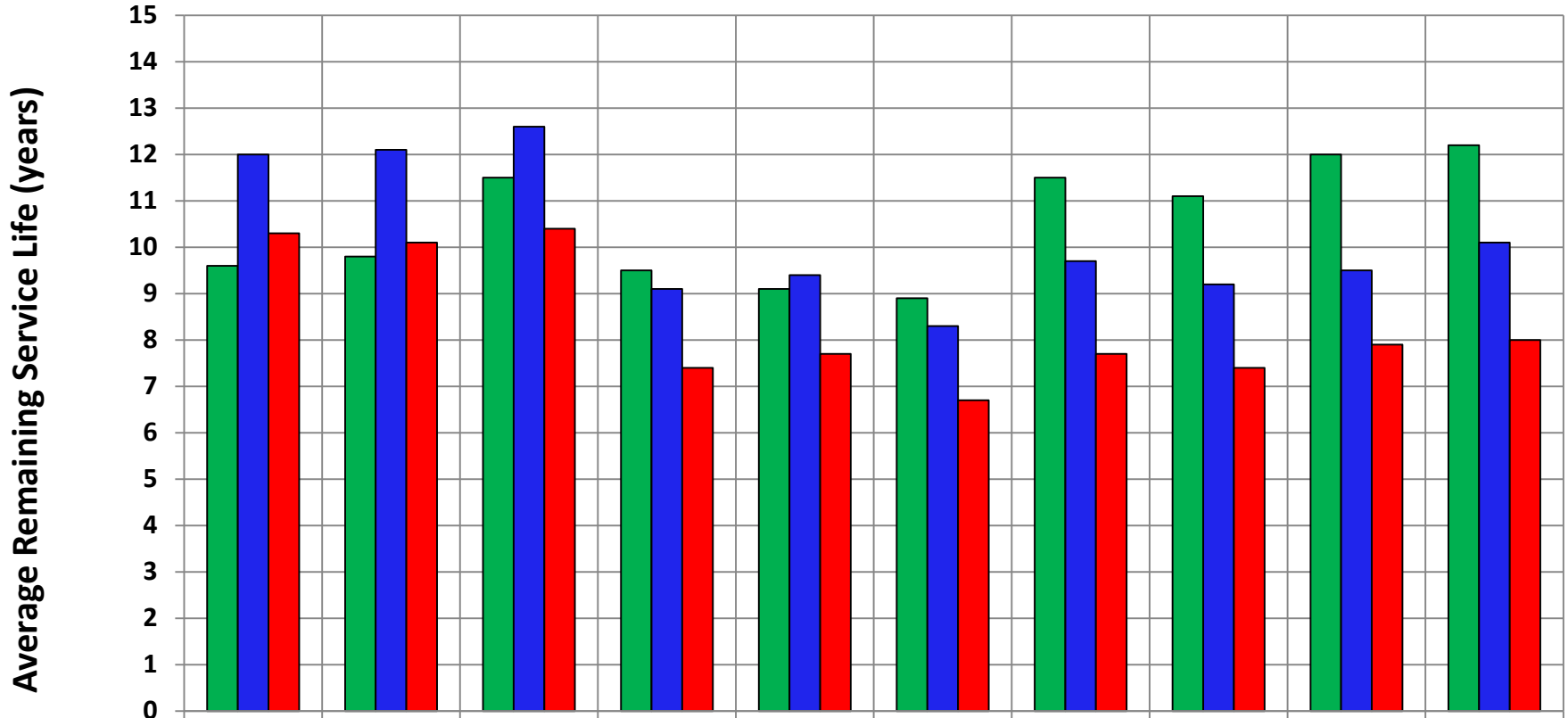
No official targets have been established for Non-NHS

Figure 12

Statewide Average Remaining Service Life (ARSL)

(years until RQI reaches 2.5)

Actual 2004 - 2013



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Interstate	9.6	9.8	11.5	9.5	9.1	8.9	11.5	11.1	12.0	12.2
Non-Interstate NHS	12.0	12.1	12.6	9.1	9.4	8.3	9.7	9.2	9.5	10.1
Non-NHS	10.3	10.1	10.4	7.4	7.7	6.7	7.7	7.4	7.9	8.0

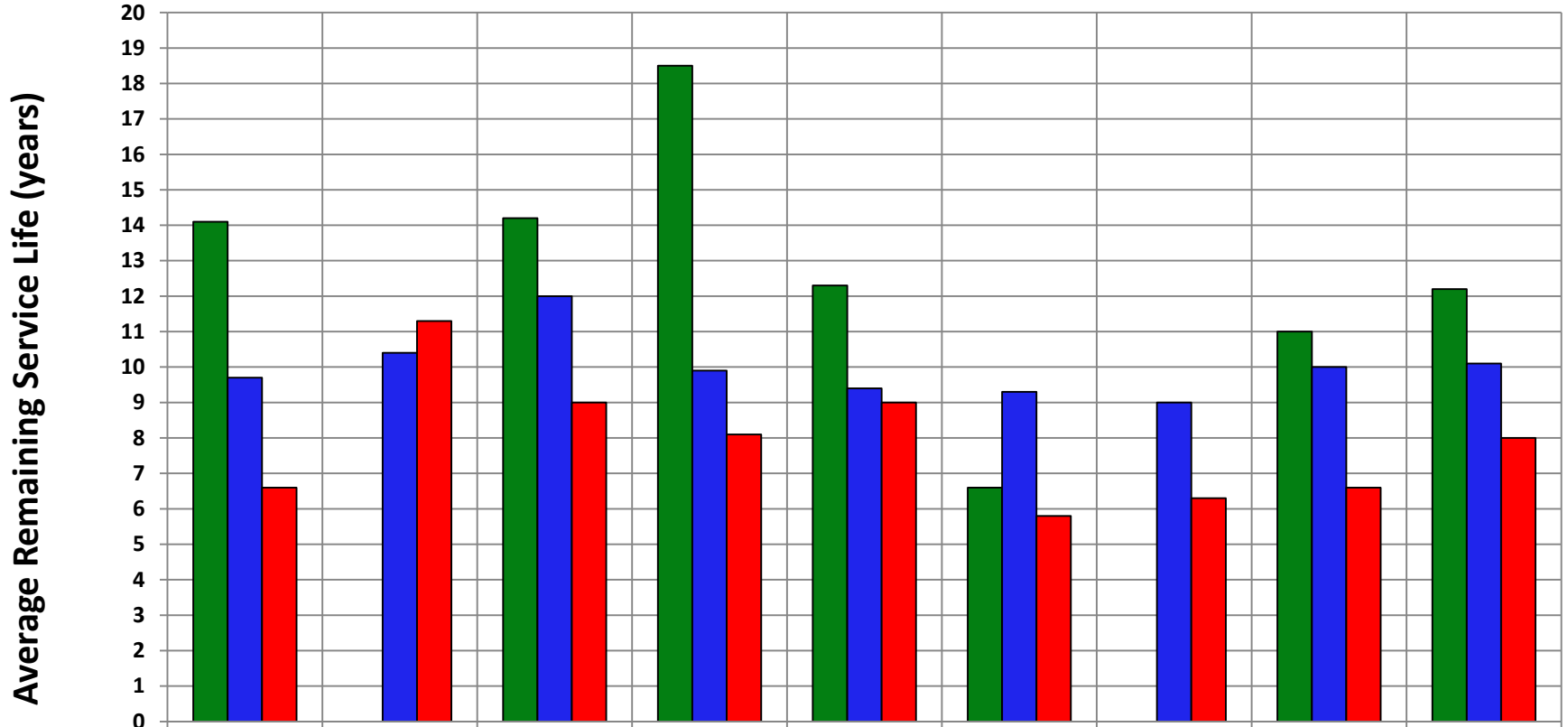
No official targets have been established for ARSL

Figure 13

Average Remaining Service Life (ARSL)

(years until RQI reaches 2.5)

Comparison of 2013 Data by ATP



	ATP-1	ATP-2	ATP-3	ATP-4	ATP-6	ATP-7	ATP-8	Metro	State
Interstate	14.1		14.2	18.5	12.3	6.6		11.0	12.2
Non-Interstate NHS	9.7	10.4	12.0	9.9	9.4	9.3	9.0	10.0	10.1
Non-NHS	6.6	11.3	9.0	8.1	9.0	5.8	6.3	6.6	8.0

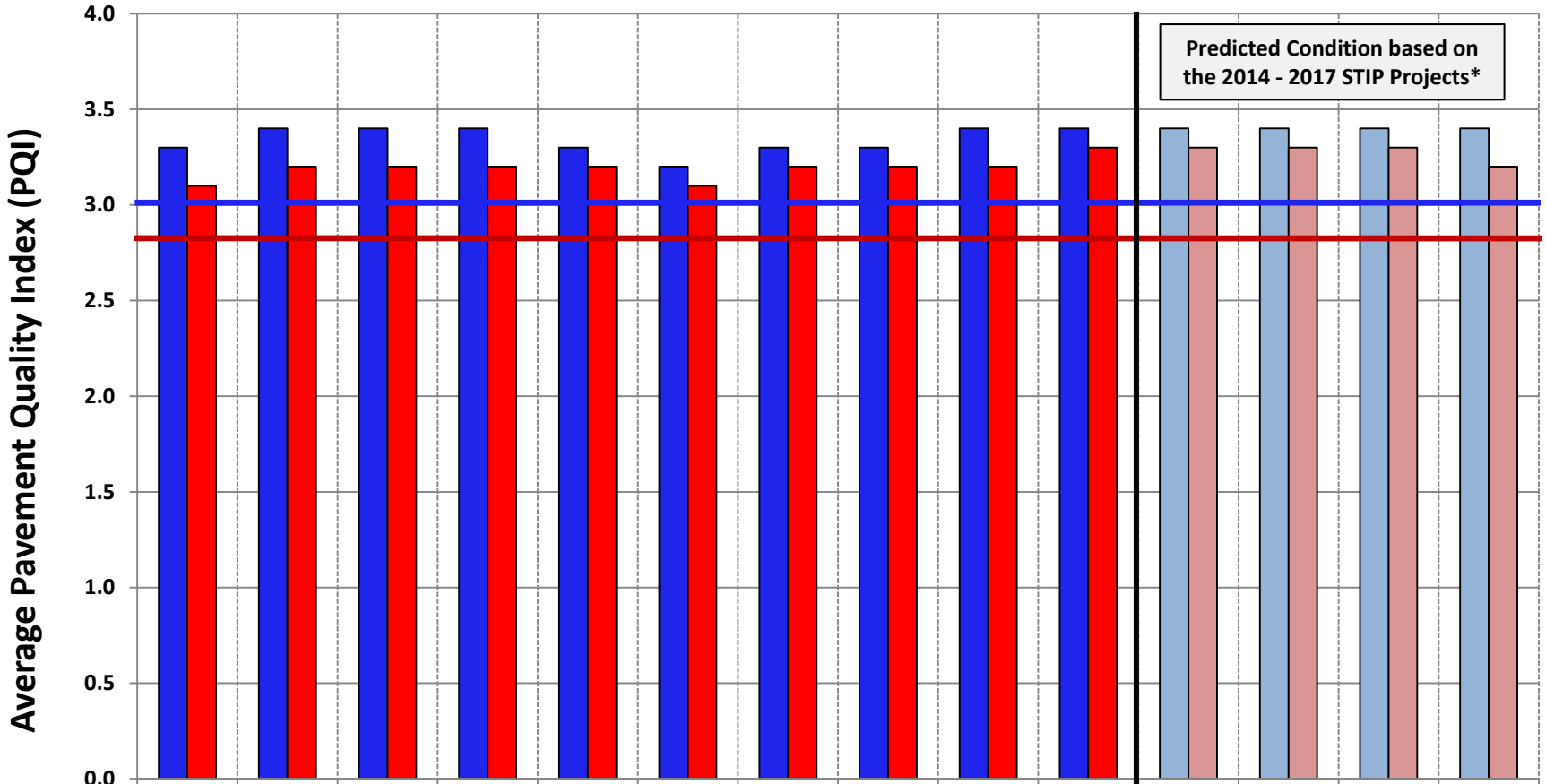
No official targets have been established for ARSL

Figure 14

Statewide Average Pavement Quality Index (PQI)

for GASB 34 Reporting

(PQI = Combined Index of Pavement Smoothness and Cracking)



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Principal Art.	3.3	3.4	3.4	3.4	3.3	3.2	3.3	3.3	3.4	3.4	3.4	3.4	3.4	3.4
Non-Principal Art.	3.1	3.2	3.2	3.2	3.2	3.1	3.2	3.2	3.2	3.3	3.3	3.3	3.3	3.2

*2013 M-Records with '14-'17 STIP + PPM

Principal Arterial Threshold: **Average PQI ≥ 3.0**

Non-Principal Arterial Threshold: **Average PQI ≥ 2.8**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