

2012 PAVEMENT CONDITION ANNUAL REPORT

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Office of Materials and
Road Research

Pavement
Management Unit

Your Destination...Our Priority



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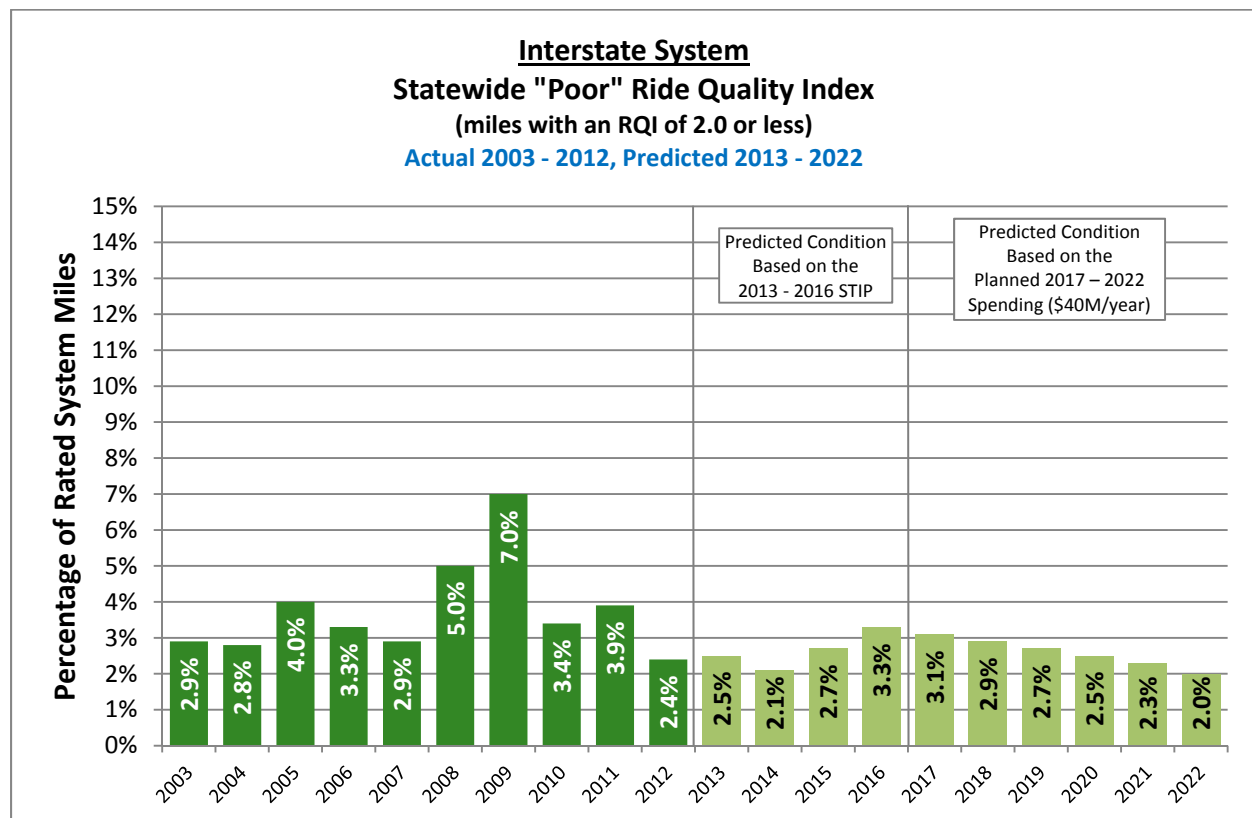
EXECUTIVE SUMMARY

With the July 6, 2012 enactment of the Moving Ahead for Progress in the 21st Century (MAP-21) legislation came a requirement that states maintain roadways on the National Highway System (NHS) to minimum (yet to be determined) performance standards. MAP-21 breaks the NHS system into two parts: Interstate and Non-Interstate. This year's annual pavement condition report will break the Minnesota highway system down in these two systems. In addition, those roads not on the National Highway System will be classified and reported as Non-NHS. This is a change from previous years when we reported the data by only two systems, Principal Arterial and Non-Principal Arterial routes.

The pavement performance of MnDOT's highway system is determined annually from the data collected by the Pavement Management Unit. Here are some of the key points from the 2012 pavement condition data and a look ahead at expected conditions.

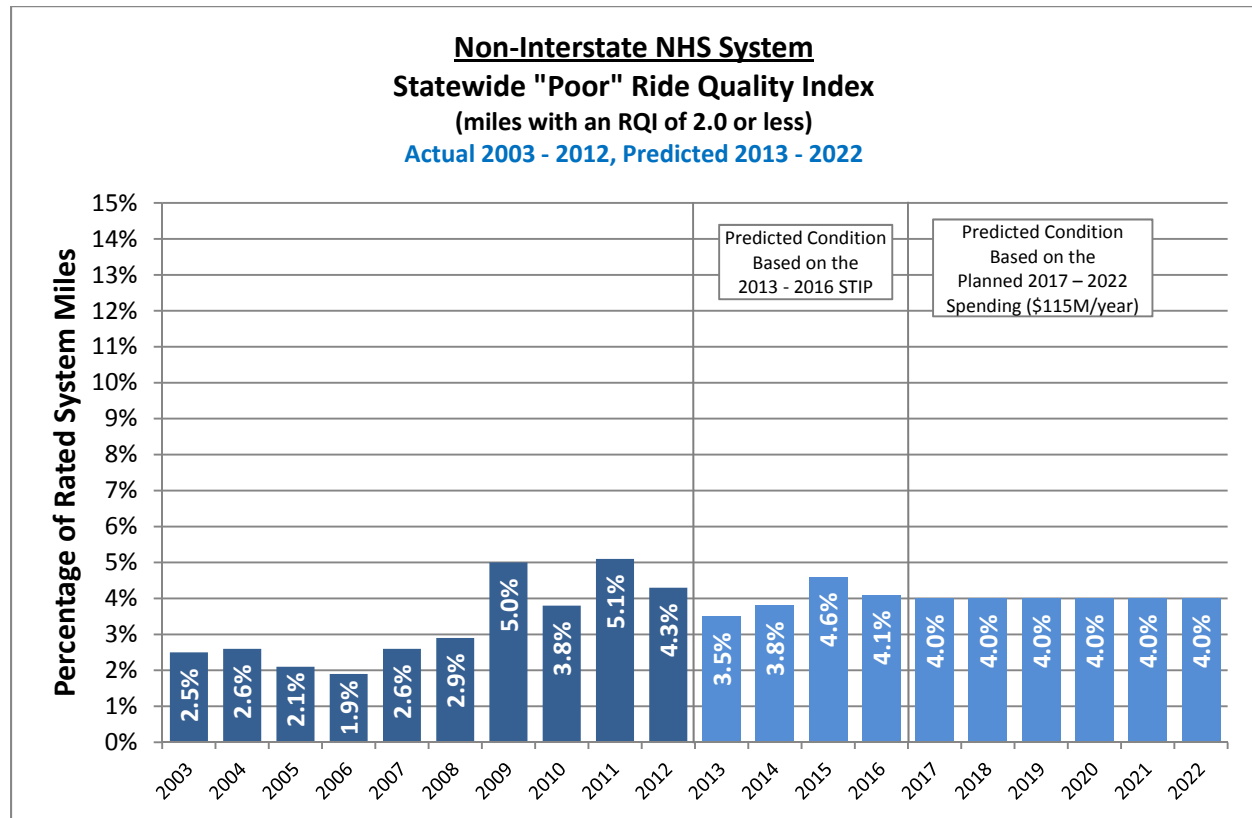
Interstate System

The Interstate system saw a continuation of the improvement that began back in 2010 with the infusion of funding from the federal stimulus program. The condition of the interstate system improved in 2012 due to a concerted effort to direct additional funds to this critical system based on a risk assessment. The condition of the Interstate System is expected to worsen slightly through 2016, based on the 2013-2016 STIP. From 2017 through 2022, the conditions are expected to improve to 2% "Poor", the target established by MnDOT for its Interstate system.



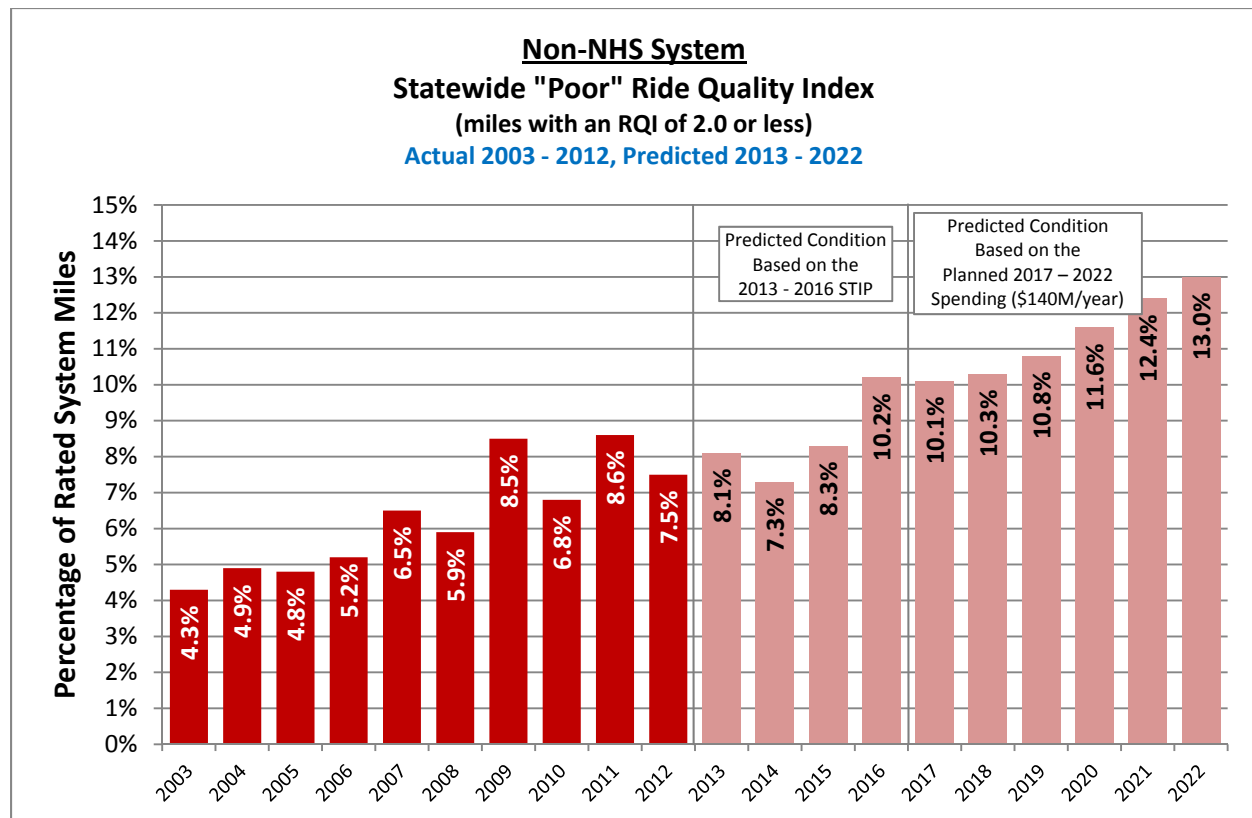
Non-Interstate National Highway System (Non-IS NHS)

The Non-Interstate NHS system also improved in 2012. The current conditions are expected to remain fairly constant through the 2013-2016 STIP and 2017-2022 HIP years based on the planned projects and spending. The goal is to maintain 4% or less of the Non-IS NHS system in "Poor" condition.



Non-National Highway System (Non-NHS)

While the Non-NHS system improved in 2012, it is not expected to remain at that level for more than a few years. By the end of the current 2013-2016 STIP the percent Poor is expected to increase to 10.2%. By 2022, the percent Poor on the Non-NHS system is expected to be around 13%, a three-fold increase from the 2003 level. Because MAP-21 places a priority on the NHS system, the conditions on the Non-NHS system are expected to decline as districts balance their needs between safety, pavement, bridges, mobility, congestion, etc. Care must be taken as 2022 approaches to ensure we do not fall below the GASB 34 threshold on the Non-NHS system.



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 Videolog. 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, predicting future maintenance and rehabilitation needs. They are 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 a vehicle. Most new construction projects have an initial RQI slightly over 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 ($\approx 10\%$ 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 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 weighting factors 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 a 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 2.0.

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, which is generally considered the end of a pavement's design life. Most pavements will need some type of major rehabilitation or reconstruction 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 inadequate 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. The ARSL provides a measure of whether the fixes being applied to the trunk highway system are mostly long-term or short-term.

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). The NHS will take investment priority to achieve the desired performance. Under MAP-21, the Interstate system (IS) will be tracked separately from other NHS routes.

This is a change from prior years' performance measure reporting. In the past, all pavement sections were assigned to one of two traffic functional groups: Principal Arterial (PA) or Non-Principal Arterial (NPA), where the Interstate system was reported as part of the PA system.

The new performance measure reporting utilizes three 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. Each state is to set targets for the Non-IS NHS. For 2013, the performance targets on the NHS are shown in Table 2. The Non-NHS performance will not be tracked under MAP-21, but the performance will continue to be tracked in-house. 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.

As in the past, the RQI targets are based on the percent of miles in the "Good" and "Poor" categories. Table 2 summarizes the revised categories for statewide pavement performance measures.

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

RQI TARGET SUMMARY

An assessment of which ATPs met the NHS pavement targets in 2012 is provided in Table 3. ATP-2, 3, and 4 met all of the NHS targets in 2012, while ATP-8 was close.

With the exception of ATP-7, all ATPs met the "Good" target on the Interstate system in 2012. On the Non-IS system, ATPs 6, 7, and 8 failed to meet the "Good" target, although ATP-8 was close.

For the "Poor" category, only ATP-1 and Metro failed to meet the targets on the Interstate system. On the Non-IS NHS system, ATP-1, 6, 7 and 8 failed to meet the targets, although ATP-1 and 8 were close.

Table 3 uses the below legend to aid in a visual comparison of NHS targets by ATP.




	Green	= Met the target
	Red	= Missed the target
	Yellow	= Missed the target, but was "close" (within 1% of the "Poor" RQI category target and within 5% for "Good")

Table 3. Comparison of Ride Quality Index (RQI) Targets by ATP

ATP	Good RQI (RQI > 3.0)		Poor RQI (RQI ≤ 2.0)	
	Interstate (target=70% or more)	Non-IS NHS (target=65% or more)	Interstate (target=2% or less)	Non-IS NHS (target=4% or less)
1	77.9%	70.4%	6.5%	4.9%
2	No Interstates	85.7%	No Interstates	0.7%
3	75.2%	73.0%	1.8%	2.9%
4	96.5%	66.7%	0.0%	2.3%
6	75.1%	55.6%	1.4%	8.5%
7	47.5%	55.3%	1.0%	7.0%
8	No Interstates	64.7%	No Interstates	5.0%
M	71.9%	67.8%	3.6%	4.0%

STATEWIDE HISTORICAL RQI TRENDS

Statewide, the smoothness of the Interstate system, Non-IS NHS and Non-NHS improved in 2012, with fewer miles in the “Poor” category and more miles in the “Good” category compared to 2011.

2003 - 2016 “Good” RQI Trend (Figure 2)

From 2011 to 2012, the percent of statewide miles on the Interstate system in “Good” condition increased from 69.8 percent to 72.9 percent. The percent of miles on the Non-IS NHS system in “Good” condition also increased, from 66.5 percent to 68.1 percent. The Non-NHS system increased in percent of miles in “Good” condition from 58.6 percent to 61.7 percent. Overall, this means there are approximately 380 more miles in “Good” condition statewide in 2012 compared to 2011.

Based on the current 2013-2016 STIP, the percent of miles in “Good” condition on the Interstate system is expected to increase from its current value of 72.9 percent to 77.1 percent by 2016. The percent of miles in “Good” condition is also expected to increase on the Non-IS NHS from its current value of 68.1 percent to 71.2 percent by 2016. The Non-NHS is expected to basically remain the same through 2016.

2003 - 2016 “Poor” RQI Trend (Figure 3)

From 2011 to 2012, the percent of miles in “Poor” condition decreased on all three systems, indicating an improvement. The Interstate system decreased from 3.9 percent to 2.4 percent, the Non-IS NHS dropped from 5.1 percent to 4.3 percent, and the Non-NHS decreased from 8.6 percent to 7.5 percent. Overall, there are about 150 fewer miles in “Poor” condition in 2012 than there were in 2011.

Based on the 2013-2016 STIP, the percent of miles in the “Poor” RQI category is expected to increase from 2.4 percent to 3.3 percent on the Interstate system. The Non-IS NHS system is expected to improve slightly with a decrease in the percent of miles in “Poor” condition, from 4.3 percent to 4.1 percent. The condition of the Non-NHS system is expected to decline considerably, with an increase in “Poor” from 7.5 percent to 10.2 percent.

Statewide, this is an increase of about 190 miles of “Poor” roads in four years. 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 high.

RQI COMPARISON BY ATP

Most ATPs showed some improvement in 2012 compared to 2011. In 2012, ATP-2, 3, and 4 met all applicable RQI targets on the Interstate and Non-IS NHS systems.

“Good” RQI Comparison (Table 3 & Figures 4, 6, 7 and 8)

On the Interstate system, four of the six ATPs had an increase in the percent of miles in “Good” condition compared to 2011. Conditions in ATP-3 and ATP-7 declined in 2012. ATP-7 saw a significant decline of 13.2 percent. All other ATPs had an increase, ranging from 0.3 to 17.8 percent. ATP-1 had the largest increase in percent of miles on the Interstate system in “Good” condition (17.8%) followed by Metro (10.0%). This is shown in Figure 4 and Figure 6.

On the Non-IS NHS system, four of the eight ATPs increased in the percent of miles in “Good” condition compared to 2011. ATP-8 improved 3.7 percent from 2011 and is within 0.3 percent of the target. The percent of miles in “Good” condition in ATP-4, 6, 7 and Metro declined. However, ATP-4 and Metro continue to meet the target. This is shown in Figure 4 and Figure 7.

On the Non-NHS system, seven of the eight ATPs had an increase in the percent of miles in “Good” condition ranging from 0.2 to 8.1 percent. ATP-6 had the largest increase (8.1%) followed by ATP-4 (6.7%). Only ATP-7 had a decline in the percent of miles in “Good” condition (-0.6%). This is shown in Figure 4 and Figure 8.

“Poor” RQI Comparison (Table 3 & Figures 5, 9, 10, and 11)

On the Interstate system, four of the six ATPs meet the target for percent of miles in “poor” condition. ATP-6 decreased the percent of miles in “Poor” condition and now meets the target. Metro also decreased its percent of miles in “Poor” condition, but continues to not meet the target. Both ATP-1 and ATP-7 increased their percent of miles in “Poor”. ATP-4 currently has no Interstate roads in “Poor” condition. This is shown in Figure 5 and Figure 9.

On the Non-IS NHS, ATP-1 and ATP-8 decreased their percent of miles in “Poor” condition and are now within 0.9 percent and 1.0 percent, respectively, of meeting the target. This is shown in Figure 5 and Figure 10.

On the Non-NHS system, six ATPs showed a decrease in the number of miles in “Poor” condition. ATP-1 and ATP-8 increased the number of miles in “Poor” by 1.7% and 0.3%, 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.

2003 - 2012 ARSL Trend (Figure 12)

The 2012 ARSL was 12.0 years on the Interstate system, 9.5 years on the Non-IS NHS system, and 7.9 years on the Non-NHS. These slight gains in years of remaining service life are

supported by the improvement seen in the RQI trends that are a direct result of longer lasting rehabilitation projects.

ARSL Comparison (Figure 13)

By ATP, the ARSL ranges from 6.2 to 17.5 years on the Interstate system, from 7.9 to 11.1 years on the Non-IS NHS, and from 5.6 to 12.2 years on the Non-NHS. ATP-4's Interstate system has the highest ARSL. ATP-2 has the highest ARSL on the Non-IS NHS system and the Non-NHS. ATP-7 has the lowest ARSL on both the Interstate system and Non-NHS. ATP-6 has the lowest ARSL on the Non-IS NHS.

PREDICTED PAVEMENT CONDITIONS AND ACCURACY

Future year's pavement conditions are predicted using MnDOT's pavement management system. These future trends are used to provide managers with insight into the pavement condition impacts of different funding scenarios, and to alert the legislature of any concerning future trends. 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 historical data or are default curves. Pavement sections not scheduled for any work in the STIP years use one of the two types of deterioration curves. If there is enough historical data since the last rehabilitation on a section, a regression curve is fit through the data and then used to predict the expected RQI. If there is inadequate historical data, 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 already have been 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 any projects are completed. Therefore, the construction year for all pavement projects listed in the STIP is increased by one year. It will not be until the following year that the impact of this work is measured.

Districts 1, 2, and 8 are driven around mid-construction season and about half of their pavement projects are increased by one year. This is done because some of their projects will already have been completed, some will be under construction, and others will not have begun when the van is collecting data. Since there is no way to predict which projects will be complete when the van is there and which ones will not, the projects are randomly chosen.

District 3 and 4 are normally driven in the late 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.

With the above methods, a best attempt is made to predict the next year's condition. Table 5 compares the predicted 2012 pavement conditions from 2011 with the actual 2012 measured conditions under the performance measures as described last year.

Table 4. Comparison of Predicted 2012 versus Actual 2012 RQI

PA System RQI Category	Actual 2011 Data	Predicted 2012 Data *	Actual 2012 Data
Good RQI (RQI > 3.0)	67.3%	66.6%	69.3%
Poor RQI (RQI ≤ 2.0)	4.8%	4.3%	3.8%
NPA System RQI Category	Actual 2011 Data	Predicted 2012 Data *	Actual 2012 Data
Good RQI (RQI > 3.0)	58.6%	56.8%	61.7%
Poor RQI (RQI ≤ 2.0)	8.6%	9.6%	7.5%

*Predictions based on the 2012-2015 STIP and Better Roads projects by 2011 M-Records

The actual 2012 conditions are better than the predicted 2012. About 50% of the miles expected to be in "Poor" condition in 2012 were kept out of this category because of maintenance patching (85 miles) or completion of a construction project ahead of schedule (90 miles). About 22% of the roads expected to be in "Poor" simply did not deteriorate as rapidly as expected and are still categorized as "Fair." One likely reason for this was the extremely mild winter, one of the warmest and driest on record. The improvement in the "Good" category is due to projects being completed ahead of schedule or a road's rate of deterioration being more gradual than expected, keeping it from falling into the "Fair" category.

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 apply an alternative modified/preservation approach.

In terms of determining the cost of using the assets, GASB 34 allows governments to report either a depreciation expense or 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 14 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 reporting by PA and NPA.

ADDITIONAL INFORMATION

Additional information about the condition and performance of the state highway system, including color-coded maps showing the various 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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 Maplewood, MN 55109
 (651) 366-5567
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Figure 1. MnDOT's Area Transportation Partnership (ATP) Boundaries

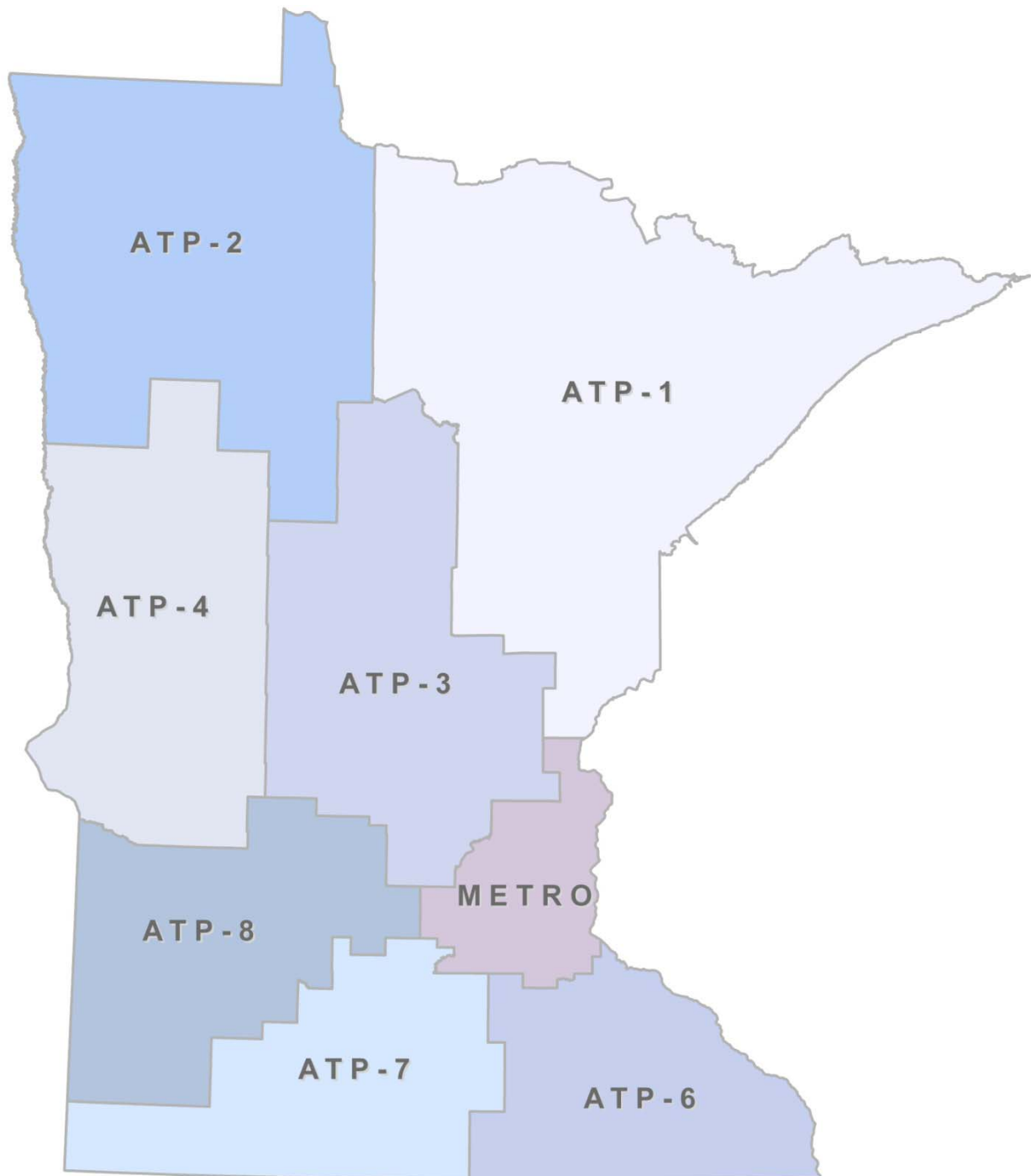


Figure 2
Statewide “Good” Ride Quality Index
(miles with an RQI greater than 3.0)
Actual 2003 - 2012, Predicted 2013 - 2016

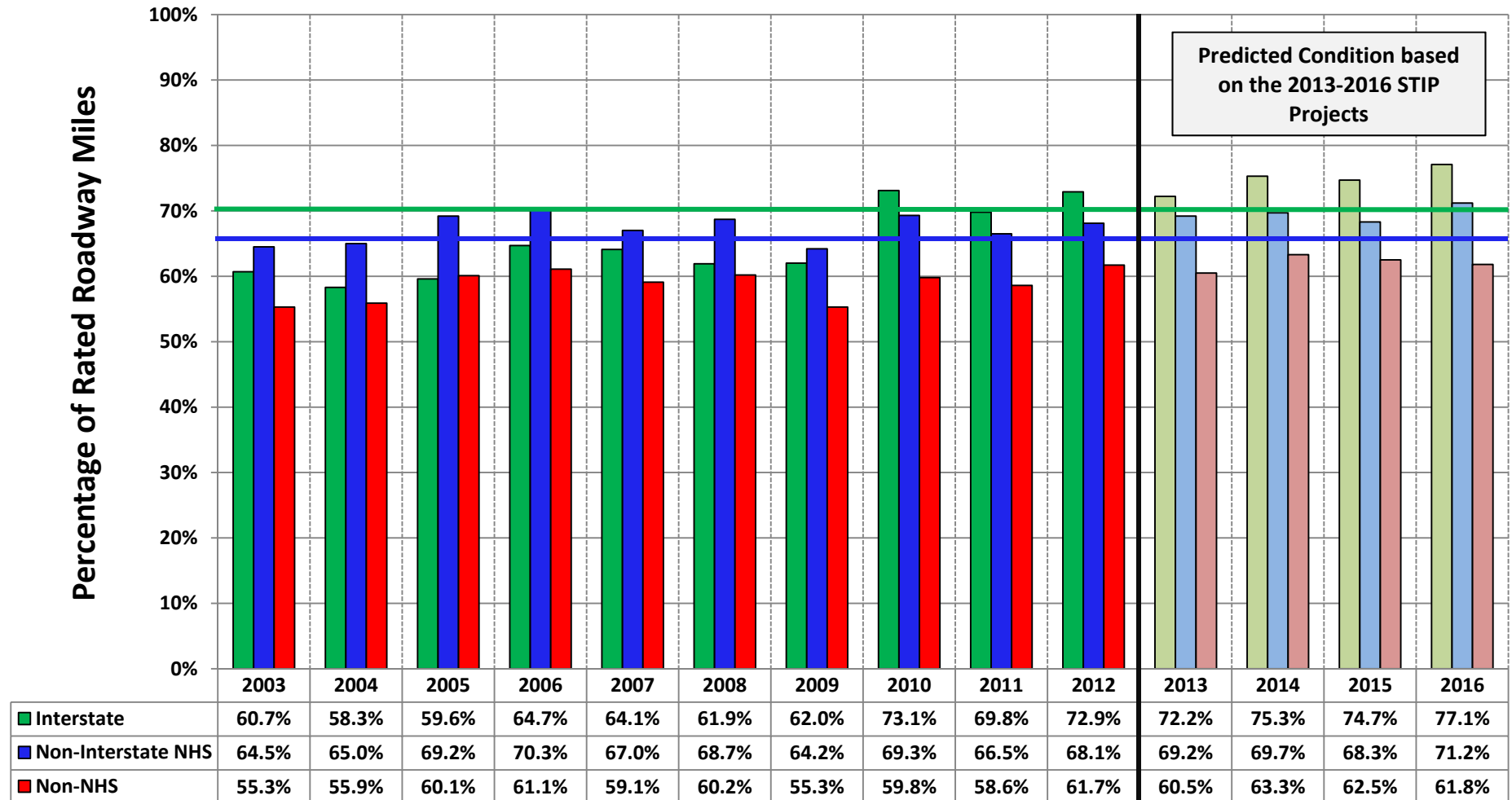
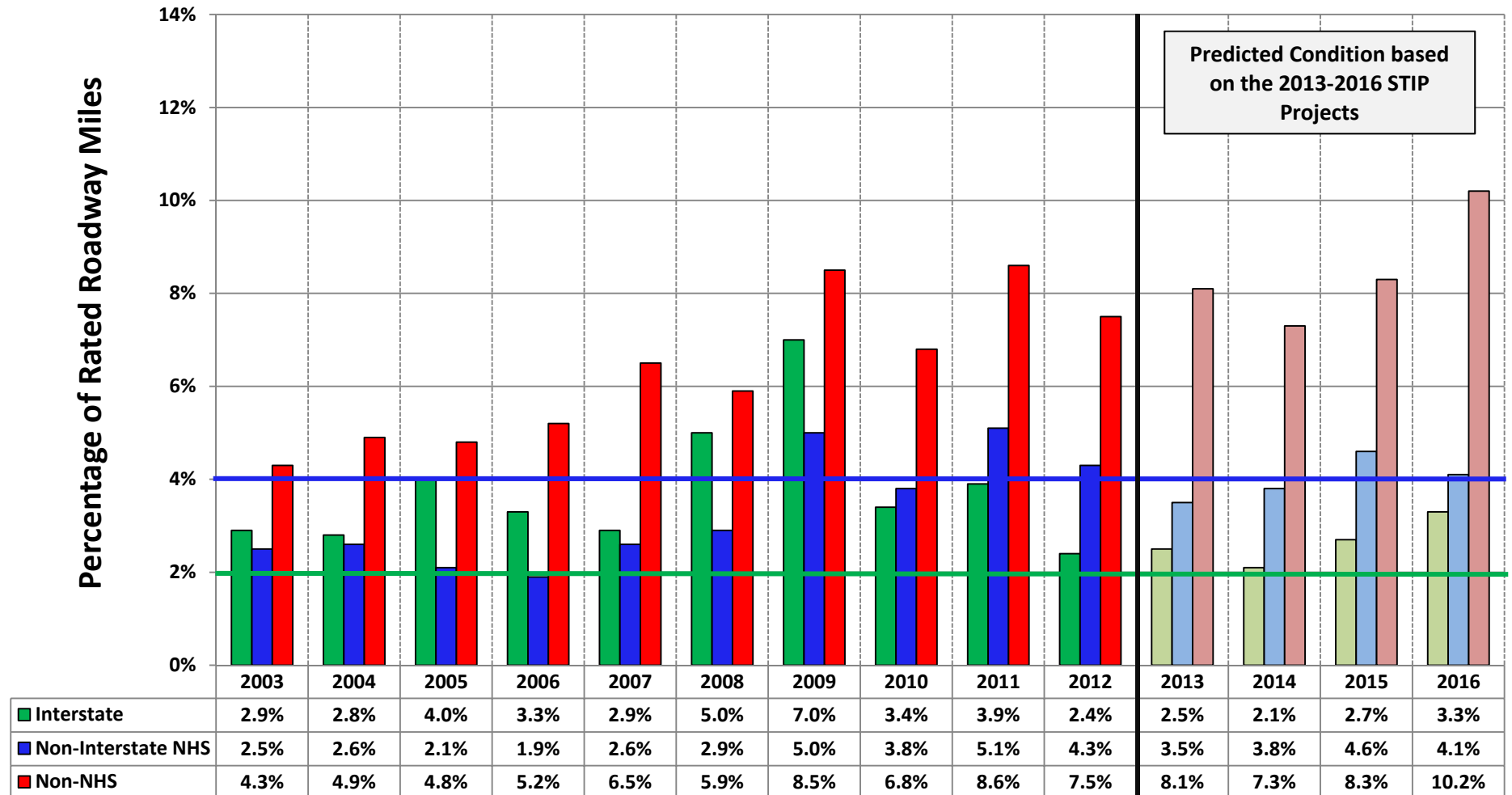


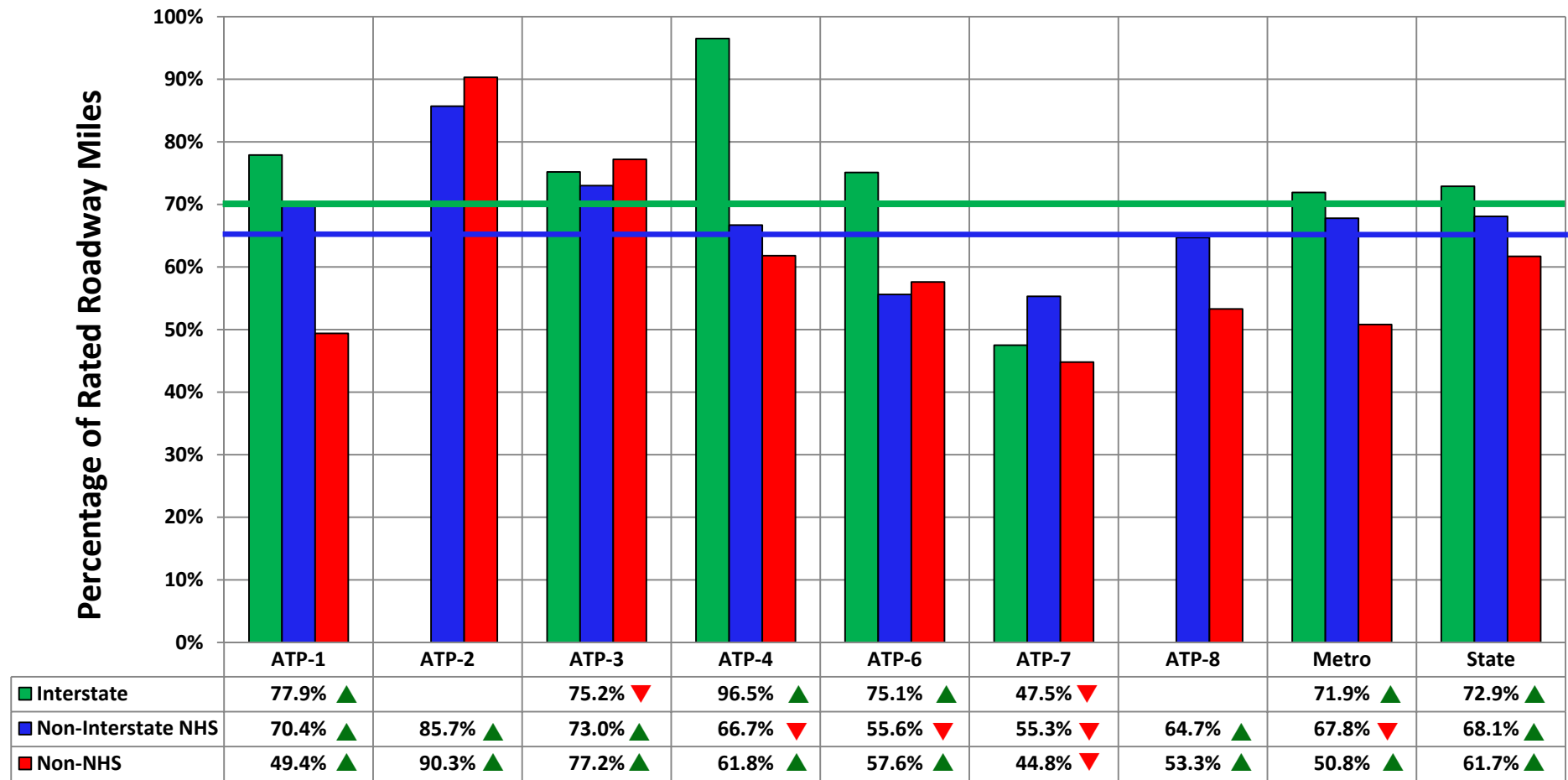
Figure 3
Statewide “Poor” Ride Quality Index
 (miles with an RQI of 2.0 or less)

Actual 2003 - 2012, Predicted 2013 - 2016



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

Figure 4
“Good” Ride Quality Index
(miles with an RQI greater than 3.0)
Comparison of 2012 Data by ATP



▲ = Better than 2011

■ = Same as 2011

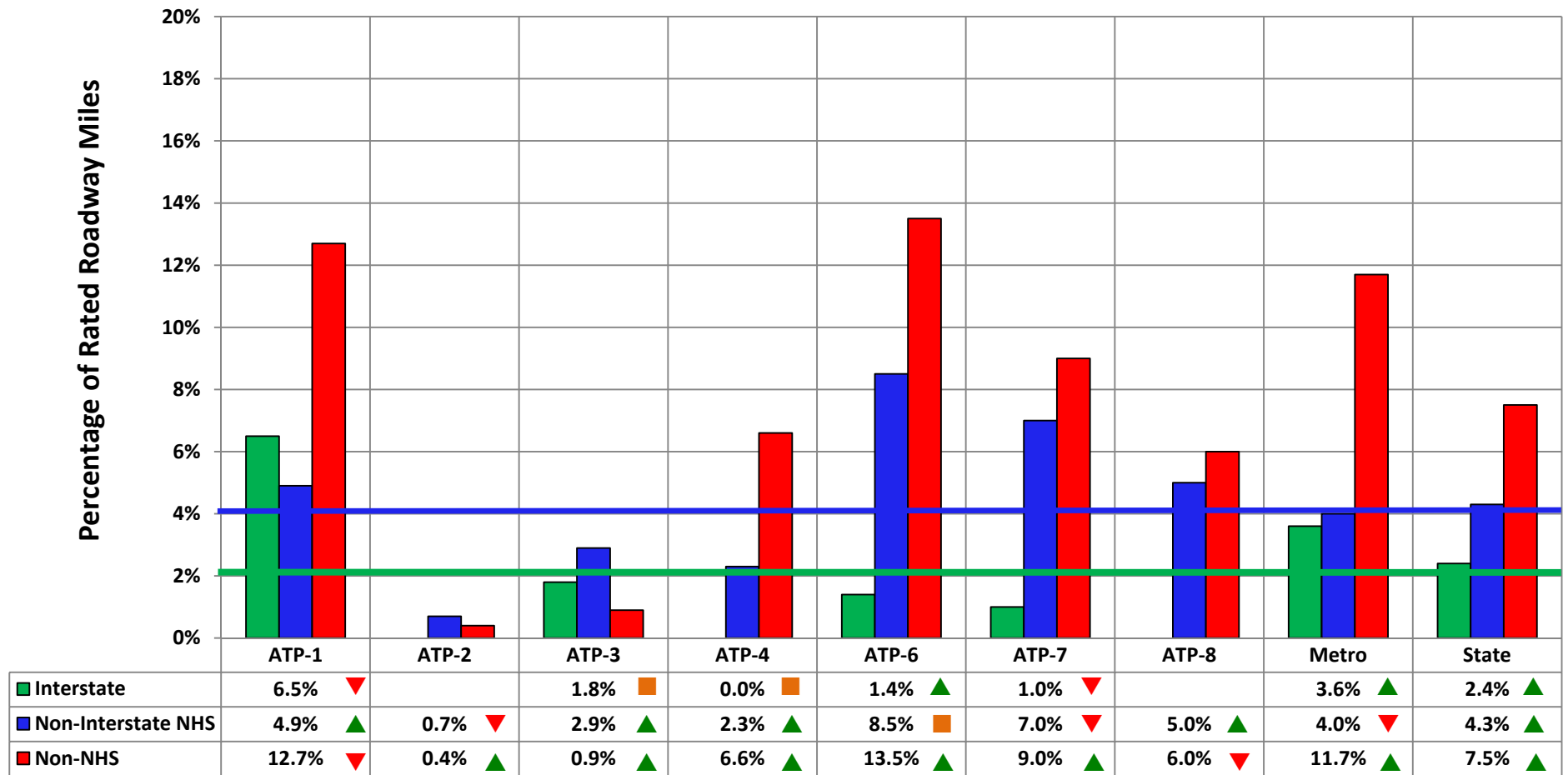
▼ = Worse than 2011

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 2012 Data by ATP



▲ = Better than 2011

▢ = Same as 2011

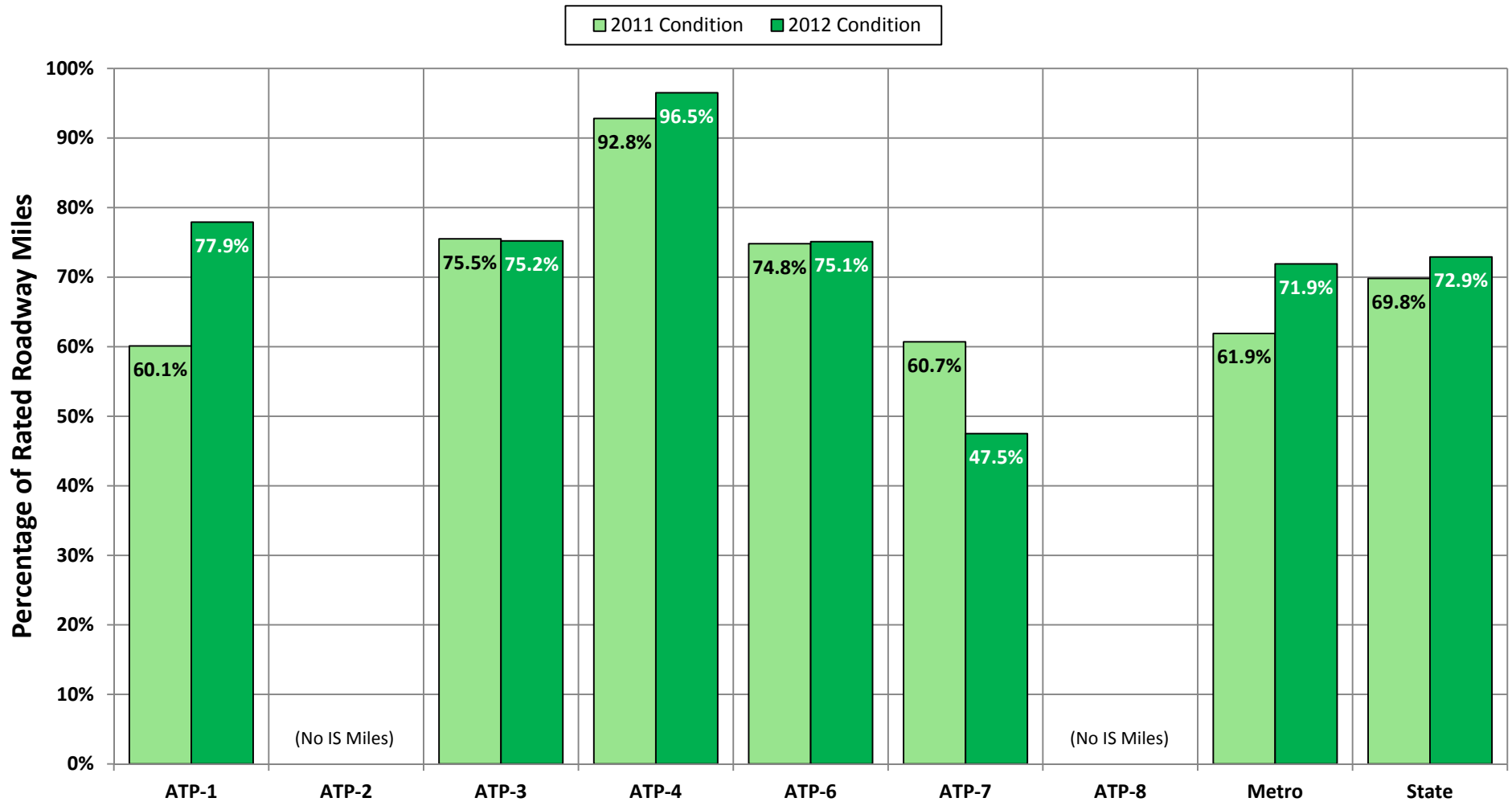
▼ = Worse than 2011

Interstate Target = 2 percent or less

Non-Interstate NHS Target = 4 percent or less

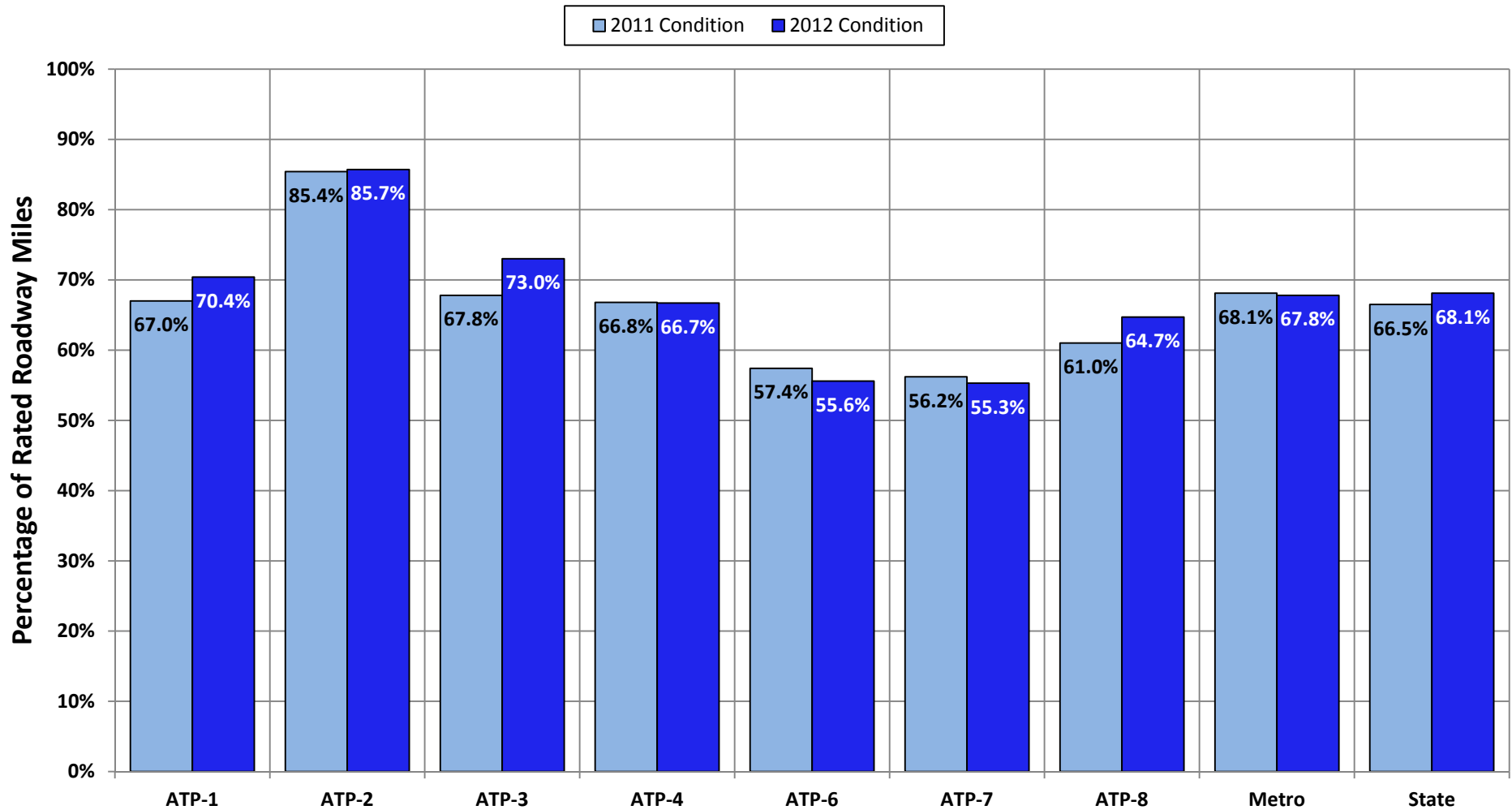
No Target Established for Non-NHS

Figure 6
Comparison of “Good” Ride Quality Index
 (miles with an RQI greater than 3.0)
 Interstate System, 2011 – vs – 2012 Condition



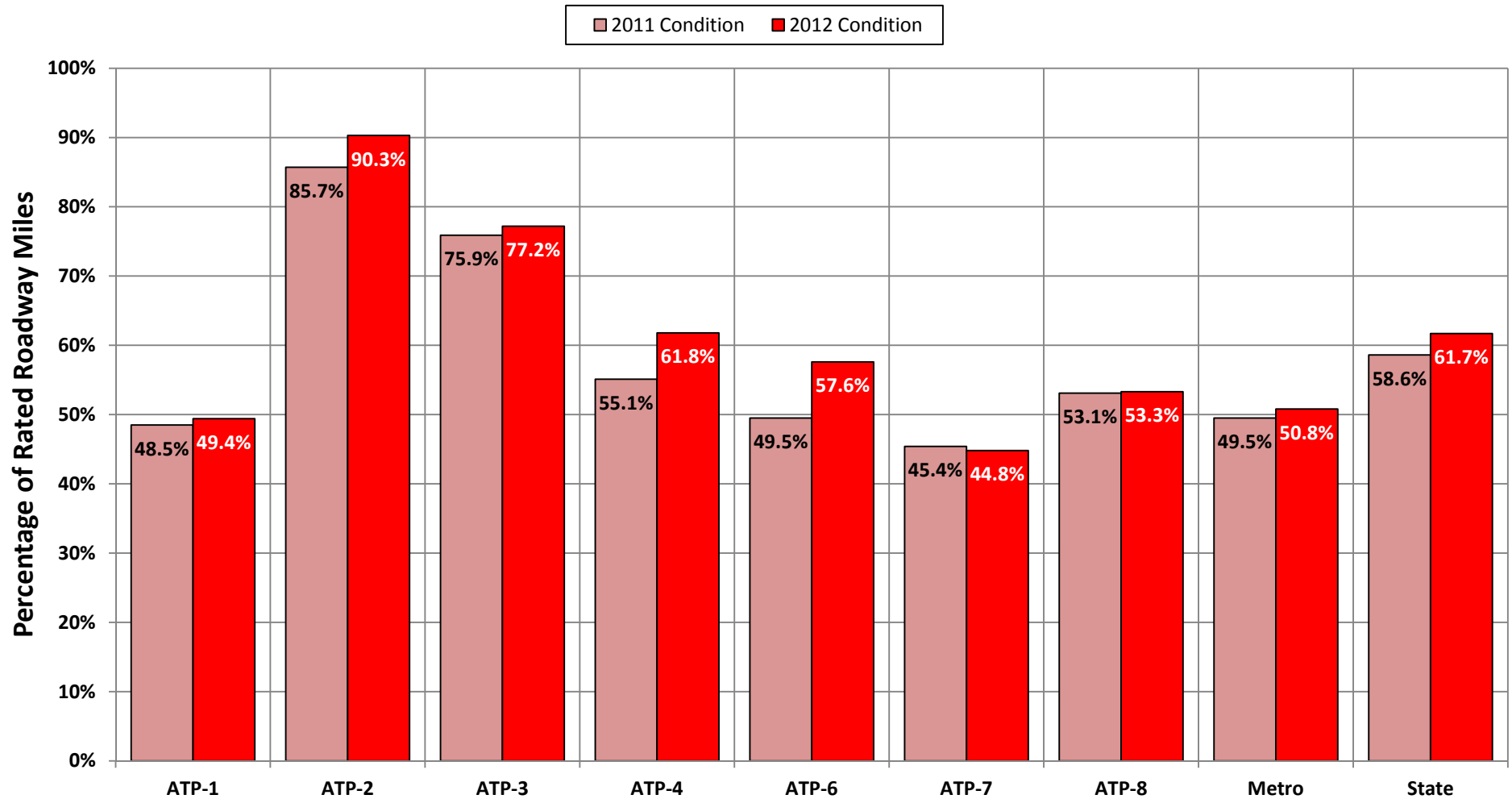
Interstate Target = 70 percent or more

Figure 7
Comparison of “Good” Ride Quality Index
(miles with an RQI greater than 3.0)
Non-Interstate NHS System, 2011 – vs – 2012 Condition



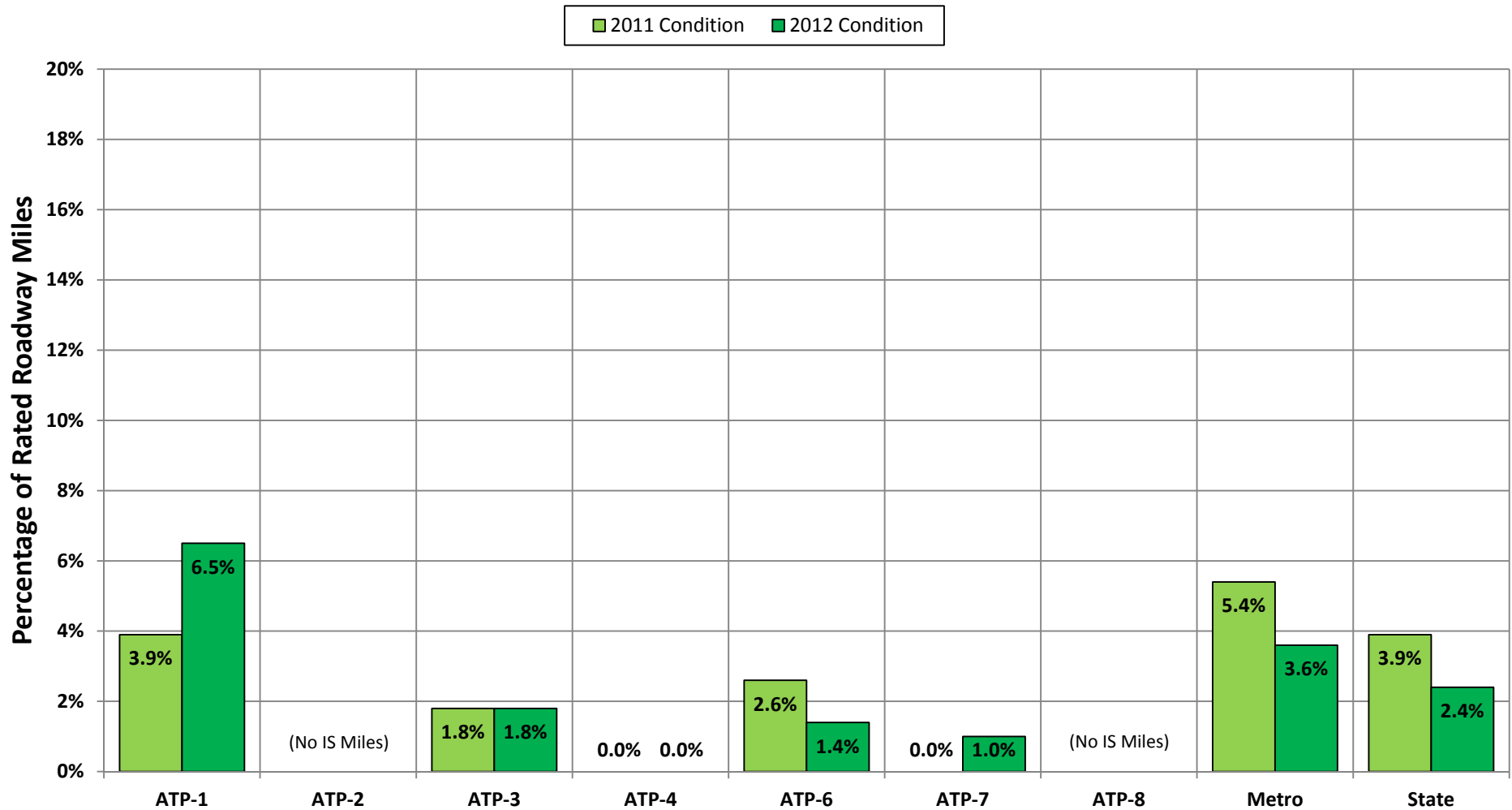
Non-Interstate NHS Target = 65 percent or more

Figure 8
Comparison of “Good” Ride Quality Index
(miles with an RQI greater than 3.0)
Non-NHS System, 2011 – vs – 2012 Condition



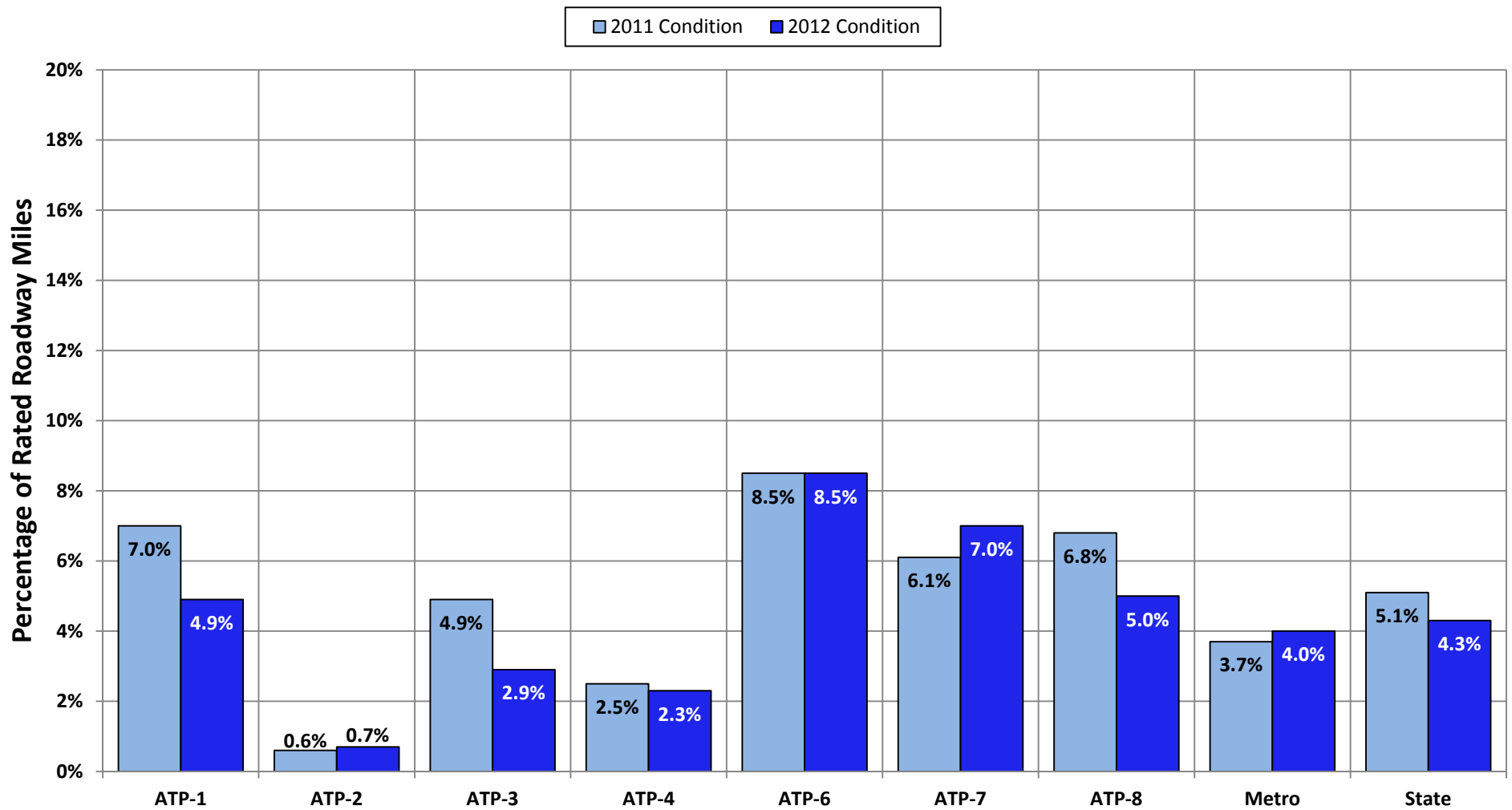
No official targets have been established for Non-NHS

Figure 9
Comparison of “Poor” Ride Quality Index
 (miles with an RQI of 2.0 or less)
 Interstate System, 2011 – vs – 2012 Condition



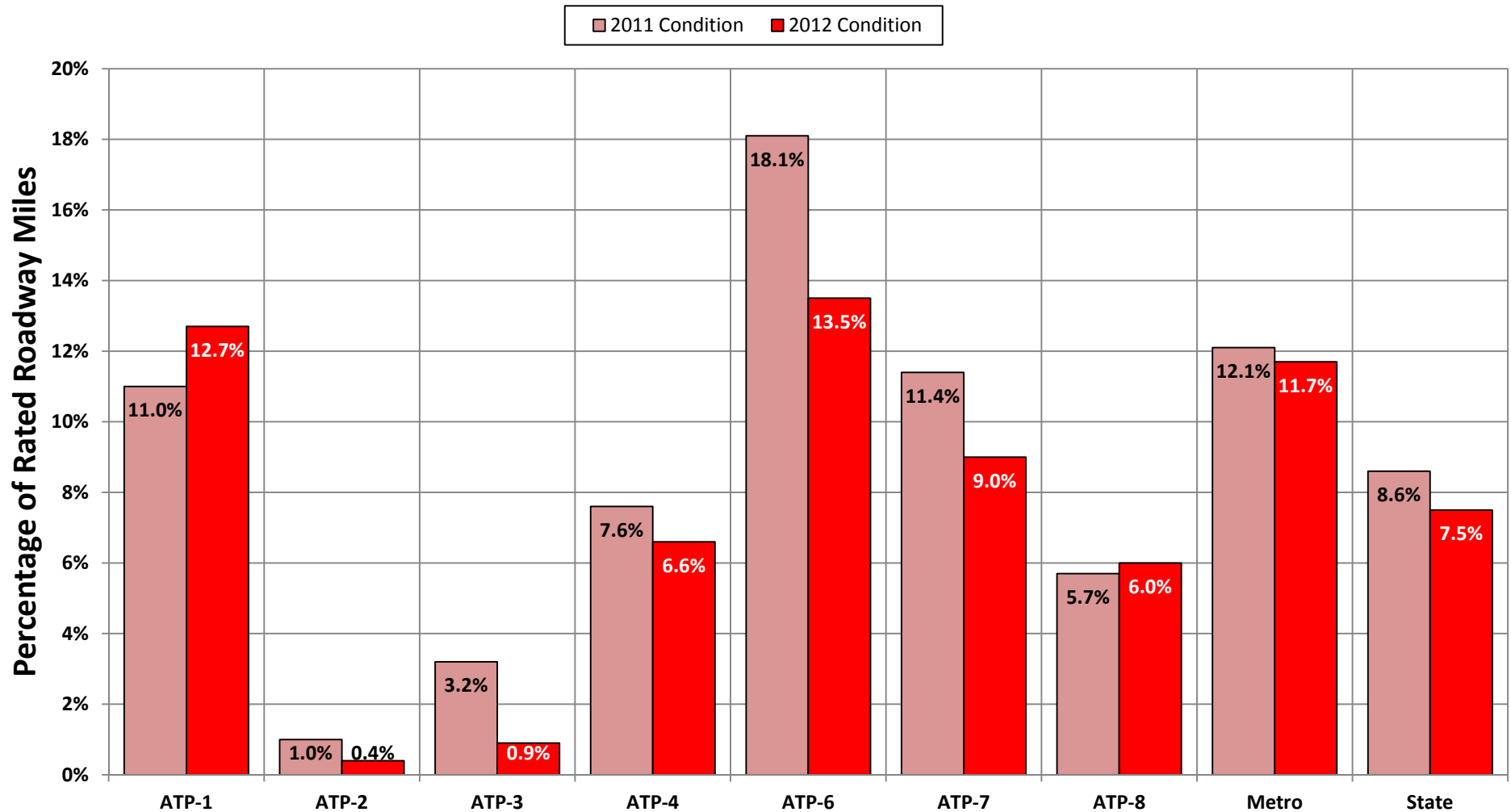
Interstate Target = 2 percent or less

Figure 10
Comparison of “Poor” Ride Quality Index
 (miles with an RQI of 2.0 or less)
 Non-Interstate NHS System, 2011 – vs – 2012 Condition



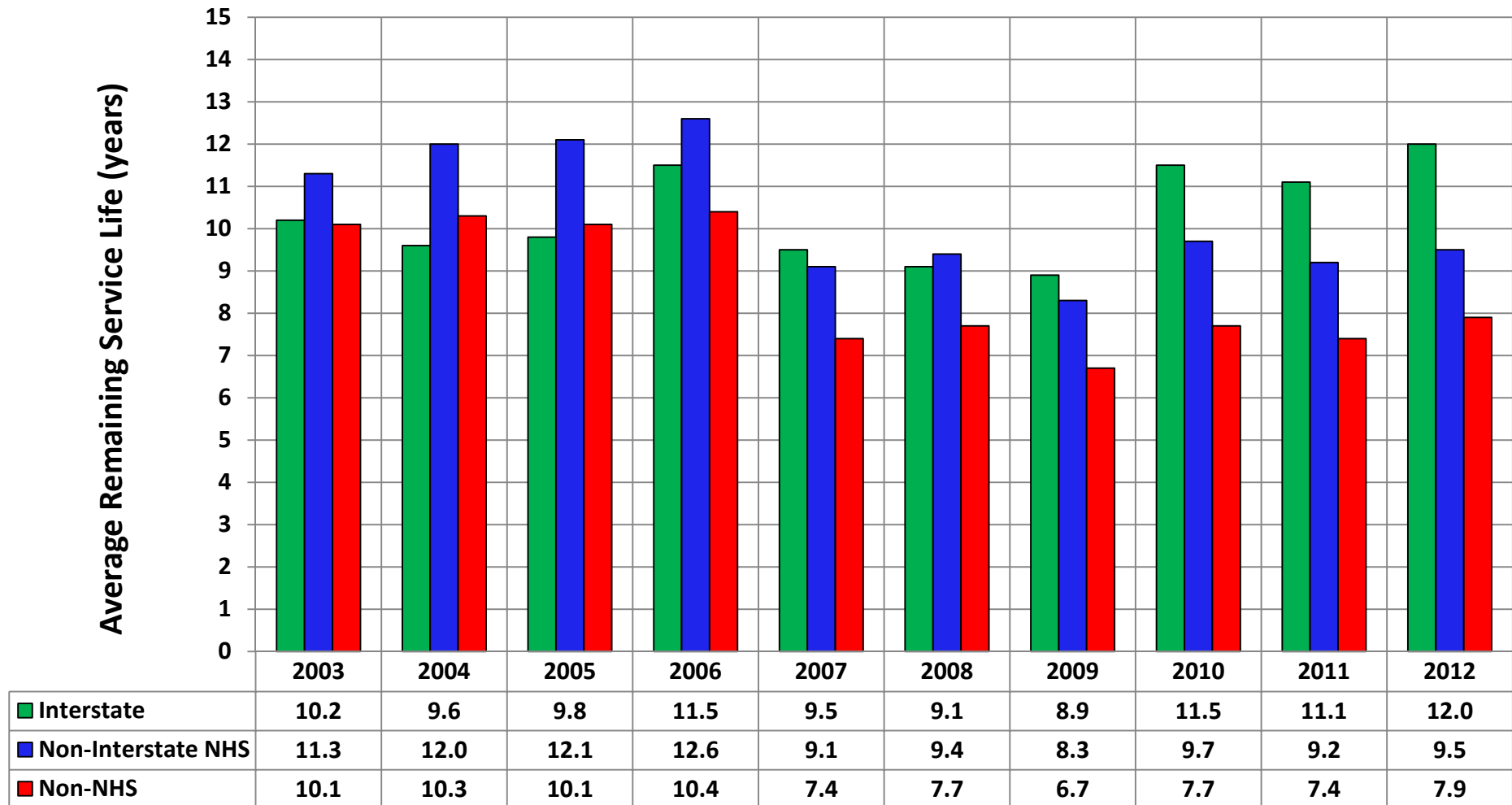
Non-Interstate NHS Target = 4 percent or less

Figure 11
Comparison of “Poor” Ride Quality Index
(miles with an RQI of 2.0 or less)
Non-NHS System, 2011 – vs – 2012 Condition



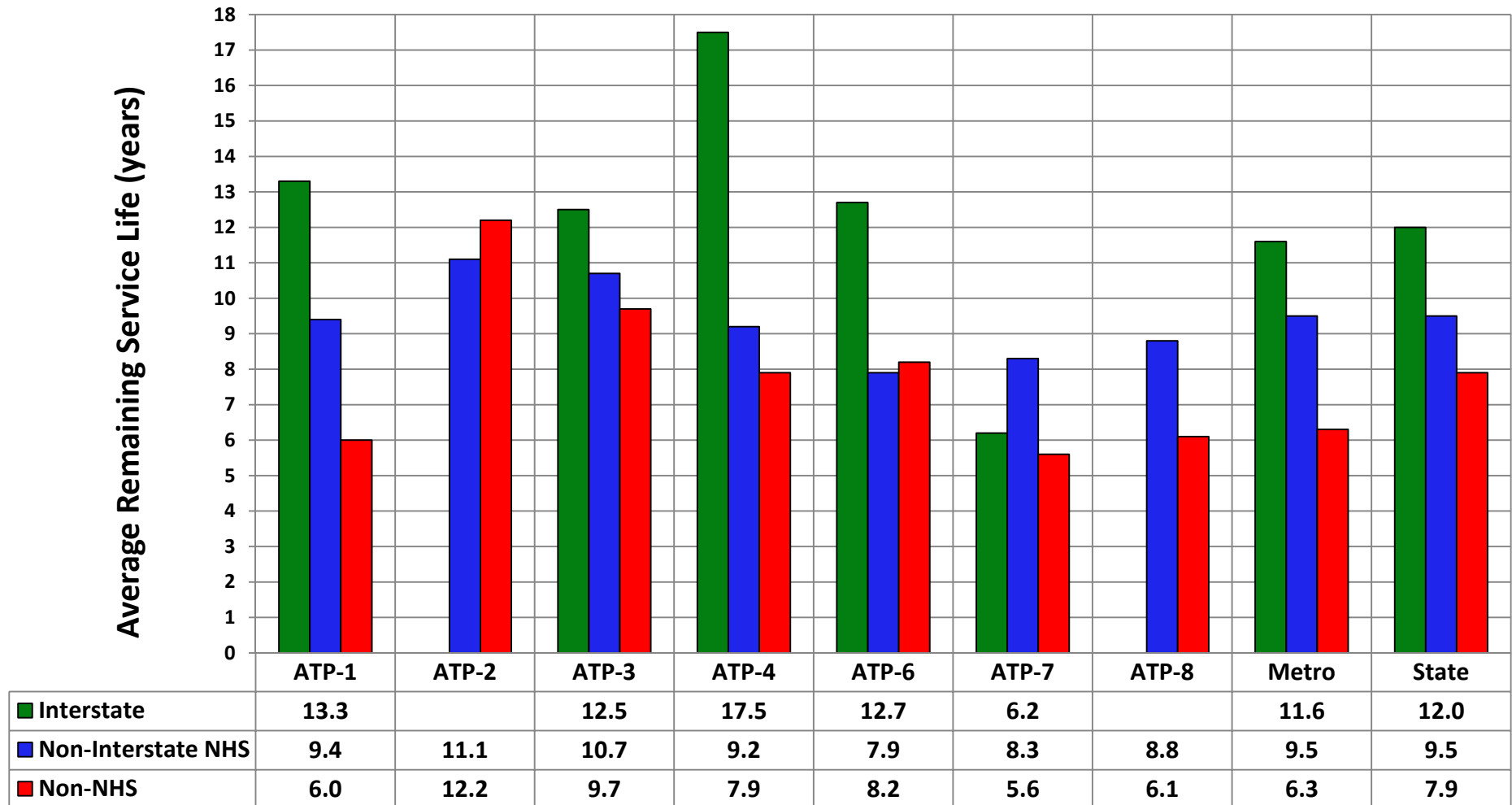
No official targets have been established for Non-NHS

Figure 12
Statewide Average Remaining Service Life (ARSL)
 (years until RQI reaches 2.5)
 Actual 2003 - 2012



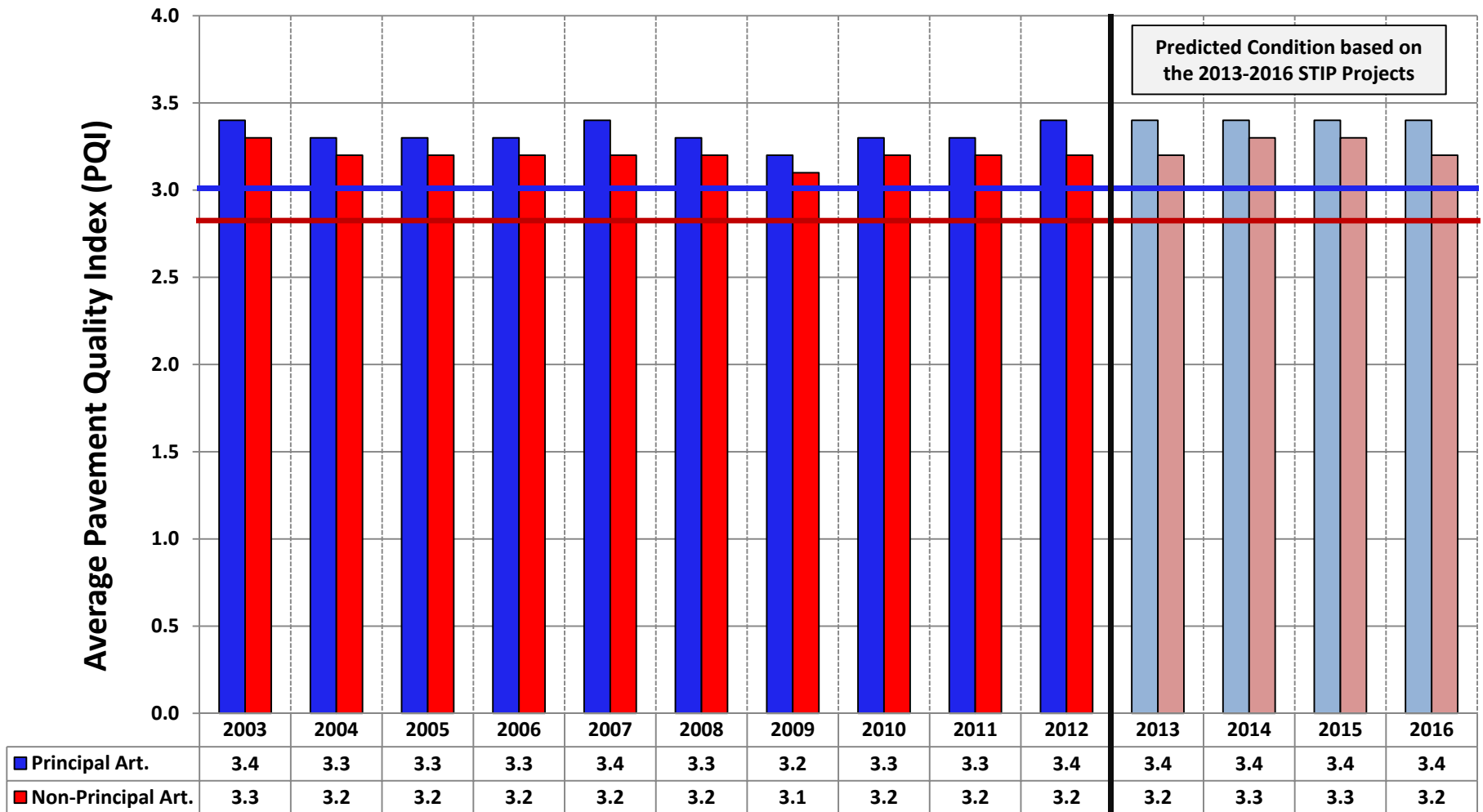
No official targets have been established for ARSL

Figure 13
Average Remaining Service Life (ARSL)
 (years until RQI reaches 2.5)
 Comparison of 2012 Data by ATP



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)



Principal Arterial Threshold:
 Non-Principal Arterial Threshold:

Average PQI \geq 3.0
 Average PQI \geq 2.8

