EXECUTIVE SUMMARY

2010 Pavement Condition Executive Summary

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INTRODUCTION

This report is prepared annually by the Minnesota Department of Transportation (Mn/DOT) Pavement Management Unit to provide information concerning trunk highway pavement performance. It briefly discusses statewide performance trends and how they compare with established targets. In addition, comparisons are made between the eight Area Transportation Partnerships (ATP) used in statewide planning.

The two indices used to measure pavement performance in Mn/DOT's 20-year Transportation Plan are the Ride Quality Index (RQI), a measure of pavement smoothness, and Remaining Service Life (RSL), an estimate of the time until the pavement will reach the end of its design life and require major rehabilitation. In addition, the Pavement Quality Index (PQI) is a composite index reflecting both pavement smoothness and cracking. It is used to determine if the state highway system is meeting performance thresholds established for the Government Accounting Standards Board, Standard 34 (GASB 34). Each of these three indices will be discussed in this report.

BACKGROUND

Mn/DOT'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.

DATA COLLECTION

The pavement roughness and surface distress data (cracks, ruts, faults, etc.) are collected using a sophisticated digital inspection vehicle (shown to the right). This van films the pavement surface using four digital cameras, one looking straight ahead, one looking to the side and two looking straight down. The two down-looking cameras are used to evaluate the pavement surface distress. In addition to the cameras, the van is equipped with lasers that measure the longitudinal pavement profile, from which pavement roughness, rutting, and faulting are calculated.

Pavement condition data is used to monitor the performance of the system, to help in the selection of projects, and identify pavements that need future maintenance and/or rehabilitation. The van is driven over every mile of trunk highway annually, in both directions.

Mn/DOT PAVEMENT CONDITION INDICES and MEASURES

Mn/DOT's pavement condition data is reduced to several indices for reporting the statewide pavement performance measures: 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 to predict future maintenance and rehabilitation needs. They are briefly described below.

RQI: Ride Quality Index

The RQI is Mn/DOT'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 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 done 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, Mn/DOT 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.

Mn/DOT uses the Surface Rating, or 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 operators to view and analyze the digital images captured by the van. The van captures four images that are shown on four monitors simultaneously. The front, side and two down views help the operator determine the type, severity, and amount of each defect.

Because of the time involved determining the SR, Mn/DOT 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 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 Surface Rating, or 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 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.

RSL: Remaining Service Life

The RSL is an estimate, in years, until the RQI will reach a value of 2.5, generally considered to be 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 applied to the current data. A curve is fitted 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

Mn/DOT 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 will be referred to as "Good" and "Poor," respectively, 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

Using the traffic functional class designation of each segment of highway, all pavement sections are assigned to one of two traffic functional groups, Principal Arterial (PA) or Non-Principal Arterial (NPA) when reporting statewide pavement performance measures. The Interstate system is considered to be part of the PA system. The current trunk highway system mileage is comprised of 53% PA and 47% NPA.

Performance targets have been established based on historical RQI values for both functional groups as shown in Table 2. The RQI targets are based on the percent of miles in the "Good" and "Poor" categories as described below.

Table 2. Ride Quality Index (RQI) Targets by Functional Group

Functional Group	Ride Quality Index (RQI)	
	"Good" RQI (RQI > 3.0)	**"Poor" RQI (RQI <= 2.0)**
Principal Arterial	70% or more	2% or less
Non-Principal Arterial	65% or more	3% or less

STATEWIDE HISTORICAL RQI TRENDS

Statewide, the smoothness of both the PA and NPA systems improved in 2010, with more miles in the "Good" category and fewer miles in the "Poor" category compared to 2009. Some ATP's, such as ATP-6, improved greatly in 2010. This is the first time both systems have improved in the same year since 2005.

2001 - 2010 "Good" RQI Trend (Figure 2)

Statewide, the percent of miles on the PA system in "Good" condition increased from 63.7 percent, in 2009, to 70.2 percent, in 2010. This is the first time since 2002 that the state PA system has been above the "Good" target of 70 percent or more. The percent of miles on the NPA system in "Good" condition also increased, from 55.3 percent, in 2009, to 59.8 percent in 2010.

All but one ATP had an increase in the percent of miles on the PA system in "Good" condition in 2010. Only ATP-3 did not improve over 2009, although they are still above the "Good" target at 70.3 percent. All other ATPs had an increase, ranging from 3.3 to 17.6 percent. ATP-6 had the largest improvement in the amount of their PA system in "Good" condition (+17.6%) followed by ATP-8 (+8.8%) and ATP-7 (+8.1%).

Although not as dramatic as the PA system, all but one ATP also had an increase in the percent of miles in "Good" condition on the NPA system in 2010. Only ATP-1 had a decrease (-0.7%) in the percent of miles in "Good" condition in 2010. All other ATP's had an increase ranging from 0.2 to 10.3 percent. Metro had the largest increase (+10.3%) followed by ATP-8 (+8.4%) and ATP-4 (+6.8%).

Based on the current 2011-2014 program, the percent of miles in "Good" condition on the PA system is expected to decrease from its current value of 70.2 percent to 68.9 percent by 2014. The percent of miles in "Good" condition is also expected to decrease on the NPA system from its current value of 59.8 percent to 57.8 percent by 2014.

2001 - 2010 "Poor" RQI Trend (Figure 3)

Although still not meeting targets, the statewide percent of miles on the PA system in "Poor" condition decreased from 5.5 percent, in 2009, to 3.7 percent, in 2010. The NPA system also had a decrease in the percent of miles in "Poor" condition, decreasing from 8.5 percent in 2009 to 6.8 percent in 2010.

On the PA system, all but one ATP had a decrease in the number of miles in "Poor" condition in 2010. While ATP-3 had a 1.1 percent increase, from 1.9 percent, in 2009, to 3.0 percent in 2010, all other ATP-s had a reduction, ranging from 0.3 to 7.8 percent. ATP-6 had the largest reduction (-7.8%) followed by ATP-7 (-2.7%). On the NPA system, every ATP had a reduction

in miles in "Poor" condition in 2010 ranging from 0.2 percent, in ATP-3, to 5.0 percent, in Metro. Based on the 2011-2014 STIP, the percent of miles in the "Poor" RQI category is expected to increase from 3.7 to 4.8 percent, on the PA system, and from 6.8 to 10.0 percent on the NPA system. This is more than twice the target amount on the PA system and more than three times the target amount on the NPA system. 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 very expensive, thus making it much harder to recover once the amount of miles in this condition gets very high.

RQI COMPARISON by ATP

In 2010, only ATP-2 met all four of the RQI targets. ATP-3 met three of the four and was close on the other. As was the case the last two years, ATP-1, 6, and Metro did not meet any of the RQI targets in 2010.

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

ATP-2, 3, and 4 met the target of having at least 70% of the PA system in "Good" condition in 2010. This was the fifth year in a row this occurred in ATP-2 and 4.

Only ATP-2 and 3 met the target of having 65% or more of the NPA system in "Good" condition. As was the case last year, only ATP-2 and 3 met the "Good" RQI targets on *both* the PA and NPA system in 2010.

As shown in Figure 6, compared to last year, every ATP had an increase in "Good" roads on the PA system except for ATP-3, which had a slight decline. Figure 7 compares the good roads on the NPA system from 2009 and 2010. While ATP-1 had a slight decrease in the number of miles in Good condition, all other ATP's had an increase.

"Poor" RQI Comparison (Figures 5, 8, and 9)

Only ATP-2 met the target of having 2% or less of the PA system in "Poor" condition in 2010.

ATP-2, 3 and 8 met the target of having 3% or less of the NPA system in "Poor" condition.

Only ATP-2 met the "Poor" RQI targets on *both* the PA and NPA system.

Figures 8 and 9 show how the 2010 conditions compare to 2009. Compared to last year, every ATP had a decrease in "Poor" roads (got better) on both the PA and NPA system except for ATP-3, which had a slight increase in the number of miles in "Poor" condition on its PA system. This widespread improvement was the result of increased funding for pavements in 2009 and 2010.

RQI TARGET SUMMARY

Table 3 provides a visual picture of which ATPs met the pavement targets in 2010. It uses the following legend:

- Green = Met the target
- Red = Missed the Target
- Yellow = Missed the target, but was "close"

"Close" means within 1% of target for the "Poor" RQI category and within 5% for "Good."

As was the case last year, only 9 of the 32 (28.1%) RQI targets were met in 2010 and shaded Green. However, 7 of the RQI targets are shaded Yellow in 2010, compared with only 2 in 2009, indicating a statewide improvement and a move toward targets.

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

ATP	Ride Quality Index (RQI) Targets Met in 2010			
	Good RQI (RQI > 3.0)		Poor RQI (RQI <= 2.0)	
	PA (target = 70% or more)	NPA (target = 65% or more)	PA (target = 2% or less)	NPA (target = 3% or less)
1	**62.7%**	**51.5%**	**7.0%**	**8.5%**
2	**86.1%**	**80.1%**	**1.0%**	**1.4%**
3	**70.3%**	**81.9%**	**3.0%**	**1.2%**
4	**81.2%**	**53.3%**	**2.9%**	**6.5%**
6	**67.2%**	**40.9%**	**4.7%**	**18.5%**
7	**66.6%**	**55.4%**	**3.2%**	**6.1%**
8	**65.6%**	**59.7%**	**2.2%**	**2.6%**
M	**69.2%**	**55.6%**	**3.6%**	**8.9%**

AVERAGE REMAINING SERVICE LIFE (ARSL)

As mentioned earlier, 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.

2001 - 2010 Average RSL Trend (Figure 10)

The 2010 ARSL was 10.1 years on the PA system and 7.7 years on the NPA system. These are both higher than last year's averages of 8.4 and 6.7 years, respectively. This improvement is due to increase spending on pavements in 2009 and 2010.

Average RSL Comparison (Figure 11)

By ATP, the ARSL ranges from 8.6 to 12.0 years on the PA system and from 5.7 to 11.3 years on the NPA system. ATP-4 has the highest ARSL on the PA system while ATP-3 has the highest ARSL on the NPA system. ATP-1 has the lowest ARSL on the PA system while ATP-6 has the lowest ARSL on the NPA systems (8.6 and 5.7 years, respectively). Every ATP had an increase in the ARSL on *both* their PA and NPA systems in 2010. ATP-6 had the largest increase on the PA system (+3.5 years) while ATP-8 had the largest increase on the NPA system (+1.8 years).

ACCURACY OF PREDICTED PAVEMENT CONDITIONS

Each year, a prediction of the following year's pavement condition is done using the pavement management system. This is done for several reasons, including reassuring management that the pavement management system is working correctly and that it can be relied on as a tool for predicting future needs, to give managers an idea of the impact different funding scenarios will have on the state's pavement conditions, and to alert the legislature of any worrisome trends that might be on the horizon.

The pavement sections not scheduled for any work in the 2011-2014 STIP use one of two types of deterioration curves to predict future condition. If there is enough historical data since the last rehabilitation was done on a section, a regression curve is fitted through the data. This curve is

then used to predict the expected RQI for the section. If there is not enough 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 curves are based on historical statewide performance.

For the pavement sections that *are* scheduled for work during the 2011-2014 STIP, adjustments are made to the construction year to better predict the expected results. Since the pavement management van can't wait until all of the work is completed each year, 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. The following adjustments are made to the construction year in the STIP to estimate the status of construction projects when the van is in each district:

D-6, 7, and Metro:
The construction year for all pavement projects listed in the STIP is increased by one year. This is done because these three districts are normally tested early in the spring, when almost none of the construction projects slated for the year have begun. It won't be until the van returns the following year that the impact of this work is measured.

D-3 and 4:
No changes are made to the construction year for projects in the STIP since these two districts are normally tested late in the fall, when most of their pavement projects are completed for the year. Thus, the van will likely be driving on the new, improved, surface and the impacts of the pavement work will be reflected.

D-1, 2, and 8:
Half of the projects in these districts have the construction year increased by one year. This is done because at the time the van is filming the pavements, some of their projects will be completed, some will be under construction, and others will not have begun. Since there is no way to predict which ones will be complete when the van is there and which ones will not, the projects are randomly chosen.

The table below compares the predicted 2010 pavement conditions with the actual conditions, using the method described above.

Table 4. Comparison of Predicted 2010 versus Actual 2010 RQI

PA System RQI Category	Actual 2009 Data	Predicted 2010 Data *	Actual 2010 Data	Adjusted 2010 Prediction
Good RQI (RQI > 3.0)	63.7%	64.3%	70.2%	69.6%
Poor RQI (RQI <= 2.0)	5.5%	5.1%	3.7%	3.5%
NPA System RQI Category	**Actual 2009 Data**	**Predicted 2010 Data ***	**Actual 2010 Data**	**Adjusted 2010 Prediction**
Good RQI (RQI > 3.0)	55.3%	53.3%	59.8%	59.7%
Poor RQI (RQI <= 2.0)	8.5%	8.9%	6.8%	6.4%

***Predictions based on the 2011-2014 STIP and ARRA projects, with adjustments to construction year as described above.

As Table 4 shows, the actual 2010 conditions were much better than the predicted 2010 condition (using 2009 data and the 2010 STIP projects). A major factor in the 2010 conditions being better than predicted was maintenance patching. Maintenance did a considerable

amount of patching on roads that either kept them from falling into “Poor” (122 miles), as predicted, or improved them enough that they went into the “Fair” category (111 miles), further reducing the number of miles in the “Poor” category. In addition, there were a number of roads that in 2009 were just barely in the “Good” category that were predicted to fall into the “Fair” category in 2010 (436 miles). Many of these roads simply did not deteriorate enough to fall out of “Good” as predicted. Accounting for both of these factors yields predicted 2010 conditions very close to the actual conditions (see last column in Table 4).

GOVERNMENT ACCOUNTING STANDARDS BOARD, STATEMENT 34 (GASB 34)

The 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, the Governmental Accounting Standards Board (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 an undisclosed liability looming in the future.

In terms of determining the cost of using the assets, GASB 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.

Mn/DOT has chosen to use the modified/preservation approach since it can meet all the requirements listed above. For the purposes of GASB 34, Mn/DOT 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 2011-2014 STIP, compare with the established GASB 34 levels.

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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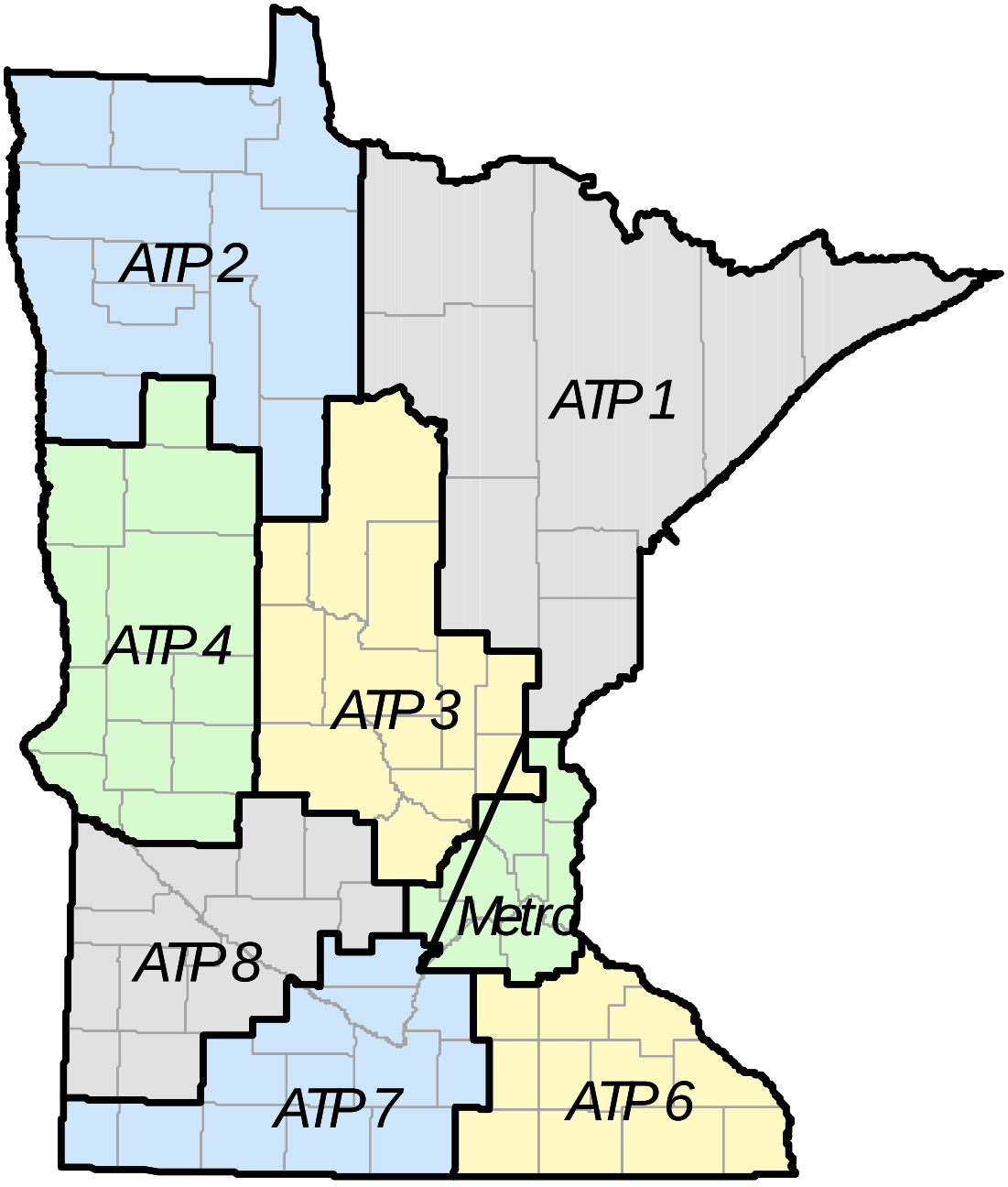
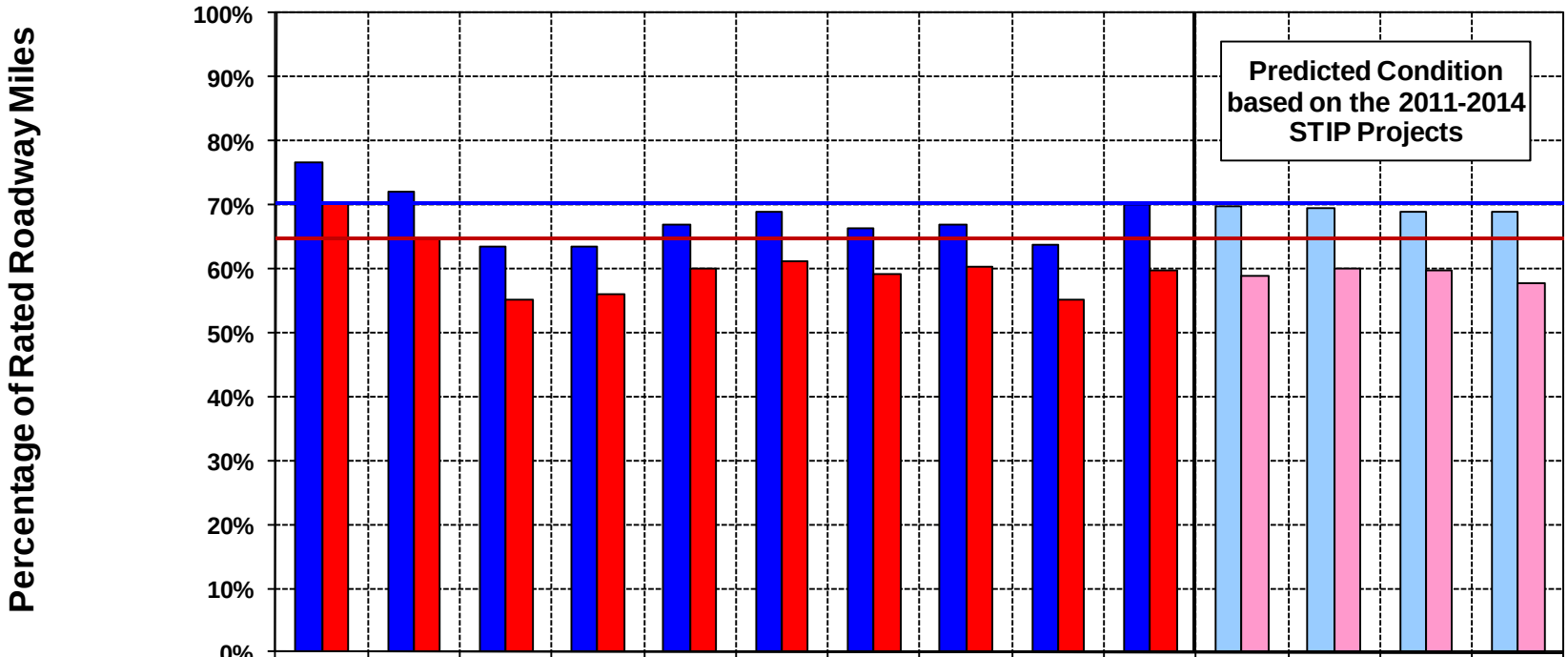


Figure 1. Mn/DOT's Area Transportation Partnership (ATP) Boundaries

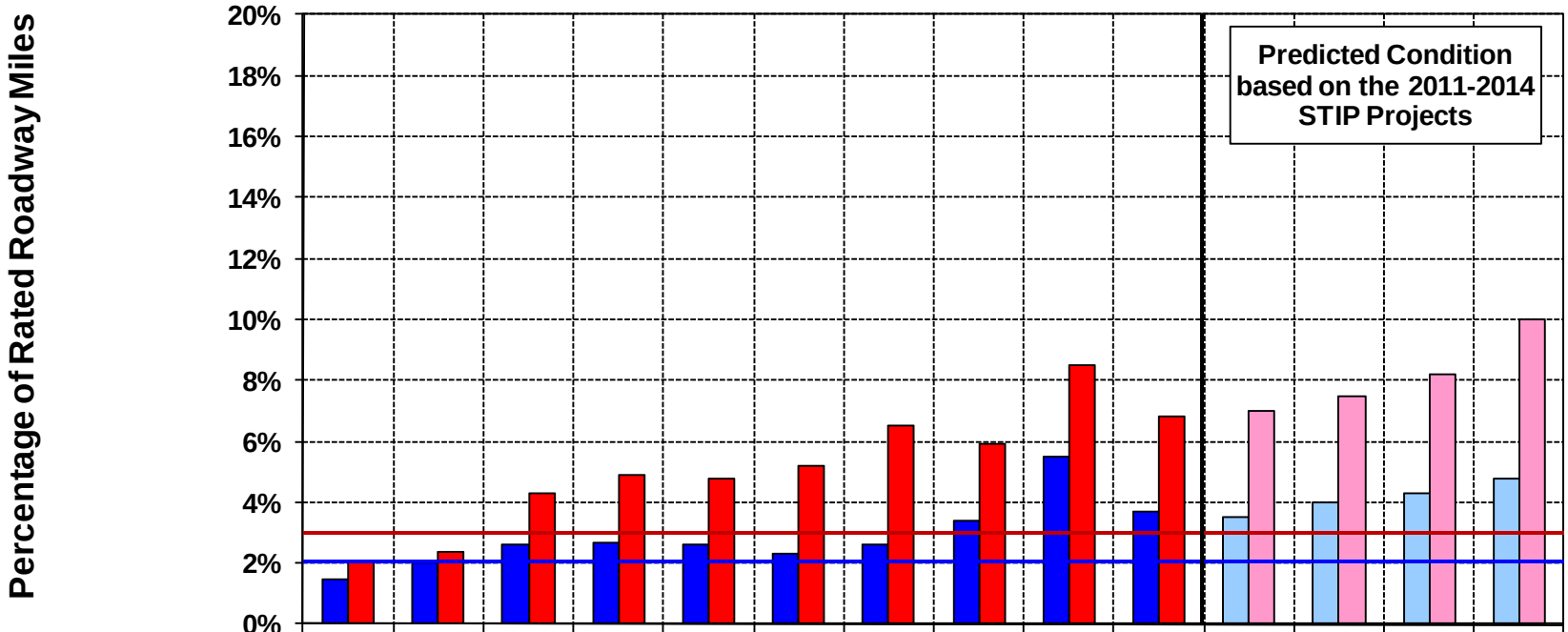
Figure 2
Statewide "Good" Ride Quality Index
(miles with an RQI greater than 3.0)
Actual 2001 - 2010, Predicted 2011 - 2014



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Principal Art.	76.7%	72.0%	63.6%	63.4%	66.8%	68.9%	66.3%	67.0%	63.7%	70.2%	69.8%	69.5%	68.8%	68.9%
Non-Principal Art.	70.3%	64.8%	55.3%	55.9%	60.1%	61.1%	59.1%	60.2%	55.3%	59.8%	59.0%	60.1%	59.7%	57.8%

Principal Arterial Target = 70 percent or more
Non-Principal Arterial Target = 65 percent or more

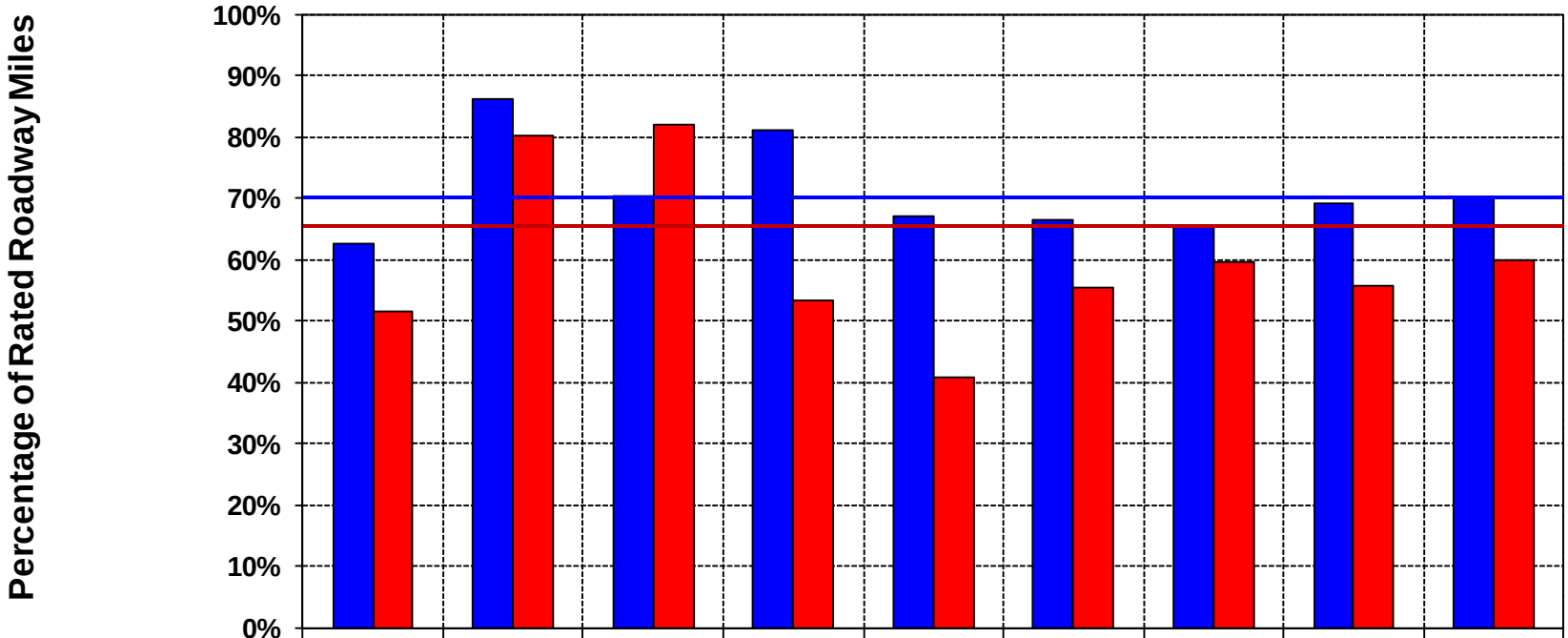
Figure 3
Statewide "Poor" Ride Quality Index
(miles with an RQI of 2.0 or less)
Actual 2001 - 2010, Predicted 2011 - 2014



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Principal Art.	1.5%	2.0%	2.6%	2.7%	2.6%	2.3%	2.6%	3.4%	5.5%	3.7%	3.5%	4.0%	4.3%	4.8%
Non-Principal Art.	2.1%	2.4%	4.3%	4.9%	4.8%	5.2%	6.5%	5.9%	8.5%	6.8%	7.0%	7.5%	8.2%	10.0%

Principal Arterial Target = 2 percent or less
Non-Principal Arterial Target = 3 percent or less

Figure 4
"Good" Ride Quality Index
(miles with an RQI greater than 3.0)
Comparison of 2010 Data by ATP

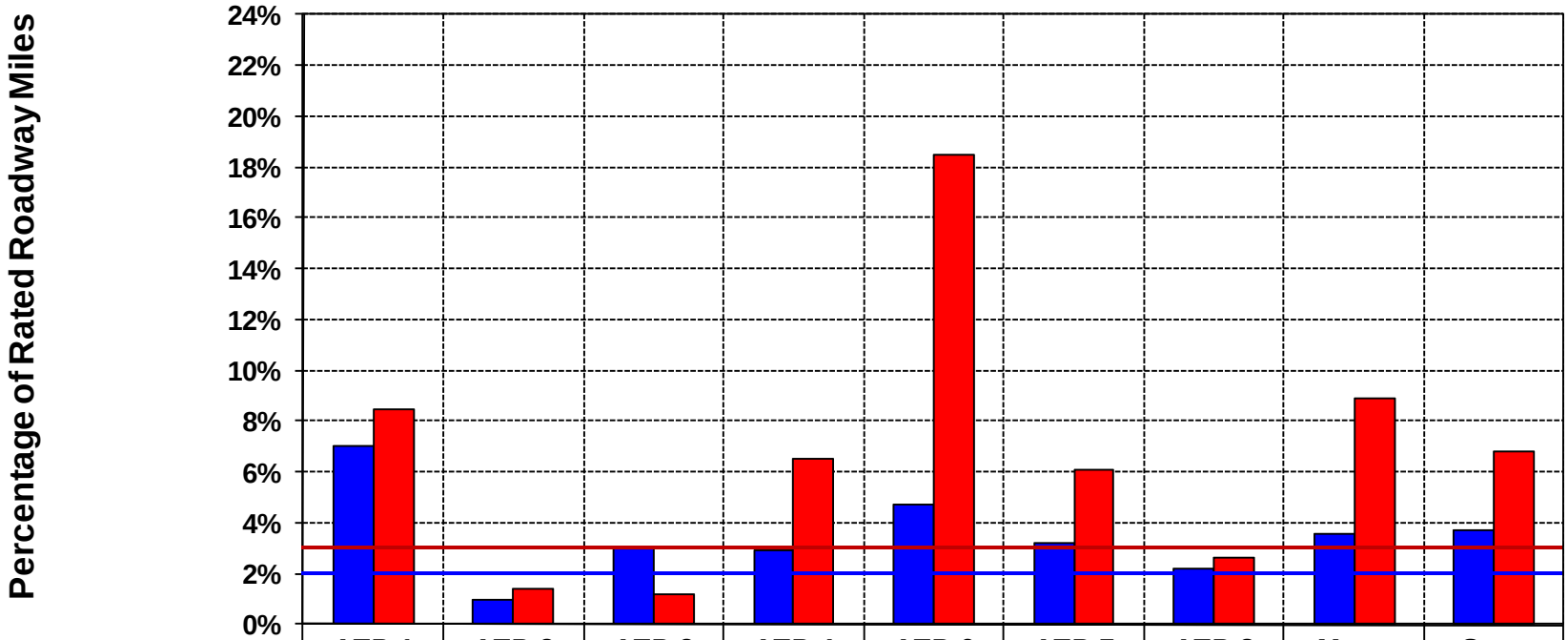


	ATP-1	ATP-2	ATP-3	ATP-4	ATP-6	ATP-7	ATP-8	Metro	State
Principal Art.	62.7% ▲	86.1% ▲	70.3% ▼	81.2% ▲	67.2% ▲	66.6% ▲	65.6% ▲	69.2% ▲	70.2% ▲
Non-Principal Art.	51.5% ▼	80.1% ▲	81.9% ▲	53.3% ▲	40.9% ▲	55.4% ▲	59.7% ▲	55.6% ▲	59.8% ▲

▲ = Better than 2009 ▼ = Worse than 2009

Principal Arterial Target = 70 percent of more
Non-Principal Arterial Target = 65 percent or more

Figure 5
"Poor" Ride Quality Index
(miles with an RQI of 2.0 or less)
Comparison of 2010 Data by ATP

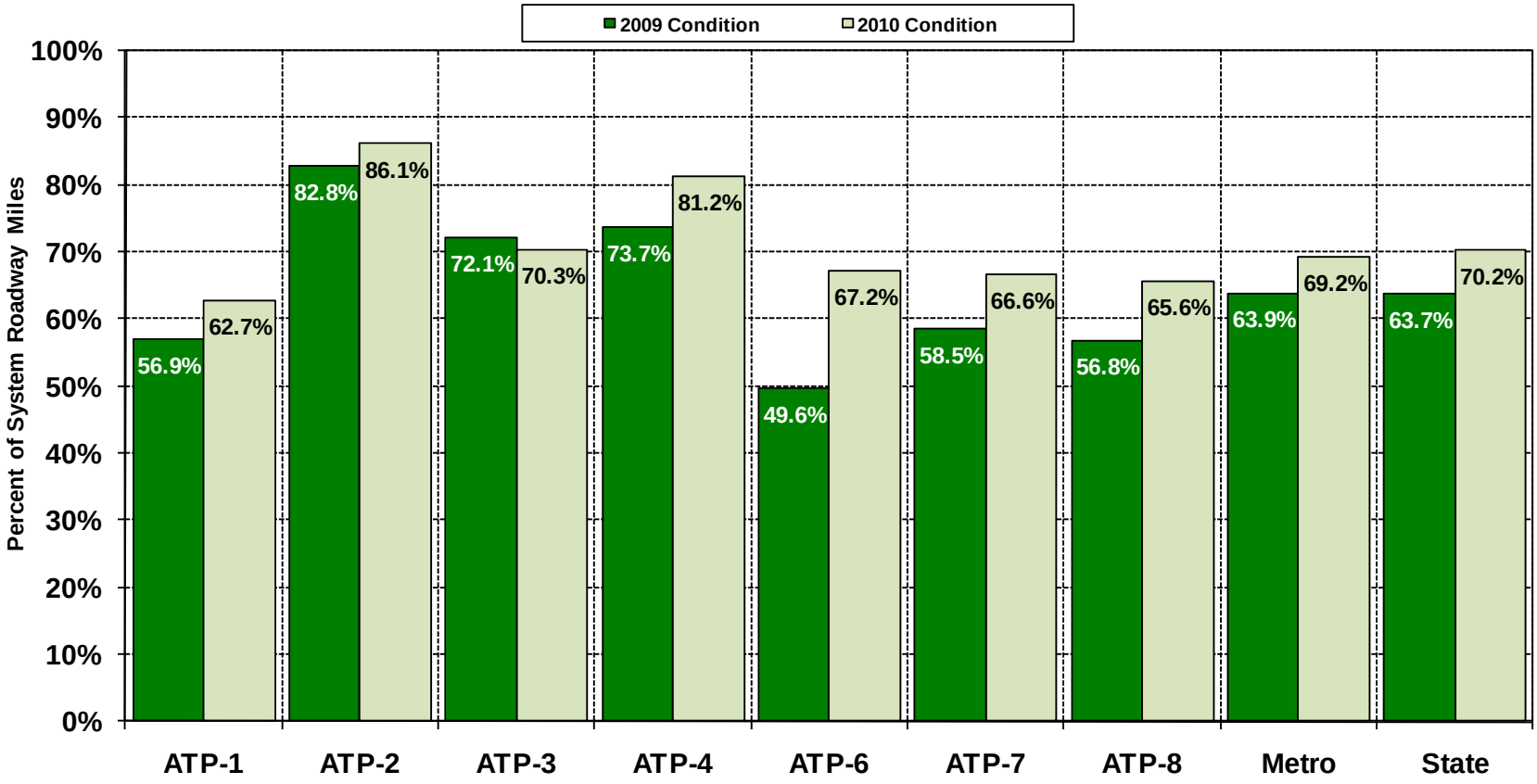


	ATP-1	ATP-2	ATP-3	ATP-4	ATP-6	ATP-7	ATP-8	Metro	State
Principal Art.	7.0% ▲	1.0% ▲	3.0% ▼	2.9% ▲	4.7% ▲	3.2% ▲	2.2% ▲	3.6% ▲	3.7% ▲
Non-Principal Art.	8.5% ▲	1.4% ▲	1.2% ▲	6.5% ▲	18.5% ▲	6.1% ▲	2.6% ▲	8.9% ▲	6.8% ▲

▲ = Better than 2009 ▼ = Worse than 2009

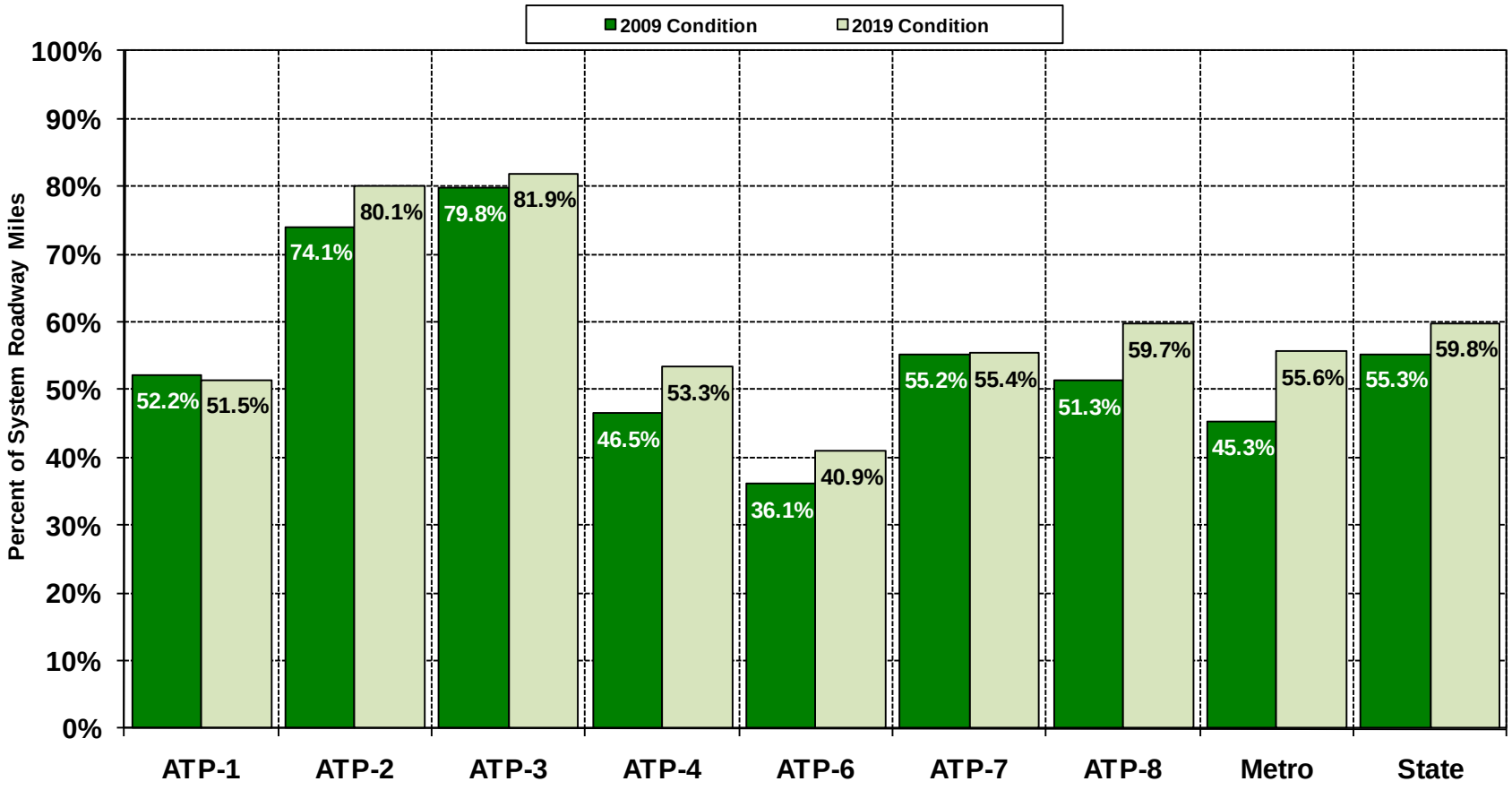
Principal Arterial Target = 2 percent or less
Non-Principal Arterial Target = 3 percent or less

Figure 6
Comparison of "Good" Ride Quality Index
(miles with an RQI greater than 3.0)
Principal Arterial System, 2009 -vs- 2010 Condition



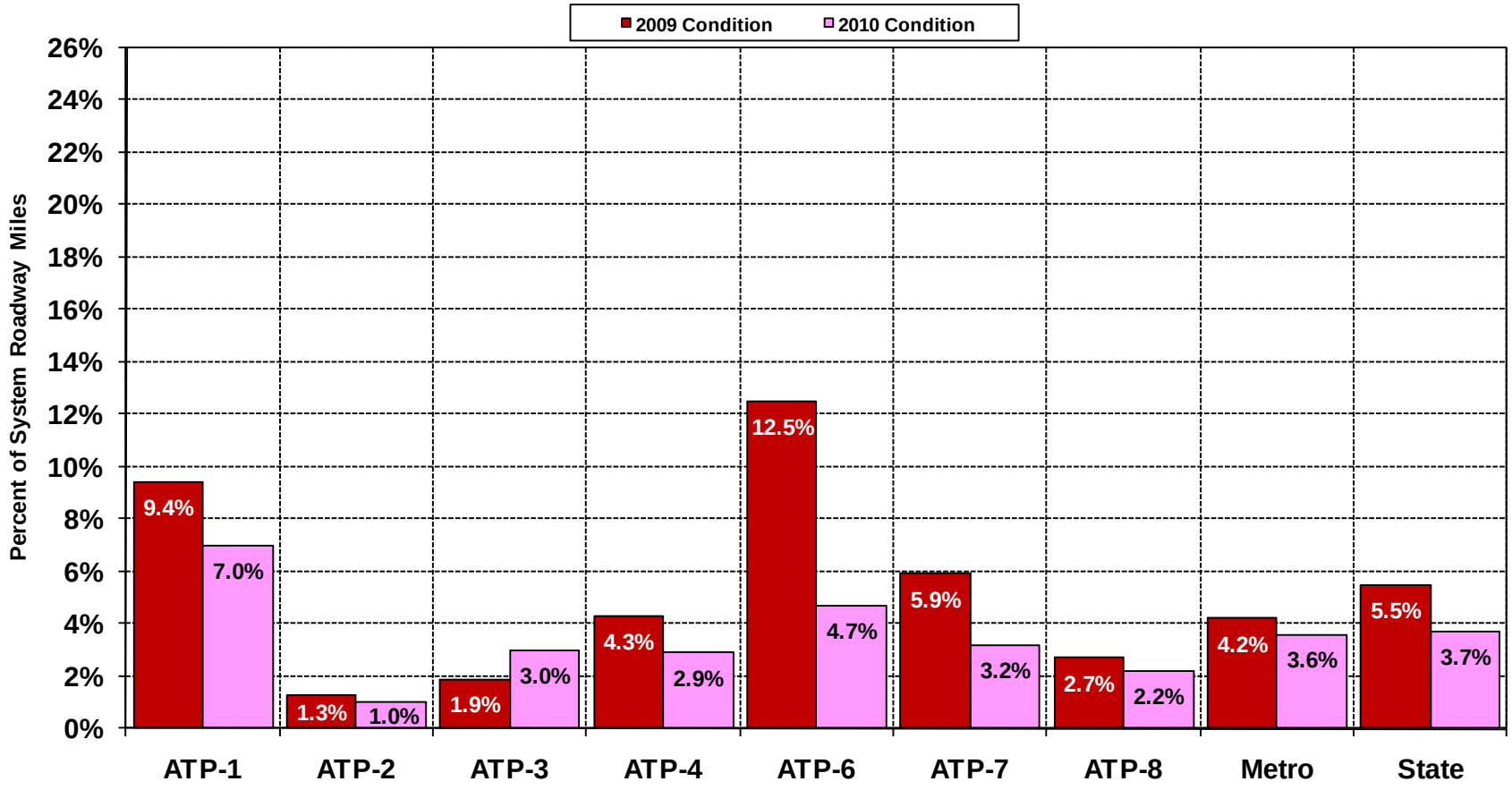
Principal Arterial Target = 70 percent or more

Figure 7
Comparison of "Good" Ride Quality Index
(miles with an RQI greater than 3.0)
Non-Principal Arterial System, 2009 -vs- 2010 Condition



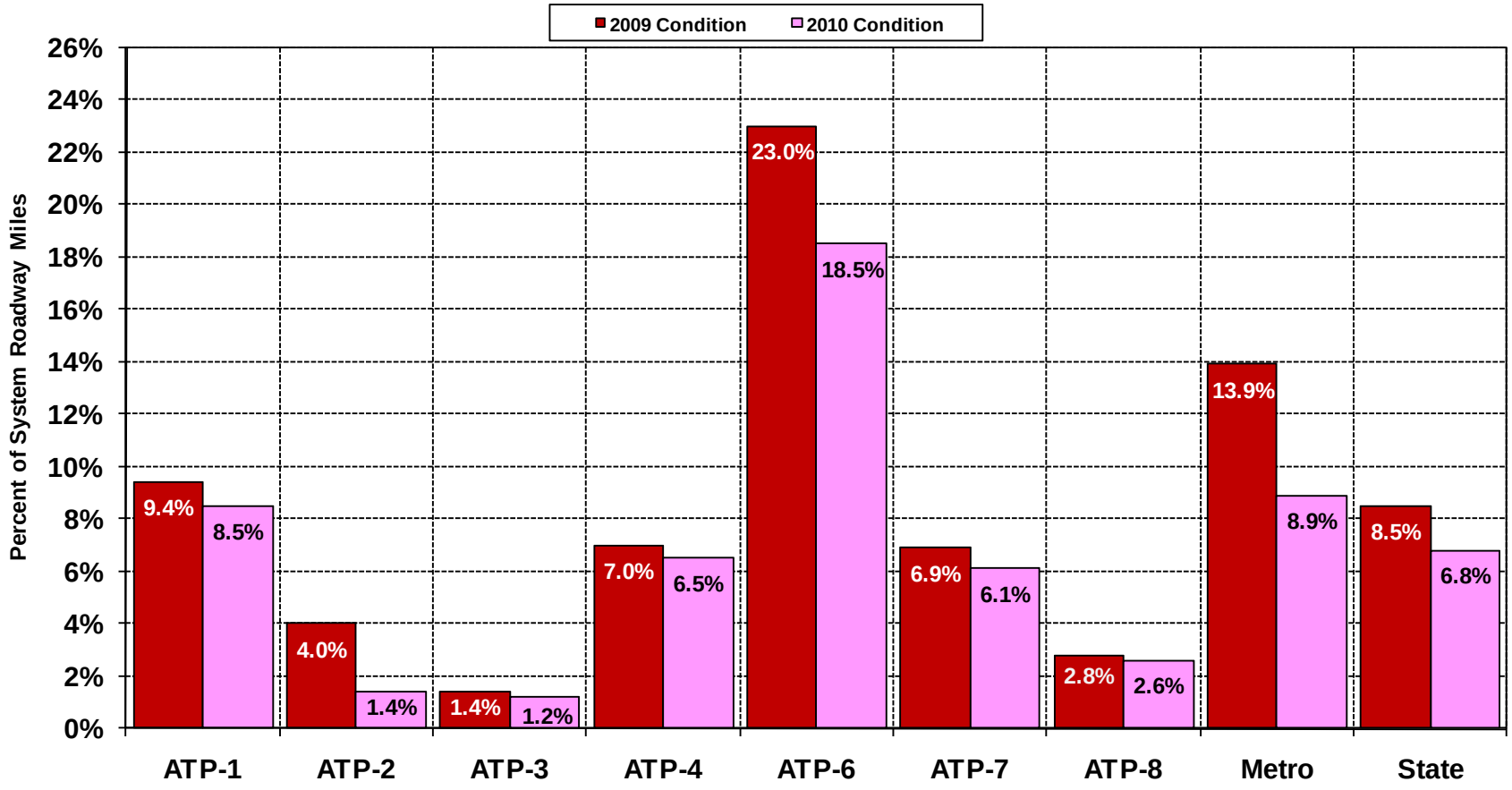
Non-Principal Arterial Target = 65 percent or more

Figure 8
Comparison of "Poor" Ride Quality Index
(miles with an RQI greater of 2.0 or less)
Principal Arterial System, 2009 -vs- 2010 Condition



Principal Arterial Target = 2 percent or less

Figure 9
Comparison of "Poor" Ride Quality Index
(miles with an RQI greater of 2.0 or less)
Non-Principal Arterial System, 2009 -vs- 2010 Condition



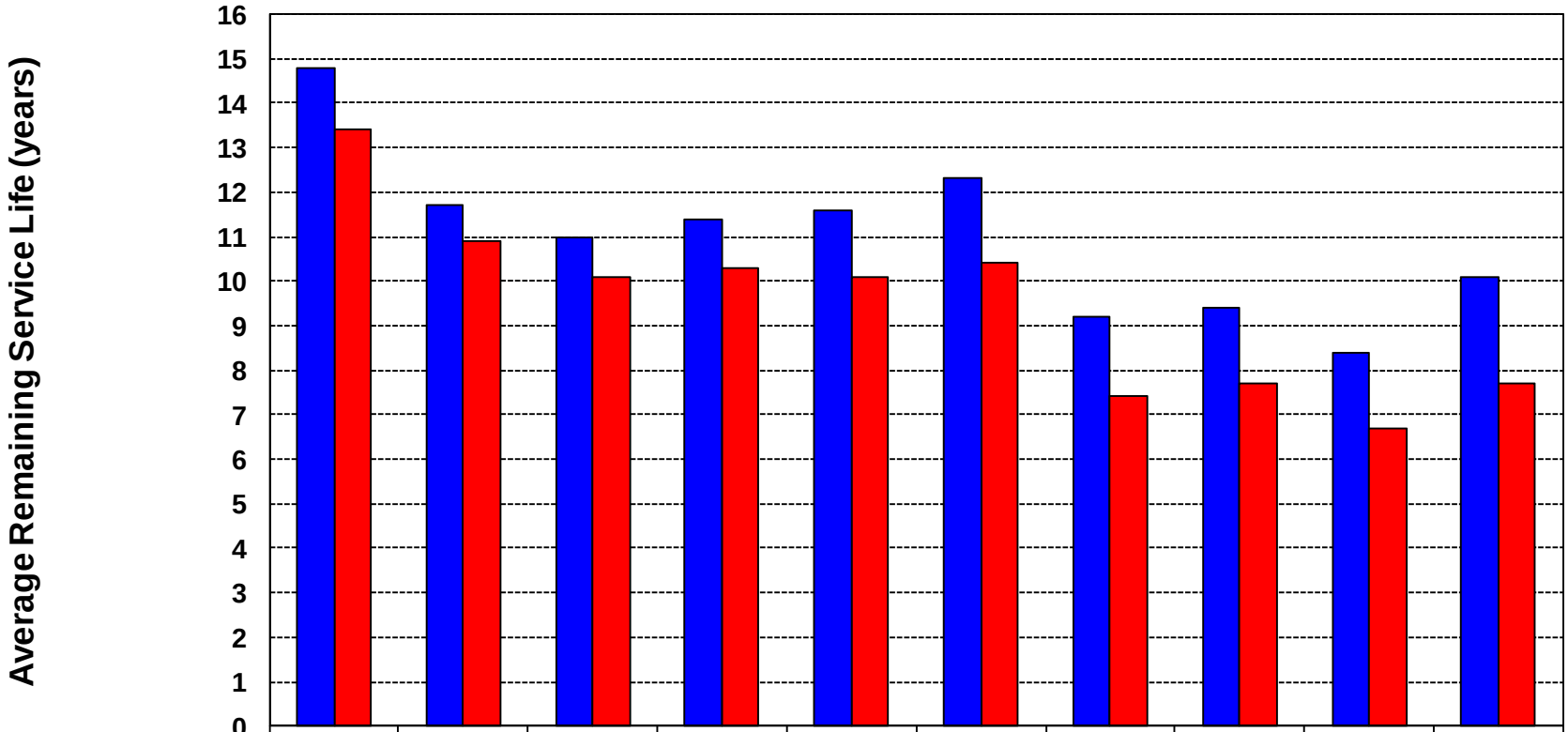
Non-Principal Arterial Target = 3 percent or less

Figure 10

Statewide Average Remaining Service Life (ARSL)

(years until RQI reaches 2.5)

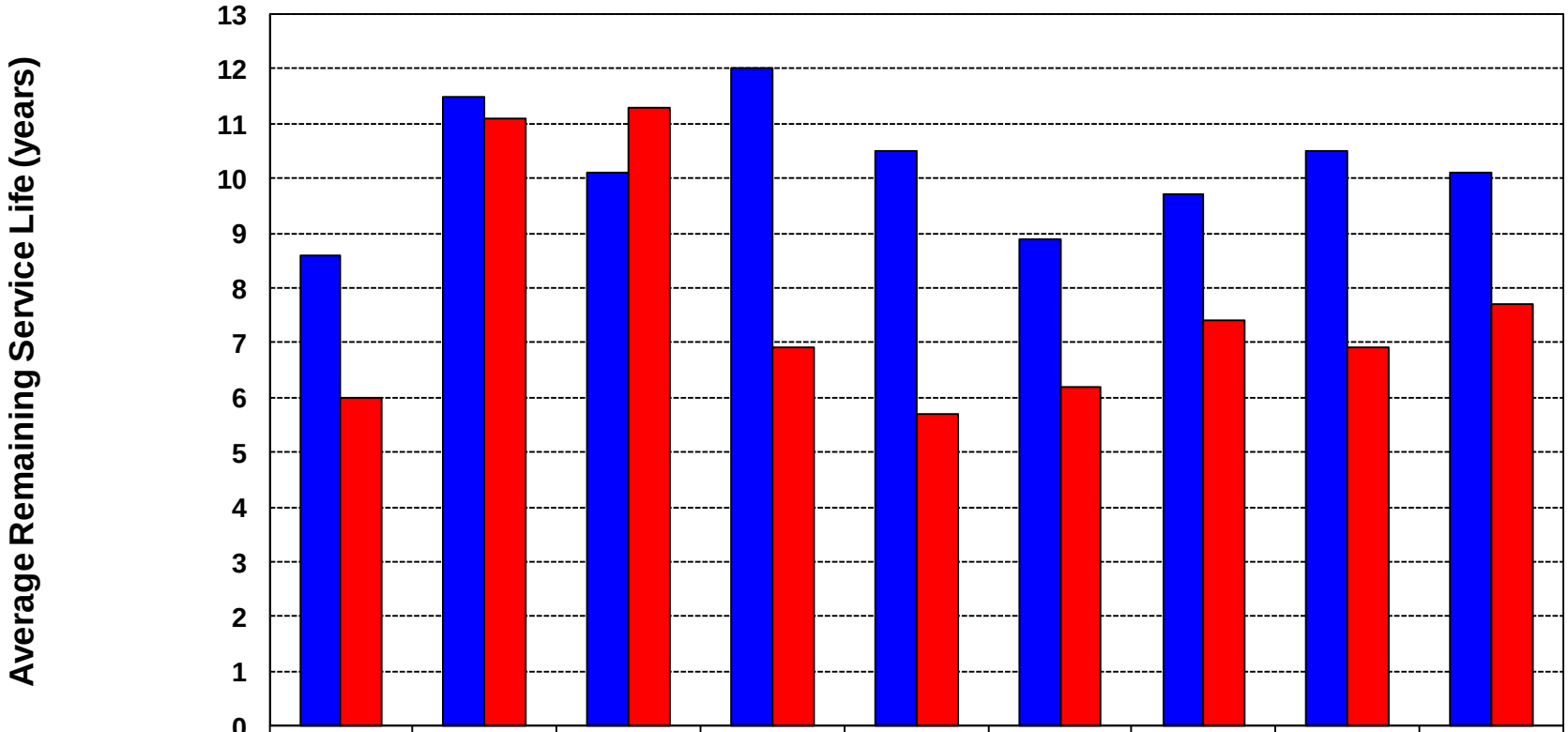
Statewide Average Remaining Service Life



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Principal Art.	14.8	11.7	11.0	11.4	11.6	12.3	9.2	9.4	8.4	10.1
Non-Principal Art.	13.4	10.9	10.1	10.3	10.1	10.4	7.4	7.7	6.7	7.7

No official targets have been established for ARSL

Figure 11
Average Remaining Service Life (ARSL)
(years until RQI reaches 2.5)
Comparison of 2010 Data, by ATP

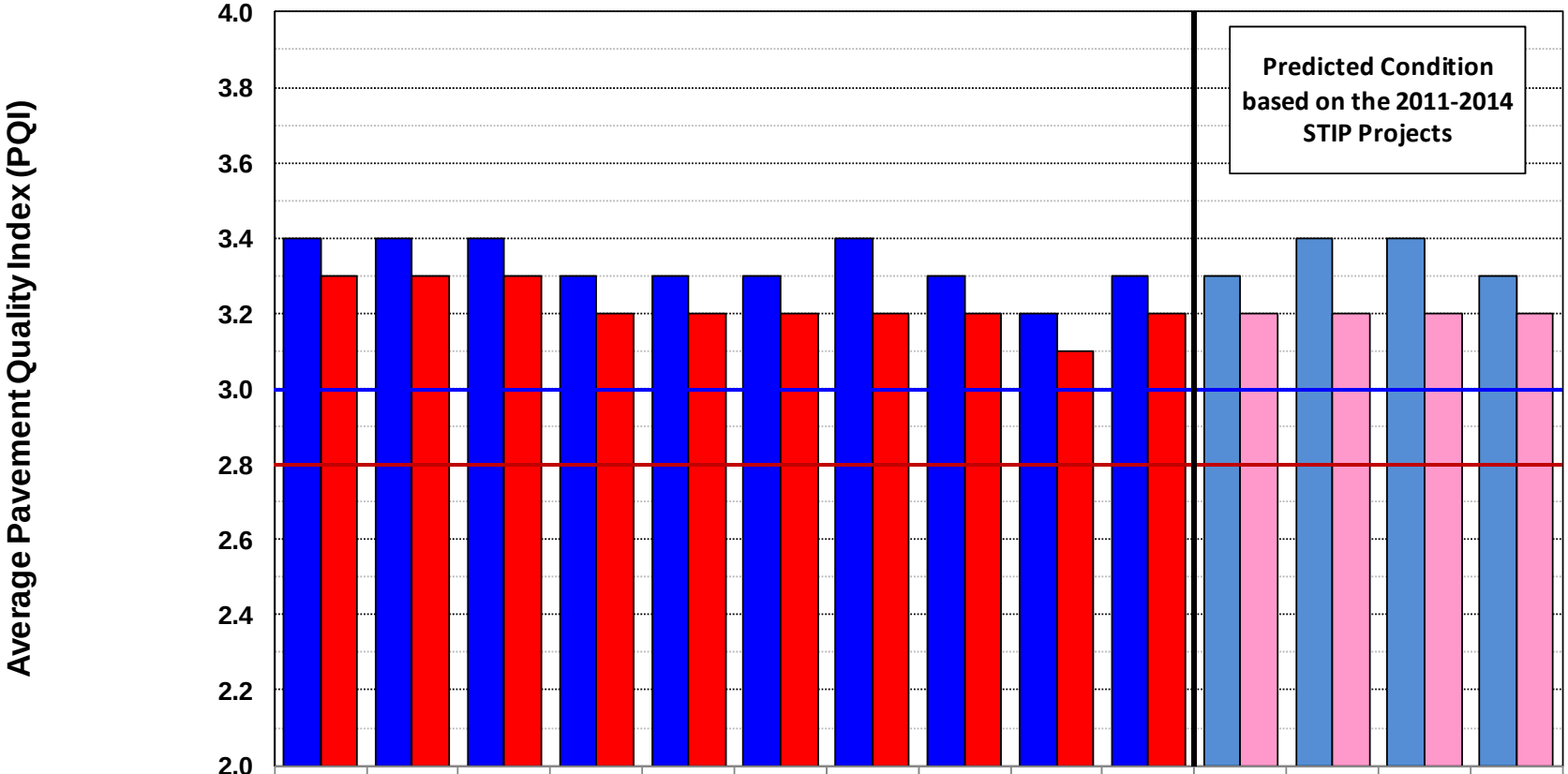


	ATP-1	ATP-2	ATP-3	ATP-4	ATP-6	ATP-7	ATP-8	Metro	State
Principal Art.	8.6	11.5	10.1	12.0	10.5	8.9	9.7	10.5	10.1
Non-Principal Art.	6.0	11.1	11.3	6.9	5.7	6.2	7.4	6.9	7.7

No official targets have been established for ARSL

Figure 12
Statewide Average Pavement Quality Index (PQI) for GASB 34 Reporting

(PQI = Combined Index of pavement smoothness and cracking



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Principal Art.	3.4	3.4	3.4	3.3	3.3	3.3	3.4	3.3	3.2	3.3	3.3	3.4	3.4	3.3
Non-Principal Art.	3.3	3.3	3.3	3.2	3.2	3.2	3.2	3.2	3.1	3.2	3.2	3.2	3.2	3.2

Principal Arterial Threshold: Average PQI >= 3.0
Non-Principal Arterial Threshold: Average PQI >= 2.8


MINNESOTA DEPARTMENT OF TRANSPORTATION