



2005 Pavement Condition Executive Summary



Report #: MnDOT/OM-PM--2006-01

January 2006
Office of Materials
Pavement Management Unit

EXECUTIVE SUMMARY

Table of Contents

INTRODUCTION	1
BACKGROUND	1
DATA COLLECTION	1
Mn/DOT PAVEMENT CONDITION INDICES and MEASURES	2
<i>RQI: Ride Quality Index</i>	2
<i>RSL: Remaining Service Life</i>	2
PERFORMANCE CATEGORIES	3
PERFORMANCE TARGETS	3
STATEWIDE HISTORICAL RQI and RSL TRENDS	3
1996 - 2005 “Good” RQI Trend	3
1996 - 2005 “Poor” RQI Trend	4
1996 - 2005 “High” RSL Trend	4
1996 - 2005 “Low” RSL Trend.....	4
ATP COMPARISON	4
“Good” RQI Comparison	4
“Poor” RQI Comparison.....	4
“High” RSL Comparison	4
“Low” RSL Comparison	5
ADDITIONAL INFORMATION	5

List of Tables

Table 1. RQI Performance Categories	3
Table 2. Pavement Performance Targets by Functional Group	3

List of Figures

Figure 1. Mn/DOT's Area Transportation Partnership (ATP) Boundaries	6
Figure 2. Statewide "Good" Ride Quality Index, 1996-2005	7
Figure 3. Statewide "Poor" Ride Quality Index, 1996-2005	8
Figure 4. Statewide "High" Remaining Service Life, 1996-2005	9
Figure 5. Statewide "Low" Remaining Service Life, 1996-2005	10
Figure 6. "Good" Ride Quality Index, Comparison of 2005 Data by ATP	10
Figure 7. "Poor" Ride Quality Index, Comparison of 2005 Data by ATP	12
Figure 8. "High" Remaining Service Life, Comparison of 2005 Data by ATP	13
Figure 9. "Low" Remaining Service Life, Comparison of 2005 Data by ATP	14

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.

BACKGROUND

Mn/DOT's highway system consists of approximately 11,900 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 data on the entire system and surface distress data on approximately 60 percent of the system.

DATA COLLECTION

The pavement roughness and surface distress data (cracks, ruts, faults, etc.) are collected using a sophisticated video 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, roughness, rutting and faulting. In 2005, a brand new van was put into service. This new van uses an improved rut measurement system. Since the new van was not ready to be used at the beginning of the testing season, five of the eight districts (1, 2, 3, 4 & 8) were tested with the new van while three districts (6, 7 & Metro) were tested with the old van. Some of the increase in RQI measured in 2005 may be due to small differences between the old and new van.



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. Each year, the Pavement Management Unit prepares an annual report summarizing the pavement condition of the trunk highway system. Copies of the annual report are available from the Office of Materials and Road Research, Pavement Management Unit website: <http://www.mrr.dot.state.mn.us/pavement/PvmtMgmt/pavemgmt.asp>.

In this report, comparisons are made between the eight Area Transportation Partnerships, or ATPs. Figure 1 shows the boundaries of the ATPs, which follow county boundaries and may be different from construction district and maintenance area boundaries.

Mn/DOT PAVEMENT CONDITION INDICES and MEASURES

Mn/DOT's pavement condition data is reduced to two indices for reporting the statewide pavement performance measures, Ride Quality Index (RQI) 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. This does not mean the road is un-drivable at this level but rather that it has deteriorated to a point where most people feel it is uncomfortable and a major rehabilitation is needed.

RSL: Remaining Service Life

The RSL estimates the number of years until the RQI will reach a value of 2.5, generally considered to be the end of the 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 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 section. Short-term fixes, which may increase the pavement smoothness, do not result in many additional years of RSL.

PERFORMANCE CATEGORIES

Mn/DOT currently categorizes pavement condition, as measured by the RQI into five equal categories as shown in Table 1.

Table 1. RQI Performance Categories

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

PERFORMANCE TARGETS

All pavements are assigned to one of two traffic functional groups, Principal Arterial (PA) and Non-Principal Arterial (NPA) for the purposes of reporting statewide pavement performance measures. The Interstate system is considered to be part of the PA system for the purposes of this report. The current trunk highway system is comprised of 52 percent PA and 48 percent NPA.

Performance targets have been established for both functional class groups as shown in Table 2. The RQI targets are based on the percent of miles in the Good & Very Good and the Poor & Very Poor categories as described in Table 1.

Table 2. Pavement Performance Targets by Functional Group

Performance Index	Principal Arterial	Non-Principal Arterial
RQI \geq 3.1	70 percent or more	65 percent or more
RQI \leq 2.0	2 percent or less	3 percent or less
RSL \geq 12 yrs	50 percent or more	40 percent or more
RSL \leq 3 yrs	15 percent or less	25 percent or less

STATEWIDE HISTORICAL RQI and RSL TRENDS (Figures 2 – 5)

Overall, the smoothness of the trunk highway system, as measured by the RQI, improved in 2005 (although it did not meet any of the statewide RQI targets). This is the first time since 2000 that there has been a noticeable improvement in the statewide RQI. The number of miles with “High” RSL decreased while the miles with “Low” RSL increased. An increase in RQI accompanied by a decrease in RSL indicates that we are not doing enough long-term fixes.

1996 - 2005 “Good” RQI Trend (Figure 2)

Although there was improvement on both the PA and NPA systems, neither RQI target was met on a statewide basis in 2005. This is the third year in a row this has occurred. On a positive note, this is the first time since 2000 that there was noticeable

improvement in the amount of miles in the “Good” RQI category.

1996 - 2005 “Poor” RQI Trend (Figure 3)

Neither “Poor” RQI target was met on a statewide basis in 2005 although there was a slight reduction in the percent of both systems in the “Poor” category in 2005. The percent of the PA system in “Poor” category has not changed much since 2003.

1996 - 2005 “High” RSL Trend (Figure 4)

Neither of the “High” Remaining Service Life targets was met in 2005. After a slight improvement in 2004, the percent of both the PA and NPA system with a RSL of 12 years or more decreased in 2005 and are now almost exactly what they were in 2003.

1996 - 2005 “Low” RSL Trend (Figure 5)

Neither of the “Low” RSL targets was met in 2005. Although the 2005 “Low” RSL values are almost the same as the 2004 values they did increase slightly on both systems. The percent of the PA system with a RSL of 3 years or less is now at 22.8 while the percent of the NPA system with a RSL of 3 years or less is now 30.5%, the highest levels measured to-date.

ATP COMPARISON

The next section will discuss how each of the eight ATPs compare with each other based on the data from the 2005 condition survey.

“Good” RQI Comparison (Figure 6)

ATP-2, 3, 4 and 8 met the target of having at least 70% of the PA system in the Good/Very Good category. Last year, only ATP-4 and 8 met this target.

ATP-2, 3, 4 and 8 also met the target of having 65% or more of the NPA system in the Good/Very Good RQI category. Last year, only ATP-8 met this target.

Four of the eight ATPs met the “Good” RQI target on both the PA and NPA system. Last year, only ATP-8 met both of these targets.

“Poor” RQI Comparison (Figure 7)

ATP-2, 3, 4, and 8 met the target of having no more than 2% of the PA system in the Poor/Very Poor category. These same four ATPs also met this target last year.

ATP-2, 3, 4 and 8 also met the target of having 3% or less of the NPA system in the Poor/Very Poor category. Last year, only ATP-4 and 8 met this target.

ATP-6 and Metro now have 13.3% and 13.8%, respectively, of their NPA system in the Poor/Very Poor category, over 4 times the target (3% or less).

“High” RSL Comparison (Figure 8)

Only ATP-2 and 8 met the target of having 50% or more of the PA system with an RSL of 12 years or more. This was also the case last year.

Only ATP-1 and 8 met the target of having 40% more of the NPA system with an RSL of 12 years or more. Last year, ATP-1, 3, 7 and ATP-8 met this target.

“Low” RSL Comparison (Figure 8)

ATP-2 and 4 met the target of having 15% or less of the PA system with an RSL of 3 years or less.

ATP-4 and 8 met the target of having 25% or less of the NPA system with an RSL of 3 years or less. Last year, only ATP-8 met this target.

Only ATP-4 met the “Low” RSL targets on both the Pa and NPA systems in 2005.

ADDITIONAL INFORMATION

For additional information about the condition and performance of the state highway system or to obtain a copy of the formal annual report, contact:

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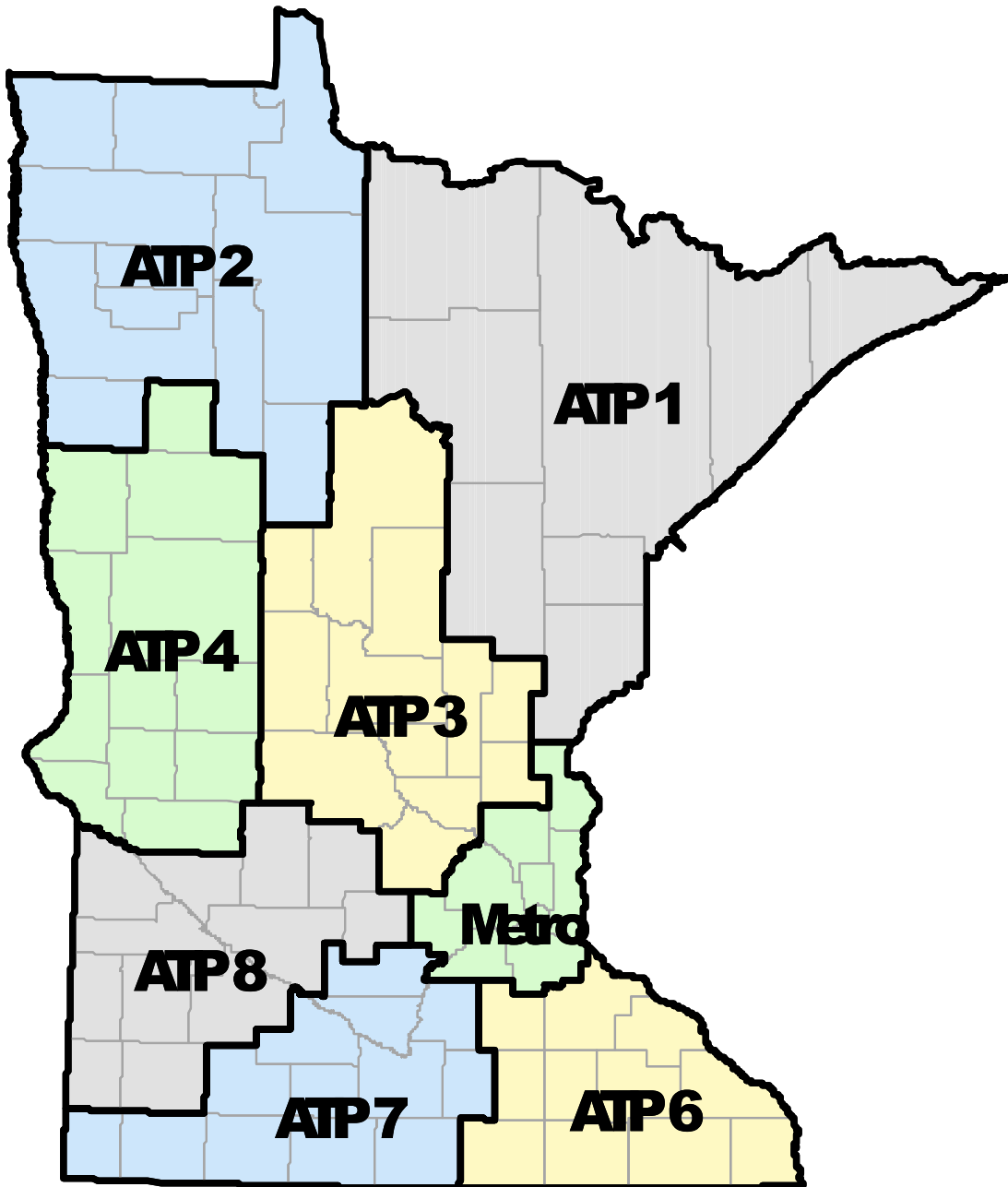


Figure 1. Mn/DOT's Area Transportation Partnership (ATP) Boundaries.

Figure 2
Statewide “Good” Ride Quality Index
(RQI above 3.0)
1996 - 2005

Principal Arterial Target = 70 percent or more in “Good/Very Good” category
 Non-Principal Arterial Target = 65 percent or more in “Good/Very Good” category

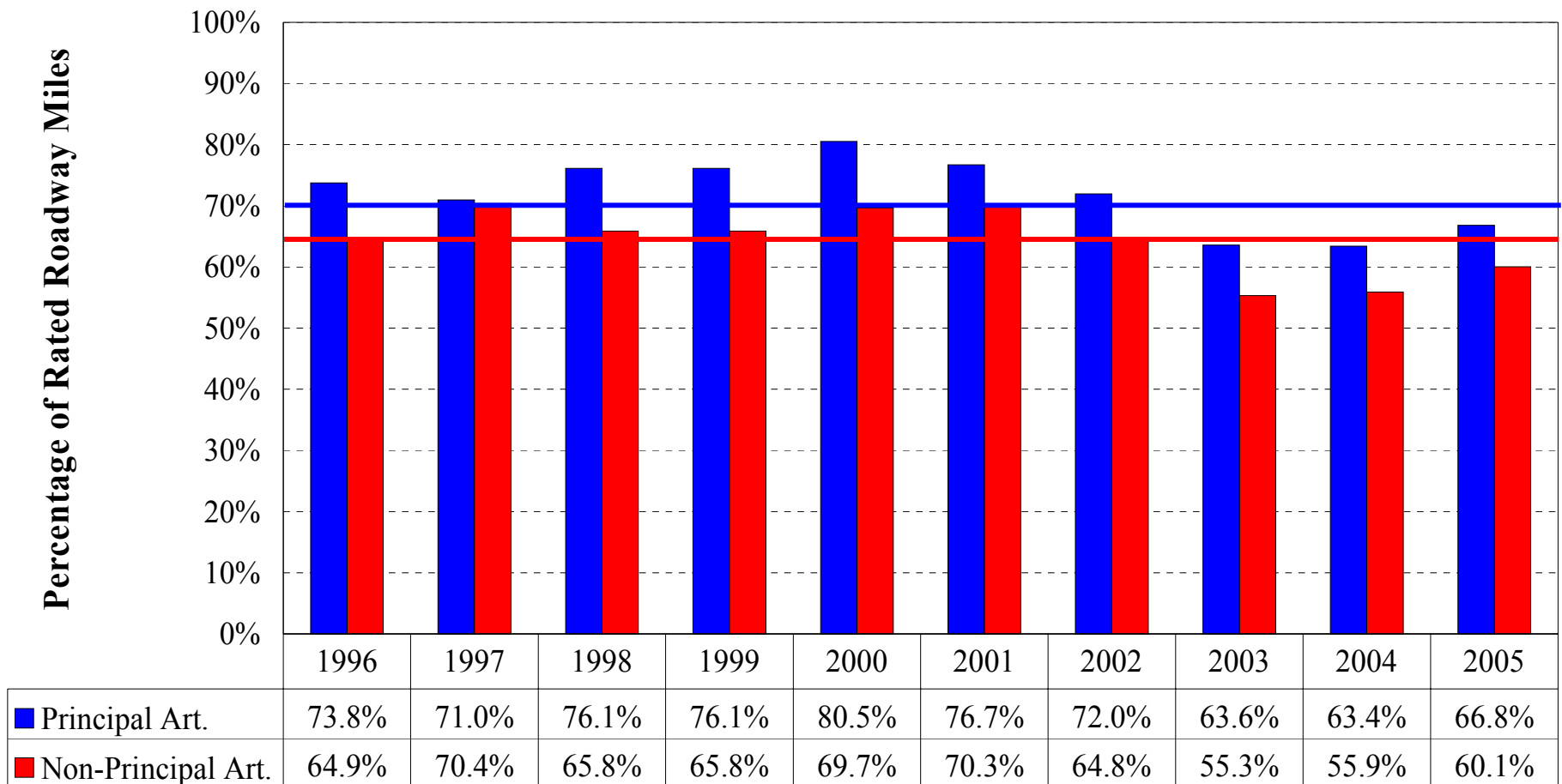


Figure 3
Statewide “Poor” Ride Quality Index
(RQI of 2.0 or less)
1996 - 2005

Principal Arterial Target = 2 percent or less in “Poor/Very Poor” category
 Non-Principal Arterial Target = 3 percent or less in “Poor/Very Poor” category

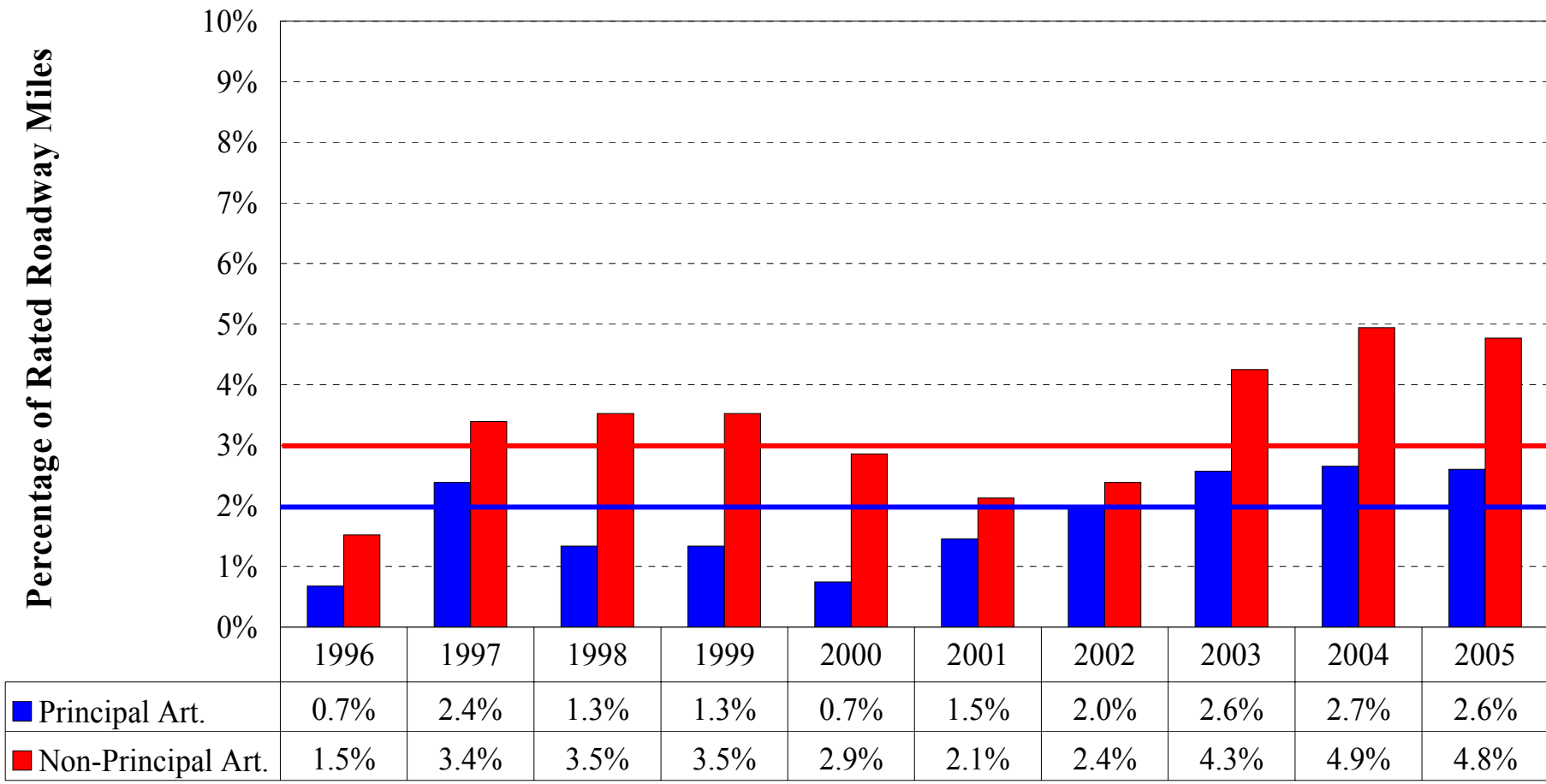


Figure 4
Statewide “High” Remaining Service Life
(RSL of 12 years or more)
1996 - 2005

Principal Arterial Target = 50 percent or more with “High” Remaining Service Life
 Non-Principal Arterial Target = 40 percent or more with “High” Remaining Service Life

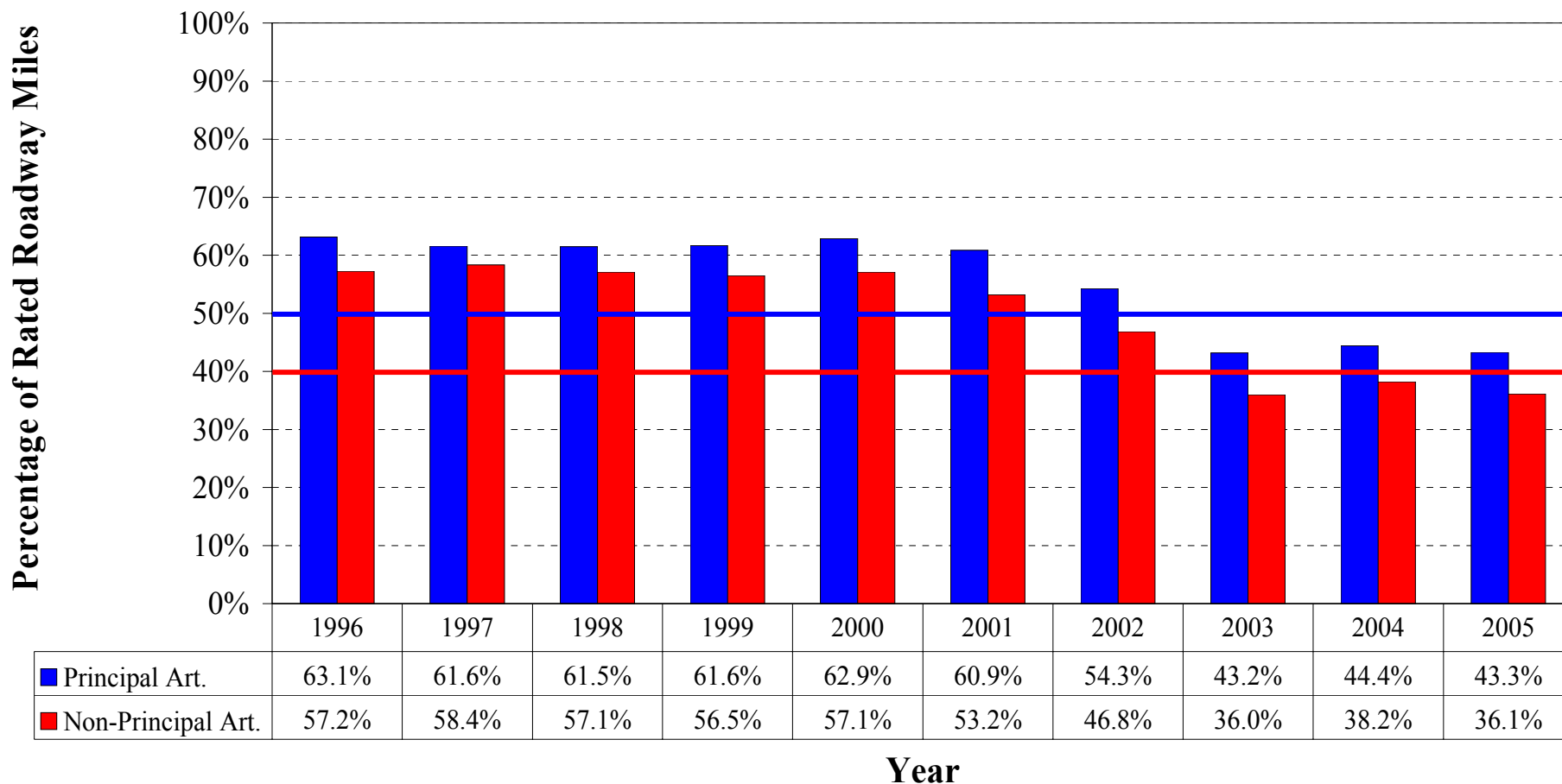


Figure 5
Statewide “Low” Remaining Service Life
(RSL of 3 years or less)
1996 - 2005

Principal Arterial Target = 10 percent or less with “Low” Remaining Service Life
 Non-Principal Arterial Target = 25 percent or less with “Low” Remaining Service Life

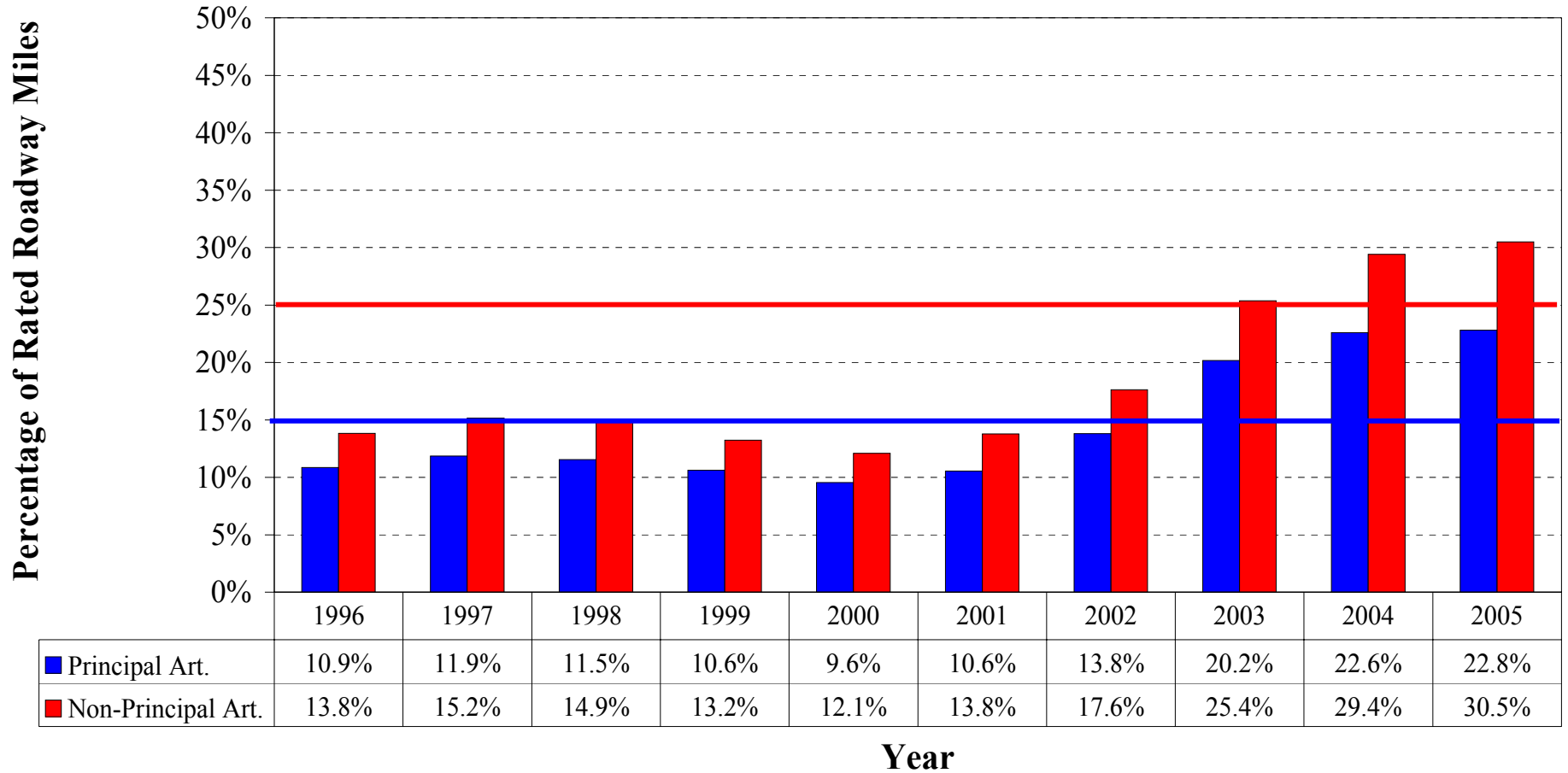


Figure 6
“Good” Ride Quality Index
(RQI above 3.0)
Comparison of 2005 Data by ATP

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

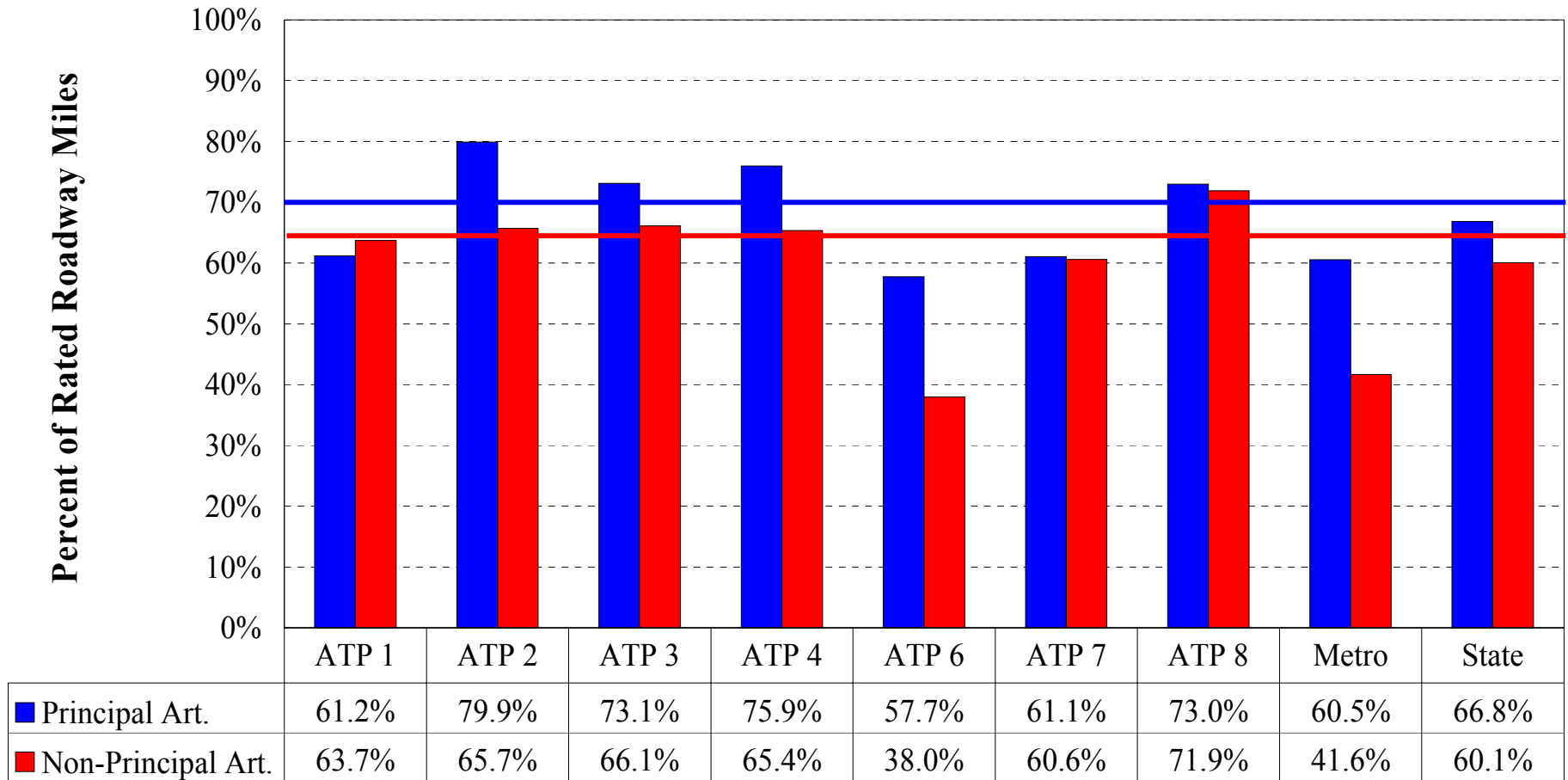


Figure 7
“Poor” Ride Quality Index
(RQI of 2.0 or less)
Comparison of 2005 Data by ATP

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

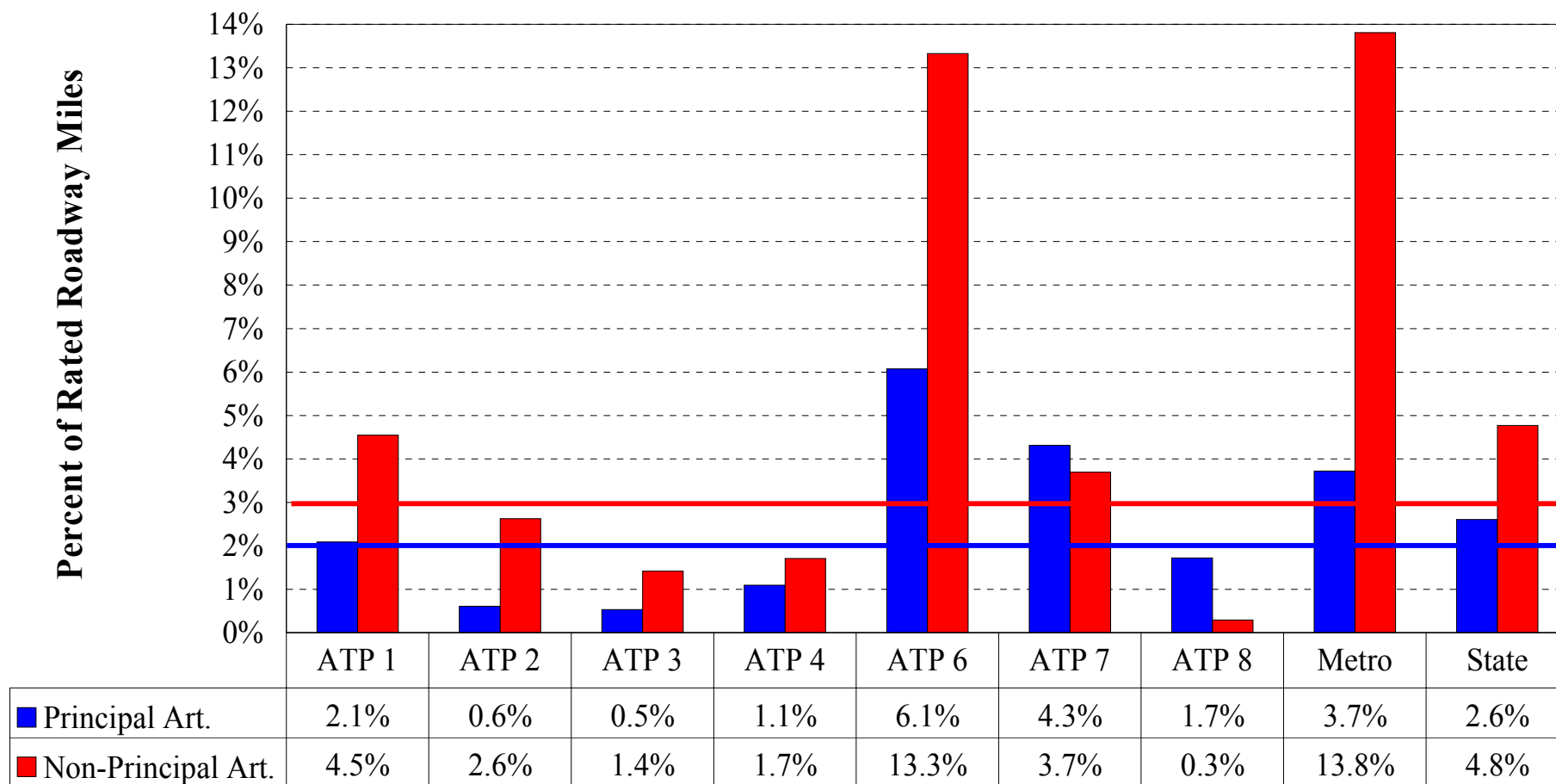
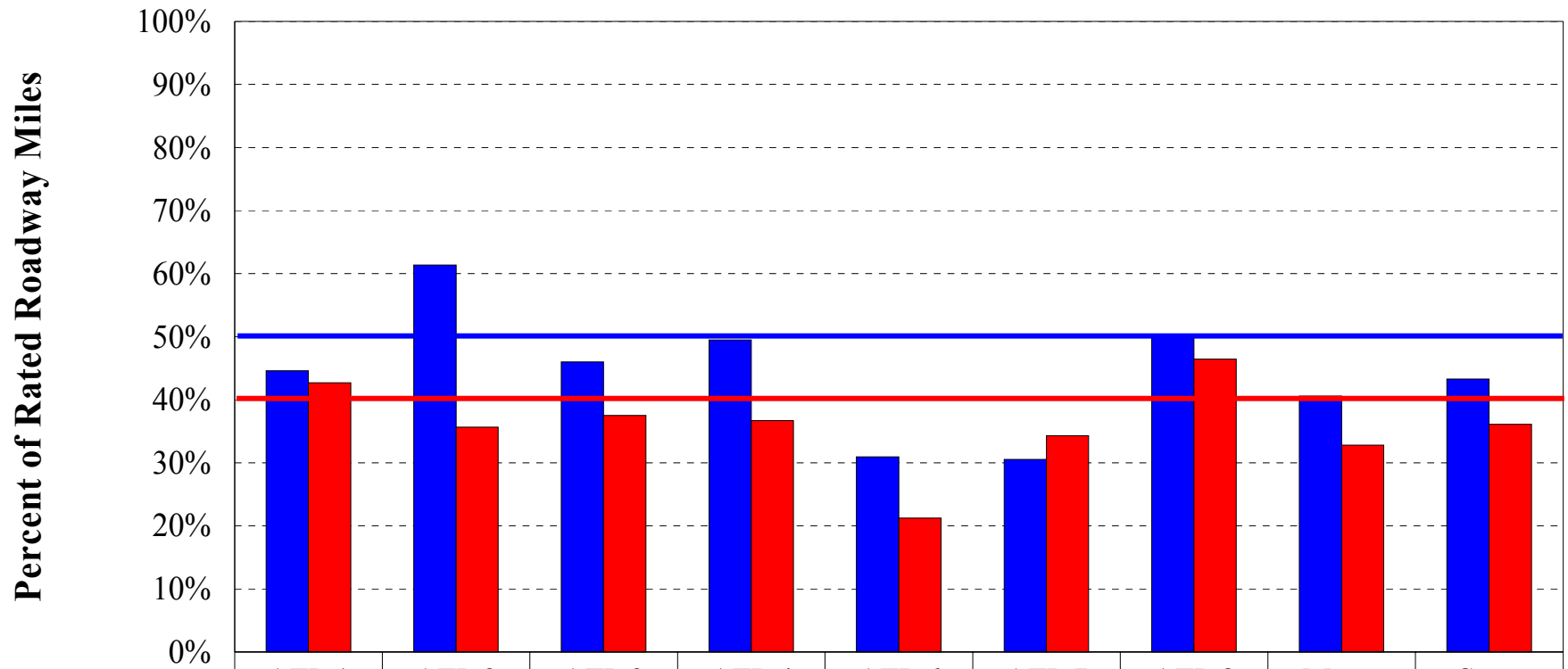


Figure 8
“High” Remaining Service Life
(RSL of 12 years or more)
Comparison of 2005 Data by ATP

Principal Arterial Target = 50 percent or more with “High” Remaining Service Life
 Non-Principal Arterial Target = 40 percent or more with “High” Remaining Service Life



■ Principal Art.	44.6%	61.3%	46.0%	49.5%	30.9%	30.5%	50.3%	40.6%	43.3%
■ Non-Principal Art.	42.7%	35.7%	37.5%	36.7%	21.2%	34.3%	46.4%	32.8%	36.1%

Figure 9
“Low” Remaining Service Life
(RSL of 3 years or less)
 Comparison of 2005 Data by ATP

Principal Arterial Target = 10 percent or less with “Low” Remaining Service Life
 Non-Principal Arterial Target = 25 percent or less with “Low” Remaining Service Life

