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Supporting Pavement Maintenance Decisions of Low-Volume Roads In Colorado Using Optimization Analysis and Artificial-Intelligence Techniques

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16. Abstract

States' Departments of Transportation (DOT) are trying to utilize the best practices of managing low-volume roads (LVRs) due to limited resources and declined transportation funding. Diverse maintenance practices and fluctuating budget allocations are noticed on LVRs which significantly impact the overall pavement performance. In this study, the optimal scheduling of maintenance strategies and effectiveness of different maintenance policies are investigated. First, the accumulated field experience of Colorado DOT's pavement engineers is highlighted through a regional survey of practice. Then, multi-year optimization models were developed using genetic algorithms with different objective functions and constraints. Using a case study of LVRs in Region 4, these models were able to study the effectiveness of considering in-place pavement recycling on roads with poor conditions compared to the applications of only thin overlays and chip seals. They also defined the benefit-cost impact of raising the overall drivability of pavement through different maintenance scenarios. In addition, the statewide analysis shows the effectiveness of current maintenance resources on future pavement conditions and defines the budget needs of each scenario. Moreover, an effective decision-making process is achieved for each Colorado DOT's engineering region using a machine-learning approach. Multiple treatment alternatives are proposed using artificial neural networks with pattern recognition algorithms.

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Executive Summary

States' Departments of Transportation (DOT) are trying to utilize the best practices of managing low-volume roads (LVRs) due to limited resources and declined transportation funding. Diverse maintenance practices and fluctuating budget allocations are noticed on LVRs which significantly impact the overall pavement performance. In this study, the optimal scheduling of maintenance strategies and effectiveness of treatment options are investigated. Pavement maintenance decision making is supported by three approaches: subjective judgment of pavement engineers; historical data on past practice (e.g., historical pavement performance plots); and optimization-based procedures. The three approaches are integrated using a pavement management data of Colorado LVRs to provide guidelines and recommendations for Colorado DOT (CDOT) and other transportation agencies.

The accumulated field experience of CDOT's pavement engineers is highlighted through a regional survey of practice. In addition, the effectiveness of low-cost treatments on the individual pavement distresses is evaluated using historical values of pavement condition indices. It was concluded that some surface treatments and recycling techniques are effective long-term treatments for fatigue, longitudinal, and transverse cracking. However, the effectiveness of these treatments depends mainly on the initial condition index.

Then, an optimization analysis is conducted using genetic algorithms to provide cost-effective capital improvement plans statewide and for deteriorated LVRs with marginal pavement conditions. The large-scale optimization analysis is limited on LVRs for statewide maintenance planning. In this study, the developed optimization models have the ability to maximize the overall pavement condition of LVRs network considering an annual budget constraint. They can also minimize the maintenance costs to achieve desired performance targets by the end of the analysis period. It was concluded that most CDOT engineering regions do not have sufficient maintenance budgets to sustain the network-level pavement condition of LVRs. The results from optimization analysis provide more realistic solutions to define the budget needs on LVRs.

Moreover, an effective decision-making process is achieved for each CDOT engineering region using a machine-learning approach. Multiple treatment alternatives are proposed using artificial neural networks with pattern recognition algorithms. It was found that these approaches provide

beneficial guidelines for managing LVRs in Colorado and nationwide. As a result of this study, transportation agencies can determine future budget needs, funding allocations, and treatment policies in order to demonstrate the best possible use of pavement management resources on LVRs.

Implementation: These approaches were found to provide beneficial guidelines for managing LVRs in Colorado and nationwide. Applying combined treatments of in-place recycling and surface treatments provides higher benefit-cost ratios compared to regular thin overlaying. In addition, chip seals provide the highest benefit-cost impact on LVRs in moderate pavement conditions. CDOT is recommended to incorporate recycled materials such as cold in-place and hot in-place recycled asphalt when maintaining LVRs, especially at poor conditions. Increasing the current CDOT maintenance funding on LVRs is recommended to sustain the network-level pavement condition. In addition, It is recommended increasing the effectiveness of managing LVRs by assigning maintenance activities at the optimal time to avoid the escalating costs of rehabilitating roads in poor conditions. Moreover, the maintenance plans should be optimized to preserve the overall drivability life of road network in a steady performance to achieve the highest benefits while minimizing maintenance costs. In general, CDOT is advised to consider such decision-making tools developed in the report. These tools determine future budget needs, funding allocations, and treatment policies in order to demonstrate the best possible use of pavement management system on LVRs.

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LIST OF ABBREVIATIONS

The following table describes the various abbreviations and acronyms used throughout the report:

Abbreviation	Description
AADT	Annual Average Daily Traffic
ACHP	Asphalt Chip Seal
ACIP	Asphalt Cold in Place Recycle
ADTT	Average Daily Truck Traffic
AHIP	Asphalt Hot In-Place Recycling
ANN	Artificial Neural Network
ATHO	Asphalt Thin Overlay
CDOT	Colorado Department of Transportation
CIR	Cold In-Place Recycling
CSU	Colorado State University
DL	Drivability Life
DN	Do Nothing
DOT	Department of Transportation
FDR	Full Depth Reclamation
GN	Genetic Algorithm
IRI	International Roughness Index
LVR	Low-Volume Road
M&R	Maintenance and Rehabilitation
PCI	Pavement Condition Index
PMS	Pavement Management System
WYT^2/LTAP	Wyoming Technology Transfer Center/Local Technical Assistance Program

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CHAPTER 1: INTRODUCTION

States' Departments of Transportation (DOT) are trying to utilize best practices in pavement maintenance with the economic challenges of limited resources and declined transportation funding. The importance of implementing pavement management systems (PMSs) for low-volume roads (LVRs) has been increased to keep the pavement performance at acceptable levels. Despite the vital role of LVRs to provide basic access to remote communities, limited maintenance funding and low maintenance priorities are commonly given to these roads (Schattler et al., 2011). In addition, low-cost pavement treatments and recycling technologies are continuously evolving on LVRs to reduce the annual maintenance costs. Diverse practices and fluctuating budget allocations are noticed on LVRs which significantly impact the overall pavement performance. In today's global economy, it is realized by pavement engineers and researchers that considerable savings can be obtained by implementing an efficient pavement management system (PMS) on LVRs (Landers et al., 2015). Decision makers are trying to get the best value for the allocated resources by considering effective pavement treatments and informed maintenance decisions. Such decisions should be optimized within defined performance and budget constraints to meet agency needs. In this report, multi-year optimization analysis and artificial intelligence techniques are adopted on LVRs in Colorado. The intent is to help CDOT and other agencies increase the effectiveness of pavement treatments and maintenance investments on LVRs by employing optimized decisions-making tools.

In the state of Colorado, the road network managed by the Colorado DOT (CDOT) is divided into five engineering regions. Rehabilitation alternatives are considered based on traffic volumes. Mainly, low-cost treatments and surface repairs are applied to roads in the low volume category due to tight maintenance budgets (CDOT, 2019). These strategies include surface sealing, in-place recycling, and hot-mix asphalt thin overlays. When there are serious structural defects in the pavement of LVRs, such as severe cracking, major rehabilitations or reconstruction may not be allowed. Severely deteriorated roads are proposed with innovative rehabilitation techniques such as in-place resurfacing combined with surface treatments and thin overlays. However, the long-term effectiveness of different maintenance plans is not well investigated. The multi-year optimization techniques support decision makers with a set of optimal maintenance activities to achieve specific pavement performance targets. In addition, the post-treatment performance of pavement differs depending on the type of treatment, time of application, and initial pavement conditions. Most decision makers in Colorado select the appropriate treatment type on LVRs considering the regional practice. Across the state, each CDOT region follows different maintenance policies depending on the previous experience and regional resources. The outcomes of the diverse treatment practices can be investigated in order to improve the maintenance decision-making process considering all affecting factors and previous experiences. Moreover, the different policies make it imperative for CDOT to highlight and share best practices which satisfy the urgent needs of managing LVRs.

1.1 Objectives

The primary objective of this report is to determine the optimal allocation of available network budgets and the corresponding maintenance policy. State DOTs need a collection of decision-making tools to maintain LVRs in the most desirable condition within their budgets. While supporting CDOT's maintenance decision making on LVRs, this study presents an integrated optimization approach that aims to achieve the following:

- Document efficient pavement management techniques using the regional experience of Colorado DOT for the benefit of implementation and guidance nationwide,
- develop multi-year optimization models using evolutionarily genetic algorithms to optimize the pavement maintenance plans of roads,
- study the impact of optimized maintenance plans on the expected pavement performance of LVRs using current resources,
- compare between the cost-effectiveness of different low-cost maintenance policies recommended for LVRs,
- define the maximum benefits of pavement maintenance investments on LVRs while enhancing the serviceability of roads,
- identify statewide optimal allocation of maintenance funding and corresponding maintenance policy recommended for CDOT regions, and
- enhance the process of selecting pavement treatments on LVRs using affecting factors and previous maintenance experience.

1.2 Research Background

More than 50% of CDOT's road network are not part of the national highway system (NHS). These roads need to be classified into different categories to set up standards of pavement design, construction, and maintenance. In terms of traffic volumes, LVRs in Colorado encompasses almost 2,135 miles of paved roads having an annual average daily traffic (AADT) of less than 2,000 vehicles per day and maximum daily trucks of 100 vehicles per day. The overall pavement condition is represented by a drivability life metric determined using a performance analysis of condition indices of five pavement distresses: fatigue cracking, longitudinal cracking, transverse cracking, pavement roughness, and rutting. The minimum remaining drivability life, in years, of the five indices represents the overall drivability life (DL) of the road segment. DL value is classified into low (3 years or less), moderate (from 4 to 10 years), or high (more than 10 years).

Due to limited funding, CDOT mainly applies low-cost treatments and light rehabilitations as an affordable alternative of pavement maintenance on LVRs. Chip seals are applied on roads in good conditions whereas thin overlays are considered for low DL values. However, limited applications of innovative treatments of in-place recycling and surface treatments are considered which provide insufficient knowledge about the cost-effectiveness of these strategies, especially for low DL categories. In 2016, CDOT sponsored a research project conducted jointly by Colorado State University (CSU) and the Wyoming Technology Transfer Center/Local Technical Assistance Program (WYT^2/LTAP). The main objective was to study the impact of current CDOT maintenance policies on the pavement management procedure of LVRs.

Figure 1.1 depicts the overall research outline. All relevant data sets were collected from CDOT, including historical maintenance records, roadway segmentation, pavement condition data, and traffic counts. The pavement maintenance decision making is supported by three approaches: subjective judgment of pavement engineers; historical data on past practice (e.g., historical pavement performance plots); and optimization-based procedures. The accumulated field experience of Colorado DOT's pavement engineers is highlighted through a regional survey of practice. In addition, the effectiveness of low-cost treatments on the individual pavement distresses is evaluated using historical values of pavement condition indices. Then, an optimization analysis is conducted using genetic algorithms to provide cost-effective capital improvement plans statewide and for deteriorated LVRs with marginal pavement conditions. At the end, an effective decision-making process is achieved for each Colorado DOT's engineering region using a machine-learning approach. Multiple treatment alternatives are proposed using artificial neural networks with pattern recognition algorithms.

The following subsections provide brief descriptions of the studies conducted previously and how they are related to the current study.

1.2.1 Previous Studies

As part of this project, a comprehensive literature review was conducted to document the key planning, design, and maintenance issues affecting LVRs. The definitions of LVRs and commonly applied treatments were reviewed showing different practices among agencies. The literature shows that state DOTs consider preventive maintenance and light rehabilitations even when the pavement degrades into severe conditions. Additionally, multiple online surveys were developed to investigate the best practices of managing low-volume roads at different management levels in Colorado and nationwide (Hafez et al., 2017a). The findings from the surveys summarize innovative program, optimization procedures, and products recommended while managing LVRs. Pavement recycling and thin overlays were also recommended on LVRs due to the limited funding. When considering the low-cost maintenance strategies as the only treatment option for distressed low-volume paved roads, different effectiveness is expected depending on the current pavement performance and the surrounding environment. Consequently, an evaluation methodology was developed to assess some of in-place pavement treatments currently applied to LVRs in Colorado (Hafez et al., 2017b). It was able to evaluate different options of surface treatments and pavement recycling using the historical values of pavement condition indices and treatment records. The findings from this study increase the understanding of applying such effective treatments based on the existing condition of individual pavement distresses. As a result, a proposed decision tree was proposed including wider treatment options of surface treatments and pavement recycling to increase the effectiveness of maintenance policies. Using the developed decision tree, decision makers can select the most recommended treatment option considering trigger values of fatigue and transverse indices.

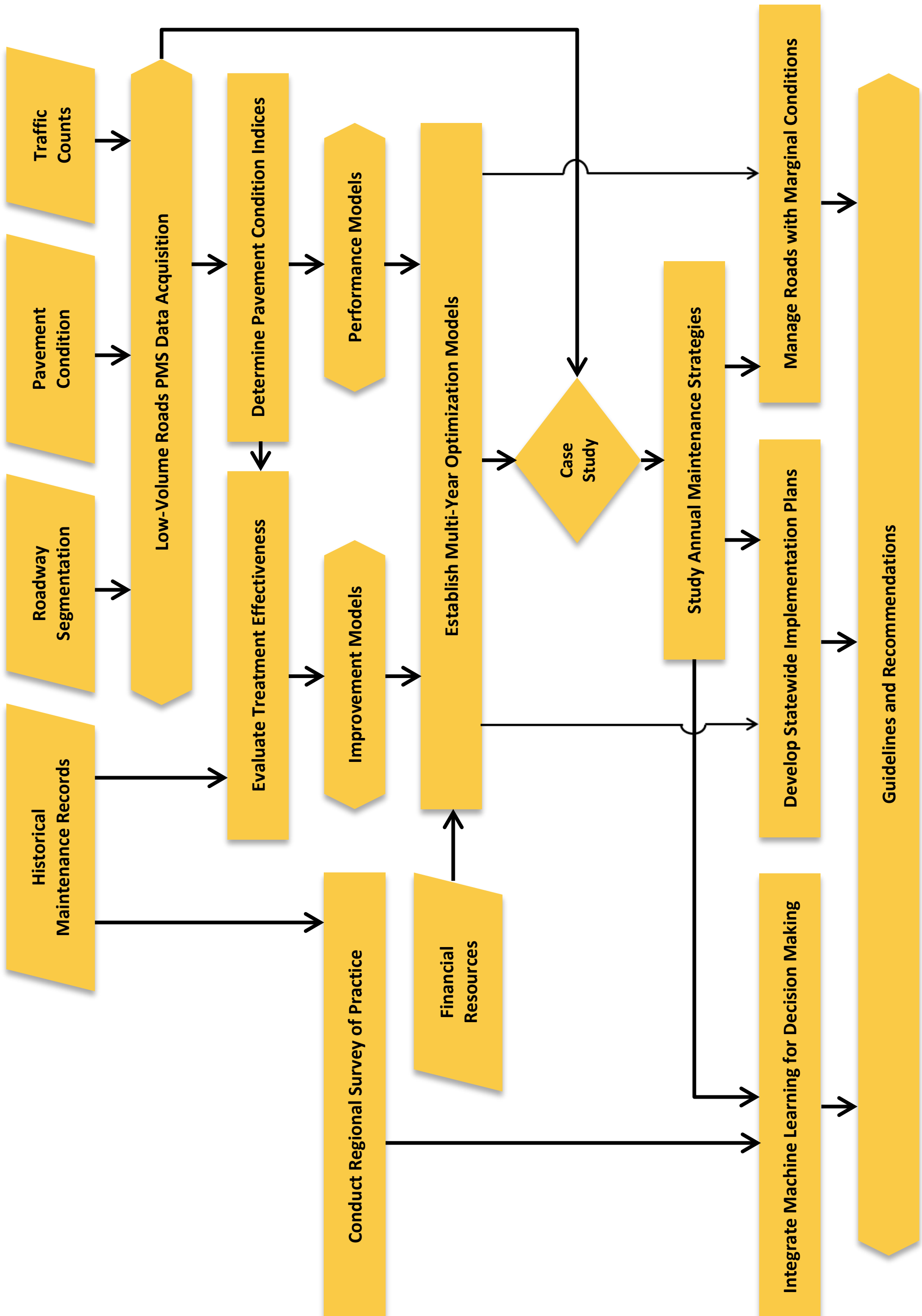


Figure 1.1. Overall Research Outline.

Not only the outcome of these studies increase the effectiveness of CDOT maintenance policies, but it also investigated the effectiveness on severely deteriorated LVRs. As part of these efforts, a comprehensive optimization analysis was performed to investigate alternative maintenance strategies and define capital improvement plans for deteriorated LVRs with marginal pavement conditions. A proposed strategy was found to enhance the effectiveness of current policies followed by CDOT. However, the results emphasize the need for additional resources at network level for dealing with deteriorated LVRs (Hafez et al., 2018).

1.2.2 Current Study

In this study, the maintenance costs are integrated with the evaluation process. A large-scale optimization analysis is performed to compare between different maintenance policies at the network level. These policies were optimized for the case study of LVRs in CDOT's Region 4. The optimized maintenance alternatives were comprehensively analyzed over a specific planning horizon to define the maximum benefits out of different maintenance scenarios. The derived recommendations from the case study and regional survey are then considered in a statewide optimization analysis of LVRs. The objective is to quantify the mid and long-term financial requirements of different treatment policies followed in Colorado so that appropriate maintenance funding can be allocated to LVRs.

In addition to the evaluation approach, the process of maintenance decision making is investigated in Colorado. Most low-volume paved roads are assigned maintenance treatments based on the regional practice and previous experience. Most decision makers rely on their expertise in recommending the most familiar low-cost treatment option. Using a unified decision tree for all LVRs may not be practical due to implementation gaps of some treatments in some regions. Hence, a proposed approach of decision-making process is introduced in this study using an artificial-intelligence technique of machine learning. An artificial neural network (ANN) was developed to learn from the previously successful decisions of pavement maintenance. Then, the treatment patterns are linked with some pavement inputs to establish a relationship between input and output data sets. Using the artificial neural network, the decision makers can simulate expert's recommendations on LVRs in Colorado.

1.3 Report Organization

The various tasks of this study are broken down into the following chapters:

Chapter 1	The report begins with a brief introduction showing the research background, problems, study objectives, and report format.
Chapter 2	A literature review is conducted in this chapter to present a brief background of optimization analysis methods and artificial intelligence techniques currently employed in different applications of the pavement management system.
Chapter 3	This chapter presents a regional survey conducted in Colorado. The responses from survey were analyzed, sorted, and compared to one another. The chapter also documents the current implementations of PMS for LVRs in Colorado. The main findings of this chapter provide pavement management guidelines for state and local agencies in Colorado and nationwide.
Chapter 4	This chapter applies evolutionarily genetic algorithms of multi-year optimization analysis on a case study of LVRs in CDOT Region 4. The chapter also presents a sensitivity analysis to study the benefit-cost impact of raising pavement performance targets of LVRs. This chapter provides recommendations for statewide optimization analysis and implementation plans.
Chapter 5	The statewide pavement maintenance implementation plans of LVRs is introduced in this chapter. The optimization analysis of CDOT LVR network is adopted to address the effectiveness of current resources on the expected pavement performance of LVRs. The optimized maintenance plans also define the budget needs assessment of each DOT region to achieve desired performance targets.
Chapter 6	The application of artificial neural network with pattern recognition algorithms is introduced in this chapter. The results from machine learning and treatment classification modeling reveal the application frequency and consistency of different treatments in Colorado. The optimized decision simulation of experts is conducted showing the flexibility of selecting effective treatments for LVRs.
Chapter 7	This chapter provides the summary and conclusions reached based on the analysis of this study.

Chapter 8 This chapter presents the recommendations and implementations for CDOT as a result from the study.

1.4 Chapter Summary

This chapter identifies the research needs of this study. Low-volume roads are commonly applied with low-cost pavement treatments due to the constrained maintenance funding. The effectiveness of these maintenance strategies depends mainly on the existing conditions. Decision makers are trying to get the best value of the allocated resources by considering effective pavement treatments and informed maintenance decisions. In this study, different maintenance strategies and treatment practices are evaluated through the regional experience and historical performance of pavement condition indices. Additionally, a multi-year optimization analysis and artificial intelligence techniques are adopted on LVRs in Colorado. The intent is to help CDOT and other agencies increase the effectiveness of pavement treatments and maintenance investments on LVRs by employing optimized decisions-making tools. The multi-year optimization techniques support decision makers with a set of optimal maintenance activities to achieve specific pavement performance targets. In addition, the post-treatment performance of pavement differs depending on the type of treatment, time of application, and initial pavement conditions. Hence, a machine learning approach is proposed to develop an enhanced decision-making tool for making future maintenance decisions on LVRs. This approach applies a knowledge-based neural network to consider treatments using affecting factors and previous maintenance experience.

CHAPTER 2: LITERATURE REVIEW

In pavement maintenance analysis, all the optimization problems are formulated to find optimal number of maintenance applications and best timings during a predefined analysis period (Tsunokawa et al., 2006). The literature shows three common mathematical methods in the application of optimization approaches to PMSs. These methods are discussed in this chapter. In addition, the importance of artificial intelligence has been increased in different applications of pavement condition assessment and prioritization/optimization problems. Three main applications provide intelligent systems that deal with common problems of data limitations in pavement management systems. These applications are also described briefly in this chapter.

2.1 Optimization Analysis in Pavement Management

Optimization analysis is a mathematical programming used to find the optimum value for one or more target variables given certain constraints (Boyd and Vandenberghe, 2004). The target variables should achieve a certain objective function or fitness function which could be either maximizing the benefits or minimizing the costs of simulated decisions. In PMS optimization procedures, the maintenance policies of transportation agencies and available resources represent the analysis constraints of achieving pavement performance targets.

2.1.1 Linear Programming

Linear programming is set in optimization models when objective and all constraint functions have linear relationships. The standard formulation of this problem is introduced in Equation 2.1. The transposed (*T*) matrices of vectors c, a_1, a_2, . . . , a_m are the problem parameters, whereas b_1, . . . , b_m should be scalars of defined constraints. In this analysis, the decision variable x is optimized linearly to end up with only one feasible solution. Thus, objective and constraints functions should form a convex feasible solution region (Bertsekas, 2009).

$$\begin{aligned} &\text{minimize} \quad c^T x \\ &\text{subject to} \quad a_i^T x \le b_i, \qquad i = 1, \dots, m. \\ &\qquad\qquad\quad x \ge 0 \end{aligned} \tag{2.1}$$

Over decades, linear programming has been employed in the optimization analysis of pavement maintenance. In Arizona, Golabi et al. (1982) developed a linear-programming optimization model for the objective of maintenance planning and budget allocation in the PMS of Arizona DOT (ADOT). These models considered Markov decision process (Altman, 1999) to minimize the total costs of maintenance planning for 7,400 miles of highways. The optimization model relied on performance constraints. The least-cost policy satisfied a minimum portion of the road network being in an acceptable condition while a maximum portion should be in an unacceptable one. The results of the study provided considerable savings over a study period of four years. The same basic formulation of this study has been adopted in a number of states' PMSs such as Alaska, Kansa, and Portugal (Alviti et al., 1994; Golabi, 2002). Grivas et al. (1993) integrated engineering factors with the economic analysis to provide effective optimization models using linear programing. The present worth of multi-year maintenance costs was minimized. Pavement condition parameters are considered in the problem formulation of constraints to achieve a certain condition state by the end of the analysis. The transitions between states were defined to model the consequences of each treatment option. The results emphasize the ability of such mathematical analysis to provide defensible answers to network-level pavement management inquiries. This study has been implemented in the pavement management practice of the New York State Thruway Authority.

Mbwana and Turnquist (1996) utilized Markov transition probabilities for pavement condition modeling to project future pavement conditions. The linear programming included both agency and user costs to minimize the total maintenance costs of individual pavement sections or links in a highway network. Because of the consideration of user costs, the optimized maintenance plans were more sensitive to traffic volume levels. The formulation of this study allowed more incorporation of user and agency costs on the solution of pavement maintenance optimization problems. In Greece, Theodorakopoulos et al. (2002) developed a linear programming tool to optimize the network-level agency costs subjected to desirable pavement condition constraints. Optimal maintenance strategies were proposed to help decision makers consider relevant project-level maintenance and rehabilitation (M&R) decisions. De La Garza et al. (2011) optimized a case study of paved roads in Virginia DOT (VDOT) using the linear programming of *Solver* add-in for *Microsoft Excel Office*. Nine treatment options were considered to minimize the road miles in very poor, poor, and fair conditions. Five condition states were projected for the next fifteen years. The optimized budget allocations provided more efficient pavement maintenance planning than the regular annual budget allocation process. Although *Solver* add-in is a user-friendly tool in *Microsoft Excel Office,* it is not practical for large-scale optimization analysis of a statewide road network. In this tool, the maximum allowable number of decision variables (e.g., road segments) is limited to only 200 cases (Frontline, 2019).

2.1.2 Integer Programming

Since some of pavement maintenance parameters are categorical, some research efforts have shifted toward the use of integer programming techniques. The integer analysis is combined with the linear programming by adding the constraint (x_j integer for $j = 1, 2, \ldots, n$). This problem is called the integer linear programming, in which the objective function and the constraints, other than the integer constraints, are linear.

Chen et al. (1992) used a mixed-integer programming model to minimize the total cost of pavement structures while meeting the constraints of AASHTO flexible pavement design criteria. The integer inputs of this problem represent the categorical type of paving materials while the non-integer variable is the pavement thickness. The flexible pavement optimal design was set to find the best combination of various paving materials for all three layers of flexible pavement (surface, base, and subbase) as well as the corresponding thicknesses.

The binary variable of pavement maintenance decision making was introduced by Li et al. (1998). The variable (x_{stm}) represent the decision of a maintenance m as shown in Equation 2.2. In this study, a multi-year optimization technique was developed for pavement preservation of the road network under the constraints of annual budget limitation. The results showed robust means of solving pavement management optimization problems. However, more work was required to convert the developed methodology into implementation tools for state and provincial DOTs.

$$X_{stm} = \begin{cases} 1, & if\ maintenance\ alternative\ m\ is\ selected\ for\ Section\ s\ in\ year\ t; \\ 0, & otherwise \end{cases} \quad (2.2)$$

2.1.3 Dynamic Programming

Dynamic programming is a multi-stage optimization technique which transfer a complex problem into a sequence of simpler problems. The PAVER system was developed by the U.S. Army Corps of Engineers to establish short and long-term budget requirements. To find the optimal solution of budget allocation, operation research techniques are used that may be either deterministic or probabilistic. The dynamic programming optimization model was used with the probabilistic prediction of pavement performance using Markov chain models (Feighan et al., 1988; Feighan et al., 1989; Butt et al., 1994). In such dynamic approaches, the pavement condition at time $t + 1$ depends only on the condition at time t and the maintenance action applied at time t. One drawback of dynamic programming in pavement maintenance planning is that the number of state variables increase exponentially when adding budget constraints, making it computationally expensive to find an optimal solution (Seyedshohadaie et al., 2010). Kuhn (2009) introduced an approximate dynamic approach to overcome these limitations and obtain close to optimal solution.

2.2 Artificial Intelligence in Pavement Management

Since transportation agencies are dealing with different PMSs processes in which most of them have a subjective nature, it is not easy to develop management plans in a reliable fashion (Ostadi, 2013). Some PMS analysis tools include subjective, ambiguous, uncertain, or erroneous information, making the decision-making process difficult or even irrational. Therefore, the application of artificial intelligence has been increased in PMS analysis to provide knowledge-based or expert systems in case of uncertainty and to meet the desired management goals of roads. Three main artificial intelligence techniques are currently applied in PMS domain, including evolutionary algorithms, artificial neural networks, and fuzzy logic systems. They provide the potential to develop intelligent systems when identifying the optimal solution of pavement maintenance problems (Sundin and Braban-Ledoux, 2001). The following subsections provide brief description of these techniques.

2.2.1 Evolutionarily Genetic Algorithms

Inspired by the biological mechanism of Darwin evolution, evolutionary algorithms are computational system used to find solutions by applying processes of reproduction, mutation, recombination, and selection. A genetic algorithm (GA) is a subset of evolutionary computation used as an optimization technique. GAs can solve nonlinear or non-differentiable optimization problems by finding initial solutions or generations. Then the algorithms are set to reproduce populations with more optimal features (Mitchell, 1998). The decision variable is divided into discrete parts that can vary independently. These parts are called "genes" and they are applied with operations of reproduction, matting, crossover, and mutation. Figure 2.1 depicts the main steps executed in the GAs analysis. After importing the data, the encoded optimization parameters create initial population or 'generation' of the potential solutions. They are selected as feasible solutions according to their fitness where all objectives and constraints are satisfied. All feasible solutions are used to reproduce a better generation by a mating process. Each two individual solutions are assigned as parents then they are combined together to form a new set of potential solutions. The genes of parents are manipulated with a crossover process where sections of the genes, called "chromosomes", are swapped to produce offspring populations, see Figure 2.2. Then, few of the produced genes are applied with a randomly mutation to prevent more solutions fall into a local optimum of the feasible solutions space. Developing subsequent generation stops when specific stopping criteria are met, and the best fit solution of the final offspring population is considered the optimum solution.

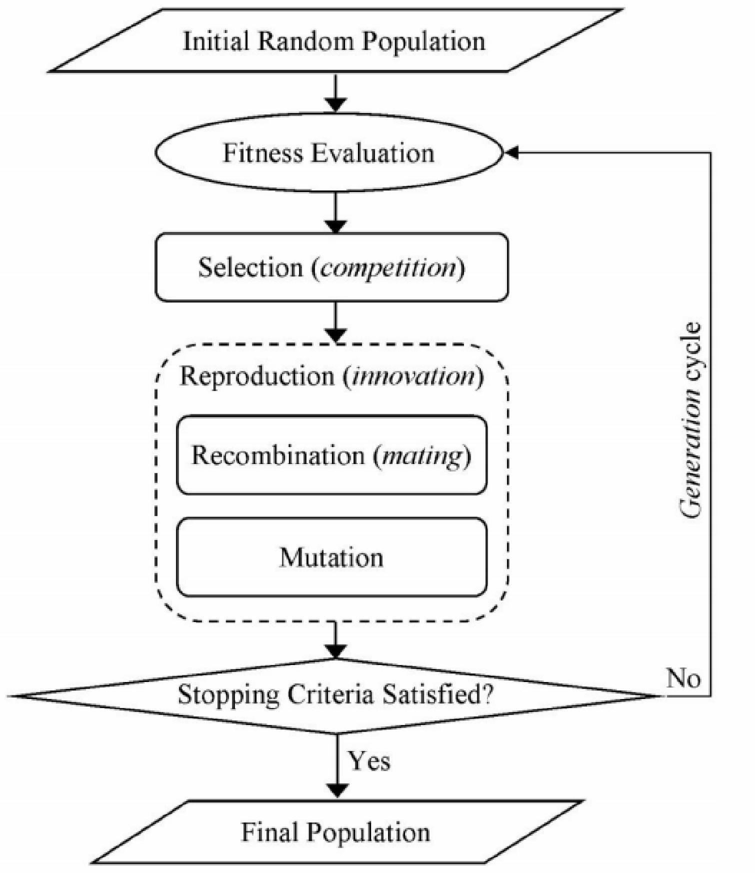


Figure 2.1. Main Steps of Problem Solving Using Genetic Algorithms (Ostadi, 2013).

The crossover probability (P_c) represents the amount of population strings used in the crossover operation. High P_c probabilities allow fast solution and better performance of the analysis. However, the mutation rate (P_m) is recommended to be low to converge the solution. The typical P_c rates are from 0.5 to 1.0 while P_m should be in the range of 0.001~0.05 (Lin et al., 2003).

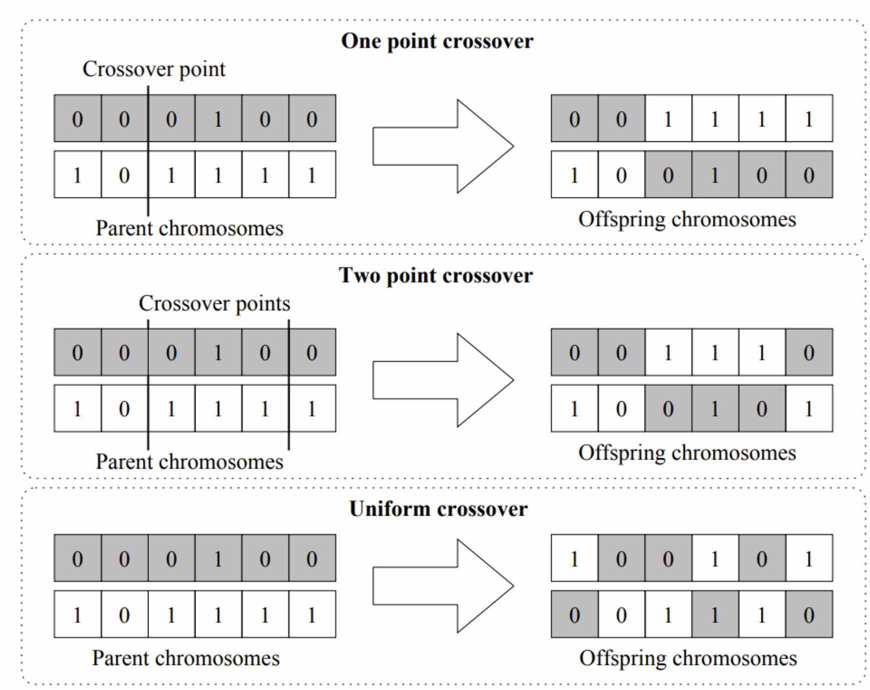


Figure 2.2. Illustration of Crossover Methods (Sastry and Goldberg, 2002).

Since the early 1990s, Genetic Algorithms (GAs) have been used widely by many researchers in civil engineering. The application of GAs in road maintenance planning was introduced by Fwa et al. (1994). An optimization model was developed to solve a network-level pavement management problem. Later, different pavement management models were developed based on GAs to consider different objective functions and constraints according to the management needs of each transportation agency. Pavement performance modeling is a key element in formulating the optimization system. Performance models are used to project future pavement conditions so that multi-year maintenance programs can be assigned. Ferreira et al. (2002a) optimized road maintenance activities using deterministic pavement performance models. Another optimization effort was conducted by Odoki and Kerali (2006) in HDM-4 to find the optimal set of maintenance treatments applied at network level. Probabilistic pavement performance models were also included in the optimized maintenance strategies using Markov-chain models (Ferreira et al., 2002b ;Morcous and Lounis, 2005). Due to the heuristic nature of GAs, they do not guarantee global optimum solutions. However, they are more applicable than many conventional or mathematical optimization methods such as linear, non-linear, dynamic, and integer programming (Morcous and Lounis, 2005). The reason is that these conventional optimization techniques require complex form of mathematical formulations when optimizing pavement maintenance activities. On the other hand, GAs are general-purpose stochastic optimization techniques that are capable to generate and store multiple solutions of a global optimization problem with a comparable level of accuracy, especially for large size networks.

2.2.2 Artificial Neural Network

Imitating the biological nervous system, an artificial neural network (ANN) is a machine learning technique used to provide decisions based on given information. The basic element in the ANN is a processing node called artificial neuron, see Figure 2.3. The perceptron "value" of this neuron depends mainly on the perceptron of the neurons in the previous computation layer. The flow of information starts from the predictors in the input layer to the corresponding responses in the output layer. The relationship between the network elements is introduced in Equation 2.3. Training the ANN aims at reducing the errors between the predicted responses and the actual ones. Two main learning approaches are considered for ANNs: supervised and unsupervised (Ceylan et al., 2014a). In the supervised learning process, a direct comparison of predicted versus measured output is carried out in order to learn the pattern within the data. The unsupervised training draws inferences to assign unlabeled inputs to distinct clusters or meaningful groups during exploratory data analysis.

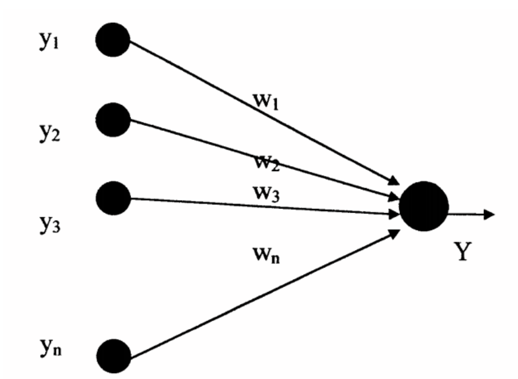


Figure 2.3. Typical Artificial Neuron Perceptron (Abdelrahim and George, 2000).

$$y = \mathrm{g}\left(\sum_{k=1}^{n} w_k y_k - \theta\right) \tag{2.3}$$

where,

y = output value,
g = transfer function,
wk =connections weights at Node k,
yk = input value at Node k, and
θ = threshold activation level.

Due to its stochastic nature, an ANN can capture many kinds of relationships compared to conventional techniques which are limited by different assumptions of normality, linearity, variable independence, etc. Over the past three decades, there has been an increased interest in the use of ANNs in many fields of civil engineering. In pavement engineering, several studies show promising ANN-based techniques to address five major categories (Ceylan et al., 2014a), which are:

1. predictions of pavement performance,
2. pavement management and maintenance strategies,
3. pavement distress forecasting,
4. structural evaluation of pavement, and
5. crack detection of pavement distresses by image processing.

George et al. (1998) developed an estimation model of ANN to predict the Pavement Condition Rating (PCR) of flexible, rigid, and composite pavements using the Mississippi DOT database. Lin et al. (2003) developed an ANN to predict the International Roughness Index (IRI) of roads based in pavement distresses. Using the Long-Term Pavement Performance (LTPP) database, Choi et al. (2004) trained an ANN model to assess the performance of pavement in terms of IRI. The appropriate selection of pavement M&R option was conducted by Alsugair and Al-Qudrah (1998) using an ANN trained with a comprehensive visual inspection data from Riyadh road network. Josen (2012) utilized an ANN for network-level pavement performance and management of asphalt pavement cracking in Connecticut. Modeling pavement deterioration using artificial intelligence was introduced by several studies to project the future pavement condition in terms of different indices (Yang et al., 2003; Najjar and Felker, 2003; Saghafi et al., 2009). Gopalakrishnan et al. (2014) and Ceylan et al. (2014b) used the falling weight deflectometer (FWD) deflection-time history data to train ANNs with backcalculation of pavement layers' moduli. Salari et al. (2010) used ANNs as an application of pavement inspection image processing for the assessment of highway surface condition.

2.2.3 Fuzzy Logic Systems

Fuzzy systems provide knowledge-based models to solve logical problems using fuzzy set rules. The concept of fuzzy logic was conceived by Lofti Zadeh who stated: "*A fuzzy set is a class of objects with a continuum of grades of membership*" (Zadeh, 1965). In other words, a continuum of a probability value is assigned as a degree of membership for each logic. Traditional logic includes discrete values such as binary values of 1 and 0 for "true" and "false" logics, respectively. In the fuzzy logic technique, the logical problems are extended to include partial logics (e.g., "partial true") which are weighted by the probability of each output class. Therefore, a fuzzy logic system can be defined as the nonlinear mapping of an input data set to a scalar output data (Mendel, 1995). It provides an approximate but effective means of describing the behavior of systems in case of uncertainty because the system is too complex or not easily analyzed mathematically.

The fuzzy logic controller includes four main algorithms, as depicted in Figure 2.4. In the Fuzzification step, a set of crisp inputs (e.g., events that either do or do not occur as in Zadeh (1965), or precise values) are gathered and converted to fuzzy variables. These variables are applied with fuzzy linguistic terms and membership functions. Then, fuzzy inferences are made to simulate human reasoning process using fuzzy if-then rules. Finally, the defuzzification module transforms the fuzzy set obtained by inferences back into a crisp value.

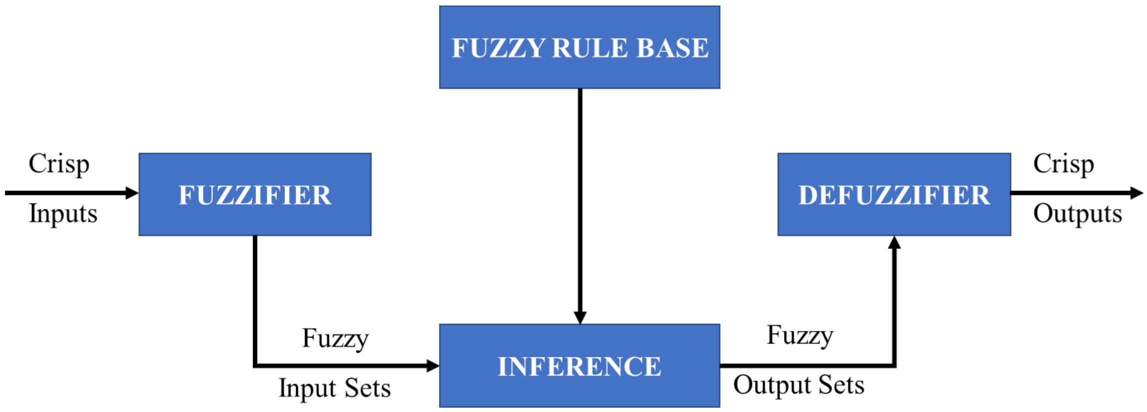


Figure 2.4. Block Diagram of a Fuzzy Logic System (Boumella et al., 2012).

The literature shows different applications of fuzzy mathematics in pavement management. Fwa and Shanmugam (1998) developed a fuzzy logic-based system for pavement condition rating and maintenance-needs assessments. The membership of distress severity levels was incorporated into a fuzzy set where the probability of pavement condition belonging to a distress severity level is assessed be an expert. Equation 2.4 shows an example of rut severity level which describes the current condition to be not of low severity (e.g., 0/Low). The condition rater think that the pavement has a high probability to be in medium severity (e.g., 0.8/Medium) and much less likely to be of high severity (e.g., 0.5/High). The membership functions were developed for the rest of pavement distresses and the overall condition rating was determined in forms of distress rating scores and severity level. The proposed procedure has a sound and logical decision framework which enables optimal programming of maintenance decisions at network level.

$$A_{(rut)} = \{0/\text{Low}, 0.8/\text{Medium}, 0.5/\text{High}\} \quad (2.4)$$

Chen and Flintsch (2007) incorporated a fuzzy logic-based model into the risk of pavement maintenance investments by uncertain variables, assumptions, or estimates. This study proposed a fuzzy logic approach for determining the timing of maintenance, rehabilitation, and reconstruction (MR&R) activities. The fuzzy logic-based risk analysis of the case study demonstrated benefit cost saving comparable to the benchmark methods of life-cycle cost analysis (LCCA). However, it effectively considered some of uncertainty inherent in the process. Jeong et al. (2017) proposed predicting the deterioration of pavement in relation to climate change using fuzzy logic. Due to the empirical relationship between the behavior of infrastructure and climate change, a climate impact-assessment system using fuzzy inferences was developed to predict specific pavement distresses. Using experts' knowledge, the baseline deterioration curve is determined for the expected design life. Then, the change in the deterioration rate is derived directly via the input of climatic factors using membership functions and if-then rules. The outcomes of this study depend mainly on the level of experts' knowledge and historical conditions of the case study considered for calibration.

2.3 Optimization Analysis on Low-Volume Roads

Although pavement deterioration rates increase over time, the maintenance financial resources are not raised accordingly. This challenge is more critical for LVRs which are managed under the supervision of state DOTs and local agencies. It can be noticed from the literature that several DOTs are trying to find alternative surface treatments and preventive maintenance to reduce the maintenance costs of LVRs. However, optimizing proposed maintenance strategies is not well investigated. The specific objectives and constraints regarding managing LVRs should be defined to reflect the local needs of these roads in an effective manner. Multi-year optimization analysis helps management officials and policy makers explore how optimized alternative maintenance programs would affect the available resources at network level.

Most of optimization studies focused on primary roads, and limited applications were implemented for local pavement management systems. Cirilovic et al. (2015) implemented a network-level optimization analysis on a case study of LVRs in Serbia. Pavement deterioration curves were adjusted from the World Bank's road network evaluation tools to assess the current and future conditions of pavement. A substantial reduction in future road agency costs was achieved by the optimized maintenance scenario of preventive maintenance compared to the current practices. Mathew and Isaac (2014) developed a PMS optimization model based on GAs for rural roads in Kerala state. In general, the strategy of the previously mentioned studies was to demonstrate the use of optimization analysis in determining multi-year maintenance plans. Few road segments were considered in the analysis of some studies for simplicity and efficiency of optimization analysis. The large-scale optimization analysis is limited to quantify the statewide funding needs and corresponding effectiveness on the overall pavement performance of LVRs networks.

2.4 Chapter Summary

Three mathematical methods are commonly applied when optimizing generic pavement maintenance planning. These conventional methods vary from linear programming to nonlinear programing with integer categories and dynamic features. They provide robust techniques to find optimum solutions; however; complex mathematical formulation is considered in the optimization models. Therefore, several limitations are encountered while managing the pavement performance within a comprehensively optimized PMS. On the other hand, evolutionary algorithms allow decision makers to consider more complex analysis of optimization techniques to find optimum maintenance plans that maximize the benefits. In addition, utilizing artificial-intelligence applications has been increased to solve different problems in pavement management with the case of uncertainty. These applications have the ability to capture many kinds of relationships using expert-based learning systems. Despite the various studies of artificial intelligence in pavement engineering, limited applications are found for managing LVRs within local management needs. Also, the large-scale optimization analysis is limited on LVRs to quantify the statewide funding needs and corresponding effectiveness of maintenance policies on the overall pavement performance of LVRs networks.

CHAPTER 3: REGIONAL SURVEY OF COLORADO DEPARTMENT OF TRANSPORTATION FOR MANAGING LOW-VOLUME ROADS

3.1 Introduction

A regional survey of practice was conducted to collect information on the pavement management and maintenance programs applied to LVRs in Colorado. The primary focus of this survey is on the budget allocation and pavement maintenance policy followed by the different engineering regions of CDOT. Due to the constraints of maintenance funding, deteriorated LVRs are restricted to light rehabilitation alternatives instead of major rehabilitation or reconstruction. In fact, some CDOT regions may be limited to applying only thin overlays to poor pavements. The effectiveness of pavement treatments in terms of the individual distresses were addressed in this survey based on the previous regional experience of CDOT practitioners. This survey provides a condensed, yet substantive overview of the key issues related to managing low-volume paved roads in Colorado. The results of the regional survey are summarized in this chapter in order to provide guidelines for state and local agencies in Colorado and nationwide.

3.2 Drivability Life

In Colorado, the overall pavement performance is evaluated by drivability life (DL) (Rada et al., 2016). The DL analysis represents the remaining time in the pavement with acceptable driving conditions in terms of years. Five pavement distresses are addressed to evaluate the drivability of roads. These distresses include three cracking types (fatigue, longitudinal, and transverse) as well as road roughness and rutting. All of the previously mentioned distresses are normalized into condition indices on a scale from 0 (worst case) to 100 (free of distress), which are:

- Fatigue Index,
- Longitudinal Index,
- Transverse Index,
- Ride Index, and

- Rut Index

These indices are classified into one of the categories listed in Table 3.1 based on the value of condition index.

Table 3.1. Pavement Performance Category for each Condition Index.

Index Range	Category
Greater than 90	Excellent
80 – 90	Good Condition
70 – 79	Fair Condition
60 – 69	Poor Condition
Less than 60	Very Poor Condition

The DL value of a road segment is projected on the basis of pavement performance models. Five performance models are developed for each distress index. Then, the overall DL of a road segment is the minimum time remaining until any of the condition indices reaches a value of 50. Road drivability is classified into three categories as follows:

- Low DL: 3 years or less,
- Moderate DL: from 4 to 10 years, and
- High DL: more than 10 years.

3.3 Methodology of Survey Questionnaire

The road network managed by CDOT is divided into five engineering regions. These regions are responsible for implementing CDOT's goals of road serviceability and manage all maintenance activities on pavements. Figure 3.1 shows the location of each region in the state of Colorado. In May of 2018, an online survey was distributed to the pavement management engineers in the five engineering regions. The survey questionnaire encompasses 29 questions with branching logic covering most relevant aspects of managing LVRs. A copy of the survey questionnaire in addition to response summary are provided in Appendix A. The survey methodology is compiled in the following sections.

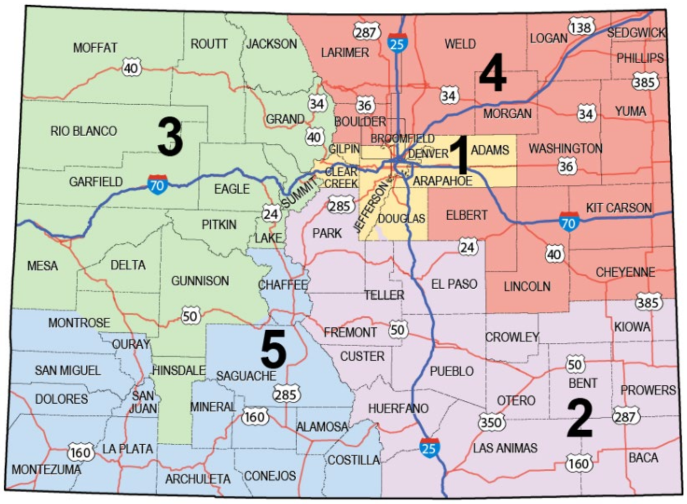


Figure 3.1. Colorado Department of Transportation Engineering Regions (CDOT, 2018).

3.3.1 Section 1: General Information

The first section is organized to identify the respondents and the regional size of LVRs network considered for maintenance and improvement strategies. In addition, budget allocations on LVRs from the different CDOT regions are reported in this section. The intent of these questions is to study how the allocated budgets in the last few years affected the pavement performance. Consequently, recommendations can be provided for appropriate approaches to annual budget allocation to LVRs to achieve optimal levels of pavement performance.

3.3.2 Section 2: Maintenance Decision

The objective of this section is to investigate if any of the CDOT regions utilizes a specific decision-making tool for maintaining the pavement of LVRs. Such a tool includes any systematic process designed to assist road engineers in selecting the most appropriate treatment and to help justify their maintenance decisions. This section of questions aims to identify pavement management parameters affecting the selection of pavement treatment alternatives such as pavement condition indices, road classifications, traffic volumes, type of pavement distresses, etc.

3.3.3 Section 3: LVRs Pavement Maintenance Strategies

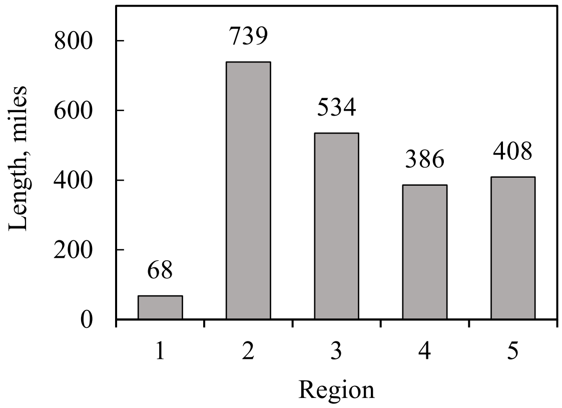
Most of the survey questions were embedded in this section. Pavement engineers and decision makers in CDOT apply alternative pavement preservation strategies to LVRs such as routine maintenance, seal coats, milling and thin overlays, and recycling treatments. This section is designed to gather information about experiences, challenges, and recommendations for the maintenance strategies applied to low-volume paved roads in each CDOT region.

3.3.4 Section 4: Optimization Analysis

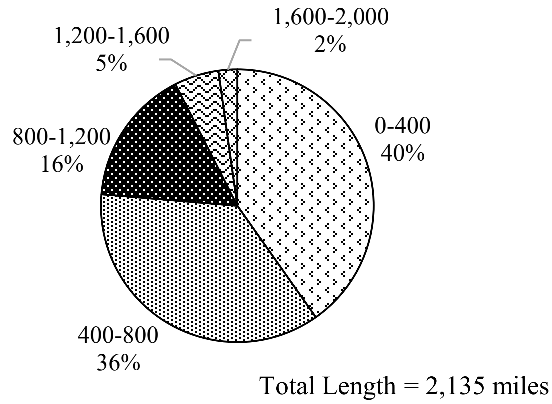
Since all maintenance and rehabilitation (M&R) strategies are limited to the network-level maintenance budgets, optimization analysis is an effective approach to get the best overall benefits associated with the maintenance expenses. Optimization models are mathematical programming used to achieve specific objective functions which are subjected to analysis constraints. This section inquires if any of such practices are implemented while managing LVRs within the CDOT region. It also investigates the best optimization strategies recommended for LVRs.

3.4 Descriptive Analysis of Colorado Low-Volume Paved Roads

CDOT is responsible for 9,106 center-line miles of roadways. According to the 2017 traffic data, there exists 2,135 miles of low-volume paved roads distributed differently among CDOT's five regions. As shown in Figure 3.2 (a), the lowest mileage of low-volume roads is in Region 1 due to the high traffic demand in the urbanized Denver metro area. The biggest low-volume road network exists in Region 2 with a total road length of 739 miles. Although CDOT's upper limit of traffic volume is 2,000 vehicles per day for LVRs, most LVRs in the state accommodate traffic volumes with AADT values less than 800 vehicles per day. Figure 3.2 (b) shows almost half of LVRs mileages (40%) are in the range of 0 to 400 AADT. This category is distributed extensively in most CDOT regions.



(a)



(b)

Figure 3.2. Mileage Distribution of Colorado Low-Volume Paved Roads in 2017: (a) by Region; (b) by Annual Average Daily Traffic (Vehicles per Day).

3.4.1 Pavement Condition

Table 3.2 summarizes the drivability conditions of LVRs statewide and among CDOT regions in 2017. The majority of LVRs have moderate and low drivability lives. Only 309 miles of roads (14% of the statewide mileage) have high drivability lives of 10 years or greater. Based on the analysis of historical values, pavement deterioration rates of most condition indices increase significantly when roads are in the moderate drivability range (Hafez et al., 2017b). Hence, numerous road segments are subjected to significant pavement degradation since more than 60% of roads are in the moderate category of DL. The pavement defects of these roads should be repaired properly with cost-effective treatments and optimized maintenance strategies. In each CDOT region, previous experience provides insights on maintenance strategies and guidelines in order to face the economic challenges of pavement investments.

Table 3.2. Pavement Condition Summary of Colorado Low-Volume Roads in 2017.

Drivability Life	Condition	Length in miles					Total	%Length
		Region 1	Region 2	Region 3	Region 4	Region 5		
Greater than 10 years	High	0	149	54.5	25	80.5	309	14%
4 - 10 years	Moderate	42	426	383	223	269.5	1,343.5	63%
3 years or less	Low	25	163.5	96.5	137	58	480	23%
Missing		1	0.5	0	1	0	2.5	0.01%
Grand total		68	739	534	386	408	2,135	100%

3.5 Survey Results: Regional Maintenance Practice for LVRs

Based on the results of the survey, the regional practice of managing and maintaining low-volume paved roads in Colorado are discussed from the perspective of the following subsections.

3.5.1 Pavement Treatment Types

Several low-cost pavement treatments are currently applied to LVRs to make the best use of limited resources. Table 3.3 summarizes the types of pavement treatments applied to CDOT regions according to each drivability category. Once may observe there are inconsistent maintenance practices applied to LVRs among the CDOT regions. This finding was also found in Washington State when managing LVRs by local agencies (White, 2012). However, the impact of different applications on the current condition is not explained by the other states. Region 3 considers the widest range of treatment options considered for different categories of drivability lives (e.g., high, moderate, and low drivability). Different applications of in-place recycling are applied in Region 3 such as cold in-place recycle (CIR) and hot in-place recycle (HIR). Asphalt medium and major overlays are applied to LVRs only in Region 4, and are relatively expensive treatments on LVRs. Consequently, maintenance activities for LVRs in moderate conditions are affected negatively in Region 4 where only two treatment options are available. In addition to the major rehabilitations, full-depth reclamation (FDR) and replacement are considered in Region 4 to rehabilitate LVRs with poor pavement condition.

On the other hand, the lack of both annual maintenance funding and expertise force some regions to have implementation gaps of most of these treatments. In Region 2, roads are treated with only a thin overlay with surgical deep repairs. Region 1 has very limited treatments where none of the treatment options are considered for high DL. Region 5 also considers only thin overlays for treating pavement in the low drivability category. The limited applications of maintaining poor roads in Region 5 provide diverse treatment options for roads in moderate conditions which can prevent most of the roads from deteriorating into poor conditions. In general, varied pavement maintenance activities are observed among CDOT regions which would provide different effectiveness on the current conditions and pavement management resources as will be linked with the following results.

Table 3.3. Pavement Treatment Options Currently Applied to Low-Volume Roads in Colorado.

Treatment	(a) High Drivability Life: more than 10 years				
	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal			x		x
Single Chip Seal			x	x	
Treatment	**(b) Moderate Drivability Life: from 4 to 10 years**				
	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal	x		x		x
Single Chip Seal	x		x	x	x
Double Chip Seal					x
Thin HMA Overlay (1.0 – 1.5 inches)			x	x	x
Hot In-Place Recycling			x		
Treatment	**(c) Low Drivability Life: 3 years or less**				
	Region 1	Region 2	Region 3	Region 4	Region 5
Thin HMA Overlay (1.0 – 1.5 inches)	x	x			x
Cold In-Place Recycling			x		
Hot In-Place Recycling			x		
Full Depth Reclamation				x	
Full Depth Replacement (10% Patching)				x	
Asphalt Medium Overlay 2" - < 4"				x	
Asphalt Major Overlay 4" - < 6"				x	

Figure 3.3 shows the most frequently applied treatments statewide by calculating the weighted percentage of treatment frequencies for each DL category. Single chip seal and thin overlay are the most common treatment options applied in the different regions for moderate and low DLs, respectively. Although thin overlays are not always effective on badly deteriorated roads (Chou et al., 2008), they are frequently applied on pavement with low drivable conditions. Crack seal is found to be preferred by most regions for roads having high

DLs. The innovative treatment alternatives of in-place recycling and reclamation are applied on deteriorated roads with low DLs. However, the applications of CIR, HIR, and FDR in only two regions provide a low frequency of application rate of almost 25% statewide.

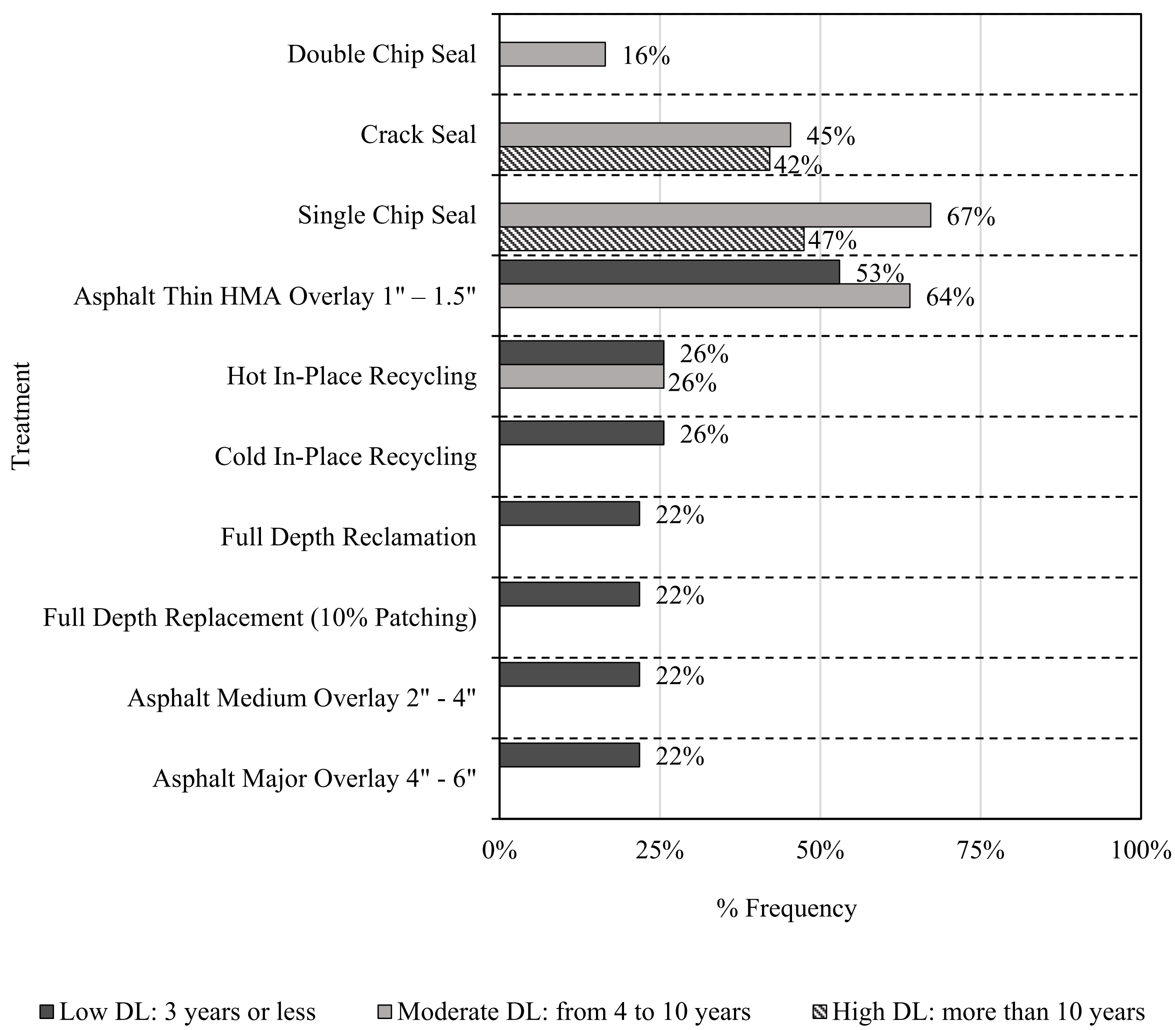


Figure 3.3. The Most Commonly Applied Treatments to Low-Volume Paved Roads in Colorado.

3.5.2 Maintenance Budget Allocation

The survey investigated the level of maintenance budgets set for maintaining LVRs in Colorado. The results of this question are displayed in Figure 3.4. Region 1 stated that no fund designation is given specifically to LVRs. The reason relates to the small size of the LVRs network in Region 1. Undefined budget allocations were also found in Region 4 in 2012 through 2014. In general, different amounts of maintenance budgets were considered for maintaining LVRs. The limited resources for roads at the local level can be noticed when zero maintenance funds are invested on LVRs over multiple years. However, in recent years, higher funding is noticeably provided to LVRs statewide. In 2017, annual maintenance budgets of more than $4.0M (million) were allocated in three CDOT regions. The large size of LVR network in Region 2 can explain the reason of allocating maintenance budgets of more than $4.0M in the past three years.

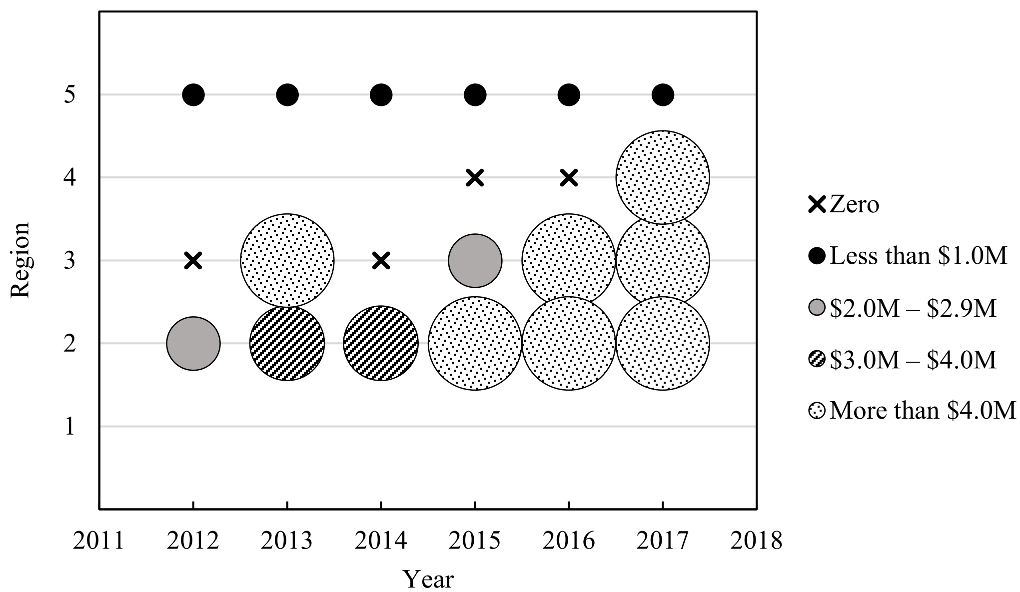


Figure 3.4. Regional Maintenance Funding Allocation to Low-Volume Paved Roads.

In the context of annual average budgets shown in Figure 3.5, Region 5 is below the state funding average. A consistent distribution of state funding can be noticed among regions with respect to the range of LVRs mileages except Region 5. Very low funding amounts are assigned in Region 5 compared to the size of LVRs network distributed. The low funding levels provided to Region 5 could explain why only thin overlays are considered for roads with low DLs.

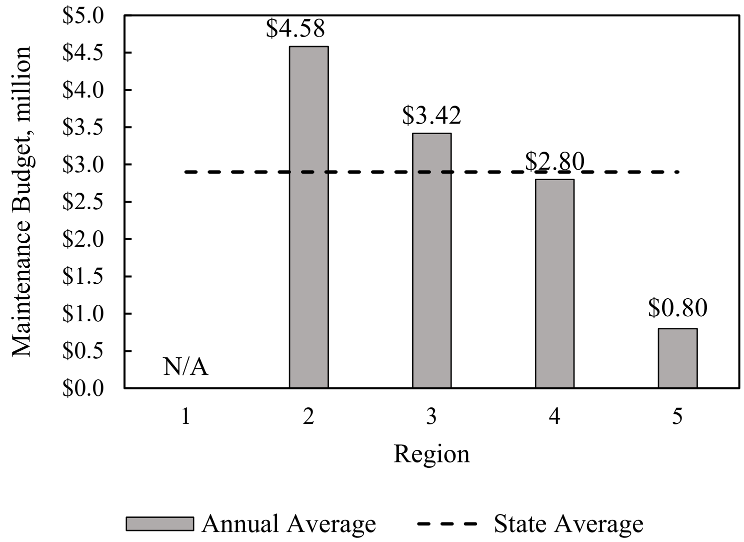


Figure 3.5. Average Annually Maintenance Budgets for Low-Volume Paved Roads.

The survey provides information on how the total annual maintenance budgets are distributed across the available treatment options. Figure 3.6 shows the percentage of budget assignments for maintaining LVRs in each region. Region 2 assigns the total budget to the sole treatment option considered for LVRs. Medium overlays with thicknesses ranging from 2 to 4 inches are assigned with 60% of the maintenance budget in Region 4 due to the relatively high unit cost of these treatments. The majority of maintenance activities in Region 4 are allocated on poor roads where 80% of the total budgets are assigned for medium overlay and FDR. These maintenance activities significantly reduce the maintenance practices considered for moderate conditions (e.g., only 10% of the total budget is considered for chip seal and thin overlay). Moving to Region 3, a uniform distribution of the total available budget was found across the different treatment options. This implies Region 3 is taking advantage of applying all treatment options on roads in different conditions for the benefit of pavement rehabilitation and preservation techniques. For Region 5, the maintenance activities focus on roads in the moderate and high drivability since 50% and 25% of the maintenance budgets are allocated for applying single chip seals and crack seal, respectively. This could be due to the extremely low maintenance funding allocated to LVRs in Region 5.

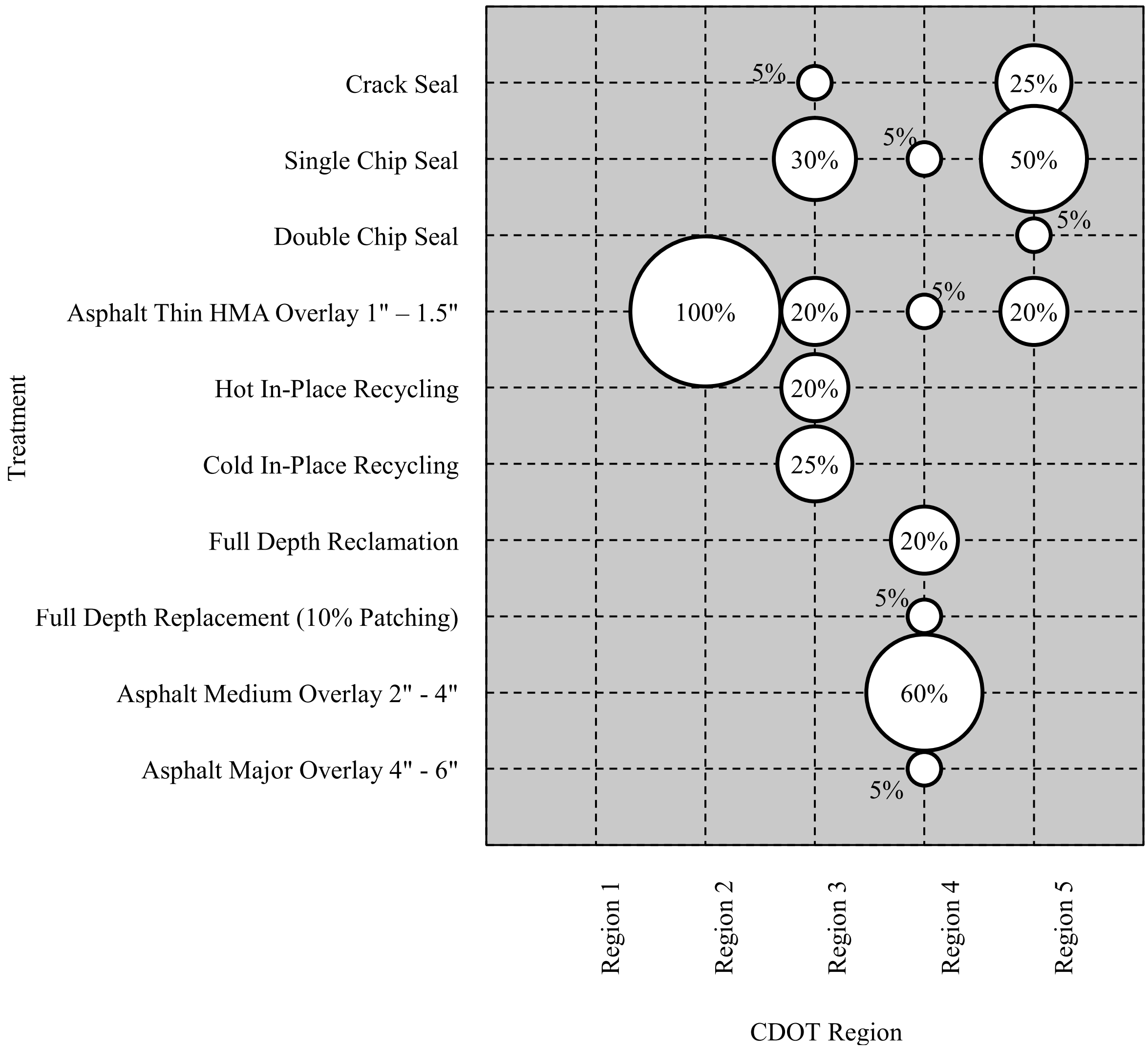


Figure 3.6. Percentage of Total Annual Budgets Allocated to Pavement Treatments of Low-Volume Roads.

3.5.3 Decision Making

Most CDOT regions follow a systematic process when selecting pavement treatments for LVRs. Figure 3.7 shows the most commonly used condition indices and pavement management data utilized for LVRs. DL is the primary parameter considered when selecting pavement treatments. In terms of individual pavement distresses, transverse and fatigue cracking are the most common pavement defects addressed while maintaining low-volume roads. This is due to the fact that LVRs in Colorado exhibit low deterioration rates in terms of longitudinal, rutting, and ride indices according to the historical condition data (Hafez et al., 2017b).

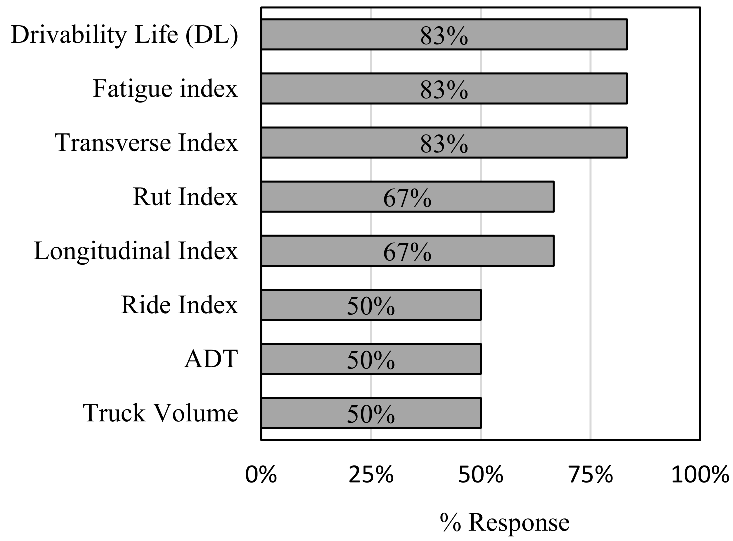


Figure 3.7. Pavement Condition Indices/Data Considered When Selecting Pavement Treatments for Low-Volume Paved Roads.

The survey also asked how the pavement treatment options are selected based on DL. The maintenance decisions were found to be made based on the DL category, as well as threshold values of DL. The current practice of maintenance decisions was compiled from the different regions by taking the weighted average of DL threshold values, as shown in Figure 3.8. Although crack seals are commonly applied to roads in high drivability status, the treatment can still be recommended to roads with a DL value of 8.5 years. Full depth replacement with 10% patching is always applied when the pavement is out of service (DL = 0). This application includes targeted rehabilitation of selected places of up to 10% of the road surface. It should be noted that this application is recommended to be surfaced with thin overlay along the total length of road segment.

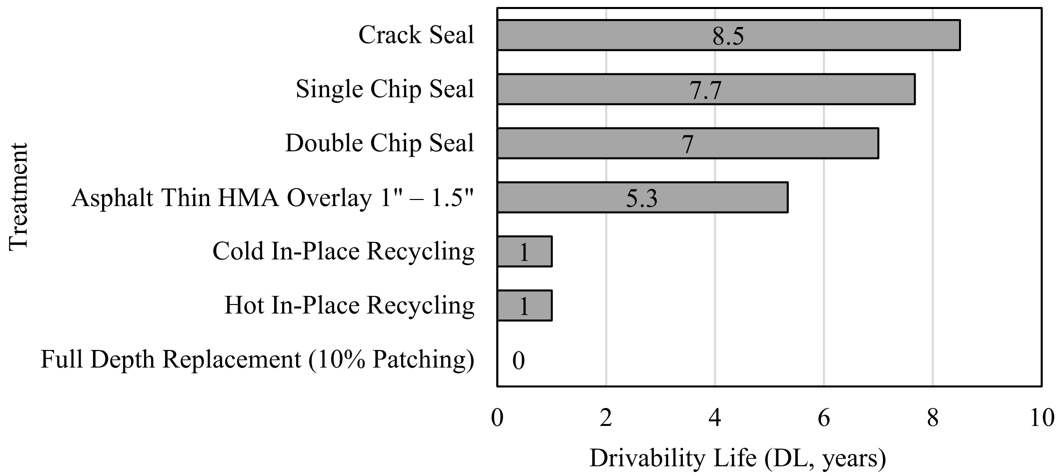


Figure 3.8. Threshold Values of Drivability Life for Selecting Pavement Treatments on Low-Volume Roads.

3.5.4 Regional Experience of Pavement Maintenance Effectiveness

The previous results for budget allocations and decision making on LVRs imply different treatment applications and practices. The diverse maintenance practices among regions show different effectiveness of pavement treatment alternatives depending on the existing condition and the available budgets allocated to LVRs. First, the results of the survey do not recommend applying any surface treatments directly on poor pavements. The effectiveness of surface treatments on severely distressed LVRs are displayed in Figure 3.9. Based on the previous experience, none of the surface treatments were found to be effective for severe distresses. Lack of knowledge still remains for the effectiveness of some surface treatments such as ultra-thin overlays and stress absorbing membranes due to limited applications.

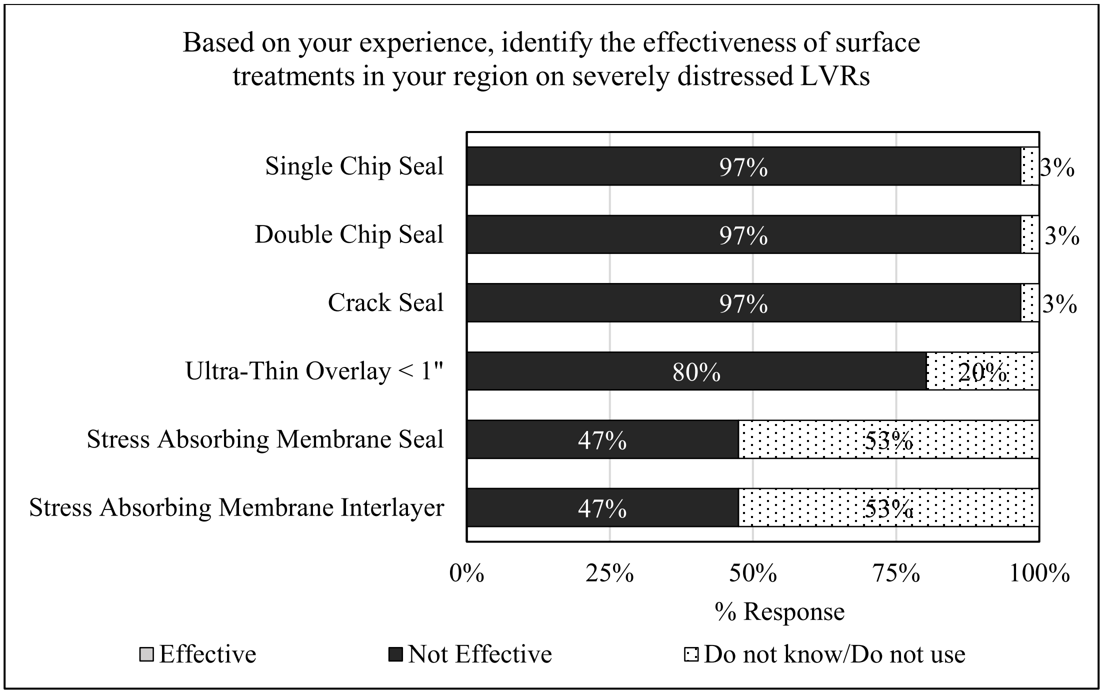


Figure 3.9. Effectiveness of Surface Treatments on Severely Distressed Roads.

For light rehabilitation techniques, the effectiveness of each treatment option was collected on the basis of previous experience and the type of pavement distress. Figure 3.10 summarizes the weighted effectiveness of pavement treatments in the various regions. CIR, HIR, and FDR provide the highest effectiveness to improve the pavement performance of the different distresses. It was determined that thin overlays are not effective to enhance the performance of pavement in terms of cracking indices. Thin overlays have the ability to improve only road roughness and pavement rutting.

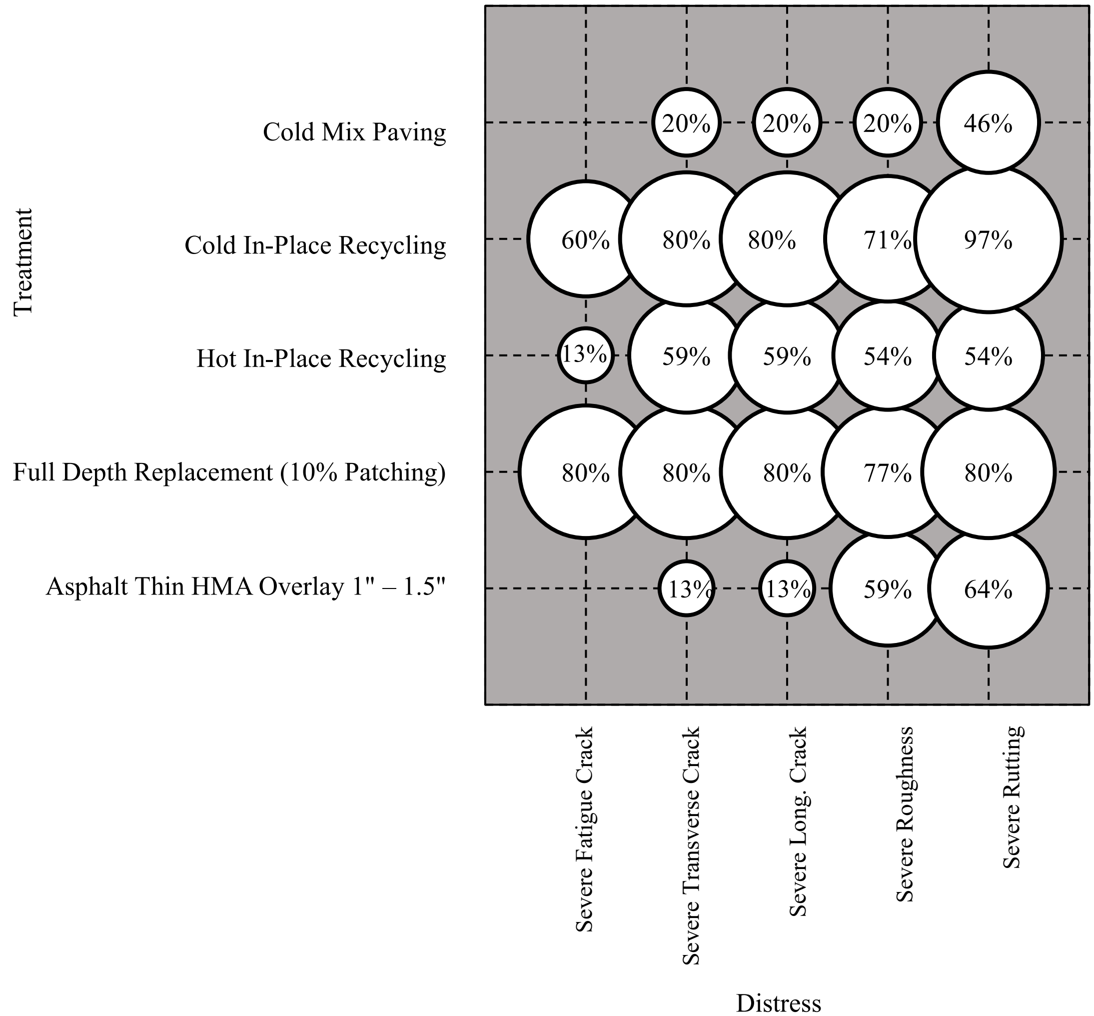


Figure 3.10. Percentage of Effectiveness of Low-Cost Treatments on Severe Distresses.

Previous experience also reveals that when recycling the existing distressed pavement before applying surface treatments, the effectiveness of these applications increases significantly. Region 3 recommends applying chip seal over hot in-place recycled pavement. Also, the combination of CIR and thin overlay was preferred by most regions to enhance the overall performance of pavement. However, the procedure of selecting these combinations differs among regions. Region 3 applies such strategies when funding is available and according to the regional maintenance planning. The distress type is considered when combining light rehabilitation with surface treatments in Region 4. The full-depth replacement technique is applied for fixing the most severe cracks before overlaying. Milling and FDR is recommended to enhance rough spots of pavements before applying thin overlays.

3.5.5 *Optimization analysis*

Among the five engineering regions of CDOT, only two regions currently perform optimization analysis when selecting maintenance strategies for LVRs. The objective of optimization analysis in Region 3 is to find the maintenance activities that can fit their maintenance budgets. Region 4 is trying to maximize the overall DL of the road network within the available annual maintenance budgets. Despite few applications of optimization analysis statewide, all regions recommend optimizing their resources while managing LVRs. As shown in Figure 3.11, maximizing DL and optimizing budgets are the most recommended optimization strategies for LVRs.

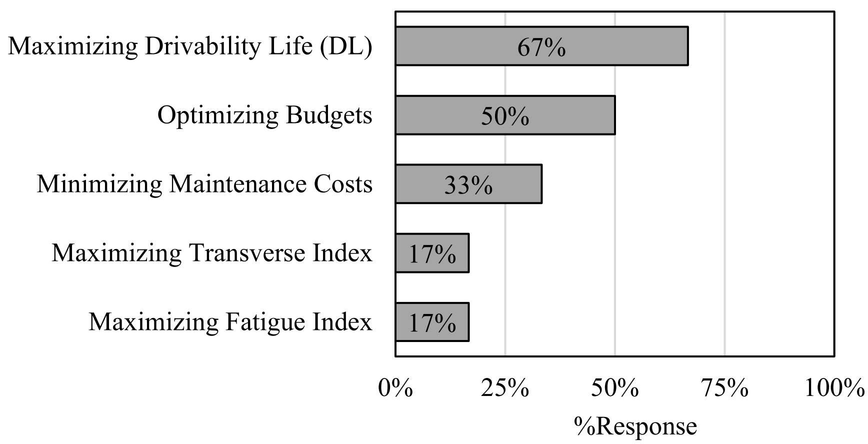


Figure 3.11. Optimization Strategies Recommended for Low-Volume Paved Roads.

3.5.6 *Potential Improvement of the Current Practice*

In addition to the current practice of managing LVRs, the survey asked about potential improvements to increase the overall benefit of LVRs maintenance. Figure 3.12 emphasizes that most pavement engineers in CDOT think that the current maintenance resources cannot sufficiently maintain or rehabilitate low-volume paved roads. Region 1 and 3 are satisfied with the recent trend of maintenance practice. The small LVR network may explain the level of satisfaction found in Region 1. However, the finding of satisfied maintenance resources can be linked with the responses received from Region 3 to highlight some of maintenance practices as one of the best practices to satisfy the current needs of managing LVRs.

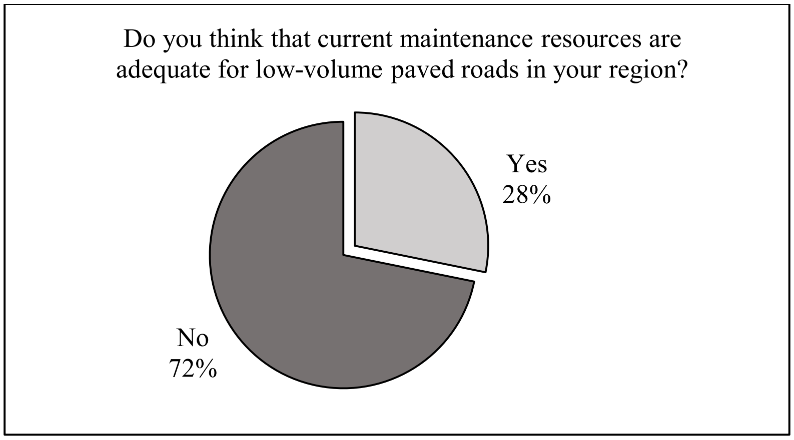
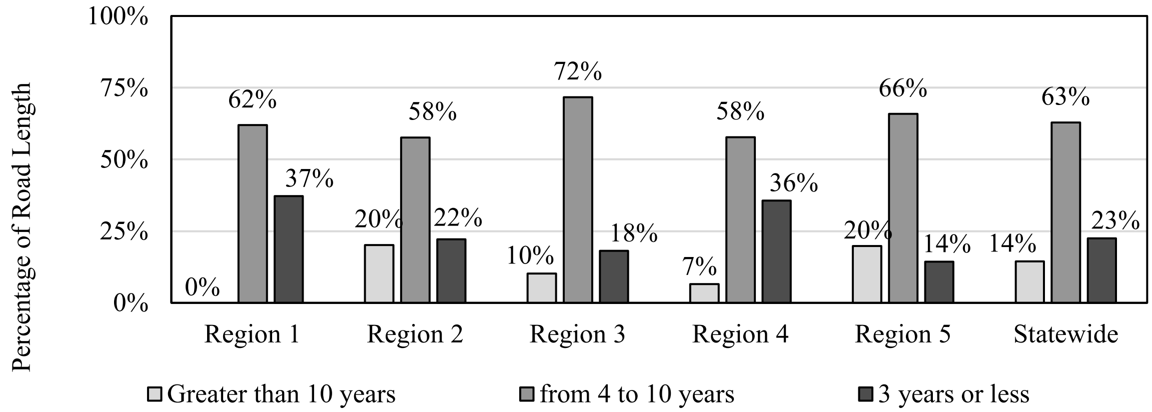


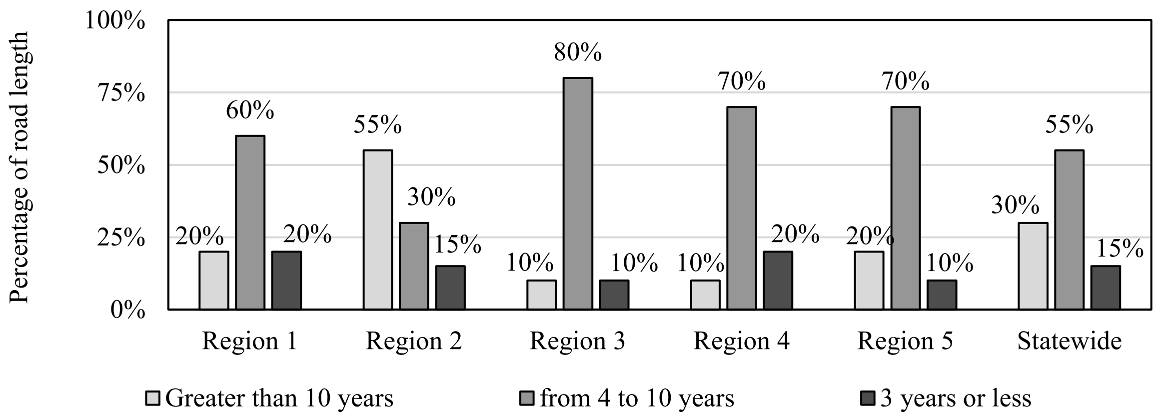
Figure 3.12. Regional Feedback about Resources Adequacy for Low-Volume Paved Roads.

On the other hand, all the respondents were invited to suggest potential changes for improving the current maintenance practice of LVRs. Some of these suggestions imply expanding the volume of maintenance investments between CDOT and the state contractor's association. The extremely limited bids and contract awards for LVRs maintenance negatively affect the ability to treat the pavement effectively. In some regions, maintenance funds are categorized by the Colorado Transportation Commission (TC). These categories involve maintenance activities set by project severity. However, most of project funds for LVRs are very limited. The overall level of funding is recommended to be determined considering the current condition of roads and PMSs recommendations of pavement maintenance planning obtained for LVR network. In regions where CIR, HIR, and FDR are not applied, some recommendations were provided about integrating recycling techniques and innovative treatments for pavement maintenance. In addition, the process of pavement preservation should be considered at the optimal time to extend the service life of pavements before they degrade into low drivability levels.

At the end of the survey, the participants were asked about the regional target percentage of road miles for each DL category after five years. The long-term target of CDOT is to attain high or moderate drivability life for 80 percent of the road network statewide by 2025 (CDOT, 2017). Figure 3.13 shows the mileage percentage of current and target pavement conditions in each region and statewide. In comparison with the current condition derived from the descriptive analysis, it can be noticed that Region 3 is the closet region to the CDOT performance targets. This could explain why Region 3 is satisfied with the current resources and maintenance practices considered for LVRs. However, the statewide maintenance planning still needs to integrate effective pavement treatments and innovative techniques to meet the performance targets set for Colorado LVRs.



(a)



(b)

Figure 3.13. Percentage of Low-Volume Roads Length for each Drivability Life Category: (a) Current Condition; (b) Target Performance.

3.6 Chapter Summary

Lower management standards and priority are applied to the pavement preservation of LVRs due to tight maintenance budgets. In 2018, a regional survey of practice was conducted to collect information on the pavement management and maintenance programs applied to LVRs in Colorado. The objective is to identify efficient management practices and techniques for the benefit of implementation and guidance. LVRs are found to be maintained with diverse treatment practices among five engineering regions managed by CDOT. In addition, the results highlight the cost-effectiveness of some pavement treatment strategies based on the field experience and regional practice. These strategies vary from applying only thin overlays to poor pavement to combining recycling techniques and surface repairs at different conditions. However, most of regions are not satisfied with maintenance resources currently allocated on LVRs. The modest maintenance budgets are allocated on roads depending on regional guidance and general maintenance policy. Limited applications of optimization analysis were found while managing LVRs in Colorado. In addition, multi-year maintenance plans are recommended to investigate in order to achieve specific performance targets set by each CDOT region. The outcome of this survey provides detailed guidelines on how current practices can be adjusted to increase the effectiveness of state policies for managing LVRs.

CHAPTER 4: DEVELOPING PAVEMENT MAINTENANCE OPTIMIZATION MODELS FOR LOW-VOLUME PAVED ROADS

4.1 Introduction

This chapter presents an approach of artificial-intelligence optimization analysis that provides a network-level maintenance decision support system on LVRs. As mentioned earlier, the evaluation study of historical conditions on LVRs proposed alternative treatments to increase the effectiveness of CDOT maintenance plans. However, a comprehensive optimization analysis is required to study the long-term effectiveness of the proposed treatments compared to commonly applied maintenance plans of CDOT. The optimized maintenance alternatives were comprehensively investigated for a case study of LVRs in CDOT Region 4 over a specific planning horizon. Genetic algorithms were applied in the optimization models because they are capable of resolving the computational complexity of optimization problems in a timely fashion. The specific optimization constraints and limitations prevailing LVRs are addressed and introduced in the problem formulation of optimization process.

4.2 Optimization Problem Formulation

At the network level, most optimization models in PMSs are segment-linked (Ferreira et al., 2002a; Ferreira et al., 2002b; Morcous and Louis, 2005; Mathew and Isaac, 2014). That set of road segments are identified every year where maintenance actions should be applied. Therefore, a decision variable (X_{st}) should be optimized for each segment (s) and at a time (t). The optimal solution of maintenance activities for every year must satisfy specific objective functions. These functions are identified by DOT's policy and decision makers, and according to the available management resources allocated for LVRs. The following subsections describe some of the important objective functions for local pavement management systems.

4.2.1 Pavement Performance Maximization

The first strategy is to maximize the overall pavement performance within an annual maintenance budget. This strategy is applied when the network-level funding is inadequate to repair the road network. As shown in Equation 4.1, the objective function is to maximize the overall weighted drivability life ($OWDL_t$) of the road network every year. Pavement performance can be weighted by different variables such as road length, ADT, ADTT, or the associated risk of maintenance (Saha and Ksaibati, 2016). However, the LVRs network tends to show low variability of traffic volumes statewide. Also, the risk of applying low-cost surface treatments is not significant on LVRs which have low economic and service return, compared to the rehabilitation projects of primary roads. In the proposed optimization model, the OWDL_t only considers the lengths of road segments (l_s) as the weighting factor so that long segments would have maintenance priorities. The main constraint of formulating this objective function is the total costs, including all maintenance treatments (m), must be less than the available budget, see Equation 4.2. The expected performance of pavement depends mainly on an optimal set of X_{st} which is an integer variable of '0' for "do nothing" and '1' when a maintenance is applied to the road, see Equation 4.3.

$$Maximize\text{: OWDL}_t = \frac{\sum_{s=1}^{S} \text{DL}_{st} * l_s}{\sum_{s=1}^{S} l_s} \tag{4.1}$$

subject to,

$$\sum_{m=1}^{M} \sum_{s=1}^{S} X_{st} \text{ Cost}_{mst} \leq \text{Budget}_t;\ \forall t = 1 \text{ to } T \tag{4.2}$$

$$X_{st} \in \{0, 1\};\ \ \forall t = 1 \text{ to } T;\ \forall s = 1 \text{ to } S \tag{4.3}$$

where,

OWDL_t: overall weighted drivability life at a time t,
DL_{st}: drivability life value at the end of a time interval t for a segment s
l_s: length of road segment,
S: Total Number of Segments, and
T: End of Analysis Period.

Equation 4.4 formulates the DL_{st} value at the end of a time interval t for each segment s. For "do nothing" option, the DL value of the previous year (e.g., $\text{DL}_{s(t-1)}$) is expected to be decreased by an annual decline of DL (dDL) due to pavement deteriorations. When applying a maintenance activity m (e.g., $x_{st} = 1$), the pavement improvement is introduced by an increase in the DL value $(\Delta\text{DL})_{sm}$ caused by the treatment. The amount of dDL and $(\Delta\text{DL})_{sm}$ can be estimated based on expertise or it can be determined using deterministic performance and improvement models for each condition index.

$$\text{DL}_{st} = \text{DL}_{s(t-1)} + X_{st}(\Delta\text{DL})_{sm} - (d\text{DL} - X_{st}\, d\text{DL}) \tag{4.4}$$

where,

$(\Delta\text{DL})_{sm}$= Expected drivability life increase due to a maintenance; and

dDL = Annual drivability life decline due to pavement deterioration.

4.2.2 Maintenance Costs Minimization

In this strategy, the present worth of the total maintenance cost (TMC) is minimized as shown in Equation 4.5. Any future costs are discounted to the base year of the analysis period using a discount rate (r). This strategy is applied when a minimum performance target (OWDL_{min}) is required to achieve by the end of the analysis period (T) as shown in Equation 4.6.

$$Minimize\text{: TMC} = \sum_{m=1}^{M}\sum_{s=1}^{S}\sum_{t=1}^{T}\frac{1}{(1+r)^t} X_{st}\ \text{Cost}_{mst} \tag{4.5}$$

subject to,

$$\text{OWDL}_T \geq \text{OWDL}_{min} \tag{4.6}$$

It can be noted that the decision variable in this strategy has a length of (S * T). At network level, the decision variable comprises a large number of segments that are candidates for maintenance over the analysis period. This affects the computational efficiency of GAs analysis in the optimization model. Thus, the objective function should be modified to have a smaller number of decisions in each model. Morcous and Lounis (2005) proposed grouping the road segments into distinctive characteristics such as type, material properties, operating loads, and environmental conditions. However, LVRs networks exhibit low variability of the main characteristics so classifying roads into groups is not a practical method. Therefore, the large-scale optimization model of this strategy is formulated as shown in Equation 4.7 where the total annual maintenance costs in each year (TMC_t) are minimized. The modified objective function reduces the length of the decision variable to be (S * 1). In this case, the pavement performance target needs to be distributed linearly or nonlinearly every year according to the management needs.

$$Minimize\text{: } \mathrm{TMC}_t = \sum_{m=1}^{M} \sum_{s=1}^{S} X_{st} \ \mathrm{Cost}_{mst}; \ \forall t = 1 \text{ to } T \quad (4.7)$$

4.2.3 Multi-objective Optimization

The objective functions of both strategies, mentioned above, can be combined into a single model shown in Equation 4.8. Since they are different in the optimizing process, the maximization problem of OWDL_t is converted into a minimization one using the transformation (1/ OWDL_t). All of the previously mentioned constraints can be included in this model. This strategy includes multi-objective optimization problems with nonlinear constraints which requires a complex GAs analysis to reach a feasible solution. In some cases, the solution remains infeasible to satisfy the constraints after a number of trials defined by stopping criteria. The unsatisfied solution then is subjected to a penalty process defined by the analyst (Goldberg, 1989).

$$Minimize\text{: } \frac{\mathrm{TMC}_t}{\mathrm{OWDL}_t} \quad (4.8)$$

4.3 Case Study: Low-Volume Paved Roads in Region 4

A case study of Region 4 was analyzed to determine the impact of different maintenance policies on future pavement performance and budget levels. In this analysis, pavement condition of the 2016 condition data set was used for pavement maintenance optimization. During that time, the LVRs network of Region 4 incorporated 85 road segments distributed on total 422 miles, as shown in Figure 4.1. The mileage distribution of different drivability categories of pavement is shown in Figure 4.2(a). Region 4 has various traffic amounts with different DL categories as shown in Figure 4.2(b). About half of LVRs (48% of road miles) have moderate DL values. There are 41% of road miles in the low DL category of less than three years while only 11% of roads have high drivability lives of more than 10 years. Most traffic volumes are not more than 800 vehicles per day. The diverse pavement condition and traffic volumes would support the validity of the optimization models since most treatment options are included in the analysis with different deterioration amounts.

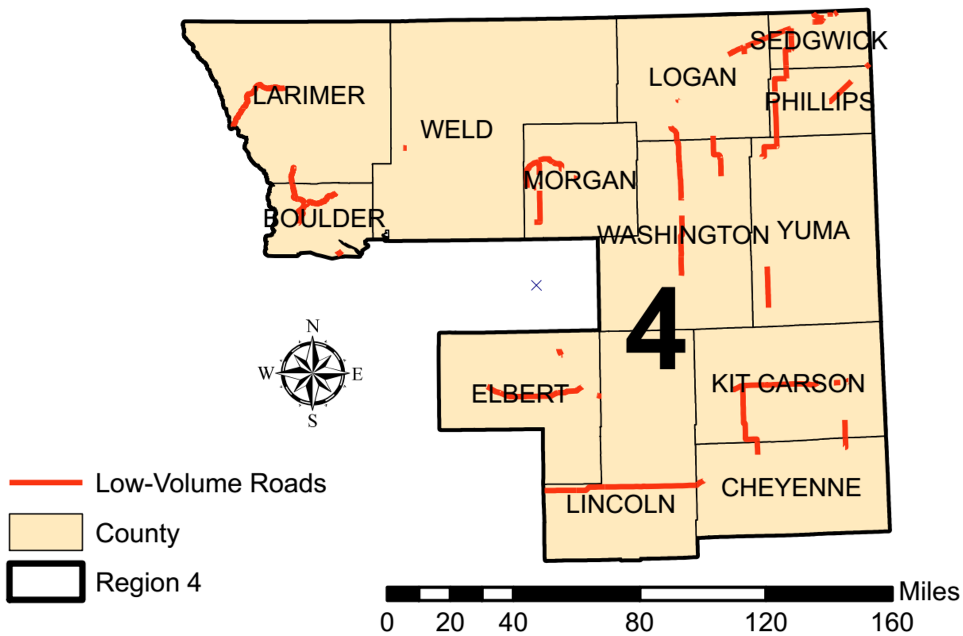
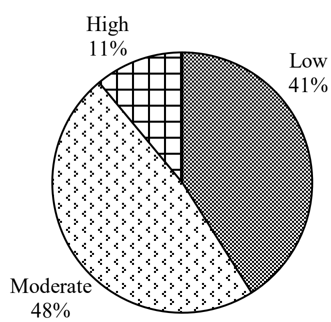
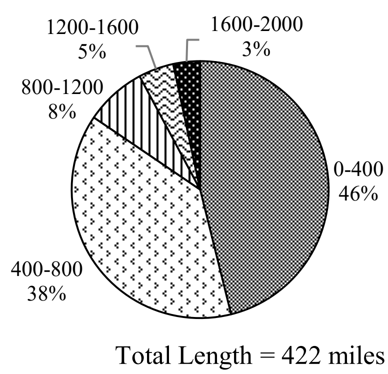


Figure 4.1. Low-Volume Roads in Colorado Region 4.

Category	DL (Years)
Low	0 - 3
Moderate	4 - 10
High	>10





(a) **(b)**

Figure 4.2. Mileage distribution of Region 4 low-volume paved roads: (a) drivability life; (b) average daily traffic (vehicles per day).

4.3.1 Pavement Treatment Strategies

Two maintenance strategies were investigated in the optimization analysis. The first strategy includes only statewide common practices of maintaining LVRs in the three categories of DLs, as listed in Table 4.1. The second strategy integrates alternative rehabilitations of in-place recycling and full-depth replacement to balance between pavement preservation and capacity improvement on LVRs. Three pavement rehabilitation alternatives involving recycling technologies were integrated with the first strategy. These treatments are:

- CIR layer surfaced with a chip seal (ACHP),
- CIR layer with an asphalt thin overlay (ATHO), and
- Full depth replacement (FDR) with 10% patching.

All treatment options were included in a developed decision tree shown in Figure 4.3. Fatigue and transverse indices were found to have a significant impact to enhance the overall drivability of roads (Hafez et al., 2017b). Therefore, trigger values of fatigue and transverse cracking were considered for each treatment option. The methodology of selecting triggers were derived from the effectiveness of treatments. This term depends on the initial condition of pavements and it is not fixed. The treatment evaluation study performed a comprehensive analysis on the past performance of the applied treatments. It was able to define the lower limit of each condition index where treatments were found to be effective (Hafez et al., 2017b). Accordingly, the trigger values were assigned in the decision tree in which they do not go below the minimum effective values to ensure effectiveness of treatments.

Table 4.1. Pavement Treatment Policy of Statewide Common Practices on Low-Volume Paved Roads.

DL Category	Treatment	Description
High	GM	General Maintenance
Moderate	ACHP	Asphalt Chip Seal
Low	ATHO	Asphalt Thin Overlay < 1.5″

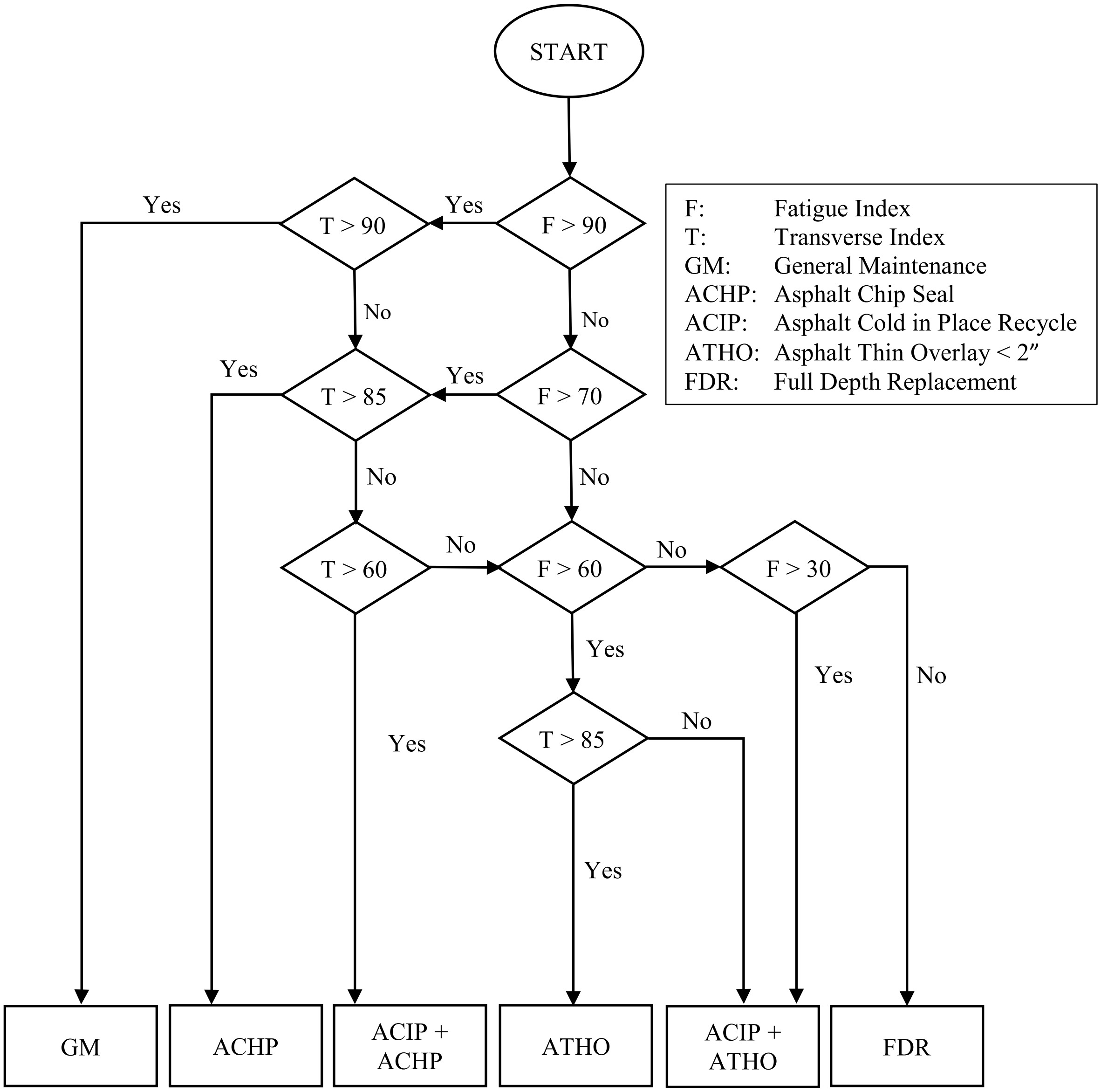


Figure 4.3. Decision Tree of the Alternative Maintenance Strategy.

4.3.2 Multi-Year Optimization Analysis Scenarios

For Region 4, the overall weighted DL is 4.87 years. This value was aimed to change over the analysis period with different scenarios. Table 4.2 lists four maintenance scenarios followed in the optimization analysis. The first scenario was to keep the overall drivability life steady over time by eliminating the overall annual deterioration of the network. The second scenario was to achieve an overall DL target that has an improvement of 10% at the end of the analysis period. Scenario III and IV optimized the maintenance activities to achieve improvement amounts of 20% and 30%, respectively. Including different scenarios in the optimization analysis allows decision makers to investigate the impact of allocating different maintenance budgets. At the end of the analysis, a summary was developed showing the costs required for each maintenance policy.

Table 4.2. Maintenance Scenarios of Optimization Analysis.

		Performance Targets ($OWDL_t$, years)	
Scenario	Maintenance Objective	From 2016	To 2025
Scenario I	Steady State	4.87	4.87
Scenario II	+10% Improvement	4.87	5.36
Scenario III	+20% Improvement	4.87	5.85
Scenario IV	+30% Improvement	4.87	6.33

NOTE: $OWDL_t$ = Overall Weighted Drivability Life in years

As explained in the formulation of optimization problems, the second strategy of minimizing costs is applied in the multi-year analysis of Region 4. The total annual maintenance costs are minimized to demonstrate the economic impact of maintenance alternatives on the desired performance targets of the different scenarios at network level. The costs were obtained from CDOT and they are listed in Table 4.3. These costs are based on the dollar value of 2016 which is the base year of the analysis period.

Table 4.3. Estimated Maintenance Unit Costs for Colorado Department of Transportation.

Maintenance	Cost (Lane – mile)
GM	$3,000
ACHP	$42,240
ACIP + ACHP	$77,440
ATHO	$151,360
ACIP + ATHO	$186,560
FDR (10% Patching)	$195,350

The multi-year optimization process for selecting treatments is shown in Figure 4.4. The 0.1-mile pavement condition data is aggregated along each road segment using the average values. At the base year, all segments are assigned with the proper treatment option according to each maintenance strategy. Then the decision to maintain segments is optimized using the developed optimization models. For the subsequent years over the analysis period, the future pavement conditions are projected for both treated and untreated roads. For those roads receiving treatments, the expected improvement of each condition index was identified in the treatment evaluation study as a function of treatment type and the initial value of the index, as listed in Table 4.4. Accordingly, the term $[\mathrm{DL}_{s(t-1)} + (\Delta\mathrm{DL})_{sm}]$ in the optimization model was determined. In addition, untreated roads are expected to have annual deterioration amount for each condition index. Despite the different deterioration rates among road segments, overall performance curves were previously developed for condition indices, as listed in Table 4.5. These models were included to project the next-year condition at network level.

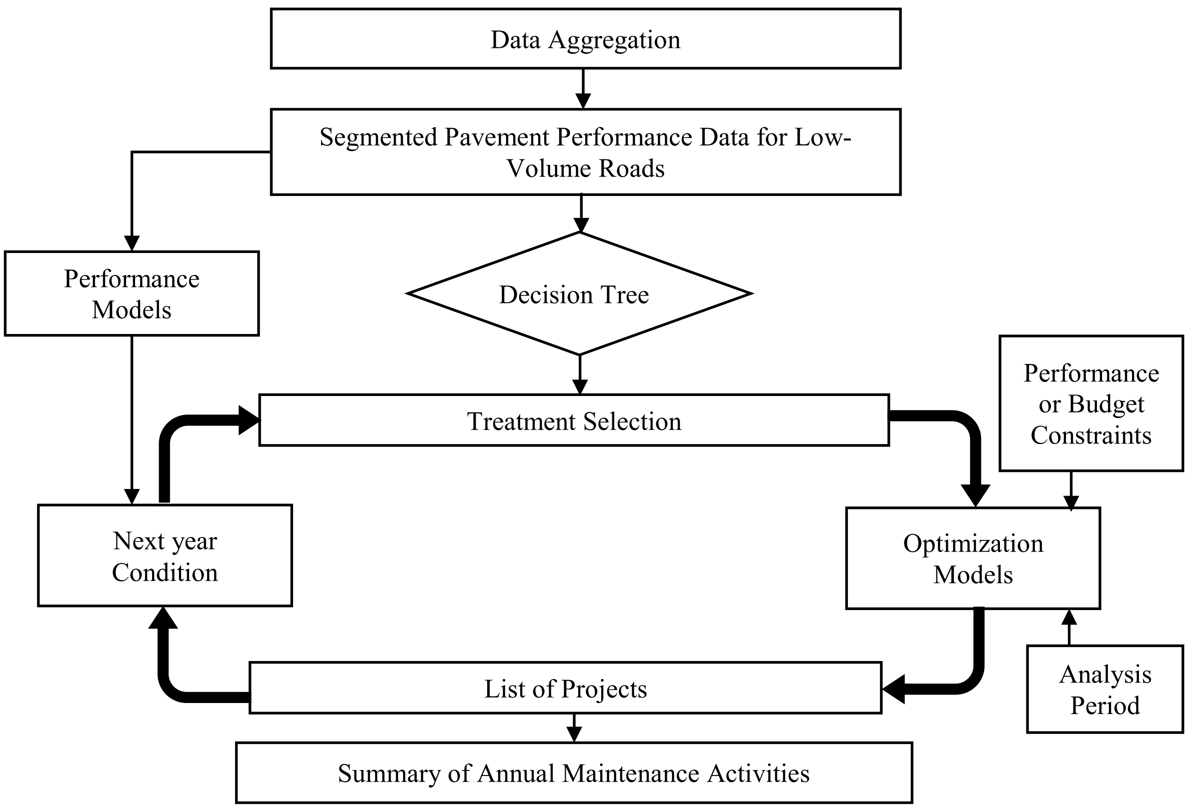


Figure 4.4. Multi-Year Maintenance Planning of Low-Volume Paved Roads.

Table 4.4. Improvement Models of Effective Treatments on Low-Volume Paved Roads (Hafez et al., 2017b).

	Fatigue Index	
Treatment	Terminal value	R-square
ACHP	$87.91 + 0.121 * FATIG\_IDX_{(i)}^{*}$	0.8748
ACIP	$79.61 + 0.204 * FATIG\_IDX_{(i)}$	0.8704
ATHO	100	–
FDR	100	–
	Longitudinal Index	
Treatment	Terminal value	R-square
ACIP	$93.79 + 0.062 * LONG\_IDX_{(i)}$	0.7329
ATHO	100	–
FDR	100	–
	Transverse Index	
Treatment	Terminal value	R-square
ACIP	100	–
FDR	100	–

*i: Initial Condition Index

Table 4.5. Deterministic Performance Models of Low-Volume Paved Roads (Hafez et al., 2017b).

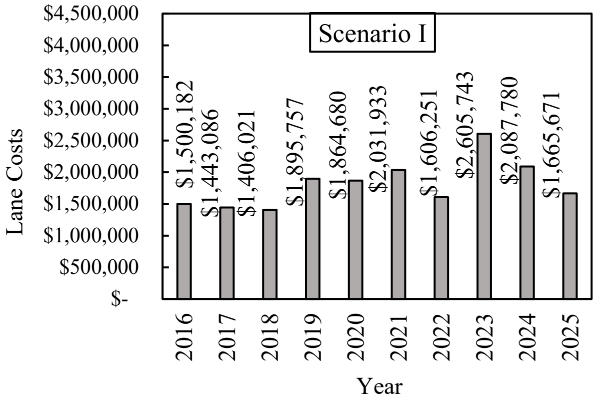
Index	Model	R-square
Fatigue Index	$y = 100 – 0.043 x^3 + 0.213 x^2 – 0.438 x$	0.815
Longitudinal Index	$y = 100 – 0.025 x^3 + 0.266 x^2 – 1.167 x$	0.755
Transverse Index	$y = 100 – 0.038 x^3 + 0.502 x^2 – 3.953 x$	0.826
Ride Index	$y = 100 – 1.7242 x$	0.891

NOTE: “y” represents the condition index; “x” represents the pavement age in years

4.4 Optimization Results

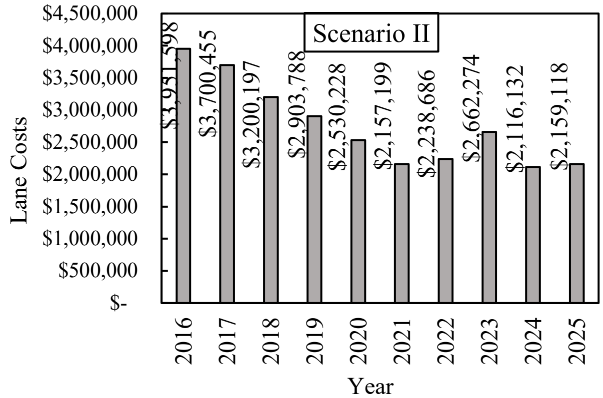
Since the optimization model does not have budget constraints, all analysis periods yielded a theoretical optimized solution. The minimum annual performance targets were attained in each maintenance scenario in a reasonable time. The optimized cash flow diagrams of Region 4 are shown in Figure 4.5 (for Scenario I and II) and Figure 4.6 (for Scenario III and IV). At the base year of 2016, all the allocated budgets of the alternative strategy are less than half of the budgets of the policy of common treatments. The reason is that about 50% of the LVRs network have low DL values. Most of these roads were optimized with lower-cost alternatives such as cold in-place recycle with chip seals. The costs of the alternative treatments are almost half of the costs of thin overlays applied in the model of the first strategy.

Over the study period, it was found that the alternative maintenance strategy allocates almost uniform annual budget except the costs at 2023. When the targeted improvement increased in each scenario, the annual costs slightly increased except scenario IV where a significant improvement target is required to achieve. On the other hand, the policy of applying only chip seals and thin overlays requires much higher budgets at the beginning of the analysis period. Then the costs decreased over time which shows a good performance of the maintenance activities. However, the annual costs increased after 2020 for all scenarios which reveal the short-term effectiveness of the applied treatments. Chip seals provide short-term effectiveness if the condition indices are below specific values derived from the evaluation study (Hafez et al., 2017b). However, all roads in the moderate category were optimized with chip seals regardless the value of the condition indices. Also, the application of thin overlays should not be applied directly on severely damaged roads without considering appropriate pre-overlay treatments. Although the post-treatment performance of thin overlays is expected to be high, some untreated defects may reflect cracks directly to the overlaid pavements. As a result, treated roads show higher deterioration rates.



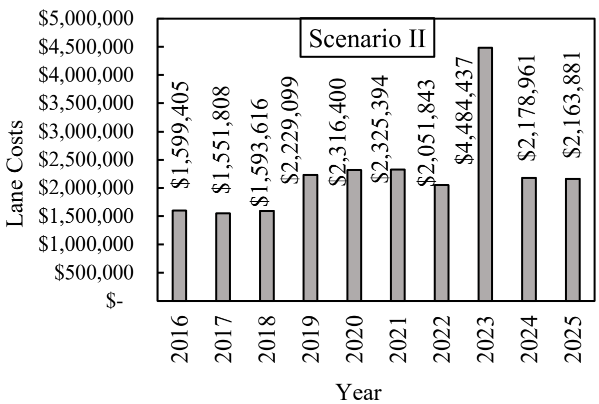
PV$_{(i = 4\%,\ N = 9)}$ = $15,884,518

(i)



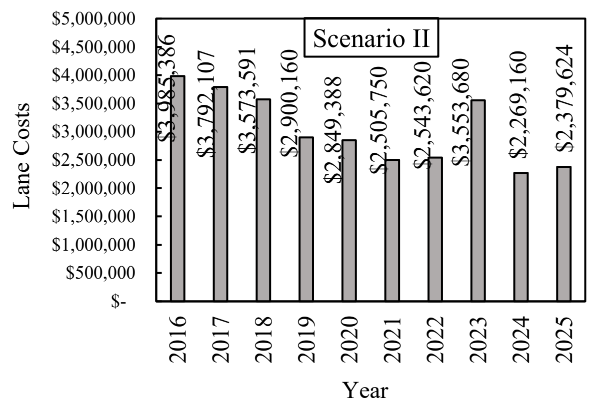
PV$_{(i = 4\%,\ N = 9)}$ = $24,692,938

(ii)



PV$_{(i = 4\%,\ N = 9)}$ = $19,497,707

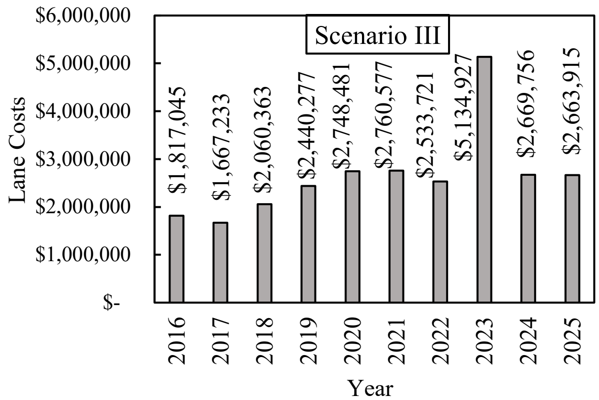
(i)



PV$_{(i = 4\%,\ N = 9)}$ = $27,038,867

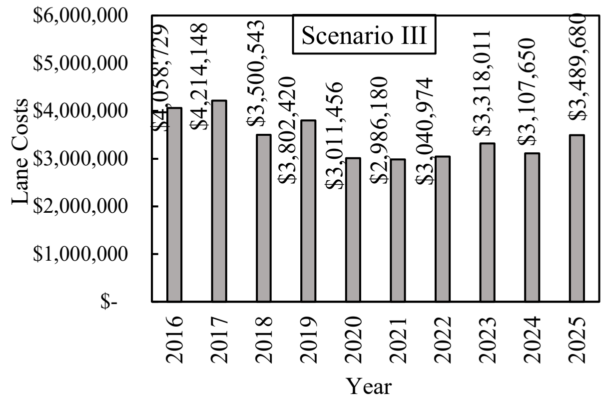
(ii)

Figure 4.5. Region 4 Cash Flow Diagram for Scenario I And II: (*i*) Alternative Maintenance Strategy; (*ii*) Current Maintenance Strategy.



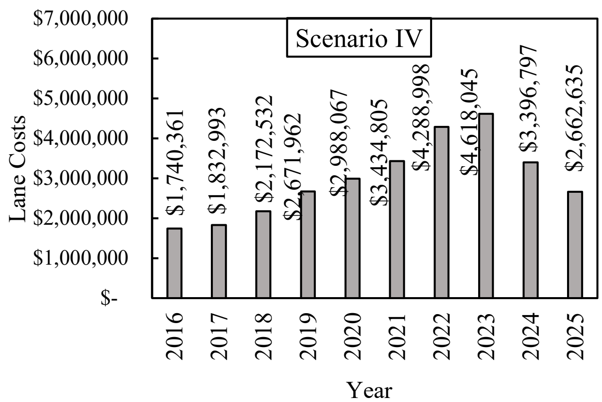
$PV_{(i = 4\%, N = 9)} = \$22,929,504$

(i)



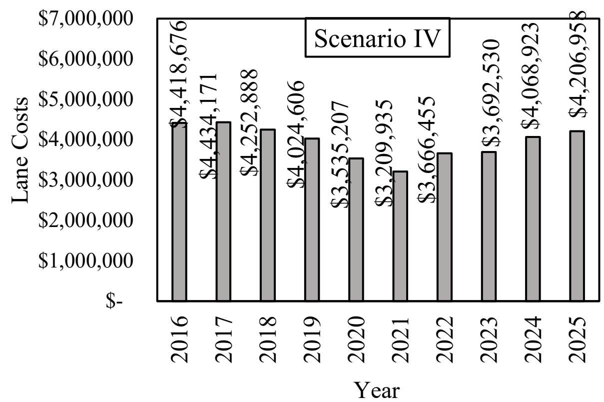
$PV_{(i = 4\%, N = 9)} = \$30,582,204$

(ii)



$PV_{(i = 4\%, N = 9)} = \$25,871,755$

(i)



$PV_{(i = 4\%, N = 9)} = \$34,752,030$

(ii)

Figure 4.6. Region 4 Cash Flow Diagram from Scenario III And IV: (*i*) Alternative Maintenance Strategy; (*ii*) Current Maintenance Strategy.

In order to compare between the total costs required for each maintenance strategy, all the allocated funds were discounted to the base year of 2016 using a discount rate of 4%. It can be seen that all present values (PVs) of the alternative maintenance strategy are less than those of the currently applied policy. Also, the total discounted value increased with increasing the targeted pavement improvement in each maintenance strategy. It was found that a sensitivity analysis is recommended to incorporate a cost-benefit comparison of the two policies on each maintenance scenario.

4.5 Sensitivity Analysis

It is highly recommended to identify the maximum benefits of different allowable treatments on LVRs. The benefit-cost analysis (BCA) is applied in PMSs to evaluate the economic strength of different maintenance alternatives over the lifespan of pavements (Sallman et al., 2012). The benefit-cost ratio represents the compound benefits of treatment selection. However, the maintenance benefits should be determined in the same currency of costs. This is not practical on LVRs where a low return is expected due to the low social impact of LVRs. For simplicity purpose, the benefit from applying the alternative maintenance strategy is introduced by the percentage of cost saving given the current budget. This amount is weighted by the corresponding condition level target as shown in Equation 4.9.

$$\%Benefits = \frac{PV_{current} - PV_{altr.}}{PV_{current}} * (1 + \%\text{Improv.}) * 100\% \quad (4.9)$$

where,

$PV_{current}$: Present value of current maintenance costs,

$PV_{altr.}$: Present value of alternative maintenance costs, and

$\%\text{Improv.}$: Percentage of target improvement of the overall drivability.

Figure 4.7 displays the percentage of benefits estimated for each maintenance scenario. The results show that the alternative maintenance strategy achieves the maximum benefit when the overall pavement performance is aimed to be steady overtime. The second recommended strategy was found to be the fourth scenario where an improvement of 30% is achieved at the end of the tenth year. It is obvious that there is no significant difference among all scenarios. Also, the optimized budget levels, required to achieve the fourth scenario, are much more than may be available to LVRs. Therefore, it is recommended to apply the first maintenance scenario to keep the overall pavement performance of the network steady over the planning period.

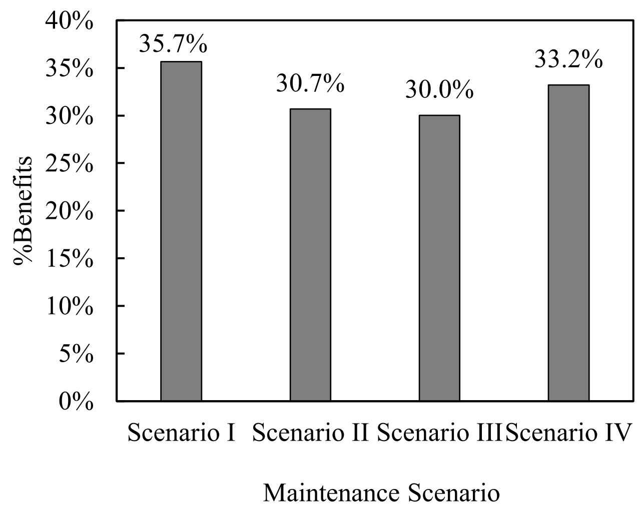


Figure 4.7. Percentage of Benefits of Applying Alternative Maintenance Strategy.

4.6 Chapter Summary

In this chapter, the multi-year optimization techniques were explained to support decision makers with a set of optimal maintenance activities to achieve specific pavement performance targets. This study applies large-scale optimization to compare between the CDOT maintenance policy of applying commonly treatment options, such as chip seals and thin overlays, and an alternative strategy recommended for low-volume paved roads in Colorado. Genetic algorithms were applied in the optimization models because they are capable to resolve computational complexity of optimization problems in a timely fashion. The optimized maintenance alternatives were comprehensively investigated for a case study of LVRs network in CDOT Region 4 over a planning horizon from 2016 to 2025. This region was found to be a representative case for the statewide analysis due to the diverse pavement condition and traffic volumes. The results of both performance and cost analysis show that the proposed maintenance strategy can increase the cost-effectiveness of maintenance planning on LVRs compared to the common application policy. Although increasing the performance targets of LVR network add higher drivability values to the pavement, the associated benefits are not significant. Thus, preserving the overall pavement performance of LVRs in a steady state provides much more benefit-cost saving for LVRs. This approach is expected to be efficient to quantify the mid and long-term financial impact of different treatment policies applied to LVRs statewide.

CHAPTER 5: STATEWIDE MAINTENANCE IMPLEMENTATION PLANS

5.1 Introduction

In this chapter, the statewide optimization analysis of Colorado LVRs is conducted. The findings from the network-level optimization models in Chapter 4 provide valuable tools to CDOT decision makers to determine the optimal budget allocations. Using the 2017 pavement condition data, the statewide effectiveness of currently available budgets is estimated using multi-year analysis. In addition, the impact of different condition targets and treatment policies is also investigated among CDOT regions to provide appropriate assessment on the required network budgets of LVRs. First, the regional maintenance practice is defined for each CDOT region. The current practices were modified by adding proposed treatments. These modifications allow decision makers to balance between commonly applied treatments in each region and recommended maintenance and light rehabilitation options derived from the regional survey and optimization analysis. The volume of maintenance activities for common treatments are then constrained to a specific level to show the effect on the multi-year analysis compared to the global optimum strategies. The results from the statewide implementation plans should be a useful reference for CDOT decision makers to establish future budget needs and treatment policy of a specific target of network condition state.

5.2 Maintenance Practice

The current pavement maintenance practice of Colorado LVRs was derived from the regional survey and can be summarized as varied applications of surface treatments combined with light rehabilitations. Due to the small size of low-volume road network in Region 1, roads are limited to treatments with chip seals and thin overlays. However, most experts in Region 1 do not recommend applying thin overlays on poor roads without appropriate pre-overlay rehabilitations of the distressed pavement. Similarly, the current maintenance program in Region 2 is limited to only treating roads with a 1.5-inch overlay with surgical deep repairs. The previous experience emphasizes that these applications are effective on poor roads to only improve roughness. Experts in Regions 1 and 2 emphasize the effectiveness of in-place recycling of the existing pavement to eliminate severe cracks. In Region 3, CIR and HIR are integrated with chip seals and thin overlays to improve the performance of roads with moderate and low drivability lives. However, these applications provide different effectiveness in terms of individual distresses. Also, FDR and full-depth replacement are applied in Region 4 to rehabilitate the road before they are surfaced with a single chip seal or thin overlay. It was found that, using this technique, Region 4 can effectively eliminate severe distresses using FDR, and prevent cracks reflecting in the overlaid pavement. Region 5 routinely makes maintenance decisions considering only DLs. The regional engineers are convinced that combining CIR with thin overlay can enhance the pavement performance of badly deteriorated roads.

Accordingly, the current practices were reviewed by adding proposed treatment options that provide higher potential to enhance the effectiveness of maintenance plans. The proposed treatments in each region are shown in Table 5.1. It has been shown that thin overlay is not a cost-effective treatment for pavements with low drivability conditions. Therefore, thin overlay is not an allowable treatment for poor and very poor pavements but can be used for pavements with fair conditions. Also, CIR surfaced with thin overlay was proposed for severely distressed pavement to effectively maintain cracks with high severity levels.

Table 5.1. Pavement Maintenance Strategies of Low-Volume Roads for Statewide Implementation Plans.

		(a) High Drivability Life: more than 10 years				
Treatment	Description	Region 1	Region 2	Region 3	Region 4	Region 5
GM	General Maintenance	x	x		x	x
ACHP	Chip Seal			x	x	
		(b) Moderate Drivability Life: from 4 to 10 years				
Treatment	Description	Region 1	Region 2	Region 3	Region 4	Region 5
GM	General Maintenance	x	x	x	x	x
ACHP	Chip Seal	x	x	x	x	x
GM + ATHO	General Maintenance + Thin Overlay	x	x	x	x	x
AHIP + ACHP	Hot In-Place Recycle + Chip Seal			x		
		(c) Low Drivability Life: 3 years or less				
Treatment	Description	Region 1	Region 2	Region 3	Region 4	Region 5
AHIP + ACHP	Hot In-Place Recycle + Chip Seal			x		
FDR + ATHO	Full Depth Reclamation + Thin Overlay				x	
ACIP + ATHO	Cold In-Place Recycle + Thin Overlay	x	x	x		x

In addition to treatment types, three main assumptions were addressed in the statewide multi-year optimization plans, which are:

- pavement treatment triggers,
- expected drivability life after applying treatments, and
- expected loss in drivability life for untreated roads.

The results from the regional survey provide appropriate estimates of these parameters. Based on the previous experience of regional survey participants, the treatment triggers were averaged from each CDOT region (Regional Survey, Question 11) and they are listed in Table 5.2. In addition, it is assumed that these treatments would provide a specific enhancement in the drivability life of LVRs and the terminal values of DLs are shown in Table 5.3. These values were averaged from the improved DL values estimated by experts of the regional survey respondents (Questions 13, 14, and 15). Although DL is projected using individual condition indices, the expected DL value of untreated roads can be estimated using the existing condition. DL is basically a serviceable life and the expected loss in DL annually should be one year regardless the deterioration rates of different distresses.

Table 5.2. Pavement Maintenance Triggers for Low-Volume Paved Roads.

Treatment	DL, years	Fatigue Index	Longitudinal Index	Transverse Index	Ride Index
GM	6 – 10	80	80	80	-
ACHP	6 – 10	85	85	85	85
GM + ATHO	3 – 6	70	-	80	70
AHIP + ACHP	3 – 6	70	70	70	70
FDR + ATHO	0 – 3	-	-	-	-
ACIP + ATHO	0 – 3	-	-	-	-

Table 5.3. Expected Pavement Drivability Life of Low-Volume Roads after Applying Treatments.

Treatment	(a) High Drivability Life: more than 10 years
GM	12 years
ACHP	12 years
Treatment	**(b) Moderate Drivability Life: from 4 to 10 years**
GM	10 years
ACHP	+4 years*
GM + ATHO	+5 years*
AHIP + ACHP	12 years
Treatment	**(c) Low Drivability Life: 3 years or less**
AHIP + ACHP	10 years
FDR + ATHO	15 years
ACIP + ATHO	15 years

* These values are expressed by an amount of increase in drivability life

5.3 Descriptive Analysis

During statewide optimization plans, the 2017 pavement condition data was used as the base year of the multi-year analysis. Historical data of pavement conditions in the five regions was received from CDOT, and included the five distress indices and DLs collected by *Pathway Services Inc*. The pavement condition data were collected every 0.1 mile. Summaries of road mileage in different condition categories are shown for the five regions in Figure 5.1 through Figure 5.5. A thorough look on these graphs show that more than 80% of road length has excellent pavement conditions in terms of fatigue cracking. Therefore, the optimization models are expected to recommend more activities of chip seals on roads having drivability lives ranging from 6 to 10 years due to this option's low unit cost. On the other hand, diverse distributions of roads were found among transverse and ride categories. This would require different applications of thin overlays and in-place recycling depending on the overall existing condition of LVRs and optimization problem constraints. Almost all roads have excellent conditions of pavement rutting. Therefore, only four condition indices were considered for treatment triggers on LVRs in Colorado.

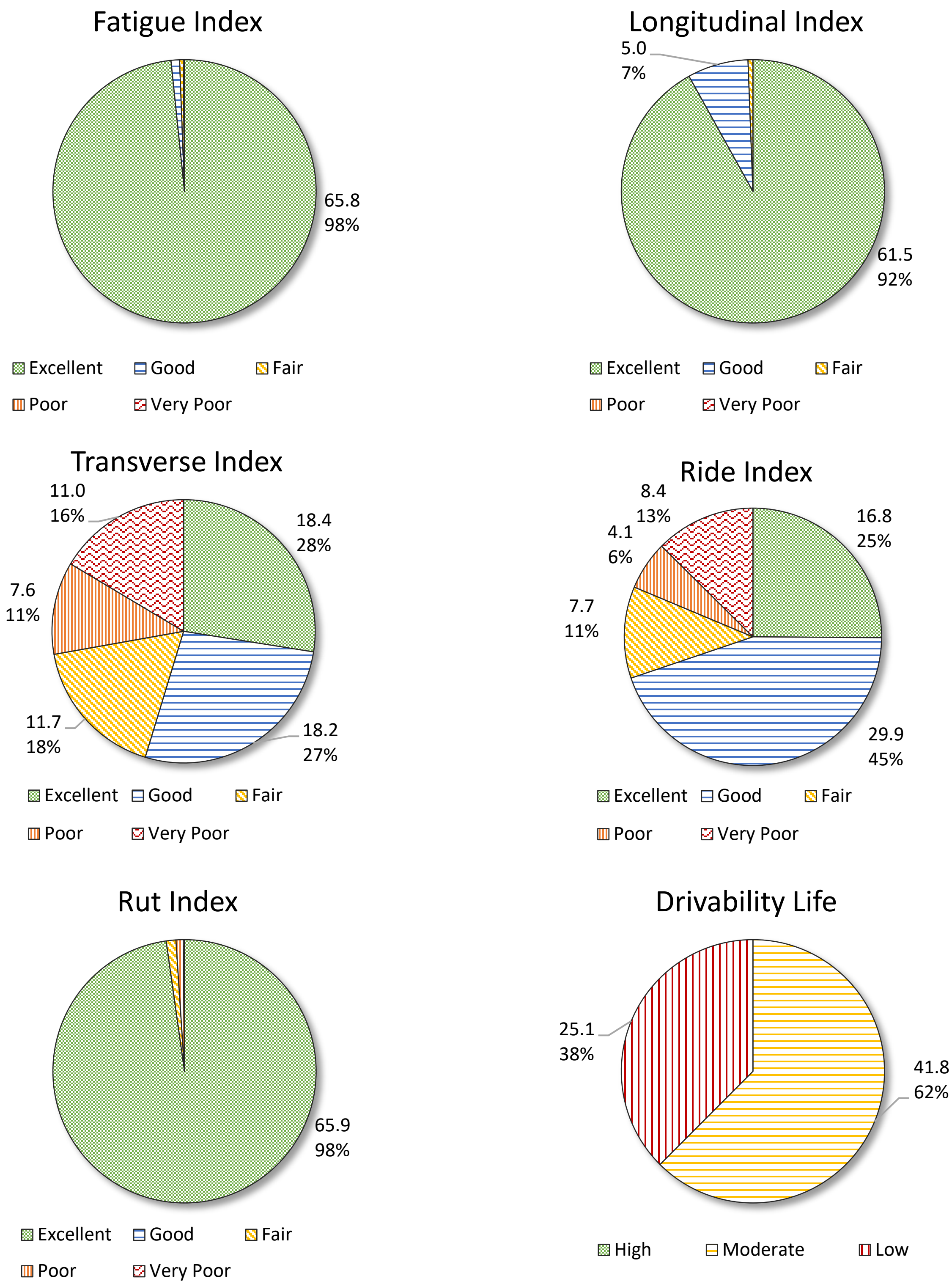


Figure 5.1. Mileage Distribution of 2017 Pavement Condition Summary of Low-Volume Roads in Region 1.

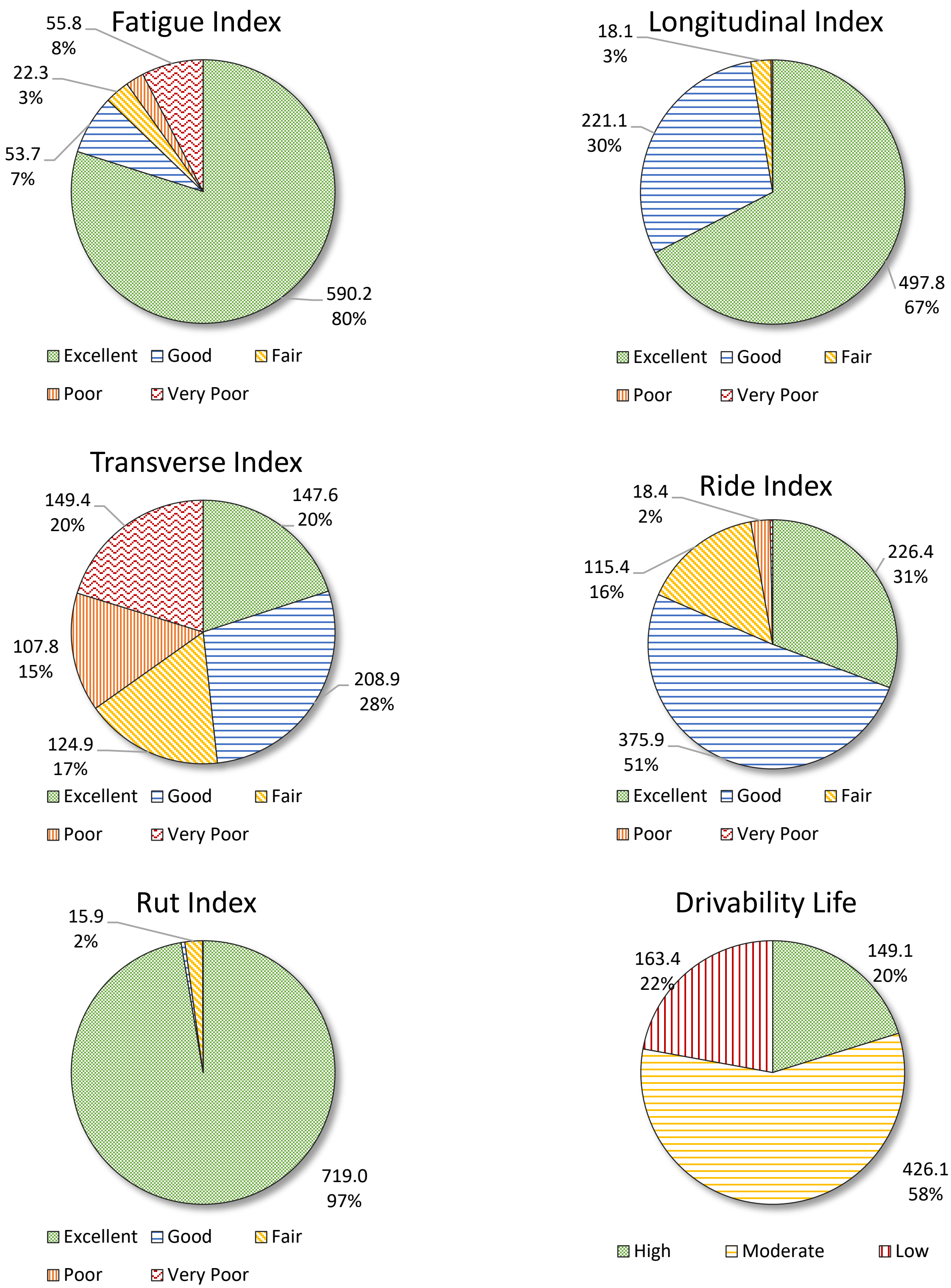


Figure 5.2. Mileage Distribution of 2017 Pavement Condition Summary of Low-Volume Roads in Region 2.

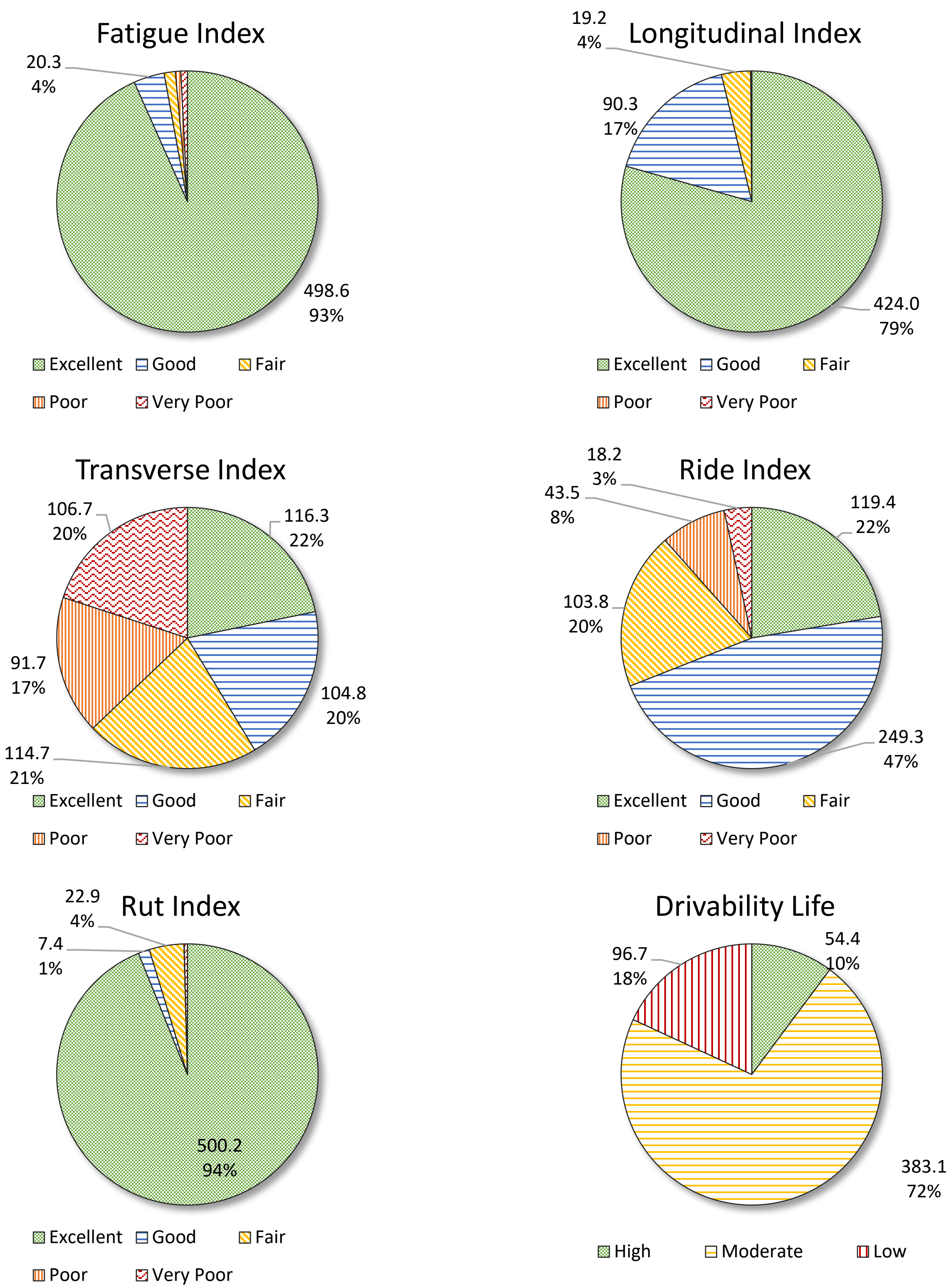


Figure 5.3. Mileage Distribution of 2017 Pavement Condition Summary of Low-Volume Roads in Region 3.

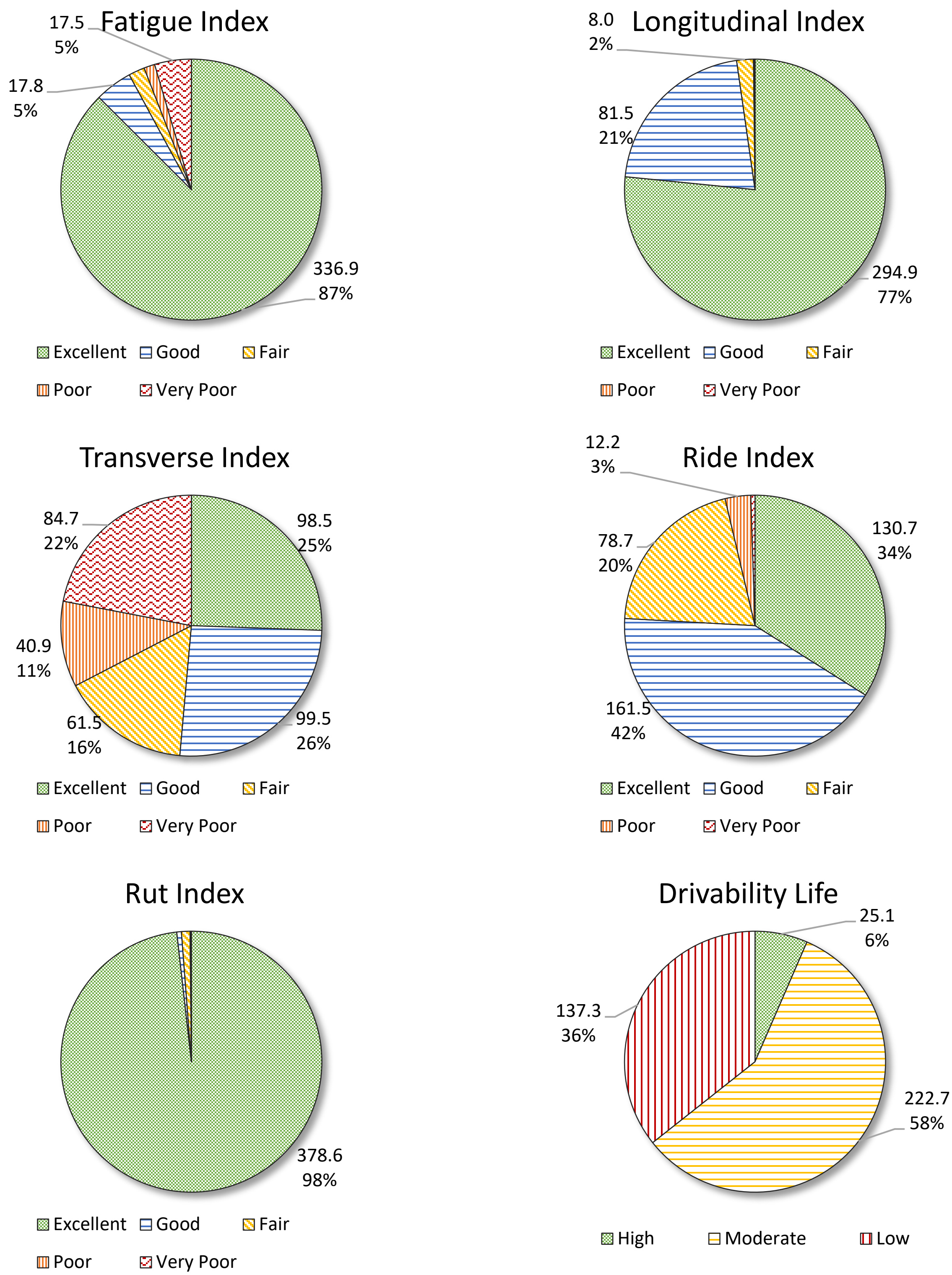


Figure 5.4. Mileage Distribution of 2017 Pavement Condition Summary of Low-Volume Roads in Region 4.

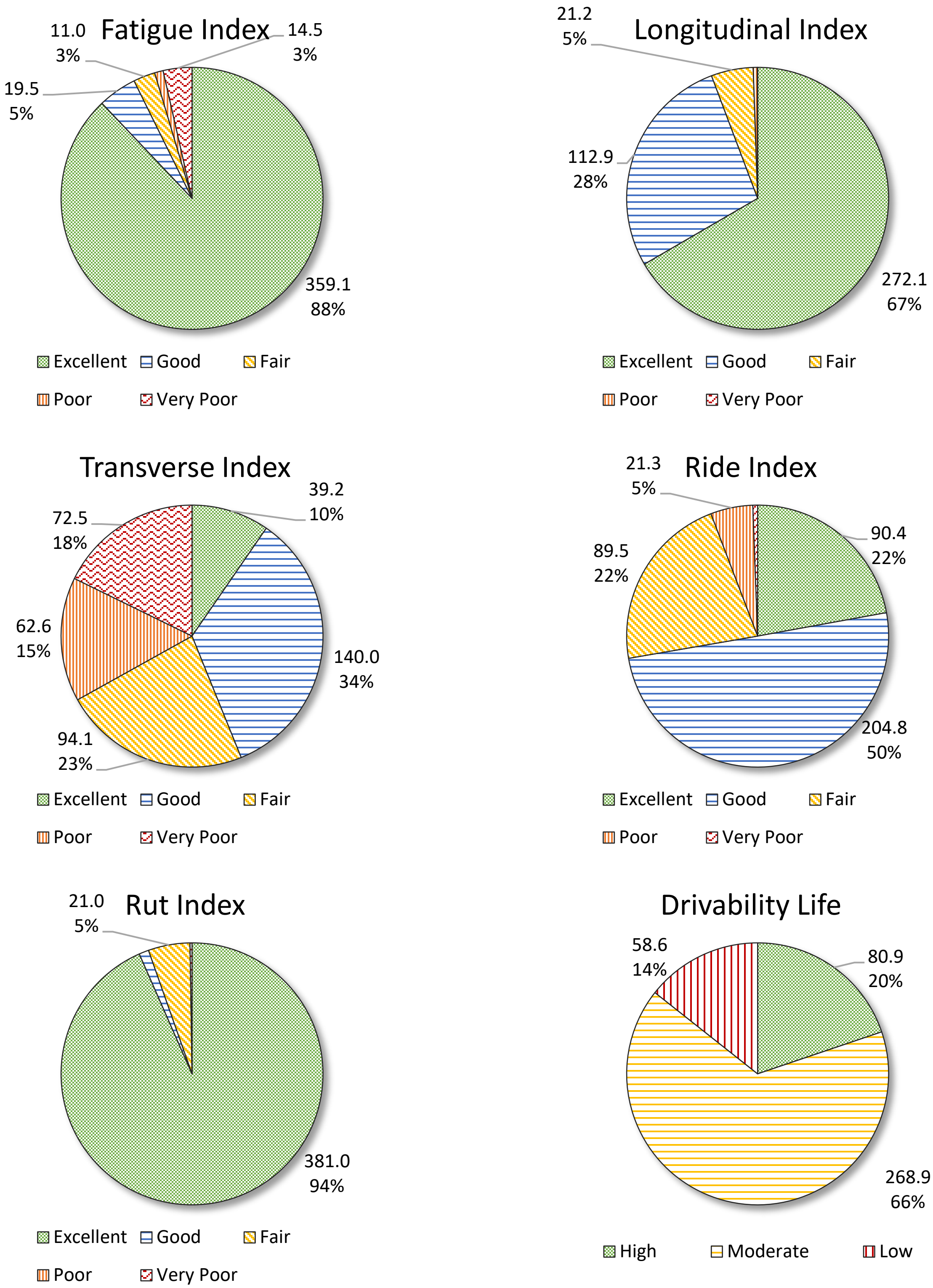


Figure 5.5. Mileage Distribution of 2017 Pavement Condition Summary of Low-Volume Roads in Region 5.

5.4 Optimization Strategies

The statewide maintenance optimization analysis was conducted separately on each CDOT region due to different pavement conditions, regional maintenance practices, and allowable budgets. The analysis period is assumed to be 8 years from 2017 to 2025. Table 5.4 shows characteristics of five optimization models considered for statewide analysis. In Model I, the impact of current maintenance budgets is defined through a performance maximization analysis where the total annual costs do not exceed annual budget constraints. Region 1 was excluded from Model I since there is no designated budget allocated specifically for LVRs in that region (Regional Survey, Question 3). The estimated unit costs of different options are listed in Table 5.5.

Similar to the case study of Region 4 in Chapter 4, cost-minimization models were investigated to define the budget needs for achieving desired performance targets (e.g., Models II, III, IV, and V). The 2017 overall weighted DL ($OVWDL_{2017}$) value of LVRs network in each region was determined, then the target values ($OVWDL_T$) were set for all cases depending on the optimization scenario of each optimization model.

Table 5.4. Optimization Models for Statewide Maintenance Analysis of Low-Volume Roads in Colorado.

Optimization Model	Maintenance Scenario	Objective	Region No.	Constraints: Annual Budget (million)	Constraints: Performance Target $OVWDL_{2017}$	Constraints: Performance Target $OVWDL_{2025}$
Model I	Budget Constraint	Performance Max.	1	N/A	5.26	N/A
	Budget Constraint	Performance Max.	2	$4.58	6.95	N/A
	Budget Constraint	Performance Max.	3	$3.42	6.61	N/A
	Budget Constraint	Performance Max.	4	$2.80	5.5	N/A
	Budget Constraint	Performance Max.	5	$0.80	7.29	N/A
Model II	Const DL	Costs Min.	1	N/A	5.26	5.26
	Const DL	Costs Min.	2	N/A	6.95	6.95
	Const DL	Costs Min.	3	N/A	6.61	6.61
	Const DL	Costs Min.	4	N/A	5.5	5.5
	Const DL	Costs Min.	5	N/A	7.29	7.29
Model III	+10% DL	Costs Min.	1	N/A	5.26	5.79
	+10% DL	Costs Min.	2	N/A	6.95	7.65
	+10% DL	Costs Min.	3	N/A	6.61	7.27
	+10% DL	Costs Min.	4	N/A	5.5	6.05
	+10% DL	Costs Min.	5	N/A	7.29	8.02
Model IV	+20% DL	Costs Min.	1	N/A	5.26	6.31
	+20% DL	Costs Min.	2	N/A	6.95	8.34
	+20% DL	Costs Min.	3	N/A	6.61	7.93
	+20% DL	Costs Min.	4	N/A	5.5	6.6
	+20% DL	Costs Min.	5	N/A	7.29	8.75
Model V	+30% DL	Costs Min.	1	N/A	5.26	6.84
	+30% DL	Costs Min.	2	N/A	6.95	9.04
	+30% DL	Costs Min.	3	N/A	6.61	8.59
	+30% DL	Costs Min.	4	N/A	5.5	7.15
	+30% DL	Costs Min.	5	N/A	7.29	9.48

NOTE: OVWDL = Overall Weighted Drivability Life; Max.= Maximization; Min. = Minimization; N/A = Not Applicable.

Table 5.5. Pavement Treatments Unit Cost for Low-Volume Roads Maintenance Plans.

Maintenance	Cost (Lane – mile)
GM	$3,000
ACHP	$42,240
AHIP+ACHP	$98,560
GM+ATHO	$154,360
FDR+ATHO	$183,040
ACIP+ATHO	$186,560

5.5 Effectiveness of Current Budgets on Future Pavement Performance

Table 5.6 shows the annual costs of pavement maintenance plans optimized using Model I. The detailed optimized decisions for all road segments in the four regions are listed in the Appendix B. The corresponding effectiveness of maintenance activities in 2025 should be projected in 2026 which is out of the analysis horizon. Therefore, costs were not optimized in 2025. The optimization results show that the average amount of statewide spending is $10,131,382 annually. This amount does not include the annual maintenance costs required by Region 1. The results show that most LVRs statewide are expected to have lower DLs by the end of 2025.

Table 5.6. Optimized Costs of Pavement Maintenance within Current Budgets – Model I.

Year	Region 2	Region 3	Region 4	Region 5
2017	$ 4,574,536	$ 3,407,232	$ 2,795,280	$ 796,536
2018	$ 4,578,792	$ 3,419,864	$ 2,793,512	$ 790,728
2019	$ 4,579,456	$ 3,404,856	$ 2,799,776	$ 769,240
2020	$ 4,574,024	$ 3,416,768	$ 2,799,688	$ 791,040
2021	$ 4,572,912	$ 3,416,624	$ 2,798,904	$ 774,720
2022	$ 4,578,496	$ 3,411,616	$ 2,794,144	$ 797,880
2023	$ 4,579,312	$ 3,406,232	$ 2,796,912	$ 798,768
2024	$ 4,578,488	$ 3,412,136	$ 2,797,912	$ 799,192
2025	--	--	--	--
PW (4%, 8)	$ 32,047,981	$ 23,890,620	$ 19,584,533	$ 5,527,920
Length, miles	738.8	534.3	385.5	408.4
$OVWDL_{2017}$	6.95	6.61	5.5	7.29
$OVWDL_{2025}$	4.85	5.90	4.42	2.83

The future performance of LVRs in each region is further displayed in Figure 5.6. Starting with LVRs in Region 2, the average annual deterioration of LVRs' overall DL is 0.26 years under the current maintenance budgets. By the end of the analysis period, the overall DL in Region 2 is expected to be 4.85 years with a total amount of loss of 30% in the current drivability value. An initial improvement was noticed for LVRs in Region 3 from 2017 to 2020, see Figure 5.6(b). This finding emphasizes the degree of satisfaction found in Region 3 where the pavement management practitioners believe the current resources are adequate for LVRs (Regional Survey, Question 27). However, the long-term analysis reveals that the current maintenance budgets should be slightly increased in order to achieve a better network condition. In Region 4, a lower amount of degradation is expected under current financial resources. The current maintenance budgets provide an annual average of pavement deterioration of only 0.13 years in the overall drivability of LVRs network. A total percentage of loss in DL of 20% is determined by 2025 in Region 4. Moving to Region 5, LVRs are expected to have significant loss in DL value due to the relatively small amount of maintenance budgets allocated to the 408.4 miles. The future performances of the road network in Region 5 under the current budgets are shown in Figure 5.6(d).

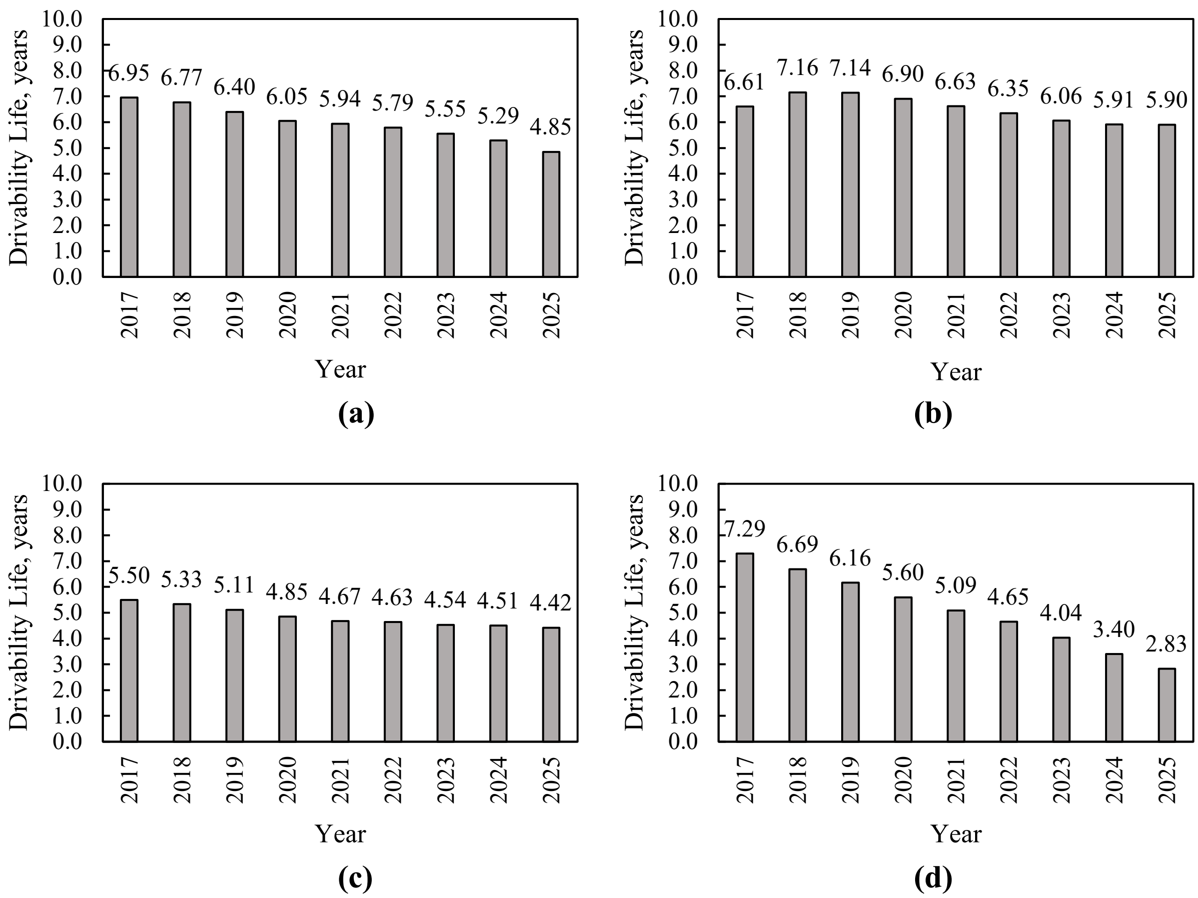


Figure 5.6. Expected Drivability Lives of Low-Volume Roads within Currently Available Budgets – Model I: (a) Region 2; (b) Region 3; (c) Region 4; (d) Region 5.

In addition to the optimized costs, Figure 5.7 shows how the total annual budgets were distributed among the allowable treatment options. Chip seals were recommended for most roads in moderate DL categories. Chip seals have maintenance unit costs of less than half of the costs for treatments in lower conditions. Therefore, almost 45% of the annual budgets were allocated to chip seals in Regions 2, 3, and 4. In Region 5, the percentage of budget allocation for chip seals was higher (e.g., 74% for chip seals) due to the extremely low maintenance budgets considered annually on LVRs in that region. It is also observed that applying thin overlays directly on roads was not recommended by the optimization model. The reason relates to the cost-effectiveness of thin overlays on LVRs. An extended drivability life of 5 years is expected after applying thin overlays. However, the unit cost is relatively high compared to the cost-effectiveness of combining overlays with in-place recycling. The combined treatments increase the maintenance costs by an average amount of only 20%. Meanwhile, the corresponding extension in drivability life is more than 12 years which represents an increase in treatment effectiveness of more than 140% compared to thin overlays. Due to the higher benefit-cost ratio of combined treatment options, almost 45% of maintenance budget was assigned to in-place recycling plus thin overlays.

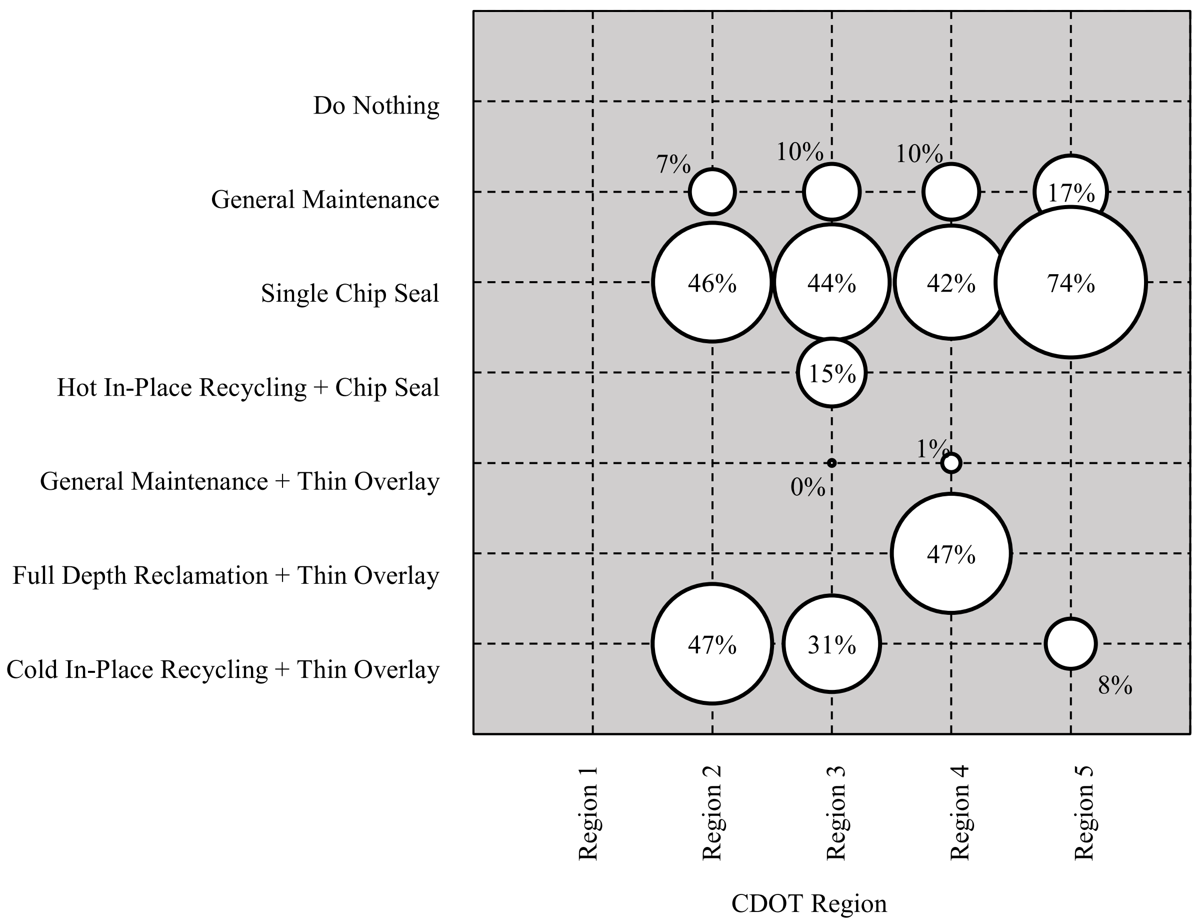


Figure 5.7. Optimized Distributions of Maintenance Costs Among Treatment Options - Model I.

5.5.1 Constrained Maintenance Budget Allocation for Model I

A significant change in current maintenance practices may not be recommended by pavement maintenance practitioners. Thin overlays are applied extensively on LVRs in Colorado, consequently, the volume of maintenance activities of thin overlays can be set to a predefined amount as an additional constraint. These amounts should be consistent with the current activities of thin overlays applied on LVRs. The consequences of considering this policy was investigated. An additional constraint was added to Model I to consider a minimum amount of maintenance activities for thin overlays. According to the current practice, the percentage of budget allocation of thin overlays was set for CDOT regions as follows:

- Region 2: subject to %Budget for thin overlay ≥ 70%,
- Region 3: subject to %Budget for thin overlay ≥ 15%,
- Region 4: subject to %Budget for thin overlay ≥ 15%, and
- Region 5: subject to %Budget for thin overlay ≥ 15%.

The optimized decisions of modified analysis in Model I are provided in Appendix C and Figure 5.8 shows the expected overall DL values of LVRs. In general, the overall DL values were downgraded compared to the global optimum solutions of Model I shown previously in Figure 5.6. A significant amount of decrease was found in Region 2 due to the high percentage of budget allocation to thin overlays. The overall DL value of the road network is expected to be 3.63 years by 2025, see Figure 5.8(a), which provides a percentage of loss in drivability value of 47%. The main reason of such significant decline in the future performance relates to the reduction in both chip seals and cold in-place recycling applications while increasing the activities of thin overlays under the same budget. In this situation, the amount of maintenance activities of chip seals dropped from 46% to 15% whereas activities of cold in-place recycle plus thin overlay dropped from 47% to only 9%, as shown in Figure 5.9. On the other hand, the terminal DL values were slightly decreased in Regions 3, 4, and 5. Also, minor changes were noticed in the budget distribution of these regions among treatments in the modified analysis compared to the global optimum. The minimum amount of thin overlay applications was reduced in Region 5 to 11% due to the limited budgets with respect to the length of road segments.

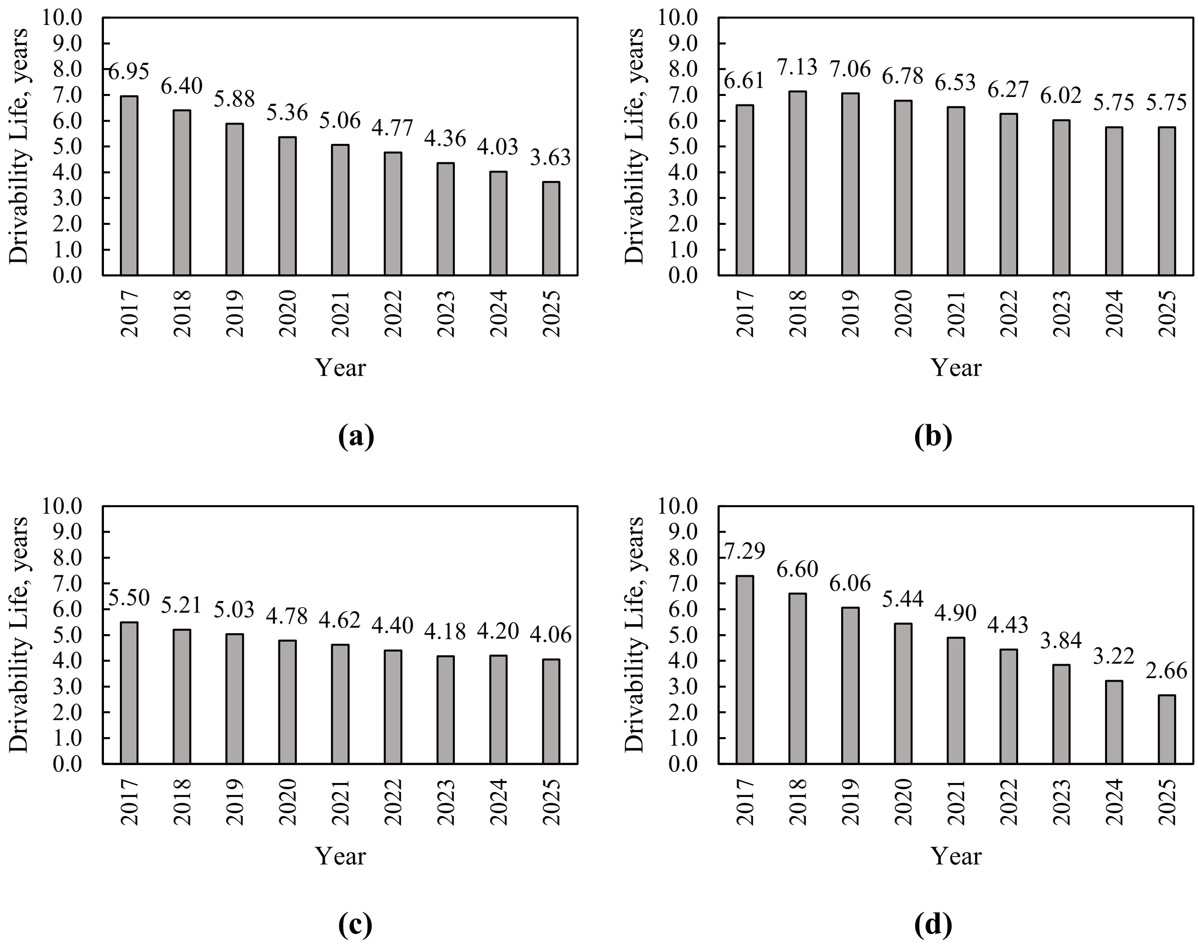


Figure 5.8. Expected Drivability Lives of Low-Volume Roads within Currently Available Budgets Using a Minimum Amount Of Maintenance Activities for General Maintenance plus Thin Overlays – Model I: (a) Region 2; (b) Region 3; (c) Region 4; (d) Region 5.

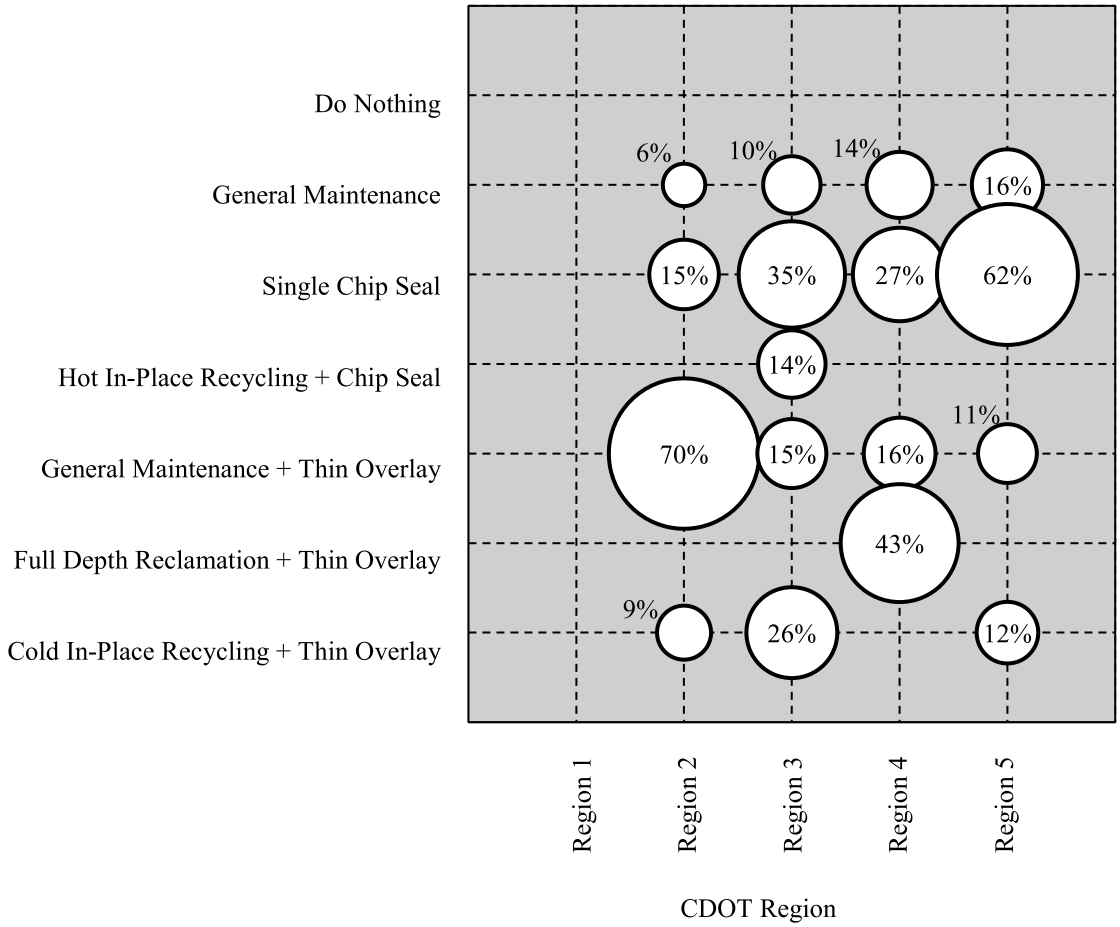


Figure 5.9. Optimized Distributions of Maintenance Costs among Treatment Options Using a Minimum Amount of Maintenance Activities for General Maintenance plus Thin Overlays - Model I.

5.6 Budget Needs Assessment for Managing Low-Volume Roads in Colorado

Since the current CDOT budgets are not able to enhance the overall performance of LVRs, the following sub sections provide the optimized maintenance costs required for each improvement scenario by 2025. The results of these models can be used to establish maintenance budget needs.

5.6.1 Achievement of Overall Steady Performance

Table 5.7 shows the optimized costs required to maintain a steady state of pavement performance in each region using optimization Model II. The optimized decisions are provided in Appendix D. It was determined that an annual average spending of $18,446,851 is required statewide for a constant overall DL value. Figure 5.10 shows the optimized distribution of total annual budgets among the allowable treatment options. Similar to what was found in the effectiveness of current maintenance budgets, almost no maintenance costs were allocated for applying only thin overlays (e.g., general maintenance +thin overlay) in the global optimum solution.

Table 5.7. Optimized Costs of Pavement Maintenance for Overall Steady Performance of Pavement Drivability – Model II.

Region	1	2	3	4	5	Statewide
2017	$ 648,304	$ 6,700,616	$ 3,407,232	$ 3,381,424	$ 3,584,472	$ 17,722,048
2018	$ 629,104	$ 6,856,336	$ 3,419,864	$ 3,602,440	$ 4,840,088	$ 19,347,832
2019	$ 560,112	$ 7,580,936	$ 3,404,856	$ 3,666,288	$ 4,632,256	$ 19,844,448
2020	$ 620,680	$ 6,988,080	$ 3,416,768	$ 3,938,304	$ 5,165,408	$ 20,129,240
2021	$ 696,472	$ 7,574,008	$ 5,779,248	$ 4,614,840	$ 6,351,104	$ 25,015,672
2022	$ 840,576	$ 7,939,136	$ 6,772,080	$ 3,913,440	$ 4,765,552	$ 24,230,784
2023	$ 830,720	$ 7,241,392	$ 5,931,824	$ 3,000,432	$ 5,792,400	$ 22,796,768
2024	$ 560,080	$ 8,363,800	$ 4,521,136	$ 3,380,112	$ 3,823,008	$ 20,648,136
2025	--	--	--	--	--	--
PW (4%, 8)	$ 4,691,233	$ 51,593,089	$ 31,511,018	$ 25,837,375	$ 33,942,089	$ 147,574,804
Average/year	$ 586,404	$ 6,449,136	$ 3,938,877	$ 3,229,672	$ 4,242,761	$ 18,446,851

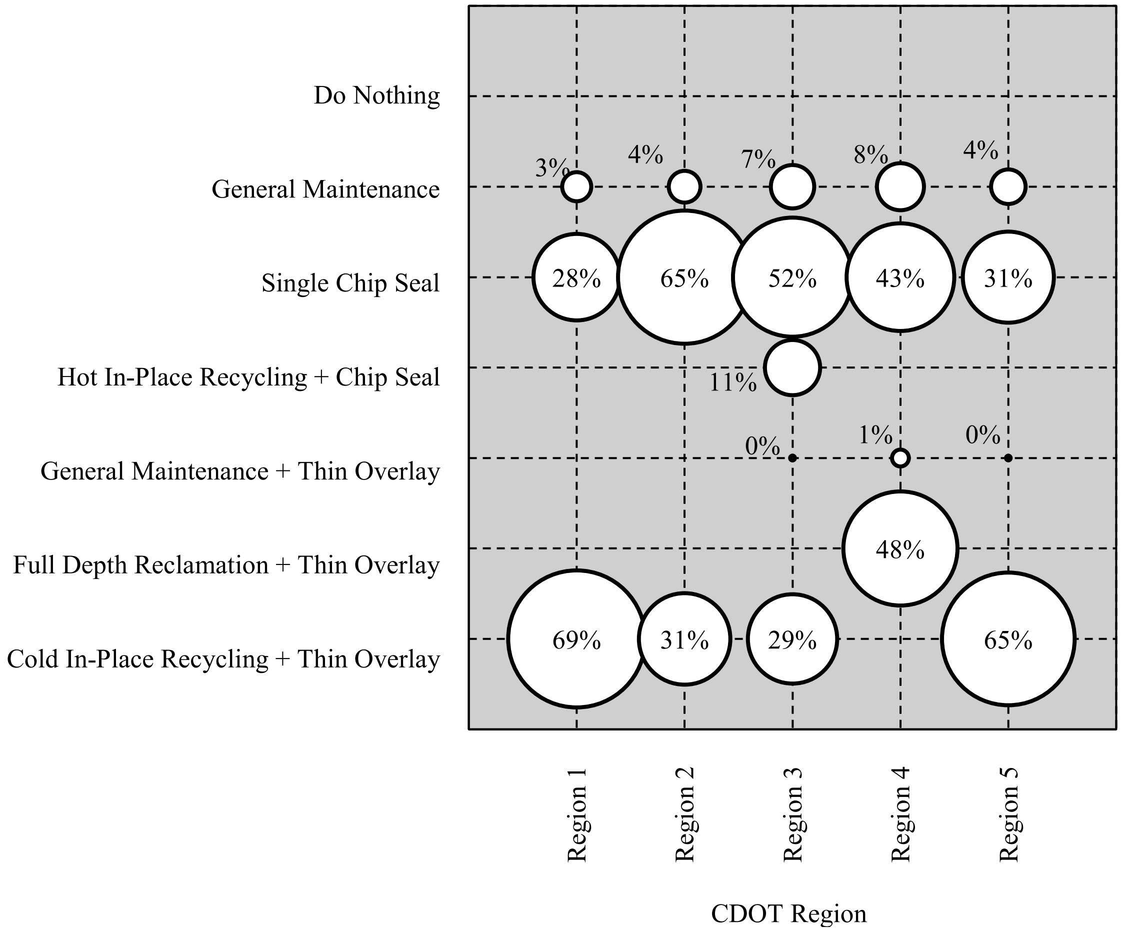


Figure 5.10. Optimized Distributions of Maintenance Costs among Treatment Options - Model II.

5.6.2 Constrained Maintenance Budget Allocation for Model II

As shown previously in Model I, the optimization analysis of a steady state model was repeated with an additional constraint of a minimum amount of maintenance activities for thin overlays. The optimized results are shown in Table 5.8, and the optimized decisions of all road segments are provided in Appendix E. The results show a higher annual maintenance cost of $22,178,712 was obtained statewide compared to the global optimum solution (e.g., $18,446,851). Figure 5.11 shows the percentage of budget allocations to treatment options. In Region 2, an unfeasible solution was found considering a minimum percentage of 70% for thin-overlay budget allocation. Therefore, the treatment constraint was reduced gradually until reaching an applicable percentage of 52%.

Table 5.8. Optimized Costs of Pavement Maintenance for Overall Steady Performance of Pavement Drivability Using a Minimum Amount of Maintenance Activities for General Maintenance plus Thin Overlays – Model II.

Region	1	2	3	4	5	Statewide
2017	$692,432	$10,418,056	$3,413,912	$4,384,408	$4,355,944	$23,264,752
2018	$705,352	$10,053,432	$3,414,808	$3,912,488	$5,273,536	$23,359,616
2019	$682,000	$9,457,568	$3,417,064	$4,209,136	$4,889,088	$22,654,856
2020	$660,784	$12,053,184	$4,411,160	$3,996,336	$6,009,232	$27,130,696
2021	$800,144	$11,297,688	$6,781,472	$4,661,136	$6,428,928	$29,969,368
2022	$897,968	$9,730,808	$7,393,080	$3,685,952	$4,738,824	$26,446,632
2023	$901,488	$10,408,472	$5,993,880	$5,051,392	$5,863,072	$28,218,304
2024	$620,992	$10,681,104	$4,128,800	$3,370,504	$3,546,432	$22,347,832
2025	--	--	--	--	--	--
PW (4%, 8)	$5,195,030	$73,542,161	$33,526,157	$29,158,164	$36,008,184	$177,429,695
Average/year	$649,379	$9,192,770	$4,190,770	$3,644,770	$4,501,023	$22,178,712

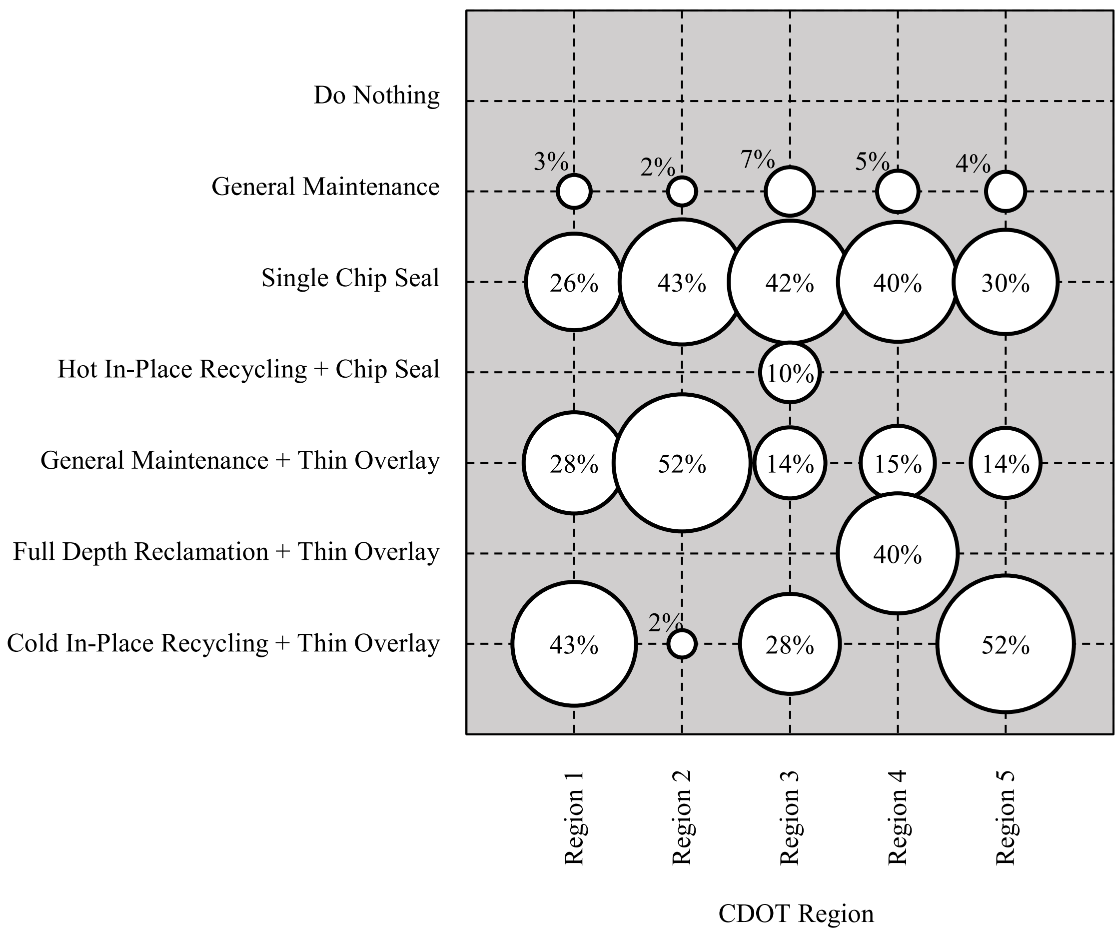


Figure 5.11. Optimized Distributions of Maintenance Costs among Treatment Options Using a Minimum Amount of Maintenance Activities for General Maintenance plus Thin Overlays - Model II.

5.6.3 Achievement of Higher Performance

In this section, the results of optimization models III, IV, and V are presented for achieving higher overall improvements of pavement drivability lives of 10, 20, and 30 percent, respectively. No additional constraints of treatment applications were considered for these analyses since higher costs are expected when extensive use of thin overlays occur to achieve a higher overall performance target of pavement drivability. Also, the minimum percentage of budget allocations, considered previously, may provide unfeasible solutions during optimization analysis. The optimized maintenance plans of the three models are provided in Appendices F, G, and H, respectively.

Statewide, the results show an annual average of $21,056,620 is required to achieve an overall improvement of 10% of LVRs network, see Table 5.9. In order to have a 20% improvement in the overall DL value, at least $24M of maintenance expenditures would be required annually as shown in Table 5.10. The highest budget needs of maintenance would be required for the 30-percent maintenance scenario where nearly $27M should be allocated annually to LVRs, see Table 5.11. The regional spending of different treatment options is shown in Figure 5.12, Figure 5.13, and Figure 5.14. It is to be noted that optimized costs may fluctuate from a year to year depending on the expected condition in each year. The budget needs assessment was estimated by averaging the present value of the annual average expenditures in each year.

Table 5.9. Optimized Costs of Pavement Maintenance for Overall 10 Percent Improvement of Pavement Drivability – Model III.

Region	1	2	3	4	5	Statewide
2017	$694,872	$7,118,088	$3,407,232	$3,668,656	$3,658,272	$18,547,120
2018	$638,104	$8,779,704	$3,419,864	$3,894,568	$6,025,024	$22,757,264
2019	$619,120	$8,848,672	$3,404,856	$4,033,848	$5,194,584	$22,101,080
2020	$597,424	$8,623,472	$4,809,264	$4,197,552	$5,883,488	$24,111,200
2021	$759,280	$10,445,192	$6,740,680	$4,865,328	$5,864,392	$28,674,872
2022	$772,320	$9,629,664	$6,318,760	$4,241,600	$5,502,848	$26,465,192
2023	$884,224	$6,684,696	$6,430,624	$4,613,480	$5,614,912	$24,227,936
2024	$717,040	$9,849,456	$5,645,784	$5,232,352	$5,852,856	$27,297,488
2025	--	--	--	--	--	--
PW (4%, 8)	$4,939,486	$61,018,706	$34,447,031	$30,142,007	$37,905,731	$168,452,961
Average/year	$617,436	$7,627,338	$4,305,879	$3,767,751	$4,738,216	$21,056,620

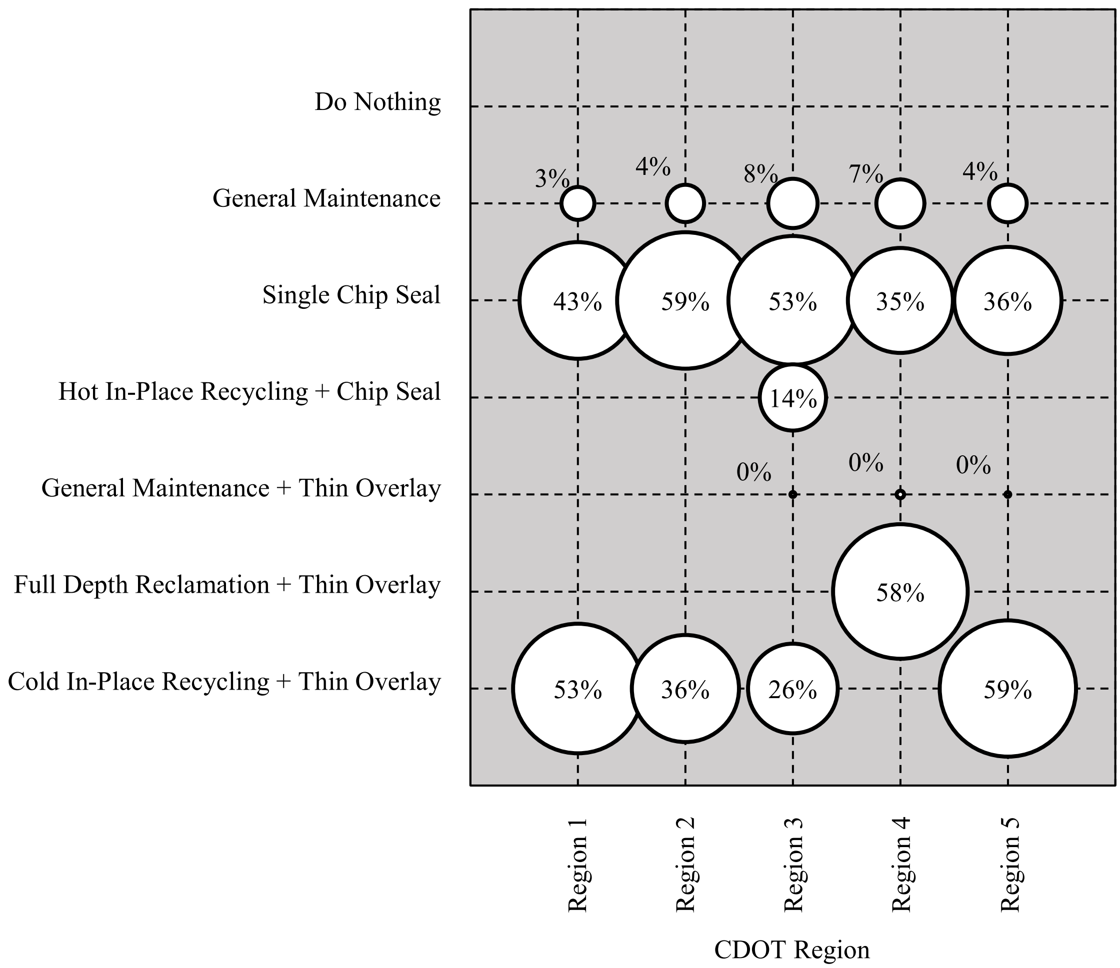


Figure 5.12. Optimized Distributions of Maintenance Costs among Treatment Options - Model III.

Table 5.10. Optimized Costs of Pavement Maintenance for Overall 20 Percent Improvement of Pavement Drivability – Model IV.

Region	1	2	3	4	5	Statewide
2017	$763,056	$8,267,016	$3,407,232	$3,947,440	$4,179,328	$20,564,072
2018	$788,208	$10,020,464	$3,419,864	$4,176,904	$6,910,328	$25,315,768
2019	$726,072	$11,113,128	$3,689,136	$4,314,576	$5,989,400	$25,832,312
2020	$650,304	$10,403,368	$6,318,840	$4,496,112	$7,070,728	$28,939,352
2021	$759,648	$11,383,760	$7,408,776	$5,104,536	$7,004,064	$31,660,784
2022	$924,384	$12,656,656	$8,266,800	$4,477,008	$6,506,752	$32,831,600
2023	$906,208	$10,586,304	$6,530,488	$4,487,752	$6,287,208	$28,797,960
2024	$852,544	$10,554,064	$5,158,984	$5,505,960	$7,883,728	$29,955,280
2025	--	--	--	--	--	--
PW (4%, 8)	$5,543,540	$73,945,811	$37,933,105	$31,723,755	$44,942,299	$194,088,510
Average/year	$692,942	$9,243,226	$4,741,638	$3,965,469	$5,617,787	$24,261,064

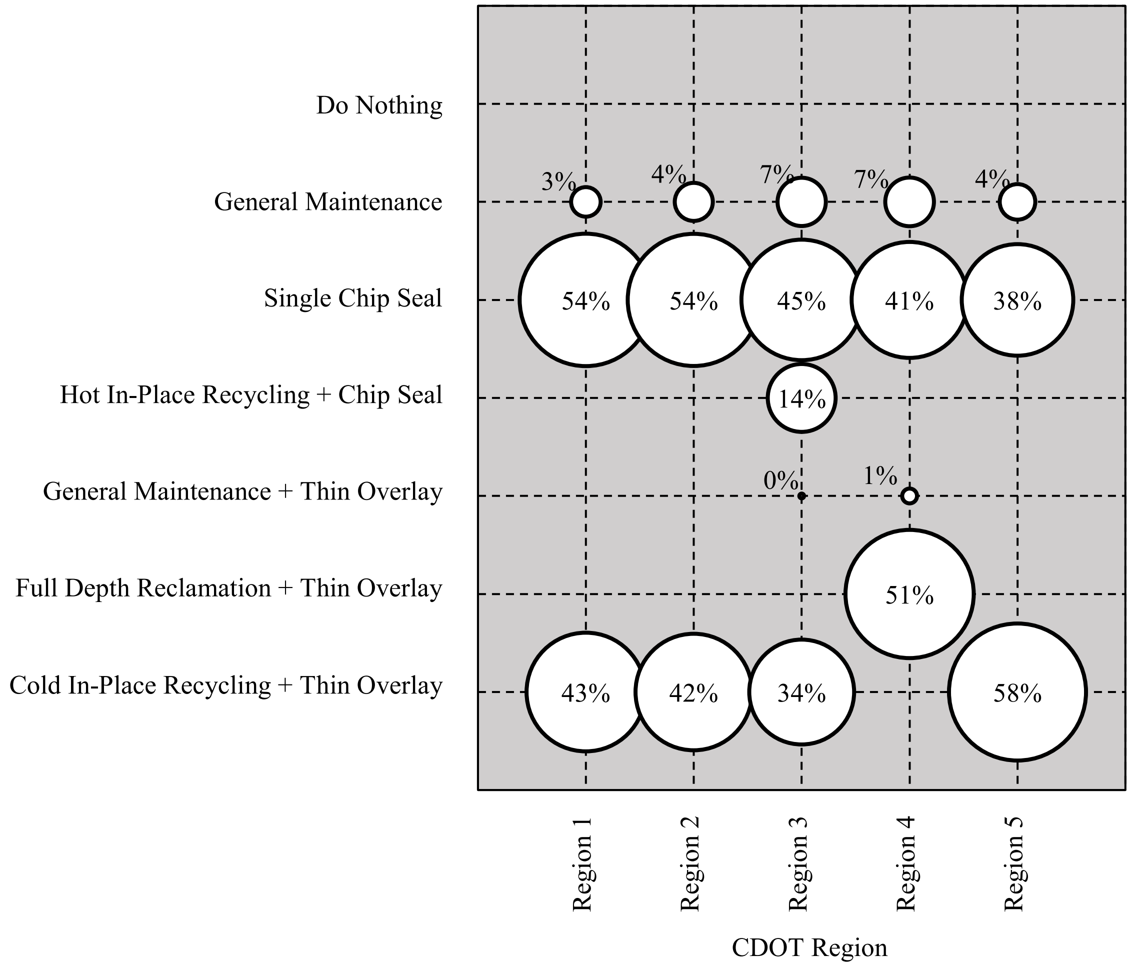


Figure 5.13. Optimized Distributions of Maintenance Costs among Treatment Options - Model IV.

Table 5.11. Optimized Costs of Pavement Maintenance for Overall 30 Percent Improvement of Pavement Drivability – Model V.

Region	1	2	3	4	5	Statewide
2017	$858,696	$9,671,496	$3,407,232	$4,439,824	$4,910,456	$23,287,704
2018	$748,872	$11,549,240	$3,419,864	$3,674,920	$7,760,192	$27,153,088
2019	$892,000	$13,495,072	$4,277,424	$4,755,144	$6,777,176	$30,196,816
2020	$763,384	$12,119,200	$4,243,600	$3,090,936	$7,669,832	$27,886,952
2021	$928,240	$13,390,160	$6,169,024	$4,712,256	$7,780,872	$32,980,552
2022	$1,049,224	$11,396,032	$8,567,760	$4,936,440	$7,821,392	$33,770,848
2023	$1,113,728	$14,544,328	$7,800,376	$4,512,504	$7,544,808	$35,515,744
2024	$1,093,312	$13,666,664	$7,641,288	$6,833,400	$9,286,136	$38,520,800
2025	--	--	--	--	--	--
PW (4%, 8)	$6,448,987	$86,720,219	$38,709,710	$31,962,200	$51,555,720	$215,396,835
Average/year	$806,123	$10,840,027	$4,838,714	$3,995,275	$6,444,465	$26,924,604

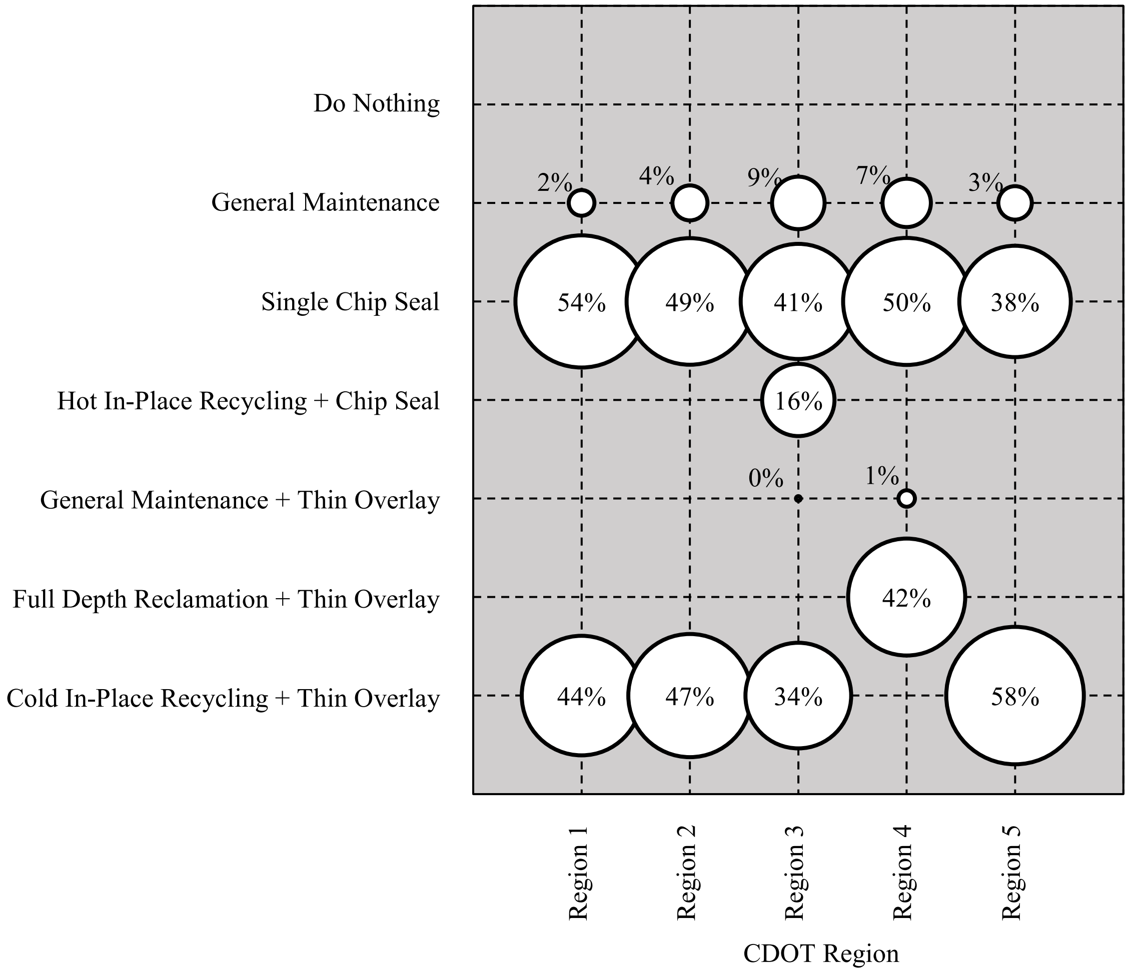


Figure 5.14. Optimized Distributions of Maintenance Costs among Treatment Options - Model V.

5.7 Chapter Summary

In this chapter, statewide implementation plans were analyzed. The optimization maintenance scenarios consider the recommendations derived from the previous studies of regional survey, treatment evaluation, and optimization models. Five optimization scenarios were analyzed to investigate the effectiveness of current resources on the optimal maintenance planning. The optimal allocations of maintenance funding given different performance targets were displayed showing different impacts when defining specific constraints of funding allocation on a specific treatment practice. The results from this chapter provide detailed budget assessments on the expected performance of LVRs in Colorado.

CHAPTER 6: ENHANCING EXPERT-BASED DECISION MAKING OF PAVEMENT MAINTENANCE USING MACHINE LEARNING APPROACH

6.1 Introduction

Most M&R treatments are selected based on common factors, including pavement conditions, road classifications, traffic volumes, and the type of pavement distresses. Yet, one critical factor is the effectiveness of treatment options in terms of costs and benefits (Dong, 2011). Effective treatments are defined based on the judgement of experienced personnel, historical maintenance data, or developed guidelines from related research studies. Recently, innovative low-cost treatments provide great potential to effectively maintain LVRs. However, there are difficulties and lack of familiarity with the optimal timing of application of these treatments. The regional CDOT survey results show that pavement maintenance decision-making is conducted at different times according to the regional practice. The recommendations of selecting these treatments based on previous experiences are not well defined. Therefore, a knowledge-based decision-making tool is proposed in this chapter using an artificial neural network (ANN) to simulate regional experts' recommendations and engineering judgments in Colorado.

6.2 Pavement Maintenance Decision Making

At network level, different maintenance decision-making tools are used to select the most recommended treatment option. They are defined in the following sections.

6.2.1 Decision Tree

In this approach, the decision makers evaluate the current status of roads through serial questions and queries until reaching the most recommended treatment option. This system includes different pavement management parameters as shown in Figure 6.1. One disadvantage of using a decision tree is that it includes many inputs and pavement parameters in order to define the appropriate treatment option (Cheng et al., 2009). Consequently, complex programming and modeling efforts are required to split the nodes and branches structured in the decision tree. Moreover, the whole decision tool should be rebuilt when any of the data inputs is not available any longer. This process is considered to be costly and time-consuming (Adbelrahim and George, 2000).

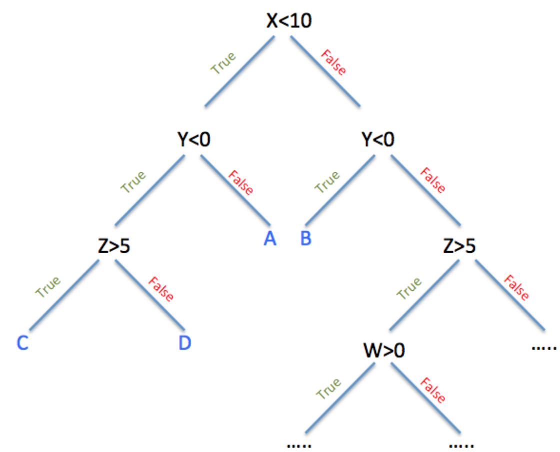


Figure 6.1. Schematic Diagram of a Decision Tree Classifier (Cavaioni, 2017)

6.2.2 Decision Matrix

The decision matrix recommends the treatment type when the overall condition of pavement is within a specific range or category. Figure 6.2 shows an example of making maintenance decisions of Champaign County's paved roads in Illinois using the Pavement Condition Index (PCI) and deflections of Rolling Weight Deflectometer (RWD). Similar to the decision tree, the decision makers rely on the previous expertise to set the appropriate trigger values of different ratings and conditions.

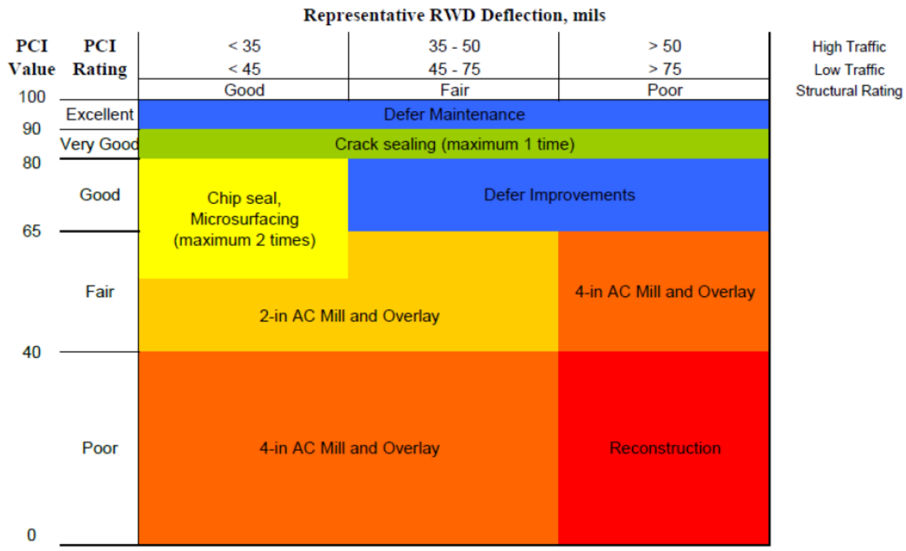


Figure 6.2. Champaign County Treatment Matrix in Illinois (Wolters et al., 2011)

6.2.3 Machine Learning Approach

In this study, the process of compiling expert's judgements in a unified decision tree or matrix is difficult and complicated due to the variation of treatment benefits and applications among CDOT regions. Machine learning offers a viable approach to optimize the expert-based decision making of pavement maintenance using an artificial neural network to learn from the previously successful decisions. Integrating machine learning into the decision-making process provide several benefits. First, the optimized tool can provide relevant maintenance decisions in case of uncertainty due to lack of knowledge or limited expertise. It also alleviates human errors by generalizing the regional recommendations for applying effective treatments. In addition, the accumulated maintenance knowledge in the tool can be trained with different parameters in case of changing some of the current parameters. The training process can be accomplished in a timely manner.

6.3 Artificial Neural Network

The following subsections describe briefly the components of ANNs as well as algorithms that are set in the maintenance decision tool of this study.

6.3.1 Network Architecture

The perceptron of most ANNs are multilayered (Samarasinghe, 2016). That is, the outputs are linked with a set of nodes called "neurons" and they are categorized in different layers, as shown in Figure 6.3. Although multiple hidden layers can be used, a single hidden layer is adequate to model arbitrarily complex nonlinear functions (Chen and Lin, 2011). The value of each neuron in the output layer (a_k) affects the activation of the target value (y_k) which represents the pavement treatment selection. The perceptron of a_k depends mainly on the pavement management inputs (x_i) since the neuron activation in the hidden layer (h_j) is a function of x_i adjusted by the weights of connecting links (w_{ij}) and biases of calculations (b_j). Therefore, for a total (R) available rehabilitation alternatives and (n_H) hidden neurons, the input-output relation of each element of the ANN is described in Equations 6.1 through 6.3.

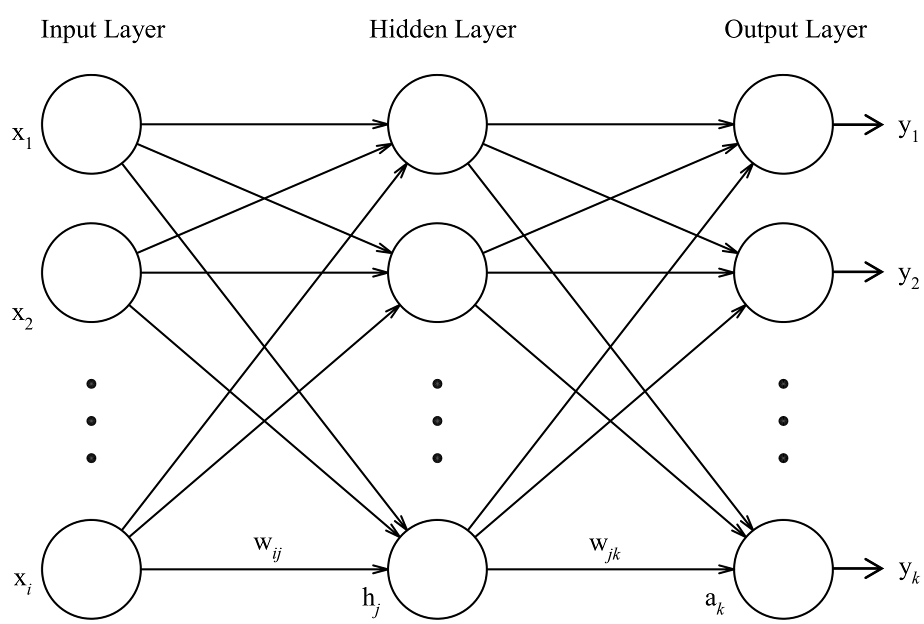


Figure 6.3. Multilayered Perceptron of a Neural Network with a Single Hidden Layer.

Pavement inputs: $x_i, \quad i = 1, 2, \ldots n$ (6.1)

Hidden nodes: $h_j = f\left(\sum_{i=1}^{n} w_{ij} \cdot x_i + b_j\right), \; j = 1, 2, \ldots, n_H$ (6.2)

Output nodes: $a_k = f\left(\sum_{j=1}^{n_H} w_{jk} \, . \, h_i + b_k\right), \; k = 1, 2, \ldots, R$ (6.3)

where,

f : transfer function.

6.3.2 Backpropagation Optimization Algorithm

Based on the ANN architecture, the overall weight matrix comprises (n x n_H + n_H x R) elements, and the bias matrices of the hidden and output layers have sizes (n_H x 1) and (R x 1), respectively. During a supervised learning phase, these values are estimated iteratively by using known outputs until establishing the predictive ability of the network. Figure 6.4 depicts the main steps executed in the back-propagation learning process. First, expert-based maintenance decisions of the different CDOT regions are determined from a case study of low-volume roads based on the existing condition of pavement. The decision patterns are considered the target (t_s) of the learning process derived from the input values of each road segment (s). After designing layers and elements of the ANN, initial weights are set at random in order to determine the predicted output (z_s) for the s^{th} training pattern in a feedforward direction. Then, the mean squared error (MSE) between the target and predicted decisions is calculated as shown in Equation 6.4 where (S) is the total number of road segments considered in the learning process. The objective from the back-propagation optimization analysis is to minimize the amount of errors by adjusting the weights and biases in the network. To achieve this, the gradient descent (Schmidhuber, 2015) of the error surface ($\partial E/\partial w$) is determined to define the sensitivity of changing each weight (w) of the connecting links. This sensitivity is used to guide the adjustment of weights (Δw_m) for each iteration (m), see Equations 6.5 and 6.6. Then, the errors are propagated backward from the output layer to the input layer in order to adjust all weights in the network. Similarly, biases are adjusted using the same algorithms differentiated by b variable. Changing weights and biases stops when specific stopping criteria are met, and the optimal parameters of the ANN are considered for decision making.

$$\text{MSE} = \frac{1}{S}\sum_{s=1}^{S}(t_s - z_s)^2 \tag{6.4}$$

$$\Delta w = -\eta . \frac{\partial E}{\partial w} \tag{6.5}$$

$$w_{m+1} = w_m + \Delta w_m \tag{6.6}$$

where,

η: Learning rate to control the relative size of adjustment in the weights.

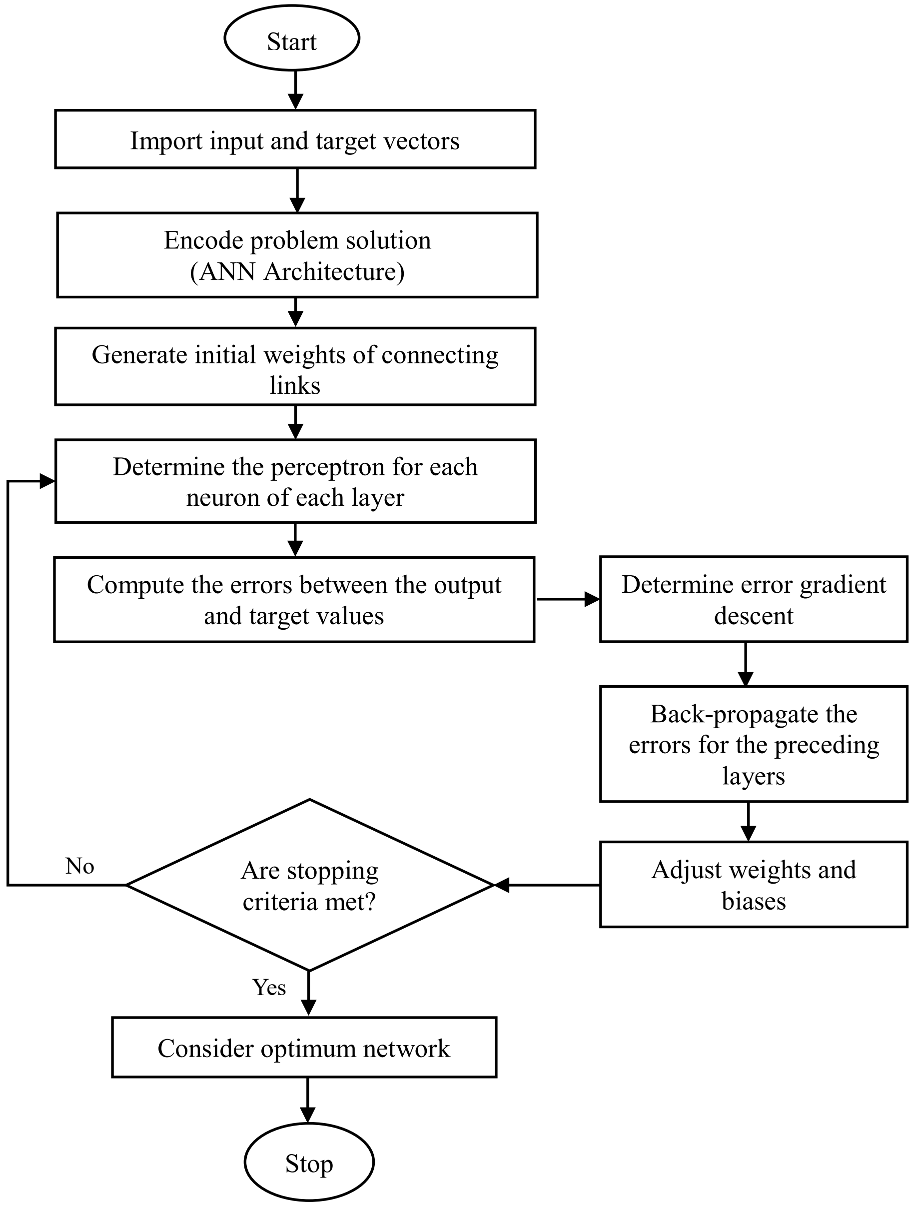


Figure 6.4. Main Steps of Back-Propagation Learning for a Neural Network.

6.3.3 Pattern Recognition

Pattern recognition algorithms are integrated with ANNs to classify treatments during a pavement maintenance planning (Elbagalati et al., 2018). The configuration of treatment pattern represents the activation of each neuron designed in the output layer of the neural network. The prediction accuracy of the network is introduced in the form of confusion matrices (Fawcett, 2006). A confusion matrix provides a summary of prediction results during the training process. The matrix comprises two dimensions, one with the observed treatment patterns of training data, and the other with the output treatment patterns as predicted from the ANN. A basic confusion matrix example of two classes, “Positive” and “Negative”, is presented in Figure 6.5. Two main performance indicators are measured from confusion matrices. The first indicator is precision which represents the partial accuracy of predicting a particular treatment class. The second indicator is the overall accuracy which is the proportional of all treatment classes predicted correctly.

Actual Class (Target)

Predicted Class (Output)	"*Positive*"	"*Negative*"	Measures
"*Positive*"	True Positive (TP)	False Positive (FP)	Positive Precision $\frac{TP}{TP + FP}$
"*Negative*"	False Negative (FN)	True Negative (TN)	Negative Precision $\frac{TN}{FN+TN}$
Measures	True Positive Rate $\frac{TP}{TP+FN}$	True Negative Rate $\frac{TN}{FP+TN}$	Accuracy $\frac{TP+TN}{TP+FP+FN+TN}$

Figure 6.5. Confusion Matrix of a Two-Class Problem.

6.4 Data Preparation and Analysis

As discussed earlier, maintenance decisions on previous cases should be prepared in order to train a statewide maintenance decision making tool using ANN. This data was obtained from pavement management database of LVRs in Colorado from 2014 to 2016. The following sections provide information on data preparation and ANN prediction models.

6.4.1 Pavement Condition Data

In 2016, LVRs were distributed along 342 roadway segments with a total length of 2,022 lane miles as displayed in Figure 6.6. A case study of 884 segments was derived for training the ANN, and each segment was considered as a single case for decision making (S = 884). Based on a descriptive analysis, it was found that data variability is valid to train the ANN. As shown in Table 6.1, the number of cases in each region is consistent with the number of segments and regional mileage distributions. Therefore, training the ANN with expert judgments is weighted by the volume of maintenance activities implemented in each region. In addition, road segments have different overall drivability lives which were based on different levels of condition indices. This would provide diverse cases to ensure the selection of all treatment options for training.

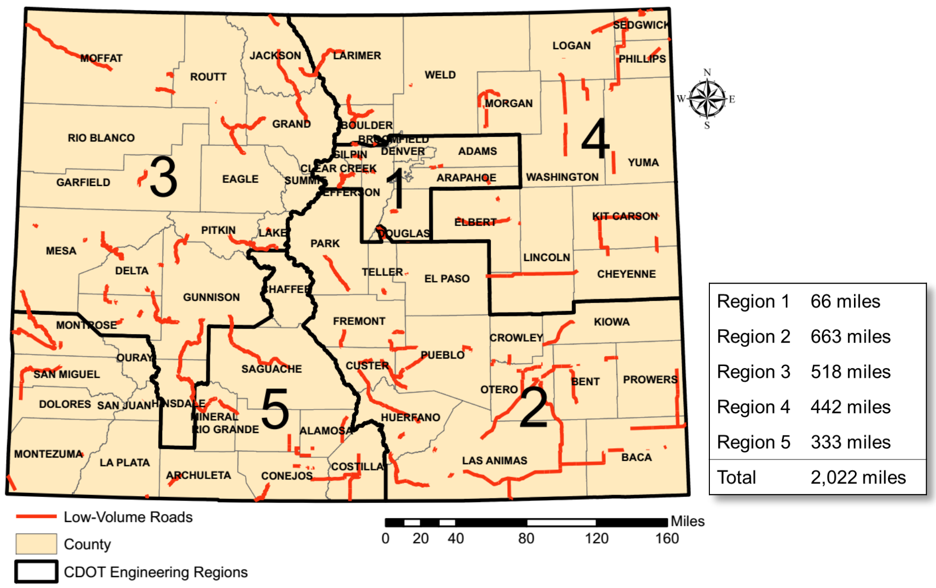


Figure 6.6. Mileage Distribution of Low-Volume Paved Roads by Region in Colorado in 2016.

Table 6.1. Pavement Condition Data Statistical Summary of Case Study in Colorado.

	Region 1: 63 cases					
Characteristic	Fatigue Index	Longitudinal Index	Transverse Index	Ride Index	Rut Index	DL*
Minimum	68	76	20	53	90	0
Maximum	100	100	100	93	100	12
Mean	96.0	96.4	76.2	79.9	99.5	5.2
St. Deviation	6.8	3.9	18.8	9.8	1.7	4.2
	Region 2: 209 cases					
Characteristic	Fatigue Index	Longitudinal Index	Transverse Index	Ride Index	Rut Index	DL, years
Minimum	16	69	0	36	95	0
Maximum	100	100	100	100	100	12
Mean	89.8	94.8	68.1	81.9	99.6	3.9
St. Deviation	15.3	5.1	22.8	7.3	0.7	4.1
	Region 3: 195 cases					
Characteristic	Fatigue Index	Longitudinal Index	Transverse Index	Ride Index	Rut Index	DL, years
Minimum	54	81	27	56	81	0
Maximum	100	100	100	92	100	12
Mean	94.8	95.9	75.5	78.6	98.6	4.7
St. Deviation	8.9	3.7	16.1	8.0	3.1	3.4
	Region 4: 258 cases					
Characteristic	Fatigue Index	Longitudinal Index	Transverse Index	Ride Index	Rut Index	DL, years
Minimum	5	56	0	21	83	0
Maximum	100	100	100	94	100	12
Mean	87.7	95.0	70.0	78.8	99.0	3.7
St. Deviation	18.8	5.1	20.3	10.5	2.6	3.5
	Region 5: 159 cases					
Characteristic	Fatigue Index	Longitudinal Index	Transverse Index	Ride Index	Rut Index	DL, years
Minimum	47	75	18	44	91	0
Maximum	100	100	100	95	100	12
Mean	96.0	93.5	66.0	80.6	99.3	3.0
St. Deviation	7.5	5.5	18.7	6.9	1.4	3.0

NOTE: DL = Drivability Life, years

6.4.2 Pavement Treatments

The results from the regional CDOT survey show that none of the regions has a written procedure for selecting the pavement treatment. Rather, most regions rely on the experience of decision makers to select from the available alternatives. It was also observed that all regions prefer applying general maintenance or 'Do nothing' for high drivability pavements. For extremely deteriorated roads, most regions have shown interest in applying targeted rehabilitation of the total depth in selected locations before overlaying. This application includes a full-depth replacement of up to 10% of the road surface before applying thin overlay. CIR is also preferred by most regions to improve the performance of pavement. However, different threshold values of selecting treatments are expected among decision makers of CDOT regions. The decision tool developed in this study intends to combine the different outputs of the decision makers during the learning phase, after which future decisions can be made using prediction models to recommend alternatives from regional recommendations, as well as, similar applications statewide in the feedforward analysis.

Accordingly, seven treatment options were considered for experts' recommendations as listed in Table 6.2. The treatment pattern compiles binary digits where the digit "1" represents the activation of the neuron of each treatment pattern. A summary of the maintenance decisions considered for the case study are shown in Table 6.3.

Table 6.2. Pavement Treatment Options and Representative Patterns.

Treatment Class	Description	Pattern						
1	Crack seal	1	0	0	0	0	0	0
2	Single Chip Seal	0	1	0	0	0	0	0
3	Hot In-Place Recycle + Chip Seal	0	0	1	0	0	0	0
4	Crack Seal + Thin overlay	0	0	0	1	0	0	0
5	Full Depth Reclamation + Thin overlay	0	0	0	0	1	0	0
6	Cold In-place Recycle + Thin overlay	0	0	0	0	0	1	0
7	10% Full Depth Replacement + Thin overlay	0	0	0	0	0	0	1

Table 6.3. Expert-Based Maintenance Decisions Summary of Low-Volume Paved Roads in Colorado

Treatment Class	Number of maintenance decisions					Total
	Region 1	Region 2	Region 3	Region 4	Region 5	
1	28	N/A	40	21	17	106
2	3	N/A	14	28	39	84
3	N/A	104	25	N/A	N/A	129
4	N/A	N/A	54	55	10	119
5	N/A	N/A	N/A	102	N/A	102
6	N/A	41	62	N/A	43	146
7	32	64	N/A	52	50	198
Grand Total	63	209	195	258	159	884

NOTE: N/A = not applicable.

6.4.3 ANN Prediction Models

In this study, two ANN prediction models were developed for training, as listed in Table 6.4. The first model is the statewide model which predicts the treatment patterns based on the five condition indices, DL, and road lengths. The objective from this model is to study the possibility to standardize the different strategies of applying treatments among CDOT regions. Road lengths are considered in the analysis since they affect the decision of some rehabilitation options due to the different unit costs and available budgets. The second prediction model includes additional input of the region number as a reference for recommending regional practices of pavement maintenance.

Table 6.4. Artificial Neural Network Prediction Models

Model	Statewide Model	Regional Model
Inputs	Drivability Life (DL, years) Fatigue Index Longitudinal Index Transverse Index Ride Index Rut Index Road Length	Drivability Life (DL, years) Fatigue Index Longitudinal Index Transverse Index Ride Index Rut Index Road Length Region Number
Objective	Unify the statewide practice.	Evaluate the variability of practice.

Accordingly, the ANN architecture of the output layer is set to have 7 neurons (R = 7). The ANN architecture of the input layer contains one neuron for each input parameter (e.g., n = 7 for the statewide model, n = 8 for the regional model). For the hidden layer, there is no exact theory to specify the number of hidden neurons. They can be determined using trial and error process, adaptive process, constructive algorithms, or network pruning (Sheela and Deepa, 2013). In general, the number of hidden neurons depends on the degree of nonlinearity of the decision-making tool. Meaning, highly nonlinear maintenance decision requires more hidden neurons to sufficiently learn the problem behavior. In this study, a trial-and-error method was adopted to define the number of hidden neurons. For simplicity, an initial number of hidden neurons can be considered from the relation ($2n + 1$) (Hunter et al., 2012). This number was adjusted iteratively using cross-check validation tests to avoid overfitting. The number of hidden neurons was eventually set to be 20 (e.g., $n_H = 20$) where the difference in the mean error of trained and validation data are not more than 0.01. The data was then divided randomly for each model into 70% for training, 15% for validation, and 15% for testing.

6.5 Results and Discussion

The maintenance selection trends of the developed prediction models are displayed in Figure 6.7. Optimizing the network elements stopped when the MSE of the validation set reaches the first minimum to avoid overfitting (Elbagalati et al., 2018). For the statewide model, the optimum values of the network elements were attained after 51 iterations (MSE = 0.13). The best validation performance of the regional model was 0.04 which was optimized after 111 iterations. The lower MSE value of the regional model suggests that maintenance strategies of roads in the same region can be planned more effectively than the statewide practice. In other words, combining the maintenance planning statewide affects the consistency of regional decision making due to implementation gaps of treatments in various regions. This finding can be extensively interpreted using the confusion matrices of the trained networks.

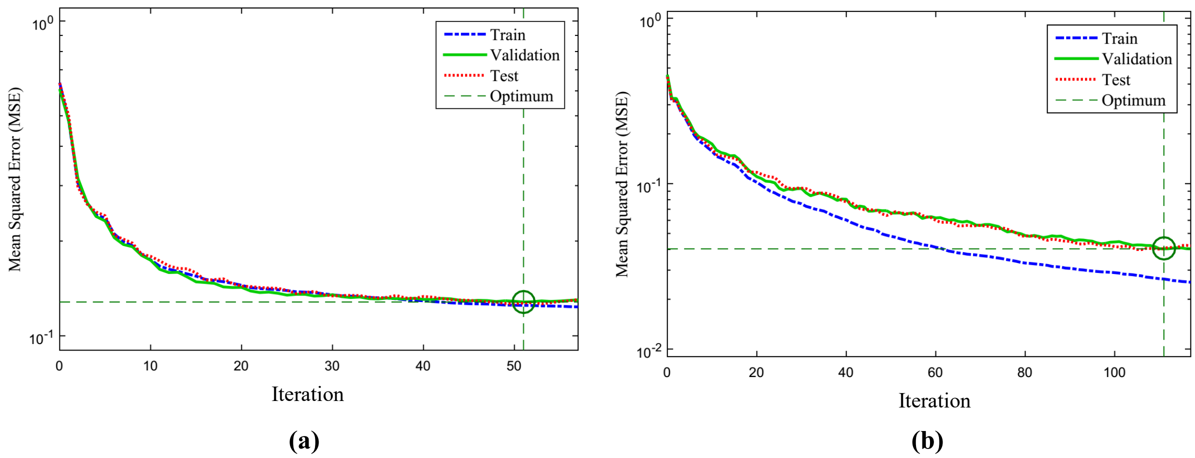


Figure 6.7. Prediction Performance of the Neural Network: (a) Statewide Model; (b) Regional Model.

As shown in Figure 6.8(a), the confusion matrix of the statewide model provides fair performance to predict the treatment class with an overall accuracy of 59.5%. The fractional precisions of each treatment class show that classes 1, 6, and 7 were better estimated than the other treatments. This could be due to the fact that crack sealing, class 1, is commonly applied for roads with high drivability lives. In addition, the rehabilitations of CIR and full depth replacement, classes 6 and 7, were recognized with a relatively higher accuracy because they are preferred by most experts on poor pavements. The reason relates to the ability of these treatments to add structural values to the pavement, however, the lack of applications in some regions negatively affected the statewide decision making. It can also be noted that selecting single chip seals has low precision among regions despite the common selection statewide. Single chip seals were considered by all regions except Region 2. However, about 54% (46 cases of chip seals) were misclassified as thin overlay over crack seal (class 4), and 24% (20 cases of chip seals) were predicted as class 1. This emphasizes that there are extremely varied preferences of applying these strategies among regions in the moderate category of pavement drivability. Therefore, classifying their patterns without referencing the road's region is not practical statewide.

Target Treatment Class

Output Treatment Class	1	2	3	4	5	6	7	Precision
1	84	20	0	5	0	0	0	77.1%
2	15	18	0	12	0	0	0	40.0%
3	0	0	46	6	24	14	8	46.9%
4	7	46	7	94	3	0	2	59.1%
5	0	0	38	1	46	19	19	37.4%
6	0	0	20	0	10	88	19	64.2%
7	0	0	18	1	19	25	150	70.4%
True Rate	79.2%	21.4%	35.7%	79.0%	45.1%	60.3%	75.8%	59.5%

(a)

Target Treatment Class

Output Treatment Class	1	2	3	4	5	6	7	Precision
1	101	15	0	0	0	0	0	87.1%
2	3	64	0	8	0	0	0	85.3%
3	0	0	124	0	0	14	0	89.9%
4	2	5	1	110	1	0	0	92.4%
5	0	0	0	0	97	0	1	99.0%
6	0	0	3	1	0	131	2	95.6%
7	0	0	1	0	4	1	195	97.0%
True Rate	95.3%	76.2%	96.1%	92.4%	95.1%	89.7%	98.5%	93.0%

(b)

Figure 6.8. Confusion Matrices of Pavement Decision Making: (a) Statewide Model; (b) Regional Model.

On the other hand, the overall accuracy was considerably improved to 93% when referencing the region number in the regional model, see Figure 6.8(b). In the regional prediction model, adding one neuron of region number in the input layer increased the size of weight matrix by 20 elements in the input-hidden relationship. This increase has changed the values of the consecutive weights and biases which represent about 65% of the whole neural network. Since the region number was found to be a significant factor, the overall accuracy was increased by almost 30%. The selection of HIR was estimated with a better precision (89.9%) compared with the relative value of the statewide model (46.9%). The interpretation of this finding relates to the regional application of HIR techniques which are recommended only from Region 2 and Region 3. So, when the region number was referenced, the ANN was able to define the pattern of these treatments more effectively. The same was found for selecting FDR surfaced with a thin overlay (class 5) where the highest precision was achieved for identifying this pattern. FDR is recommended only by Region 4 so referencing the region number minimizes the variability among regions of selecting this treatment.

6.6 Decision Simulation

In this step, a well-trained ANN model is used to predict the rehabilitation alternative of road segments in the feedforward analysis. Considering an acceptable level of accuracy of 80% (Medskar and Liebowitz, 1993), it was decided to consider only the regional model for simulating the experts' maintenance decisions of the 2017 condition data set. One important aspect in the feedforward analysis is to define the appropriate transfer function for the output layer. The hard-limit transfer function (*hardlim*), shown in Figure 6.9, is commonly used to provide binary outputs using *MATLAB* software package (Rubaai, 2003). Consequently, the maintenance decision of a particular treatment can be made (e.g., $y_k \in \{0, 1\}, \forall k = 1$ to R). However, *softmax* transfer function is adopted in this study (Reverdy and Leonard, 2016). One advantage of using *softmax* operation is that it calculates the probabilities of selecting each rehabilitation alternative (r) as shown in Equation 6.7. This would provide more flexibility in selecting the type of treatment especially with limited maintenance resources. The decision maker can select the most recommended treatment alternatives from the *softmax* probability density function.

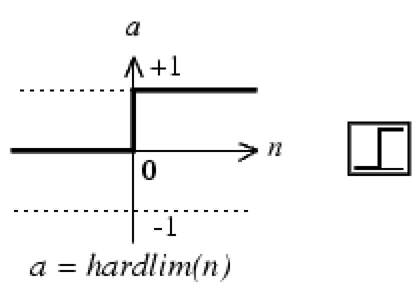


Figure 6.9. Hard-Limit Transfer Function (Dabove and Manzino, 2013).

$$y_k = \Pr[r] = \frac{\exp(a_r)}{\sum_{k=1}^{R} \exp(a_k)} \ , r = 1, 2, \ldots, R \tag{6.7}$$

Table 6.5 shows the results of simulating decision making for a sample of road segments from different regions. For the cases that were misclassified, the probability of considering different treatments are only one or two levels away from the experts' decisions. The decisions can also recommend recycling treatments with either technique, hot in-place (class 3) or cold in-place (class 6) depending on the availability of the practice. With such flexibilities, the decision makers can consider wider options to fit the pavement management needs within the available resources.

Table 6.5. Feedforward Results of Simulating Pavement Maintenance Decision Making.

Route	REF MP	End REF MP	Region	DL	Expert Treat. Class	Probability of Simulated Treatment							Predicted Treat. Class
						1	2	3	4	5	6	7	
023A	0	9.6	4	9.8	2	0.78	0.22	0.00	0.01	0.00	0.00	0.00	1
141A	0	9.4	5	11.5	1	0.97	0.03	0.00	0.00	0.00	0.00	0.00	1
041A	0	9.5	5	13	1	0.98	0.02	0.00	0.00	0.00	0.00	0.00	1
065A	14.4	26.9	3	12.1	1	0.96	0.03	0.00	0.01	0.00	0.00	0.00	1
138A	27.5	27.9	4	6	4	0.00	0.35	0.00	0.64	0.00	0.00	0.00	4
046A	0	3.9	1	3	7	0.00	0.00	0.03	0.00	0.00	0.00	0.97	7
266A	3	5.4	2	3.1	3	0.00	0.00	0.65	0.00	0.00	0.35	0.00	3
144A	10.5	11.1	4	5	4	0.00	0.26	0.00	0.72	0.02	0.00	0.00	4
006A	11.8	13.9	3	3	6	0.00	0.00	0.57	0.00	0.00	0.43	0.00	3
138A	54	54.8	4	1.5	5	0.00	0.00	0.00	0.00	0.98	0.00	0.02	5
101A	16.5	21.4	2	0.8	3	0.00	0.00	0.63	0.00	0.01	0.07	0.30	3
096A	16.6	22.1	2	0	6	0.00	0.00	0.32	0.00	0.01	0.35	0.31	6

NOTE: REF MP = Referenced mile post; DL = Drivability life, years, Treat. = Treatment

6.7 Chapter Summary

Light pavement rehabilitations and low-cost treatments are employed among transportation agencies on roads with relatively low traffic volumes to optimize the available resources. One concern with this approach entails difficulties of determining the optimal timing for treatment application. Making the best use of limited resources requires improvements in maintenance decision-making for selecting treatments considering all affecting factors and previous experience. This chapter presents an optimized decision-making tool for determining a pavement maintenance and rehabilitation program for low-volume paved roads at the network level. Based on regional experts' recommendations and engineering judgments in Colorado, a wide range of 884 cases of pavement treatment patterns were generated. Then an artificial neural network (ANN) was trained with pattern recognition algorithms. Two ANN prediction models were developed on the basis of pavement condition data, represented by six condition indices, and road lengths. The objective of training the models is to evaluate the variability of maintenance practices among the CDOT engineering regions. The statewide model reveals the low possibility to unify the maintenance practice among regions. This is due to the fact that regions have implementation gaps of some treatments due to the lack of expertise or limited resources. On the other hand, the regional model provides higher reliability to learn from the regional recommendations to simulate decision makers in the feedforward analysis. Using the current pavement condition, the optimized tool can propose more flexible treatments considering the regional practice and similar applications statewide to fit the management needs.

CHAPTER 7: CONCLUSIONS

This report provides an optimized decision support system to ensure efficient allocation of maintenance budgets on low-volume paved roads in Colorado. Different optimization procedures were established to effectively manage LVRs considering effective treatment options and optimum timing of maintenance applications recommend to CDOT. As a result of this study, CDOT can determine future budget needs, funding allocations, and treatment policy in order to demonstrate the best possible use of pavement management resources on LVRs.

7.1 Conclusions from Regional CDOT Survey

A regional survey was conducted for pavement engineers in CDOT to document the current implementations of pavement management systems for LVRs. The survey also provides observations of barriers to the maintenance planning for LVRs in Colorado. Based on the primary results of the survey, the following conclusions can be drawn:

- Diverse pavement maintenance practices were found for LVRs. The size of LVRs network affects the type of pavement treatments applied in each CDOT region.
- Recently, different maintenance budgets were allocated on LVRs in each DOT region. Maintenance funding tends to be allocated in accordance with the volume of maintenance activities required in each region. However, inconsistent maintenance practices were found in some regions where only thin overlays are considered for deteriorated roads.
- The process of uniform distribution of the annual maintenance budget on the different treatment options provides flexible maintenance plans for the benefit of pavement rehabilitation and preservation strategies. This would be applicable when roads can be addressed with multiple treatment options having affordable unit costs.
- Drivability lives are the primary factor considered when selecting pavement treatments for LVRs in Colorado. The overall pavement condition is affected significantly by the pavement performance of fatigue and transverse cracking. The condition indices of these distresses provide high annual deterioration rates and they should be addressed when selecting the appropriate pavement treatment.

- Integrating recycling techniques with surface treatments provides great potential to effectively fix the most severe pavement distresses on LVRs. These maintenance activities were found to satisfy the management needs in Region 3 of CDOT.
- In-place recycling and full-depth replacement are limited statewide despite the potential effectiveness to fix poor pavements. This relates to the limited expertise or the maintenance policy followed in some regions.
- Based on previous experience, thin overlays provide insignificant effectiveness to treat pavement distresses in terms of fatigue, longitudinal, and transverse cracking. They cannot prevent the existing severe cracks reflecting to the thin overlaid layers.
- For extremely deteriorated roads, most regions have shown interest in applying targeted rehabilitation of the total depth in selected locations before overlaying. This application includes a full-depth replacement of up to 10% of the road surface before applying thin overlay.
- Optimizing the available maintenance resources provides cost-effective plans of pavement maintenance for LVRs. The maintenance decisions of road segments can be optimized to maximize the overall drivability life of road network so that the total annual maintenance costs do not exceed the available budgets.
- When regions are constrained with a single maintenance practice, it becomes difficult to optimize the available resources from the different alternatives. Consequently, agencies have to follow the concept of fixing 'worst road first' as found in Region 2. This strategy would have significant impact on the overall performance of LVRs in the context of pavement preservation of moderate conditions.
- Pavement engineers of most CDOT regions are interested in increasing the effectiveness of the CDOT approach for managing low-volume paved roads. Roads were recommended to be maintained at the optimal time to avoid the escalating costs of rehabilitating roads in poor conditions.

7.2 Conclusions from Developing Pavement Maintenance Optimization Models

A comprehensive optimization analysis was conducted on a case study of LVRs in CDOT Region 4. The road network encompasses 422 miles and it was optimized using genetic algorithms to minimize the annual maintenance costs restricted by drivability performance targets. Based on the findings of this study, the following conclusions are drawn:

- The optimization tool is functional to seek the long-term effectiveness of different maintenance policies among various treatment options. In this study, the key benefit of optimizing LVRs network is making more effective use of maintenance and rehabilitation strategies.
- Genetic Algorithms are capable to solve a large-scale optimization problem for LVRs network. The maintenance decision matrix of multi-year planning can be optimized within a reasonable time. However, the decision variable of a large road network can be optimized annually to reduce the number of genes set in the analysis. That enhances the performance and efficiency of optimization process.
- The large-scale optimization of LVRs provides more realistic solutions to quantify the maintenance funding needs. Engineers can identify prudent treatment policies to achieve a desired target state of the network. Moreover, the impact of various condition targets can be evaluated to determine the optimal allocation of maintenance budgets.
- The policy of applying only commonly treatment options such as chip seals and thin overlays requires additional funding to sustain the network-level pavement condition. Including alternative light rehabilitation strategies for poor roads can save significant money.
- Cold in-place recycling and full-depth replacement techniques enhance the overall drivability of LVRs with lower costs compared to the regular rehabilitation of overlays. Also, applying thin overlays over severely deteriorated pavements provides short-term effectiveness. The application of thin overlays should be addressed considering minimum threshold values of pavement distresses.
- Although raising the performance target levels may add drivability value to LVRs, the benefit-cost impact is not significant. Applying the alternative maintenance policy provides maximum benefit-cost saving when the maintenance decisions are optimized to maintain the overall drivability in a steady state.

7.3 Conclusions from Statewide Implementation Plans

Statewide optimization analysis was conducted using 2017 pavement condition data of LVRs in Colorado. A total of five optimization approaches was analyzed to study the impact of currently available maintenance budgets and the optimal allocations of maintenance funding given different performance targets. The multi-year analysis considers a specific planning horizon from 2017 to 2025 and the following conclusions were found:

- The developed optimization models provide valuable tools for CDOT decision makers to increase the benefits of maintenance activities. The costs of statewide implementation plans can be minimized to achieve desired performance levels.
- The estimated average of annual maintenance budgets may not be able to enhance the overall pavement condition of LVRs in each CDOT region. Using the current budget constraints, the regional overall DL values of LVRs are expected to degrade into lower levels by 2025.
- The network level optimization analysis shows that preserving the pavement of LVRs in a steady performance requires a statewide annual funding of $18,446,851.
- The assessment of budget needs show that increasing the overall pavement performance of LVRs requires higher maintenance funding depending on the percentage of improvement in the overall DL value of road network.
- Increasing the overall pavement performance of LVRs 10% by 2025 requires a statewide annual funding of $21,056,620.
- Increasing the overall pavement performance of LVRs 20% by 2025 requires a statewide annual funding of $24,261,064.
- Increasing the overall pavement performance of LVRs 30% by 2025 requires a statewide annual funding of $26,924,604.
- Applying combined treatments of in-place recycling and surface treatments provides higher benefit-cost ratios compared to regular thin overlaying. In addition, chip seals provide the highest benefit-cost impact on LVRs in moderate conditions. Therefore, higher finding was allocated to these applications during multi-year optimization analysis.

- Increasing the volume of maintenance activities for thin overlays negatively affects the optimized maintenance plans. The statewide analysis shows that lower pavement DL values are expected given currently available budgets. Also, the optimized capital improvement plans would require higher amount of funding in order to achieve the desired performance targets.
- The developed improvement plans provide defensible information to secure appropriate funding from decision makers and state legislatures.

7.4 Conclusions from Enhancing Expert-Based Decision Making of Pavement Maintenance Using Machine Learning Approach

A knowledge-based decision-making tool was developed to enhance the decision makers' capabilities of selecting effective pavement maintenance strategies in Colorado. Two prediction models were trained for selecting treatments using ANN with pattern recognition algorithms. A wide range of 884 cases of treatment patterns was generated from regional experts' recommendations, and the following conclusions are drawn:

- ANN-based pattern recognition algorithms are effective to find the most optimum M&R decisions by minimizing the mean square errors of the decision tool outputs compared to the expert-based treatment patterns.
- There is a wide variety of pavement maintenance practices across the state for low-volume paved roads. The low accuracy of the statewide treatment selection model reveals that most CDOT regions rely on the regional experience for recommending the most familiar rehabilitation alternative of low-cost treatments and recycling techniques.
- There is a consensus that applying cold in-place recycling or 10% full-depth replacement patching surfaced with thin overlay is effective in enhancing the DL on poor roads since they add structural value to the distressed pavement. The statewide prediction model also emphasizes that CDOT regions have consistent practices of maintaining roads with high drivability lives.
- The limited resources for managing roads at the local level force some regions to have implementation gaps of some pavement preservation techniques on low-volume roads.

This provides lack of appropriate knowledge for recommending effective treatments and affects the consistency of decision making statewide.

- An efficient maintenance decision making can be achieved for each CDOT region through a combination of pavement condition indices, drivability lives, and road lengths. Multiple alternatives are proposed by ANNs considering regional recommendations, as well as, similar applications statewide to fit the pavement management needs.

CHAPTER 8: RECOMMENDATIONS TO COLORADO DOT

Based on the findings of this report, it is highly recommended that CDOT integrates optimization approach as part of a comprehensive pavement management system for low-volume paved roads. This report provides the following recommendations while addressing pavement maintenance plans on LVRs in Colorado:

- CDOT regions are recommended to incorporate recycled materials such as cold in-place and hot in-place recycled asphalt when maintaining LVRs. These innovative alternatives provide high potential to maintain severely deteriorated roads with a high benefit-cost impact.
- The regional experience of managing LVRs does not recommend applying thin overlays directly on poor pavements. This application can be considered for roads with DL ranging from 3 to 6 years. However, an appropriate pre-overlay treatment is more encouraged before overlaying such as crack seal, milling, or in-place recycling of the existing layer.
- In-place recycling combined with surface treatments is highly recommended for maintaining LVRs in poor pavement conditions. The combined practices can increase the effectiveness of maintenance plans to be almost satisfied with the current resources.
- CDOT should not limit the pavement maintenance strategies to treat only the worst roads first as followed in some regions. CDOT regions are recommended to consider pavement maintenance activities on LVRs at different DL categories to avoid the escalating costs of pavement rehabilitation in poor conditions.
- The uniform distribution of maintenance budgets among different DL categories is recommended. This policy would allow CDOT regions to consider different maintenance activities for the benefits of pavement preservation and rehabilitation.
- CDOT should avoid allocating maintenance budgets based on only regional decisions or political direction. The budget allocation should be coordinated with the PMS optimization analysis and maintenance recommendations at network level.
- Increasing the current CDOT maintenance funding on LVRs is recommended to sustain the network-level pavement condition. However, optimized maintenance plans to maintain a steady state is recommended because it has the highest benefit-cost ratio.

- Applying chip seals are recommended on LVRs in moderate conditions ranging from 6 to 10 years. However, cracking indices should be in higher levels of more than 85. These treatments have the ability to extend the drivability life of pavement with relatively low costs compared to light rehabilitation techniques.
- The optimization analysis recommends allocating almost one third of the maintenance budgets to chip seals in order to get the best benefit of such low-cost applications. In addition, the light rehabilitation expenditures should not be less than one third of the allocated maintenance budgets.
- CDOT regions are highly recommended to promote the political awareness of the economic and social importance of maintaining LVRs.
- The decision-making simulation of selecting LVRs treatments is recommended using advanced artificial intelligence and machine learning. These techniques provide robust systems to retain successful knowledge for the coming practitioners who may not have enough expertise while managing LVRs.
- Since the conducted optimization analysis requires advanced programming, user-friendly implementation tools are recommended to develop for CDOT's decision makers. These tools can be readily implemented on future optimization planning using the most recent condition of low-volume paved roads and budget limits. In this tool, decision makers can consider flexible performance target constraints, budget constraints, and specific budget allocations of treatment practices. The outputs of this tool can be integrated directly to the PMS database of LVRs in CDOT.
- Another user-friendly software tool is recommended to help CDOT regions simulate expert-based decision making of selecting treatments on low-volume paved roads in Colorado. Successful experiences of selecting effective treatments at the appropriate time can be trained with advanced classification techniques and machine learning. Then the ANN-based decision modeling can be converted into a decision-making tool.

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APPENDIX A: CDOT REGIONAL SURVEY

Appendix A-1: Survey Questionnaire

General Information

* 1. Please enter your contact information:

Name	
Title	
CDOT Region#	
Email Address	
Phone Number	

General Information

2. How many miles of low volume paved roads (LVRs) are in your region?

- ◯ More than 600 miles
- ◯ 500 – 600 miles
- ◯ 400 – 499 miles
- ◯ 300 – 399 miles
- ◯ 200 – 299 miles
- ◯ 100 – 199 miles
- ◯ 50 – 99 miles
- ◯ Less than 50 miles

3. What is the annual LVRs maintenance budget of your region for every year from 2012 to 2017?

	Do not Know	Zero	Less than $1.0M	$1.0M – $1.9M	$2.0M – $2.9M	$3.0M – $4.0M	More than $4.0M
2012	○	○	○	○	○	○	○
2013	○	○	○	○	○	○	○
2014	○	○	○	○	○	○	○
2015	○	○	○	○	○	○	○
2016	○	○	○	○	○	○	○
2017	○	○	○	○	○	○	○

Other (please specify)

Maintenance Decision

4. Do you follow a systematic process when selecting pavement treatments for LVRs?

A systematic process is any decision-making framework that assists road engineers in selecting the most appropriate pavement treatment based on the current pavement condition and/or any other pavement management data.

- ○ Yes
- ○ No

Maintenance Decision

5. Which indices/data do you consider when selecting pavement treatments for LVRs? Please check all that apply.

- ☐ Drivability Life (DL)
- ☐ Fatigue index
- ☐ Longitudinal Index
- ☐ Transverse Index
- ☐ Ride Index
- ☐ Rut Index
- ☐ Average Annual Daily Traffic (AADT)
- ☐ Average Daily Truck Traffic (ADTT)
- ☐ Other (please specify)

6. Please upload a file including the decision support tool or decision tree that you consider in your region for selecting treatments on LVRs.
Note: If the file is in Microsoft Excel format, please email it to: khaled@uwyo.edu

Choose File No file chosen

Copy of page: **Low Volume Paved Roads Maintenance Strategies**

* 7. Which of the following pavement treatments do you currently apply to LVRs in your region? Please check all that apply.
Note: All the subsequent questions will consider only the treatments selected from this list. If you skip some of the treatments, they will not appear in the subsequent questions.

- ☐ Single Chip Seal
- ☐ Double Chip Seal
- ☐ Cape Seal
- ☐ Hot Chip Seal
- ☐ Slurry Seal
- ☐ Micro-Surfacing
- ☐ Crack Seal
- ☐ Fog Coat
- ☐ Ultra-Thin Overlay (<1 inch)
- ☐ Stress Absorbing Membrane Seal
- ☐ Stress Absorbing Membrane Interlayer
- ☐ Cold Mix Paving
- ☐ Thin HMA Overlay (1.0 – 1.5 inches)
- ☐ Cold In-Place Recycling
- ☐ Hot In-Place Recycling
- ☐ Full Depth Replacement (10% Patching)
- ☐ Asphalt Medium Overlay 2" - < 4"
- ☐ Asphalt Major Overlay 4" - < 6"
- ☐ Asphalt Reconstruction >= 6"
- ☐ Other (please specify)

Low Volume Paved Roads Maintenance Strategies

8. When should the selected treatments be applied to LVRs? Please check treatments recommended to each of the following Drivability Life (DL) categories.

	Low DL: 3 years or less	Moderate DL: from 4 to 10 years	High DL: more than 10 years
Single Chip Seal	☐	☐	☐
Double Chip Seal	☐	☐	☐
Cape Seal	☐	☐	☐
Hot Chip Seal	☐	☐	☐
Slurry Seal	☐	☐	☐
Micro-Surfacing	☐	☐	☐
Crack Seal	☐	☐	☐
Fog Coat	☐	☐	☐
Ultra-Thin Overlay (<1 inch)	☐	☐	☐
Stress Absorbing Membrane Seal	☐	☐	☐
Stress Absorbing Membrane Interlayer	☐	☐	☐
Cold Mix Paving	☐	☐	☐
Thin HMA Overlay (1.0 – 1.5 inches)	☐	☐	☐
Cold In-Place Recycling	☐	☐	☐
Hot In-Place Recycling	☐	☐	☐
Full Depth Replacement (10% Patching)	☐	☐	☐
[Insert text from Other]	☐	☐	☐
Asphalt Medium Overlay 2" - < 4"	☐	☐	☐
Asphalt Major Overlay 4" - < 6"	☐	☐	☐
Asphalt Reconstruction >= 6"	☐	☐	☐

Other (please specify)

☐

Low Volume Paved Roads Maintenance Strategies

9. What is the approximate percentage of total annual budgets allocated to all pavement treatments in your region? “Percentages must add up to 100%”

	5%	10%	15%	20%	25%	30%	40%	50%	60%	70%	80%	90%	100%
Single Chip Seal													
Double Chip Seal													
Cape Seal													
Hot Chip Seal													
Slurry Seal													
Micro-Surfacing													
Crack Seal													
Fog Coat													
Ultra-Thin Overlay (<1 inch)													
Stress Absorbing Membrane Seal													
Stress Absorbing Membrane Interlayer													
Cold Mix Paving													
Thin HMA Overlay (1.0 – 1.5 inches)													
Cold In-Place Recycling													
Hot In-Place Recycling													
Full Depth Replacement (10% Patching)													
[Insert text from Other]													
Asphalt Medium Overlay 2" - < 4"													
Asphalt Major Overlay 4" - < 6"													
Asphalt Reconstruction >= 6"													

Other (please specify)

Low Volume Paved Roads Maintenance Strategies

10. Do you consider any condition index/data when selecting the type of pavement treatment?

◯ Yes

◯ No

Low Volume Paved Roads Maintenance Strategies

11. Identify the optimum values for any of the following indices when each treatment should be applied. Please leave the answer blank if it is not applicable.

	Drivability Life (DL, years)	Fatigue Index	Long. Index	Transverse Index	Ride Index	Rut Index
Single Chip Seal						
Double Chip Seal						
Cape Seal						
Hot Chip Seal						
Slurry Seal						
Micro-Surfacing						
Crack Seal						
Fog Coat						
Ultra-Thin Overlay (<1 inch)						
Stress Absorbing Membrane Seal						
Stress Absorbing Membrane Interlayer						
Cold Mix Paving						
Thin HMA Overlay (1.0 – 1.5 inches)						
Cold In-Place Recycling						
Hot In-Place Recycling						
Full Depth Replacement (10% Patching)						

Other (please specify)

Low Volume Paved Roads Maintenance Strategies

12. please explain how you select the type of pavement treatment recommended for low volume paved roads.

Low Volume Paved Roads Maintenance Strategies

For roads with the three DL categories shown below, identify the expected Drivability Live (expected DL) after applying each pavement treatment to LVRs in your region.

13. Roads with low DL values (3 years or less)

	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years	10 years	12 years	more than 12 years
Single Chip Seal											
Double Chip Seal											
Cape Seal											
Hot Chip Seal											
Slurry Seal											
Micro-Surfacing											
Crack Seal											
Fog Coat											
Ultra-Thin Overlay (<1 inch)											
Stress Absorbing Membrane Seal											
Stress Absorbing Membrane Interlayer											
Cold Mix Paving											
Thin HMA Overlay (1.0 – 1.5 inches)											
Cold In-Place Recycling											
Hot In-Place Recycling											
Full Depth Replacement (10% Patching)											
[Insert text from Other]											
Asphalt Medium Overlay 2" - < 4"											
Asphalt Major Overlay 4" - < 6"											
Asphalt Reconstruction >= 6"											

Other (please specify)

14. Roads with moderate DL values (from 4 to 10 years)

	4 years	5 years	6 years	7 years	8 years	9 years	10 years	12 years	more than 12 years
Single Chip Seal	○	○	○	○	○	○	○	○	○
Double Chip Seal	○	○	○	○	○	○	○	○	○
Cape Seal	○	○	○	○	○	○	○	○	○
Hot Chip Seal	○	○	○	○	○	○	○	○	○
Slurry Seal	○	○	○	○	○	○	○	○	○
Micro-Surfacing	○	○	○	○	○	○	○	○	○
Crack Seal	○	○	○	○	○	○	○	○	○
Fog Coat	○	○	○	○	○	○	○	○	○
Ultra-Thin Overlay (<1 inch)	○	○	○	○	○	○	○	○	○
Stress Absorbing Membrane Seal	○	○	○	○	○	○	○	○	○
Stress Absorbing Membrane Interlayer	○	○	○	○	○	○	○	○	○
Cold Mix Paving	○	○	○	○	○	○	○	○	○
Thin HMA Overlay (1.0 – 1.5 inches)	○	○	○	○	○	○	○	○	○
Cold In-Place Recycling	○	○	○	○	○	○	○	○	○
Hot In-Place Recycling	○	○	○	○	○	○	○	○	○
Full Depth Replacement (10% Patching)	○	○	○	○	○	○	○	○	○
[Insert text from Other]	○	○	○	○	○	○	○	○	○
Asphalt Medium Overlay 2" - < 4"	○	○	○	○	○	○	○	○	○
Asphalt Major Overlay 4" - < 6"	○	○	○	○	○	○	○	○	○
Asphalt Reconstruction >= 6"	○	○	○	○	○	○	○	○	○

Other (please specify)

15. Roads with high DL values (more than 10 years)

	10 years	12 years	14 years	16 years	more than 16 years
Single Chip Seal					
Double Chip Seal					
Cape Seal					
Hot Chip Seal					
Slurry Seal					
Micro-Surfacing					
Crack Seal					
Fog Coat					
Ultra-Thin Overlay (<1 inch)					
Stress Absorbing Membrane Seal					
Stress Absorbing Membrane Interlayer					
Cold Mix Paving					
Thin HMA Overlay (1.0 – 1.5 inches)					
Cold In-Place Recycling					
Hot In-Place Recycling					
Full Depth Replacement (10% Patching)					
[Insert text from Other]					
Asphalt Medium Overlay 2" - < 4"					
Asphalt Major Overlay 4" - < 6"					
Asphalt Reconstruction >= 6"					

Low Volume Paved Roads Maintenance Strategies

16. Based on your experience, identify the effectiveness of surface treatments in your region on severely distressed LVRs.

	Effective	Not Effective	Do not know/Do not use
Single Chip Seal	○	○	○
Double Chip Seal	○	○	○
Cape Seal	○	○	○
Hot Chip Seal	○	○	○
Slurry Seal	○	○	○
Micro-Surfacing	○	○	○
Crack Seal	○	○	○
Fog Coat	○	○	○
Ultra-Thin Overlay (<1 inch)	○	○	○
Stress Absorbing Membrane Seal	○	○	○
Stress Absorbing Membrane Interlayer	○	○	○

Other (please specify)

Low Volume Paved Roads Maintenance Strategies

17. Identify the effectiveness of various rehabilitation techniques for the following severe distresses.

	Severe Fatigue Cracks	Severe Longitudinal Cracks	Sever Transverse Cracks	Severe Rutting	Roughness
Cold Mix Paving					
Thin HMA Overlay (1.0 – 1.5 inches)					
Cold In-Place Recycling					
Hot In-Place Recycling					
Full Depth Replacement (10% Patching)					

Other (please specify)

Low Volume Paved Roads Maintenance Strategies

18. Do you combine any rehabilitation activities with surface treatments?

- ◯ Yes
- ◯ No

Low Volume Paved Roads Maintenance Strategies

19. Please identify these combinations.

20. How do you select the type of surface treatment when it is combined with a rehabilitation technique?

Optimization Analysis

21. Do you perform an optimization analysis when selecting maintenance strategies for low volume paved roads?

- ◯ Yes
- ◯ No

Optimization Analysis

22. Which parameters are being optimized?

- ☐ Maximizing Drivability Life (DL)
- ☐ Optimizing Budgets
- ☐ Minimizing Maintenance Costs
- ☐ Other (please specify)

23. Which optimization technique do you use on low volume paved roads?

- [ ] Linear/Non-Linear Programming
- [ ] Genetic Algorithms
- [ ] Optimal Control
- [ ] Do not know
- [ ] Dynamic Programming
- [ ] Other (please specify)

Optimization Analysis

24. How do you select roads for maintenance within the available budget?

- ○ Worst roads
- ○ Other (Please specify)
- ○ Prioritization (Please identify a priority index in the comment box below)

Comment:

25. Do you think that optimization techniques should be used when selecting treatments on low volume paved roads?

- ○ Yes
- ○ No

Optimization Analysis

26. Which parameters should be optimized while managing low volume paved roads?

- [ ] Maximizing Drivability Life (DL)
- [ ] Maximizing Longitudinal Index
- [ ] Minimizing Maintenance Costs
- [ ] Maximizing Transverse Index
- [ ] Optimizing Budgets
- [ ] Maximizing Ride Index
- [ ] Maximizing Fatigue Index
- [ ] Maximizing Rut Index
- [ ] Other (please specify)

Optimization Analysis

27. Do you think that current maintenance resources are adequate for low-volume paved roads in your region?

◯ Yes

◯ No

Optimization Analysis

28. How should current resources be changed to satisfy the urgent needs of LVRs?

☐ Increasing Maintenance Budgets (Indicate the percentage of increase in the comment box below)

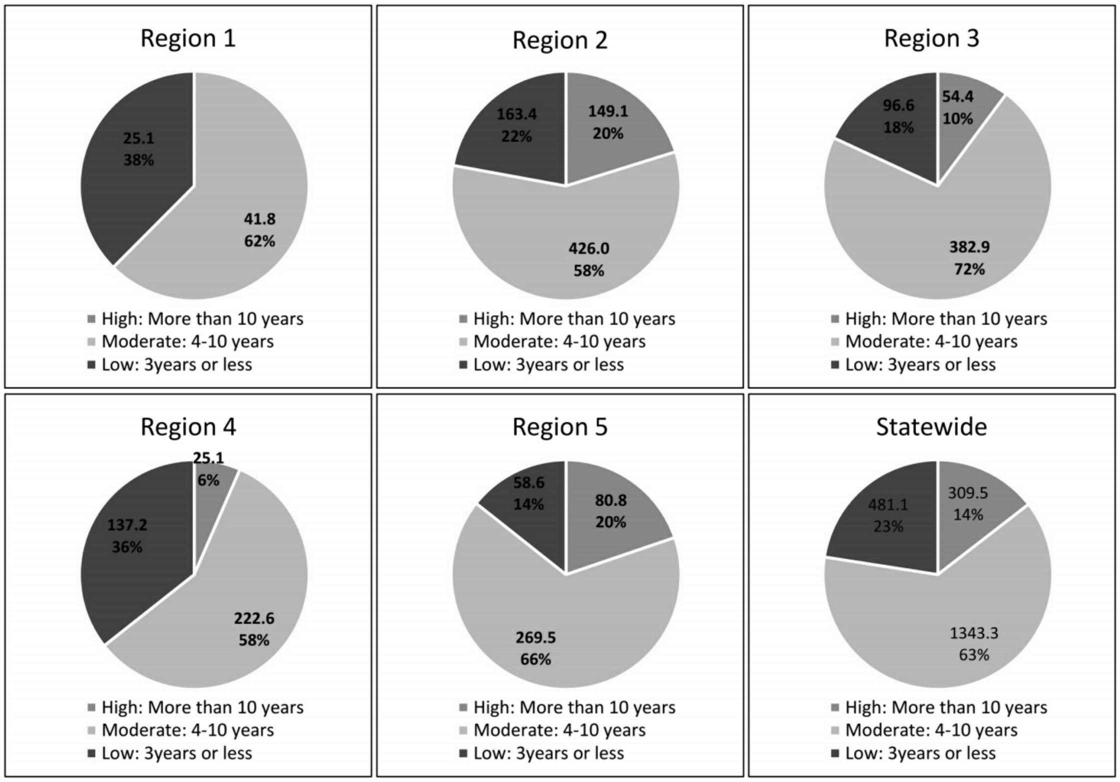
☐ Modifying Maintenance Policy (Please explain this modification in the comment box below)

☐ Integrating Innovative Treatments (Identify these techniques in the comment box below)

Comment

Optimization Analysis

The charts below show the current mileage of LVRs distributed on three DL categories.



29. What should be the target percentage of road miles for each DL category in 5 years from now in your region and statewide? "Percentages must add up to 100%"

	Region 1	Region 2	Region 3	Region 4	Region 5	Statewide
Low DL (3 years or less)						
Moderate DL (from 4 to 10 years)						
High DL (more than 10 years)						

Other (please specify)

30. Would you like to get a copy of the results of the survey?

- ◯ Yes
- ◯ No

Appendix A-2: Survey Responses

Q1. Please enter your contact information:

Name	Title	CDOT Region#	Email Address	Phone Number
Bob Mero		1	bob.mero@state.co.us	303-398-6703
Jody Pieper	Region Materials Engineer	2	jody.pieper@state.co.us	719-562-5532
Jeremy Lucero	Region Materials Engineer	3	jeremy.lucero@state.co.us	970-683-7562
Beaux Kemp	EIT	5	beaux.kemp@state.co.us	970-385-1627
Steven Heimmer	Region 4 Pavement Manager	4	steven.heimmer@state.co.us	9703502381
Melody Perkins	Pavement Design Engineer, PE I	HQ	melody.perkins@state.co.us	303-398-6562

Q2. How many miles of low volume paved roads (LVRs) are in your region?

Region#	Total Length
1	50 - 99 miles
2	More than 600 miles
3	500 – 600 miles
4	More than 600 miles
5	400 – 499 miles
HQ	N/A

Q3. What is the annual LVRs maintenance budget of your region for every year from 2012 to 2017?

Region#	Annual Budget					
	2012	2013	2014	2015	2016	2017
1	There has never been a set budget specifically dedicated to LVRs					
2	$2.0M – $2.9M	$3.0M – $4.0M	$3.0M – $4.0M	> $4.0M	> $4.0M	> $4.0M
3	Zero	> $4.0M	Zero	$2.0M – $2.9M	> $4.0M	> $4.0M
4	Do not Know	Do not Know	Do not Know	Zero	Zero	> $4.0M
5	< $1.0M	< $1.0M	< $1.0M	< $1.0M	< $1.0M	< $1.0M
HQ	N/A	N/A	N/A	N/A	N/A	N/A

Q4. Do you follow a systematic process when selecting pavement treatments for LVRs?

Region#	Response
1	Yes
2	No
3	Yes
4	Yes
5	Yes
HQ	Yes

Q5. Which indices/data do you consider when selecting pavement treatments for LVRs? Please check all that apply.

Index/Data	Region#					
	1	2	3	4	5	HQ
Drivability Life (DL)	•			•	•	•
Fatigue index	•		•	•	•	•
Longitudinal Index	•			•	•	•
Transverse Index	•		•	•	•	•
Ride Index				•	•	•
Rut Index			•	•	•	•
Average Annual Daily Traffic (AADT)	•			•	•	
Average Daily Truck Traffic (ADTT)	•			•	•	
Other				Soil type/strength		

Q6. Please explain how you select the type of pavement treatment recommended for low volume paved roads. (If Q4 is No)

Region#2 – We are limited to only treating low volume roads with a 1.5" overlay with surgical deep repairs by the Colorado Transportation Commission. If I had the opportunity, I would definitely select a different treatment for low volume roads based on our condition data and engineering judgement.

Q7. Which of the following pavement treatments do you currently apply to LVRs in your region?

Treatment	(a) High DL: more than 10 years				
	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal			•		•
Single Chip Seal			•	•	
Treatment	(b) Moderate DL: from 4 to 10 years				
	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal	•		•		•
Single Chip Seal	•		•	•	•
Double Chip Seal					•
Thin HMA Overlay (1.0 – 1.5 inches)			•	•	•
Hot In-Place Recycling			•		
Treatment	(c) Low DL: 3 years or less				
	Region 1	Region 2	Region 3	Region 4	Region 5
Thin HMA Overlay (1.0 – 1.5 inches)	•	•			•
Cold In-Place Recycling			•		
Hot In-Place Recycling			•		
Full Depth Reclamation				•	
Full Depth Replacement (10% Patching)				•	
Asphalt Medium Overlay 2" - < 4"				•	
Asphalt Major Overlay 4" - < 6"				•	

Q9. What is the approximate percentage of total annual budgets allocated to all pavement treatments in your region?

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal			5%		25%
Single Chip Seal			30%	5%	50%
Double Chip Seal					5%
Thin HMA Overlay (1.0 – 1.5 inches)		100%	20%	5%	20%
Cold In-Place Recycling			25%		
Hot In-Place Recycling			20%		
Full Depth Reclamation				20%	
Full Depth Replacement (10% Patching)				5%	
Asphalt Medium Overlay 2" - < 4"				60%	
Asphalt Major Overlay 4" - < 6"				5%	

Q10. Do you consider any condition index/data when selecting the type of pavement treatment?

Region#	Response
1	Yes
2	No
3	Yes
4	Yes
5	Yes
HQ	Yes

Q11. Identify the optimum values for any of the following indices when each treatment should be applied.

Treatment	Drivability Life (DL)	Fatigue index	Long. Index	Transverse Index	Ride Index	Rut Index
	Region 1					
Crack Seal	5	80	80	80		
Single Chip Seal	5	70	70	70		
Thin Overlay (1.0 – 1.5 inches)	4	70	60	60		
	Region 2					
Treatment	Drivability Life (DL)	Fatigue index	Long. Index	Transverse Index	Ride Index	Rut Index
	N/A					
	Region 3					
Treatment	Drivability Life (DL)	Fatigue index	Long. Index	Transverse Index	Ride Index	Rut Index
Crack Seal	7	80	70	70	70	80
Single Chip Seal	10	90	90	90	90	90
Thin Overlay (1.0 – 1.5 inches)	7	80	90	90	80	70
Cold In-Place Recycling	1	50	50	50	50	50
Hot In-Place Recycling	1	70	70	70	70	70
	Region 4					
Treatment	Drivability Life (DL)	Fatigue index	Long. Index	Transverse Index	Ride Index	Rut Index
Single Chip Seal	6	80	80	80	80	70
Thin Overlay (1.0 – 1.5 inches)	6	80	80	80	80	60
Full Depth Reclamation						
Full Depth Replacement (10% Patching)	0	60	50	50	60	50
Asphalt Medium Overlay 2" - < 4"						
Asphalt Major Overlay 4" - < 6"						
	Region 5					
Treatment	Drivability Life (DL)	Fatigue index	Long. Index	Transverse Index	Ride Index	Rut Index
Crack Seal	10					
Single Chip Seal	7					
Double Chip Seal	7					
Thin Overlay (1.0 – 1.5 inches)	3					

Q13-14-15. Identify the expected Drivability Live (expected DL) after applying each pavement treatment to LVRs in your region.

Treatment	(a) High DL: more than 10 years				
	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal			12 years		12 years
Single Chip Seal			12 years	10 years	
Treatment	(b) Moderate DL: from 4 to 10 years				
	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal	4 years		10 years		10 years
Single Chip Seal	4 years		10 years	4 years	10 years
Double Chip Seal					10 years
Thin HMA Overlay (1.0 – 1.5 inches)			10 years	5 years	10 years
Hot In-Place Recycling			10 years		
Treatment	(c) Low DL: 3 years or less				
	Region 1	Region 2	Region 3	Region 4	Region 5
Thin HMA Overlay (1.0 – 1.5 inches)	4 years				10 years
Cold In-Place Recycling			> 12 years		
Hot In-Place Recycling			10 years		
Full Depth Reclamation				> 12 years	
Full Depth Replacement (10% Patching)				> 12 years	
Asphalt Medium Overlay 2" - < 4"				8 years	
Asphalt Major Overlay 4" - < 6"				> 12 years	

Q16. Based on your experience, identify the effectiveness of surface treatments in your region on severely distressed LVRs.

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5
Crack Seal	Do not know/Do not use	Not Effective	Not Effective	Not Effective	Not Effective
Single Chip Seal	Do not know/Do not use	Not Effective	Not Effective	Not Effective	Not Effective
Double Chip Seal	Do not know/Do not use	Not Effective	Not Effective	Not Effective	Not Effective
Ultra-Thin Overlay (<1")	Do not know/Do not use	Do not know/Do not use	Not Effective	Not Effective	
Stress Absorbing Membrane Seal	Do not know/Do not use	Do not know/Do not use	Not Effective	Not Effective	
Stress Absorbing Membrane Interlayer	Do not know/Do not use	Not Effective	Not Effective	Not Effective	

Q17. Identify the effectiveness of various rehabilitation techniques for the following severe distresses.

(a) Severe Fatigue Cracks

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5	HQ
Cold Mix Paving	Not Effective	Not Effective		Not Effective		Not Effective
Thin HMA Overlay (1.0 – 1.5 inches)	Not Effective	Not Effective	Not Effective	Not Effective	Not Effective	Not Effective
Cold In-Place Recycling		Effective	Effective	Not Effective	Effective	Not Effective
Hot In-Place Recycling		Not Effective	Not Effective	Not Effective	Effective	Not Effective
Full Depth Replacement (10% Patching)	Effective	Effective		Effective	Effective	Effective

(b) Severe Longitudinal Cracks

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5	HQ
Cold Mix Paving		Not Effective		Not Effective		Effective
Thin HMA Overlay (1.0 – 1.5 inches)		Not Effective	Not Effective	Not Effective	Effective	Not Effective
Cold In-Place Recycling		Effective	Effective	Not Effective	Effective	Effective
Hot In-Place Recycling		Effective	Not Effective	Not Effective	Effective	Effective
Full Depth Replacement (10% Patching)	Effective	Effective		Effective	Effective	Effective

(c) Severe Transverse Cracks

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5	HQ
Cold Mix Paving		Not Effective		Not Effective		Effective
Thin HMA Overlay (1.0 – 1.5 inches)		Not Effective	Not Effective	Not Effective	Effective	Not Effective
Cold In-Place Recycling		Effective	Effective	Not Effective	Effective	Effective
Hot In-Place Recycling		Effective	Not Effective	Not Effective	Effective	Effective
Full Depth Replacement (10% Patching)	Effective	Effective		Effective	Effective	Effective

(d) Severe Rutting

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5	HQ
Cold Mix Paving		Effective		Not Effective		Effective
Thin HMA Overlay (1.0 – 1.5 inches)		Effective	Not Effective	Effective	Not Effective	Effective
Cold In-Place Recycling		Effective	Effective	Effective	Effective	Effective
Hot In-Place Recycling		Not Effective	Effective	Not Effective	Effective	Effective
Full Depth Replacement (10% Patching)	Effective	Effective		Effective	Effective	Effective

(e) Severe Roughness

Treatment	Region 1	Region 2	Region 3	Region 4	Region 5	HQ
Cold Mix Paving		Not Effective		Not Effective		Effective
Thin HMA Overlay (1.0 – 1.5 inches)		Effective	Not Effective	Not Effective	Effective	Effective
Cold In-Place Recycling		Not Effective	Effective	Effective	Effective	Effective
Hot In-Place Recycling		Not Effective	Effective	Not Effective	Effective	Effective
Full Depth Replacement (10% Patching)		Effective		Effective	Effective	Effective

Other Response:

Region#4 – Full Depth Reclamation has proven to be exceedingly Effective for all of the above distresses, much more effective than Cold in Place Recycling.

Region#2 – FDR and 4" overlay will last forever.

Region#1 – HIR & CIR might be effective but only to a certain point.

Q18. Do you combine any rehabilitation activities with surface treatments?

Region#	Response
1	Yes
2	No
3	Yes
4	Yes
5	Yes
HQ	Yes

Q19. Please identify these combinations.

Region#	Response
1	Milling + Overlays
2	N/A
3	Hot in-place recycle + Chip seal Cold in-place recycle + Thin overlay
4	Full depth reclamation + Thin overlay 10% full depth patching + Thin overlay Milling/Leveling + Thin overlay Reflective crack interlayer + Thin overlay
5	Crack seal + Chip seal (1 year later)

Q20. How do you select the type of surface treatment when it is combined with a rehabilitation technique?

Region#	Response
1	
2	
3	Funding and/or Regional direction and Statewide policies typically dictate.
4	I select based upon the distress type and where the distress originates in the pavement. For lots of transverse cracks and fatigue I would use full depth reclamation. For Ruts I would use milling or leveling courses as long as it is not a subgrade failure or stripped pavement. For transverse cracks that have not subsided and are not wide I would use a reflective crack interlayer to buy some moderate life. For minor ride correction and if the pavement was in good shape I might mill some rough spots prior to overlay. Subsided or wide transverse cracks need full depth reclamation to effectively fix.
5	The rehab is a prep treatment that increases the effectiveness of the primary treatment.

Q21. Do you perform an optimization analysis when selecting maintenance strategies for low volume paved roads?

Region#	Response
1	No
2	No
3	Yes
4	Yes
5	No
HQ	Yes

Q22. Which parameters are being/should be optimized?

Objective	Region 1	Region 2	Region 3	Region 4	HQ
Maximizing Drivability Life (DL)	•	•		•	•
Minimizing Maintenance Costs	•	•			
Optimizing Budgets			•	•	•
Maximizing Fatigue Index		•			
Maximizing Transverse Index		•			

Other Response:

Region 4 – The selected treatment must be worthwhile to apply to fix the primary distress.

HQ – Budget consideration is huge, what can we do to this road with the money that has been allocated. Sometimes the whole road needs loving, but the budget may only allow full depth in isolated places followed by a chip seal.

Q23. Which optimization technique do you use on low volume paved roads?

Region#	Response
1	N/A
2	N/A
3	Optimized as a network, not based on a traffic tier.
4	I use Pavement ME to achieve a design life to fix the controlling distress and then maximize Design Life based on available budget. Considering the wide variety of distresses being addressed a Benefit to Cost Ratio alone cannot accurately gauge performance and engineering judgement and experience play a huge part in this.
5	N/A
HQ	Engineering Judgement

Q24. How do you select roads for maintenance within the available budget? "If Q21 is No"

Region#1 – The entire network is examined and input is received from the Engineering and Maintenance sections.

Region#2 – Worst roads.

Region 5 – Prioritization (Roads which can be successfully rehabilitated).

Q25. Do you think that optimization techniques should be used when selecting treatments on low volume paved roads?

Region#1 – Yes.

Region#2 – Yes.

Region#5 – No.

Q27. Do you think that current maintenance resources are adequate for low-volume paved roads in your region?

Region#	Response
1	Yes
2	No
3	Yes
4	No
5	No
HQ	No

Q28. How should current resources be changed to satisfy the urgent needs of LVRs? "If No"

Region#	Increasing Maintenance Budgets	Integrating Innovative Treatments	Modifying Maintenance Policy	Comment
Region 1				
Region 2	•		•	The agreement between CDOT and the General Contractor's Association limiting CDOT's Maintenance forces to $150,000 per job severely limits their ability to treat low volume roads.
Region 4			•	Rehabilitation techniques performed by Maint. are currently capped at $ 50,000 for non-commission approved projects and $ 150k for commission approved projects (which there are not many of). Their other option is to get a commission approved M-Project for $ 1M. However each region only gets 1 or 2 of these a year which can't keep up with degradation of the system. This $ 50k dollar cap should be eliminated or drastically increased so they can perform cost effective treatments based upon the area of distress, so they could effectively work on a longer stretch of roadway instead of $50k spent one year even though it doesn't treat the fully distressed area. Effectively they stop short of fixing the distressed area as they run into the $ 50k cap. $50k effectively only treats between 0.1 miles to 0.3 miles depending on the width of the roadway at a 1.5" overlay depth. These caps also preclude them from using more effective treatments. Depending on the length of the distress they may not be able to add in the milling they should for example. Also, they are currently limited to doing 1.5" overlays, in many high distress areas they are applying this, this is ineffective for more than 1 to 2 years worth of service before potholes start developing again in high distress areas. They should not be capped on the thickness of treatments they can apply. Engineering should be able to advise them on thicker treatments to be effective.
Region 5		•		Recycle with a thin overlay or chip
HQ				Preventative maintenance saves roads, whatever they can do seams to help and extend the life of the road.

Q29. What should be the target percentage of road miles for each DL category in 5 years from now in your region and statewide?

Condition	Region 1	Region 2	Region 3	Region 4	Region 5	Statewide
Low DL (3 years or less)	20%	15%	10%	20%	10%	15%
Moderate DL (from 4 to 10 years)	60%	30%	80%	70%	70%	55%
High DL (more than 10 years)	20%	55%	10%	10%	20%	30%

Q30. Would you like to get a copy of the results of the survey?

Region#	Response
1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
HQ	Yes

APPENDIX B: OPTIMIZED MAINTENANCE DECISIONS ON ROADS WITHIN CURRENT BUDGETS

Appendix B-1: Region 2

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	DN	GM	DN
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	41.2	44.9	2	3.7	DN	DN	DN	DN	DN	DN	DN	DN
009A	44.9	47	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
010A	5.1	10.1	2	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
010A	10.1	15.1	2	5	DN	DN	GM	DN	DN	DN	GM	DN
010A	15.1	20.1	2	5	GM	DN	DN	DN	DN	DN	DN	DN
010A	20.1	25.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	DN
010A	25.1	30.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	DN
010A	30.1	35.1	2	5	DN	GM	DN	DN	DN	DN	DN	DN
010A	35.1	40.1	2	5	DN	DN	DN	GM	DN	DN	DN	DN
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	DN	DN	DN
010A	62.9	67.9	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
010A	67.9	68	2	0.1	GM	DN	GM	DN	DN	ACHP	DN	DN
010A	68	71	2	3	DN	DN	DN	DN	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	0	4.6	2	4.6	GM	DN	GM	ACHP	DN	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	DN	ACHP	DN	DN	DN
012A	20.2	25.2	2	5	DN	GM	DN	DN	DN	GM	DN	DN
012A	25.2	30.2	2	5	GM	DN	DN	DN	DN	GM	DN	DN
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	38.1	43	2	4.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	48	53	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	53	56.8	2	3.8	DN	DN	DN	DN	ACHP	DN	DN	DN
024E	0	0.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
025B	0	1.6	2	1.6	DN	DN	DN	DN	DN	DN	DN	DN
025B	1.6	1.9	2	0.3	DN	DN	DN	DN	ACHP	DN	DN	DN
067A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067A	5	6.8	2	1.8	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
067A	6.8	10.2	2	3.4	DN	DN	DN	DN	DN	DN	DN	DN
067C	45.6	45.7	2	0.1	ACHP	DN	DN	DN	DN	DN	DN	ACHP
067C	45.7	50.7	2	5	DN	GM	DN	DN	ACHP	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN
069A	0	5	2	5	GM	DN	DN	DN	DN	DN	DN	DN
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	DN	DN	DN
069A	5.3	9.7	2	4.4	DN	DN	ACHP	DN	DN	DN	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	19.7	24.7	2	5	DN	DN	DN	GM	DN	DN	GM	DN
069A	24.7	25	2	0.3	DN	DN	DN	GM	DN	DN	DN	DN
069A	25	26	2	1	DN	DN	DN	GM	ACHP	DN	DN	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	DN	GM	DN
069A	31	36	2	5	DN	DN	DN	GM	DN	DN	GM	DN
069A	36	41	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	41	46	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	46	49.4	2	3.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
069A	49.4	54.1	2	4.7	DN	DN	DN	DN	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	GM	DN	ACHP	DN	DN	DN	DN
069A	62.1	64.7	2	2.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
069A	71.6	76.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
071A	0	5	2	5	GM	DN	DN	GM	DN	DN	DN	DN
071A	5	7	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071A	7	9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	9.6	11.6	2	2	DN	DN	GM	DN	DN	DN	GM	DN
071B	11.6	13.7	2	2.1	DN	DN	GM	DN	DN	DN	GM	DN
071B	13.7	14.1	2	0.4	DN	DN	DN	DN	DN	DN	DN	DN
078A	8.9	9	2	0.1	DN	DN	DN	DN	DN	DN	ACHP	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	DN	DN	DN	GM
078A	12.7	14.6	2	1.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	14.6	15.5	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	15.5	18.2	2	2.7	DN	DN	DN	DN	DN	DN	DN	DN
078A	18.2	23.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
078A	28.2	29.9	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	DN	DN	DN
089A	0	5	2	5	DN	DN	DN	DN	DN	GM	DN	DN
089A	5	9	2	4	DN	DN	DN	GM	DN	DN	ACHP	DN
089A	9	14	2	5	DN	DN	DN	GM	DN	DN	ACHP	DN
089A	14	18.6	2	4.6	DN	DN	DN	GM	DN	DN	DN	DN
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	DN	DN
089A	21.5	26.5	2	5	DN	DN	DN	DN	DN	DN	GM	DN
089A	26.5	31.5	2	5	DN	DN	DN	DN	DN	DN	GM	DN
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	DN	DN
094A	33.1	35	2	1.9	DN	DN	DN	DN	DN	DN	DN	DN
096A	11.1	16.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
096A	22.1	26.3	2	4.2	DN	DN	DN	DN	DN	DN	DN	DN
096A	26.3	31.3	2	5	DN	DN	DN	DN	DN	GM	DN	DN
096A	31.3	33.6	2	2.3	DN	DN	DN	DN	ACHP	DN	DN	DN
096A	33.6	38.6	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
096A	38.6	42.2	2	3.6	DN	DN	DN	DN	DN	DN	DN	DN
096B	69.5	70.6	2	1.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
100A	0	0.3	2	0.3	GM	DN	DN	GM	DN	DN	DN	DN
100A	0.3	0.4	2	0.1	DN	GM	DN	DN	DN	DN	DN	DN
101A	0.4	1.2	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
101A	1.2	5.2	2	4	DN	DN	DN	DN	DN	DN	DN	DN
101A	5.2	10.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
101A	16.5	21.4	2	4.9	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
105A	9.2	9.5	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	27.7	32.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
109A	32.7	37.7	2	5	ACHP	DN	DN	DN	DN	DN	DN	ACHP
109A	37.7	42.7	2	5	DN	ACHP	DN	DN	DN	DN	DN	DN
109A	42.7	47.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	47.7	52.7	2	5	ACHP	DN	DN	DN	DN	DN	DN	DN
109A	52.7	53	2	0.3	DN	GM	DN	DN	DN	DN	DN	DN
109A	53	54.8	2	1.8	DN	GM	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	DN	DN	DN	DN	DN	DN	DN
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
116A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
116A	12	12.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	DN	DN	DN
116A	18.1	20	2	1.9	GM	ACHP	DN	DN	DN	DN	DN	DN
116A	20	25	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	25	27	2	2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
116A	27	32	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	32	32.3	2	0.3	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
120A	3.1	7.2	2	4.1	GM	DN	ACHP	DN	DN	DN	DN	DN
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	358.7	363.7	2	5	GM	DN	DN	DN	GM	DN	DN	DN
160C	363.7	367.8	2	4.1	DN	GM	DN	DN	DN	GM	ACHP	DN
160C	367.8	372.8	2	5	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	372.8	375.8	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	375.8	380.8	2	5	GM	DN	DN	GM	DN	ACHP	DN	DN
160C	380.8	382.8	2	2	GM	DN	GM	DN	DN	ACHP	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN
160C	386.6	391.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	391.6	396.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	396.6	401.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	401.6	403.7	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
160C	403.7	406.7	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	406.7	411.7	2	5	DN	DN	DN	DN	DN	ACHP	DN	DN
160C	411.7	414.3	2	2.6	DN	DN	DN	DN	ACHP	DN	DN	DN
160C	414.3	414.8	2	0.5	DN	DN	DN	DN	DN	DN	GM	DN
160C	414.8	416.5	2	1.7	DN	ACHP	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	416.5	421.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	421.5	425.7	2	4.2	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	425.7	430.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	DN	DN	DN	DN	GM	DN	DN
160C	441.7	446.7	2	5	GM	DN	DN	DN	GM	DN	DN	DN
160C	446.7	447.6	2	0.9	GM	DN	DN	GM	DN	DN	DN	DN
160C	447.6	451	2	3.4	GM	DN	DN	DN	DN	DN	DN	DN
160C	451	456	2	5	DN	DN	DN	DN	GM	DN	ACHP	DN
160C	456	460.1	2	4.1	DN	DN	DN	DN	DN	DN	GM	DN
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	DN	GM	DN
160C	483	484.4	2	1.4	DN	DN	DN	DN	GM	DN	DN	DN
160C	492	497	2	5	DN	DN	DN	DN	GM	DN	DN	DN
160C	497	497.2	2	0.2	DN	DN	DN	ACHP	DN	DN	DN	DN
165A	0	5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
165A	5	10	2	5	DN	DN	DN	DN	DN	DN	GM	DN
165A	10	15	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	15	15.3	2	0.3	GM	DN	DN	DN	DN	DN	DN	ACIP+ATHO
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	DN	DN
165A	18.5	23.5	2	5	GM	DN	DN	GM	DN	ACHP	DN	DN
165A	23.5	28.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
167A	1.7	2	2	0.3	GM	DN	DN	GM	DN	DN	DN	DN
167A	2	2.4	2	0.4	GM	DN	DN	DN	DN	DN	DN	ACIP+ATHO
167A	2.4	2.9	2	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	DN	DN
194A	0	3.8	2	3.8	DN	DN	DN	GM	DN	ACHP	DN	DN
194A	3.8	8.8	2	5	DN	DN	DN	GM	DN	DN	DN	DN
194A	8.8	13.8	2	5	GM	DN	GM	ACHP	DN	DN	DN	DN
194A	13.8	14.7	2	0.9	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
196A	0	1.6	2	1.6	DN	DN	DN	DN	DN	DN	DN	DN
196A	1.6	6.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
196A	6.9	8.9	2	2	DN	DN	GM	DN	ACHP	DN	DN	DN
202A	0	0.1	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
202A	0.2	1.2	2	1	DN	DN	DN	DN	ACHP	DN	DN	DN
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	DN	DN
207A	0	3.5	2	3.5	DN	GM	DN	DN	DN	GM	DN	ACHP
207A	3.5	5.9	2	2.4	DN	GM	DN	DN	DN	GM	DN	DN
209A	0	1.4	2	1.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	DN	GM	DN	DN	DN	DN
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	DN	DN	DN
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN
266A	0.1	0.2	2	0.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
266A	0.2	1.3	2	1.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
266A	1.3	3	2	1.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	9.5	11.5	2	2	GM	DN	GM	DN	ACHP	DN	DN	DN
350A	0	2.7	2	2.7	DN	DN	GM	DN	ACHP	DN	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	GM	DN	DN	ACHP	DN	DN
350A	7.1	12.1	2	5	ACHP	DN	DN	DN	DN	DN	DN	DN
350A	12.1	17.1	2	5	GM	DN	DN	DN	DN	DN	DN	DN
350A	17.1	22.1	2	5	ACHP	DN	DN	DN	DN	DN	DN	DN
350A	22.1	24	2	1.9	DN	DN	DN	DN	DN	DN	DN	DN
350A	24	29	2	5	ACHP	DN	DN	DN	DN	DN	DN	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	DN	DN	ACHP
350A	34	39	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	39	44	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	44	49	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	49	54	2	5	GM	DN	ACHP	DN	DN	DN	DN	DN
350A	54	56.2	2	2.2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
350A	56.2	59.4	2	3.2	GM	DN	DN	GM	ACHP	DN	DN	DN
350A	59.4	64.4	2	5	DN	GM	DN	DN	DN	GM	DN	ACHP
350A	64.4	69.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.4	69.7	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.7	72	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	Length	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
350A	72	72.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	72.3	72.4	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
350A	72.4	72.6	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
385A	95.3	98.6	2	3.3	GM	DN	DN	DN	DN	DN	DN	DN
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
385B	129.2	134.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	GM	DN	DN
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	DN	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN
389A	11.9	12.8	2	0.9	DN	GM	DN	DN	DN	GM	DN	DN

Appendix B-2: Region 3

ROUTE	REFPT	ENDREFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	ACHP	DN	DN	DN	DN	DN	ACHP
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	ACHP	DN	DN	DN
006A	11.8	13.9	3	2.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
006A	13.9	15.1	3	1.2	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
006C	43.4	45.6	3	2.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
006C	45.6	46.1	3	0.5	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
006M	75.4	80.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	ACHP	DN	DN	DN	DN
014B	34.1	34.3	3	0.2	GM+ATHO	DN	DN	DN	ACHP	DN	DN	DN
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	56.3	61.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	61.3	64.9	3	3.6	DN	DN	DN	DN	DN	DN	DN	DN
050D	0	0.9	3	0.9	GM	GM	DN	DN	GM	DN	DN	DN
050D	0.9	1.5	3	0.6	GM	GM	GM	DN	DN	DN	DN	DN
065A	14.4	19.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	19.4	24.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	24.4	26.9	3	2.5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	26.9	31.9	3	5	GM	GM	DN	DN	DN	DN	DN	ACHP
065A	31.9	36.2	3	4.3	GM	GM	DN	DN	DN	DN	DN	ACHP
065A	36.2	41.2	3	5	DN	DN	DN	DN	GM	GM	GM	DN
065A	41.2	46.2	3	5	DN	DN	DN	DN	GM	GM	GM	DN
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	GM	GM	GM	DN
065A	49.6	51.2	3	1.6	DN	DN	DN	GM	GM	GM	DN	GM
082A	42.5	47.5	3	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
082A	47.5	51.3	3	3.8	ACHP	DN	DN	DN	DN	ACHP	DN	DN
082A	51.3	56.3	3	5	GM	DN	DN	DN	DN	DN	DN	GM
082A	56.3	61.3	3	5	GM	DN	DN	DN	DN	DN	DN	GM
082A	61.3	66.3	3	5	GM	DN	DN	DN	DN	DN	DN	GM
082A	66.3	71.3	3	5	GM	DN	DN	DN	DN	DN	DN	GM
082A	71.3	76.3	3	5	GM	DN	DN	DN	DN	DN	DN	GM
082A	76.3	79	3	2.7	GM	DN	DN	DN	DN	DN	DN	GM
082A	79	83.5	3	4.5	GM	GM	DN	DN	DN	DN	DN	ACHP

ROUTE	REFPT	ENDREFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM
090B	81.5	81.7	3	0.2	ACHP	DN	DN	DN	ACHP	DN	DN	DN
090B	81.7	84.9	3	3.2	ACHP	DN	DN	DN	DN	DN	DN	ACHP
090B	84.9	86.1	3	1.2	ACHP	DN	DN	DN	DN	DN	DN	ACHP
090B	86.1	86.9	3	0.8	ACHP	DN	DN	DN	ACHP	DN	DN	DN
090B	86.9	87.9	3	1	GM	DN	DN	DN	ACHP	DN	DN	DN
092A	27.1	30.1	3	3	GM	GM	GM	DN	DN	DN	DN	DN
092A	30.1	31.5	3	1.4	GM	GM	DN	GM	DN	DN	DN	DN
092A	31.5	33.6	3	2.1	GM	GM	GM	DN	DN	DN	DN	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	41.6	46.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	46.6	51.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	51.6	56.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	56.6	61.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	61.6	66.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	66.6	71.6	3	5	GM	GM	DN	DN	DN	DN	DN	GM
092A	71.6	73.3	3	1.7	GM	GM	DN	DN	DN	DN	DN	GM
114A	0	5	3	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
114A	5	8	3	3	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
125A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	20	25	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	25	29.5	3	4.5	DN	DN	DN	DN	DN	DN	DN	DN
125A	29.5	31.5	3	2	DN	DN	DN	DN	DN	DN	DN	DN
125A	31.5	35.6	3	4.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	DN	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	DN	DN	DN	DN	DN
131B	38.4	42.1	3	3.7	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
131B	42.7	47.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	47.7	47.9	3	0.2	DN	DN	DN	DN	DN	DN	DN	DN
133A	18.9	23.9	3	5	GM	GM	GM	DN	DN	DN	DN	DN
133A	23.9	24	3	0.1	GM	GM	GM	DN	DN	DN	DN	DN

ROUTE	REFPT	ENDREFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	24	29	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	29	34	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	34	39	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	39	44	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	44	46.4	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
133A	46.4	51.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
133A	51.4	56.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	ACHP	DN	DN	DN	DN
133B	13.3	16.1	3	2.8	DN	DN	DN	DN	DN	DN	DN	DN
134A	0	5	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	5	10	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	10	15	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	15	16.3	3	1.3	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	16.3	21.3	3	5	DN	GM	DN	DN	DN	DN	DN	ACHP
134A	21.3	26.3	3	5	DN	GM	DN	DN	DN	DN	DN	ACHP
134A	26.3	27.2	3	0.9	DN	GM	DN	DN	DN	DN	DN	ACHP
139A	0	0.1	3	0.1	GM	GM	DN	DN	DN	DN	DN	ACHP
139A	65.2	70.2	3	5	GM	GM	DN	DN	DN	DN	DN	GM
139A	70.2	72.1	3	1.9	GM	GM	DN	DN	DN	DN	DN	GM
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	42.4	45.5	3	3.1	DN	DN	DN	DN	DN	DN	DN	DN
149A	45.5	50.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	50.5	55.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	55.5	60.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	60.5	62.7	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
149A	67.7	69.9	3	2.2	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	72.2	72.8	3	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
149A	72.8	73.2	3	0.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	73.2	78.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	78.2	83.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	83.2	88.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	88.2	93.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	93.2	98.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	ENDREFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	DN	DN
300A	0	0.5	3	0.5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
300A	0.5	3.4	3	2.9	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
317A	0	5	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
317A	5	10	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
317A	10	12.2	3	2.2	GM	DN	DN	DN	DN	ACHP	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	DN	DN	DN	DN	DN	DN	DN	DN
318A	20.6	25.6	3	5	GM	GM	DN	DN	DN	DN	GM	DN
318A	25.6	30.6	3	5	GM	GM	DN	DN	DN	DN	GM	DN
318A	30.6	35.6	3	5	GM	GM	DN	DN	DN	DN	GM	DN
318A	35.6	40.6	3	5	GM	GM	DN	DN	DN	DN	GM	DN
318A	40.6	45.6	3	5	GM	GM	DN	DN	DN	DN	GM	DN
318A	45.6	50.6	3	5	GM	GM	DN	DN	DN	DN	GM	DN
318A	50.6	54.3	3	3.7	GM	GM	DN	DN	DN	DN	GM	DN
318A	54.3	59.3	3	5	GM	GM	DN	DN	GM	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	GM	DN	DN	GM	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	GM	DN	GM	DN	DN	DN	DN	DN
347A	0	1.8	3	1.8	DN	GM	DN	DN	DN	ACHP	DN	DN
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	DN	DN	GM	DN
348A	0	1.3	3	1.3	GM	GM	DN	DN	GM	DN	DN	DN
348A	1.3	3.3	3	2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
348A	3.3	4	3	0.7	DN	DN	DN	DN	AHIP+ACHP	DN	DN	ACHP
348A	4	7.3	3	3.3	GM	DN	GM	DN	DN	DN	DN	ACHP
348A	7.3	11.4	3	4.1	GM	DN	DN	GM	DN	DN	DN	DN
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	DN
348A	12.9	14.4	3	1.5	GM	DN	GM	DN	DN	GM	DN	DN
394A	3.9	7	3	3.1	GM	GM	DN	DN	DN	DN	DN	GM

Appendix B-3: Region 4

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	DN	DN	DN	ACHP	DN	DN	DN	DN
006I	343.7	344.7	4	1	GM	ACHP	DN	DN	DN	GM	DN	GM
006I	344.7	345.9	4	1.2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006I	345.9	346.4	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006Z	0.4	0.6	4	0.2	FDR+ATHO	DN	DN	DN	DN	GM	DN	DN
007A	14.9	16.1	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
007A	19.2	24.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
007A	24.2	29.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
007A	29.2	32.6	4	3.4	DN	DN	DN	DN	DN	DN	DN	DN
007E	0	0.6	4	0.6	ACHP	DN	DN	DN	DN	GM	DN	ACHP
007E	0.6	1.6	4	1	ACHP	DN	DN	DN	DN	GM	DN	ACHP
011A	0	0.4	4	0.4	GM+ATHO	ACHP	DN	DN	DN	DN	GM	DN
011A	0.4	1.4	4	1	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
014B	64.9	69.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	69.9	71.5	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
014B	71.5	76.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	76.5	81.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	81.5	86.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	86.5	91	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
023A	0	5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
023A	5	9.6	4	4.6	DN	DN	DN	DN	DN	DN	DN	DN
023A	16	17.5	4	1.5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
024B	420	422.7	4	2.7	GM	GM	GM	GM	GM	GM	GM	GM
024B	422.7	423.1	4	0.4	ACHP	DN	DN	DN	GM	DN	ACHP	DN
024B	423.1	428.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024B	428.1	429.6	4	1.5	DN	DN	DN	DN	DN	DN	DN	DN
024B	429.6	434.6	4	5	DN	DN	ACHP	DN	GM	DN	GM	DN
024B	434.6	436.6	4	2	DN	DN	ACHP	DN	GM	DN	GM	DN
024B	436.6	437.2	4	0.6	DN	DN	DN	GM	DN	DN	DN	DN
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
040F	360.2	363	4	2.8	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
040G	380.7	381	4	0.3	FDR+ATHO	DN	DN	DN	DN	GM	ACHP	DN
040G	381	382.2	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
052A	58.9	60.9	4	2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
055A	0	0.2	4	0.2	GM+ATHO	DN	DN	DN	DN	DN	GM+ATHO	ACHP
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
059A	15	20	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	DN	DN	DN	DN	DN	DN	DN
059A	33	38	4	5	GM	DN	GM	ACHP	DN	DN	GM	DN
059A	38	41	4	3	GM	DN	GM	ACHP	DN	DN	GM	DN
059B	120.9	122.9	4	2	ACHP	DN	DN	GM	DN	GM	DN	DN
059B	122.9	127.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059B	127.9	130.6	4	2.7	DN	DN	DN	DN	DN	DN	DN	DN
059B	130.6	135.6	4	5	DN	DN	DN	GM	GM	DN	DN	DN
059B	135.6	140.6	4	5	DN	DN	DN	GM	GM	DN	DN	DN
059B	140.6	145.5	4	4.9	DN	DN	DN	GM	GM	DN	DN	DN
059B	147.1	147.2	4	0.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059B	147.8	152.8	4	5	DN	DN	DN	DN	GM	ACHP	DN	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	DN	GM	ACHP	DN	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	GM	DN	GM
059B	159.7	164.7	4	5	GM	GM	GM	DN	DN	GM	ACHP	DN
059B	164.7	166.5	4	1.8	GM	GM	GM	DN	DN	GM	ACHP	DN
059B	166.5	171.1	4	4.6	GM	GM	DN	GM	GM	DN	DN	DN
059B	171.1	173.3	4	2.2	GM	GM	DN	GM	ACHP	DN	GM	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	5.2	8.1	4	2.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	14	19	4	5	GM	DN	GM	DN	DN	DN	DN	DN
061A	19	22.5	4	3.5	GM	DN	GM	DN	DN	DN	DN	DN
061A	22.5	27.5	4	5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	27.5	32	4	4.5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	32	36	4	4	DN	DN	DN	DN	DN	DN	DN	DN
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	DN	DN	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	GM	GM	GM	ACHP	DN	DN	GM
063A	16.1	21.1	4	5	GM	GM	GM	GM	ACHP	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	21.1	24.2	4	3.1	GM	GM	GM	GM	ACHP	DN	DN	GM
063A	39.3	44.3	4	5	GM	DN	DN	DN	DN	GM	ACHP	DN
063A	44.3	48.2	4	3.9	GM	DN	DN	DN	DN	GM	ACHP	DN
070O	0	0.4	4	0.4	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
072B	32.8	37.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	37.8	42.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	42.8	44.1	4	1.3	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	44.1	48.4	4	4.3	DN	DN	DN	DN	DN	DN	DN	DN
072B	48.4	53.4	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	53.4	54.1	4	0.7	ACHP	DN	DN	DN	DN	GM	DN	DN
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	DN	DN	DN	DN	DN	DN	DN	DN
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
138A	21.7	26.3	4	4.6	GM	ACHP	DN	GM	DN	GM	DN	DN
138A	26.3	27.5	4	1.2	GM	DN	GM	ACHP	DN	DN	GM	DN
138A	27.5	27.9	4	0.4	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	40	41.4	4	1.4	DN	DN	DN	DN	DN	DN	DN	DN
138A	41.4	43	4	1.6	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
138A	43	43.1	4	0.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
138A	43.4	48.4	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	DN	DN	DN
138A	50.5	50.6	4	0.1	FDR+ATHO	DN	DN	DN	DN	GM	ACHP	DN
138A	50.9	54	4	3.1	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
138A	54	54.8	4	0.8	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
144A	0	2.8	4	2.8	GM	GM	GM	GM	ACHP	DN	DN	GM
144A	2.8	7.8	4	5	GM	GM	GM	DN	DN	DN	DN	DN
144A	7.8	10.5	4	2.7	GM	GM	GM	DN	DN	DN	DN	DN
144A	10.5	11.1	4	0.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
144A	16.1	16.6	4	0.5	DN	DN	DN	DN	DN	DN	DN	DN
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	DN	DN
170A	0	2.2	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
257B	0	0.6	4	0.6	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
257B	0.6	1.1	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
385E	313.8	317.6	4	3.8	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO

Appendix B-4: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
015A	1.4	2.4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
015A	2.4	7.4	5	5	GM	DN	DN	DN	GM	DN	DN	DN
015A	7.4	8.4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
015A	8.4	10.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015A	10.4	12.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	DN	DN	DN
017A	0	5	5	5	GM	DN	GM	DN	DN	DN	DN	DN
017A	5	10	5	5	DN	GM	DN	ACHP	DN	DN	DN	DN
017A	10	15	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	15	17.3	5	2.3	DN	GM	DN	DN	DN	DN	DN	DN
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	27.3	29	5	1.7	DN	DN	DN	DN	DN	DN	DN	DN
017A	29	34	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34	34.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
041A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
041A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
084A	0	4.6	5	4.6	DN	DN	DN	DN	DN	DN	DN	DN
090A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
090A	9.5	14.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	14.5	14.8	5	0.3	DN	ACHP	DN	DN	DN	ACHP	DN	DN
090A	14.8	19.8	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	19.8	24.8	5	5	GM	DN	DN	GM	DN	ACHP	DN	DN
090A	24.8	29.8	5	5	DN	GM	DN	DN	GM	DN	DN	DN
090A	29.8	33.9	5	4.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	0.3	3.8	5	3.5	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.8	3.9	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.9	4.6	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
110A	0	0.1	5	0.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
114A	8	13	5	5	GM	DN	DN	DN	DN	DN	DN	DN
114A	13	18	5	5	GM	DN	DN	GM	DN	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	DN
114A	19	20.3	5	1.3	DN	GM	DN	DN	DN	GM	DN	DN
114A	20.3	25.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	GM	DN	GM	DN	DN	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	DN	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	DN	DN	DN	GM	DN	DN
114A	45.3	50.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	50.3	55.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
114A	56	61	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	61	61.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	DN	DN	DN	DN
136A	0	0.2	5	0.2	GM	ACHP	DN	DN	DN	ACHP	DN	DN
136A	0.2	0.6	5	0.4	GM	ACHP	DN	DN	DN	DN	DN	ACHP
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	DN	DN
136A	3.5	4.5	5	1	DN	GM	ACHP	DN	DN	DN	DN	ACHP
141A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	5	9.4	5	4.4	DN	DN	DN	DN	DN	DN	DN	DN
141A	9.4	11.3	5	1.9	DN	DN	DN	DN	DN	ACHP	DN	DN
141A	11.3	16.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	21.3	26.3	5	5	DN	DN	DN	DN	DN	DN	GM	DN
141A	26.3	31.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	31.3	36.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	DN	GM	DN	DN	GM	DN	ACHP	DN
141A	41.3	44.1	5	2.8	DN	DN	DN	DN	DN	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
141A	62.4	64.4	5	2	DN	GM	DN	DN	DN	DN	DN	GM
141A	64.4	69.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	69.4	74.4	5	5	DN	GM	DN	DN	ACHP	DN	DN	DN
141A	74.4	79.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	79.4	84.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	89.4	94.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	94.4	95.7	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
142A	3.3	8.3	5	5	DN	GM	DN	DN	DN	DN	DN	DN
142A	8.3	13.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.3	13.4	5	0.1	DN	DN	DN	GM	ACHP	DN	DN	DN
142A	13.4	18.4	5	5	DN	DN	GM	DN	DN	GM	DN	DN
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	DN
142A	23	28	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	28	28.7	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	33.7	33.8	5	0.1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
145A	102.6	107.6	5	5	ACHP	DN	DN	DN	DN	DN	DN	ACHP
145A	107.6	112.6	5	5	DN	DN	DN	DN	DN	DN	DN	DN
145A	112.6	116.9	5	4.3	DN	DN	DN	DN	DN	DN	DN	DN
149A	1.2	3.5	5	2.3	DN	GM	DN	ACHP	DN	DN	DN	DN
149A	3.5	8.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	8.5	13.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	21.6	21.9	5	0.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	DN	DN	DN	DN	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	DN	DN	DN	DN	DN	DN	DN
149A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	32.7	37.7	5	5	GM	DN	DN	DN	DN	DN	DN	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	41.5	42.4	5	0.9	DN	DN	DN	DN	DN	DN	DN	DN
150A	0	5	5	5	DN	DN	GM	DN	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	DN	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	DN	GM	DN	DN	DN	DN	DN
150A	13.5	16.1	5	2.6	DN	DN	GM	DN	DN	DN	DN	DN
151A	22.7	27.7	5	5	DN	DN	DN	DN	GM	DN	DN	GM
151A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	32.7	34	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	5	7	5	2	DN	DN	DN	DN	DN	DN	DN	DN
159A	7	12	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	12	13.3	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
159A	17.5	17.8	5	0.3	DN	DN	DN	GM	DN	DN	DN	GM
159A	18.3	23.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	23.3	28.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	DN	DN	DN	DN
160D	0	1.2	5	1.2	DN	DN	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.5	2.5	5	1	DN	DN	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
368A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
368A	6	11	5	5	DN	DN	DN	DN	DN	DN	DN	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	DN	DN	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	DN	GM	ACHP	DN
370A	6	11	5	5	DN	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	ACHP	DN	DN	DN	ACHP	DN	DN
370A	12.1	14.1	5	2	GM	ACHP	DN	DN	DN	DN	DN	ACHP

APPENDIX C: OPTIMIZED MAINTENANCE DECISIONS ON ROADS WITHIN CURRENT BUDGETS USING SPECIFIC MAINTENANCE ACTIVITIES OF THIN OVERLAY

Appendix C-1: Region 2

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	DN	GM	DN
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	41.2	44.9	2	3.7	DN	DN	DN	DN	DN	DN	DN	DN
009A	44.9	47	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
010A	5.1	10.1	2	5	GM+ATHO	DN	DN	DN	DN	DN	DN	DN
010A	10.1	15.1	2	5	DN	DN	GM	DN	DN	DN	GM	DN
010A	15.1	20.1	2	5	GM	DN	DN	DN	DN	DN	DN	DN
010A	20.1	25.1	2	5	DN	GM	DN	DN	DN	DN	DN	DN
010A	25.1	30.1	2	5	GM	DN	DN	DN	DN	DN	DN	DN
010A	30.1	35.1	2	5	GM+ATHO	DN	DN	DN	DN	DN	DN	DN
010A	35.1	40.1	2	5	DN	DN	DN	GM	DN	DN	GM+ATHO	DN
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	DN	DN	DN
010A	62.9	67.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN
010A	67.9	68	2	0.1	GM	DN	GM	DN	ACHP	DN	DN	DN
010A	68	71	2	3	DN	DN	DN	DN	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
012A	0	4.6	2	4.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	DN	DN	DN	DN	DN
012A	20.2	25.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	25.2	30.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	38.1	43	2	4.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	48	53	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	53	56.8	2	3.8	DN	DN	DN	DN	DN	DN	DN	GM
024E	0	0.6	2	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
025B	0	1.6	2	1.6	DN	DN	DN	DN	DN	ACHP	DN	DN
025B	1.6	1.9	2	0.3	DN	DN	DN	DN	ACHP	DN	DN	DN
067A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067A	5	6.8	2	1.8	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
067A	6.8	10.2	2	3.4	DN	DN	DN	DN	DN	DN	DN	DN
067C	45.6	45.7	2	0.1	DN	DN	GM+ATHO	DN	DN	DN	ACHP	DN
067C	45.7	50.7	2	5	DN	GM	DN	DN	DN	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN
069A	0	5	2	5	DN	GM	DN	DN	DN	DN	DN	DN
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	DN	DN	DN
069A	5.3	9.7	2	4.4	DN	DN	ACHP	DN	DN	DN	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	19.7	24.7	2	5	DN	DN	DN	GM	DN	DN	GM	DN
069A	24.7	25	2	0.3	DN	DN	GM	DN	ACHP	DN	DN	DN
069A	25	26	2	1	DN	DN	GM+ATHO	DN	DN	DN	DN	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	DN	GM	DN
069A	31	36	2	5	DN	DN	DN	GM	DN	DN	GM	DN
069A	36	41	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	41	46	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	46	49.4	2	3.4	DN	DN	DN	DN	DN	DN	DN	DN
069A	49.4	54.1	2	4.7	DN	DN	DN	DN	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	DN	GM	ACHP	DN	DN	DN	DN
069A	62.1	64.7	2	2.6	DN	DN	DN	DN	DN	DN	DN	DN
069A	71.6	76.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
071A	0	5	2	5	GM	DN	DN	GM	DN	DN	DN	DN
071A	5	7	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071A	7	9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	9.6	11.6	2	2	DN	DN	GM	DN	DN	DN	DN	GM
071B	11.6	13.7	2	2.1	DN	DN	GM	DN	DN	DN	DN	GM
071B	13.7	14.1	2	0.4	DN	GM+ATHO	DN	DN	DN	DN	GM+ATHO	DN
078A	8.9	9	2	0.1	DN	DN	DN	DN	DN	DN	ACHP	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	DN	DN	DN	GM
078A	12.7	14.6	2	1.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	14.6	15.5	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	15.5	18.2	2	2.7	DN	DN	DN	DN	DN	DN	DN	DN
078A	18.2	23.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	28.2	29.9	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
089A	0	5	2	5	DN	DN	DN	DN	DN	GM	DN	DN
089A	5	9	2	4	DN	DN	DN	DN	GM	DN	DN	GM+ATHO
089A	9	14	2	5	DN	DN	DN	GM	DN	DN	ACHP	DN
089A	14	18.6	2	4.6	DN	DN	DN	GM	DN	DN	DN	DN
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	DN	DN
089A	21.5	26.5	2	5	DN	DN	DN	DN	DN	DN	GM	DN
089A	26.5	31.5	2	5	DN	DN	DN	DN	DN	DN	GM	DN
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	DN	DN
094A	33.1	35	2	1.9	DN	DN	GM+ATHO	DN	DN	DN	DN	DN
096A	11.1	16.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
096A	22.1	26.3	2	4.2	DN	DN	DN	DN	DN	DN	DN	DN
096A	26.3	31.3	2	5	DN	DN	DN	DN	DN	GM	DN	DN
096A	31.3	33.6	2	2.3	DN	DN	DN	DN	ACHP	DN	DN	DN
096A	33.6	38.6	2	5	DN	DN	DN	DN	DN	DN	DN	GM
096A	38.6	42.2	2	3.6	DN	DN	DN	DN	DN	DN	DN	DN
096B	69.5	70.6	2	1.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
100A	0	0.3	2	0.3	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
100A	0.3	0.4	2	0.1	GM+ATHO	DN	ACHP	DN	DN	DN	DN	DN
101A	0.4	1.2	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
101A	1.2	5.2	2	4	DN	DN	DN	DN	DN	DN	DN	DN
101A	5.2	10.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	DN	DN	DN	DN	DN	DN
101A	16.5	21.4	2	4.9	DN	DN	DN	DN	DN	DN	DN	DN
105A	9.2	9.5	2	0.3	ACHP	DN	DN	DN	DN	DN	DN	DN
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	DN	DN	DN	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	27.7	32.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	32.7	37.7	2	5	DN	DN	DN	DN	GM	GM+ATHO	DN	DN
109A	37.7	42.7	2	5	DN	ACHP	DN	DN	DN	DN	DN	DN
109A	42.7	47.7	2	5	DN	DN	GM+ATHO	DN	DN	DN	DN	DN
109A	47.7	52.7	2	5	DN	DN	DN	GM	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
109A	52.7	53	2	0.3	GM+ATHO	DN	DN	DN	DN	DN	DN	DN
109A	53	54.8	2	1.8	DN	DN	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	DN	DN	DN	GM+ATHO	DN	DN	DN
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
116A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	DN	DN
116A	12	12.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	DN	DN	DN
116A	18.1	20	2	1.9	GM	DN	DN	GM+ATHO	DN	DN	DN	DN
116A	20	25	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	25	27	2	2	DN	DN	DN	DN	DN	DN	DN	DN
116A	27	32	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	32	32.3	2	0.3	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
120A	3.1	7.2	2	4.1	GM	DN	ACHP	DN	DN	DN	DN	DN
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	358.7	363.7	2	5	DN	GM	DN	GM	DN	DN	DN	DN
160C	363.7	367.8	2	4.1	DN	GM	DN	DN	GM+ATHO	DN	DN	DN
160C	367.8	372.8	2	5	DN	GM	DN	DN	ACHP	DN	DN	DN
160C	372.8	375.8	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	375.8	380.8	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	380.8	382.8	2	2	DN	DN	DN	DN	DN	DN	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN
160C	386.6	391.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	391.6	396.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	396.6	401.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	401.6	403.7	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
160C	403.7	406.7	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	406.7	411.7	2	5	DN	DN	DN	DN	DN	DN	DN	GM
160C	411.7	414.3	2	2.6	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
160C	414.3	414.8	2	0.5	DN	DN	DN	DN	DN	DN	GM	DN
160C	414.8	416.5	2	1.7	DN	ACHP	DN	DN	DN	DN	DN	DN
160C	416.5	421.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	421.5	425.7	2	4.2	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	425.7	430.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	DN	GM	DN	DN	GM+ATHO	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	ACHP	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	441.7	446.7	2	5	GM	DN	DN	DN	GM	DN	DN	DN
160C	446.7	447.6	2	0.9	GM	DN	GM+ATHO	DN	DN	DN	ACHP	DN
160C	447.6	451	2	3.4	GM	DN	DN	DN	DN	DN	DN	DN
160C	451	456	2	5	DN	DN	DN	DN	GM	DN	DN	DN
160C	456	460.1	2	4.1	DN	DN	DN	DN	DN	DN	GM	DN
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	DN	GM	DN
160C	483	484.4	2	1.4	DN	DN	GM+ATHO	DN	DN	DN	ACHP	DN
160C	492	497	2	5	DN	DN	DN	DN	GM	DN	DN	DN
160C	497	497.2	2	0.2	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
165A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	5	10	2	5	DN	DN	DN	DN	DN	DN	GM	DN
165A	10	15	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	15	15.3	2	0.3	GM	DN	DN	GM+ATHO	DN	DN	ACHP	DN
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	DN	DN
165A	18.5	23.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	23.5	28.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
167A	1.7	2	2	0.3	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
167A	2	2.4	2	0.4	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
167A	2.4	2.9	2	0.5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	DN	DN
194A	0	3.8	2	3.8	DN	DN	DN	DN	GM	DN	DN	GM+ATHO
194A	3.8	8.8	2	5	DN	DN	DN	GM	DN	DN	DN	DN
194A	8.8	13.8	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	13.8	14.7	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
196A	0	1.6	2	1.6	DN	DN	DN	DN	DN	DN	DN	DN
196A	1.6	6.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
196A	6.9	8.9	2	2	DN	DN	GM	DN	DN	GM+ATHO	DN	DN
202A	0	0.1	2	0.1	DN	ACHP	DN	DN	DN	DN	DN	DN
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
202A	0.2	1.2	2	1	DN	DN	DN	DN	DN	DN	DN	GM
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	DN	DN
207A	0	3.5	2	3.5	DN	DN	DN	DN	DN	DN	DN	DN
207A	3.5	5.9	2	2.4	DN	GM	DN	DN	DN	GM	DN	ACHP

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
209A	0	1.4	2	1.4	DN	DN	DN	DN	DN	DN	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	GM+ATHO	DN	DN	DN	DN	DN
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	DN	DN	DN
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN
266A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
266A	0.2	1.3	2	1.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
266A	1.3	3	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	9.5	11.5	2	2	GM	DN	GM	ACHP	DN	DN	DN	DN
350A	0	2.7	2	2.7	DN	DN	GM	DN	DN	ACHP	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	GM	DN	DN	ACHP	DN	DN
350A	7.1	12.1	2	5	DN	GM+ATHO	DN	DN	DN	DN	DN	DN
350A	12.1	17.1	2	5	GM	DN	DN	DN	GM+ATHO	DN	DN	DN
350A	17.1	22.1	2	5	DN	GM+ATHO	DN	DN	DN	DN	DN	DN
350A	22.1	24	2	1.9	ACHP	DN	DN	DN	DN	DN	DN	ACHP
350A	24	29	2	5	DN	DN	DN	DN	GM	DN	DN	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	DN	DN	DN
350A	34	39	2	5	DN	DN	DN	GM+ATHO	DN	DN	DN	DN
350A	39	44	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	44	49	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	49	54	2	5	GM	DN	DN	DN	DN	GM	DN	DN
350A	54	56.2	2	2.2	DN	DN	DN	DN	DN	DN	DN	DN
350A	56.2	59.4	2	3.2	GM	DN	DN	DN	GM	GM+ATHO	DN	DN
350A	59.4	64.4	2	5	DN	GM	DN	DN	DN	GM	DN	ACHP
350A	64.4	69.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.4	69.7	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.7	72	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	72	72.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	72.3	72.4	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
350A	72.4	72.6	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
385A	95.3	98.6	2	3.3	DN	GM	DN	GM+ATHO	DN	DN	DN	DN
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	129.2	134.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	GM	DN	DN
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	DN	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
389A	11.9	12.8	2	0.9	DN	GM	DN	DN	DN	GM	DN	DN

Appendix C-2: Region 3

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	ACHP	DN	DN	DN	DN	DN	DN
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	DN	ACHP	DN	DN
006A	11.8	13.9	3	2.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
006A	13.9	15.1	3	1.2	DN	DN	DN	DN	DN	DN	DN	DN
006C	43.4	45.6	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
006C	45.6	46.1	3	0.5	GM+ATHO	DN	ACHP	DN	DN	DN	DN	DN
006M	75.4	80.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	DN	ACHP	DN	DN	DN
014B	34.1	34.3	3	0.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	56.3	61.3	3	5	DN	DN	DN	AHIP+ACHP	DN	DN	DN	DN
014B	61.3	64.9	3	3.6	DN	DN	GM+ATHO	DN	DN	ACHP	DN	DN
050D	0	0.9	3	0.9	GM	GM	DN	DN	GM	DN	DN	DN
050D	0.9	1.5	3	0.6	GM	GM	GM	DN	DN	DN	DN	DN
065A	14.4	19.4	3	5	DN	DN	DN	DN	GM	DN	DN	DN
065A	19.4	24.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
065A	24.4	26.9	3	2.5	DN	DN	DN	ACHP	DN	GM	DN	DN
065A	26.9	31.9	3	5	GM	GM	DN	DN	DN	DN	DN	DN
065A	31.9	36.2	3	4.3	GM	DN	DN	GM	DN	DN	DN	DN
065A	36.2	41.2	3	5	DN	DN	DN	DN	GM	GM	GM	GM
065A	41.2	46.2	3	5	DN	DN	DN	DN	GM	DN	DN	GM
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	GM	GM	GM	GM
065A	49.6	51.2	3	1.6	DN	DN	DN	GM	GM	GM	GM	GM
082A	42.5	47.5	3	5	DN	GM	DN	DN	DN	DN	DN	GM
082A	47.5	51.3	3	3.8	DN	DN	DN	AHIP+ACHP	DN	DN	DN	ACHP
082A	51.3	56.3	3	5	DN	ACHP	DN	DN	DN	DN	DN	DN
082A	56.3	61.3	3	5	DN	DN	ACHP	DN	DN	DN	DN	DN
082A	61.3	66.3	3	5	DN	DN	ACHP	DN	DN	DN	DN	DN
082A	66.3	71.3	3	5	GM	DN	DN	GM	DN	DN	DN	DN
082A	71.3	76.3	3	5	GM	GM	DN	DN	GM	DN	DN	DN
082A	76.3	79	3	2.7	GM	GM	DN	DN	DN	DN	DN	GM
082A	79	83.5	3	4.5	GM	GM	DN	DN	DN	DN	DN	ACHP
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
090B	81.5	81.7	3	0.2	DN	ACHP	DN	DN	DN	DN	DN	DN
090B	81.7	84.9	3	3.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
090B	84.9	86.1	3	1.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
090B	86.1	86.9	3	0.8	DN	ACHP	DN	DN	DN	DN	DN	DN
090B	86.9	87.9	3	1	GM	DN	DN	DN	DN	ACHP	DN	DN
092A	27.1	30.1	3	3	GM	GM	GM	DN	DN	DN	DN	DN
092A	30.1	31.5	3	1.4	GM	GM	DN	GM	DN	DN	DN	DN
092A	31.5	33.6	3	2.1	GM	GM	GM	DN	DN	DN	DN	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	GM	GM	DN	DN	DN	DN	DN
092A	41.6	46.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
092A	46.6	51.6	3	5	GM	GM	DN	DN	GM	DN	DN	DN
092A	51.6	56.6	3	5	GM	GM	DN	DN	DN	DN	DN	DN
092A	56.6	61.6	3	5	GM	DN	DN	DN	DN	GM	DN	DN
092A	61.6	66.6	3	5	GM	GM	DN	GM	DN	DN	DN	DN
092A	66.6	71.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	71.6	73.3	3	1.7	GM	GM	DN	DN	DN	DN	DN	ACHP
114A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	5	8	3	3	DN	DN	DN	DN	DN	DN	DN	DN
125A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	20	25	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	25	29.5	3	4.5	DN	DN	DN	DN	DN	DN	DN	DN
125A	29.5	31.5	3	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
125A	31.5	35.6	3	4.1	DN	DN	DN	DN	DN	DN	DN	DN
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	DN	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
131B	38.4	42.1	3	3.7	DN	DN	DN	DN	DN	DN	DN	DN
131B	42.7	47.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	47.7	47.9	3	0.2	DN	AHIP+ACHP	ACHP	DN	DN	DN	DN	DN
133A	18.9	23.9	3	5	GM	GM	GM	DN	DN	DN	DN	DN
133A	23.9	24	3	0.1	DN	DN	DN	GM+ATHO	DN	ACHP	DN	DN
133A	24	29	3	5	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	29	34	3	5	DN	ACHP	DN	DN	DN	DN	DN	DN
133A	34	39	3	5	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
133A	39	44	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	44	46.4	3	2.4	GM	DN	DN	DN	DN	ACHP	DN	DN
133A	46.4	51.4	3	5	DN	DN	DN	DN	DN	GM	DN	DN
133A	51.4	56.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
133B	13.3	16.1	3	2.8	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
134A	0	5	3	5	GM	DN	DN	DN	DN	DN	ACHP	DN
134A	5	10	3	5	GM	DN	DN	DN	DN	DN	DN	GM
134A	10	15	3	5	GM	DN	DN	DN	DN	DN	GM	DN
134A	15	16.3	3	1.3	GM	DN	DN	DN	DN	DN	GM	DN
134A	16.3	21.3	3	5	DN	GM	DN	DN	DN	DN	DN	ACHP
134A	21.3	26.3	3	5	DN	DN	GM	DN	DN	DN	DN	ACHP
134A	26.3	27.2	3	0.9	GM	DN	DN	DN	DN	DN	GM	DN
139A	0	0.1	3	0.1	GM	GM	DN	DN	DN	DN	ACHP	DN
139A	65.2	70.2	3	5	GM	GM	DN	DN	DN	DN	DN	DN
139A	70.2	72.1	3	1.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	42.4	45.5	3	3.1	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
149A	45.5	50.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	50.5	55.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	55.5	60.5	3	5	ACHP	DN	DN	DN	DN	DN	DN	ACHP
149A	60.5	62.7	3	2.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
149A	67.7	69.9	3	2.2	DN	GM+ATHO	DN	DN	DN	ACHP	DN	DN
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	72.2	72.8	3	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
149A	72.8	73.2	3	0.4	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	73.2	78.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	78.2	83.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	83.2	88.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	88.2	93.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	93.2	98.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	DN	DN
300A	0	0.5	3	0.5	GM+ATHO	DN	DN	ACHP	DN	DN	DN	DN
300A	0.5	3.4	3	2.9	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
317A	0	5	3	5	DN	DN	DN	DN	GM	DN	DN	DN
317A	5	10	3	5	GM	DN	GM	DN	DN	DN	DN	DN
317A	10	12.2	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	GM	GM	DN	DN	GM	DN	DN	DN
318A	20.6	25.6	3	5	GM	GM	DN	GM	DN	DN	DN	DN
318A	25.6	30.6	3	5	GM	GM	DN	DN	DN	DN	DN	DN
318A	30.6	35.6	3	5	GM	GM	GM	DN	DN	DN	DN	DN
318A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	45.6	50.6	3	5	GM	GM	DN	DN	DN	DN	DN	DN
318A	50.6	54.3	3	3.7	GM	DN	GM	DN	DN	DN	DN	DN
318A	54.3	59.3	3	5	GM	GM	GM	DN	DN	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	DN	DN	GM	DN	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	GM	DN	GM	DN	DN	DN	DN	DN
347A	0	1.8	3	1.8	DN	GM	DN	DN	DN	DN	DN	DN
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	DN	ACHP	DN	DN
348A	0	1.3	3	1.3	GM	GM	DN	DN	GM	DN	DN	DN
348A	1.3	3.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
348A	3.3	4	3	0.7	GM+ATHO	DN	DN	DN	ACHP	DN	DN	DN
348A	4	7.3	3	3.3	GM	DN	GM	DN	DN	DN	DN	DN
348A	7.3	11.4	3	4.1	GM	DN	DN	GM	DN	DN	DN	DN
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	DN
348A	12.9	14.4	3	1.5	GM	DN	GM	DN	DN	GM	DN	DN
394A	3.9	7	3	3.1	GM	GM	DN	DN	DN	DN	ACHP	DN

Appendix C-3: Region 4

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	DN	DN	DN	ACHP	DN	DN	DN	ACHP
006I	343.7	344.7	4	1	DN	DN	GM	DN	GM	GM+ATHO	DN	DN
006I	344.7	345.9	4	1.2	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
006I	345.9	346.4	4	0.5	GM	DN	GM	DN	GM	GM	GM+ATHO	DN
006Z	0.4	0.6	4	0.2	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
007A	14.9	16.1	4	1.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
007A	19.2	24.2	4	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
007A	24.2	29.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
007A	29.2	32.6	4	3.4	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
007E	0	0.6	4	0.6	DN	ACHP	DN	DN	DN	ACHP	DN	DN
007E	0.6	1.6	4	1	DN	ACHP	DN	DN	DN	DN	DN	DN
011A	0	0.4	4	0.4	DN	DN	DN	DN	DN	DN	DN	DN
011A	0.4	1.4	4	1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
014B	64.9	69.9	4	5	GM	DN	GM	DN	GM	GM	GM	DN
014B	69.9	71.5	4	1.6	GM+ATHO	DN	DN	DN	DN	ACHP	DN	DN
014B	71.5	76.5	4	5	DN	GM	DN	GM	GM	DN	GM	DN
014B	76.5	81.5	4	5	DN	DN	DN	ACHP	DN	DN	DN	DN
014B	81.5	86.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	86.5	91	4	4.5	DN	GM	DN	GM	DN	GM	DN	GM
023A	0	5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
023A	5	9.6	4	4.6	DN	DN	ACHP	DN	DN	DN	DN	ACHP
023A	16	17.5	4	1.5	DN	DN	GM+ATHO	DN	DN	DN	ACHP	DN
024B	420	422.7	4	2.7	DN	DN	DN	DN	DN	DN	DN	DN
024B	422.7	423.1	4	0.4	ACHP	DN	DN	DN	ACHP	DN	DN	DN
024B	423.1	428.1	4	5	DN	DN	DN	DN	DN	DN	DN	GM
024B	428.1	429.6	4	1.5	DN	DN	DN	ACHP	DN	DN	DN	DN
024B	429.6	434.6	4	5	DN	DN	DN	DN	GM	DN	GM	DN
024B	434.6	436.6	4	2	DN	DN	DN	DN	GM	GM	GM	DN
024B	436.6	437.2	4	0.6	DN	DN	DN	DN	DN	GM	GM+ATHO	DN
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
040F	360.2	363	4	2.8	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
040G	380.7	381	4	0.3	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
040G	381	382.2	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
052A	58.9	60.9	4	2	DN	DN	DN	DN	DN	DN	DN	DN
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
055A	0	0.2	4	0.2	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	DN	DN	DN	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	GM	GM	DN	GM	DN	GM	DN
059A	15	20	4	5	DN	ACHP	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	GM	DN	GM	GM	DN	DN	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	GM	DN	GM	GM+ATHO	DN	ACHP	DN
059A	33	38	4	5	DN	DN	DN	GM	GM	GM	GM	DN
059A	38	41	4	3	DN	DN	DN	GM	GM	GM	DN	GM
059B	120.9	122.9	4	2	ACHP	DN	DN	DN	DN	DN	DN	GM
059B	122.9	127.9	4	5	DN	DN	DN	DN	DN	GM	DN	GM
059B	127.9	130.6	4	2.7	DN	DN	ACHP	DN	DN	DN	DN	ACHP
059B	130.6	135.6	4	5	DN	DN	DN	DN	GM	GM	DN	GM
059B	135.6	140.6	4	5	DN	DN	DN	DN	GM	DN	GM	DN
059B	140.6	145.5	4	4.9	ACHP	DN	DN	DN	DN	DN	DN	GM
059B	147.1	147.2	4	0.1	DN	GM+ATHO	ACHP	DN	DN	ACHP	DN	DN
059B	147.8	152.8	4	5	DN	DN	DN	ACHP	DN	DN	DN	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	ACHP	DN	DN	DN	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	DN	DN	GM
059B	159.7	164.7	4	5	DN	DN	DN	GM	GM	GM	GM	DN
059B	164.7	166.5	4	1.8	DN	GM	DN	DN	DN	DN	DN	DN
059B	166.5	171.1	4	4.6	DN	DN	GM	DN	DN	DN	DN	DN
059B	171.1	173.3	4	2.2	DN	DN	GM	DN	GM	GM	GM	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	5.2	8.1	4	2.9	FDR+ATHO	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	14	19	4	5	DN	GM	DN	GM	GM	DN	GM	DN
061A	19	22.5	4	3.5	DN	DN	DN	DN	DN	GM	DN	GM
061A	22.5	27.5	4	5	DN	DN	GM	DN	GM	GM	DN	GM
061A	27.5	32	4	4.5	DN	DN	GM	DN	GM	DN	GM	DN
061A	32	36	4	4	DN	DN	DN	DN	DN	DN	DN	DN
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	DN	DN	DN	DN	DN	DN	DN
063A	16.1	21.1	4	5	DN	GM	DN	GM	GM	GM	GM	DN
063A	21.1	24.2	4	3.1	DN	GM	DN	GM	GM	GM	GM	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	39.3	44.3	4	5	DN	DN	DN	GM	GM	GM	GM	DN
063A	44.3	48.2	4	3.9	DN	DN	DN	DN	DN	DN	DN	GM
070O	0	0.4	4	0.4	GM	DN	GM	DN	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
072B	32.8	37.8	4	5	DN	DN	DN	DN	DN	DN	DN	DN
072B	37.8	42.8	4	5	DN	DN	DN	DN	DN	DN	DN	DN
072B	42.8	44.1	4	1.3	DN	DN	GM+ATHO	DN	DN	DN	DN	ACHP
072B	44.1	48.4	4	4.3	DN	ACHP	DN	DN	DN	DN	ACHP	DN
072B	48.4	53.4	4	5	DN	DN	DN	DN	DN	DN	DN	DN
072B	53.4	54.1	4	0.7	DN	ACHP	DN	DN	DN	ACHP	DN	DN
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	DN	FDR+ATHO	DN	DN	DN	DN	DN	ACHP
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
138A	21.7	26.3	4	4.6	DN	DN	GM	DN	GM	GM	GM	DN
138A	26.3	27.5	4	1.2	DN	DN	DN	GM	GM	GM	GM	DN
138A	27.5	27.9	4	0.4	GM	DN	DN	GM	GM	GM+ATHO	DN	DN
138A	35	40	4	5	GM	GM	DN	GM	DN	GM	DN	GM
138A	40	41.4	4	1.4	GM	GM	DN	GM	GM	GM	GM	DN
138A	41.4	43	4	1.6	GM	GM	DN	GM	GM	DN	GM	GM+ATHO
138A	43	43.1	4	0.1	GM	GM	DN	GM	GM	GM	GM	DN
138A	43.4	48.4	4	5	GM	DN	GM	DN	GM	DN	GM	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
138A	50.5	50.6	4	0.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
138A	50.9	54	4	3.1	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
138A	54	54.8	4	0.8	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
144A	0	2.8	4	2.8	DN	GM	DN	GM	GM	GM	GM	DN
144A	2.8	7.8	4	5	DN	DN	GM	DN	DN	DN	DN	DN
144A	7.8	10.5	4	2.7	GM	DN	GM	DN	GM	GM	GM	DN
144A	10.5	11.1	4	0.6	GM	DN	DN	DN	DN	DN	DN	DN
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	16.1	16.6	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	DN	DN
170A	0	2.2	4	2.2	GM	DN	GM	DN	GM	GM	GM	DN
257B	0	0.6	4	0.6	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
257B	0.6	1.1	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
385E	313.8	317.6	4	3.8	GM	DN	DN	DN	DN	DN	DN	DN

Appendix C-4: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
015A	1.4	2.4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
015A	2.4	7.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
015A	7.4	8.4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
015A	8.4	10.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015A	10.4	12.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	DN	DN	DN
017A	0	5	5	5	GM	DN	GM	DN	DN	DN	DN	DN
017A	5	10	5	5	DN	GM	DN	ACHP	DN	DN	DN	DN
017A	10	15	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	15	17.3	5	2.3	DN	GM	DN	DN	DN	DN	DN	DN
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	27.3	29	5	1.7	DN	DN	DN	DN	DN	DN	DN	DN
017A	29	34	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34	34.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
041A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
041A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
084A	0	4.6	5	4.6	DN	DN	DN	DN	DN	ACHP	DN	DN
090A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
090A	9.5	14.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	14.5	14.8	5	0.3	DN	ACHP	DN	DN	DN	DN	ACHP	DN
090A	14.8	19.8	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	19.8	24.8	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	24.8	29.8	5	5	DN	GM	DN	DN	GM	DN	DN	DN
090A	29.8	33.9	5	4.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	0.3	3.8	5	3.5	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.8	3.9	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.9	4.6	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
110A	0	0.1	5	0.1	DN	GM+ATHO	ACHP	DN	DN	DN	ACHP	DN
114A	8	13	5	5	GM	ACHP	DN	DN	DN	DN	DN	DN
114A	13	18	5	5	GM	DN	DN	GM	DN	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	DN
114A	19	20.3	5	1.3	DN	GM	DN	DN	DN	GM	DN	DN
114A	20.3	25.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	GM	DN	GM	DN	DN	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	DN	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	DN	DN	DN	GM	DN	ACHP
114A	45.3	50.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	50.3	55.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
114A	56	61	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	61	61.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	DN	DN	DN	DN
136A	0	0.2	5	0.2	DN	GM	DN	GM	ACHP	DN	DN	ACHP
136A	0.2	0.6	5	0.4	GM	ACHP	DN	DN	DN	ACHP	DN	DN
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	DN	DN
136A	3.5	4.5	5	1	GM+ATHO	DN	DN	DN	ACHP	DN	DN	ACHP
141A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	5	9.4	5	4.4	DN	DN	DN	DN	DN	DN	DN	DN
141A	9.4	11.3	5	1.9	DN	DN	DN	DN	DN	DN	DN	DN
141A	11.3	16.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	21.3	26.3	5	5	DN	DN	DN	DN	DN	DN	GM	DN
141A	26.3	31.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	31.3	36.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	DN	GM	DN	DN	GM	DN	DN	DN
141A	41.3	44.1	5	2.8	DN	DN	DN	DN	DN	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
141A	62.4	64.4	5	2	DN	GM	DN	DN	DN	DN	DN	GM
141A	64.4	69.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	69.4	74.4	5	5	DN	GM	DN	DN	ACHP	DN	DN	DN
141A	74.4	79.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	79.4	84.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	DN	DN	DN	DN	DN	DN
141A	89.4	94.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	94.4	95.7	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
142A	3.3	8.3	5	5	DN	GM	DN	DN	DN	DN	DN	DN
142A	8.3	13.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.3	13.4	5	0.1	DN	DN	DN	GM	ACHP	DN	DN	ACHP
142A	13.4	18.4	5	5	DN	DN	GM	DN	DN	GM	DN	DN
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	DN
142A	23	28	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	28	28.7	5	0.7	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	33.7	33.8	5	0.1	DN	DN	ACHP	DN	DN	DN	ACHP	DN
145A	102.6	107.6	5	5	DN	DN	DN	DN	DN	GM	ACHP	DN
145A	107.6	112.6	5	5	DN	DN	DN	DN	DN	DN	DN	DN
145A	112.6	116.9	5	4.3	DN	DN	DN	DN	DN	DN	DN	DN
149A	1.2	3.5	5	2.3	DN	GM	DN	ACHP	DN	DN	DN	ACHP
149A	3.5	8.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	8.5	13.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	21.6	21.9	5	0.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	DN	DN	DN	DN	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	DN	DN	DN	DN	DN	DN	DN
149A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	32.7	37.7	5	5	GM	DN	DN	DN	DN	DN	DN	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	41.5	42.4	5	0.9	DN	DN	DN	DN	DN	DN	DN	DN
150A	0	5	5	5	DN	DN	GM	DN	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	DN	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	DN	GM	DN	DN	DN	DN	DN
150A	13.5	16.1	5	2.6	DN	DN	GM	DN	DN	DN	DN	DN
151A	22.7	27.7	5	5	DN	DN	DN	DN	GM	DN	DN	GM
151A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	32.7	34	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	5	7	5	2	DN	DN	DN	DN	DN	DN	DN	DN
159A	7	12	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	12	13.3	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
159A	17.5	17.8	5	0.3	DN	DN	DN	GM	DN	DN	DN	GM
159A	18.3	23.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	23.3	28.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	DN	DN	DN	DN
160D	0	1.2	5	1.2	DN	DN	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	ACHP
160D	1.5	2.5	5	1	DN	DN	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	ACHP	DN	DN	DN	ACHP	DN	DN	DN
368A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
368A	6	11	5	5	DN	DN	DN	DN	DN	DN	DN	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	DN	DN	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	DN	GM	ACHP	DN
370A	6	11	5	5	DN	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	DN	GM+ATHO	DN	DN	DN	ACHP	DN
370A	12.1	14.1	5	2	GM	DN	DN	DN	DN	DN	DN	DN

APPENDIX D: OPTIMIZED MAINTENANCE DECISIONS ON ROADS FOR OVERALL STEADY PERFORMANCE OF PAVEMENT DRIVABILITY

Appendix D-1: Region 1

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
005A	0	1	1	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
005A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	2	3	1	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
005A	3	4	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	4	5	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	5	6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	6	7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	7	8	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	8	9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	9	10	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	10	11	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	11	12	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	12	13	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	13	14	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	14	14.9	1	0.9	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
036C	76.4	76.5	1	0.1	GM	DN	DN	DN	GM	DN	DN	DN
036C	76.5	77.5	1	1	DN	GM	DN	DN	DN	DN	DN	DN
036C	77.5	78.5	1	1	DN	DN	DN	DN	GM	DN	DN	ACHP
036C	78.5	78.7	1	0.2	DN	DN	DN	DN	GM	DN	DN	DN
036C	78.7	79.7	1	1	DN	DN	GM	DN	DN	DN	DN	GM
040B	272.6	273.6	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
040B	273.6	274.6	1	1	DN	GM	DN	DN	DN	DN	DN	DN
040B	274.6	275.6	1	1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
040B	275.6	276.2	1	0.6	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
040C	279.2	280.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	280.2	281.2	1	1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
040C	281.2	281.8	1	0.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
040E	346.3	347.3	1	1	DN	GM	DN	DN	DN	DN	DN	DN
040E	347.3	348.3	1	1	GM	DN	DN	DN	DN	DN	DN	DN
040E	348.3	349.3	1	1	DN	GM	DN	DN	DN	DN	ACHP	DN
040E	349.3	350.3	1	1	GM	DN	DN	DN	DN	DN	DN	ACHP
040E	350.3	350.6	1	0.3	DN	DN	ACHP	DN	DN	DN	DN	DN
040E	350.6	350.9	1	0.3	DN	DN	DN	ACHP	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
040E	350.9	351.1	1	0.2	DN	DN	DN	DN	GM	DN	DN	DN
040E	351.1	352.1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040E	352.1	352.2	1	0.1	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
046A	0	1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	3	3.9	1	0.9	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
046A	3.9	4.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	4.9	5.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	5.9	6	1	0.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
046A	6	6.6	1	0.6	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
067E	117.3	118.3	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
067E	118.3	119.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	DN
067E	119.3	120.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
067E	120.3	121.3	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
067E	121.3	122.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
070K	0	0.7	1	0.7	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
070N	0	0.1	1	0.1	GM	DN	DN	DN	DN	DN	DN	DN
070N	0.1	0.4	1	0.3	DN	DN	DN	GM	DN	DN	DN	DN
072A	20.7	21.7	1	1	GM	DN	DN	DN	DN	DN	DN	GM
072A	21.7	22.7	1	1	GM	DN	DN	DN	DN	DN	DN	GM
072A	22.7	23.7	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
072A	23.7	24.7	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
072A	24.7	25.7	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
072A	25.7	26.7	1	1	DN	DN	GM	DN	ACHP	DN	DN	DN
072A	26.7	27.7	1	1	GM	DN	DN	DN	GM	DN	DN	DN
072A	27.7	28.7	1	1	GM	DN	DN	GM	DN	DN	DN	DN
072A	28.7	29.4	1	0.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
103A	6.7	7.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	7.7	8.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	8.7	9.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	9.7	10.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	10.7	11.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	11.7	12.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	12.7	13.3	1	0.6	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
103A	13.3	14.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	14.3	15.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	15.3	16.3	1	1	DN	DN	GM	DN	DN	DN	DN	DN
103A	16.3	17.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
103A	17.3	18.3	1	1	DN	DN	GM	DN	DN	DN	DN	DN
103A	18.3	19.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	19.3	20.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	20.3	21.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	21.3	22.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	22.3	22.5	1	0.2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN

Appendix D-2: Region 2

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	41.2	44.9	2	3.7	DN	DN	DN	DN	DN	DN	DN	DN
009A	44.9	47	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
010A	5.1	10.1	2	5	DN	DN	DN	GM	DN	DN	DN	DN
010A	10.1	15.1	2	5	DN	DN	GM	DN	DN	DN	GM	ACHP
010A	15.1	20.1	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	20.1	25.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
010A	25.1	30.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	30.1	35.1	2	5	DN	GM	DN	DN	DN	DN	DN	DN
010A	35.1	40.1	2	5	DN	DN	DN	GM	DN	DN	DN	DN
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	DN	DN	DN
010A	62.9	67.9	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	67.9	68	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
010A	68	71	2	3	DN	DN	DN	DN	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	0	4.6	2	4.6	GM	DN	GM	ACHP	DN	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
012A	20.2	25.2	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
012A	25.2	30.2	2	5	GM	DN	ACHP	DN	DN	DN	DN	ACHP
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	38.1	43	2	4.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	48	53	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	53	56.8	2	3.8	DN	DN	DN	ACHP	DN	DN	DN	DN
024E	0	0.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
025B	0	1.6	2	1.6	DN	DN	DN	ACHP	DN	DN	DN	DN
025B	1.6	1.9	2	0.3	DN	DN	DN	DN	ACHP	DN	DN	DN
067A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067A	5	6.8	2	1.8	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
067A	6.8	10.2	2	3.4	DN	DN	DN	DN	DN	DN	DN	DN
067C	45.6	45.7	2	0.1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
067C	45.7	50.7	2	5	DN	GM	DN	ACHP	DN	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
069A	0	5	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	DN	ACHP	DN
069A	5.3	9.7	2	4.4	DN	DN	ACHP	DN	DN	DN	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	19.7	24.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	24.7	25	2	0.3	DN	DN	GM	DN	ACHP	DN	DN	DN
069A	25	26	2	1	DN	DN	DN	GM	ACHP	DN	DN	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	DN	GM	ACHP
069A	31	36	2	5	DN	DN	DN	GM	DN	DN	DN	GM
069A	36	41	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	41	46	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	46	49.4	2	3.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
069A	49.4	54.1	2	4.7	DN	DN	DN	DN	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	GM	ACHP	DN	DN	DN	DN	ACHP
069A	62.1	64.7	2	2.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
069A	71.6	76.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
071A	0	5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
071A	5	7	2	2	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
071A	7	9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	9.6	11.6	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	11.6	13.7	2	2.1	DN	DN	DN	GM	DN	DN	GM	ACHP
071B	13.7	14.1	2	0.4	DN	DN	GM	DN	DN	DN	DN	DN
078A	8.9	9	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	12.7	14.6	2	1.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	14.6	15.5	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	15.5	18.2	2	2.7	DN	DN	DN	DN	DN	DN	DN	DN
078A	18.2	23.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
078A	28.2	29.9	2	1.7	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	DN	DN	DN
089A	0	5	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
089A	5	9	2	4	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	9	14	2	5	DN	DN	DN	DN	GM	DN	DN	GM
089A	14	18.6	2	4.6	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
089A	21.5	26.5	2	5	DN	DN	DN	DN	DN	DN	GM	ACHP
089A	26.5	31.5	2	5	DN	DN	DN	DN	DN	DN	GM	ACHP
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	ACHP	DN
094A	33.1	35	2	1.9	DN	ACHP	DN	DN	DN	DN	DN	ACHP
096A	11.1	16.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
096A	22.1	26.3	2	4.2	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
096A	26.3	31.3	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
096A	31.3	33.6	2	2.3	DN	DN	DN	ACHP	DN	DN	DN	DN
096A	33.6	38.6	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
096A	38.6	42.2	2	3.6	DN	DN	DN	DN	DN	DN	DN	DN
096B	69.5	70.6	2	1.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
100A	0	0.3	2	0.3	GM	DN	DN	DN	GM	DN	DN	GM
100A	0.3	0.4	2	0.1	DN	DN	GM	ACHP	DN	DN	DN	DN
101A	0.4	1.2	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
101A	1.2	5.2	2	4	DN	DN	DN	DN	DN	DN	DN	DN
101A	5.2	10.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
101A	16.5	21.4	2	4.9	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
105A	9.2	9.5	2	0.3	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	27.7	32.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
109A	32.7	37.7	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
109A	37.7	42.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	42.7	47.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	47.7	52.7	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
109A	52.7	53	2	0.3	DN	GM	DN	DN	DN	DN	DN	DN
109A	53	54.8	2	1.8	DN	GM	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	DN	ACHP	DN	DN	DN	DN	ACHP
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
116A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	DN	DN
116A	12	12.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	ACHP	DN	DN
116A	18.1	20	2	1.9	GM	ACHP	DN	DN	DN	DN	ACHP	DN
116A	20	25	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	25	27	2	2	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
116A	27	32	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	32	32.3	2	0.3	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
120A	3.1	7.2	2	4.1	GM	DN	ACHP	DN	DN	DN	DN	ACHP
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	358.7	363.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
160C	363.7	367.8	2	4.1	DN	GM	ACHP	DN	DN	DN	DN	DN
160C	367.8	372.8	2	5	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	372.8	375.8	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	375.8	380.8	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	380.8	382.8	2	2	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN
160C	386.6	391.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	391.6	396.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	396.6	401.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	401.6	403.7	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
160C	403.7	406.7	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	406.7	411.7	2	5	DN	DN	DN	DN	ACHP	DN	DN	DN
160C	411.7	414.3	2	2.6	DN	DN	DN	DN	ACHP	DN	DN	DN
160C	414.3	414.8	2	0.5	DN	DN	DN	DN	DN	DN	GM	ACHP
160C	414.8	416.5	2	1.7	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	416.5	421.5	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
160C	421.5	425.7	2	4.2	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	425.7	430.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	DN	DN	DN	DN	GM	ACHP	DN
160C	441.7	446.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
160C	446.7	447.6	2	0.9	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	447.6	451	2	3.4	GM	DN	DN	DN	DN	DN	DN	DN
160C	451	456	2	5	DN	DN	DN	DN	GM	ACHP	DN	DN
160C	456	460.1	2	4.1	DN	DN	DN	ACHP	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	DN	GM	DN
160C	483	484.4	2	1.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	492	497	2	5	DN	DN	DN	DN	GM	ACHP	DN	DN
160C	497	497.2	2	0.2	DN	DN	DN	ACHP	DN	DN	DN	ACHP
165A	0	5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
165A	5	10	2	5	DN	DN	DN	DN	DN	DN	GM	DN
165A	10	15	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	15	15.3	2	0.3	GM	DN	DN	DN	DN	DN	DN	DN
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	DN	DN
165A	18.5	23.5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
165A	23.5	28.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
167A	1.7	2	2	0.3	GM	DN	DN	GM	ACHP	DN	DN	DN
167A	2	2.4	2	0.4	GM	DN	DN	DN	DN	DN	DN	ACIP+ATHO
167A	2.4	2.9	2	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	DN	DN
194A	0	3.8	2	3.8	DN	DN	DN	DN	GM	ACHP	DN	DN
194A	3.8	8.8	2	5	DN	DN	DN	DN	GM	DN	DN	GM
194A	8.8	13.8	2	5	GM	DN	GM	ACHP	DN	DN	DN	DN
194A	13.8	14.7	2	0.9	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
196A	0	1.6	2	1.6	DN	DN	DN	DN	DN	DN	DN	DN
196A	1.6	6.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
196A	6.9	8.9	2	2	DN	DN	GM	ACHP	DN	DN	DN	DN
202A	0	0.1	2	0.1	ACHP	DN	DN	DN	DN	DN	DN	ACHP
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
202A	0.2	1.2	2	1	DN	DN	DN	ACHP	DN	DN	DN	DN
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	DN	DN
207A	0	3.5	2	3.5	DN	GM	DN	DN	DN	GM	ACHP	DN
207A	3.5	5.9	2	2.4	DN	GM	DN	DN	DN	GM	ACHP	DN
209A	0	1.4	2	1.4	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	DN	DN	DN
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
266A	0.1	0.2	2	0.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
266A	0.2	1.3	2	1.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
266A	1.3	3	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	9.5	11.5	2	2	GM	DN	GM	ACHP	DN	DN	DN	DN
350A	0	2.7	2	2.7	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	7.1	12.1	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	12.1	17.1	2	5	GM	DN	ACHP	DN	DN	DN	DN	ACHP
350A	17.1	22.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	22.1	24	2	1.9	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	24	29	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	34	39	2	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
350A	39	44	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	44	49	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	49	54	2	5	GM	DN	ACHP	DN	DN	DN	DN	ACHP
350A	54	56.2	2	2.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
350A	56.2	59.4	2	3.2	GM	DN	DN	GM	ACHP	DN	DN	DN
350A	59.4	64.4	2	5	DN	GM	DN	DN	DN	GM	ACHP	DN
350A	64.4	69.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.4	69.7	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.7	72	2	2.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	72	72.3	2	0.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	72.3	72.4	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
350A	72.4	72.6	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
385A	95.3	98.6	2	3.3	GM	DN	ACHP	DN	DN	DN	DN	DN
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	129.2	134.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	DN	GM	DN
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN

Appendix D-3: Region 3

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	DN	DN	DN	DN	DN	DN	GM+ATHO
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	DN	ACHP	DN	DN
006A	11.8	13.9	3	2.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
006A	13.9	15.1	3	1.2	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
006C	43.4	45.6	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
006C	45.6	46.1	3	0.5	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
006M	75.4	80.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	DN	ACHP	DN	DN	DN
014B	34.1	34.3	3	0.2	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	AHIP+ACHP	DN	DN	DN	DN
014B	56.3	61.3	3	5	DN	DN	DN	AHIP+ACHP	DN	DN	DN	DN
014B	61.3	64.9	3	3.6	DN	DN	DN	AHIP+ACHP	DN	DN	DN	DN
050D	0	0.9	3	0.9	GM	DN	DN	GM	GM	DN	DN	DN
050D	0.9	1.5	3	0.6	GM	DN	GM	DN	GM	DN	DN	GM
065A	14.4	19.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	GM
065A	19.4	24.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	GM
065A	24.4	26.9	3	2.5	DN	DN	DN	DN	ACHP	DN	DN	GM
065A	26.9	31.9	3	5	DN	GM	DN	GM	DN	DN	DN	DN
065A	31.9	36.2	3	4.3	DN	GM	DN	GM	DN	DN	DN	DN
065A	36.2	41.2	3	5	DN	DN	DN	DN	GM	GM	DN	GM
065A	41.2	46.2	3	5	DN	DN	DN	DN	GM	GM	DN	GM
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	GM	GM	DN	GM
065A	49.6	51.2	3	1.6	DN	DN	DN	DN	GM	GM	DN	GM
082A	42.5	47.5	3	5	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
082A	47.5	51.3	3	3.8	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
082A	51.3	56.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
082A	56.3	61.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
082A	61.3	66.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
082A	66.3	71.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
082A	71.3	76.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
082A	76.3	79	3	2.7	DN	GM	DN	DN	DN	ACHP	DN	DN
082A	79	83.5	3	4.5	DN	GM	DN	GM	DN	GM	DN	DN
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
090B	81.5	81.7	3	0.2	DN	DN	GM+ATHO	DN	DN	DN	DN	ACHP
090B	81.7	84.9	3	3.2	DN	DN	GM	DN	ACHP	DN	DN	DN
090B	84.9	86.1	3	1.2	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
090B	86.1	86.9	3	0.8	DN	DN	DN	DN	DN	DN	DN	DN
090B	86.9	87.9	3	1	GM	DN	DN	DN	ACHP	DN	DN	DN
092A	27.1	30.1	3	3	DN	GM	DN	DN	DN	DN	GM	DN
092A	30.1	31.5	3	1.4	GM	DN	DN	GM	GM	DN	DN	GM
092A	31.5	33.6	3	2.1	GM	DN	DN	DN	DN	GM	DN	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	41.6	46.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	46.6	51.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	51.6	56.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	56.6	61.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	61.6	66.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	66.6	71.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	71.6	73.3	3	1.7	GM	DN	GM	DN	DN	DN	DN	DN
114A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	5	8	3	3	DN	DN	DN	DN	DN	DN	DN	DN
125A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	20	25	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	25	29.5	3	4.5	DN	DN	DN	DN	DN	DN	DN	DN
125A	29.5	31.5	3	2	DN	DN	DN	DN	DN	DN	DN	DN
125A	31.5	35.6	3	4.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	DN	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
131B	38.4	42.1	3	3.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
131B	42.7	47.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	47.7	47.9	3	0.2	DN	DN	DN	DN	DN	DN	DN	DN
133A	18.9	23.9	3	5	GM	DN	DN	DN	DN	GM	DN	DN
133A	23.9	24	3	0.1	GM	DN	DN	DN	DN	GM	DN	DN
133A	24	29	3	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	29	34	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	34	39	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	39	44	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	44	46.4	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
133A	46.4	51.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
133A	51.4	56.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	DN	ACHP	DN	DN	DN
133B	13.3	16.1	3	2.8	DN	DN	DN	DN	DN	DN	DN	DN
134A	0	5	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	5	10	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	10	15	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	15	16.3	3	1.3	DN	GM	DN	GM	DN	DN	DN	DN
134A	16.3	21.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
134A	21.3	26.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
134A	26.3	27.2	3	0.9	DN	GM	DN	DN	DN	ACHP	DN	DN
139A	0	0.1	3	0.1	DN	DN	DN	DN	DN	DN	DN	DN
139A	65.2	70.2	3	5	DN	DN	DN	GM	DN	DN	DN	DN
139A	70.2	72.1	3	1.9	DN	DN	DN	GM	DN	DN	DN	DN
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	42.4	45.5	3	3.1	DN	DN	DN	DN	DN	DN	DN	DN
149A	45.5	50.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	50.5	55.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	55.5	60.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	60.5	62.7	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	67.7	69.9	3	2.2	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	GM	DN
149A	72.2	72.8	3	0.6	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	72.8	73.2	3	0.4	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	73.2	78.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	78.2	83.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	83.2	88.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	88.2	93.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	93.2	98.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
300A	0	0.5	3	0.5	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
300A	0.5	3.4	3	2.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
317A	0	5	3	5	DN	GM	DN	GM	DN	DN	DN	DN
317A	5	10	3	5	DN	GM	DN	GM	DN	DN	DN	DN
317A	10	12.2	3	2.2	DN	GM	DN	GM	DN	DN	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	DN	DN	DN	DN	DN	DN	DN	DN
318A	20.6	25.6	3	5	GM	DN	GM	DN	DN	DN	DN	GM
318A	25.6	30.6	3	5	GM	DN	GM	DN	DN	DN	DN	GM
318A	30.6	35.6	3	5	GM	DN	GM	DN	DN	DN	DN	GM
318A	35.6	40.6	3	5	GM	DN	GM	DN	DN	DN	DN	GM
318A	40.6	45.6	3	5	GM	DN	GM	DN	DN	DN	DN	GM
318A	45.6	50.6	3	5	GM	DN	GM	DN	DN	DN	DN	GM
318A	50.6	54.3	3	3.7	GM	DN	GM	DN	DN	DN	DN	GM
318A	54.3	59.3	3	5	GM	DN	DN	GM	GM	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	DN	DN	GM	GM	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	DN	DN	GM	GM	DN	DN	GM	DN
347A	0	1.8	3	1.8	DN	DN	DN	DN	DN	DN	DN	DN
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	ACHP	DN	DN	DN
348A	0	1.3	3	1.3	GM	DN	DN	GM	GM	DN	DN	DN
348A	1.3	3.3	3	2	DN	DN	AHIP+ACHP	DN	DN	DN	DN	DN
348A	3.3	4	3	0.7	DN	DN	DN	AHIP+ACHP	DN	DN	DN	DN
348A	4	7.3	3	3.3	GM	DN	DN	GM	DN	DN	DN	DN
348A	7.3	11.4	3	4.1	DN	GM	DN	GM	DN	GM	DN	DN
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	DN
348A	12.9	14.4	3	1.5	DN	DN	DN	DN	DN	DN	DN	DN

Appendix D-4: Region 4

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
006I	343.7	344.7	4	1	GM	DN	DN	DN	DN	DN	FDR+ATHO	DN
006I	344.7	345.9	4	1.2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006I	345.9	346.4	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006Z	0.4	0.6	4	0.2	FDR+ATHO	DN	DN	DN	ACHP	DN	DN	DN
007A	14.9	16.1	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
007A	19.2	24.2	4	5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
007A	24.2	29.2	4	5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
007A	29.2	32.6	4	3.4	ACHP	DN	DN	DN	DN	GM	DN	ACHP
007E	0	0.6	4	0.6	DN	DN	DN	DN	DN	GM+ATHO	ACHP	DN
007E	0.6	1.6	4	1	DN	ACHP	DN	DN	DN	DN	DN	DN
011A	0	0.4	4	0.4	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
011A	0.4	1.4	4	1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
014B	64.9	69.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	69.9	71.5	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
014B	71.5	76.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	76.5	81.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	81.5	86.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	86.5	91	4	4.5	DN	ACHP	DN	DN	GM	DN	DN	GM
023A	0	5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
023A	5	9.6	4	4.6	DN	DN	DN	DN	DN	DN	DN	DN
023A	16	17.5	4	1.5	ACHP	DN	DN	DN	DN	DN	DN	ACHP
024B	420	422.7	4	2.7	GM	GM	GM	GM	GM	GM	GM	GM
024B	422.7	423.1	4	0.4	ACHP	DN	DN	DN	GM	DN	DN	ACHP
024B	423.1	428.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024B	428.1	429.6	4	1.5	DN	DN	DN	DN	DN	DN	DN	DN
024B	429.6	434.6	4	5	DN	DN	ACHP	DN	GM	DN	GM	DN
024B	434.6	436.6	4	2	DN	DN	ACHP	DN	GM	DN	GM	DN
024B	436.6	437.2	4	0.6	DN	DN	DN	GM	ACHP	DN	DN	GM
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
040F	360.2	363	4	2.8	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
040G	380.7	381	4	0.3	FDR+ATHO	DN	DN	DN	ACHP	DN	DN	DN
040G	381	382.2	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
052A	58.9	60.9	4	2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
055A	0	0.2	4	0.2	GM+ATHO	ACHP	DN	DN	ACHP	DN	DN	DN
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
059A	15	20	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	DN	DN	DN	DN	DN	DN	DN
059A	33	38	4	5	GM	DN	GM	ACHP	DN	DN	GM	DN
059A	38	41	4	3	GM	DN	GM	ACHP	DN	DN	GM	DN
059B	120.9	122.9	4	2	DN	GM	DN	DN	DN	DN	FDR+ATHO	DN
059B	122.9	127.9	4	5	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	127.9	130.6	4	2.7	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	130.6	135.6	4	5	DN	DN	GM	DN	GM	DN	DN	DN
059B	135.6	140.6	4	5	DN	DN	GM	DN	GM	DN	DN	DN
059B	140.6	145.5	4	4.9	DN	DN	GM	DN	GM	DN	DN	DN
059B	147.1	147.2	4	0.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059B	147.8	152.8	4	5	DN	DN	DN	DN	GM	DN	DN	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	DN	GM	DN	DN	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	GM	ACHP	DN
059B	159.7	164.7	4	5	GM	GM	GM	DN	DN	GM	ACHP	DN
059B	164.7	166.5	4	1.8	GM	GM	GM	DN	DN	GM	ACHP	DN
059B	166.5	171.1	4	4.6	GM	GM	DN	GM	GM	ACHP	DN	DN
059B	171.1	173.3	4	2.2	GM	GM	GM	DN	ACHP	DN	GM	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	5.2	8.1	4	2.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	14	19	4	5	GM	DN	GM	DN	DN	DN	DN	DN
061A	19	22.5	4	3.5	GM	DN	GM	DN	DN	DN	DN	DN
061A	22.5	27.5	4	5	GM	DN	GM	ACHP	DN	DN	GM	DN
061A	27.5	32	4	4.5	GM	DN	GM	ACHP	DN	DN	GM	DN
061A	32	36	4	4	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	DN	DN	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	GM	GM	GM	DN	DN	DN	DN
063A	16.1	21.1	4	5	GM	GM	GM	GM	DN	DN	DN	DN
063A	21.1	24.2	4	3.1	GM	GM	GM	GM	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	39.3	44.3	4	5	GM	DN	DN	DN	DN	GM	ACHP	DN
063A	44.3	48.2	4	3.9	GM	DN	DN	DN	DN	GM	ACHP	DN
070O	0	0.4	4	0.4	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
072B	32.8	37.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	37.8	42.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	42.8	44.1	4	1.3	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	44.1	48.4	4	4.3	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	48.4	53.4	4	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
072B	53.4	54.1	4	0.7	DN	ACHP	DN	DN	DN	DN	DN	ACHP
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	DN	DN	DN	DN	DN	DN	DN	DN
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
138A	21.7	26.3	4	4.6	GM	ACHP	DN	GM	DN	GM	DN	DN
138A	26.3	27.5	4	1.2	GM	DN	GM	DN	GM	ACHP	DN	DN
138A	27.5	27.9	4	0.4	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	40	41.4	4	1.4	DN	DN	DN	DN	DN	DN	DN	DN
138A	41.4	43	4	1.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
138A	43	43.1	4	0.1	DN	DN	FDR+ATHO	DN	ACHP	DN	DN	DN
138A	43.4	48.4	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	DN	DN	DN
138A	50.5	50.6	4	0.1	FDR+ATHO	DN	DN	DN	ACHP	DN	DN	DN
138A	50.9	54	4	3.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	54	54.8	4	0.8	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
144A	0	2.8	4	2.8	GM	GM	DN	DN	DN	DN	DN	FDR+ATHO
144A	2.8	7.8	4	5	GM	GM	GM	DN	DN	DN	DN	DN
144A	7.8	10.5	4	2.7	GM	GM	GM	DN	DN	DN	DN	DN
144A	10.5	11.1	4	0.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	16.1	16.6	4	0.5	DN	DN	DN	DN	DN	DN	DN	DN
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	DN	DN
170A	0	2.2	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
257B	0	0.6	4	0.6	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
257B	0.6	1.1	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
385E	313.8	317.6	4	3.8	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN

Appendix D-5: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
015A	1.4	2.4	5	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
015A	2.4	7.4	5	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
015A	7.4	8.4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
015A	8.4	10.4	5	2	GM	DN	DN	DN	DN	GM	DN	GM
015A	10.4	12.4	5	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
017A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
017A	5	10	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
017A	10	15	5	5	DN	DN	GM	DN	DN	DN	DN	DN
017A	15	17.3	5	2.3	DN	GM	DN	ACHP	DN	DN	DN	DN
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	27.3	29	5	1.7	DN	DN	DN	DN	DN	DN	DN	DN
017A	29	34	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34	34.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
041A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	GM
041A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	GM
084A	0	4.6	5	4.6	DN	DN	DN	DN	ACHP	DN	DN	DN
090A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	5	9.5	5	4.5	GM	DN	DN	DN	DN	DN	DN	GM
090A	9.5	14.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	14.5	14.8	5	0.3	DN	DN	ACHP	DN	DN	DN	DN	ACHP
090A	14.8	19.8	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
090A	19.8	24.8	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
090A	24.8	29.8	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
090A	29.8	33.9	5	4.1	GM	DN	DN	DN	DN	DN	DN	DN
097A	0.3	3.8	5	3.5	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.8	3.9	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.9	4.6	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
110A	0	0.1	5	0.1	DN	DN	GM	DN	GM+ATHO	DN	DN	DN
114A	8	13	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
114A	13	18	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	DN
114A	19	20.3	5	1.3	DN	GM	DN	DN	DN	GM	DN	GM
114A	20.3	25.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	DN	DN	DN	GM	ACHP	DN
114A	45.3	50.3	5	5	GM	DN	DN	DN	DN	DN	ACHP	DN
114A	50.3	55.3	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	DN	GM	DN	GM
114A	56	61	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	61	61.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	GM
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	DN	GM	DN	GM
136A	0	0.2	5	0.2	DN	GM	DN	DN	GM	DN	ACHP	DN
136A	0.2	0.6	5	0.4	DN	GM	ACHP	DN	DN	DN	DN	ACHP
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
136A	3.5	4.5	5	1	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	GM
141A	5	9.4	5	4.4	DN	DN	DN	DN	DN	GM	DN	GM
141A	9.4	11.3	5	1.9	DN	DN	DN	DN	DN	DN	DN	GM
141A	11.3	16.3	5	5	DN	DN	DN	DN	DN	GM	DN	GM
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	21.3	26.3	5	5	DN	DN	DN	ACHP	DN	DN	DN	DN
141A	26.3	31.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	31.3	36.3	5	5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	GM	ACHP	DN	DN	DN	DN	DN	DN
141A	41.3	44.1	5	2.8	DN	DN	DN	DN	DN	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
141A	62.4	64.4	5	2	DN	GM	DN	ACHP	DN	DN	DN	DN
141A	64.4	69.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	69.4	74.4	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	74.4	79.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	79.4	84.4	5	5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	89.4	94.4	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	94.4	95.7	5	1.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
142A	3.3	8.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
142A	8.3	13.3	5	5	GM	DN	DN	DN	DN	DN	GM	DN
142A	13.3	13.4	5	0.1	DN	DN	DN	DN	GM	DN	DN	GM
142A	13.4	18.4	5	5	DN	DN	GM	DN	DN	DN	GM	ACHP
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	DN
142A	23	28	5	5	GM	DN	DN	DN	DN	DN	DN	DN
142A	28	28.7	5	0.7	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	33.7	33.8	5	0.1	DN	DN	DN	DN	DN	GM	DN	DN
145A	102.6	107.6	5	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
145A	107.6	112.6	5	5	DN	DN	DN	DN	DN	DN	DN	DN
145A	112.6	116.9	5	4.3	DN	DN	DN	DN	DN	GM	DN	GM
149A	1.2	3.5	5	2.3	DN	GM	DN	DN	DN	DN	DN	DN
149A	3.5	8.5	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
149A	8.5	13.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	21.6	21.9	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	32.7	37.7	5	5	GM	DN	DN	DN	DN	DN	DN	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	41.5	42.4	5	0.9	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
150A	0	5	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	13.5	16.1	5	2.6	DN	DN	GM	ACHP	DN	DN	DN	DN
151A	22.7	27.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	27.7	32.7	5	5	DN	DN	DN	DN	DN	GM	DN	GM
151A	32.7	34	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	0	5	5	5	GM	DN	DN	DN	DN	DN	GM	DN
159A	5	7	5	2	GM	DN	DN	DN	DN	DN	DN	GM
159A	7	12	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	12	13.3	5	1.3	DN	DN	DN	DN	DN	GM	DN	GM
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	DN	GM	DN	GM
159A	17.5	17.8	5	0.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	18.3	23.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	23.3	28.3	5	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
160D	0	1.2	5	1.2	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.5	2.5	5	1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
368A	0	5	5	5	GM	DN	DN	DN	DN	GM	DN	DN
368A	6	11	5	5	DN	DN	DN	DN	DN	DN	DN	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	DN	GM	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	DN	GM	ACHP	DN
370A	6	11	5	5	GM	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
370A	12.1	14.1	5	2	DN	GM	DN	DN	GM	DN	DN	DN

APPENDIX E: OPTIMIZED MAINTENANCE DECISIONS ON ROADS FOR OVERALL STEADY PERFORMANCE USING SPECIFIC MAINTENANCE ACTIVITIES OF THIN OVERLAY

Appendix E-1: Region 1

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
005A	0	1	1	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
005A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
005A	2	3	1	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
005A	3	4	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	4	5	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	5	6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	6	7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	7	8	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	8	9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	9	10	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	10	11	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	11	12	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	12	13	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	13	14	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	14	14.9	1	0.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
036C	76.4	76.5	1	0.1	DN	DN	DN	DN	DN	DN	DN	DN
036C	76.5	77.5	1	1	GM	DN	DN	DN	DN	DN	DN	GM
036C	77.5	78.5	1	1	DN	DN	DN	DN	GM	DN	DN	DN
036C	78.5	78.7	1	0.2	DN	DN	GM	DN	DN	DN	DN	DN
036C	78.7	79.7	1	1	DN	GM	DN	DN	DN	DN	DN	DN
040B	272.6	273.6	1	1	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
040B	273.6	274.6	1	1	GM	ACHP	DN	DN	DN	DN	DN	DN
040B	274.6	275.6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040B	275.6	276.2	1	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
040C	279.2	280.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	280.2	281.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	281.2	281.8	1	0.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
040E	346.3	347.3	1	1	DN	GM	DN	DN	DN	DN	ACHP	DN
040E	347.3	348.3	1	1	GM	DN	DN	DN	DN	DN	DN	GM
040E	348.3	349.3	1	1	DN	GM	DN	DN	DN	DN	ACHP	DN
040E	349.3	350.3	1	1	GM	DN	DN	DN	DN	DN	DN	DN
040E	350.3	350.6	1	0.3	DN	DN	ACHP	DN	DN	DN	DN	DN
040E	350.6	350.9	1	0.3	DN	ACHP	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
040E	350.9	351.1	1	0.2	ACHP	DN	DN	DN	DN	DN	DN	DN
040E	351.1	352.1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040E	352.1	352.2	1	0.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
046A	0	1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	3	3.9	1	0.9	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
046A	3.9	4.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	4.9	5.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	5.9	6	1	0.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
046A	6	6.6	1	0.6	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
067E	117.3	118.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	DN
067E	118.3	119.3	1	1	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
067E	119.3	120.3	1	1	DN	DN	DN	ACHP	DN	DN	DN	DN
067E	120.3	121.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
067E	121.3	122.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
070K	0	0.7	1	0.7	GM+ATHO	DN	DN	DN	DN	ACHP	DN	DN
070N	0	0.1	1	0.1	GM	DN	DN	DN	DN	DN	DN	DN
070N	0.1	0.4	1	0.3	GM	DN	DN	DN	DN	ACHP	DN	DN
072A	20.7	21.7	1	1	GM	DN	DN	DN	DN	DN	DN	GM
072A	21.7	22.7	1	1	GM	DN	DN	DN	DN	DN	DN	GM
072A	22.7	23.7	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
072A	23.7	24.7	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
072A	24.7	25.7	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
072A	25.7	26.7	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
072A	26.7	27.7	1	1	GM	DN	DN	DN	GM	DN	DN	DN
072A	27.7	28.7	1	1	GM	DN	DN	GM	DN	DN	DN	DN
072A	28.7	29.4	1	0.7	GM	GM	DN	DN	ACHP	DN	DN	DN
103A	6.7	7.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	7.7	8.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	8.7	9.7	1	1	DN	DN	DN	GM+ATHO	DN	DN	DN	DN
103A	9.7	10.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	10.7	11.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	11.7	12.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	12.7	13.3	1	0.6	DN	GM+ATHO	DN	DN	DN	DN	ACHP	DN
103A	13.3	14.3	1	1	DN	DN	DN	GM	GM+ATHO	DN	DN	DN
103A	14.3	15.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	15.3	16.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	16.3	17.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
103A	17.3	18.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN
103A	18.3	19.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	19.3	20.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	20.3	21.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	21.3	22.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	22.3	22.5	1	0.2	DN	GM+ATHO	ACHP	DN	DN	DN	DN	DN

Appendix E-2: Region 2

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
009A	41.2	44.9	2	3.7	DN	DN	DN	DN	DN	DN	DN	DN
009A	44.9	47	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
010A	5.1	10.1	2	5	GM+ATHO	DN	DN	DN	ACHP	DN	DN	DN
010A	10.1	15.1	2	5	DN	DN	GM	DN	DN	DN	GM	ACHP
010A	15.1	20.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	20.1	25.1	2	5	GM+ATHO	DN	DN	DN	ACHP	DN	DN	DN
010A	25.1	30.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	30.1	35.1	2	5	GM+ATHO	DN	DN	DN	DN	DN	GM+ATHO	DN
010A	35.1	40.1	2	5	DN	DN	GM+ATHO	DN	DN	DN	DN	DN
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
010A	62.9	67.9	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	67.9	68	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
010A	68	71	2	3	DN	DN	DN	GM+ATHO	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	0	4.6	2	4.6	GM	GM+ATHO	DN	DN	ACHP	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
012A	20.2	25.2	2	5	DN	GM	ACHP	DN	DN	DN	DN	DN
012A	25.2	30.2	2	5	GM	DN	ACHP	DN	DN	DN	DN	DN
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	38.1	43	2	4.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
012A	48	53	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	53	56.8	2	3.8	DN	DN	DN	ACHP	DN	DN	DN	DN
024E	0	0.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
025B	0	1.6	2	1.6	DN	DN	DN	ACHP	DN	DN	DN	DN
025B	1.6	1.9	2	0.3	DN	DN	DN	ACHP	DN	DN	DN	DN
067A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067A	5	6.8	2	1.8	DN	DN	DN	DN	DN	DN	DN	DN
067A	6.8	10.2	2	3.4	DN	DN	DN	DN	DN	DN	DN	DN
067C	45.6	45.7	2	0.1	DN	DN	DN	DN	GM+ATHO	DN	ACHP	DN
067C	45.7	50.7	2	5	DN	GM	DN	ACHP	DN	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	GM+ATHO	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
069A	0	5	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	5.3	9.7	2	4.4	DN	DN	ACHP	DN	DN	DN	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
069A	19.7	24.7	2	5	DN	DN	DN	DN	GM+ATHO	DN	DN	DN
069A	24.7	25	2	0.3	DN	GM+ATHO	DN	DN	DN	ACHP	DN	DN
069A	25	26	2	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	DN	GM	ACHP
069A	31	36	2	5	DN	DN	DN	GM	DN	DN	DN	GM
069A	36	41	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	41	46	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	46	49.4	2	3.4	DN	DN	DN	DN	DN	DN	DN	DN
069A	49.4	54.1	2	4.7	DN	DN	DN	GM+ATHO	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	GM	ACHP	DN	DN	DN	DN	DN
069A	62.1	64.7	2	2.6	DN	DN	DN	DN	DN	DN	DN	DN
069A	71.6	76.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	DN	DN	DN	DN	DN	DN	DN	DN
071A	0	5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
071A	5	7	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071A	7	9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	9.6	11.6	2	2	DN	DN	DN	GM+ATHO	DN	DN	DN	DN
071B	11.6	13.7	2	2.1	DN	DN	DN	GM	DN	DN	GM	ACHP
071B	13.7	14.1	2	0.4	DN	GM+ATHO	DN	ACHP	DN	DN	DN	DN
078A	8.9	9	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	12.7	14.6	2	1.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	14.6	15.5	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN
078A	15.5	18.2	2	2.7	DN	DN	DN	DN	DN	DN	DN	DN
078A	18.2	23.2	2	5	DN	DN	DN	GM+ATHO	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	28.2	29.9	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
089A	0	5	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
089A	5	9	2	4	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	9	14	2	5	DN	DN	DN	DN	GM	DN	DN	GM
089A	14	18.6	2	4.6	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
089A	21.5	26.5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
089A	26.5	31.5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	ACHP	DN
094A	33.1	35	2	1.9	ACHP	DN	DN	DN	DN	ACHP	DN	DN
096A	11.1	16.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
096A	22.1	26.3	2	4.2	DN	DN	DN	DN	DN	DN	DN	DN
096A	26.3	31.3	2	5	DN	DN	ACHP	DN	DN	DN	DN	DN
096A	31.3	33.6	2	2.3	DN	DN	DN	ACHP	DN	DN	DN	DN
096A	33.6	38.6	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
096A	38.6	42.2	2	3.6	DN	DN	DN	DN	DN	DN	DN	DN
096B	69.5	70.6	2	1.1	DN	DN	DN	DN	DN	DN	DN	DN
100A	0	0.3	2	0.3	GM	DN	DN	DN	GM	DN	DN	GM
100A	0.3	0.4	2	0.1	DN	DN	GM	ACHP	DN	DN	DN	DN
101A	0.4	1.2	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
101A	1.2	5.2	2	4	DN	DN	DN	DN	DN	DN	DN	DN
101A	5.2	10.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	DN	DN	DN	DN	DN	DN
101A	16.5	21.4	2	4.9	DN	DN	DN	DN	DN	DN	DN	DN
105A	9.2	9.5	2	0.3	DN	GM+ATHO	DN	DN	DN	ACHP	DN	DN
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	DN	DN	DN	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	27.7	32.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
109A	32.7	37.7	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
109A	37.7	42.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	42.7	47.7	2	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
109A	47.7	52.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	52.7	53	2	0.3	DN	GM	DN	DN	GM+ATHO	DN	ACHP	DN
109A	53	54.8	2	1.8	DN	GM	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	DN	ACHP	DN	DN	DN	DN	DN
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
116A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	DN	DN
116A	12	12.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	ACHP	DN	DN
116A	18.1	20	2	1.9	GM	DN	ACHP	DN	DN	DN	DN	DN
116A	20	25	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	25	27	2	2	DN	DN	DN	DN	DN	DN	DN	DN
116A	27	32	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	32	32.3	2	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
120A	3.1	7.2	2	4.1	GM	DN	ACHP	DN	DN	DN	DN	DN
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
160C	358.7	363.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
160C	363.7	367.8	2	4.1	DN	GM	ACHP	DN	DN	DN	DN	DN
160C	367.8	372.8	2	5	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	372.8	375.8	2	3	DN	DN	DN	GM+ATHO	DN	DN	ACHP	DN
160C	375.8	380.8	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	380.8	382.8	2	2	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN
160C	386.6	391.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	391.6	396.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	396.6	401.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	401.6	403.7	2	2.1	DN	DN	DN	DN	DN	DN	DN	DN
160C	403.7	406.7	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	406.7	411.7	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
160C	411.7	414.3	2	2.6	DN	DN	DN	DN	ACHP	DN	DN	DN
160C	414.3	414.8	2	0.5	DN	DN	DN	DN	DN	DN	GM	ACHP
160C	414.8	416.5	2	1.7	DN	DN	ACHP	DN	DN	DN	DN	DN
160C	416.5	421.5	2	5	DN	DN	ACHP	DN	DN	DN	DN	DN
160C	421.5	425.7	2	4.2	DN	GM	DN	ACHP	DN	DN	DN	DN
160C	425.7	430.7	2	5	DN	DN	DN	GM+ATHO	ACHP	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	GM+ATHO	DN	DN	DN	ACHP	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	DN	ACHP	DN	DN	DN	DN	DN
160C	441.7	446.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
160C	446.7	447.6	2	0.9	GM	GM+ATHO	DN	DN	DN	ACHP	DN	DN
160C	447.6	451	2	3.4	GM	GM+ATHO	DN	DN	DN	ACHP	DN	DN
160C	451	456	2	5	DN	DN	DN	DN	GM	ACHP	DN	DN
160C	456	460.1	2	4.1	DN	DN	ACHP	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	DN	GM	DN
160C	483	484.4	2	1.4	ACHP	DN	DN	DN	DN	DN	DN	ACHP
160C	492	497	2	5	DN	DN	DN	DN	GM	ACHP	DN	DN
160C	497	497.2	2	0.2	DN	DN	DN	ACHP	DN	DN	DN	DN
165A	0	5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
165A	5	10	2	5	DN	DN	DN	DN	DN	DN	GM	DN
165A	10	15	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	15	15.3	2	0.3	GM	GM+ATHO	DN	DN	ACHP	DN	DN	DN
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	DN	DN
165A	18.5	23.5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
165A	23.5	28.5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	DN	DN	ACHP	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
167A	1.7	2	2	0.3	GM	GM+ATHO	DN	DN	ACHP	DN	DN	DN
167A	2	2.4	2	0.4	GM	GM+ATHO	DN	DN	ACHP	DN	DN	DN
167A	2.4	2.9	2	0.5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	DN	DN	DN	DN
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
194A	0	3.8	2	3.8	DN	DN	DN	DN	GM	ACHP	DN	DN
194A	3.8	8.8	2	5	DN	DN	DN	DN	GM	DN	DN	GM
194A	8.8	13.8	2	5	GM	GM+ATHO	DN	DN	DN	ACHP	DN	DN
194A	13.8	14.7	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
196A	0	1.6	2	1.6	DN	DN	DN	DN	DN	DN	DN	DN
196A	1.6	6.6	2	5	DN	DN	DN	DN	GM+ATHO	DN	DN	DN
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
196A	6.9	8.9	2	2	DN	DN	GM	ACHP	DN	DN	DN	DN
202A	0	0.1	2	0.1	DN	DN	DN	ACHP	DN	DN	DN	DN
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
202A	0.2	1.2	2	1	DN	DN	DN	ACHP	DN	DN	DN	DN
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	DN	DN
207A	0	3.5	2	3.5	DN	GM	DN	DN	DN	GM	ACHP	DN
207A	3.5	5.9	2	2.4	DN	GM	DN	DN	DN	GM	ACHP	DN
209A	0	1.4	2	1.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	DN	DN	GM	GM+ATHO	DN	ACHP
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	DN	DN	DN
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	GM+ATHO	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
266A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	0.2	1.3	2	1.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	1.3	3	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	9.5	11.5	2	2	GM	GM+ATHO	DN	DN	DN	ACHP	DN	DN
350A	0	2.7	2	2.7	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	7.1	12.1	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	12.1	17.1	2	5	GM	DN	ACHP	DN	DN	DN	DN	DN
350A	17.1	22.1	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	22.1	24	2	1.9	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	24	29	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	34	39	2	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
350A	39	44	2	5	DN	DN	ACHP	DN	DN	DN	DN	DN
350A	44	49	2	5	GM+ATHO	DN	DN	DN	DN	DN	GM+ATHO	DN
350A	49	54	2	5	GM	DN	ACHP	DN	DN	DN	DN	DN
350A	54	56.2	2	2.2	DN	DN	DN	DN	DN	DN	DN	DN
350A	56.2	59.4	2	3.2	GM	DN	GM+ATHO	DN	DN	DN	ACHP	DN
350A	59.4	64.4	2	5	DN	GM	DN	DN	DN	GM	ACHP	DN
350A	64.4	69.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.4	69.7	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	69.7	72	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	72	72.3	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
350A	72.3	72.4	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
350A	72.4	72.6	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
385A	95.3	98.6	2	3.3	GM	ACHP	DN	DN	DN	DN	DN	ACHP
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	129.2	134.2	2	5	DN	DN	DN	DN	GM+ATHO	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	DN	DN	DN	DN	DN
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	DN	GM	DN
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	GM+ATHO	DN	DN	DN
389A	11.9	12.8	2	0.9	DN	GM	ACHP	DN	DN	DN	DN	DN

Appendix E-3: Region 3

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	ACHP	DN	DN	DN	ACHP	DN	DN
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	ACHP	DN	DN	DN
006A	11.8	13.9	3	2.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
006A	13.9	15.1	3	1.2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
006C	43.4	45.6	3	2.2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
006C	45.6	46.1	3	0.5	GM+ATHO	DN	ACHP	DN	DN	DN	DN	DN
006M	75.4	80.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	DN	ACHP	DN	DN	DN
014B	34.1	34.3	3	0.2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	56.3	61.3	3	5	DN	DN	DN	AHIP+ACHP	DN	DN	DN	DN
014B	61.3	64.9	3	3.6	DN	DN	GM+ATHO	DN	ACHP	DN	DN	DN
050D	0	0.9	3	0.9	GM	GM	DN	DN	GM	DN	DN	DN
050D	0.9	1.5	3	0.6	GM	GM	GM	DN	DN	DN	DN	DN
065A	14.4	19.4	3	5	DN	DN	DN	DN	GM	DN	DN	DN
065A	19.4	24.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
065A	24.4	26.9	3	2.5	DN	DN	DN	ACHP	DN	GM	DN	DN
065A	26.9	31.9	3	5	GM	GM	DN	DN	DN	DN	DN	ACHP
065A	31.9	36.2	3	4.3	GM	DN	DN	GM	DN	DN	DN	DN
065A	36.2	41.2	3	5	DN	DN	DN	DN	GM	GM	DN	DN
065A	41.2	46.2	3	5	DN	DN	DN	DN	GM	DN	DN	GM
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	GM	GM	DN	DN
065A	49.6	51.2	3	1.6	DN	DN	DN	GM	GM	GM	DN	DN
082A	42.5	47.5	3	5	DN	GM	DN	DN	DN	DN	ACHP	DN
082A	47.5	51.3	3	3.8	DN	DN	DN	AHIP+ACHP	DN	ACHP	DN	DN
082A	51.3	56.3	3	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
082A	56.3	61.3	3	5	DN	DN	ACHP	DN	DN	DN	DN	DN
082A	61.3	66.3	3	5	DN	DN	ACHP	DN	DN	DN	DN	DN
082A	66.3	71.3	3	5	GM	DN	DN	GM	DN	DN	DN	DN
082A	71.3	76.3	3	5	GM	GM	DN	DN	GM	DN	DN	DN
082A	76.3	79	3	2.7	GM	GM	DN	DN	DN	DN	DN	GM
082A	79	83.5	3	4.5	GM	GM	DN	DN	DN	DN	DN	ACHP
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
090B	81.5	81.7	3	0.2	DN	ACHP	DN	DN	DN	ACHP	DN	DN
090B	81.7	84.9	3	3.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
090B	84.9	86.1	3	1.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
090B	86.1	86.9	3	0.8	DN	ACHP	DN	DN	DN	DN	ACHP	DN
090B	86.9	87.9	3	1	GM	DN	DN	DN	ACHP	DN	DN	DN
092A	27.1	30.1	3	3	GM	GM	GM	DN	DN	DN	DN	DN
092A	30.1	31.5	3	1.4	GM	GM	DN	GM	DN	DN	DN	DN
092A	31.5	33.6	3	2.1	GM	GM	GM	DN	DN	DN	DN	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	GM	GM	DN	DN	DN	DN	DN
092A	41.6	46.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
092A	46.6	51.6	3	5	GM	GM	DN	DN	GM	DN	DN	DN
092A	51.6	56.6	3	5	GM	GM	DN	DN	DN	DN	ACHP	DN
092A	56.6	61.6	3	5	GM	DN	DN	DN	ACHP	DN	DN	DN
092A	61.6	66.6	3	5	GM	GM	DN	GM	DN	DN	DN	DN
092A	66.6	71.6	3	5	GM	DN	GM	DN	DN	DN	DN	DN
092A	71.6	73.3	3	1.7	GM	GM	DN	DN	DN	DN	ACHP	DN
114A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	5	8	3	3	DN	DN	DN	DN	DN	DN	DN	DN
125A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	20	25	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	25	29.5	3	4.5	DN	DN	DN	DN	DN	DN	DN	DN
125A	29.5	31.5	3	2	DN	DN	DN	DN	DN	DN	DN	DN
125A	31.5	35.6	3	4.1	DN	DN	DN	DN	DN	DN	DN	DN
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
131B	38.4	42.1	3	3.7	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
131B	42.7	47.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	47.7	47.9	3	0.2	DN	AHIP+ACHP	ACHP	DN	DN	DN	DN	DN
133A	18.9	23.9	3	5	GM	GM	GM	DN	DN	DN	DN	DN
133A	23.9	24	3	0.1	DN	DN	DN	GM+ATHO	ACHP	DN	DN	DN
133A	24	29	3	5	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	29	34	3	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
133A	34	39	3	5	DN	DN	DN	DN	GM+ATHO	DN	DN	ACHP
133A	39	44	3	5	DN	DN	DN	DN	DN	GM+ATHO	DN	DN
133A	44	46.4	3	2.4	GM	DN	DN	DN	DN	ACHP	DN	DN
133A	46.4	51.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
133A	51.4	56.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	ACHP	DN	DN	DN	DN
133B	13.3	16.1	3	2.8	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
134A	0	5	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	5	10	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	10	15	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	15	16.3	3	1.3	GM	DN	DN	DN	DN	ACHP	DN	DN
134A	16.3	21.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
134A	21.3	26.3	3	5	DN	DN	GM	DN	DN	DN	ACHP	DN
134A	26.3	27.2	3	0.9	GM	DN	DN	DN	DN	ACHP	DN	DN
139A	0	0.1	3	0.1	GM	GM	DN	DN	DN	ACHP	DN	DN
139A	65.2	70.2	3	5	GM	GM	DN	DN	DN	DN	ACHP	DN
139A	70.2	72.1	3	1.9	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	42.4	45.5	3	3.1	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
149A	45.5	50.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	50.5	55.5	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
149A	55.5	60.5	3	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
149A	60.5	62.7	3	2.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
149A	67.7	69.9	3	2.2	DN	GM+ATHO	DN	DN	DN	ACHP	DN	DN
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	72.2	72.8	3	0.6	DN	DN	DN	DN	DN	DN	DN	DN
149A	72.8	73.2	3	0.4	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
149A	73.2	78.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	78.2	83.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	83.2	88.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	88.2	93.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	93.2	98.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	DN	DN
300A	0	0.5	3	0.5	GM+ATHO	DN	DN	ACHP	DN	DN	DN	DN
300A	0.5	3.4	3	2.9	DN	DN	DN	DN	DN	DN	DN	DN
317A	0	5	3	5	DN	DN	DN	DN	GM	DN	DN	DN
317A	5	10	3	5	GM	DN	GM	DN	DN	DN	DN	ACHP
317A	10	12.2	3	2.2	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	GM	GM	DN	DN	GM	DN	DN	DN
318A	20.6	25.6	3	5	GM	GM	DN	GM	DN	DN	DN	DN
318A	25.6	30.6	3	5	GM	GM	DN	DN	DN	DN	ACHP	DN
318A	30.6	35.6	3	5	GM	GM	GM	DN	DN	DN	DN	DN
318A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	45.6	50.6	3	5	GM	GM	DN	DN	DN	DN	ACHP	DN
318A	50.6	54.3	3	3.7	GM	DN	GM	DN	DN	DN	DN	DN
318A	54.3	59.3	3	5	GM	GM	GM	DN	DN	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	DN	DN	GM	DN	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	GM	DN	GM	DN	DN	DN	DN	DN
347A	0	1.8	3	1.8	DN	GM	DN	DN	DN	DN	DN	ACHP
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	DN	ACHP	DN	DN
348A	0	1.3	3	1.3	GM	GM	DN	DN	GM	DN	DN	DN
348A	1.3	3.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
348A	3.3	4	3	0.7	GM+ATHO	DN	DN	ACHP	DN	DN	DN	DN
348A	4	7.3	3	3.3	GM	DN	GM	DN	DN	DN	DN	ACHP
348A	7.3	11.4	3	4.1	GM	DN	DN	GM	DN	DN	DN	DN
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	DN
348A	12.9	14.4	3	1.5	GM	DN	GM	DN	DN	GM	DN	DN
394A	3.9	7	3	3.1	GM	GM	DN	DN	DN	DN	ACHP	DN

Appendix E-4: Region 4

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	DN	ACHP	DN	DN	DN	DN	DN	DN
006I	343.7	344.7	4	1	DN	DN	GM	DN	DN	GM	DN	DN
006I	344.7	345.9	4	1.2	DN	DN	DN	DN	DN	DN	DN	DN
006I	345.9	346.4	4	0.5	GM	DN	GM	DN	DN	GM	DN	DN
006Z	0.4	0.6	4	0.2	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
007A	14.9	16.1	4	1.2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
007A	19.2	24.2	4	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
007A	24.2	29.2	4	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
007A	29.2	32.6	4	3.4	DN	GM+ATHO	DN	DN	DN	DN	DN	DN
007E	0	0.6	4	0.6	ACHP	DN	DN	DN	ACHP	DN	DN	DN
007E	0.6	1.6	4	1	DN	ACHP	DN	DN	DN	DN	DN	ACHP
011A	0	0.4	4	0.4	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
011A	0.4	1.4	4	1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
014B	64.9	69.9	4	5	GM	DN	GM	DN	DN	GM	DN	DN
014B	69.9	71.5	4	1.6	GM+ATHO	DN	DN	ACHP	DN	DN	DN	DN
014B	71.5	76.5	4	5	DN	GM	DN	DN	GM	DN	DN	DN
014B	76.5	81.5	4	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
014B	81.5	86.5	4	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
014B	86.5	91	4	4.5	DN	GM	DN	DN	GM	DN	DN	GM
023A	0	5	4	5	DN	DN	DN	ACHP	DN	DN	DN	ACHP
023A	5	9.6	4	4.6	DN	ACHP	DN	DN	DN	DN	DN	ACHP
023A	16	17.5	4	1.5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
024B	420	422.7	4	2.7	DN	DN	DN	DN	DN	DN	DN	DN
024B	422.7	423.1	4	0.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
024B	423.1	428.1	4	5	DN	DN	DN	ACHP	DN	DN	DN	ACHP
024B	428.1	429.6	4	1.5	DN	DN	DN	ACHP	DN	DN	DN	DN
024B	429.6	434.6	4	5	DN	DN	ACHP	DN	DN	DN	DN	DN
024B	434.6	436.6	4	2	DN	DN	DN	DN	GM	DN	DN	DN
024B	436.6	437.2	4	0.6	DN	ACHP	DN	DN	DN	DN	ACHP	DN
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
040F	360.2	363	4	2.8	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
040G	380.7	381	4	0.3	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
040G	381	382.2	4	1.2	DN	DN	DN	DN	DN	DN	DN	DN
052A	58.9	60.9	4	2	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
055A	0	0.2	4	0.2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	GM	GM	DN	DN	GM	DN	DN
059A	15	20	4	5	ACHP	DN	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	GM	GM+ATHO	DN	DN	DN	ACHP	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	GM	DN	GM	DN	GM	DN	DN
059A	33	38	4	5	DN	DN	DN	GM	DN	DN	DN	DN
059A	38	41	4	3	DN	DN	DN	GM	DN	DN	DN	DN
059B	120.9	122.9	4	2	ACHP	DN	DN	DN	DN	DN	DN	GM
059B	122.9	127.9	4	5	DN	DN	DN	DN	DN	GM	DN	GM
059B	127.9	130.6	4	2.7	DN	DN	DN	ACHP	DN	DN	DN	DN
059B	130.6	135.6	4	5	DN	DN	DN	DN	GM	DN	DN	GM
059B	135.6	140.6	4	5	DN	DN	DN	DN	GM	DN	DN	GM
059B	140.6	145.5	4	4.9	ACHP	DN	DN	DN	DN	DN	DN	GM
059B	147.1	147.2	4	0.1	GM+ATHO	DN	DN	DN	DN	DN	DN	GM+ATHO
059B	147.8	152.8	4	5	DN	ACHP	DN	DN	DN	DN	DN	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	DN	DN	GM
059B	159.7	164.7	4	5	DN	DN	DN	GM	DN	DN	DN	DN
059B	164.7	166.5	4	1.8	DN	GM	DN	DN	DN	DN	DN	DN
059B	166.5	171.1	4	4.6	DN	DN	GM	DN	DN	DN	DN	DN
059B	171.1	173.3	4	2.2	DN	DN	GM	DN	DN	DN	DN	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
061A	5.2	8.1	4	2.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	14	19	4	5	DN	GM	DN	DN	GM	DN	DN	DN
061A	19	22.5	4	3.5	DN	DN	DN	DN	GM+ATHO	DN	DN	ACHP
061A	22.5	27.5	4	5	DN	DN	GM	DN	DN	GM	DN	DN
061A	27.5	32	4	4.5	DN	DN	GM	DN	DN	GM	DN	DN
061A	32	36	4	4	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	DN	DN	DN	DN	DN	DN	DN
063A	16.1	21.1	4	5	DN	GM	DN	DN	DN	DN	DN	DN
063A	21.1	24.2	4	3.1	DN	GM	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	39.3	44.3	4	5	DN	DN	DN	GM	DN	DN	DN	DN
063A	44.3	48.2	4	3.9	DN	DN	DN	DN	DN	DN	DN	GM
070O	0	0.4	4	0.4	GM	DN	GM	DN	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
072B	32.8	37.8	4	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
072B	37.8	42.8	4	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
072B	42.8	44.1	4	1.3	ACHP	DN	DN	DN	ACHP	DN	DN	DN
072B	44.1	48.4	4	4.3	ACHP	DN	DN	DN	DN	DN	ACHP	DN
072B	48.4	53.4	4	5	ACHP	DN	DN	DN	DN	DN	ACHP	DN
072B	53.4	54.1	4	0.7	ACHP	DN	DN	DN	DN	ACHP	DN	DN
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	FDR+ATHO	DN	DN	DN	DN	DN	ACHP	DN
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
138A	21.7	26.3	4	4.6	DN	DN	GM	DN	DN	GM	DN	DN
138A	26.3	27.5	4	1.2	DN	DN	DN	GM	DN	DN	DN	DN
138A	27.5	27.9	4	0.4	GM	DN	DN	GM	DN	DN	GM	DN
138A	35	40	4	5	GM	GM	DN	DN	GM	DN	DN	GM
138A	40	41.4	4	1.4	GM	GM	DN	DN	DN	DN	DN	DN
138A	41.4	43	4	1.6	GM	GM	DN	DN	GM	DN	DN	DN
138A	43	43.1	4	0.1	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
138A	43.4	48.4	4	5	GM	DN	GM	DN	DN	GM	DN	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
138A	50.5	50.6	4	0.1	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
138A	50.9	54	4	3.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
138A	54	54.8	4	0.8	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
144A	0	2.8	4	2.8	DN	GM	DN	DN	DN	DN	DN	DN
144A	2.8	7.8	4	5	DN	DN	GM	DN	DN	DN	DN	DN
144A	7.8	10.5	4	2.7	GM	DN	GM	DN	DN	GM	DN	DN
144A	10.5	11.1	4	0.6	GM	DN	DN	DN	DN	DN	DN	DN
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	16.1	16.6	4	0.5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	DN	DN
170A	0	2.2	4	2.2	GM	DN	GM	DN	DN	DN	DN	DN
257B	0	0.6	4	0.6	DN	FDR+ATHO	DN	DN	DN	DN	DN	DN
257B	0.6	1.1	4	0.5	FDR+ATHO	DN	DN	DN	DN	DN	DN	ACHP
385E	313.8	317.6	4	3.8	GM	DN	DN	DN	DN	DN	DN	DN

Appendix E-5: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
015A	1.4	2.4	5	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
015A	2.4	7.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
015A	7.4	8.4	5	1	GM	DN	DN	ACHP	DN	DN	DN	DN
015A	8.4	10.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015A	10.4	12.4	5	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
017A	0	5	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
017A	5	10	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
017A	10	15	5	5	DN	DN	GM	DN	DN	GM+ATHO	ACHP	DN
017A	15	17.3	5	2.3	DN	GM	DN	ACHP	DN	DN	DN	DN
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	27.3	29	5	1.7	DN	DN	DN	DN	DN	DN	DN	DN
017A	29	34	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34	34.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	GM	DN	GM
041A	0	5	5	5	DN	DN	DN	DN	DN	GM	DN	GM
041A	5	9.5	5	4.5	DN	DN	DN	DN	DN	GM	DN	GM
084A	0	4.6	5	4.6	DN	DN	DN	DN	ACHP	DN	DN	DN
090A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
090A	9.5	14.5	5	5	DN	DN	DN	DN	DN	GM	DN	GM
090A	14.5	14.8	5	0.3	DN	DN	DN	ACHP	DN	DN	DN	DN
090A	14.8	19.8	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
090A	19.8	24.8	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
090A	24.8	29.8	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
090A	29.8	33.9	5	4.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	0.3	3.8	5	3.5	GM	DN	DN	DN	DN	DN	DN	GM
097A	3.8	3.9	5	0.1	GM	DN	DN	DN	ACHP	DN	DN	DN
097A	3.9	4.6	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
110A	0	0.1	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
114A	8	13	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
114A	13	18	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	DN
114A	19	20.3	5	1.3	DN	GM	DN	DN	DN	GM	DN	GM
114A	20.3	25.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	DN	DN	DN	GM	ACHP	DN
114A	45.3	50.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	50.3	55.3	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
114A	56	61	5	5	DN	DN	DN	DN	DN	GM	DN	GM
114A	61	61.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	GM
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	DN	DN	DN	DN
136A	0	0.2	5	0.2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
136A	0.2	0.6	5	0.4	DN	GM	ACHP	DN	DN	DN	ACHP	DN
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
136A	3.5	4.5	5	1	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	0	5	5	5	DN	DN	DN	DN	DN	GM	DN	GM
141A	5	9.4	5	4.4	DN	DN	DN	DN	DN	GM	DN	GM
141A	9.4	11.3	5	1.9	DN	DN	DN	DN	DN	DN	DN	GM
141A	11.3	16.3	5	5	DN	DN	DN	DN	DN	GM	DN	GM
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	21.3	26.3	5	5	DN	DN	DN	ACHP	DN	DN	DN	DN
141A	26.3	31.3	5	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
141A	31.3	36.3	5	5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	DN	GM	DN	DN	DN	GM	ACHP	DN
141A	41.3	44.1	5	2.8	GM	DN	DN	DN	ACHP	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
141A	62.4	64.4	5	2	GM	ACHP	DN	DN	DN	DN	DN	ACHP
141A	64.4	69.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	69.4	74.4	5	5	GM	ACHP	DN	DN	DN	DN	DN	DN
141A	74.4	79.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	79.4	84.4	5	5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	89.4	94.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	94.4	95.7	5	1.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
142A	3.3	8.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
142A	8.3	13.3	5	5	GM	DN	DN	DN	DN	DN	GM	DN
142A	13.3	13.4	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.4	18.4	5	5	DN	DN	GM	DN	DN	DN	GM	DN
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	DN
142A	23	28	5	5	GM	DN	DN	DN	DN	DN	DN	DN
142A	28	28.7	5	0.7	GM	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	33.7	33.8	5	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
145A	102.6	107.6	5	5	DN	ACHP	DN	DN	DN	DN	DN	DN
145A	107.6	112.6	5	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
145A	112.6	116.9	5	4.3	DN	DN	DN	DN	DN	GM	DN	GM
149A	1.2	3.5	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	DN
149A	3.5	8.5	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
149A	8.5	13.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	21.6	21.9	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
149A	27.7	32.7	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
149A	32.7	37.7	5	5	GM	DN	DN	GM+ATHO	DN	DN	ACHP	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
149A	41.5	42.4	5	0.9	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
150A	0	5	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	GM+ATHO	DN	DN	ACHP	DN	DN	DN
150A	13.5	16.1	5	2.6	GM+ATHO	DN	DN	DN	ACHP	DN	DN	DN
151A	22.7	27.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	32.7	34	5	1.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	0	5	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
159A	5	7	5	2	GM	DN	DN	DN	DN	DN	DN	GM
159A	7	12	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	12	13.3	5	1.3	DN	DN	DN	DN	DN	DN	DN	GM
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
159A	17.5	17.8	5	0.3	GM	DN	DN	ACHP	DN	DN	DN	DN
159A	18.3	23.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	23.3	28.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
160D	0	1.2	5	1.2	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.5	2.5	5	1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	DN	ACHP	DN	DN	DN	DN	DN	DN
368A	0	5	5	5	GM	DN	DN	DN	DN	DN	DN	GM
368A	6	11	5	5	DN	DN	DN	DN	DN	DN	DN	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	DN	DN	DN	DN
370A	6	11	5	5	GM	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
370A	12.1	14.1	5	2	DN	GM	GM+ATHO	DN	DN	DN	ACHP	DN

APPENDIX F: OPTIMIZED MAINTENANCE DECISIONS ON ROADS FOR OVERALL 10 PERCENT IMPROVEMENT OF PAVEMENT DRIVABILITY

Appendix F-1: Region 1

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
005A	0	1	1	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
005A	1	2	1	1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
005A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
005A	3	4	1	1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
005A	4	5	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	5	6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	6	7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	7	8	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	8	9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	9	10	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	10	11	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	11	12	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	12	13	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	13	14	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	14	14.9	1	0.9	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
036C	76.4	76.5	1	0.1	GM	DN	DN	DN	DN	DN	DN	DN
036C	76.5	77.5	1	1	GM	DN	DN	DN	DN	DN	DN	GM
036C	77.5	78.5	1	1	DN	DN	DN	ACHP	DN	DN	DN	DN
036C	78.5	78.7	1	0.2	DN	GM	DN	DN	ACHP	DN	DN	DN
036C	78.7	79.7	1	1	DN	GM	DN	DN	DN	DN	ACHP	DN
040B	272.6	273.6	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
040B	273.6	274.6	1	1	DN	DN	GM	GM	DN	ACHP	DN	DN
040B	274.6	275.6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040B	275.6	276.2	1	0.6	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
040C	279.2	280.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	280.2	281.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	281.2	281.8	1	0.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
040E	346.3	347.3	1	1	DN	DN	GM	DN	DN	ACHP	DN	DN
040E	347.3	348.3	1	1	DN	GM	DN	DN	DN	GM	DN	DN
040E	348.3	349.3	1	1	DN	GM	DN	DN	DN	ACHP	DN	DN
040E	349.3	350.3	1	1	GM	DN	DN	DN	DN	DN	ACHP	DN
040E	350.3	350.6	1	0.3	DN	DN	ACHP	DN	DN	DN	ACHP	DN
040E	350.6	350.9	1	0.3	DN	DN	DN	ACHP	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
040E	350.9	351.1	1	0.2	DN	GM	ACHP	DN	DN	DN	DN	DN
040E	351.1	352.1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040E	352.1	352.2	1	0.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
046A	0	1	1	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
046A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	3	3.9	1	0.9	DN	DN	DN	DN	DN	DN	DN	DN
046A	3.9	4.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	4.9	5.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	5.9	6	1	0.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
046A	6	6.6	1	0.6	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
067E	117.3	118.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
067E	118.3	119.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	DN
067E	119.3	120.3	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
067E	120.3	121.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
067E	121.3	122.3	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
070K	0	0.7	1	0.7	DN	DN	DN	DN	DN	DN	DN	DN
070N	0	0.1	1	0.1	DN	GM	GM	DN	DN	DN	ACHP	DN
070N	0.1	0.4	1	0.3	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	20.7	21.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	21.7	22.7	1	1	GM	DN	DN	DN	DN	GM	ACHP	DN
072A	22.7	23.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	23.7	24.7	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
072A	24.7	25.7	1	1	DN	ACHP	DN	DN	DN	DN	DN	DN
072A	25.7	26.7	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
072A	26.7	27.7	1	1	GM	DN	DN	DN	GM	DN	DN	DN
072A	27.7	28.7	1	1	GM	DN	DN	GM	DN	DN	DN	DN
072A	28.7	29.4	1	0.7	GM	DN	GM	DN	DN	ACHP	DN	DN
103A	6.7	7.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	DN
103A	7.7	8.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	8.7	9.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	ACHP
103A	9.7	10.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	ACHP
103A	10.7	11.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	ACHP
103A	11.7	12.7	1	1	ACHP	DN	DN	DN	DN	DN	DN	ACHP
103A	12.7	13.3	1	0.6	DN	DN	DN	DN	DN	DN	DN	DN
103A	13.3	14.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	14.3	15.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	15.3	16.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	16.3	17.3	1	1	DN	DN	GM	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
103A	17.3	18.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN
103A	18.3	19.3	1	1	DN	DN	GM	DN	DN	DN	DN	DN
103A	19.3	20.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	20.3	21.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	21.3	22.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	22.3	22.5	1	0.2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN

Appendix F-2: Region 2

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	DN	GM	ACHP
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	DN	GM	GM
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	DN	GM	GM
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	DN	GM	GM
009A	41.2	44.9	2	3.7	DN	DN	DN	DN	DN	DN	GM	GM
009A	44.9	47	2	2.1	DN	DN	DN	DN	DN	DN	GM	GM
010A	5.1	10.1	2	5	DN	DN	DN	GM	ACHP	DN	DN	DN
010A	10.1	15.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
010A	15.1	20.1	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	20.1	25.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
010A	25.1	30.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	30.1	35.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	DN
010A	35.1	40.1	2	5	DN	DN	DN	GM	DN	DN	GM	GM
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	DN	DN	DN
010A	62.9	67.9	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	67.9	68	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
010A	68	71	2	3	DN	DN	DN	DN	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	0	4.6	2	4.6	GM	DN	GM	ACHP	DN	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
012A	20.2	25.2	2	5	DN	GM	ACHP	DN	DN	DN	DN	DN
012A	25.2	30.2	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	DN	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
012A	38.1	43	2	4.9	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	48	53	2	5	DN	DN	DN	DN	DN	DN	GM	GM
012A	53	56.8	2	3.8	DN	DN	DN	ACHP	DN	DN	DN	DN
024E	0	0.6	2	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
025B	0	1.6	2	1.6	DN	DN	DN	ACHP	DN	DN	DN	DN
025B	1.6	1.9	2	0.3	DN	DN	ACHP	DN	DN	DN	DN	DN
067A	0	5	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
067A	5	6.8	2	1.8	DN	DN	DN	DN	DN	DN	DN	DN
067A	6.8	10.2	2	3.4	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
067C	45.6	45.7	2	0.1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
067C	45.7	50.7	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
069A	0	5	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	5.3	9.7	2	4.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	DN	DN	DN	GM	GM
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	GM	GM
069A	19.7	24.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	24.7	25	2	0.3	DN	DN	GM	ACHP	DN	DN	DN	DN
069A	25	26	2	1	DN	DN	DN	GM	ACHP	DN	DN	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	DN	GM	ACHP
069A	31	36	2	5	DN	DN	DN	GM	DN	DN	GM	ACHP
069A	36	41	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
069A	41	46	2	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
069A	46	49.4	2	3.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
069A	49.4	54.1	2	4.7	DN	DN	DN	DN	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	GM	ACHP	DN	DN	DN	DN	DN
069A	62.1	64.7	2	2.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
069A	71.6	76.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
071A	0	5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
071A	5	7	2	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
071A	7	9	2	2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
071B	9.6	11.6	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	11.6	13.7	2	2.1	DN	DN	DN	GM	DN	DN	GM	ACHP
071B	13.7	14.1	2	0.4	DN	DN	GM	DN	DN	DN	DN	DN
078A	8.9	9	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	12.7	14.6	2	1.9	DN	DN	DN	DN	DN	GM	DN	GM
078A	14.6	15.5	2	0.9	DN	DN	DN	DN	DN	GM	DN	DN
078A	15.5	18.2	2	2.7	DN	DN	DN	DN	DN	DN	GM	GM
078A	18.2	23.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	28.2	29.9	2	1.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	DN	GM	GM
089A	0	5	2	5	DN	DN	ACHP	DN	DN	GM	DN	DN
089A	5	9	2	4	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	9	14	2	5	DN	DN	DN	DN	GM	DN	GM	ACHP
089A	14	18.6	2	4.6	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	GM	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
089A	21.5	26.5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
089A	26.5	31.5	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	ACHP	DN
094A	33.1	35	2	1.9	DN	DN	ACHP	DN	DN	DN	DN	ACHP
096A	11.1	16.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
096A	22.1	26.3	2	4.2	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
096A	26.3	31.3	2	5	DN	DN	ACHP	DN	DN	DN	DN	DN
096A	31.3	33.6	2	2.3	DN	DN	DN	ACHP	DN	DN	DN	DN
096A	33.6	38.6	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
096A	38.6	42.2	2	3.6	DN	DN	DN	DN	DN	GM	DN	GM
096B	69.5	70.6	2	1.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
100A	0	0.3	2	0.3	GM	DN	DN	DN	GM	DN	GM	ACHP
100A	0.3	0.4	2	0.1	DN	GM	DN	DN	DN	DN	DN	DN
101A	0.4	1.2	2	0.8	DN	DN	DN	DN	DN	GM	DN	DN
101A	1.2	5.2	2	4	DN	DN	DN	DN	DN	GM	DN	GM
101A	5.2	10.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
101A	16.5	21.4	2	4.9	DN	DN	DN	DN	DN	DN	DN	DN
105A	9.2	9.5	2	0.3	DN	ACHP	DN	DN	DN	DN	ACHP	DN
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	27.7	32.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
109A	32.7	37.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	37.7	42.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	42.7	47.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	47.7	52.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	52.7	53	2	0.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
109A	53	54.8	2	1.8	DN	GM	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	DN	ACHP	DN	DN	DN	DN	DN
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
116A	0	5	2	5	DN	DN	DN	DN	DN	DN	GM	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	DN	DN
116A	12	12.3	2	0.3	DN	DN	DN	DN	DN	GM	DN	DN
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	ACHP	DN	DN
116A	18.1	20	2	1.9	GM	ACHP	DN	DN	DN	DN	ACHP	DN
116A	20	25	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	25	27	2	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
116A	27	32	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	32	32.3	2	0.3	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
120A	3.1	7.2	2	4.1	GM	DN	ACHP	DN	DN	DN	DN	ACHP
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	358.7	363.7	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
160C	363.7	367.8	2	4.1	DN	GM	ACHP	DN	DN	DN	DN	DN
160C	367.8	372.8	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
160C	372.8	375.8	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	375.8	380.8	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	380.8	382.8	2	2	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	DN	DN	GM	DN	DN
160C	386.6	391.6	2	5	DN	DN	DN	DN	DN	GM	DN	DN
160C	391.6	396.6	2	5	DN	DN	DN	DN	DN	GM	DN	DN
160C	396.6	401.6	2	5	DN	DN	DN	DN	DN	GM	DN	DN
160C	401.6	403.7	2	2.1	DN	DN	DN	DN	DN	GM	DN	DN
160C	403.7	406.7	2	3	DN	DN	DN	DN	DN	DN	GM	GM
160C	406.7	411.7	2	5	DN	DN	DN	ACHP	DN	DN	DN	DN
160C	411.7	414.3	2	2.6	DN	DN	DN	ACHP	DN	DN	DN	DN
160C	414.3	414.8	2	0.5	DN	DN	DN	DN	DN	DN	GM	ACHP
160C	414.8	416.5	2	1.7	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	416.5	421.5	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	421.5	425.7	2	4.2	DN	GM	ACHP	DN	DN	DN	DN	ACHP
160C	425.7	430.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	DN	ACHP	DN	DN	DN	DN	ACHP
160C	441.7	446.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	446.7	447.6	2	0.9	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	447.6	451	2	3.4	GM	DN	DN	DN	DN	DN	DN	DN
160C	451	456	2	5	DN	DN	DN	DN	GM	ACHP	DN	DN
160C	456	460.1	2	4.1	DN	DN	ACHP	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	DN	GM	GM
160C	483	484.4	2	1.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	492	497	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
160C	497	497.2	2	0.2	DN	ACHP	DN	DN	DN	DN	ACHP	DN
165A	0	5	2	5	DN	DN	ACHP	DN	DN	DN	DN	DN
165A	5	10	2	5	DN	DN	DN	DN	DN	DN	GM	GM
165A	10	15	2	5	DN	DN	DN	DN	DN	DN	GM	GM
165A	15	15.3	2	0.3	GM	DN	DN	DN	DN	DN	DN	DN
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
165A	18.5	23.5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
165A	23.5	28.5	2	5	DN	DN	DN	DN	DN	DN	GM	DN
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	DN	ACHP	DN	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
167A	1.7	2	2	0.3	GM	DN	DN	GM	ACHP	DN	DN	DN
167A	2	2.4	2	0.4	GM	DN	DN	DN	DN	DN	DN	DN
167A	2.4	2.9	2	0.5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	DN	DN
194A	0	3.8	2	3.8	DN	DN	DN	DN	GM	ACHP	DN	DN
194A	3.8	8.8	2	5	DN	DN	DN	DN	GM	DN	GM	ACHP
194A	8.8	13.8	2	5	GM	DN	GM	ACHP	DN	DN	DN	DN
194A	13.8	14.7	2	0.9	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
196A	0	1.6	2	1.6	DN	DN	DN	DN	DN	GM	DN	DN
196A	1.6	6.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
196A	6.9	8.9	2	2	DN	DN	GM	ACHP	DN	DN	DN	DN
202A	0	0.1	2	0.1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
202A	0.2	1.2	2	1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	GM	DN
207A	0	3.5	2	3.5	DN	DN	DN	DN	DN	DN	DN	DN
207A	3.5	5.9	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
209A	0	1.4	2	1.4	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	DN	GM	GM
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
266A	0.1	0.2	2	0.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
266A	0.2	1.3	2	1.1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
266A	1.3	3	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	9.5	11.5	2	2	GM	DN	GM	ACHP	DN	DN	DN	DN
350A	0	2.7	2	2.7	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	7.1	12.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	12.1	17.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
350A	17.1	22.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	22.1	24	2	1.9	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	24	29	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	34	39	2	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
350A	39	44	2	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
350A	44	49	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	49	54	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
350A	54	56.2	2	2.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
350A	56.2	59.4	2	3.2	GM	DN	DN	GM	ACHP	DN	DN	DN
350A	59.4	64.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	64.4	69.4	2	5	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	69.4	69.7	2	0.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	69.7	72	2	2.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	72	72.3	2	0.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	72.3	72.4	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
350A	72.4	72.6	2	0.2	DN	DN	DN	DN	DN	DN	GM	DN
385A	95.3	98.6	2	3.3	GM	ACHP	DN	DN	DN	DN	ACHP	DN
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	129.2	134.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	DN	DN	DN	GM	DN
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	DN	GM	GM
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN
389A	11.9	12.8	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN

Appendix F-3: Region 3

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	DN	DN	DN	DN	DN	GM+ATHO	DN
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	DN	DN	DN	DN
006A	11.8	13.9	3	2.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
006A	13.9	15.1	3	1.2	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
006C	43.4	45.6	3	2.2	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
006C	45.6	46.1	3	0.5	DN	DN	DN	AHIP+ACHP	DN	DN	DN	ACHP
006M	75.4	80.4	3	5	DN	DN	DN	DN	DN	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	DN	DN	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	DN	DN	DN	DN	DN
014B	34.1	34.3	3	0.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	56.3	61.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	61.3	64.9	3	3.6	DN	DN	DN	DN	DN	DN	DN	DN
050D	0	0.9	3	0.9	GM	DN	GM	DN	GM	DN	DN	DN
050D	0.9	1.5	3	0.6	GM	DN	DN	DN	DN	GM	DN	DN
065A	14.4	19.4	3	5	DN	DN	DN	DN	DN	ACHP	GM	DN
065A	19.4	24.4	3	5	DN	DN	DN	DN	DN	ACHP	GM	DN
065A	24.4	26.9	3	2.5	DN	DN	DN	DN	DN	ACHP	GM	DN
065A	26.9	31.9	3	5	DN	DN	GM	DN	GM	GM	DN	DN
065A	31.9	36.2	3	4.3	DN	DN	GM	DN	GM	GM	DN	DN
065A	36.2	41.2	3	5	DN	DN	DN	DN	DN	GM	GM	GM
065A	41.2	46.2	3	5	DN	DN	DN	DN	DN	GM	GM	GM
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	DN	GM	GM	GM
065A	49.6	51.2	3	1.6	DN	DN	DN	DN	DN	GM	DN	GM
082A	42.5	47.5	3	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
082A	47.5	51.3	3	3.8	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
082A	51.3	56.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	56.3	61.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	61.3	66.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	66.3	71.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	71.3	76.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	76.3	79	3	2.7	DN	DN	GM	GM	DN	DN	DN	DN
082A	79	83.5	3	4.5	DN	DN	DN	GM	GM	DN	GM	GM
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
090B	81.5	81.7	3	0.2	DN	DN	DN	DN	DN	DN	GM+ATHO	DN
090B	81.7	84.9	3	3.2	DN	DN	GM	DN	DN	DN	GM	DN
090B	84.9	86.1	3	1.2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
090B	86.1	86.9	3	0.8	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
090B	86.9	87.9	3	1	DN	GM	DN	DN	DN	GM	DN	DN
092A	27.1	30.1	3	3	DN	GM	DN	DN	DN	DN	GM	DN
092A	30.1	31.5	3	1.4	GM	DN	DN	GM	GM	DN	DN	GM
092A	31.5	33.6	3	2.1	GM	DN	DN	DN	DN	GM	DN	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	41.6	46.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	46.6	51.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	51.6	56.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	56.6	61.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	61.6	66.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	66.6	71.6	3	5	GM	DN	GM	DN	GM	DN	DN	DN
092A	71.6	73.3	3	1.7	GM	DN	GM	DN	GM	DN	DN	DN
114A	0	5	3	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
114A	5	8	3	3	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
125A	0	5	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	5	10	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	10	15	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	15	20	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	20	25	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	25	29.5	3	4.5	GM	GM	DN	GM	DN	GM	DN	DN
125A	29.5	31.5	3	2	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
125A	31.5	35.6	3	4.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	DN	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
131B	38.4	42.1	3	3.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
131B	42.7	47.7	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
131B	47.7	47.9	3	0.2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
133A	18.9	23.9	3	5	GM	DN	DN	DN	DN	GM	DN	DN
133A	23.9	24	3	0.1	GM	DN	DN	DN	DN	GM	DN	DN
133A	24	29	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	29	34	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
133A	34	39	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
133A	39	44	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
133A	44	46.4	3	2.4	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
133A	46.4	51.4	3	5	DN	DN	DN	DN	DN	GM	DN	DN
133A	51.4	56.4	3	5	DN	DN	DN	DN	DN	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	DN	DN	DN	DN	DN
133B	13.3	16.1	3	2.8	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
134A	0	5	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	5	10	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	10	15	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	15	16.3	3	1.3	DN	GM	DN	GM	DN	DN	DN	DN
134A	16.3	21.3	3	5	DN	DN	GM	DN	DN	DN	ACHP	DN
134A	21.3	26.3	3	5	DN	DN	GM	DN	DN	DN	ACHP	DN
134A	26.3	27.2	3	0.9	DN	DN	GM	DN	DN	DN	ACHP	DN
139A	0	0.1	3	0.1	DN	DN	GM	DN	DN	DN	DN	GM
139A	65.2	70.2	3	5	DN	DN	DN	GM	DN	DN	DN	DN
139A	70.2	72.1	3	1.9	DN	DN	DN	GM	DN	DN	DN	DN
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	DN	DN	DN
149A	42.4	45.5	3	3.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
149A	45.5	50.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	50.5	55.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	55.5	60.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	60.5	62.7	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	67.7	69.9	3	2.2	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	GM	DN
149A	72.2	72.8	3	0.6	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	72.8	73.2	3	0.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	73.2	78.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	78.2	83.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	83.2	88.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	88.2	93.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	93.2	98.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	DN	DN
300A	0	0.5	3	0.5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
300A	0.5	3.4	3	2.9	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
317A	0	5	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
317A	5	10	3	5	GM	DN	DN	DN	DN	ACHP	DN	DN
317A	10	12.2	3	2.2	GM	DN	DN	DN	DN	ACHP	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	DN	DN	DN	DN	DN	DN	DN	DN
318A	20.6	25.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	25.6	30.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	30.6	35.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	35.6	40.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	40.6	45.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	45.6	50.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	50.6	54.3	3	3.7	DN	GM	DN	DN	DN	DN	GM	DN
318A	54.3	59.3	3	5	GM	DN	DN	GM	GM	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	DN	DN	GM	GM	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	DN	DN	GM	DN	GM	GM	DN	DN
347A	0	1.8	3	1.8	DN	DN	DN	DN	DN	DN	DN	DN
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	DN	DN	GM	DN
348A	0	1.3	3	1.3	GM	DN	GM	DN	GM	DN	DN	DN
348A	1.3	3.3	3	2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
348A	3.3	4	3	0.7	DN	DN	DN	DN	AHIP+ACHP	DN	DN	ACHP
348A	4	7.3	3	3.3	GM	DN	DN	GM	DN	DN	DN	ACHP
348A	7.3	11.4	3	4.1	DN	GM	DN	GM	DN	GM	DN	DN
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	DN
348A	12.9	14.4	3	1.5	DN	GM	DN	GM	DN	GM	DN	DN
394A	3.9	7	3	3.1	DN	GM	DN	GM	DN	GM	DN	GM

Appendix F-4: Region 4

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	ACHP	DN	DN	DN	DN	DN	ACHP	DN
006I	343.7	344.7	4	1	GM	ACHP	DN	DN	GM	DN	DN	GM
006I	344.7	345.9	4	1.2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006I	345.9	346.4	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006Z	0.4	0.6	4	0.2	FDR+ATHO	DN	ACHP	DN	DN	DN	DN	GM
007A	14.9	16.1	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
007A	19.2	24.2	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
007A	24.2	29.2	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
007A	29.2	32.6	4	3.4	ACHP	DN	DN	DN	DN	GM	DN	DN
007E	0	0.6	4	0.6	ACHP	DN	ACHP	DN	DN	DN	ACHP	DN
007E	0.6	1.6	4	1	ACHP	DN	DN	DN	DN	GM	DN	ACHP
011A	0	0.4	4	0.4	DN	FDR+ATHO	DN	DN	DN	ACHP	DN	DN
011A	0.4	1.4	4	1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
014B	64.9	69.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	69.9	71.5	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
014B	71.5	76.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	76.5	81.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	81.5	86.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	86.5	91	4	4.5	DN	ACHP	DN	DN	GM	DN	DN	GM
023A	0	5	4	5	DN	DN	ACHP	DN	DN	DN	DN	GM
023A	5	9.6	4	4.6	DN	DN	ACHP	DN	DN	DN	DN	GM
023A	16	17.5	4	1.5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
024B	420	422.7	4	2.7	GM	GM	GM	GM	GM	GM	GM	GM
024B	422.7	423.1	4	0.4	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
024B	423.1	428.1	4	5	DN	DN	DN	ACHP	DN	DN	GM	DN
024B	428.1	429.6	4	1.5	DN	DN	DN	ACHP	DN	DN	GM	DN
024B	429.6	434.6	4	5	DN	DN	DN	GM	DN	DN	DN	DN
024B	434.6	436.6	4	2	DN	DN	DN	GM	DN	DN	DN	DN
024B	436.6	437.2	4	0.6	DN	DN	ACHP	DN	GM	DN	DN	DN
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
040F	360.2	363	4	2.8	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
040G	380.7	381	4	0.3	FDR+ATHO	DN	ACHP	DN	DN	DN	DN	GM
040G	381	382.2	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
052A	58.9	60.9	4	2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
055A	0	0.2	4	0.2	GM+ATHO	DN	ACHP	DN	DN	ACHP	DN	DN
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
059A	15	20	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	DN	DN	DN	DN	DN	DN	DN
059A	33	38	4	5	GM	DN	GM	DN	GM	ACHP	DN	DN
059A	38	41	4	3	GM	DN	GM	DN	GM	ACHP	DN	DN
059B	120.9	122.9	4	2	ACHP	DN	DN	GM	DN	GM	DN	ACHP
059B	122.9	127.9	4	5	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	127.9	130.6	4	2.7	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	130.6	135.6	4	5	DN	DN	GM	DN	GM	DN	DN	DN
059B	135.6	140.6	4	5	DN	DN	GM	DN	GM	DN	DN	DN
059B	140.6	145.5	4	4.9	DN	DN	GM	DN	GM	DN	DN	DN
059B	147.1	147.2	4	0.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059B	147.8	152.8	4	5	DN	DN	DN	ACHP	DN	DN	GM	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	ACHP	DN	DN	GM	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	GM	DN	GM
059B	159.7	164.7	4	5	GM	GM	GM	DN	ACHP	DN	GM	DN
059B	164.7	166.5	4	1.8	GM	GM	GM	DN	ACHP	DN	GM	DN
059B	166.5	171.1	4	4.6	GM	GM	GM	ACHP	DN	DN	GM	DN
059B	171.1	173.3	4	2.2	GM	GM	GM	DN	DN	DN	DN	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	5.2	8.1	4	2.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
061A	14	19	4	5	GM	DN	GM	DN	DN	DN	DN	DN
061A	19	22.5	4	3.5	GM	DN	GM	DN	DN	DN	DN	DN
061A	22.5	27.5	4	5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	27.5	32	4	4.5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	32	36	4	4	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	DN	DN	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	GM	GM	GM	DN	DN	DN	DN
063A	16.1	21.1	4	5	GM	GM	GM	GM	DN	DN	DN	DN
063A	21.1	24.2	4	3.1	GM	GM	GM	GM	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	39.3	44.3	4	5	GM	DN	DN	DN	DN	GM	ACHP	DN
063A	44.3	48.2	4	3.9	GM	DN	DN	DN	DN	GM	ACHP	DN
070O	0	0.4	4	0.4	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	FDR+ATHO	DN	DN	DN	ACHP	DN	DN
072B	32.8	37.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	37.8	42.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	42.8	44.1	4	1.3	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	44.1	48.4	4	4.3	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	48.4	53.4	4	5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
072B	53.4	54.1	4	0.7	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	DN	DN	DN	DN	DN	DN	DN	DN
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
138A	21.7	26.3	4	4.6	GM	ACHP	DN	GM	DN	GM	DN	DN
138A	26.3	27.5	4	1.2	GM	DN	GM	ACHP	DN	DN	GM	DN
138A	27.5	27.9	4	0.4	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	40	41.4	4	1.4	DN	DN	DN	DN	DN	DN	DN	DN
138A	41.4	43	4	1.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
138A	43	43.1	4	0.1	DN	DN	FDR+ATHO	DN	DN	ACHP	DN	DN
138A	43.4	48.4	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	DN	DN	DN
138A	50.5	50.6	4	0.1	FDR+ATHO	DN	DN	DN	DN	GM	ACHP	DN
138A	50.9	54	4	3.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	54	54.8	4	0.8	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
144A	0	2.8	4	2.8	GM	GM	GM	GM	DN	DN	DN	DN
144A	2.8	7.8	4	5	GM	GM	GM	DN	DN	DN	DN	DN
144A	7.8	10.5	4	2.7	GM	GM	GM	DN	DN	DN	DN	DN
144A	10.5	11.1	4	0.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	16.1	16.6	4	0.5	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
170A	0	2.2	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
257B	0	0.6	4	0.6	DN	FDR+ATHO	DN	DN	DN	ACHP	DN	DN
257B	0.6	1.1	4	0.5	DN	FDR+ATHO	DN	DN	DN	ACHP	DN	DN
385E	313.8	317.6	4	3.8	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN

Appendix F-5: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
015A	1.4	2.4	5	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
015A	2.4	7.4	5	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
015A	7.4	8.4	5	1	GM	DN	DN	DN	ACHP	DN	DN	DN
015A	8.4	10.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015A	10.4	12.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	DN	DN	DN
017A	0	5	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
017A	5	10	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
017A	10	15	5	5	DN	DN	GM	DN	DN	DN	DN	DN
017A	15	17.3	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	27.3	29	5	1.7	DN	DN	DN	DN	DN	DN	DN	DN
017A	29	34	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34	34.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
041A	0	5	5	5	DN	DN	DN	DN	DN	DN	GM	GM
041A	5	9.5	5	4.5	DN	DN	DN	DN	GM	DN	DN	GM
084A	0	4.6	5	4.6	DN	DN	DN	DN	ACHP	DN	DN	DN
090A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
090A	9.5	14.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	14.5	14.8	5	0.3	DN	ACHP	DN	DN	DN	ACHP	DN	DN
090A	14.8	19.8	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
090A	19.8	24.8	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
090A	24.8	29.8	5	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
090A	29.8	33.9	5	4.1	GM	DN	DN	DN	GM	DN	ACHP	DN
097A	0.3	3.8	5	3.5	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.8	3.9	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.9	4.6	5	0.7	DN	DN	DN	DN	DN	DN	DN	DN
110A	0	0.1	5	0.1	DN	GM+ATHO	ACHP	DN	DN	DN	ACHP	DN
114A	8	13	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
114A	13	18	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	DN
114A	19	20.3	5	1.3	DN	GM	DN	DN	GM	ACHP	DN	DN
114A	20.3	25.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
114A	45.3	50.3	5	5	GM	DN	DN	DN	DN	ACHP	DN	DN
114A	50.3	55.3	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	DN	GM	GM	DN
114A	56	61	5	5	DN	DN	DN	DN	DN	DN	GM	GM
114A	61	61.5	5	0.5	DN	DN	DN	DN	GM	DN	GM	DN
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	DN	GM	GM	DN
136A	0	0.2	5	0.2	DN	GM	DN	DN	DN	DN	DN	DN
136A	0.2	0.6	5	0.4	DN	GM	ACHP	DN	DN	DN	DN	ACHP
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	DN	DN
136A	3.5	4.5	5	1	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	0	5	5	5	DN	DN	DN	DN	DN	GM	GM	DN
141A	5	9.4	5	4.4	DN	DN	DN	DN	GM	GM	DN	DN
141A	9.4	11.3	5	1.9	DN	DN	DN	DN	DN	DN	GM	DN
141A	11.3	16.3	5	5	DN	DN	DN	DN	GM	GM	DN	DN
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	21.3	26.3	5	5	DN	ACHP	DN	DN	DN	DN	DN	ACHP
141A	26.3	31.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	31.3	36.3	5	5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
141A	41.3	44.1	5	2.8	GM	DN	DN	ACHP	DN	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	62.4	64.4	5	2	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	64.4	69.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	69.4	74.4	5	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
141A	74.4	79.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	79.4	84.4	5	5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	89.4	94.4	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
141A	94.4	95.7	5	1.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
142A	3.3	8.3	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
142A	8.3	13.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.3	13.4	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.4	18.4	5	5	DN	DN	GM	DN	GM	ACHP	DN	DN
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
142A	23	28	5	5	GM	DN	DN	DN	DN	DN	DN	DN
142A	28	28.7	5	0.7	GM	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	33.7	33.8	5	0.1	DN	DN	DN	DN	DN	DN	GM	ACHP
145A	102.6	107.6	5	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
145A	107.6	112.6	5	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
145A	112.6	116.9	5	4.3	DN	DN	DN	DN	DN	DN	GM	GM
149A	1.2	3.5	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	DN
149A	3.5	8.5	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
149A	8.5	13.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	DN	GM	GM	DN
149A	21.6	21.9	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	32.7	37.7	5	5	GM	DN	DN	DN	DN	DN	DN	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	41.5	42.4	5	0.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
150A	0	5	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	13.5	16.1	5	2.6	DN	DN	GM	ACHP	DN	DN	DN	DN
151A	22.7	27.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	27.7	32.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
151A	32.7	34	5	1.3	DN	DN	DN	DN	DN	GM	GM	DN
159A	0	5	5	5	GM	DN	ACHP	DN	DN	DN	DN	DN
159A	5	7	5	2	GM	DN	DN	DN	ACHP	DN	DN	DN
159A	7	12	5	5	DN	DN	DN	DN	GM	GM	DN	GM
159A	12	13.3	5	1.3	DN	DN	DN	DN	GM	DN	GM	DN
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	DN	DN	GM	GM
159A	17.5	17.8	5	0.3	GM	DN	DN	DN	ACHP	DN	DN	DN
159A	18.3	23.3	5	5	GM	DN	DN	DN	DN	GM	DN	DN
159A	23.3	28.3	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	DN	DN	DN	DN
160D	0	1.2	5	1.2	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.5	2.5	5	1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
368A	0	5	5	5	GM	DN	DN	DN	DN	GM	DN	DN
368A	6	11	5	5	DN	DN	DN	DN	DN	GM	GM	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	DN	DN	GM	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	GM	ACHP	DN	DN
370A	6	11	5	5	GM	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
370A	12.1	14.1	5	2	GM	ACHP	DN	DN	DN	DN	DN	ACHP

APPENDIX G: OPTIMIZED MAINTENANCE DECISIONS ON ROADS FOR OVERALL 20 PERCENT IMPROVEMENT OF PAVEMENT DRIVABILITY

Appendix G-1: Region 1

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
005A	0	1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	1	2	1	1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
005A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	3	4	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	4	5	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	5	6	1	1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
005A	6	7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	7	8	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	8	9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	9	10	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	10	11	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	11	12	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	12	13	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	13	14	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	14	14.9	1	0.9	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
036C	76.4	76.5	1	0.1	GM	DN	DN	DN	DN	DN	GM	DN
036C	76.5	77.5	1	1	GM	DN	DN	DN	DN	DN	GM	DN
036C	77.5	78.5	1	1	DN	DN	DN	DN	GM	ACHP	DN	DN
036C	78.5	78.7	1	0.2	DN	DN	GM	DN	ACHP	DN	DN	DN
036C	78.7	79.7	1	1	DN	DN	GM	DN	DN	GM	DN	DN
040B	272.6	273.6	1	1	DN	ACHP	DN	DN	DN	DN	DN	ACHP
040B	273.6	274.6	1	1	GM	ACHP	DN	DN	DN	DN	DN	ACHP
040B	274.6	275.6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040B	275.6	276.2	1	0.6	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
040C	279.2	280.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	280.2	281.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	281.2	281.8	1	0.6	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
040E	346.3	347.3	1	1	DN	DN	GM	DN	ACHP	DN	DN	DN
040E	347.3	348.3	1	1	DN	GM	DN	DN	DN	GM	DN	ACHP
040E	348.3	349.3	1	1	DN	GM	DN	DN	DN	ACHP	DN	DN
040E	349.3	350.3	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
040E	350.3	350.6	1	0.3	DN	DN	DN	GM	DN	ACHP	DN	DN
040E	350.6	350.9	1	0.3	DN	DN	ACHP	DN	DN	DN	ACHP	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
040E	350.9	351.1	1	0.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
040E	351.1	352.1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040E	352.1	352.2	1	0.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
046A	0	1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	3	3.9	1	0.9	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
046A	3.9	4.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	4.9	5.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	5.9	6	1	0.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
046A	6	6.6	1	0.6	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
067E	117.3	118.3	1	1	DN	ACHP	DN	DN	DN	DN	DN	ACHP
067E	118.3	119.3	1	1	DN	DN	DN	ACHP	DN	DN	DN	DN
067E	119.3	120.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	DN
067E	120.3	121.3	1	1	DN	ACHP	DN	DN	DN	DN	DN	ACHP
067E	121.3	122.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	DN
070K	0	0.7	1	0.7	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
070N	0	0.1	1	0.1	GM	DN	DN	DN	DN	DN	GM	DN
070N	0.1	0.4	1	0.3	DN	DN	GM	GM	DN	DN	DN	DN
072A	20.7	21.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	21.7	22.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	22.7	23.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	23.7	24.7	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
072A	24.7	25.7	1	1	DN	ACHP	DN	DN	DN	DN	DN	ACHP
072A	25.7	26.7	1	1	DN	DN	GM	DN	ACHP	DN	DN	DN
072A	26.7	27.7	1	1	GM	DN	DN	DN	GM	DN	DN	ACHP
072A	27.7	28.7	1	1	GM	DN	DN	GM	DN	DN	ACHP	DN
072A	28.7	29.4	1	0.7	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
103A	6.7	7.7	1	1	ACHP	DN	DN	DN	DN	DN	ACHP	DN
103A	7.7	8.7	1	1	ACHP	DN	DN	DN	DN	DN	ACHP	DN
103A	8.7	9.7	1	1	ACHP	DN	DN	DN	DN	DN	ACHP	DN
103A	9.7	10.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	10.7	11.7	1	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
103A	11.7	12.7	1	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
103A	12.7	13.3	1	0.6	ACHP	DN	DN	DN	DN	DN	ACHP	DN
103A	13.3	14.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	14.3	15.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	15.3	16.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	16.3	17.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
103A	17.3	18.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN
103A	18.3	19.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	19.3	20.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	20.3	21.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	21.3	22.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	22.3	22.5	1	0.2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN

Appendix G-2: Region 2

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	DN	GM	ACHP
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	DN	GM	GM
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	DN	GM	GM
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	DN	GM	GM
009A	41.2	44.9	2	3.7	DN	DN	DN	GM	DN	ACHP	DN	DN
009A	44.9	47	2	2.1	DN	DN	DN	GM	DN	DN	DN	GM
010A	5.1	10.1	2	5	DN	DN	DN	GM	ACHP	DN	DN	DN
010A	10.1	15.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
010A	15.1	20.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	20.1	25.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
010A	25.1	30.1	2	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
010A	30.1	35.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
010A	35.1	40.1	2	5	DN	DN	DN	GM	DN	DN	GM	GM
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	DN	DN	DN
010A	62.9	67.9	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	67.9	68	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
010A	68	71	2	3	DN	DN	DN	DN	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	0	4.6	2	4.6	GM	DN	GM	ACHP	DN	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
012A	20.2	25.2	2	5	DN	GM	ACHP	DN	DN	DN	DN	DN
012A	25.2	30.2	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	38.1	43	2	4.9	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	DN	DN	DN
012A	48	53	2	5	DN	DN	DN	DN	DN	DN	GM	GM
012A	53	56.8	2	3.8	DN	DN	ACHP	DN	DN	DN	DN	DN
024E	0	0.6	2	0.6	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
025B	0	1.6	2	1.6	DN	DN	ACHP	DN	DN	DN	DN	ACHP
025B	1.6	1.9	2	0.3	DN	DN	ACHP	DN	DN	DN	DN	DN
067A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067A	5	6.8	2	1.8	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
067A	6.8	10.2	2	3.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
067C	45.6	45.7	2	0.1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
067C	45.7	50.7	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
069A	0	5	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	5.3	9.7	2	4.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	GM	GM	GM	DN	DN
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	GM	GM
069A	19.7	24.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	24.7	25	2	0.3	DN	DN	GM	ACHP	DN	DN	DN	DN
069A	25	26	2	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	DN	GM	ACHP
069A	31	36	2	5	DN	DN	DN	GM	DN	DN	GM	ACHP
069A	36	41	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	41	46	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
069A	46	49.4	2	3.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
069A	49.4	54.1	2	4.7	DN	DN	DN	DN	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	GM	ACHP	DN	DN	DN	DN	ACHP
069A	62.1	64.7	2	2.6	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
069A	71.6	76.6	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
071A	0	5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
071A	5	7	2	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
071A	7	9	2	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
071B	9.6	11.6	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	11.6	13.7	2	2.1	DN	DN	DN	GM	DN	DN	GM	ACHP
071B	13.7	14.1	2	0.4	DN	DN	GM	DN	DN	DN	DN	DN
078A	8.9	9	2	0.1	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	12.7	14.6	2	1.9	DN	DN	DN	GM	GM	GM	DN	DN
078A	14.6	15.5	2	0.9	DN	DN	DN	GM	GM	DN	DN	GM
078A	15.5	18.2	2	2.7	DN	DN	DN	GM	DN	DN	DN	ACHP
078A	18.2	23.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	28.2	29.9	2	1.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	DN	GM	GM
089A	0	5	2	5	DN	DN	ACHP	DN	GM	DN	DN	DN
089A	5	9	2	4	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	9	14	2	5	DN	DN	DN	DN	GM	DN	GM	DN
089A	14	18.6	2	4.6	DN	DN	DN	DN	GM	ACHP	DN	GM
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	GM	ACHP

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
089A	21.5	26.5	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
089A	26.5	31.5	2	5	DN	DN	ACHP	DN	DN	DN	DN	DN
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	ACHP	DN
094A	33.1	35	2	1.9	ACHP	DN	DN	DN	DN	ACHP	DN	DN
096A	11.1	16.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
096A	22.1	26.3	2	4.2	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
096A	26.3	31.3	2	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
096A	31.3	33.6	2	2.3	DN	DN	ACHP	DN	DN	DN	DN	DN
096A	33.6	38.6	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
096A	38.6	42.2	2	3.6	DN	DN	DN	GM	GM	GM	DN	GM
096B	69.5	70.6	2	1.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
100A	0	0.3	2	0.3	GM	DN	DN	DN	GM	DN	GM	ACHP
100A	0.3	0.4	2	0.1	DN	GM	ACHP	DN	DN	DN	DN	DN
101A	0.4	1.2	2	0.8	DN	DN	DN	GM	GM	GM	DN	GM
101A	1.2	5.2	2	4	DN	DN	DN	GM	GM	GM	DN	GM
101A	5.2	10.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
101A	16.5	21.4	2	4.9	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
105A	9.2	9.5	2	0.3	ACHP	DN	DN	DN	ACHP	DN	DN	DN
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
109A	27.7	32.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
109A	32.7	37.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	37.7	42.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	42.7	47.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	47.7	52.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	52.7	53	2	0.3	DN	DN	GM	DN	DN	DN	DN	DN
109A	53	54.8	2	1.8	DN	GM	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	ACHP	DN	DN	DN	DN	ACHP	DN
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
116A	0	5	2	5	DN	DN	DN	DN	DN	DN	GM	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
116A	12	12.3	2	0.3	DN	DN	DN	GM	GM	DN	DN	GM
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	DN	DN	DN
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	ACHP	DN	DN
116A	18.1	20	2	1.9	GM	ACHP	DN	DN	DN	DN	ACHP	DN
116A	20	25	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
116A	25	27	2	2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
116A	27	32	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
116A	32	32.3	2	0.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
120A	3.1	7.2	2	4.1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	358.7	363.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	363.7	367.8	2	4.1	DN	GM	ACHP	DN	DN	DN	DN	DN
160C	367.8	372.8	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
160C	372.8	375.8	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	375.8	380.8	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	380.8	382.8	2	2	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	GM	GM	GM	DN	GM
160C	386.6	391.6	2	5	DN	DN	DN	GM	GM	GM	DN	GM
160C	391.6	396.6	2	5	DN	DN	DN	GM	GM	GM	DN	GM
160C	396.6	401.6	2	5	DN	DN	DN	GM	GM	GM	DN	GM
160C	401.6	403.7	2	2.1	DN	DN	DN	GM	GM	GM	DN	GM
160C	403.7	406.7	2	3	DN	DN	DN	GM	GM	GM	DN	GM
160C	406.7	411.7	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	411.7	414.3	2	2.6	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	414.3	414.8	2	0.5	DN	DN	DN	DN	DN	DN	GM	ACHP
160C	414.8	416.5	2	1.7	DN	ACHP	DN	DN	DN	DN	DN	ACHP
160C	416.5	421.5	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	421.5	425.7	2	4.2	DN	GM	ACHP	DN	DN	DN	DN	ACHP
160C	425.7	430.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	441.7	446.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	446.7	447.6	2	0.9	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	447.6	451	2	3.4	GM	DN	DN	DN	DN	DN	DN	DN
160C	451	456	2	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
160C	456	460.1	2	4.1	DN	DN	ACHP	DN	DN	DN	DN	ACHP

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	DN	GM	GM
160C	483	484.4	2	1.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	492	497	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
160C	497	497.2	2	0.2	ACHP	DN	DN	DN	DN	ACHP	DN	DN
165A	0	5	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
165A	5	10	2	5	DN	DN	DN	DN	DN	DN	GM	GM
165A	10	15	2	5	DN	DN	DN	DN	DN	DN	GM	GM
165A	15	15.3	2	0.3	GM	DN	DN	DN	DN	DN	DN	DN
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
165A	18.5	23.5	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
165A	23.5	28.5	2	5	DN	DN	DN	GM	DN	DN	DN	ACHP
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	GM	DN	DN	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	DN	DN	DN
167A	1.7	2	2	0.3	GM	DN	DN	GM	ACHP	DN	DN	DN
167A	2	2.4	2	0.4	GM	DN	DN	DN	DN	DN	DN	DN
167A	2.4	2.9	2	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	DN	DN
194A	0	3.8	2	3.8	DN	DN	DN	DN	GM	ACHP	DN	DN
194A	3.8	8.8	2	5	DN	DN	DN	DN	GM	DN	GM	DN
194A	8.8	13.8	2	5	GM	DN	GM	ACHP	DN	DN	DN	DN
194A	13.8	14.7	2	0.9	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
196A	0	1.6	2	1.6	DN	DN	DN	GM	GM	DN	DN	GM
196A	1.6	6.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.9	8.9	2	2	DN	DN	GM	ACHP	DN	DN	DN	DN
202A	0	0.1	2	0.1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
202A	0.2	1.2	2	1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	GM	DN
207A	0	3.5	2	3.5	DN	DN	DN	DN	DN	DN	DN	DN
207A	3.5	5.9	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
209A	0	1.4	2	1.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	DN	GM	GM
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
266A	0.1	0.2	2	0.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
266A	0.2	1.3	2	1.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
266A	1.3	3	2	1.7	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	DN	DN	DN	DN
266A	9.5	11.5	2	2	GM	DN	GM	ACHP	DN	DN	DN	DN
350A	0	2.7	2	2.7	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	7.1	12.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	12.1	17.1	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
350A	17.1	22.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	22.1	24	2	1.9	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	24	29	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	34	39	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	39	44	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	44	49	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	49	54	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
350A	54	56.2	2	2.2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
350A	56.2	59.4	2	3.2	GM	DN	DN	GM	ACHP	DN	DN	DN
350A	59.4	64.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	64.4	69.4	2	5	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	69.4	69.7	2	0.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	69.7	72	2	2.3	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	72	72.3	2	0.3	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	72.3	72.4	2	0.1	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	72.4	72.6	2	0.2	DN	DN	DN	DN	DN	DN	DN	GM
385A	95.3	98.6	2	3.3	GM	ACHP	DN	DN	DN	DN	ACHP	DN
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	129.2	134.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	GM	DN	DN	GM	GM
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	DN	GM	GM
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN
389A	11.9	12.8	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN

Appendix G-3: Region 3

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	DN	DN	DN	GM+ATHO	DN	DN	DN
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	DN	DN	ACHP	DN
006A	11.8	13.9	3	2.1	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
006A	13.9	15.1	3	1.2	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
006C	43.4	45.6	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
006C	45.6	46.1	3	0.5	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
006M	75.4	80.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	ACHP	DN	DN	DN	DN
014B	34.1	34.3	3	0.2	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	56.3	61.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	61.3	64.9	3	3.6	DN	DN	DN	DN	DN	DN	DN	DN
050D	0	0.9	3	0.9	GM	DN	DN	GM	GM	DN	DN	DN
050D	0.9	1.5	3	0.6	GM	DN	DN	DN	DN	GM	DN	DN
065A	14.4	19.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	19.4	24.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	24.4	26.9	3	2.5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	26.9	31.9	3	5	GM	DN	DN	DN	GM	DN	DN	DN
065A	31.9	36.2	3	4.3	GM	DN	DN	DN	GM	DN	DN	DN
065A	36.2	41.2	3	5	DN	DN	DN	DN	GM	GM	GM	DN
065A	41.2	46.2	3	5	DN	DN	DN	DN	GM	GM	GM	DN
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	GM	GM	GM	DN
065A	49.6	51.2	3	1.6	DN	DN	DN	DN	GM	GM	GM	GM
082A	42.5	47.5	3	5	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
082A	47.5	51.3	3	3.8	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
082A	51.3	56.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	56.3	61.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	61.3	66.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	66.3	71.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	71.3	76.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	76.3	79	3	2.7	DN	DN	GM	GM	DN	DN	DN	DN
082A	79	83.5	3	4.5	DN	DN	DN	GM	GM	GM	DN	GM
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
090B	81.5	81.7	3	0.2	DN	DN	DN	GM+ATHO	DN	DN	DN	ACHP
090B	81.7	84.9	3	3.2	DN	GM	DN	DN	DN	ACHP	DN	DN
090B	84.9	86.1	3	1.2	DN	DN	DN	GM+ATHO	DN	DN	DN	ACHP
090B	86.1	86.9	3	0.8	DN	DN	DN	GM+ATHO	DN	DN	ACHP	DN
090B	86.9	87.9	3	1	DN	DN	GM	DN	GM	DN	DN	DN
092A	27.1	30.1	3	3	DN	GM	DN	DN	DN	DN	GM	DN
092A	30.1	31.5	3	1.4	GM	DN	DN	GM	GM	DN	DN	GM
092A	31.5	33.6	3	2.1	GM	DN	GM	DN	GM	GM	DN	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	41.6	46.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	46.6	51.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	51.6	56.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	56.6	61.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	61.6	66.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	66.6	71.6	3	5	GM	DN	GM	DN	GM	DN	DN	GM
092A	71.6	73.3	3	1.7	GM	DN	GM	DN	GM	DN	DN	GM
114A	0	5	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
114A	5	8	3	3	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
125A	0	5	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	5	10	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	10	15	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	15	20	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	20	25	3	5	GM	GM	DN	GM	DN	GM	DN	DN
125A	25	29.5	3	4.5	GM	GM	DN	GM	DN	GM	DN	DN
125A	29.5	31.5	3	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
125A	31.5	35.6	3	4.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	DN	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
131B	38.4	42.1	3	3.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
131B	42.7	47.7	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	47.7	47.9	3	0.2	DN	DN	DN	DN	DN	DN	DN	DN
133A	18.9	23.9	3	5	GM	DN	DN	DN	DN	GM	DN	DN
133A	23.9	24	3	0.1	GM	DN	DN	DN	DN	GM	DN	DN
133A	24	29	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	29	34	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	34	39	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	39	44	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	44	46.4	3	2.4	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	46.4	51.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
133A	51.4	56.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	DN	ACHP	DN	DN	DN
133B	13.3	16.1	3	2.8	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
134A	0	5	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	5	10	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	10	15	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	15	16.3	3	1.3	DN	GM	DN	GM	DN	DN	DN	DN
134A	16.3	21.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
134A	21.3	26.3	3	5	DN	GM	DN	DN	DN	ACHP	DN	DN
134A	26.3	27.2	3	0.9	DN	GM	DN	DN	DN	ACHP	DN	DN
139A	0	0.1	3	0.1	DN	DN	GM	DN	DN	DN	DN	GM
139A	65.2	70.2	3	5	DN	DN	DN	GM	DN	DN	DN	DN
139A	70.2	72.1	3	1.9	DN	DN	DN	GM	DN	DN	DN	DN
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
149A	42.4	45.5	3	3.1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	45.5	50.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	50.5	55.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	55.5	60.5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	60.5	62.7	3	2.2	DN	DN	DN	DN	DN	DN	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	67.7	69.9	3	2.2	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	72.2	72.8	3	0.6	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	72.8	73.2	3	0.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	73.2	78.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	78.2	83.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	83.2	88.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	88.2	93.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	93.2	98.2	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	DN	DN	DN	DN	DN	DN
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	DN	DN
300A	0	0.5	3	0.5	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
300A	0.5	3.4	3	2.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
317A	0	5	3	5	GM	DN	DN	DN	ACHP	DN	DN	DN
317A	5	10	3	5	GM	DN	DN	DN	ACHP	DN	DN	DN
317A	10	12.2	3	2.2	GM	DN	DN	DN	ACHP	DN	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	DN	DN	DN	DN	DN	DN	DN	DN
318A	20.6	25.6	3	5	DN	GM	GM	GM	DN	DN	GM	DN
318A	25.6	30.6	3	5	DN	GM	GM	GM	DN	DN	GM	DN
318A	30.6	35.6	3	5	DN	GM	GM	GM	DN	DN	GM	DN
318A	35.6	40.6	3	5	DN	GM	GM	GM	DN	DN	GM	DN
318A	40.6	45.6	3	5	DN	GM	GM	GM	DN	DN	GM	DN
318A	45.6	50.6	3	5	DN	GM	GM	GM	DN	DN	GM	DN
318A	50.6	54.3	3	3.7	DN	GM	GM	GM	DN	DN	GM	DN
318A	54.3	59.3	3	5	GM	DN	GM	GM	DN	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	DN	GM	GM	DN	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	DN	DN	GM	GM	DN	DN	GM	DN
347A	0	1.8	3	1.8	DN	DN	DN	GM	DN	GM	DN	DN
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	DN	ACHP	DN	DN
348A	0	1.3	3	1.3	GM	DN	DN	GM	GM	DN	DN	DN
348A	1.3	3.3	3	2	DN	DN	AHIP+ACHP	DN	DN	DN	DN	ACHP
348A	3.3	4	3	0.7	DN	DN	GM+ATHO	DN	DN	ACHP	DN	DN
348A	4	7.3	3	3.3	GM	DN	DN	GM	DN	DN	DN	ACHP
348A	7.3	11.4	3	4.1	DN	GM	DN	GM	DN	GM	DN	DN
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	DN
348A	12.9	14.4	3	1.5	DN	GM	DN	GM	GM	DN	DN	DN
394A	3.9	7	3	3.1	DN	GM	DN	GM	DN	GM	DN	GM

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ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	DN	DN	DN	ACHP	DN	DN	DN	ACHP
006I	343.7	344.7	4	1	GM	DN	ACHP	DN	GM	DN	DN	GM
006I	344.7	345.9	4	1.2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006I	345.9	346.4	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006Z	0.4	0.6	4	0.2	FDR+ATHO	DN	DN	DN	DN	DN	DN	ACHP
007A	14.9	16.1	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
007A	19.2	24.2	4	5	ACHP	DN	DN	DN	DN	GM	ACHP	DN
007A	24.2	29.2	4	5	ACHP	DN	DN	DN	DN	GM	ACHP	DN
007A	29.2	32.6	4	3.4	ACHP	DN	DN	DN	DN	GM	ACHP	DN
007E	0	0.6	4	0.6	DN	DN	DN	DN	DN	GM+ATHO	ACHP	DN
007E	0.6	1.6	4	1	ACHP	DN	DN	DN	DN	GM	ACHP	DN
011A	0	0.4	4	0.4	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
011A	0.4	1.4	4	1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
014B	64.9	69.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	69.9	71.5	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
014B	71.5	76.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	76.5	81.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	81.5	86.5	4	5	DN	ACHP	DN	DN	GM	DN	DN	GM
014B	86.5	91	4	4.5	DN	ACHP	DN	DN	GM	DN	DN	GM
023A	0	5	4	5	DN	DN	DN	ACHP	DN	DN	DN	GM
023A	5	9.6	4	4.6	DN	DN	DN	ACHP	DN	DN	DN	GM
023A	16	17.5	4	1.5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
024B	420	422.7	4	2.7	GM	GM	GM	GM	DN	DN	DN	DN
024B	422.7	423.1	4	0.4	ACHP	DN	DN	DN	GM	DN	ACHP	DN
024B	423.1	428.1	4	5	DN	DN	ACHP	DN	DN	DN	GM	DN
024B	428.1	429.6	4	1.5	DN	DN	ACHP	DN	DN	DN	GM	DN
024B	429.6	434.6	4	5	DN	DN	ACHP	DN	GM	DN	GM	DN
024B	434.6	436.6	4	2	DN	DN	ACHP	DN	GM	DN	GM	DN
024B	436.6	437.2	4	0.6	DN	DN	ACHP	DN	GM	DN	DN	GM
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
040F	360.2	363	4	2.8	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
040G	380.7	381	4	0.3	FDR+ATHO	DN	DN	DN	DN	DN	GM	ACHP
040G	381	382.2	4	1.2	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
052A	58.9	60.9	4	2	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
055A	0	0.2	4	0.2	GM+ATHO	ACHP	DN	DN	DN	DN	DN	ACHP
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
059A	15	20	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	DN	DN	DN	DN	DN	DN	DN
059A	33	38	4	5	GM	DN	GM	ACHP	DN	DN	GM	DN
059A	38	41	4	3	GM	DN	GM	ACHP	DN	DN	GM	DN
059B	120.9	122.9	4	2	DN	GM	DN	DN	DN	DN	FDR+ATHO	DN
059B	122.9	127.9	4	5	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	127.9	130.6	4	2.7	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	130.6	135.6	4	5	DN	DN	GM	DN	GM	DN	DN	DN
059B	135.6	140.6	4	5	DN	DN	GM	DN	GM	DN	DN	DN
059B	140.6	145.5	4	4.9	DN	DN	GM	DN	GM	DN	DN	DN
059B	147.1	147.2	4	0.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	ACHP
059B	147.8	152.8	4	5	DN	DN	DN	DN	GM	ACHP	DN	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	DN	GM	ACHP	DN	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	DN	GM	GM
059B	159.7	164.7	4	5	GM	GM	GM	DN	DN	GM	ACHP	DN
059B	164.7	166.5	4	1.8	GM	GM	GM	DN	DN	GM	ACHP	DN
059B	166.5	171.1	4	4.6	GM	GM	GM	DN	GM	ACHP	DN	DN
059B	171.1	173.3	4	2.2	GM	GM	GM	ACHP	DN	DN	GM	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	5.2	8.1	4	2.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
061A	14	19	4	5	GM	ACHP	DN	DN	DN	GM	GM	DN
061A	19	22.5	4	3.5	GM	ACHP	DN	DN	DN	GM	GM	DN
061A	22.5	27.5	4	5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	27.5	32	4	4.5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	32	36	4	4	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	DN	DN	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	GM	GM	GM	DN	DN	DN	DN
063A	16.1	21.1	4	5	GM	GM	GM	GM	DN	DN	DN	DN
063A	21.1	24.2	4	3.1	GM	GM	GM	GM	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	39.3	44.3	4	5	GM	DN	DN	DN	ACHP	DN	GM	DN
063A	44.3	48.2	4	3.9	GM	DN	DN	DN	ACHP	DN	GM	DN
070O	0	0.4	4	0.4	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
072B	32.8	37.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	37.8	42.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	42.8	44.1	4	1.3	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	44.1	48.4	4	4.3	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	48.4	53.4	4	5	ACHP	DN	DN	DN	DN	GM	DN	ACHP
072B	53.4	54.1	4	0.7	ACHP	DN	DN	DN	DN	GM	DN	ACHP
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	DN	DN	DN	DN	DN	DN	DN	DN
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
138A	21.7	26.3	4	4.6	GM	DN	GM	ACHP	DN	GM	DN	GM
138A	26.3	27.5	4	1.2	GM	DN	GM	DN	GM	DN	DN	DN
138A	27.5	27.9	4	0.4	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	40	41.4	4	1.4	DN	DN	DN	DN	DN	DN	DN	DN
138A	41.4	43	4	1.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
138A	43	43.1	4	0.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
138A	43.4	48.4	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	DN	DN	DN
138A	50.5	50.6	4	0.1	FDR+ATHO	ACHP	DN	DN	DN	DN	GM	ACHP
138A	50.9	54	4	3.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	54	54.8	4	0.8	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
144A	0	2.8	4	2.8	GM	GM	GM	GM	DN	DN	DN	DN
144A	2.8	7.8	4	5	GM	GM	GM	DN	DN	DN	DN	DN
144A	7.8	10.5	4	2.7	GM	GM	GM	DN	DN	DN	DN	DN
144A	10.5	11.1	4	0.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	16.1	16.6	4	0.5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
170A	0	2.2	4	2.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
257B	0	0.6	4	0.6	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
257B	0.6	1.1	4	0.5	DN	FDR+ATHO	DN	DN	DN	DN	GM	DN
385E	313.8	317.6	4	3.8	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN

Appendix G-5: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
015A	1.4	2.4	5	1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
015A	2.4	7.4	5	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
015A	7.4	8.4	5	1	GM	DN	DN	ACHP	DN	DN	DN	DN
015A	8.4	10.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015A	10.4	12.4	5	2	GM	DN	DN	DN	DN	DN	DN	DN
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
017A	0	5	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
017A	5	10	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
017A	10	15	5	5	DN	DN	GM	DN	DN	DN	DN	DN
017A	15	17.3	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
017A	27.3	29	5	1.7	GM	DN	DN	DN	DN	ACHP	DN	DN
017A	29	34	5	5	GM	DN	DN	DN	DN	ACHP	DN	DN
017A	34	34.5	5	0.5	GM	DN	DN	DN	DN	ACHP	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
041A	0	5	5	5	DN	DN	DN	GM	DN	GM	DN	DN
041A	5	9.5	5	4.5	DN	DN	DN	GM	DN	DN	GM	DN
084A	0	4.6	5	4.6	DN	DN	DN	DN	ACHP	DN	DN	DN
090A	0	5	5	5	GM	DN	DN	GM	DN	DN	DN	ACHP
090A	5	9.5	5	4.5	GM	DN	DN	DN	DN	DN	GM	GM
090A	9.5	14.5	5	5	DN	DN	DN	DN	GM	GM	DN	DN
090A	14.5	14.8	5	0.3	DN	ACHP	DN	DN	DN	ACHP	DN	DN
090A	14.8	19.8	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	19.8	24.8	5	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
090A	24.8	29.8	5	5	GM	ACHP	DN	DN	DN	DN	DN	ACHP
090A	29.8	33.9	5	4.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	0.3	3.8	5	3.5	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.8	3.9	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.9	4.6	5	0.7	GM	DN	DN	DN	DN	ACHP	DN	DN
110A	0	0.1	5	0.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
114A	8	13	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
114A	13	18	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	DN
114A	19	20.3	5	1.3	DN	GM	DN	DN	GM	ACHP	DN	DN
114A	20.3	25.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
114A	45.3	50.3	5	5	GM	DN	DN	DN	DN	ACHP	DN	DN
114A	50.3	55.3	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	DN	GM	GM	DN
114A	56	61	5	5	DN	DN	DN	DN	DN	GM	GM	DN
114A	61	61.5	5	0.5	DN	DN	DN	DN	DN	DN	DN	GM
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	DN	GM	DN	GM
136A	0	0.2	5	0.2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
136A	0.2	0.6	5	0.4	DN	GM	ACHP	DN	DN	DN	ACHP	DN
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
136A	3.5	4.5	5	1	DN	GM	ACHP	DN	DN	DN	ACHP	DN
141A	0	5	5	5	DN	DN	DN	DN	GM	DN	GM	DN
141A	5	9.4	5	4.4	DN	DN	DN	DN	GM	GM	DN	DN
141A	9.4	11.3	5	1.9	DN	DN	DN	GM	DN	DN	DN	ACHP
141A	11.3	16.3	5	5	DN	DN	DN	DN	GM	GM	DN	DN
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	21.3	26.3	5	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
141A	26.3	31.3	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	31.3	36.3	5	5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	41.3	44.1	5	2.8	GM	DN	DN	ACHP	DN	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
141A	62.4	64.4	5	2	DN	GM	ACHP	DN	DN	DN	DN	DN
141A	64.4	69.4	5	5	GM	DN	ACHP	DN	DN	DN	DN	ACHP
141A	69.4	74.4	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	74.4	79.4	5	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
141A	79.4	84.4	5	5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
141A	89.4	94.4	5	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
141A	94.4	95.7	5	1.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
142A	3.3	8.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
142A	8.3	13.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.3	13.4	5	0.1	DN	DN	DN	DN	DN	DN	DN	DN
142A	13.4	18.4	5	5	DN	DN	GM	DN	DN	GM	ACHP	DN
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	DN
142A	23	28	5	5	GM	DN	DN	DN	DN	DN	DN	DN
142A	28	28.7	5	0.7	GM	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	DN	DN	DN
142A	33.7	33.8	5	0.1	DN	DN	DN	ACHP	DN	DN	DN	DN
145A	102.6	107.6	5	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
145A	107.6	112.6	5	5	DN	DN	DN	DN	DN	DN	DN	DN
145A	112.6	116.9	5	4.3	DN	DN	DN	GM	DN	DN	ACHP	DN
149A	1.2	3.5	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
149A	3.5	8.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	8.5	13.5	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	DN	GM	GM	DN
149A	21.6	21.9	5	0.3	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	27.7	32.7	5	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
149A	32.7	37.7	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	41.5	42.4	5	0.9	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
150A	0	5	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	13.5	16.1	5	2.6	DN	DN	GM	ACHP	DN	DN	DN	DN
151A	22.7	27.7	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
151A	27.7	32.7	5	5	DN	DN	DN	DN	GM	DN	GM	DN
151A	32.7	34	5	1.3	DN	DN	DN	DN	DN	GM	DN	GM
159A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	5	7	5	2	GM	DN	DN	DN	DN	ACHP	DN	DN
159A	7	12	5	5	GM	DN	DN	DN	DN	ACHP	DN	DN
159A	12	13.3	5	1.3	DN	DN	DN	DN	GM	DN	GM	DN
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	GM	DN	GM	DN
159A	17.5	17.8	5	0.3	DN	DN	DN	DN	DN	DN	DN	DN
159A	18.3	23.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	23.3	28.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
160D	0	1.2	5	1.2	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
160D	1.5	2.5	5	1	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	DN	ACHP	DN	DN	DN	DN	DN	ACHP
368A	0	5	5	5	GM	DN	DN	GM	DN	DN	DN	ACHP
368A	6	11	5	5	DN	DN	DN	DN	DN	GM	GM	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	DN	DN	GM	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	GM	ACHP	DN	DN
370A	6	11	5	5	GM	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	ACHP	DN	DN	DN	ACHP	DN	DN
370A	12.1	14.1	5	2	DN	GM	DN	DN	DN	DN	DN	DN

APPENDIX H: OPTIMIZED MAINTENANCE DECISIONS ON ROADS FOR OVERALL 30 PERCENT IMPROVEMENT OF PAVEMENT DRIVABILITY

Appendix H-1: Region 1

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
005A	0	1	1	1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
005A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	3	4	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	4	5	1	1	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
005A	5	6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	6	7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	7	8	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	8	9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	9	10	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	10	11	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	11	12	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	12	13	1	1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
005A	13	14	1	1	DN	DN	DN	DN	DN	DN	DN	DN
005A	14	14.9	1	0.9	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
036C	76.4	76.5	1	0.1	DN	GM	DN	DN	DN	GM	DN	DN
036C	76.5	77.5	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
036C	77.5	78.5	1	1	DN	DN	DN	ACHP	DN	DN	DN	DN
036C	78.5	78.7	1	0.2	DN	GM	DN	DN	DN	DN	DN	ACHP
036C	78.7	79.7	1	1	DN	GM	DN	DN	DN	ACHP	DN	DN
040B	272.6	273.6	1	1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
040B	273.6	274.6	1	1	GM	DN	ACHP	DN	DN	DN	DN	ACHP
040B	274.6	275.6	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040B	275.6	276.2	1	0.6	DN	DN	DN	DN	DN	DN	DN	DN
040C	279.2	280.2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040C	280.2	281.2	1	1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
040C	281.2	281.8	1	0.6	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
040E	346.3	347.3	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
040E	347.3	348.3	1	1	DN	GM	DN	DN	DN	GM	DN	ACHP
040E	348.3	349.3	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
040E	349.3	350.3	1	1	GM	DN	DN	DN	DN	ACHP	DN	DN
040E	350.3	350.6	1	0.3	DN	DN	DN	GM	ACHP	DN	DN	DN
040E	350.6	350.9	1	0.3	DN	ACHP	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
040E	350.9	351.1	1	0.2	DN	DN	DN	GM	ACHP	DN	DN	DN
040E	351.1	352.1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
040E	352.1	352.2	1	0.1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
046A	0	1	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	1	2	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	2	3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	3	3.9	1	0.9	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
046A	3.9	4.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	4.9	5.9	1	1	DN	DN	DN	DN	DN	DN	DN	DN
046A	5.9	6	1	0.1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
046A	6	6.6	1	0.6	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
067E	117.3	118.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
067E	118.3	119.3	1	1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
067E	119.3	120.3	1	1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
067E	120.3	121.3	1	1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
067E	121.3	122.3	1	1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
070K	0	0.7	1	0.7	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
070N	0	0.1	1	0.1	DN	DN	DN	DN	DN	DN	DN	DN
070N	0.1	0.4	1	0.3	GM	DN	DN	ACHP	DN	DN	DN	DN
072A	20.7	21.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	21.7	22.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	22.7	23.7	1	1	GM	DN	DN	DN	ACHP	DN	DN	DN
072A	23.7	24.7	1	1	DN	GM	DN	ACHP	DN	DN	DN	DN
072A	24.7	25.7	1	1	DN	ACHP	DN	DN	DN	DN	ACHP	DN
072A	25.7	26.7	1	1	DN	GM	DN	DN	ACHP	DN	DN	DN
072A	26.7	27.7	1	1	GM	DN	DN	DN	GM	DN	DN	ACHP
072A	27.7	28.7	1	1	GM	DN	DN	GM	DN	DN	ACHP	DN
072A	28.7	29.4	1	0.7	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
103A	6.7	7.7	1	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
103A	7.7	8.7	1	1	ACHP	DN	DN	DN	DN	DN	ACHP	DN
103A	8.7	9.7	1	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
103A	9.7	10.7	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	10.7	11.7	1	1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
103A	11.7	12.7	1	1	ACHP	DN	DN	DN	DN	DN	ACHP	DN
103A	12.7	13.3	1	0.6	ACHP	DN	DN	DN	DN	ACHP	DN	DN
103A	13.3	14.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	14.3	15.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	15.3	16.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	16.3	17.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
103A	17.3	18.3	1	1	DN	GM	ACHP	DN	DN	DN	DN	ACHP
103A	18.3	19.3	1	1	DN	DN	GM	ACHP	DN	DN	DN	DN
103A	19.3	20.3	1	1	DN	DN	DN	GM	DN	DN	DN	DN
103A	20.3	21.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	21.3	22.3	1	1	DN	DN	DN	DN	DN	DN	DN	DN
103A	22.3	22.5	1	0.2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO

Appendix H-2: Region 2

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
009A	21.2	26.2	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
009A	26.2	31.2	2	5	DN	DN	DN	DN	DN	GM	DN	GM
009A	31.2	36.2	2	5	DN	DN	DN	DN	DN	GM	DN	GM
009A	36.2	41.2	2	5	DN	DN	DN	DN	DN	GM	DN	GM
009A	41.2	44.9	2	3.7	DN	DN	DN	GM	DN	DN	ACHP	DN
009A	44.9	47	2	2.1	DN	DN	DN	GM	DN	DN	DN	GM
010A	5.1	10.1	2	5	DN	DN	DN	GM	ACHP	DN	DN	DN
010A	10.1	15.1	2	5	DN	DN	DN	DN	DN	DN	DN	DN
010A	15.1	20.1	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	20.1	25.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
010A	25.1	30.1	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	30.1	35.1	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
010A	35.1	40.1	2	5	DN	DN	DN	GM	DN	GM	DN	GM
010A	40.1	44.1	2	4	DN	DN	DN	DN	DN	DN	DN	DN
010A	62.9	67.9	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
010A	67.9	68	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
010A	68	71	2	3	DN	DN	DN	DN	DN	DN	DN	DN
010A	71	71.6	2	0.6	DN	DN	DN	DN	DN	DN	DN	DN
012A	0	4.6	2	4.6	GM	DN	GM	ACHP	DN	DN	DN	DN
012A	15.2	20.2	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
012A	20.2	25.2	2	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
012A	25.2	30.2	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
012A	30.2	33.1	2	2.9	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
012A	33.1	38.1	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
012A	38.1	43	2	4.9	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
012A	43	48	2	5	DN	DN	DN	DN	DN	GM	DN	GM
012A	48	53	2	5	DN	DN	DN	DN	DN	GM	DN	GM
012A	53	56.8	2	3.8	DN	DN	ACHP	DN	DN	DN	DN	ACHP
024E	0	0.6	2	0.6	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
025B	0	1.6	2	1.6	DN	DN	ACHP	DN	DN	DN	DN	ACHP
025B	1.6	1.9	2	0.3	DN	DN	DN	ACHP	DN	DN	DN	ACHP
067A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
067A	5	6.8	2	1.8	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
067A	6.8	10.2	2	3.4	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
067C	45.6	45.7	2	0.1	ACHP	DN	DN	DN	DN	ACHP	DN	DN
067C	45.7	50.7	2	5	DN	DN	GM	ACHP	DN	DN	DN	DN
067D	91.2	96.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
067D	96.2	100	2	3.8	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
069A	0	5	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
069A	5	5.3	2	0.3	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	5.3	9.7	2	4.4	ACHP	DN	DN	DN	DN	ACHP	DN	DN
069A	9.7	14.7	2	5	DN	DN	DN	GM	GM	GM	DN	DN
069A	14.7	19.7	2	5	DN	DN	DN	DN	DN	GM	DN	GM
069A	19.7	24.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	24.7	25	2	0.3	DN	DN	GM	ACHP	DN	DN	DN	DN
069A	25	26	2	1	ACHP	DN	DN	DN	DN	DN	ACHP	DN
069A	26	31	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
069A	31	36	2	5	DN	DN	DN	GM	DN	GM	DN	ACHP
069A	36	41	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
069A	41	46	2	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
069A	46	49.4	2	3.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
069A	49.4	54.1	2	4.7	DN	DN	DN	DN	DN	DN	DN	DN
069A	54.1	55.3	2	1.2	DN	GM	ACHP	DN	DN	DN	DN	ACHP
069A	62.1	64.7	2	2.6	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
069A	71.6	76.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	76.6	81.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
069A	81.6	82.7	2	1.1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
071A	0	5	2	5	GM	DN	DN	DN	GM	ACHP	DN	DN
071A	5	7	2	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
071A	7	9	2	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
071B	9.6	11.6	2	2	DN	DN	DN	DN	DN	DN	DN	DN
071B	11.6	13.7	2	2.1	DN	DN	DN	GM	DN	GM	ACHP	DN
071B	13.7	14.1	2	0.4	DN	DN	GM	DN	DN	DN	DN	DN
078A	8.9	9	2	0.1	DN	DN	DN	ACHP	DN	DN	DN	DN
078A	9	12.7	2	3.7	DN	DN	DN	DN	ACHP	DN	DN	DN
078A	12.7	14.6	2	1.9	DN	DN	DN	GM	GM	GM	DN	DN
078A	14.6	15.5	2	0.9	DN	DN	DN	GM	GM	DN	GM	DN
078A	15.5	18.2	2	2.7	DN	DN	DN	GM	DN	DN	DN	ACHP
078A	18.2	23.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	23.2	28.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
078A	28.2	29.9	2	1.7	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
078B	0	1.5	2	1.5	DN	DN	DN	DN	DN	GM	DN	GM
089A	0	5	2	5	DN	ACHP	DN	DN	GM	DN	DN	ACHP
089A	5	9	2	4	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	9	14	2	5	DN	DN	DN	DN	GM	GM	DN	ACHP
089A	14	18.6	2	4.6	DN	DN	DN	DN	GM	ACHP	DN	DN
089A	18.6	21.5	2	2.9	DN	DN	DN	DN	DN	GM	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
089A	21.5	26.5	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
089A	26.5	31.5	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
089A	31.5	33.2	2	1.7	DN	DN	DN	DN	DN	GM	ACHP	DN
094A	33.1	35	2	1.9	ACHP	DN	DN	DN	DN	DN	ACHP	DN
096A	11.1	16.1	2	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
096A	16.1	16.6	2	0.5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
096A	16.6	21.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
096A	21.6	22.1	2	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
096A	22.1	26.3	2	4.2	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
096A	26.3	31.3	2	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
096A	31.3	33.6	2	2.3	DN	DN	ACHP	DN	DN	DN	DN	ACHP
096A	33.6	38.6	2	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
096A	38.6	42.2	2	3.6	DN	DN	DN	GM	GM	GM	GM	DN
096B	69.5	70.6	2	1.1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
100A	0	0.3	2	0.3	GM	DN	DN	DN	GM	GM	DN	ACHP
100A	0.3	0.4	2	0.1	DN	GM	ACHP	DN	DN	DN	DN	ACHP
101A	0.4	1.2	2	0.8	DN	DN	DN	GM	GM	GM	GM	DN
101A	1.2	5.2	2	4	DN	DN	DN	GM	GM	GM	GM	DN
101A	5.2	10.2	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
101A	10.2	15.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
101A	15.2	16.5	2	1.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
101A	16.5	21.4	2	4.9	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
105A	9.2	9.5	2	0.3	ACHP	DN	DN	DN	ACHP	DN	DN	DN
109A	0	5	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	5	7.7	2	2.7	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
109A	7.7	12.7	2	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
109A	12.7	17.7	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
109A	17.7	22.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
109A	22.7	27.7	2	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
109A	27.7	32.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
109A	32.7	37.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	37.7	42.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	42.7	47.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	47.7	52.7	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
109A	52.7	53	2	0.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
109A	53	54.8	2	1.8	DN	GM	DN	DN	DN	DN	DN	DN
109A	63.3	64.7	2	1.4	GM	ACHP	DN	DN	DN	DN	DN	ACHP
109A	64.7	65.3	2	0.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
116A	0	5	2	5	DN	DN	DN	DN	DN	GM	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
116A	5	10	2	5	DN	DN	DN	DN	DN	DN	DN	DN
116A	10	12	2	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
116A	12	12.3	2	0.3	DN	DN	DN	GM	GM	GM	GM	DN
116A	12.3	13.1	2	0.8	DN	DN	DN	DN	DN	GM	DN	GM
116A	13.1	18.1	2	5	DN	GM	DN	DN	GM	DN	DN	GM
116A	18.1	20	2	1.9	GM	ACHP	DN	DN	DN	DN	ACHP	DN
116A	20	25	2	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
116A	25	27	2	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
116A	27	32	2	5	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
116A	32	32.3	2	0.3	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
120A	3.1	7.2	2	4.1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	353.7	358.7	2	5	DN	DN	DN	DN	DN	GM	DN	GM
160C	358.7	363.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	363.7	367.8	2	4.1	DN	GM	ACHP	DN	DN	DN	DN	ACHP
160C	367.8	372.8	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
160C	372.8	375.8	2	3	DN	DN	DN	DN	DN	DN	DN	DN
160C	375.8	380.8	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	380.8	382.8	2	2	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	382.8	386.6	2	3.8	DN	DN	DN	GM	GM	GM	GM	DN
160C	386.6	391.6	2	5	DN	DN	DN	GM	GM	GM	GM	DN
160C	391.6	396.6	2	5	DN	DN	DN	GM	GM	GM	GM	DN
160C	396.6	401.6	2	5	DN	DN	DN	GM	GM	GM	GM	DN
160C	401.6	403.7	2	2.1	DN	DN	DN	GM	GM	GM	GM	DN
160C	403.7	406.7	2	3	DN	DN	DN	GM	GM	GM	GM	DN
160C	406.7	411.7	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	411.7	414.3	2	2.6	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	414.3	414.8	2	0.5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
160C	414.8	416.5	2	1.7	DN	ACHP	DN	DN	DN	DN	DN	ACHP
160C	416.5	421.5	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	421.5	425.7	2	4.2	DN	GM	ACHP	DN	DN	DN	DN	ACHP
160C	425.7	430.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	430.7	435.7	2	5	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	435.7	440.7	2	5	DN	DN	DN	DN	DN	DN	DN	DN
160C	440.7	441.7	2	1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	441.7	446.7	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
160C	446.7	447.6	2	0.9	GM	DN	DN	GM	ACHP	DN	DN	DN
160C	447.6	451	2	3.4	GM	DN	DN	DN	DN	DN	DN	DN
160C	451	456	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
160C	456	460.1	2	4.1	DN	ACHP	DN	DN	DN	DN	ACHP	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
160C	460.1	464.4	2	4.3	DN	DN	DN	DN	DN	GM	ACHP	DN
160C	483	484.4	2	1.4	ACHP	DN	DN	DN	DN	DN	ACHP	DN
160C	492	497	2	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
160C	497	497.2	2	0.2	DN	DN	ACHP	DN	DN	DN	DN	ACHP
165A	0	5	2	5	DN	DN	ACHP	DN	DN	DN	DN	ACHP
165A	5	10	2	5	DN	DN	DN	DN	DN	GM	ACHP	DN
165A	10	15	2	5	DN	DN	DN	DN	DN	GM	DN	GM
165A	15	15.3	2	0.3	GM	DN	DN	DN	DN	DN	DN	DN
165A	15.3	18.5	2	3.2	DN	DN	DN	DN	DN	DN	DN	DN
165A	18.5	23.5	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
165A	23.5	28.5	2	5	DN	DN	DN	GM	DN	DN	DN	ACHP
165A	28.5	28.6	2	0.1	DN	DN	DN	DN	GM	DN	ACHP	DN
167A	0	1.7	2	1.7	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
167A	1.7	2	2	0.3	GM	DN	DN	GM	ACHP	DN	DN	DN
167A	2	2.4	2	0.4	GM	DN	DN	DN	DN	DN	DN	DN
167A	2.4	2.9	2	0.5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
167A	2.9	4.9	2	2	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
183A	0	1	2	1	DN	DN	DN	DN	DN	DN	DN	DN
194A	0	3.8	2	3.8	DN	DN	DN	DN	GM	ACHP	DN	DN
194A	3.8	8.8	2	5	DN	DN	DN	DN	GM	GM	DN	ACHP
194A	8.8	13.8	2	5	GM	DN	GM	ACHP	DN	DN	DN	DN
194A	13.8	14.7	2	0.9	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
194A	14.7	19.7	2	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
194A	19.7	20.3	2	0.6	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
196A	0	1.6	2	1.6	DN	DN	DN	GM	GM	DN	GM	DN
196A	1.6	6.6	2	5	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.6	6.9	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
196A	6.9	8.9	2	2	DN	DN	GM	ACHP	DN	DN	DN	DN
202A	0	0.1	2	0.1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
202A	0.1	0.2	2	0.1	DN	DN	DN	DN	DN	DN	DN	DN
202A	0.2	1.2	2	1	DN	DN	ACHP	DN	DN	DN	DN	ACHP
202A	1.2	3.2	2	2	DN	DN	DN	DN	DN	GM	DN	GM
207A	0	3.5	2	3.5	DN	DN	DN	DN	DN	DN	DN	DN
207A	3.5	5.9	2	2.4	DN	DN	DN	DN	DN	DN	DN	DN
209A	0	1.4	2	1.4	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
209A	1.4	1.5	2	0.1	GM	DN	DN	GM	ACHP	DN	DN	DN
239A	0	0.7	2	0.7	DN	DN	DN	DN	DN	GM	DN	GM
239A	0.7	1	2	0.3	DN	DN	DN	DN	DN	DN	DN	DN
239A	1	3.3	2	2.3	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
266A	0.1	0.2	2	0.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
266A	0.2	1.3	2	1.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
266A	1.3	3	2	1.7	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
266A	3	5.4	2	2.4	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
266A	5.4	9.5	2	4.1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
266A	9.5	11.5	2	2	GM	DN	GM	ACHP	DN	DN	DN	DN
350A	0	2.7	2	2.7	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	2.7	7.1	2	4.4	DN	DN	DN	GM	ACHP	DN	DN	DN
350A	7.1	12.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	12.1	17.1	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
350A	17.1	22.1	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	22.1	24	2	1.9	ACHP	DN	DN	DN	DN	DN	ACHP	DN
350A	24	29	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	29	34	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	34	39	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	39	44	2	5	ACHP	DN	DN	DN	DN	ACHP	DN	DN
350A	44	49	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	49	54	2	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
350A	54	56.2	2	2.2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
350A	56.2	59.4	2	3.2	GM	DN	DN	GM	ACHP	DN	DN	DN
350A	59.4	64.4	2	5	DN	DN	DN	DN	DN	DN	DN	DN
350A	64.4	69.4	2	5	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	69.4	69.7	2	0.3	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	69.7	72	2	2.3	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	72	72.3	2	0.3	DN	DN	DN	GM	DN	DN	DN	ACHP
350A	72.3	72.4	2	0.1	DN	DN	DN	DN	DN	ACHP	DN	DN
350A	72.4	72.6	2	0.2	DN	DN	DN	GM	DN	DN	DN	ACHP
385A	95.3	98.6	2	3.3	GM	ACHP	DN	DN	DN	DN	ACHP	DN
385B	124.2	129.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	129.2	134.2	2	5	DN	DN	DN	DN	DN	DN	DN	DN
385B	134.2	134.4	2	0.2	DN	DN	DN	DN	DN	GM	DN	GM
389A	0	1.9	2	1.9	DN	DN	GM	DN	DN	GM	DN	GM
389A	1.9	6.9	2	5	DN	DN	GM	DN	DN	GM	ACHP	DN
389A	6.9	11.9	2	5	DN	DN	DN	DN	DN	DN	DN	DN
389A	11.9	12.8	2	0.9	DN	DN	DN	DN	DN	DN	DN	DN

Appendix H-3: Region 3

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006A	11.1	11.2	3	0.1	GM+ATHO	DN	DN	DN	DN	DN	DN	DN
006A	11.2	11.8	3	0.6	AHIP+ACHP	DN	DN	DN	DN	DN	ACHP	DN
006A	11.8	13.9	3	2.1	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
006A	13.9	15.1	3	1.2	DN	ACIP+ATHO	DN	DN	DN	DN	DN	GM
006C	43.4	45.6	3	2.2	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
006C	45.6	46.1	3	0.5	DN	DN	DN	AHIP+ACHP	ACHP	DN	DN	DN
006M	75.4	80.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
006M	80.4	85.4	3	5	DN	DN	DN	DN	ACHP	DN	DN	DN
006M	85.4	88.9	3	3.5	DN	DN	DN	DN	ACHP	DN	DN	DN
014B	34.1	34.3	3	0.2	DN	DN	DN	AHIP+ACHP	DN	DN	DN	ACHP
014B	34.3	39.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	39.3	44.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	44.3	49.3	3	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	49.3	51.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
014B	51.3	56.3	3	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
014B	56.3	61.3	3	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
014B	61.3	64.9	3	3.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
050D	0	0.9	3	0.9	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
050D	0.9	1.5	3	0.6	GM	DN	GM	GM	DN	DN	DN	ACHP
065A	14.4	19.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	19.4	24.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	24.4	26.9	3	2.5	DN	DN	DN	DN	ACHP	DN	GM	DN
065A	26.9	31.9	3	5	DN	GM	DN	GM	DN	DN	DN	DN
065A	31.9	36.2	3	4.3	DN	GM	DN	GM	DN	DN	DN	DN
065A	36.2	41.2	3	5	DN	DN	DN	DN	GM	GM	GM	DN
065A	41.2	46.2	3	5	DN	DN	DN	DN	GM	GM	GM	DN
065A	46.2	49.6	3	3.4	DN	DN	DN	DN	GM	GM	GM	DN
065A	49.6	51.2	3	1.6	DN	DN	DN	GM	GM	GM	GM	GM
082A	42.5	47.5	3	5	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
082A	47.5	51.3	3	3.8	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
082A	51.3	56.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	56.3	61.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	61.3	66.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	66.3	71.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	71.3	76.3	3	5	DN	DN	GM	GM	DN	DN	DN	DN
082A	76.3	79	3	2.7	DN	DN	GM	GM	DN	DN	DN	DN
082A	79	83.5	3	4.5	DN	DN	DN	GM	GM	GM	DN	GM
082A	83.5	85.3	3	1.8	DN	DN	GM	DN	DN	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
090B	81.5	81.7	3	0.2	DN	DN	DN	GM+ATHO	DN	ACHP	DN	DN
090B	81.7	84.9	3	3.2	DN	GM	DN	ACHP	DN	DN	DN	DN
090B	84.9	86.1	3	1.2	DN	DN	DN	DN	AHIP+ACHP	DN	DN	DN
090B	86.1	86.9	3	0.8	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
090B	86.9	87.9	3	1	DN	GM	GM	DN	DN	DN	ACHP	DN
092A	27.1	30.1	3	3	DN	GM	DN	DN	DN	DN	GM	DN
092A	30.1	31.5	3	1.4	DN	GM	GM	GM	DN	DN	DN	ACHP
092A	31.5	33.6	3	2.1	GM	DN	GM	GM	DN	DN	GM	DN
092A	33.6	36.6	3	3	DN	DN	DN	GM	DN	DN	DN	DN
092A	36.6	41.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	41.6	46.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	46.6	51.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	51.6	56.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	56.6	61.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	61.6	66.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	66.6	71.6	3	5	GM	DN	DN	GM	GM	DN	DN	DN
092A	71.6	73.3	3	1.7	GM	DN	DN	GM	GM	DN	DN	DN
114A	0	5	3	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
114A	5	8	3	3	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
125A	0	5	3	5	GM	DN	DN	DN	DN	GM	DN	GM
125A	5	10	3	5	GM	DN	DN	DN	DN	GM	DN	GM
125A	10	15	3	5	GM	DN	DN	DN	DN	GM	DN	GM
125A	15	20	3	5	GM	DN	DN	DN	DN	GM	DN	GM
125A	20	25	3	5	GM	DN	DN	DN	DN	GM	DN	GM
125A	25	29.5	3	4.5	GM	DN	DN	DN	DN	GM	DN	GM
125A	29.5	31.5	3	2	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
125A	31.5	35.6	3	4.1	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
125A	35.6	40.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	40.6	45.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	45.6	50.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
125A	50.6	52	3	1.4	DN	DN	DN	DN	DN	DN	DN	DN
131B	32.9	37.9	3	5	DN	DN	DN	DN	DN	DN	DN	DN
131B	37.9	38.4	3	0.5	DN	DN	DN	DN	DN	DN	DN	DN
131B	38.4	42.1	3	3.7	DN	ACIP+ATHO	DN	DN	DN	DN	GM	DN
131B	42.7	47.7	3	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
131B	47.7	47.9	3	0.2	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
133A	18.9	23.9	3	5	GM	DN	DN	DN	DN	GM	DN	DN
133A	23.9	24	3	0.1	GM	DN	DN	DN	DN	GM	DN	DN
133A	24	29	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
133A	29	34	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	34	39	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	39	44	3	5	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	44	46.4	3	2.4	DN	DN	DN	DN	DN	DN	AHIP+ACHP	DN
133A	46.4	51.4	3	5	DN	DN	DN	DN	ACHP	DN	GM	DN
133A	51.4	56.4	3	5	DN	DN	DN	ACHP	DN	DN	DN	DN
133A	56.4	56.8	3	0.4	DN	DN	DN	ACHP	DN	DN	DN	DN
133B	13.3	16.1	3	2.8	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
134A	0	5	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	5	10	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	10	15	3	5	DN	GM	DN	GM	DN	DN	DN	DN
134A	15	16.3	3	1.3	DN	GM	DN	GM	DN	DN	DN	DN
134A	16.3	21.3	3	5	DN	DN	GM	DN	DN	DN	ACHP	DN
134A	21.3	26.3	3	5	DN	DN	GM	DN	DN	DN	ACHP	DN
134A	26.3	27.2	3	0.9	DN	DN	GM	DN	DN	DN	ACHP	DN
139A	0	0.1	3	0.1	DN	DN	GM	DN	DN	DN	DN	GM
139A	65.2	70.2	3	5	DN	DN	DN	GM	DN	DN	DN	GM
139A	70.2	72.1	3	1.9	DN	DN	DN	GM	DN	DN	DN	GM
141A	95.7	100.7	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	100.7	105.7	3	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	105.7	110.5	3	4.8	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
149A	42.4	45.5	3	3.1	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	45.5	50.5	3	5	DN	GM	DN	DN	GM	DN	DN	DN
149A	50.5	55.5	3	5	DN	GM	DN	DN	GM	DN	DN	DN
149A	55.5	60.5	3	5	DN	GM	DN	DN	GM	DN	DN	DN
149A	60.5	62.7	3	2.2	DN	GM	DN	DN	GM	DN	DN	DN
149A	62.7	67.7	3	5	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	67.7	69.9	3	2.2	DN	DN	DN	DN	DN	DN	DN	AHIP+ACHP
149A	69.9	71.9	3	2	ACIP+ATHO	DN	DN	DN	DN	GM	DN	DN
149A	71.9	72.2	3	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	GM	DN
149A	72.2	72.8	3	0.6	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	72.8	73.2	3	0.4	DN	DN	ACIP+ATHO	DN	DN	DN	DN	GM
149A	73.2	78.2	3	5	DN	DN	GM	DN	DN	GM	DN	DN
149A	78.2	83.2	3	5	DN	DN	GM	DN	DN	GM	DN	DN
149A	83.2	88.2	3	5	DN	DN	GM	DN	DN	GM	DN	DN
149A	88.2	93.2	3	5	DN	DN	GM	DN	DN	GM	DN	DN
149A	93.2	98.2	3	5	DN	DN	GM	DN	DN	GM	DN	DN
149A	98.2	100.6	3	2.4	DN	DN	GM	DN	DN	GM	DN	DN
149A	100.6	105.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
149A	105.6	110.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	110.6	115.6	3	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	115.6	117.5	3	1.9	DN	DN	DN	DN	DN	DN	DN	DN
300A	0	0.5	3	0.5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
300A	0.5	3.4	3	2.9	DN	DN	DN	DN	DN	DN	DN	DN
317A	0	5	3	5	DN	DN	DN	GM	DN	DN	DN	DN
317A	5	10	3	5	DN	DN	DN	GM	DN	DN	DN	DN
317A	10	12.2	3	2.2	DN	DN	DN	GM	DN	DN	DN	DN
318A	0	5	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	5	10	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	10	15	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	15	20	3	5	DN	DN	DN	DN	DN	DN	DN	DN
318A	20	20.6	3	0.6	DN	DN	DN	DN	DN	DN	DN	DN
318A	20.6	25.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	25.6	30.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	30.6	35.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	35.6	40.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	40.6	45.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	45.6	50.6	3	5	DN	GM	DN	DN	DN	DN	GM	DN
318A	50.6	54.3	3	3.7	DN	GM	DN	DN	DN	DN	GM	DN
318A	54.3	59.3	3	5	GM	DN	GM	GM	DN	DN	DN	DN
318A	59.3	60.7	3	1.4	GM	DN	GM	GM	DN	DN	DN	DN
325A	0	4.1	3	4.1	DN	DN	GM	DN	DN	DN	DN	GM
325A	4.1	7	3	2.9	DN	DN	DN	GM	DN	DN	DN	DN
325A	7	11.4	3	4.4	DN	DN	GM	GM	DN	DN	GM	DN
347A	0	1.8	3	1.8	DN	DN	DN	GM	DN	GM	DN	DN
347A	1.8	5.2	3	3.4	DN	DN	DN	DN	DN	ACHP	DN	DN
348A	0	1.3	3	1.3	GM	DN	GM	GM	DN	DN	DN	ACHP
348A	1.3	3.3	3	2	DN	DN	DN	DN	DN	DN	DN	DN
348A	3.3	4	3	0.7	DN	DN	DN	AHIP+ACHP	DN	DN	DN	ACHP
348A	4	7.3	3	3.3	DN	DN	DN	DN	DN	DN	DN	DN
348A	7.3	11.4	3	4.1	DN	GM	GM	DN	DN	DN	DN	ACHP
348A	11.4	12.9	3	1.5	DN	GM	DN	GM	DN	DN	DN	ACHP
348A	12.9	14.4	3	1.5	DN	GM	DN	GM	GM	DN	DN	DN
394A	3.9	7	3	3.1	DN	GM	DN	GM	GM	DN	DN	DN

Appendix H-4: Region 4

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
006I	343.5	343.7	4	0.2	DN	DN	DN	DN	DN	DN	DN	GM+ATHO
006I	343.7	344.7	4	1	GM	ACHP	DN	DN	GM	DN	DN	GM
006I	344.7	345.9	4	1.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
006I	345.9	346.4	4	0.5	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
006Z	0.4	0.6	4	0.2	FDR+ATHO	DN	DN	DN	DN	GM	DN	DN
007A	14.9	16.1	4	1.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
007A	19.2	24.2	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
007A	24.2	29.2	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
007A	29.2	32.6	4	3.4	ACHP	DN	DN	DN	DN	GM	DN	DN
007E	0	0.6	4	0.6	ACHP	DN	DN	DN	DN	GM	ACHP	DN
007E	0.6	1.6	4	1	ACHP	DN	DN	DN	DN	GM	ACHP	DN
011A	0	0.4	4	0.4	GM+ATHO	DN	ACHP	DN	DN	ACHP	DN	DN
011A	0.4	1.4	4	1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
014B	64.9	69.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
014B	69.9	71.5	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
014B	71.5	76.5	4	5	DN	DN	ACHP	DN	GM	ACHP	DN	DN
014B	76.5	81.5	4	5	DN	DN	ACHP	DN	GM	ACHP	DN	DN
014B	81.5	86.5	4	5	DN	DN	ACHP	DN	GM	ACHP	DN	DN
014B	86.5	91	4	4.5	DN	DN	ACHP	DN	GM	ACHP	DN	DN
023A	0	5	4	5	DN	DN	ACHP	DN	DN	DN	DN	GM
023A	5	9.6	4	4.6	DN	DN	ACHP	DN	DN	DN	DN	GM
023A	16	17.5	4	1.5	ACHP	DN	DN	DN	DN	GM	ACHP	DN
024B	420	422.7	4	2.7	GM	GM	GM	GM	GM	GM	GM	GM
024B	422.7	423.1	4	0.4	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
024B	423.1	428.1	4	5	DN	DN	DN	ACHP	DN	DN	GM	DN
024B	428.1	429.6	4	1.5	DN	DN	DN	ACHP	DN	DN	GM	DN
024B	429.6	434.6	4	5	DN	DN	DN	GM	ACHP	DN	GM	DN
024B	434.6	436.6	4	2	DN	DN	DN	GM	ACHP	DN	GM	DN
024B	436.6	437.2	4	0.6	DN	DN	DN	GM	ACHP	DN	DN	GM
024C	437.5	442.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
024C	442.5	446.9	4	4.4	DN	DN	DN	DN	DN	DN	DN	DN
034C	0	1.1	4	1.1	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
040F	360.2	363	4	2.8	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
040G	380.7	381	4	0.3	FDR+ATHO	DN	DN	DN	DN	GM	DN	DN
040G	381	382.2	4	1.2	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
052A	58.9	60.9	4	2	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
052A	60.9	65.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN
052A	65.9	70.9	4	5	DN	DN	DN	DN	DN	DN	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
055A	0	0.2	4	0.2	GM+ATHO	DN	DN	DN	DN	DN	GM+ATHO	ACHP
055A	0.2	2.4	4	2.2	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
059A	0.5	5.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	5.5	10.5	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	10.5	15	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
059A	15	20	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	20	25	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	25	30	4	5	DN	DN	DN	DN	DN	DN	DN	DN
059A	30	33	4	3	DN	DN	DN	DN	DN	DN	DN	DN
059A	33	38	4	5	GM	DN	GM	DN	GM	ACHP	DN	DN
059A	38	41	4	3	GM	DN	GM	DN	GM	ACHP	DN	DN
059B	120.9	122.9	4	2	ACHP	DN	DN	GM	DN	GM	DN	ACHP
059B	122.9	127.9	4	5	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	127.9	130.6	4	2.7	DN	DN	ACHP	DN	DN	GM	DN	DN
059B	130.6	135.6	4	5	DN	ACHP	DN	GM	DN	DN	GM	DN
059B	135.6	140.6	4	5	DN	ACHP	DN	GM	DN	DN	GM	DN
059B	140.6	145.5	4	4.9	DN	ACHP	DN	GM	DN	DN	GM	DN
059B	147.1	147.2	4	0.1	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
059B	147.8	152.8	4	5	DN	DN	DN	ACHP	DN	DN	GM	DN
059B	152.8	155.6	4	2.8	DN	DN	DN	ACHP	DN	DN	GM	DN
059B	155.6	159.7	4	4.1	DN	DN	DN	DN	DN	GM	ACHP	DN
059B	159.7	164.7	4	5	GM	GM	GM	DN	ACHP	DN	GM	DN
059B	164.7	166.5	4	1.8	GM	GM	GM	DN	ACHP	DN	GM	DN
059B	166.5	171.1	4	4.6	GM	GM	GM	ACHP	DN	DN	GM	DN
059B	171.1	173.3	4	2.2	GM	GM	GM	DN	DN	DN	DN	DN
061A	0.2	5.2	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	5.2	8.1	4	2.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	8.1	13.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
061A	13.1	14	4	0.9	DN	DN	DN	DN	DN	DN	DN	DN
061A	14	19	4	5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	19	22.5	4	3.5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	22.5	27.5	4	5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	27.5	32	4	4.5	GM	ACHP	DN	DN	GM	DN	GM	DN
061A	32	36	4	4	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
063A	5.1	10.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
063A	10.1	11.1	4	1	DN	DN	DN	DN	DN	DN	DN	DN
063A	11.1	16.1	4	5	GM	GM	GM	GM	ACHP	DN	DN	GM
063A	16.1	21.1	4	5	GM	GM	GM	GM	ACHP	DN	DN	GM
063A	21.1	24.2	4	3.1	GM	GM	GM	GM	ACHP	DN	DN	GM

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
063A	39.3	44.3	4	5	GM	DN	DN	DN	DN	GM	ACHP	DN
063A	44.3	48.2	4	3.9	GM	DN	DN	DN	DN	GM	ACHP	DN
070O	0	0.4	4	0.4	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
070P	0	0.5	4	0.5	DN	FDR+ATHO	DN	DN	DN	ACHP	DN	DN
072B	32.8	37.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	37.8	42.8	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	42.8	44.1	4	1.3	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	44.1	48.4	4	4.3	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	48.4	53.4	4	5	ACHP	DN	DN	DN	DN	GM	DN	DN
072B	53.4	54.1	4	0.7	ACHP	DN	DN	DN	DN	GM	DN	DN
094A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	40	45	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	45	45.1	4	0.1	DN	DN	DN	DN	DN	DN	DN	DN
094A	45.1	50.1	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	50.1	54.6	4	4.5	DN	DN	DN	DN	DN	DN	DN	DN
094A	54.6	59.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	59.6	64.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	64.6	69.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	69.6	74.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	74.6	79.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	79.6	84.6	4	5	DN	DN	DN	DN	DN	DN	DN	DN
094A	84.6	86.2	4	1.6	DN	DN	DN	DN	DN	DN	DN	DN
138A	21.7	26.3	4	4.6	GM	ACHP	DN	GM	DN	GM	DN	DN
138A	26.3	27.5	4	1.2	GM	DN	GM	DN	GM	ACHP	DN	DN
138A	27.5	27.9	4	0.4	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	35	40	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	40	41.4	4	1.4	DN	DN	DN	DN	DN	DN	DN	DN
138A	41.4	43	4	1.6	DN	DN	DN	DN	FDR+ATHO	DN	DN	DN
138A	43	43.1	4	0.1	DN	DN	FDR+ATHO	DN	DN	DN	ACHP	DN
138A	43.4	48.4	4	5	DN	DN	DN	DN	DN	DN	DN	DN
138A	48.4	50.5	4	2.1	DN	DN	DN	DN	DN	DN	DN	DN
138A	50.5	50.6	4	0.1	FDR+ATHO	DN	DN	ACHP	DN	DN	DN	DN
138A	50.9	54	4	3.1	DN	DN	DN	DN	DN	DN	FDR+ATHO	DN
138A	54	54.8	4	0.8	DN	DN	FDR+ATHO	DN	DN	DN	DN	GM
144A	0	2.8	4	2.8	GM	GM	GM	GM	DN	DN	DN	DN
144A	2.8	7.8	4	5	GM	GM	GM	ACHP	DN	GM	DN	DN
144A	7.8	10.5	4	2.7	GM	GM	GM	ACHP	DN	GM	DN	DN
144A	10.5	11.1	4	0.6	DN	DN	DN	FDR+ATHO	DN	DN	DN	DN
144A	11.1	16.1	4	5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
144A	16.1	16.6	4	0.5	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
144A	16.6	20.8	4	4.2	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO
170A	0	2.2	4	2.2	DN	DN	DN	DN	DN	FDR+ATHO	DN	DN
257B	0	0.6	4	0.6	DN	DN	FDR+ATHO	DN	DN	DN	DN	DN
257B	0.6	1.1	4	0.5	FDR+ATHO	DN	DN	DN	DN	GM	DN	DN
385E	313.8	317.6	4	3.8	DN	DN	DN	DN	DN	DN	DN	FDR+ATHO

Appendix H-5: Region 5

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
015A	0.8	1.4	5	0.6	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
015A	1.4	2.4	5	1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
015A	2.4	7.4	5	5	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
015A	7.4	8.4	5	1	DN	DN	DN	DN	DN	DN	DN	DN
015A	8.4	10.4	5	2	DN	DN	DN	DN	DN	DN	DN	DN
015A	10.4	12.4	5	2	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
015B	20.4	22.5	5	2.1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
017A	0	5	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
017A	5	10	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
017A	10	15	5	5	DN	DN	GM	DN	DN	DN	DN	DN
017A	15	17.3	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
017A	17.3	22.3	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	22.3	27.3	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
017A	27.3	29	5	1.7	DN	DN	DN	DN	GM	DN	GM	GM
017A	29	34	5	5	DN	DN	DN	DN	DN	DN	DN	DN
017A	34	34.5	5	0.5	GM	DN	DN	DN	DN	ACHP	DN	DN
017A	34.5	38.7	5	4.2	DN	DN	DN	DN	DN	DN	DN	DN
041A	0	5	5	5	DN	DN	DN	GM	DN	DN	GM	DN
041A	5	9.5	5	4.5	DN	DN	DN	GM	DN	GM	DN	DN
084A	0	4.6	5	4.6	DN	DN	DN	DN	ACHP	DN	DN	DN
090A	0	5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	5	9.5	5	4.5	DN	DN	DN	DN	DN	DN	DN	DN
090A	9.5	14.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
090A	14.5	14.8	5	0.3	DN	ACHP	DN	DN	DN	DN	DN	ACHP
090A	14.8	19.8	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
090A	19.8	24.8	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
090A	24.8	29.8	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
090A	29.8	33.9	5	4.1	DN	DN	DN	DN	DN	DN	DN	DN
097A	0.3	3.8	5	3.5	DN	DN	DN	DN	DN	DN	DN	DN
097A	3.8	3.9	5	0.1	DN	DN	DN	DN	GM	GM	DN	GM
097A	3.9	4.6	5	0.7	DN	DN	DN	DN	GM	GM	DN	GM
110A	0	0.1	5	0.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
114A	8	13	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
114A	13	18	5	5	GM	DN	DN	GM	ACHP	DN	DN	DN
114A	18	19	5	1	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
114A	19	20.3	5	1.3	GM	ACHP	DN	DN	DN	DN	ACHP	DN
114A	20.3	25.3	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
114A	25.3	30.3	5	5	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
114A	30.3	35.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	35.3	40.3	5	5	GM	DN	GM	ACHP	DN	DN	DN	DN
114A	40.3	45.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
114A	45.3	50.3	5	5	GM	DN	DN	DN	DN	ACHP	DN	DN
114A	50.3	55.3	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
114A	55.3	56	5	0.7	DN	DN	DN	DN	GM	DN	GM	DN
114A	56	61	5	5	DN	DN	DN	DN	DN	DN	GM	GM
114A	61	61.5	5	0.5	DN	DN	DN	DN	DN	GM	GM	DN
114A	61.5	61.7	5	0.2	DN	DN	DN	DN	GM	DN	GM	DN
136A	0	0.2	5	0.2	DN	GM	DN	DN	DN	DN	DN	ACIP+ATHO
136A	0.2	0.6	5	0.4	DN	GM	ACHP	DN	DN	DN	DN	ACHP
136A	0.6	1.6	5	1	DN	DN	DN	DN	DN	DN	ACIP+ATHO	DN
136A	3.5	4.5	5	1	DN	GM	ACHP	DN	DN	DN	DN	ACHP
141A	0	5	5	5	DN	DN	DN	DN	DN	DN	GM	GM
141A	5	9.4	5	4.4	DN	DN	DN	DN	DN	DN	DN	DN
141A	9.4	11.3	5	1.9	DN	DN	DN	GM	DN	DN	ACHP	DN
141A	11.3	16.3	5	5	DN	DN	DN	DN	DN	GM	GM	DN
141A	16.3	21.3	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	21.3	26.3	5	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
141A	26.3	31.3	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
141A	31.3	36.3	5	5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
141A	36.3	41.3	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	41.3	44.1	5	2.8	GM	DN	DN	ACHP	DN	DN	DN	DN
141A	60.7	60.8	5	0.1	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	62.4	64.4	5	2	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	64.4	69.4	5	5	DN	DN	DN	DN	DN	DN	DN	DN
141A	69.4	74.4	5	5	GM	ACHP	DN	DN	DN	DN	ACHP	DN
141A	74.4	79.4	5	5	DN	DN	DN	DN	DN	ACIP+ATHO	DN	DN
141A	79.4	84.4	5	5	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
141A	84.4	89.4	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
141A	89.4	94.4	5	5	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
141A	94.4	95.7	5	1.3	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
142A	3.3	8.3	5	5	DN	GM	ACHP	DN	DN	DN	DN	ACHP
142A	8.3	13.3	5	5	GM	DN	ACHP	DN	DN	DN	DN	ACHP
142A	13.3	13.4	5	0.1	DN	DN	DN	DN	GM	GM	ACHP	DN
142A	13.4	18.4	5	5	DN	DN	GM	DN	DN	GM	ACHP	DN
142A	18.4	23	5	4.6	DN	DN	DN	DN	DN	DN	DN	ACIP+ATHO
142A	23	28	5	5	GM	DN	DN	DN	GM	ACHP	DN	DN
142A	28	28.7	5	0.7	GM	DN	DN	DN	GM	GM	DN	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
142A	28.7	33.7	5	5	DN	DN	DN	DN	DN	GM	GM	DN
142A	33.7	33.8	5	0.1	DN	DN	DN	ACHP	DN	DN	DN	ACHP
145A	102.6	107.6	5	5	DN	ACHP	DN	DN	DN	DN	ACHP	DN
145A	107.6	112.6	5	5	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
145A	112.6	116.9	5	4.3	DN	DN	DN	GM	DN	DN	ACHP	DN
149A	1.2	3.5	5	2.3	DN	GM	ACHP	DN	DN	DN	DN	ACHP
149A	3.5	8.5	5	5	GM	DN	DN	ACHP	DN	DN	DN	DN
149A	8.5	13.5	5	5	DN	DN	DN	DN	DN	DN	DN	DN
149A	13.5	18.5	5	5	DN	DN	DN	DN	GM	GM	DN	DN
149A	21.6	21.9	5	0.3	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
149A	22.9	26.6	5	3.7	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	26.6	27.7	5	1.1	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
149A	27.7	32.7	5	5	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
149A	32.7	37.7	5	5	GM	DN	DN	DN	DN	DN	DN	DN
149A	37.7	41.5	5	3.8	DN	DN	DN	ACIP+ATHO	DN	DN	DN	DN
149A	41.5	42.4	5	0.9	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
150A	0	5	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	5	10	5	5	DN	DN	GM	ACHP	DN	DN	DN	DN
150A	10	13.5	5	3.5	DN	DN	GM	ACHP	DN	DN	DN	ACHP
150A	13.5	16.1	5	2.6	DN	DN	GM	ACHP	DN	DN	DN	ACHP
151A	22.7	27.7	5	5	GM	DN	DN	DN	ACHP	DN	DN	DN
151A	27.7	32.7	5	5	DN	DN	DN	DN	GM	DN	GM	DN
151A	32.7	34	5	1.3	DN	DN	DN	DN	GM	ACHP	DN	DN
159A	0	5	5	5	GM	DN	ACHP	DN	DN	DN	DN	ACHP
159A	5	7	5	2	GM	DN	DN	DN	DN	ACHP	DN	DN
159A	7	12	5	5	DN	DN	DN	DN	DN	DN	DN	DN
159A	12	13.3	5	1.3	DN	DN	DN	DN	GM	DN	GM	DN
159A	13.3	17.5	5	4.2	DN	DN	DN	DN	GM	DN	GM	DN
159A	17.5	17.8	5	0.3	GM	DN	DN	DN	DN	ACHP	DN	DN
159A	18.3	23.3	5	5	GM	DN	DN	DN	DN	GM	DN	ACHP
159A	23.3	28.3	5	5	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
159A	28.3	31	5	2.7	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
160D	0	1.2	5	1.2	DN	ACIP+ATHO	DN	DN	DN	DN	DN	DN
160D	1.2	1.5	5	0.3	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
160D	1.5	2.5	5	1	ACIP+ATHO	DN	DN	DN	DN	DN	DN	DN
172A	0	2.1	5	2.1	DN	ACHP	DN	DN	DN	ACHP	DN	DN
368A	0	5	5	5	GM	DN	DN	GM	DN	DN	ACHP	DN
368A	6	11	5	5	DN	DN	DN	DN	GM	GM	DN	DN
368A	11	12.3	5	1.3	DN	DN	DN	DN	GM	DN	GM	DN

ROUTE	REFPT	END REFPT	Region	LENGTH	Maintenance Decisions							
					2017	2018	2019	2020	2021	2022	2023	2024
370A	0	3	5	3	DN	DN	ACIP+ATHO	DN	DN	DN	DN	DN
370A	3	4	5	1	DN	DN	DN	DN	ACIP+ATHO	DN	DN	DN
370A	4	6	5	2	DN	GM	DN	DN	GM	ACHP	DN	DN
370A	6	11	5	5	GM	DN	DN	DN	DN	DN	DN	DN
370A	11	12.1	5	1.1	GM	ACHP	DN	DN	DN	DN	ACHP	DN
370A	12.1	14.1	5	2	DN	GM	DN	DN	GM	ACHP	DN	DN