

Pavement Management System Analysis for Campbell County and Wyoming

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Executive Summary

This report provides a complete pavement management evaluation for Campbell County, Wyoming, focusing on assessing current roadway conditions, comparing county roads with statewide highway systems, and identifying cost-effective maintenance and rehabilitation strategies for a five-year period. Using pavement indicators such as the Pavement Condition Index (PCI), International Roughness Index (IRI), rut depth, and Present Serviceability Index (PSI), the analysis shows that statewide interstate, primary, and secondary roads are in significantly better condition than county roads, most of which fall below a PSI of 2.0. Campbell County shows moderate deterioration, with PCI decreasing from 87.59 in 2014 to 74.83 in 2018 and PSI values ranging from 2.01 to 2.20, while rut depth remains below 0.3 inches for the majority of segments. Treatment needs were estimated at 44.60 million dollars for the 2018 network, with major rehabilitation categories representing most of the cost. Four maintenance scenarios were evaluated: doing nothing, allocating an annual budget of one million dollars, maintaining a steady PSI, and applying a critical budget approach. Results show that the critical budget method produced the highest PSI improvement, especially when more investment was allocated at the beginning of the analysis period. Optimization of cost and performance identified a critical budget of 28,425,000 dollars, which represents the investment level beyond which additional spending provides reduced benefits. This study offers Campbell County a data-driven and economically efficient framework to preserve and improve pavement conditions over the coming years.

Introduction

Pavements are an essential part of the transportation system because they allow people and goods to travel safely and efficiently. Over time, pavement conditions naturally get worse due to traffic, weather, and aging, so regular maintenance is needed. To help manage this, transportation agencies use a Pavement Management System (PMS). A PMS is a tool that helps decision makers plan, evaluate, and choose the best maintenance and repair strategies while staying within their budgets.

In the United States, every state uses its own pavement management system, following guidance first provided by AASHTO in 1985 and later supported by federal policy in 1989. Today, improved PMS methods place more focus on preservation and long-term performance. In Wyoming, both state and county roads rely on PMS tools to monitor pavement conditions and decide which maintenance treatments should be applied.

Wyoming has more than 27,000 miles of roads, and about 2,550 miles of these are paved county roads managed by 23 counties. Most of these pavements are flexible asphalt roads, which can develop problems such as rutting, cracking, and roughness as they age. Limited funding and growing traffic make it even more challenging to keep these roads in good condition, so a strong maintenance strategy is important.

To evaluate pavement performance, Wyoming uses several condition indices such as rut depth, International Roughness Index (IRI), Pavement Condition Index (PCI), and Present Serviceability Index (PSI). WYDOT commonly uses the PSI model to understand how well pavements are functioning.

This project uses a pavement management system to study the condition of county roads in Wyoming. It compares county roads to state roads, analyzes one county, Campbell County, in more detail, and develops maintenance strategies under different scenarios, such as no maintenance, limited budgets, and performance-based goals. The results provide recommendations for how Wyoming can maintain its county roads effectively over the next five years.

Statement of the Problem

Wyoming's roadway system spans approximately 27,831 miles, yet only 6,844 centerline miles of state and interstate highways are currently evaluated using a formal Pavement Management System (PMS) operated by the Wyoming Department of Transportation (WYDOT) (1). In contrast, nearly 63% of the roadway network, which falls under local government jurisdiction, lacks any structured pavement management framework. This absence of systematic monitoring limits the ability of local agencies to effectively assess pavement performance, plan maintenance activities, and ensure long-term infrastructure reliability.

Many county roads in Wyoming were constructed decades ago without adherence to minimum design and engineering standards, leading to accelerated deterioration and reduced serviceability (2). As a result, an estimated 68% of local roads are currently classified as being in very poor

condition. Increasing industrial activity, mineral exploration, and associated heavy truck traffic are expected to intensify pavement degradation. However, local governments continue to face chronic budget constraints and recurring funding reductions, making timely maintenance and rehabilitation increasingly difficult. Consequently, counties are forced to prioritize only the most critical road segments, despite systemwide deterioration.

Despite WYDOT's successful implementation of a PMS for state highways, no similar system exists for county roads, and limited research has been conducted to develop optimized performance models or decision-support tools tailored to local road networks. This gap highlights the need for an optimization-based methodology that can guide counties in assessing pavement conditions, allocating limited resources, and improving long-term pavement performance. Developing such a framework is essential for enabling data-driven decision-making, reducing lifecycle costs, and ensuring a more resilient and sustainable county transportation system.

Objectives

The primary objective of this project is to develop an efficient Pavement Management System (PMS) for Campbell County at the network level. To achieve this, the study will first compare pavement conditions in Campbell County with conditions across Wyoming's statewide roadway systems, including interstate, primary, and secondary roads. The comparison will utilize key pavement condition indices such as the Pavement Condition Index (PCI), International Roughness Index (IRI), rutting measurements, and the Present Serviceability Index (PSI).

The project further aims to evaluate the condition of Campbell County's paved roads using these indices and assess how they compare to statewide county road conditions. Maintenance costs for Campbell County will be estimated using WYDOT's decision tree and cost guidelines. Additionally, the study will propose maintenance strategies and forecast pavement performance over a five-year analysis period under various funding levels. These scenarios will support the development of an optimized and practical pavement management approach for Campbell County.

Literature Review

Pavement Management System

Pavements are one of the most important parts of any transportation system because they support the movement of people and goods and help drive economic growth. In the United States, highways carried nearly 70% of all freight in 1993, showing how essential pavement networks are to national and international trade (3). However, as pavements age and deteriorate, transportation agencies must invest significant funds to keep them in acceptable condition. Figure 1 illustrates how pavement performance declines over time and how rehabilitation costs rise as deterioration progresses.

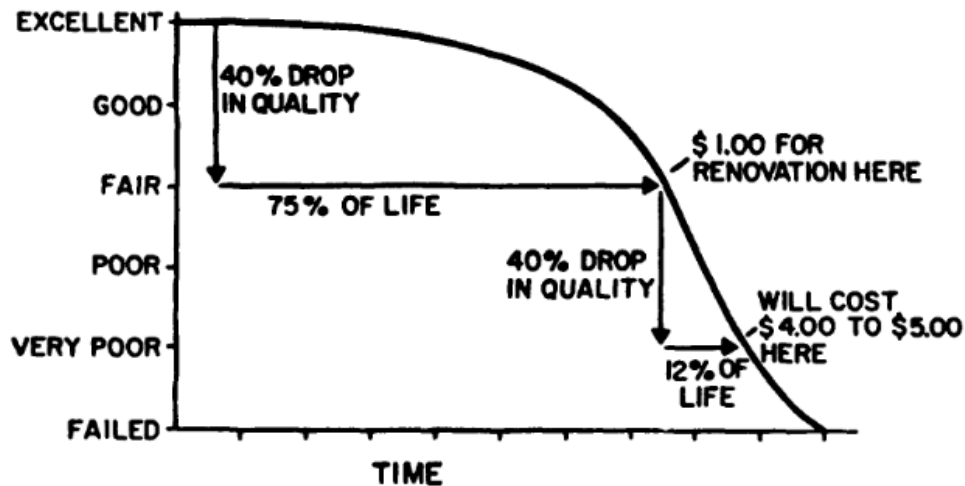


Figure 1: Typical pavement condition life cycle (4).

To address these challenges, agencies use a Pavement Management System (PMS). A PMS helps decision-makers select the best maintenance practices and allocate funds more effectively. The Federal Highway Administration defines PMS as “a set of tools or methods that can assist decision-makers in finding cost-effective strategies for providing, evaluating, and maintaining pavements in a serviceable condition” (5). By adopting PMS, agencies follow a systematic process that considers current pavement conditions, performance goals, funding needs, and long-term preservation strategies (6). Because these decisions must balance technical needs and financial constraints, PMS represents an intersection between engineering and policy.

Pavement management works at two main levels: the network level and the project level. The network level focuses on the entire roadway system, where agencies set policies, estimate budgets, and prioritize maintenance needs (7). It provides an overall picture of pavement health using both quantitative and qualitative assessments. On the other hand, the project level deals with specific roadway segments. It involves detailed analysis of pavement distress, traffic loading, materials, and environmental effects to determine appropriate maintenance or rehabilitation treatments. Project-level information supports the budgeting process and helps evaluate design alternatives based on performance and life-cycle costs.

Under the federal MAP-21 legislation, every state must develop a PMS to improve roadway conditions and overall system performance. Most state departments of transportation, including the Wyoming Department of Transportation (WYDOT), already operate their own PMS programs. WYDOT manages 6,844 miles of interstate and state highways using its PMS. However, there is currently no PMS for the 63% of Wyoming roads maintained by local governments. A study by Huntington et al. (2013) recommended the development of a pavement management system specifically for county roads (8).

Wyoming's counties manage approximately 2,550 miles of paved county roads, which have very different traffic patterns and local conditions compared to state highways (6). Because many county roads were built decades ago and have limited funding for maintenance, their condition continues to decline. Implementing a PMS tailored to county needs would help local agencies make cost-effective decisions about maintenance, rehabilitation, and long-term planning.

Given ongoing budget constraints and worsening pavement conditions, PMS offers a practical and effective approach to managing Wyoming's county road network. It helps determine what type of treatment is needed, where it should be applied, and when the treatment will be most effective (5). Overall, PMS provides a structured method for planning, budgeting, monitoring, and evaluating pavement performance across both network and project levels.

Pavement Condition Indices

Pavements naturally deteriorate over time because of traffic loading, environmental factors, and general wear. A key function of any Pavement Management System (PMS) is the ability to determine the current pavement condition and predict how it will change in the future (9). To do this effectively, pavements must be evaluated using an objective and reliable rating system. Pavement condition evaluation includes both structural and functional assessments: structural evaluation examines whether the pavement can carry loads, while functional evaluation focuses on ride quality, surface distress, and safety. These evaluations are expressed through various pavement condition indices, which help describe the overall health of the pavement network and guide the selection of appropriate maintenance or rehabilitation treatments. Commonly used indices include the Pavement Condition Index (PCI), Present Serviceability Index (PSI), International Roughness Index (IRI), rut depth, Remaining Service Life (RSL), and other state-specific measures such as the Pavement Quality Index (PQI) or Drivability Life (DL). Pavement condition indices play a critical role because they provide quantifiable and unbiased measurements of pavement distresses and performance, enabling agencies to prioritize projects effectively. Pavement condition analysis forms the basic foundation for more advanced pavement evaluations, commonly relying on PCI, IRI, and rutting as primary indicators (7).

Pavement Condition Index (PCI)

The Pavement Condition Index (PCI) was first created by the U.S. Army Corps of Engineers and Shahin et al. to evaluate the condition of airfield pavements (10). It was developed to organize and prioritize maintenance for aging airfields that showed many types of distress. Over time, the PCI system was adapted for roadway pavements and later standardized by ASTM, ensuring that pavement evaluations followed consistent and reliable procedures across all users.

PCI provides a numerical rating from 0 to 100 to represent the overall health of a pavement, where 0 indicates failure and 100 indicates a new pavement. The score is based on a visual inspection of each pavement section, documenting the type, severity, and extent of distress. To combine different distress types into a single meaningful score, deduct values were introduced, which act as weighting factors to reflect the impact of each distress on pavement condition.

The calculation of the PCI for an asphalt pavement follows a series of basic steps. These steps can be summarized as follows:

Step 1: Calculate the deduct value.

- a. Begin by recording the total amount of each type of distress at every severity level on the survey form. Distresses are measured in square feet, linear feet, or by the number of occurrences, depending on the type.
- b. Then, convert these measurements into percentages by dividing the distress quantity by the total sample unit area and multiplying by 100. This gives the density of each distress type and severity level.
- c. Finally, use the appropriate deduct value curves to determine the deduct value for each distress type and severity. For example, a typical curve may show how deduct values change for Alligator Cracking in asphalt pavements.

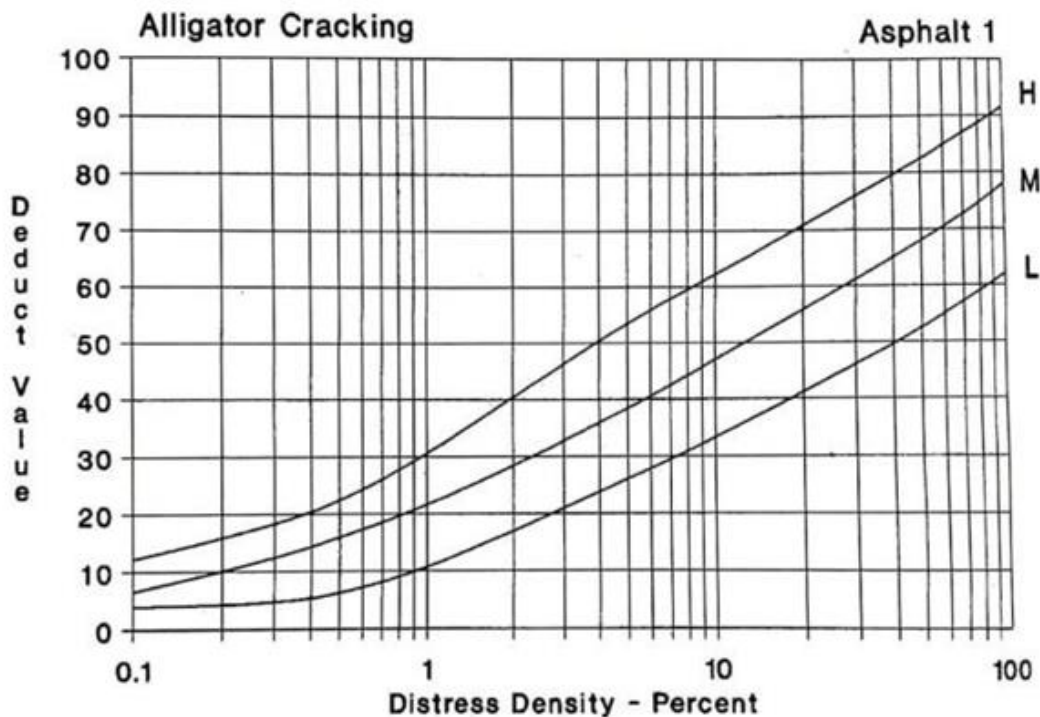


Figure 2: Determining Deduct Values using alligator cracking curves.

Step 2: Determine the maximum number of allowable deducts (m)

- a. If only one deduct value (or none) is greater than 2, then the total deduct value is used directly later in the calculation. In this case, Steps 2(b) and 2(c) are not needed.
- b. If more than one deduct value is greater than 2, list all individual deduct values in descending order (from largest to smallest).
- c. Then calculate the allowable number of deducts, m, using the formula for Asphalt Concrete (AC) pavements:

$$m_i = 1 + \frac{9}{98}(100 - HDV_i) \quad (1)$$

where:

- m_i = allowable number of deducts for sample unit i
- HDV_i = highest individual deduct value in that sample unit

d. Only up to m deduct values should be used, including any decimal portion. If the total number of available deduct values is less than m , then simply use all the deduct values.

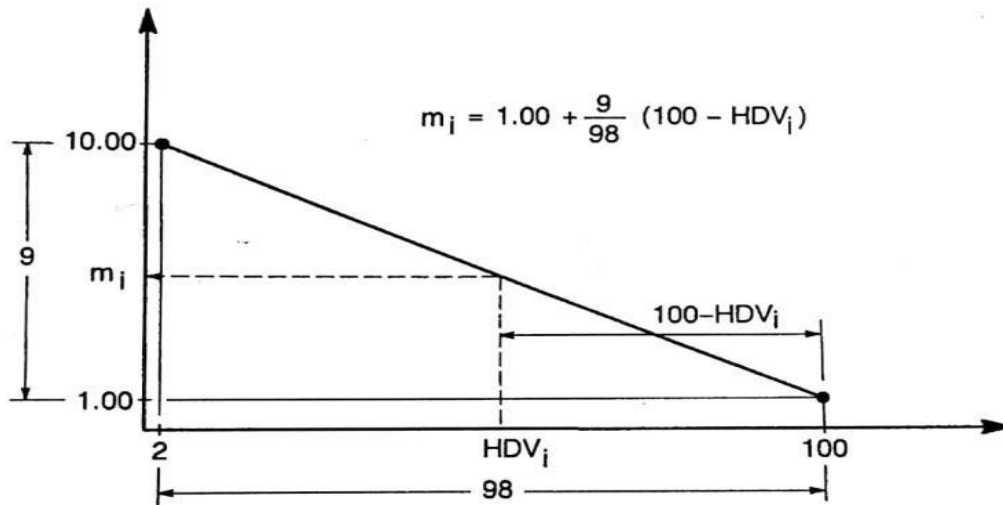


Figure 3: Calculation of maximum allowable deducts (m) for pavements.

Step 3: Determine the maximum Corrected Deduct Value (CDV)

- Identify how many deduct values are greater than 2 for Asphalt Concrete pavements.
- Add together all the individual deduct values to find the total deduct value.
- Use the appropriate correction curve from the PCI Distress Manual to find the Corrected Deduct Value (CDV). This curve gives the CDV based on the total deduct value and the number of deducts greater than 2.
- Next, reduce the smallest deduct value that is greater than 2 down to exactly 2.0. Then repeat Steps 3(a) through 3(c) until only one deduct value remains above 2.
- The max CDV is the largest of the CDVs determined.

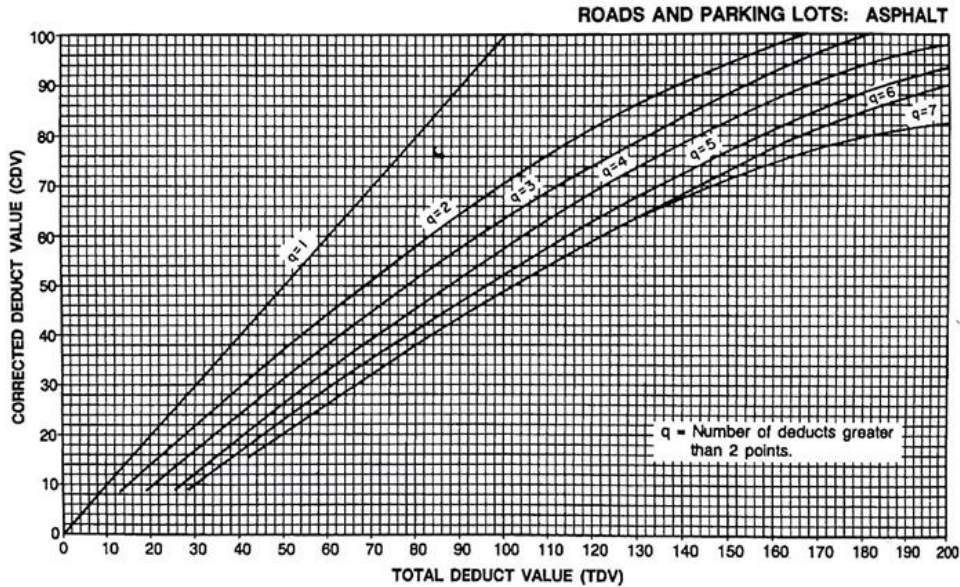


Figure 4: Corrected Deduct Value (CDV) graph for AC roads and Parking Lot.

Step 4: Calculation of PCI

$$PCI = 100 - \text{Maximum CDV} \quad (2)$$

International Roughness Index (IRI)

Roughness evaluation is an essential part of any Pavement Management System (PMS) because it reflects how the public experiences the ride quality of a roadway. Roughness describes the irregularities or distortions along the pavement's longitudinal profile. It is also used during construction quality control, where roughness measurements can influence contractor payment. To measure roughness, engineers focus on collecting pavement profile data using different types of profiling equipment. These systems are generally grouped into four categories: high-speed profilers, lightweight profilers, walking profilers, and traditional precision surveying methods. Modern roughness assessments commonly rely on noncontact profile measuring devices. The most common and internationally accepted measure of pavement roughness is the International Roughness Index (IRI), which has become the universal standard for evaluating ride quality.

Table 1: International Roughness Index (IRI) Categorization.

IRI Values (In/mile)	Category
<70	Excellent
70-100	Good
101-130	Fair
131-170	Poor
>170	Very Poor

Rutting

Pavement rutting refers to the formation of depression in the wheel paths of a roadway. It is a load-related distress in flexible pavement (11). Ruts are often accompanied by slight pavement displacement or shearing along the sides. Rutting was first identified as a major highway performance issue during the AASHO Road Test conducted between 1956 and 1960. It was recognized as an important factor influencing pavement performance and was included as a key component in the serviceability equation for flexible pavements (12). Rutting becomes most noticeable after rain, when the depressions fill with water. There are three main types of rutting: mix rutting, subgrade rutting, and densification. Mix rutting happens when the asphalt mixture is poorly designed or inadequately compacted, causing the surface layer to deform under traffic. Subgrade rutting occurs when the underlying soil or base layers fail, leading to deeper depressions that reflect on the surface. Densification rutting develops when the pavement was not compacted properly during construction; over time, traffic causes the material to compress further, creating ruts.

Rut depth represents the amount of permanent deformation that has formed in the pavement, usually in the wheel paths. According to WYDOT, any rut depth greater than 0.3 inches is considered a potential safety concern because it can affect how vehicles travel on the roadway (8). This issue is especially important for flexible pavements, where increasing rutting can reduce drainage and lower skid resistance. Rut depth is typically measured in either millimeters or inches using tools such as profilometers or laser-based equipment. When rutting becomes excessive, it can lead to faster pavement deterioration, increased fatigue, and serious safety problems like hydroplaning or loss of vehicle control. Several different methods are used to measure rut depth, as shown in the figure below.

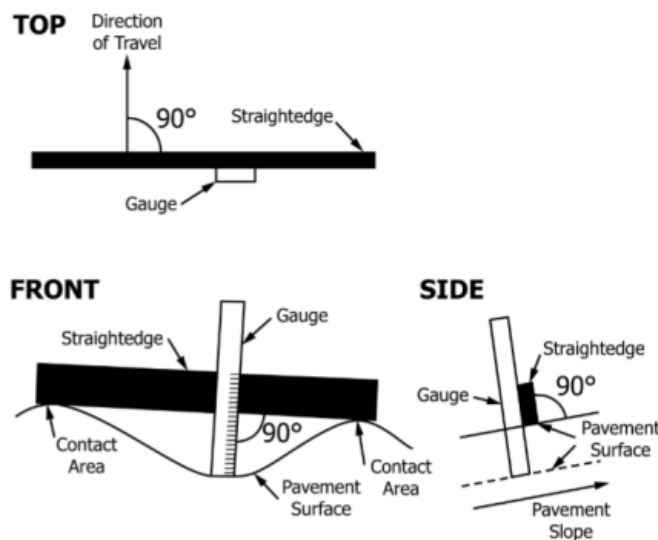


Figure 5: Rut Depth Measurement Using Straight Method.

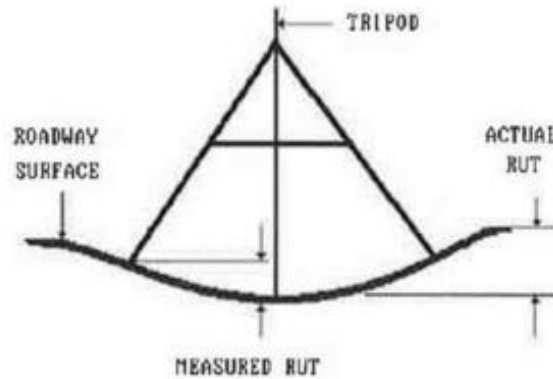


Figure 6: Rut Depth Measurement Using Tripod.

Present Serviceability Index (PSI)

The Present Serviceability Index (PSI) was first introduced during the AASHO Road Test in the 1960s to describe how well a pavement performs in its current condition (13). Serviceability was defined as “the adequacy of a section of pavement in its existing condition to serve its intended use” (14). PSI summarizes this concept using a numerical scale from 0 to 5, where 0 represents very poor performance and 5 represents excellent serviceability from the perspective of road users. Although PSI is intuitive and easy to understand, its original form relies on user perception, making it partially subjective. To overcome this limitation, WYDOT developed a predictive PSI model based on measurable pavement characteristics such as roughness, rut depth, and PCI, allowing for a more objective evaluation of pavement condition (15).

The WYDOT PSI model estimates pavement serviceability using three measurable inputs: the International Roughness Index (IRI), mean rut depth, and the Pavement Condition Index (PCI). The model is expressed as:

$$PSI = 5.35e^{-0.0058*IRI} - 4 * (Rut)^2 - 3\left(1 - \frac{PCI}{100}\right) \quad (3)$$

Where:

- IRI = International Roughness Index (inches/mile)
- Rut = Mean rut depth (inches)
- PCI = Pavement Condition Index

In this model, PSI is the dependent variable, while IRI, rut depth, and PCI are the independent variables used to estimate how well a pavement segment can carry high-speed, high-volume traffic under its present condition (1).

Table 2: Present Serviceability Index (PSI) Categorization.

PSI Values	Category
Greater than 3.5	Excellent
3.01 - 3.5	Good
2.51 - 3.0	Fair
2.0 – 2.5	Poor
Less than 2.0	Very Poor

Pavement Performance Models

Performance models are an essential part of any pavement management system because they help predict how pavement conditions will change in the future. These models estimate when a pavement section will need maintenance, repair, or full rehabilitation. Pavement performance modeling is generally carried out using two approaches: deterministic models and probabilistic models. By forecasting future pavement conditions, these models support better planning, help agencies choose the most effective maintenance strategies, and allow for more efficient use of limited financial resources. When prediction accuracy improves, agencies can make smarter investment decisions, reduce overall maintenance costs, and ensure pavements remain in good condition for longer periods.

The following sections explain each approach in more detail and describe how these models help forecast future pavement conditions.

Deterministic Performance Models

A deterministic approach is one of the most commonly used modeling techniques in pavement management. It relies on methods such as regression analysis, mechanistic or mechanistic–empirical relationships, and other mathematical functions developed from long-term pavement data. The goal is to predict a single outcome based on its relationship with one or more input variables. In a deterministic model, the results are fully determined by the chosen parameters and initial values. This means the model produces the same output whenever the same inputs are used, without involving probability or statistical variation. Although deterministic models are straightforward and easy to apply, their accuracy can be affected by unusual data or outliers. In such cases, a probabilistic approach may provide more reliable predictions.

Probabilistic Performance Models

A probabilistic approach uses probability-based methods to predict how pavement conditions may change over time. Instead of giving a single predicted value, this approach provides a range of possible outcomes based on the likelihood of a pavement section moving from one condition state to another. Probabilistic models account for uncertainty and variation in input data, making them especially useful at the network level where decisions must consider many factors and limited detailed information. These models help agencies evaluate the risk of deterioration and the reliability of different maintenance strategies. Common probabilistic tools used in PMS include

Markov transition matrices, Monte Carlo simulations, Bayesian methods, and sensitivity analyses. Unlike deterministic models, which always produce the same result for the same inputs, probabilistic models incorporate randomness, meaning that identical inputs can lead to multiple possible outputs depending on their assigned probabilities. This allows the model to better reflect real-world variability and uncertainty.

Treatment Classification

Pavements are grouped into different treatment categories based on their condition and the type of maintenance or rehabilitation they need. Treatment categorization is an important part of a Pavement Management System (PMS) because it helps agencies organize, prioritize, and select the most appropriate maintenance actions. These categories are based on the pavement's current condition, the expected effectiveness of each treatment, and the cost involved. Common PMS treatment classes include routine maintenance, preventive maintenance, minor rehabilitation, major rehabilitation, and full reconstruction. This classification system allows managers to match the right treatment to the right pavement at the right time, ensuring efficient use of resources and better long-term pavement performance.

Preventive Maintenance

Preventive maintenance plays an important role in keeping roads in good condition over the long term. It helps maintain safety and reduces future repair costs. By inspecting pavements regularly, problems such as small cracks or early potholes can be found before they turn into bigger issues. These inspections may involve visual checks or specialized tools that detect hidden problems beneath the surface.

Addressing defects early, such as sealing cracks or filling small potholes, prevents water from entering the pavement and causing serious damage. Preventive treatments can also restore aging road surfaces, improve strength, and protect the pavement from weather effects like sunlight, moisture, and temperature changes.

Corrective Maintenance

Corrective maintenance focuses on fixing specific pavement problems to restore proper function. It is usually performed in response to noticeable or urgent issues. Common corrective actions include repairing potholes, patching damaged areas, and resealing joints. These treatments target localized areas of deterioration and are applied as needed to address problems that have already developed.

Minor Rehabilitation

Minor rehabilitation involves making focused repairs to improve pavement conditions without replacing the entire structure. It is a cost-effective method designed to extend the pavement's service life and keep it performing well. Typical techniques include fixing localized problems such as potholes, cracking, or minor rutting, applying surface treatments like thin overlays or seal coats

to strengthen the surface, and improving drainage to reduce water damage. These actions help maintain pavement usability, enhance safety for road users, and reduce major disruptions to traffic.

Routine Maintenance

Routine maintenance includes regular activities carried out to keep pavements safe and in good working conditions. These tasks are performed repeatedly and help prevent small issues from becoming larger problems. Examples include repainting pavement markings, sealing minor cracks, and sweeping debris from the roadway. Such actions help maintain safety, improve visibility for drivers, and keep the pavement looking clean and well-maintained.

Reconstruction

Reconstruction is carried out when a pavement has reached a stage where it can no longer be restored through routine repairs or rehabilitation. At this point, the pavement has extensive structural damage, widespread distress, or severe deterioration that makes smaller fixes ineffective. During reconstruction, the entire existing pavement, often including underlying layers, is removed. A completely new pavement structure is then built from the ground up. This process restores full strength, improves smoothness, and brings the pavement back to a safe and reliable condition. In essence, reconstruction provides the roadway with a fresh, long-lasting foundation so it can meet current and future traffic demands.

Pavement Management Optimization

Optimization plays an essential role in a Pavement Management System (PMS) because it helps agencies make the best use of limited resources while improving roadway performance. In this project, two main optimization goals are considered: maximizing pavement performance and minimizing maintenance costs. To achieve these objectives, optimization analysis is conducted using the Solver tool in Microsoft Excel, which allows the user to determine the optimal value of one or more target variables while applying specific constraints.

The optimization process begins with organizing roadway data from multiple networks and calculating key pavement condition indicators such as IRI, rut depth, PCI, and PSI. Once the data are ready, the optimization model steps shown in figure 7 help to choose the most suitable maintenance treatments. The model incorporates inputs such as roadway segmentation, functional classification, rut depth, and performance predictions to identify the most appropriate treatments for each pavement segment.

The optimization framework also integrates the PSI model and the decision tree, both of which rely on rut depth as an important factor in determining suitable rehabilitation methods. Rut depth is especially significant because it directly influences safety, ride quality, and overall pavement condition. After running the optimization, the system generates a list of recommended maintenance projects for the next five years, ensuring that all selected treatments fit within the available budget. This approach enables data-driven decisions that balance performance improvement with financial efficiency.

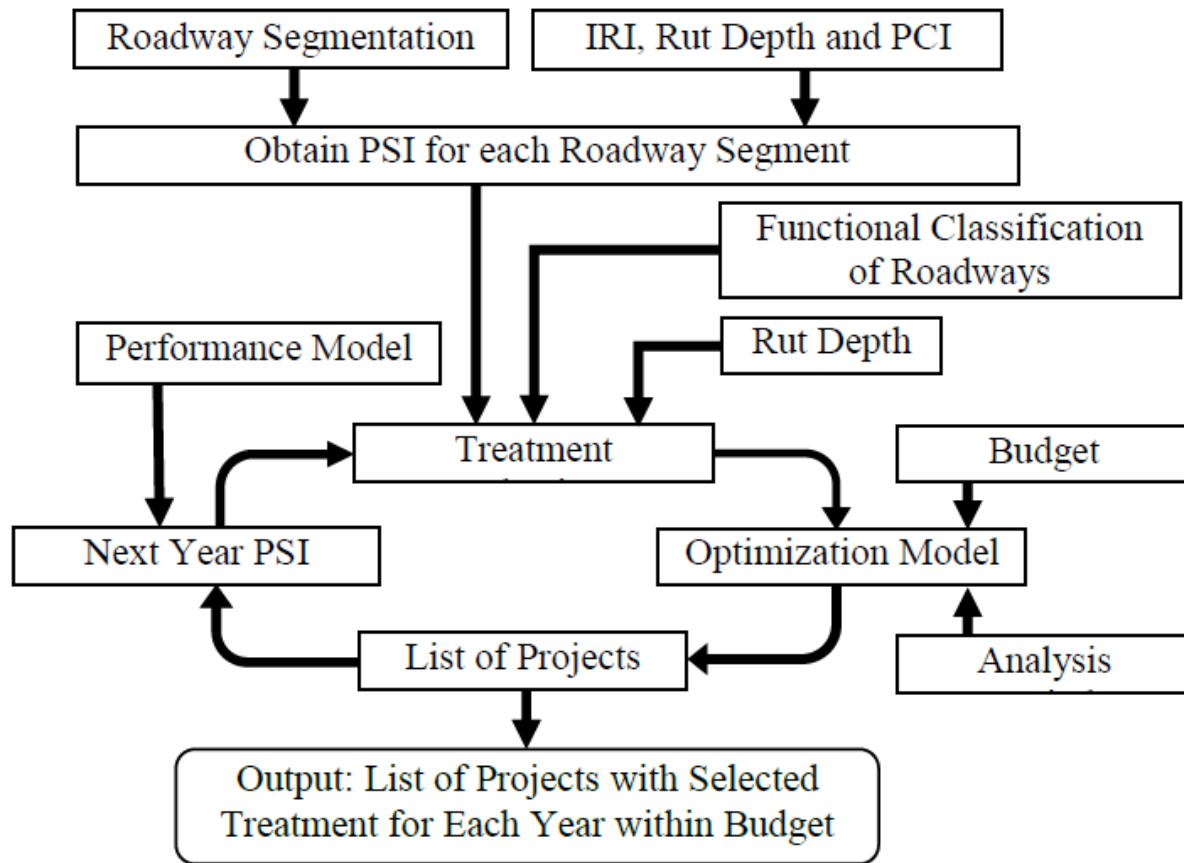


Figure 7: Methodology for PMS optimization model.

Treatment selection framework

A decision tree is used in this project to systematically identify the most suitable pavement treatment for each roadway segment. This approach allows engineers to make consistent and informed decisions based on available pavement condition data. As shown in the decision tree (Figure 8), the process begins by categorizing each segment according to its Present Serviceability Index (PSI). After determining the PSI range, additional factors such as rut depth and roadway width are evaluated to guide the treatment choice.

Each branch of the decision tree leads to a specific treatment category—GM, 1-R, 2-R, 3-R, 4-R, or 5-R—based on the combination of PSI values, rut depth thresholds, and road width. These treatment categories correspond to various maintenance and rehabilitation strategies, whose descriptions and estimated costs are shown in Table 3. WYDOT’s Construction Design Guide includes a wide range of maintenance techniques, such as milling, overlays, chip seals, micro-surfacing, seal coats, and full-depth reclamation, and the treatments used in this project reflect the most common and practical options for Wyoming’s county roads.

Using the decision tree, pavement segments with PSI below 1.0 are assigned to 5-R, indicating the need for full reconstruction due to severe deterioration. When PSI falls between 1.0 and 2.0, the roadway width determines whether a segment receives a 4-R or 2-R treatment. For segments with

PSI between 2.0 and 2.5 or between 2.5 and 3.0, rut depth becomes the key factor: a rut depth greater than 0.3 inches typically leads to higher-level rehabilitation such as 3-R or 4-R, while lower rutting suggests treatments such as 1-R or 2-R. Segments with PSI above 3.0 generally require only GM (General Maintenance), as their condition is still relatively good.

By combining PSI, rut depth, and road width, the decision tree ensures that each pavement segment receives the most appropriate and cost-effective treatment. This structured selection process supports better budgeting, efficient use of resources, and improved pavement performance across Wyoming’s roadway network.

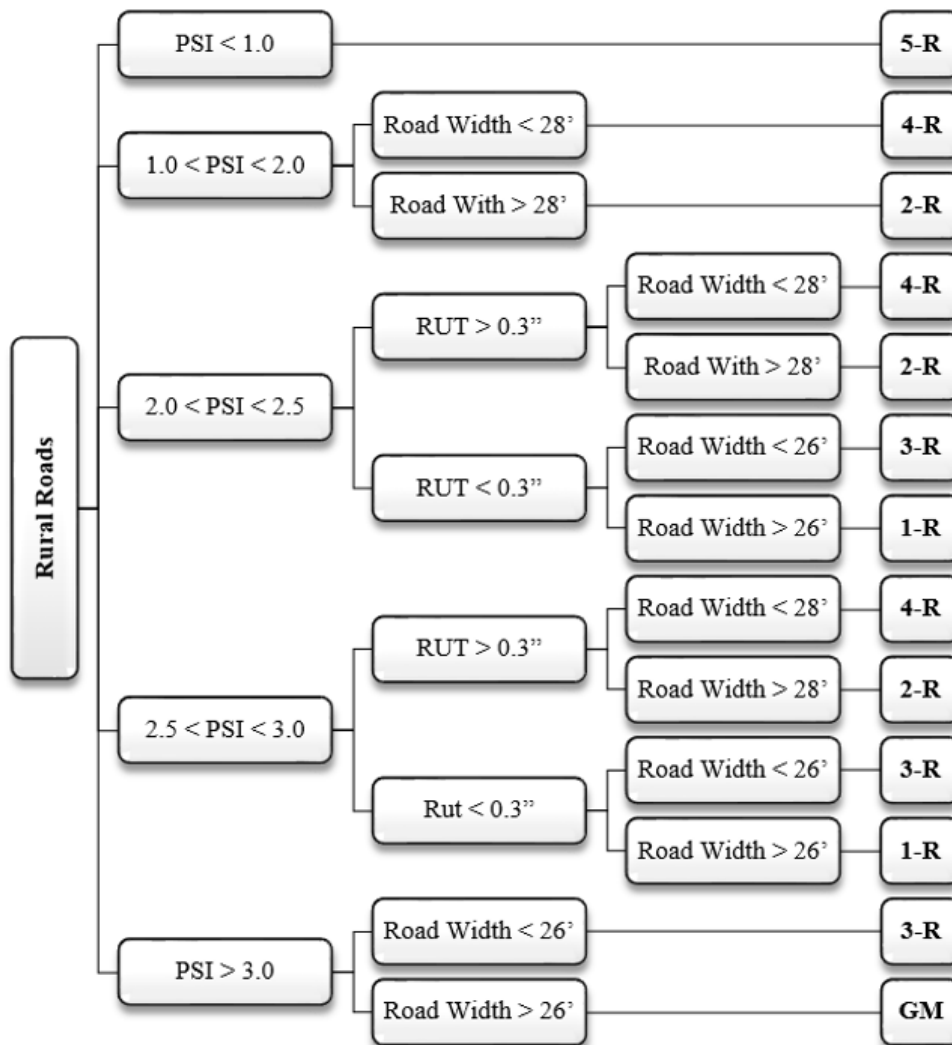


Figure 8: Pavement Management System Decision Tree.

Table 3: Treatment and Rehabilitation strategies for county roads.

Treatment Type	Details and Applications	Est. Cost/Mile
GM General Maintenance	➤ General Maintenance Procedure	\$0
	➤ Asphalt Patching	
	➤ Pothole Repair	
	➤ Crack Sealing	
	➤ Road Striping	
1-R Preventive Rehabilitation	➤ Chip Seal	\$60,000
	➤ Micro-surface	
	➤ Thin Overlay (<2")	
2-R Minor Rehabilitation	➤ Surface Preparation (mil, level, full-depth reclamation, or combination thereof)	\$250,000
	➤ Thick Overlay (>2")	
	➤ Seal Coat	
3-R Preventive Rehabilitation with Shoulder Needs	➤ 1-R plus shoulder or widening requirements	\$350,000
	➤ Applicable on roads in good condition with shoulder needs	
4-R Major Rehabilitation	➤ 2-R plus shoulder or widening requirements	\$650,000
	➤ Applicable on narrow roads with shoulder or widening needs	
5-R Full Reconstruction	➤ Complete Reconstruction	\$1,200,000

Data Collection

Segmentation

Segmentation is an important first step in developing a pavement management system because it organizes roadway data into manageable units. Although many types of data can be collected, not all of them are necessary for low-volume paved roads, and gathering unnecessary information would waste time and resources. For this project, the pavement network was divided into multiple sections. Roads may be divided into segments based on factors such as traffic demand, changes in pavement surface type, and the presence of major intersections (16).

The position of each road segment is recorded using GPS technology and then stored in a GIS database. This segmentation work was carried out by WYT²/LTAP staff and Pathway Services. County-level data include information for every segment from 2014 to 2019, with pavement condition indicators such as PCI, IRI, and rut depth available for each section. Because the data collection alternated between the eastern and western parts of the counties, different areas were surveyed in alternating years. The Wyoming Road Network database also contains pavement data

for state highways and primary, secondary, and urban roads; however, interstate data were not used in this project.

Automated Data Collection

WYDOT uses a specialized vendor to collect pavement condition data across the state, including IRI, rutting, faulting, and cracking percent. The vendor's vehicles are calibrated and tested extensively to ensure accuracy and must meet strict AASHTO standards. Even with these procedures, daily checks and regular validation are performed to maintain high data quality.

To measure pavement thickness on county roads, WYT²/LTAP hired Resource International, Inc., which used Ground Penetrating Radar (GPR) to determine the depth of asphalt and base layers (17). Automated data collection methods offer several advantages compared to traditional manual surveys. These include:

- **Improved Efficiency:** Automated tools gather pavement information at a much faster rate, allowing surveys to be completed quickly and more often.
- **Accuracy:** Mechanical systems minimize human error and produce consistent results, allowing for better comparison over time.
- **Comprehensive Data:** Automated equipment can gather large amounts of detailed information, giving a more complete picture of pavement conditions.
- **Quick Response:** Faster access to new data helps agencies identify issues sooner, improve safety, and plan maintenance more effectively.

Data Analysis & Results

Task 1: Compare between the pavement condition of county roads and statewide roadway systems (Interstate, primary, and secondary roads).

Pavement condition indices are grouped into categories based on their value ranges. For the Pavement Condition Index (PCI), scores above 85 indicate a high-quality pavement, values from 70 to 85 represent medium condition, and anything below 70 is considered low. The International Roughness Index (IRI) is rated as Excellent when it is below 70, Good from 70 to 100, Fair from 101 to 130, Poor from 131 to 170, and Very Poor when it exceeds 170. Rut depth is classified into two groups: 0.3 inches or less, which indicates acceptable conditions, and greater than 0.3 inches, which signals more severe rutting. The Present Serviceability Index (PSI) is also divided into several ranges: greater than 3.5, between 3.01 and 3.5, 2.51 to 3.0, 2.0 to 2.5, and below 2.0, with lower values indicating poorer pavement performance.

PSI

The pavement condition of county, interstate, primary, and secondary roads was compared using the Present Serviceability Index (PSI), as shown in Figures 9–12. PSI values range from 0 to 5,

where scores below 2.0 indicate very poor conditions and scores above 3.5 represent excellent pavement performance. The charts show that interstate, primary, and secondary roads are generally in much better condition than county roads. Interstate roads have the highest share of excellent pavements at 83%, followed by primary roads at 56% and secondary roads at 45%. A large proportion of these road classes also fall within the “good” category. In contrast, county roads show a significantly lower percentage of excellent pavements (14%) and a much higher share of lower-quality segments, including 3% poor and 4% very poor. This indicates that county roads experience more deterioration and require greater maintenance attention compared to higher-classification roadways.

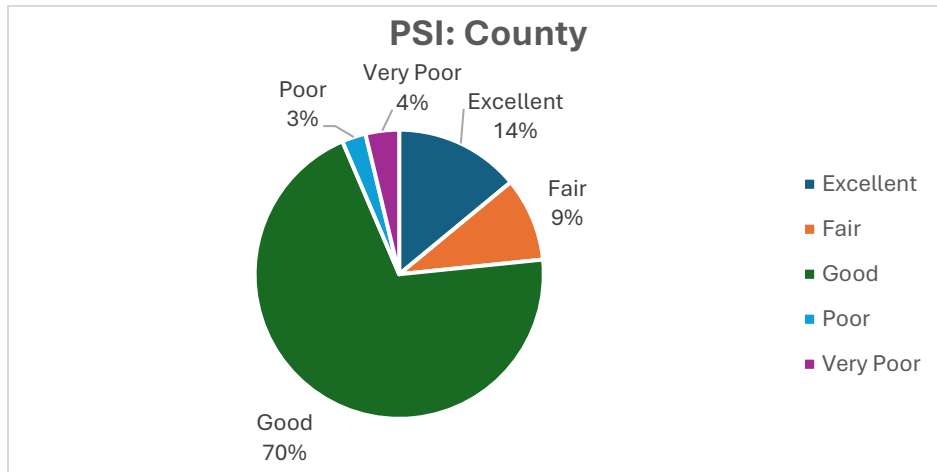


Figure 9: Pavement Condition of County Road (PSI).

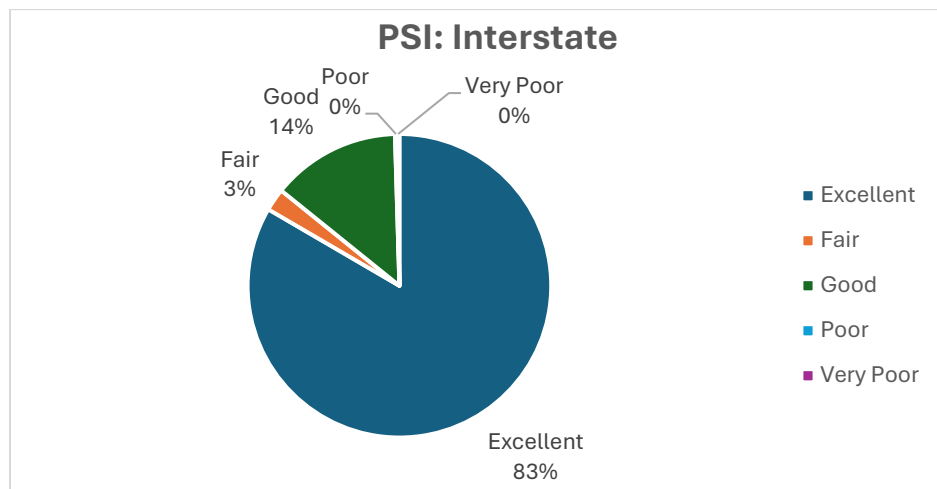


Figure 10: Pavement Condition of Interstate Road (PSI).

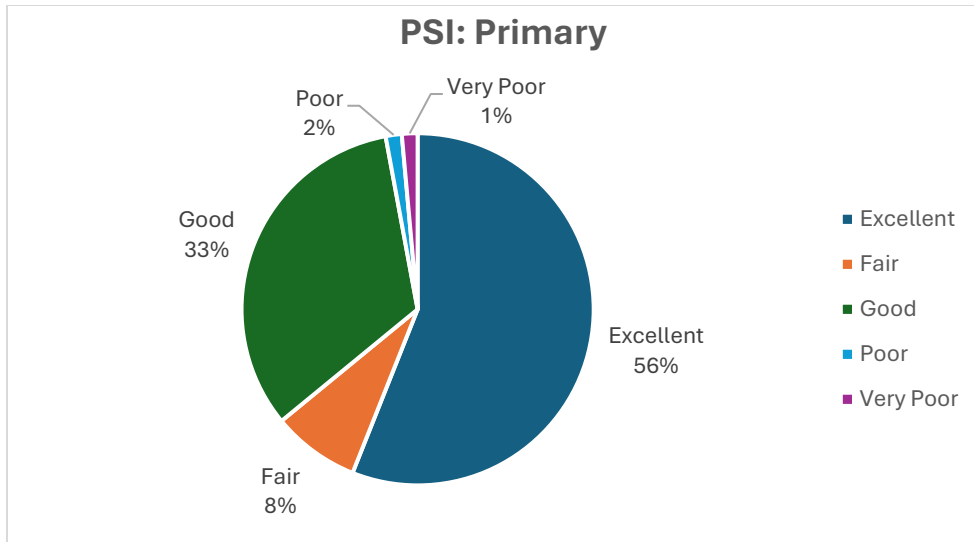


Figure 11: Pavement Condition of Primary Road (PSI).

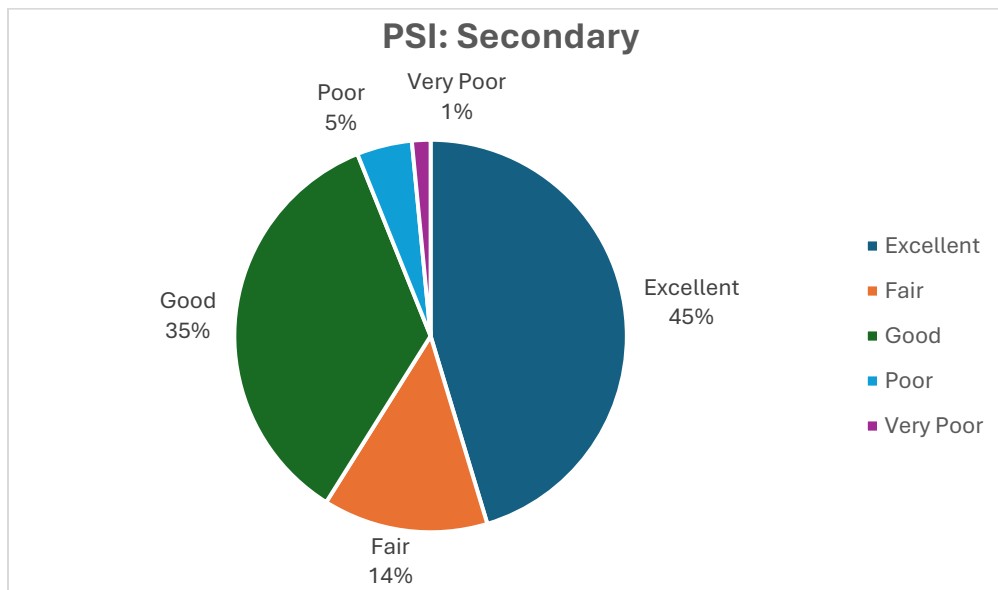


Figure 12: Pavement Condition of Secondary Road (PSI).

PCI

The Pavement Condition Index (PCI) distribution for county, interstate, primary, and secondary roads is shown in the figures. PCI values above 85 are classified as High, values between 70 and 85 as Medium, and values below 70 as Low. Across all roadway classes, the majority of segments fall within the High PCI category, indicating generally good surface condition. Interstate roads have the highest share of High PCI segments at 95.2%, followed by primary roads at 90.7%, secondary roads at 89.9%, and county roads at 87.9%. The proportion of Medium PCI segments remains small for all classes, while Low PCI segments make up less than 1% across the entire network. Although county roads show slightly lower overall PCI performance compared to

interstate, primary, and secondary roads, all systems exhibit a strong predominance of pavements in good surface condition.

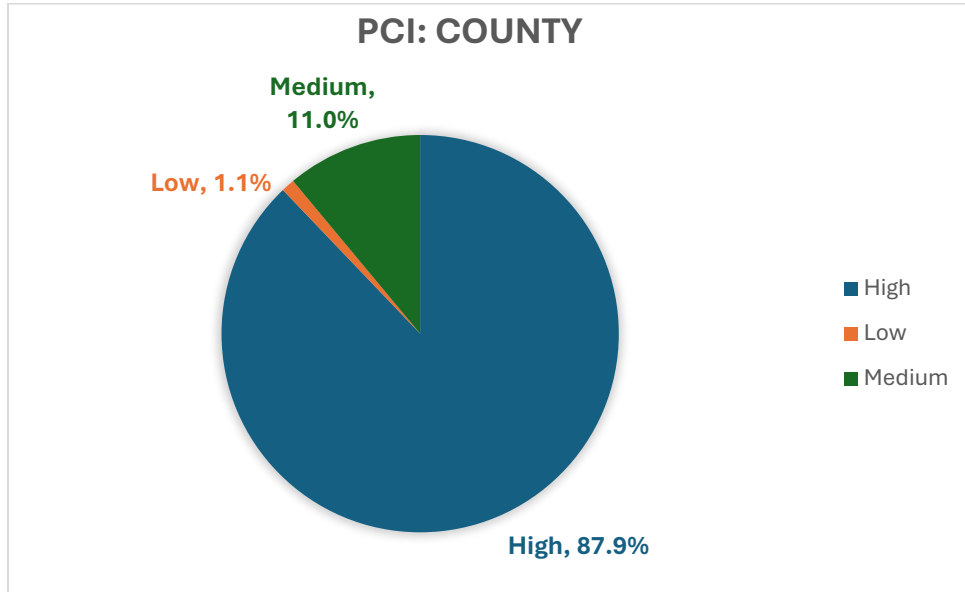


Figure 13: Pavement Condition of County Road (PCI).

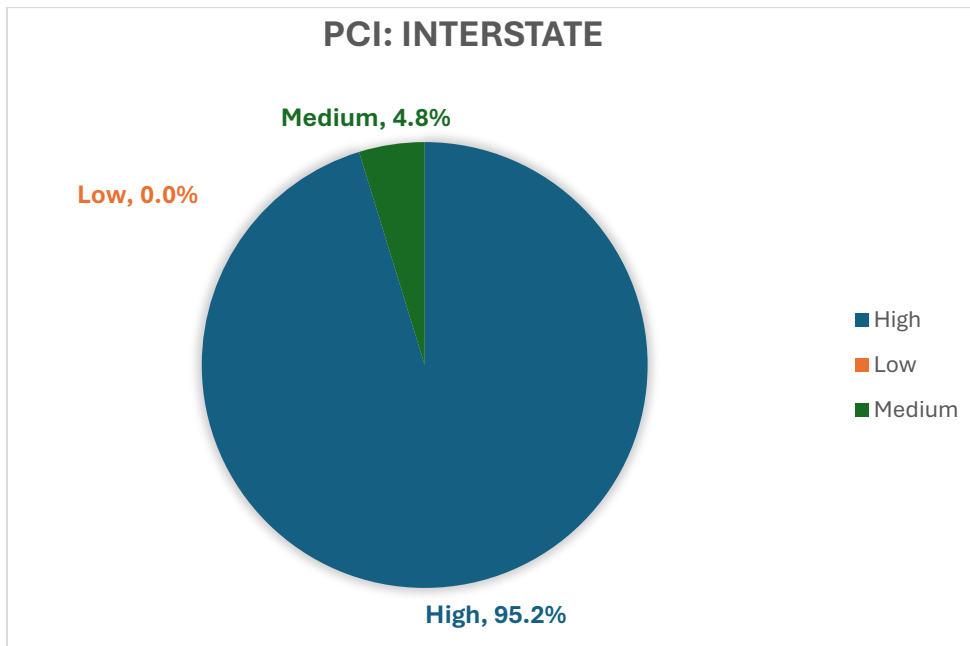


Figure 14: Pavement Condition of Interstate Road (PCI).

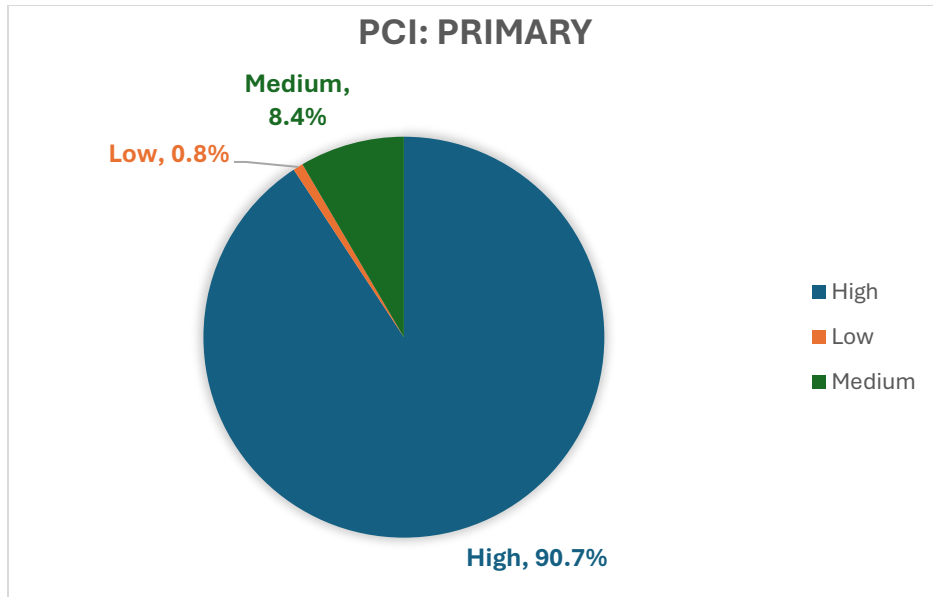


Figure 15: Pavement Condition of Primary Road (PCI).

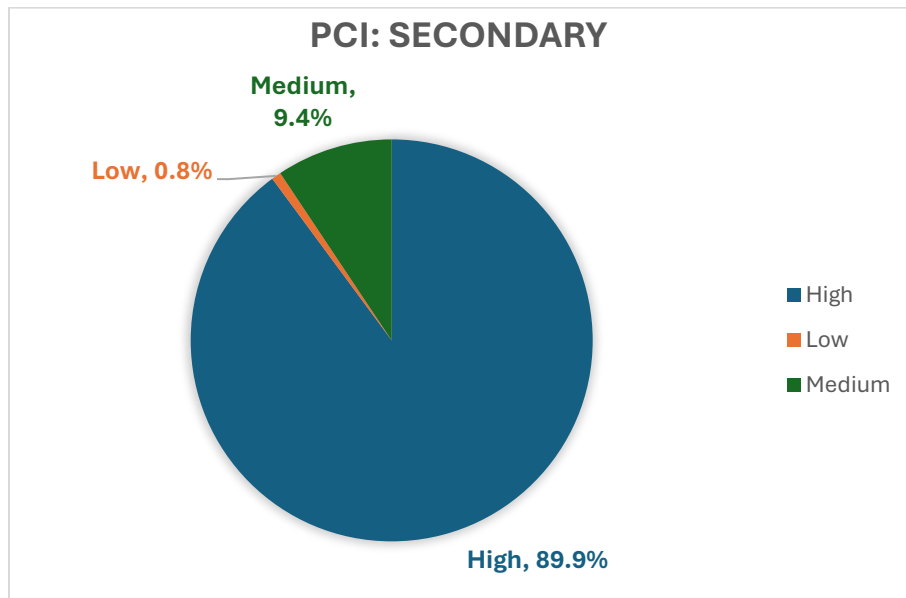


Figure 16: Pavement Condition of Secondary Road (PCI).

IRI

The International Roughness Index (IRI) distributions for county, interstate, primary, and secondary roads are shown in Figures 17–20. These figures highlight clear differences in ride quality across the roadway network. Interstate roads exhibit the smoothest pavements, with 37% of segments classified as Excellent and 38% as Good, while only 6% fall under Poor and 4% under Very Poor conditions. Primary roads show more variation, consisting of 16% Excellent, 32% Good, 26% Fair, 12% Poor, and 14% Very Poor. Secondary roads follow a similar trend, with 10%

Excellent, 28% Good, 25% Fair, 21% Poor, and 16% Very Poor. In contrast, county roads display the roughest surfaces, with only 1% Excellent, 8% Good, and 15% Fair, while 20% are classified as Poor and a large 56% as Very Poor. Overall, Figures 17–20 clearly demonstrate that interstate, primary, and secondary roads maintain much smoother ride quality compared to county roads, which show substantial roughness and a greater need for maintenance intervention.

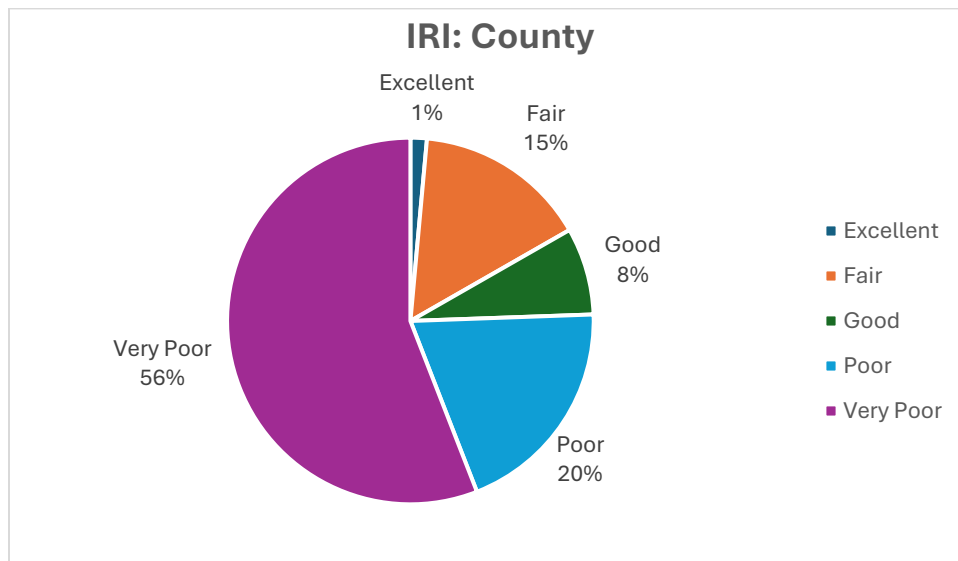


Figure 17: Pavement Condition of County Road (IRI).

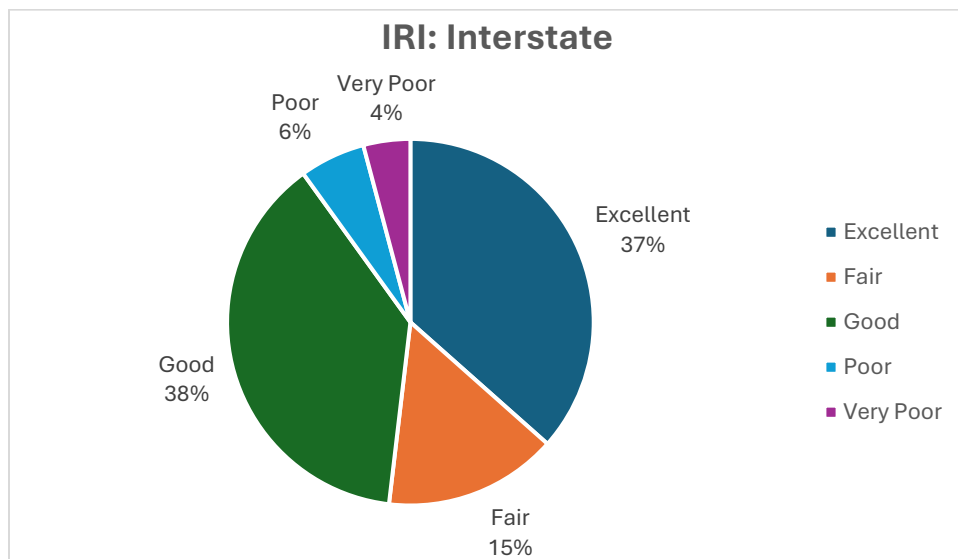


Figure 18: Pavement Condition of Interstate Road (IRI).

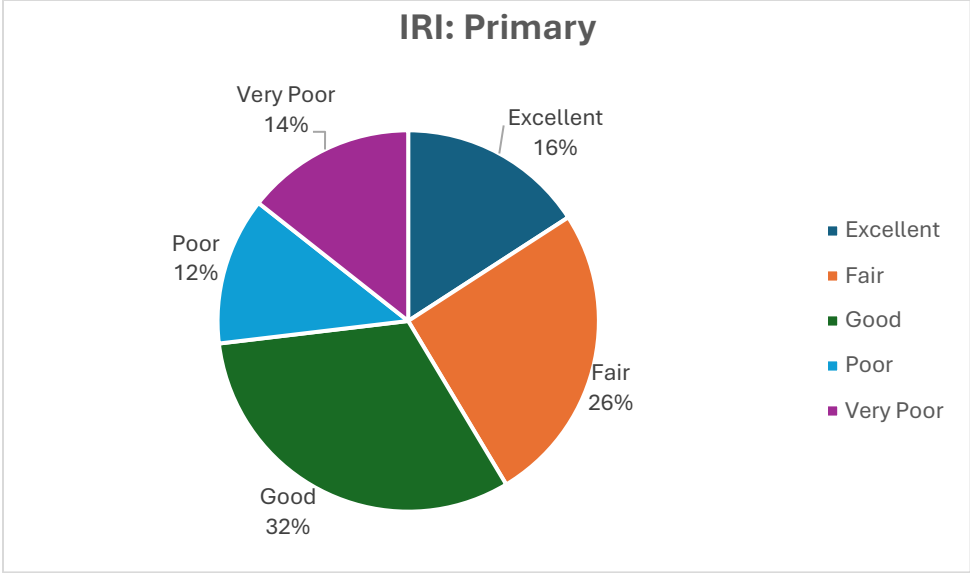


Figure 19: Pavement Condition of Primary Road (IRI).

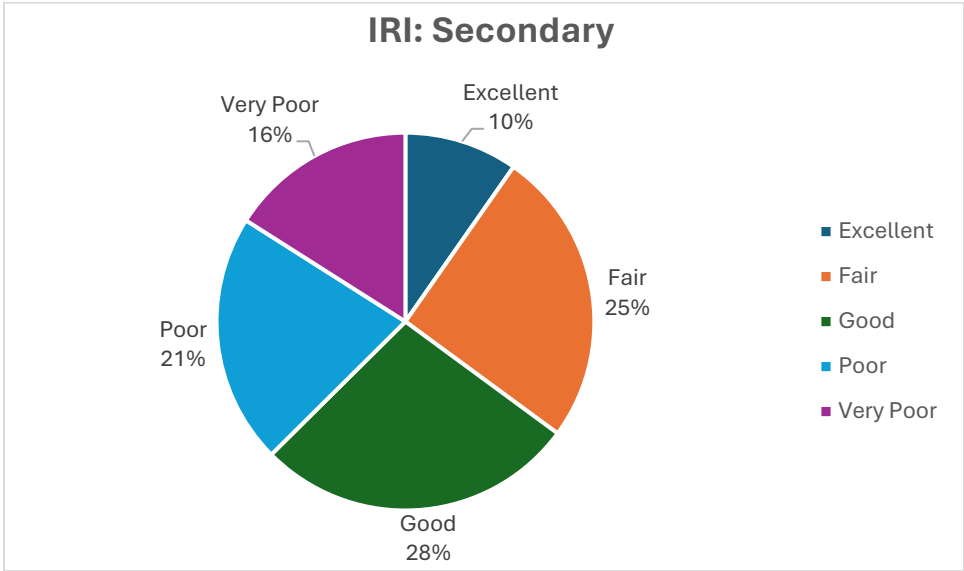


Figure 20: Pavement Condition of Secondary Road (IRI).

Rut

The rut depth distributions for county, interstate, primary, and secondary roads are shown in Figures 21–24, using the standard classification where rut depths greater than 0.3 inches are considered high and those below 0.3 inches are considered low. Across all roadway types, most segments fall within the low-rut category. Primary roads show the best performance, with 97% of segments exhibiting low rut depth and only 3% classified as high. Secondary roads also perform well, with 93% low and 7% high rutting. Interstate roads follow closely, with 90% low and 10% high rut depth. County roads, however, have the highest proportion of deeper ruts, with 87% of

segments classified as low and 13% as high. These results indicate that while rutting is generally well controlled across the network, county roads experience the greatest share of severe rut depths and may require more focused maintenance efforts.

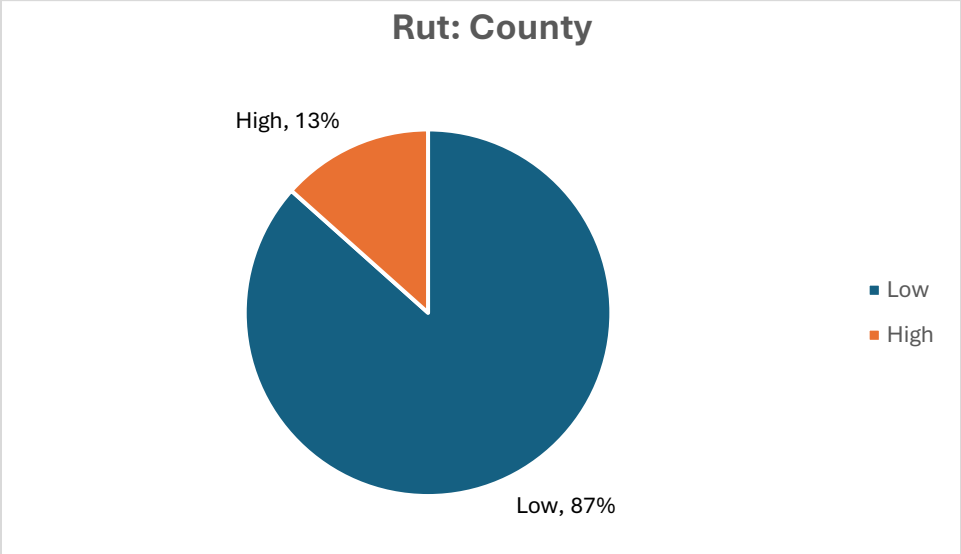


Figure 21: Pavement Condition of County Road (Rut).

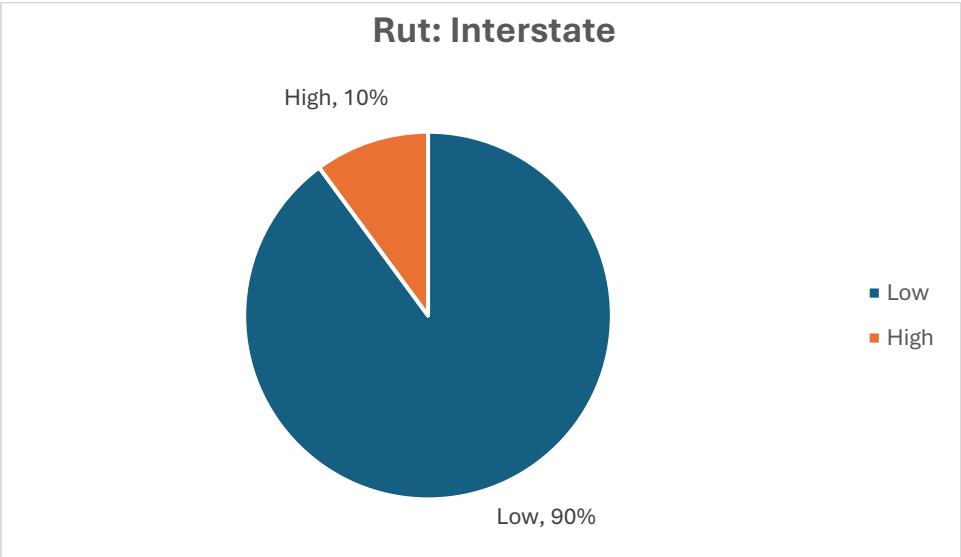


Figure 22: Pavement Condition of Interstate Road (Rut).

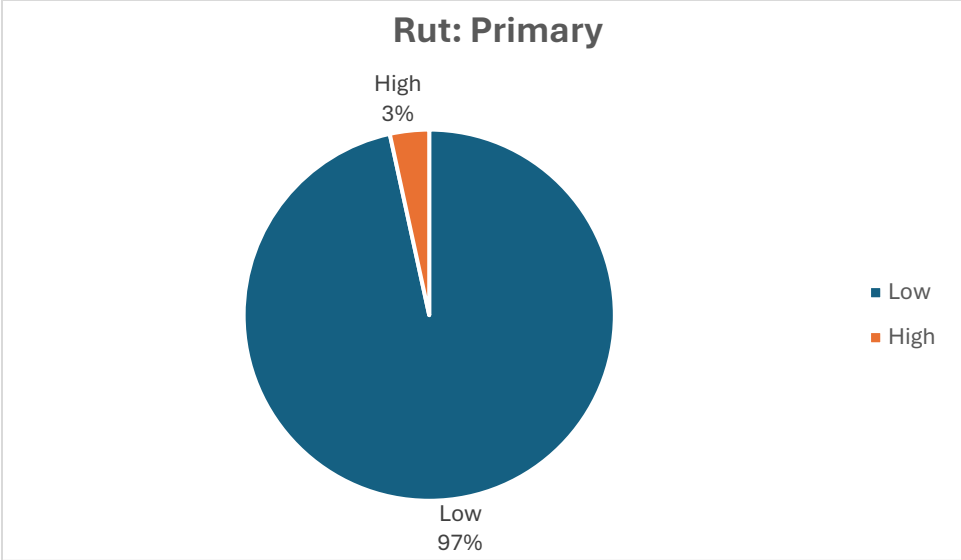


Figure 23: Pavement Condition of Primary Road (Rut).

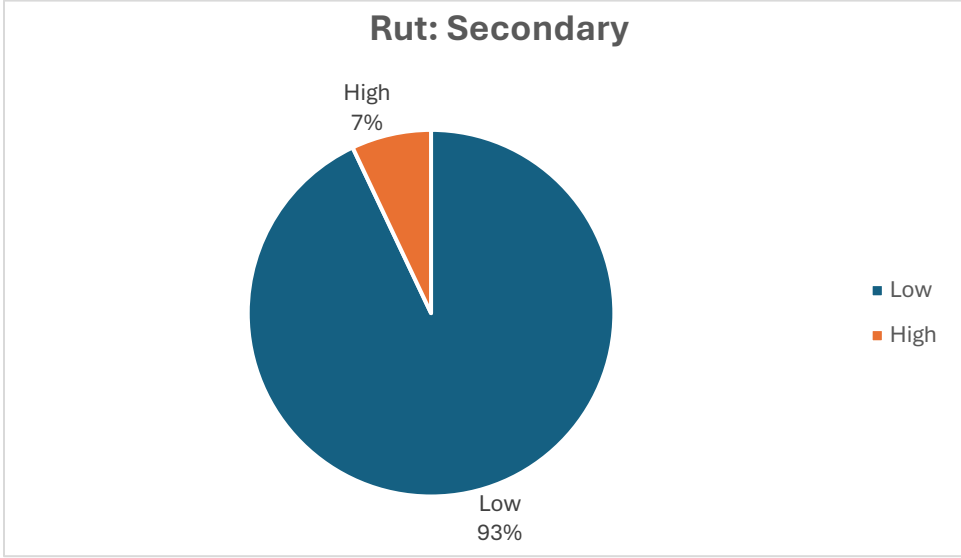


Figure 24: Pavement Condition of Primary Road (Rut).

Task 2: Comparison of Campbell County with Statewide Counties

This section presents a comparative assessment of Campbell County’s roadway conditions against statewide county road conditions, using pavement indicators such as PCI, rut depth, IRI, and PSI.

PCI

Based on the PCI data for 2014, 2016, and 2018, the pavement condition of Campbell County shows a noticeable decline over time. In 2014, the county recorded a high PCI value of 87.59,

indicating excellent pavement conditions and performance well above the statewide average. However, by 2016, PCI had dropped significantly to 72.2, placing Campbell County in the medium condition category. A similar level was observed in 2018, with a PCI of 74.83, suggesting that the pavement condition stabilized but did not return to its earlier high standard. Overall, this trend shows that while Campbell County's roads were in excellent condition in 2014, their condition gradually declined in the following years, eventually becoming comparable to the average condition of county roads across Wyoming.

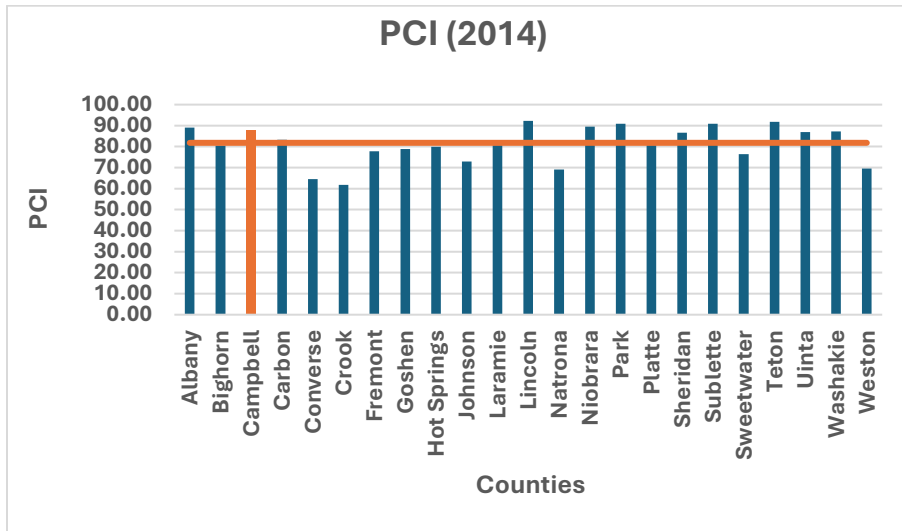


Figure 25: Overall PCI Summary of County Roads in Wyoming in 2014.

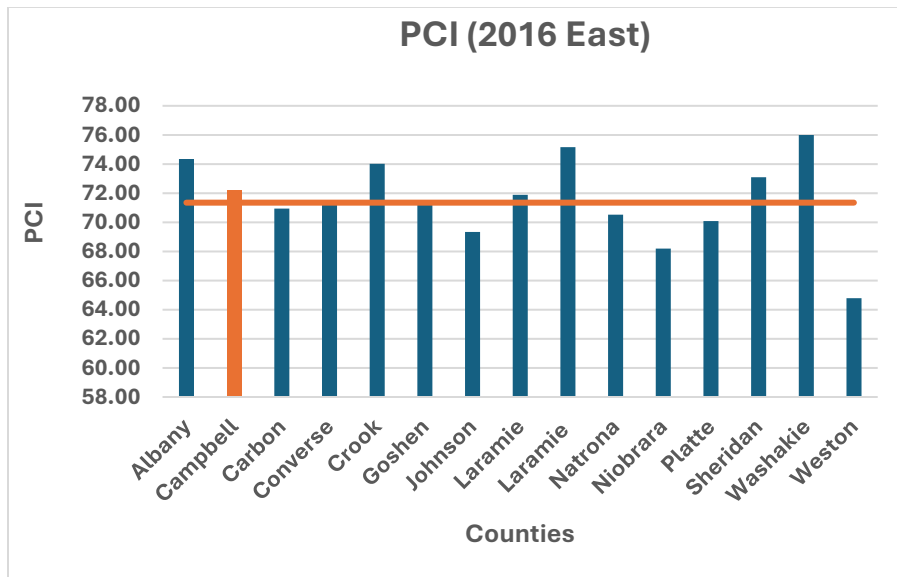


Figure 26; Overall PCI Summary of County Roads in East Wyoming in 2016.

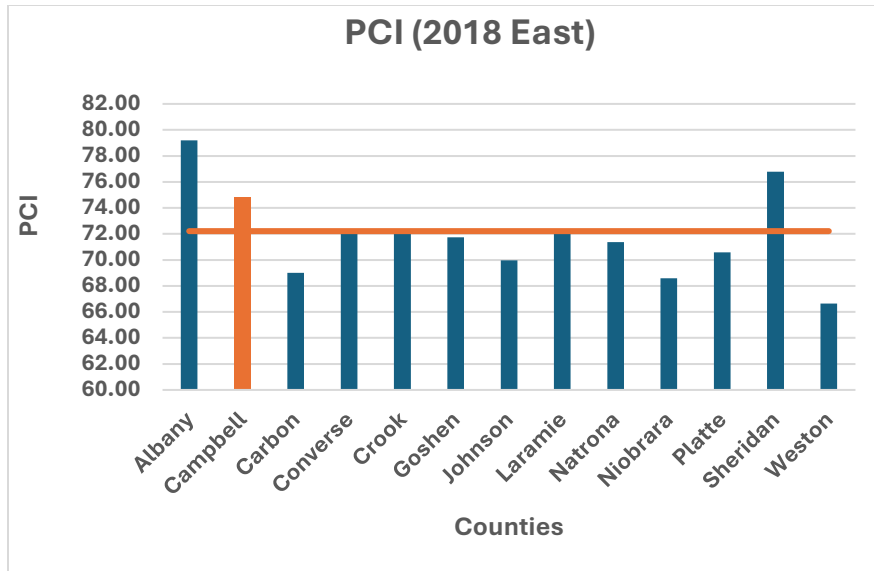


Figure 27: Overall PCI Summary of County Roads in East Wyoming in 2018.

IRI

Based on the IRI data for 2014, 2016, and 2018, the riding quality of Campbell County roads remained consistently smoother than that of many other counties in the state. In 2014, Campbell County recorded an IRI of 101.26 in/mile, indicating relatively smooth pavement surfaces compared to the statewide average. The IRI increased slightly in 2016 to 108.94 in/mile, showing a modest decline in riding quality, but still performing better than several neighboring counties. In 2018, the IRI improved again to 104.52 in/mile, reflecting smoother conditions than in 2016 and remaining below the statewide mean. Overall, the data shows that Campbell County maintained good riding quality throughout all three years, with only minor fluctuations and consistently better smoothness levels than many counties across Wyoming.

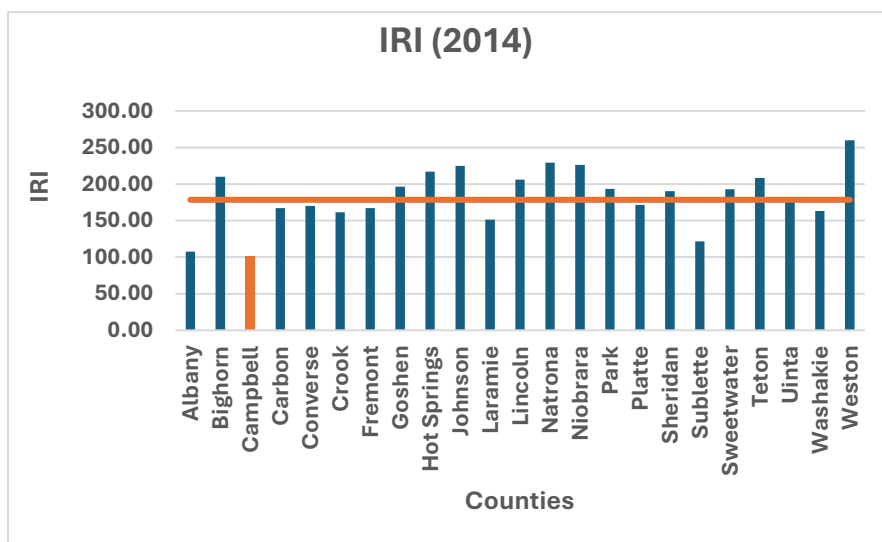


Figure 28: Overall IRI Summary of County Roads in Wyoming in 2014.

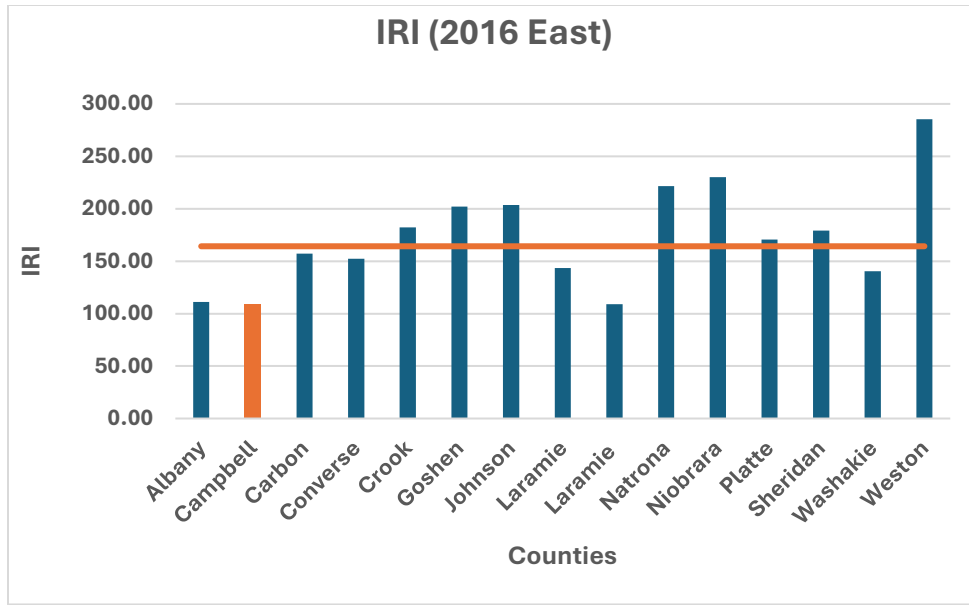


Figure 29: Overall IRI Summary of County Roads in East Wyoming in 2016.

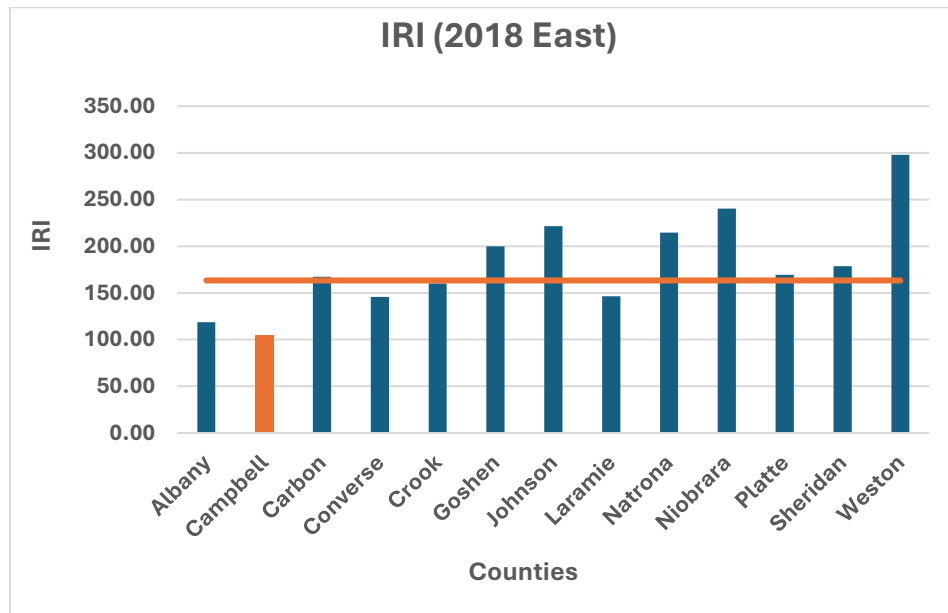


Figure 30: Overall IRI Summary of County Roads in East Wyoming in 2018.

Rut Depth

The rut depth values for 2014, 2016, and 2018 indicate that Campbell County consistently maintained low rutting levels, showing better performance than many other counties in Wyoming. In 2014, Campbell County recorded a rut depth of 0.14 in, which is below the statewide average and well within the low-rut category (less than 0.30 in). By 2016, the rut depth remained steady at 0.13 in, continuing to reflect minimal surface deformation compared to other eastern counties. In 2018, rutting improved slightly to 0.10 in, marking one of the smoothers and least-rutted pavement

profiles among the counties assessed that year. Overall, Campbell County demonstrated consistently low rutting and stable pavement structure, indicating effective pavement performance and reduced susceptibility to wheel-path deformation over time.

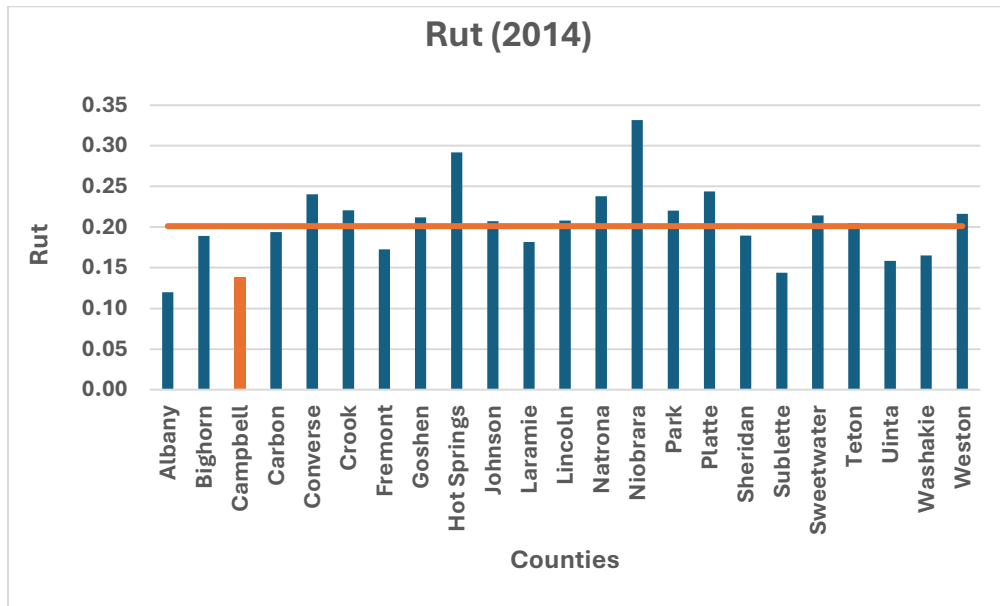


Figure 31: Overall Rut Depth Summary of County Roads in Wyoming in 2014.

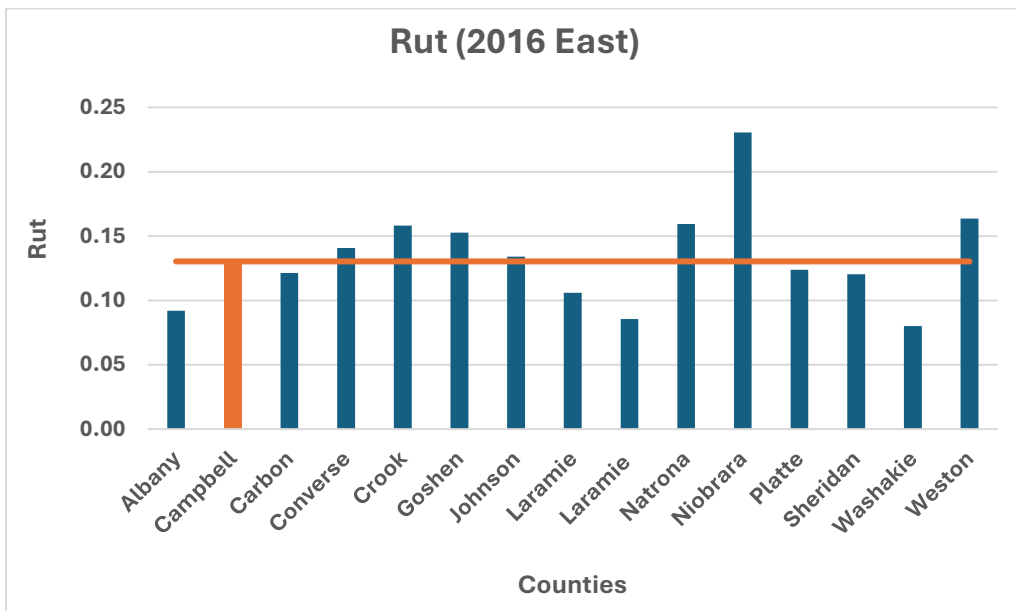


Figure 32: Overall Rut Depth Summary of County Roads in East Wyoming in 2016.

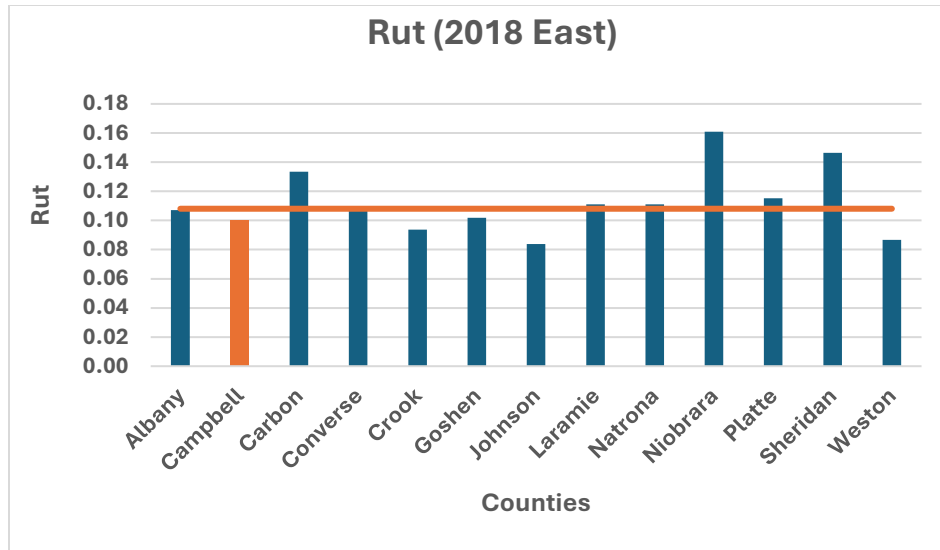


Figure 33: Overall Rut Depth Summary of County Roads in East Wyoming in 2018.

PSI

The PSI data for 2014, 2016, and 2018 shows that Campbell County maintained relatively good serviceability levels compared to many other counties in Wyoming. In 2014, Campbell County recorded a PSI of 2.58, placing it among the higher-performing counties and indicating a pavement system that provided a generally comfortable and functional ride. By 2016, the PSI decreased slightly to 2.01 but still remained above the statewide average for that year. In 2018, Campbell County achieved a PSI of 2.20, showing an improvement over 2016 and maintaining serviceability levels higher than many of the eastern counties. Overall, Campbell County’s PSI remained consistently above the mean in all three assessment years, suggesting that its pavements offered better riding quality and serviceability compared to several other counties across the state.

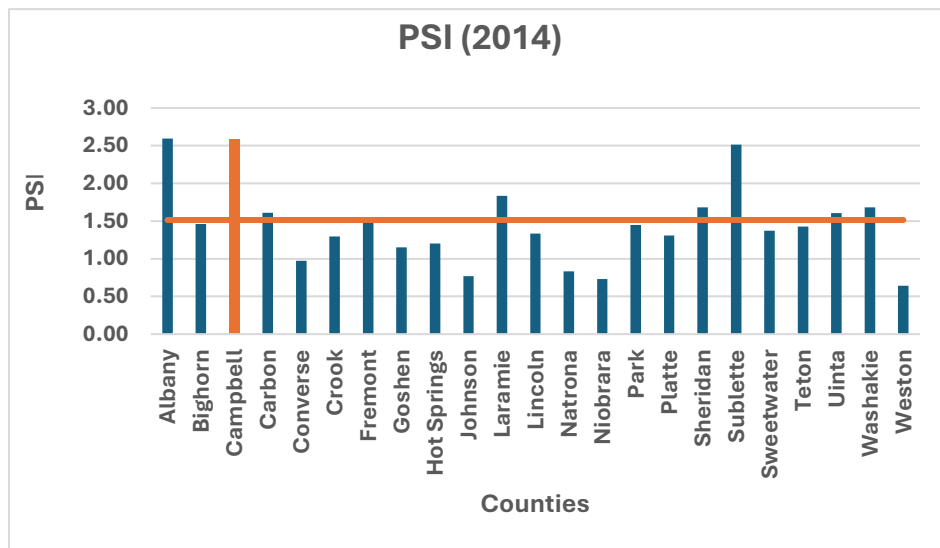


Figure 34: Overall PSI Summary of County Roads in Wyoming in 2014.

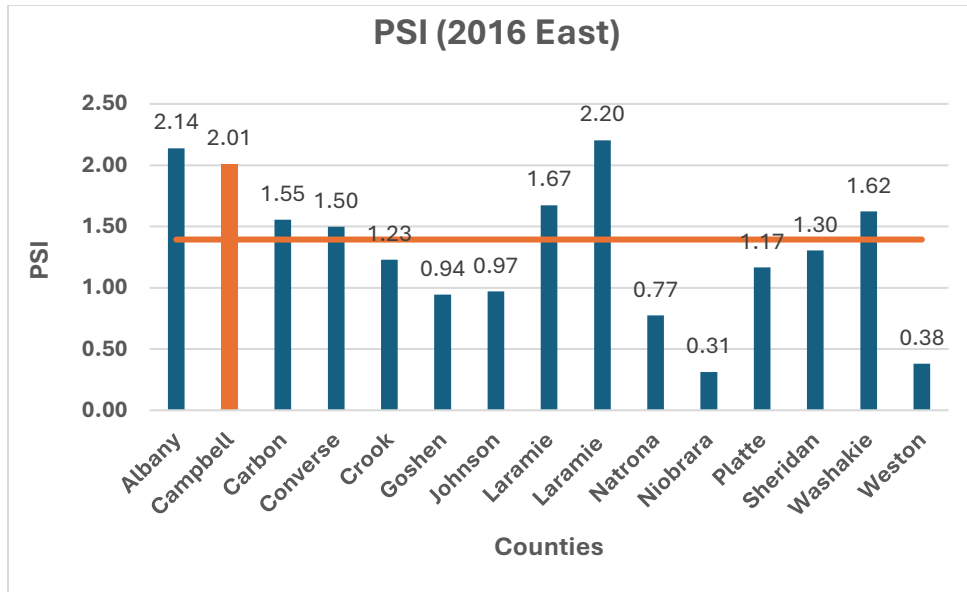


Figure 35: Overall PSI Summary of County Roads in East Wyoming in 2016.

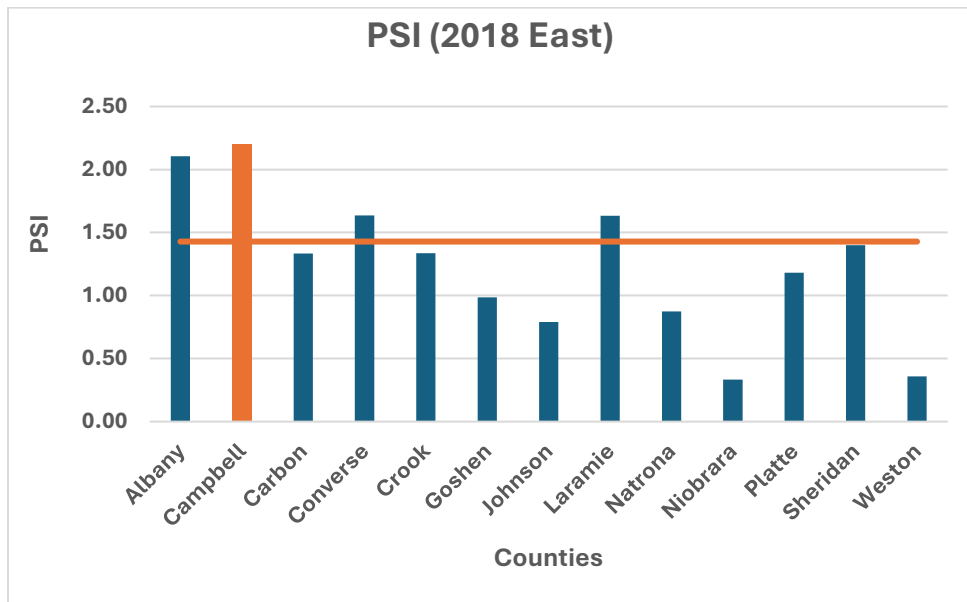


Figure 36: Overall PSI Summary of County Roads in East Wyoming in 2018.

Task 3: Costs of maintaining county roads in Campbell County

Based on the analysis of 2018 Campbell County data, the total cost required to maintain the county’s paved roads is \$44.60 million (USD). The distribution of treatment needs, as shown in the pie charts, indicates that the largest portion of road segments falls under the 1-R, 2-R, 3-R, 4-R, 5-R, and GM treatment categories, with 1-R covering 56.23 miles (32%), 2-R covering 27.87 miles (16%), 3-R covering 23.64 miles (14%), 4-R covering 30.71 miles (18%), 5-R covering 5.02 miles (3%), and GM accounting for 28.69 miles (17%). However, the cost distribution shows a

different pattern. The 4-R treatment requires the largest share of funding, amounting to \$19.96 million, which represents 45% of the total maintenance cost. This is followed by 3-R (\$8.27 million, 18%), 2-R (\$6.97 million, 16%), 5-R (\$6.02 million, 13%), and 1-R (\$3.37 million, 8%), while GM incurs no cost. From Figures 37 & 38, it is evident that although 4-R does not represent the largest mileage, it accounts for nearly half of the total cost due to the extensive rehabilitation work required. Overall, the results show that Campbell County requires a significant investment, with substantial portions of the network needing higher-level rehabilitation treatments to maintain or improve pavement conditions.

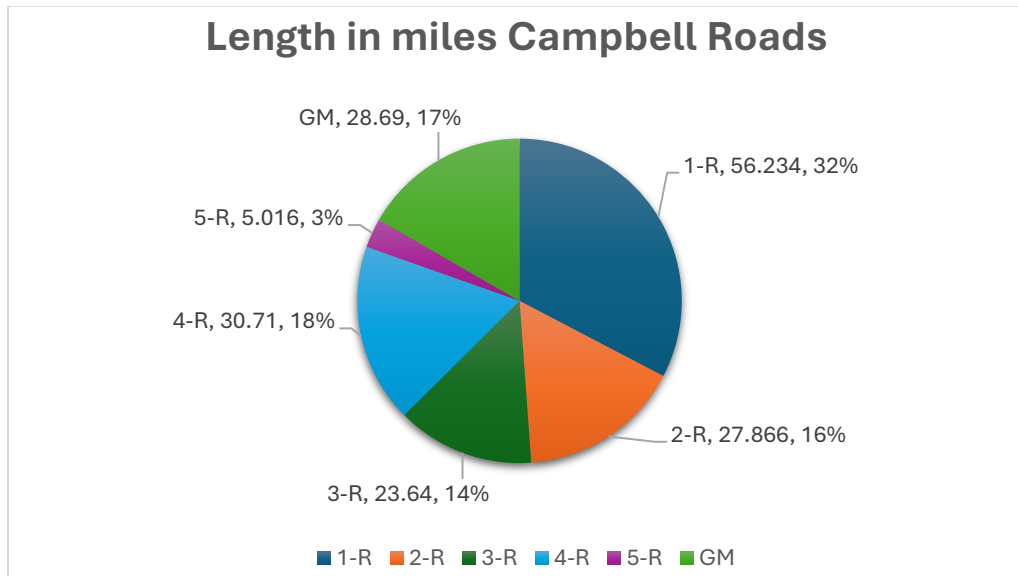


Figure 37: Segment lengths of Campbell County roads by treatment type.

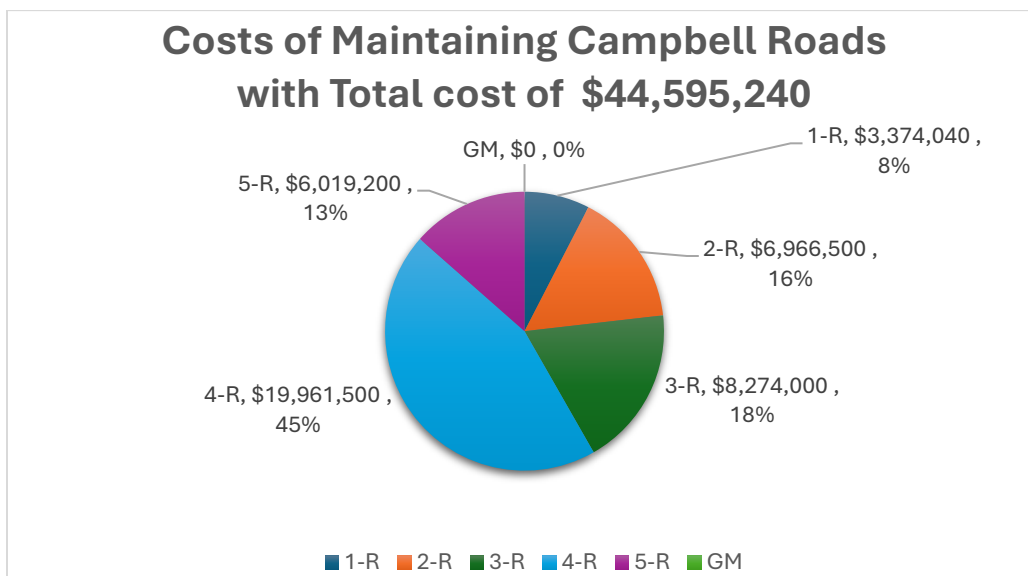


Figure 38: Cost distribution for each treatment type on Campbell County roads.

Task 4: Proposed Maintenance Strategies for County roads of Campbell County

Scenario 1: Do Nothing

Under the “Do Nothing” scenario, no maintenance or rehabilitation is applied, allowing the pavement to deteriorate naturally over time. As illustrated in the figure, the PSI of Campbell County roads show a steady and predictable decline throughout the five-year period. Beginning with a PSI of 2.20 in 2018, the condition drops to 2.00 in 2019 and continues falling to 1.81 in 2020. The downward trend persists with PSI values of 1.62 in 2021, 1.45 in 2022, and eventually 1.30 by 2023. This gradual but significant reduction reflects the expected deterioration when pavements are left untreated. Over time, riding quality declines, surface distresses increase, and the roadway becomes progressively less serviceable, highlighting the consequences of deferring maintenance and the potential for higher future rehabilitation costs.

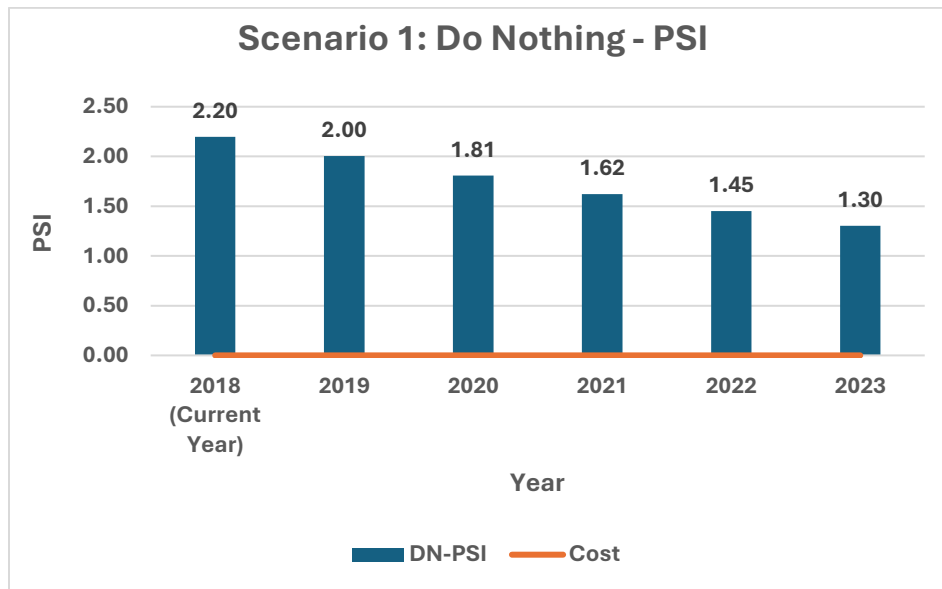


Figure 39: PSI values for a 5-year analysis period for scenario 1.

Scenario 2: Annual Budget constraint of \$ 1 million USD

In Scenario 2, an annual maintenance budget of \$1 million USD is applied, and pavement treatments are selected using the Decision Tree method to allocate funds as effectively as possible. The resulting PSI trend over the five-year analysis period is shown in figure 40. Although the available budget slows the rate of deterioration compared to the “Do Nothing” scenario, the PSI of Campbell County roads still steadily decline. Beginning at 2.20 in 2018, the PSI decreases to 2.12 in 2019, 1.96 in 2020, 1.80 in 2021, 1.66 in 2022, and finally 1.55 by 2023. At the same time, cumulative maintenance costs rise from \$968,400 in 2019 to \$1.91 million in 2020, \$2.81 million in 2021, \$3.78 million in 2022, and \$4.76 million by 2023, reflecting the yearly spending cap.

Although the roads receive consistent annual treatment, the continuous drop in PSI indicates that \$1 million per year is insufficient to maintain current pavement conditions, and a higher budget would be required to stabilize or improve overall serviceability. This highlights the financial challenge of preserving pavement quality under limited funding conditions.

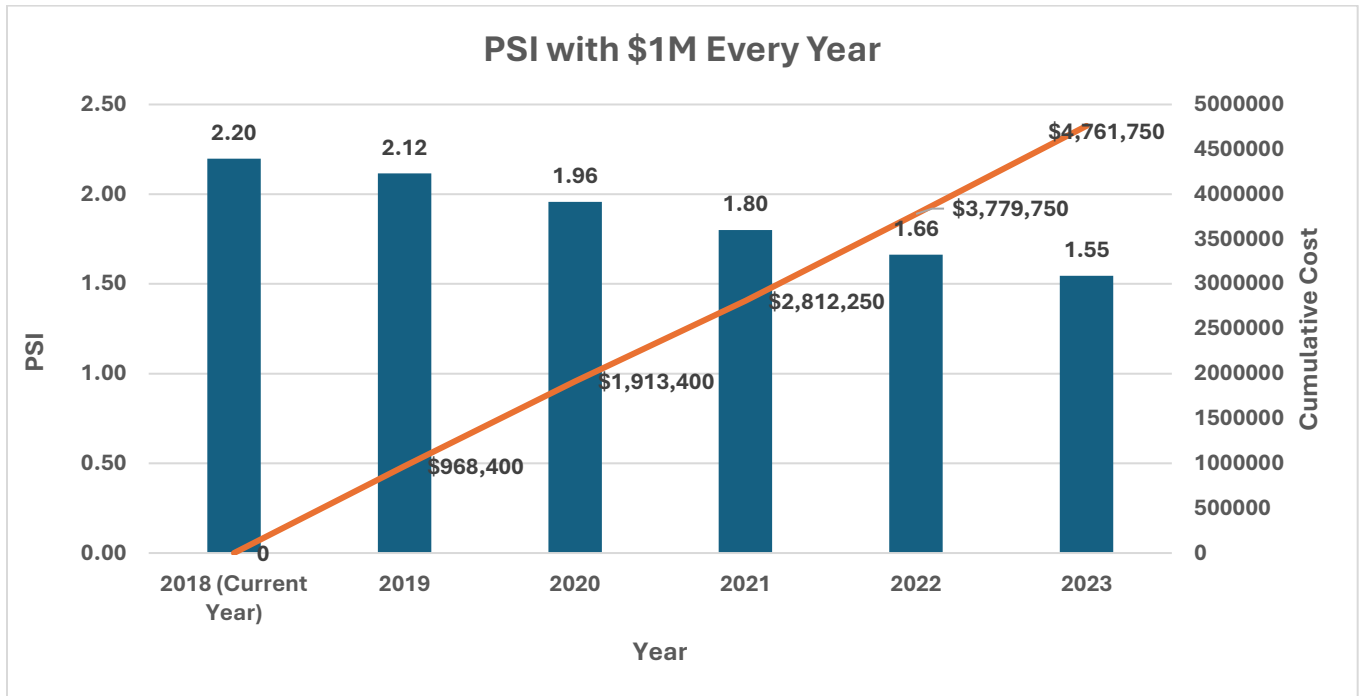


Figure 40: PSI Trend and Cumulative Cost Under Scenario 2 (\$1 Million Annual Budget).

Scenario 3: A steady state of PSI considering latest condition

In this scenario, the analysis follows the same approach used in Scenario 2; however, instead of allowing the PSI to decline, the goal is to maintain a steady PSI equal to the most recent condition, which is 2.20. To achieve this, the optimization model minimizes the total maintenance cost required to keep the PSI constant over the entire 5-year period. As shown in figure 41, maintaining a steady PSI of 2.20 requires a substantial investment. The cumulative cost reaches \$1,124,520 by 2019, \$7,620,420 by 2020, \$13,829,920 by 2021, \$19,708,220 by 2022, and \$24,189,570 by 2023. This indicates that approximately \$24.19 million is needed to hold the pavement network at its current PSI level across five years. The cost continues to rise each year as more segments require treatment to prevent deterioration.

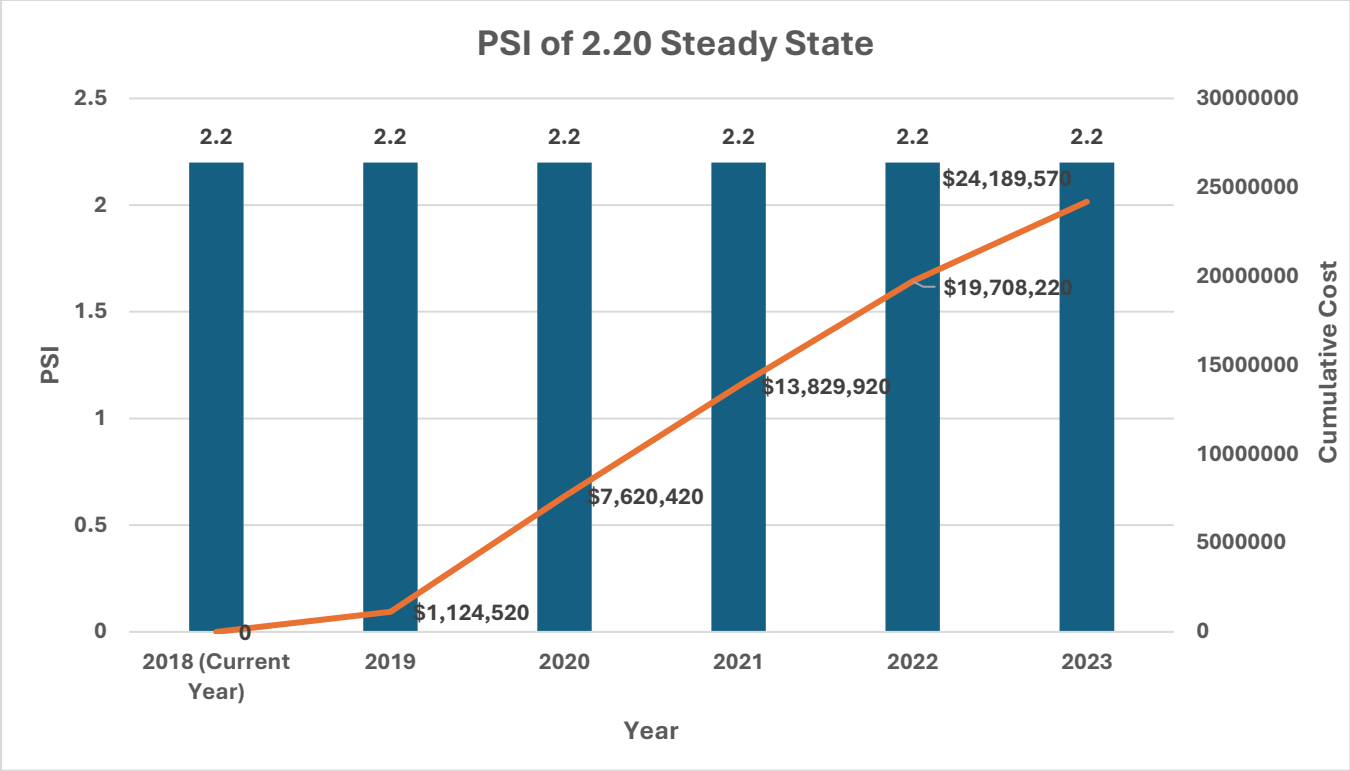


Figure 41: PSI values & respective budgets for a 5-year analysis period for Scenario 3.

Scenario 4: Within an annual maintenance funding derived from critical budgets

To determine an optimal funding level that maximizes pavement condition with the least possible cost, a critical budget analysis was performed. The process involved evaluating a range of maintenance budgets between the minimum cost needed to maintain the current PSI and the higher cost required to significantly improve pavement conditions. Using optimization, multiple budget levels were tested, and the corresponding PSI values were computed for each funding level, as shown in the results table 4.

As the budget increased, the PSI improved initially at a relatively steep rate, but after a certain point, the improvement per dollar began to flatten. This behavior was examined by plotting PSI against cost and fitting two trend lines with distinctly different slopes. The intersection of these two best-fit lines represents the point at which additional spending begins to yield diminishing returns.

From this analysis, the change in slope occurs at \$30 million, and using the intersection of the two best-fit lines, the critical budget was calculated to be \$28,425,000. This value represents the most efficient investment level, beyond which further spending still improves PSI but at a much slower rate. Identifying this critical budget helps establish a practical funding guideline for maximizing pavement performance while avoiding unnecessary expenditures.

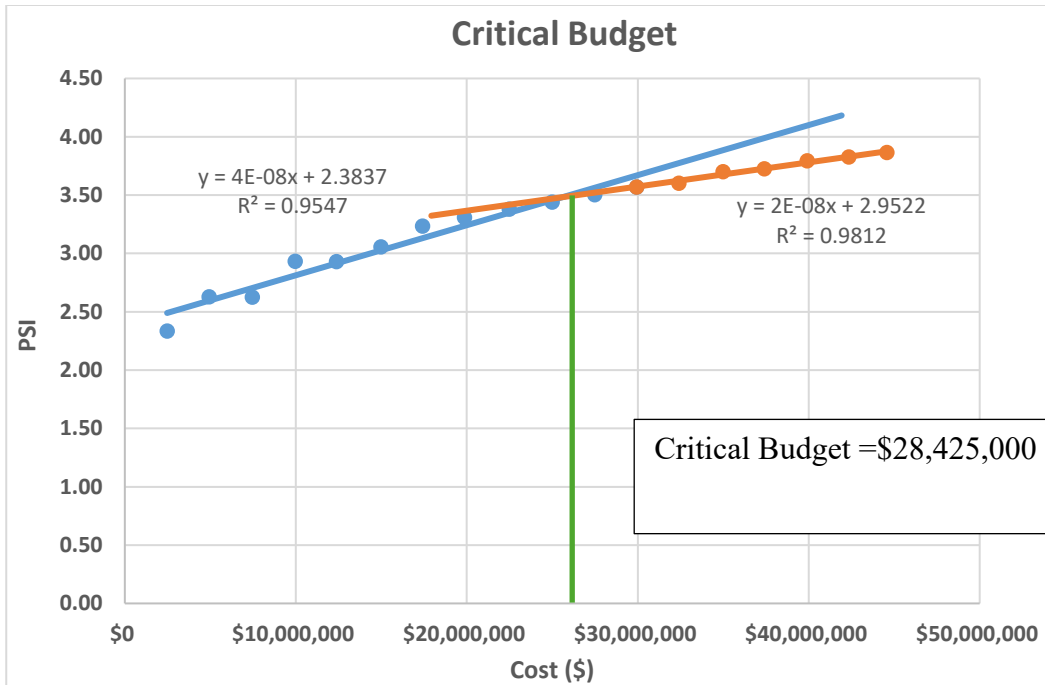


Figure 42: Determination of Critical Budget Using PSI–Cost Relationship.

Table 4: PSI Response to Incremental Maintenance Budget Levels.

Trial Cost (in \$)	PSI	Δ PSI	Δ Cost (in \$1,000,000)	Slope (Δ PSI/ Δ cost)
\$2,472,540	2.33	-	-	-
\$4,929,140	2.63	0.29	\$2.46	0.120
\$7,462,200	2.63	0.00	\$2.53	-0.001
\$9,953,540	2.93	0.31	\$2.49	0.124
\$12,367,840	2.93	0.00	\$2.41	-0.001
\$14,981,340	3.06	0.13	\$2.61	0.048
\$17,418,340	3.24	0.18	\$2.44	0.073
\$19,861,340	3.31	0.07	\$2.44	0.030
\$22,492,340	3.38	0.07	\$2.63	0.027
\$24,982,540	3.44	0.06	\$2.49	0.024
\$27,475,440	3.50	0.06	\$2.49	0.025
\$29,926,040	3.57	0.07	\$2.45	0.027
\$32,396,340	3.60	0.03	\$2.47	0.013
\$34,985,840	3.70	0.10	\$2.59	0.038
\$37,403,360	3.73	0.02	\$2.42	0.010
\$39,902,740	3.79	0.07	\$2.50	0.027
\$42,340,440	3.83	0.03	\$2.44	0.014
\$44,565,240	3.86	0.04	\$2.22	0.017

Critical Budget: Equal Split of Critical Budget

Table 5 summarizes the equal yearly distribution of the critical budget and its effect on pavement conditions from 2018 to 2023. Despite steady spending each year, the PSI continues to decline, showing that this budget level is not enough to sustain current road conditions.

Table 5: Equal Split of Critical Budget.

Year	PSI	Cost	Cumulative Cost
Current Year (2018)	2.20	\$0	\$0
2019	2.04	\$566,540	\$566,540
2020	1.86	\$549,000	\$1,115,540
2021	1.69	\$535,500	\$1,651,040
2022	1.53	\$533,000	\$2,184,040
2023	1.40	\$492,000	\$2,676,040

Critical Budget: Front Loading

The critical budget was allocated more heavily in the initial years and gradually reduced in subsequent years, with distributions of 40%, 25%, 15%, 10%, and 10% for 2019, 2020, 2021, 2022, and 2023, respectively. The corresponding PSI values were computed as shown in table 6.

Table 6: Front Loading of Critical Budget.

Year	PSI	Cost	Cumulative Cost
Current Year (2018)	2.20	\$0	\$0
2019	3.04	\$11,363,140	\$11,363,140
2020	3.08	\$6,973,900	\$18,337,040
2021	3.10	\$4,107,050	\$22,444,090
2022	3.10	\$2,738,150	\$25,182,240
2023	3.11	\$2,822,500	\$28,004,740

Critical Budget: Back Loading

The critical budget was allocated at lower levels in the initial years and gradually increased in the later years, with distributions of 10%, 10%, 15%, 25%, and 40% for 2019, 2020, 2021, 2022, and 2023, respectively. The corresponding PSI values were computed as shown in table 7.

Table 7: Back Loading of Critical Budget.

Year	PSI	Cost	Cumulative Cost
Current Year (2018)	2.20	\$0	\$0
2019	2.28	\$2,818,180	\$2,818,180
2020	2.18	\$2,826,900	\$5,645,080
2021	2.09	\$4,158,900	\$9,803,980
2022	2.05	\$7,036,400	\$16,840,380
2023	2.21	\$11,231,550	\$28,071,930

Once all results were compiled, the three methods of allocating the critical budget were compared. Figure 43 shows how the PSI changes over time for each of the three approaches. From the graph, it is clear that the Front-Loading method maintains the highest PSI throughout the five-year period, while the Equal Split method results in a steady decline. The Back Loading method performs moderately, showing slight improvement toward the final year but still lagging behind the Front-Loading approach.

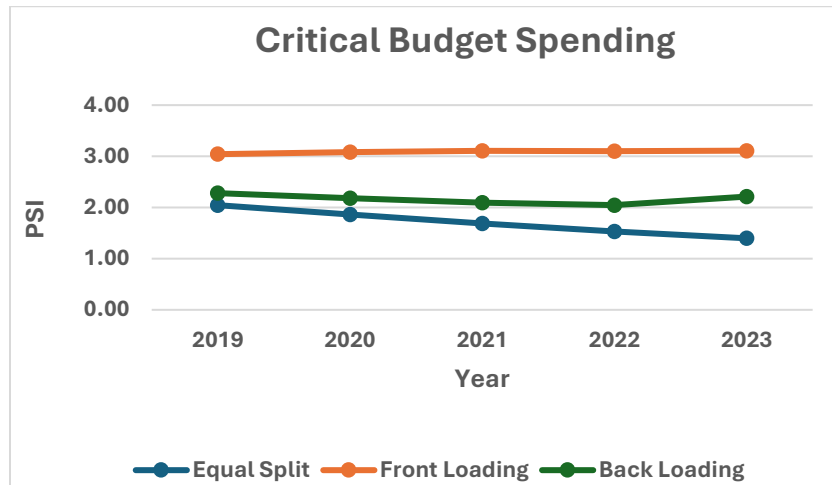


Figure 43: Critical Budget Split Method Comparison.

Summary of Maintenance Scenarios

For Cambell County roads, four maintenance and rehabilitation strategies were evaluated over a five-year period: doing nothing, applying a \$1 million annual budget, maintaining a steady-state PSI, and using the critical budget with three allocation methods. Figure 44 illustrates how pavement condition evolves under each scenario from 2019 through 2023. The Critical (Front) strategy clearly provides the best pavement performance, maintaining PSI values consistently above 3.0 throughout the entire analysis period. This indicates that the up-front investment in major rehabilitation early in the analysis cycle effectively boosts serviceability and slows the rate of deterioration. The nearly flat trend line suggests that this strategy succeeds in preserving high-quality pavement conditions over time.

In contrast, the Do-Nothing strategy results in the most rapid deterioration of pavement serviceability. PSI declines steadily from approximately 2.0 in 2019 to roughly 1.3 by 2023. This downward trend mirrors typical deterioration curves and demonstrates how quickly pavement quality decreases when no maintenance treatments are applied. The sharp decline highlights the risks associated with deferring maintenance, which can lead to significantly higher long-term rehabilitation costs.

The \$1M annual budget and Steady State scenarios fall between the two extremes. The \$1M scenario slows deterioration compared to doing nothing but does not fully offset the natural decline in pavement condition; PSI drops from around 2.1 to 1.55 over the five years. Meanwhile, the Steady State approach maintains PSI values near 2.20 – 2.25 with only minimal yearly variation,

indicating that this strategy effectively preserves pavement condition at a stable and acceptable level. However, based solely on PSI trends, it is difficult to determine definitively which of the two spending-based strategies provides better long-term value. Thus, cost analysis is needed to supplement the performance evaluation.

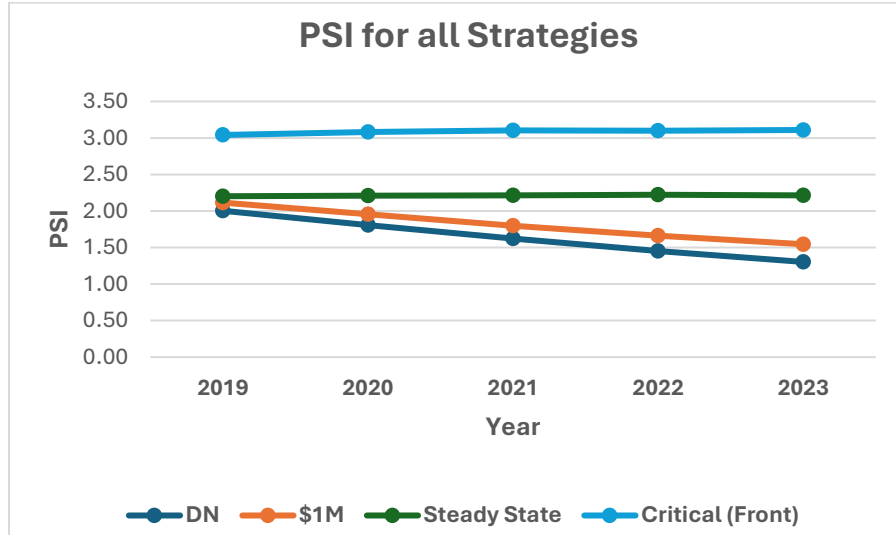


Figure 44: PSI for 5 Years for Each Maintenance Scenario.

Present Cost (2018) for All Scenarios

The formula for calculating the present value (PV) is:

$$PV = FV / (1 + r)^n \tag{4}$$

Where:

- PV = Present Value
- FV = Future Value
- r = Discount Rate (4% or 0.04)
- n = Number of periods (in Year)

To compare the economic implications of each scenario, all future expenditures were converted to their present value in 2018 dollars using a standard discounting procedure. After discounting, the total present costs for each scenario were calculated and are shown in figure 45. The results indicate substantial differences in financial requirements across the four scenarios.

The Critical (Front) scenario is the most expensive by a wide margin, with a present cost of approximately \$25.7 million. This high expenditure explains the superior PSI outcomes: the

strategy relies on significant early investment to elevate and preserve pavement conditions. The Steady State scenario also incurs a substantial cost, totaling about \$21.3 million, making it the second most expensive approach. Although less costly than the Critical scenario, it still requires considerable commitment of funds to maintain serviceability at a stable level.

The \$1M annual budget scenario is far more economical, with a present cost of about \$4.24 million. However, its lower financial commitment results in declining pavement conditions over time, as seen in the PSI analysis. The Do-Nothing scenario, while having zero expenditure during the five-year period, leads to severe deterioration and is therefore not sustainable. Although it appears to be the least expensive option, the lack of investment would ultimately result in much higher rehabilitation costs outside the analysis horizon.

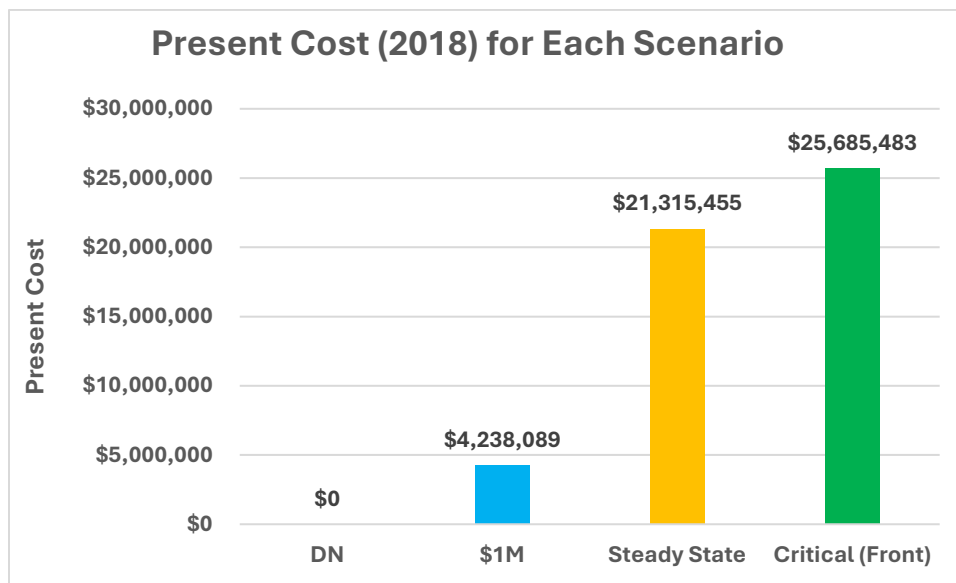


Figure 45: Present Cost (2018) for Each Maintenance Scenario.

Conclusions & Recommendations

Conclusions

1. Statewide highways perform far better than county roads. About 83% of interstate, 56% primary, and 45% secondary roads fall into the excellent category (PSI > 3.5), and 14% of interstate, 33% of primary, and 35% of secondary roads are in good condition. Overall, the statewide system is in significantly better shape than county roads.
2. Nearly 70 % of county road segments have a PSI between 3.01 – 3.5, indicating good conditions, 3 % of county roads are in poor condition, and 4% of county road segments are in very poor condition.
3. Campbell County shows moderate deterioration but still performs better than many counties. PCI declined from 87.59 in 2014 to 74.83 in 2018, and PSI remained between 2.0 – 2.6.

Although better than statewide averages in some years, Campbell County still requires substantial rehabilitation.

4. Rutting is not a major problem statewide or in Campbell County. 87% of county roads, 90% of interstate, 97% of primary, and 93% of secondary roads have rut depths under 0.3 in, indicating strong rut resistance and stable pavement structures.
5. Among evaluated strategies, the Critical Budget approach performs best. The front-loaded Critical Budget method achieved the highest PSI values (above 3.0), demonstrating that early heavy investment yields the most effective improvement in pavement serviceability.
6. The Steady-State PSI strategy performs better than the \$1M annual budget. Although less effective than the Critical Budget, the steady-state approach better maintains overall pavement condition at lower total cost compared to the \$1M annual funding scenario.
7. The Do-Nothing scenario results in rapid deterioration. PSI dropped from 2.20 to about 1.30 over five years, confirming that lack of maintenance accelerates pavement failure and increases future costs.

Recommendations

1. Improve the PMS by integrating local variables. Future optimization should incorporate ADT, ADTT, historical maintenance, risk factors, and overall PSI to produce more reliable and realistic treatment strategies.
2. Adopt the Critical Budget (Front-Loaded) Strategy as the primary maintenance approach. This method provides the highest long-term PSI and maximizes the benefits of early investment. It is the most effective and recommended strategy for Campbell County.
3. If the critical budget is not available, apply the Steady-State PSI strategy. Maintaining a steady PSI of 2.20 is more cost-effective than using a fixed \$1M yearly budget and keeps pavement performance stable. If possible, targeting a slightly higher PSI may further improve conditions.
4. Avoid the Do-Nothing option under all circumstances. Allowing pavements to deteriorate without action leads to rapid serviceability decline, increased safety concerns, and significantly higher future rehabilitation costs.

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Appendix

Task 1

Row Labels	Sum of PCI	Sum of PSI	Sum of IRI	Sum of Rut
County	21939.8727	772.8063	38155.4891	41.0044
High	19276.4666	656.5408	30556.5539	34.3081
Excellent	2691.5998	104.5783	2140.7589	4.5531
Excellent	682.4414	27.8896	421.8827	0.9014
Low	682.4414	27.8896	421.8827	0.9014
Fair	100	3.541	107.2893	0.1031
Low	100	3.541	107.2893	0.1031
Good	1909.1584	73.1477	1611.5869	3.5486
High	191.5	7.3052	164.0303	0.7058
Low	1717.6584	65.8425	1447.5566	2.8428
Fair	2182.6907	63.7887	3241.1482	4.3935
Fair	867	26.2865	1101.0641	1.555
Low	867	26.2865	1101.0641	1.555
Poor	1023.6907	29.5263	1587.9505	2.4669
High	95.6923	2.5264	151.9697	0.3275
Low	927.9984	26.9999	1435.9808	2.1394
Very Poor	292	7.9759	552.1336	0.3716
Low	292	7.9759	552.1336	0.3716
Good	12375.9643	442.1513	20420.5373	21.7929
Excellent	198	7	130.4002	0.3189
Low	198	7	130.4002	0.3189
Fair	3419.3148	119.4611	4024.2288	6.4117
High	87	3.0834	117.9386	0.3416
Low	3332.3148	116.3777	3906.2902	6.0701
Good	1330.5	48.3237	1253.9557	2.4133
Low	1330.5	48.3237	1253.9557	2.4133
Poor	3031.0413	107.2752	4580.9603	5.0711
High	185.5	7	297.1666	0.6015
Low	2845.5413	100.2752	4283.7937	4.4696
Very Poor	4397.1082	160.0913	10430.9923	7.5779
High	466.4802	17.2979	811.2271	1.8377
Low	3930.628	142.7934	9619.7652	5.7402
Poor	856.4512	20.6567	1812.664	1.3847
Poor	181	4.7246	315.9688	0.4114
Low	181	4.7246	315.9688	0.4114
Very Poor	675.4512	15.9321	1496.6952	0.9733
Low	675.4512	15.9321	1496.6952	0.9733
Very Poor	1169.7606	25.3658	2941.4455	2.1839
Fair	98	3.0034	117.0713	0.0706
Low	98	3.0034	117.0713	0.0706
Very Poor	1071.7606	22.3624	2824.3742	2.1133
High	93	1.8974	284.2999	0.4735
Low	978.7606	20.465	2540.0743	1.6398
Low	240.1596	14	1084.3431	0.7364

Good	240.1596	14	1084.3431	0.7364
Very Poor	240.1596	14	1084.3431	0.7364
Low	240.1596	14	1084.3431	0.7364
Medium	2423.2465	102.2655	6514.5921	5.9599
Excellent	83	3.7304	74.0282	0.1294
Good	83	3.7304	74.0282	0.1294
Low	83	3.7304	74.0282	0.1294
Fair	231.6887	8.5527	430.8611	0.8045
Fair	81.1887	2.9974	123.804	0.5159
High	81.1887	2.9974	123.804	0.5159
Poor	150.5	5.5553	307.0571	0.2886
Low	150.5	5.5553	307.0571	0.2886
Good	1940.5578	86.3365	5434.1476	4.6513
Fair	248.8659	9.7394	357.2183	0.6999
High	79	3.1659	109.9981	0.3104
Low	169.8659	6.5735	247.2202	0.3895
Poor	376.6179	17.0971	706.7854	0.7925
Low	376.6179	17.0971	706.7854	0.7925
Very Poor	1315.074	59.5	4370.1439	3.1589
High	76	3.5	245.8063	0.3804
Low	1239.074	56	4124.3376	2.7785
Very Poor	168	3.6459	575.5552	0.3747
Very Poor	168	3.6459	575.5552	0.3747
Low	168	3.6459	575.5552	0.3747
Interstate	28950.373	1161.5122	23219.1874	53.2002
High	27572.695	1099.1862	21702.8644	49.9005
Excellent	22392.4452	925.6858	15305.7915	40.9643
Excellent	13977.5064	600.1798	8025.3707	25.1072
High	488.25	19.9256	320.9353	1.7062
Low	13489.2564	580.2542	7704.4354	23.401
Fair	187.3333	7.0533	216.2976	0.2469
Low	187.3333	7.0533	216.2976	0.2469
Good	8227.6055	318.4527	7064.1232	15.6102
High	569.9167	22.2453	467.32	2.0924
Low	7657.6888	296.2074	6596.8032	13.5178
Fair	988	27.8874	1543.7738	1.5845
Fair	288	8.7064	373.392	0.6161
Low	288	8.7064	373.392	0.6161
Poor	400	11.0008	623.3035	0.5195
Low	400	11.0008	623.3035	0.5195
Very Poor	300	8.1802	547.0783	0.4489
Low	300	8.1802	547.0783	0.4489
Good	3994.2498	140.1787	4487.2433	7.0372
Fair	2405.9999	83.0147	2840.8288	3.8651
High	195	6.1588	229.9897	0.606
Low	2210.9999	76.8559	2610.8391	3.2591
Good	1311.2499	47.4598	1296.7324	2.5931
High	92	3.4699	93.0951	0.3182
Low	1219.2499	43.9899	1203.6373	2.2749

Poor	100	3.082	148.4574	0.138
Low	100	3.082	148.4574	0.138
Very Poor	177	6.6222	201.2247	0.441
High	86	3.3543	100.5208	0.3112
Low	91	3.2679	100.7039	0.1298
Poor	100	2.4267	213.7456	0.1895
Very Poor	100	2.4267	213.7456	0.1895
Low	100	2.4267	213.7456	0.1895
Very Poor	98	3.0076	152.3102	0.125
Poor	98	3.0076	152.3102	0.125
Low	98	3.0076	152.3102	0.125
Medium	1377.678	62.326	1516.323	3.2997
Excellent	908.589	42.9997	771.9756	2.3089
Excellent	577	27.7953	461.52	1.5994
High	84	3.9238	65.7162	0.3352
Low	493	23.8715	395.8038	1.2642
Good	331.589	15.2044	310.4556	0.7095
Low	331.589	15.2044	310.4556	0.7095
Good	469.089	19.3263	744.3474	0.9908
Fair	74	3.2675	126.5656	0.1409
Low	74	3.2675	126.5656	0.1409
Good	161.089	6.7359	194.5668	0.4822
Low	161.089	6.7359	194.5668	0.4822
Poor	234	9.3229	423.215	0.3677
Low	234	9.3229	423.215	0.3677
Primary	53430.0482	2016.2672	56151.1545	93.9343
High	48481.4506	1813.5815	48758.6206	82.1144
Excellent	26215.1879	1067.1106	19057.8387	39.5829
Excellent	13750.9249	579.2725	8548.9642	18.98
High	85.75	3.9654	65.3765	0.3076
Low	13665.1749	575.3071	8483.5877	18.6724
Fair	100	3.5141	112.9655	0.0872
Low	100	3.5141	112.9655	0.0872
Good	12364.263	484.324	10395.909	20.5157
Low	12364.263	484.324	10395.909	20.5157
Fair	4691.1412	143.2695	6834.1021	10.2824
Excellent	100	2.7988	65	0.2215
Low	100	2.7988	65	0.2215
Fair	1939.2355	61.2889	2607.5137	4.3054
Low	1939.2355	61.2889	2607.5137	4.3054
Poor	2195.239	65.0691	3450.7384	4.8695
High	95.5	2.7776	138.9947	0.4028
Low	2099.739	62.2915	3311.7437	4.4667
Very Poor	456.6667	14.1127	710.85	0.886
Low	456.6667	14.1127	710.85	0.886
Good	15613.1435	555.4094	18820.249	28.2195
Excellent	497.2	17.5	288.3334	0.6738
Low	497.2	17.5	288.3334	0.6738
Fair	7561.0839	263.8015	9090.9812	14.7717

High	185.5556	6.5236	211.0863	0.6837
Low	7375.5283	257.2779	8879.8949	14.088
Good	5243.8389	191.1286	5250.4273	9.0465
High	191.2271	6.884	182.0232	0.6383
Low	5052.6118	184.2446	5068.4041	8.4082
Poor	1050.9936	38.105	1602.361	1.7498
High	100	3.5	134.806	0.3137
Low	950.9936	34.605	1467.555	1.4361
Very Poor	1260.0271	44.8743	2588.1461	1.9777
High	97.7838	3.2708	100.1545	0.3218
Low	1162.2433	41.6035	2487.9916	1.6559
Poor	926.4447	22.542	1936.3895	1.8626
Poor	85.5	2.4077	159.568	0.2161
Low	85.5	2.4077	159.568	0.2161
Very Poor	840.9447	20.1343	1776.8215	1.6465
Low	840.9447	20.1343	1776.8215	1.6465
Very Poor	1035.5333	25.25	2110.0413	2.167
Fair	462.2	15.0188	599.6308	1.1091
Low	462.2	15.0188	599.6308	1.1091
Poor	92.3333	2.5003	154.4036	0.2222
Low	92.3333	2.5003	154.4036	0.2222
Very Poor	481	7.7309	1356.0069	0.8357
Low	481	7.7309	1356.0069	0.8357
Low	437	22.4038	847.5283	1.3491
Excellent	108	7.3352	158.4235	0.2995
Good	108	7.3352	158.4235	0.2995
Low	108	7.3352	158.4235	0.2995
Good	271	13.0752	488.5769	0.8044
Fair	202	9.5752	327.9622	0.576
Low	202	9.5752	327.9622	0.576
Poor	69	3.5	160.6147	0.2284
Low	69	3.5	160.6147	0.2284
Very Poor	58	1.9934	200.5279	0.2452
Very Poor	58	1.9934	200.5279	0.2452
Low	58	1.9934	200.5279	0.2452
Medium	4511.5976	180.2819	6545.0056	10.4708
Excellent	1239.8066	55.1726	1240.5494	3.0292
Good	1239.8066	55.1726	1240.5494	3.0292
Low	1239.8066	55.1726	1240.5494	3.0292
Fair	559.5182	18.8968	1024.1057	1.5332
Poor	559.5182	18.8968	1024.1057	1.5332
Low	559.5182	18.8968	1024.1057	1.5332
Good	2390.4753	97.2428	3498.9127	4.8418
Fair	1254.1126	49.0678	1607.8426	2.4343
Low	1254.1126	49.0678	1607.8426	2.4343
Good	657.8627	27.3252	758.8158	1.3732
Low	657.8627	27.3252	758.8158	1.3732
Poor	80	3.5	151.6769	0.2591
Low	80	3.5	151.6769	0.2591

Very Poor	398.5	17.3498	980.5774	0.7752
Low	398.5	17.3498	980.5774	0.7752
Poor	244.7975	7.1968	549.9304	0.8739
Poor	164.7975	4.89	322.9473	0.7643
High	80	2.466	164.3961	0.5389
Low	84.7975	2.424	158.5512	0.2254
Very Poor	80	2.3068	226.9831	0.1096
Low	80	2.3068	226.9831	0.1096
Very Poor	77	1.7729	231.5074	0.1927
Very Poor	77	1.7729	231.5074	0.1927
Low	77	1.7729	231.5074	0.1927
Secondary	50722.8344	1831.6377	58745.5239	100.289
High	45587.1174	1640.9813	50036.9348	86.2021
Excellent	19843.464	792.6298	14829.2023	32.3572
Excellent	8727.7851	363.046	5463.4103	12.8344
Low	8727.7851	363.046	5463.4103	12.8344
Good	11115.6789	429.5838	9365.792	19.5228
High	186.5833	7.2765	165.2124	0.6629
Low	10929.0956	422.3073	9200.5796	18.8599
Fair	6831.3285	209.8184	10252.1429	15.1831
Fair	2462.7154	79.0223	3331.4596	5.1658
High	92	2.901	126.7788	0.3325
Low	2370.7154	76.1213	3204.6808	4.8333
Poor	3999.6131	120.0377	6300.5564	9.2948
Low	3999.6131	120.0377	6300.5564	9.2948
Very Poor	369	10.7584	620.1269	0.7225
Low	369	10.7584	620.1269	0.7225
Good	15990.2774	566.941	19201.7287	30.9029
Fair	8147.9652	282.5819	9833.8188	15.7876
High	93.6667	3.0703	126.0072	0.3534
Low	8054.2985	279.5116	9707.8116	15.4342
Good	5642.0122	204.8693	5624.7598	10.7958
High	196.1667	6.7953	188.1174	0.7312
Low	5445.8455	198.074	5436.6424	10.0646
Poor	1032.5	38.5	1657.5805	2.2462
High	92	3.5	144.0987	0.4203
Low	940.5	35	1513.4818	1.8259
Very Poor	1167.8	40.9898	2085.5696	2.0733
Low	1167.8	40.9898	2085.5696	2.0733
Poor	2014.6357	51.0486	3884.5947	4.8206
Poor	713.3125	19.2466	1295.3126	1.49
Low	713.3125	19.2466	1295.3126	1.49
Very Poor	1301.3232	31.802	2589.2821	3.3306
High	190	4.2475	394.4052	0.6934
Low	1111.3232	27.5545	2194.8769	2.6372
Very Poor	907.4118	20.5435	1869.2662	2.9383
Excellent	90	1.5645	65	0.5228
High	90	1.5645	65	0.5228
Fair	86	3.0058	118.961	0.1674

Low	86	3.0058	118.961	0.1674
Poor	179.3285	5.01	322.1013	0.6556
High	88	2.504	160.8186	0.3758
Low	91.3285	2.506	161.2827	0.2798
Very Poor	552.0833	10.9632	1363.2039	1.5925
High	175.5	3.5935	462.7538	0.6576
Low	376.5833	7.3697	900.4501	0.9349
Low	390.1667	15.1913	971.1799	1.2958
Fair	185.6667	8.23	424.1106	0.543
Fair	54	2.9616	115.0751	0.1169
Low	54	2.9616	115.0751	0.1169
Poor	131.6667	5.2684	309.0355	0.4261
Low	131.6667	5.2684	309.0355	0.4261
Poor	204.5	6.9613	547.0693	0.7528
Poor	68.5	2.4654	160.4287	0.218
Low	68.5	2.4654	160.4287	0.218
Very Poor	136	4.4959	386.6406	0.5348
High	69	2.459	178.202	0.3046
Low	67	2.0369	208.4386	0.2302
Medium	4745.5503	175.4651	7737.4092	12.7911
Excellent	833.8132	37.6892	757.5774	2.0611
Excellent	252.0799	12.2046	177.1192	0.7057
Low	252.0799	12.2046	177.1192	0.7057
Good	581.7333	25.4846	580.4582	1.3554
Low	581.7333	25.4846	580.4582	1.3554
Fair	908.5306	31.0211	1496.4695	2.6846
Fair	246	8.8912	360.0315	0.7398
High	82	2.9969	113.4694	0.352
Low	164	5.8943	246.5621	0.3878
Poor	662.5306	22.1299	1136.438	1.9448
High	85	2.9452	133.6946	0.3311
Low	577.5306	19.1847	1002.7434	1.6137
Good	1788.5502	73.903	2695.1741	4.16
Fair	817.75	32.4479	1145.264	1.8717
Low	817.75	32.4479	1145.264	1.8717
Good	493.8002	20.4551	573.6196	1.0621
Low	493.8002	20.4551	573.6196	1.0621
Poor	318	14	591.6501	0.7388
Low	318	14	591.6501	0.7388
Very Poor	159	7	384.6404	0.4874
High	74	3.5	197.3279	0.3464
Low	85	3.5	187.3125	0.141
Poor	897.8	25.3876	1920.0939	2.8581
Poor	405.8	12.0321	821.3	1.3864
High	153.8	4.7506	334.2273	0.6626
Low	252	7.2815	487.0727	0.7238
Very Poor	492	13.3555	1098.7939	1.4717
Low	492	13.3555	1098.7939	1.4717
Very Poor	316.8563	7.4642	868.0943	1.0273

Very Poor	316.8563	7.4642	868.0943	1.0273
High	80	1.4848	250.5	0.31
Low	236.8563	5.9794	617.5943	0.7173
Grand Total	155043.1283	5782.2234	176271.3549	288.4279

Task 2

Row Labels	Sum of Length (mi)	Sum of Rut*L	Sum of IRI*L	Sum of PCI*L	Sum of PSI*L
Albany	42.68	5.12	4592.41	3800.12	110.7389911
Bighorn	105.871	20.02201	22250.654	8525.391	154.5280313
Campbell	176.94	24.5971	17917.76	15498.98	456.4702188
Carbon	51.885	10.0647	8680.665	4319.815	83.58121343
Converse	94.087	22.60828	16005.592	6072.924	91.57297191
Crook	36.59	8.0695	5915.43	2261.06	47.33337979
Fremont	198.46	34.2372	33142.9	15435.05	304.3670277
Goshen	114.9	24.3565	22576.58	9054.28	132.3793926
Hot Springs	76.076	22.19406	16524.446	6082.278	91.52580003
Johnson	80.481	16.66708	18113.585	5871.454	61.74806266
Laramie	215.658	39.17769	32697.981	17383.632	395.2601
Lincoln	178.82	37.2403	36855.22	16504.58	238.3406075
Natrona	135.37	32.2317	31034.51	9351.05	112.9128034
Niobrara	3.28	1.0885	742.63	293.36	2.403348021
Park	262.8	57.8814	50781.99	23872.96	380.9291096
Platte	159.292	38.83294	27357.6	12843.502	208.2657881
Sheridan	22.937	4.35176	4363.57	1985.373	38.57891576
Sublette	71.41	10.2806	8698.82	6491.44	179.6278989
Sweetwater	153.497	32.90867	29655.647	11737.521	210.8825466
Teton	64.557	13.22022	13442.19	5930.844	92.1613026
Uinta	41.79	6.6277	7362.78	3629.52	67.15040394
Washakie	44.327	7.32848	7237.93	3864.443	74.59906837
Weston	4.57	0.9888	1187.59	318.1	2.932438262
Grand Total	2336.278	470.09519	417138.48	191127.677	3538.289421

Task 3

Row Labels	Sum of Cost	Sum of Length (mi)
1-R	\$3,374,040	56.234
2-R	\$6,966,500	27.866
3-R	\$8,274,000	23.64
4-R	\$19,961,500	30.71
5-R	\$6,019,200	5.016
GM	\$0	28.69
Grand Total	\$44,595,240	172.156

Task 4

Do Nothing

Year	DN-PSI	Cost
2018 (Current Year)		2.20
2019		2.00
2020		1.81
2021		1.62
2022		1.45
2023		1.30

COUNTY	Length (r	Width (ft)	Rut (in)	IRI (in/mi)	PCI	PSI	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type
Campbell	0.54	26	0.075	111	74	2.01	1.08	0 DN		\$0	27	1.73	0.93	0 DN		\$0	29	1.43	0.77	0 DN	
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	0 DN		\$0	33	0.81	0.17	0 DN		\$0	34	0.64	0.13	0 DN	
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	0 DN		\$0	18	2.92	7.95	0 DN		\$0	19	2.82	7.68	0 DN	
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0 DN		\$0	14	3.31	1.13	0 DN		\$0	15	3.29	1.12	0 DN	
Campbell	2.32	26	0.06	136	68	1.46	3.38	0 DN		\$0	31	1.16	2.68	0 DN		\$0	32	0.89	2.07	0 DN	
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	0 DN		\$0	24	2.14	8.99	0 DN		\$0	26	1.88	7.90	0 DN	
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	0 DN		\$0	26	1.94	5.97	0 DN		\$0	27	1.65	5.09	0 DN	
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	0 DN		\$0	24	2.10	5.82	0 DN		\$0	26	1.83	5.08	0 DN	
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	0 DN		\$0	20	2.72	5.67	0 DN		\$0	21	2.58	5.37	0 DN	
Campbell	3.02	26	0.06	76	86	3.01	9.09	0 DN		\$0	18	2.93	8.84	0 DN		\$0	19	2.83	8.54	0 DN	
Campbell	0.97	26	0.04	243	68	0.34	0.33	0 DN		\$0	35	0.39	0.38	0 DN		\$0	35	0.42	0.40	0 DN	
Campbell	0.65	26	0.075	146	78	1.61	1.05	0 DN		\$0	30	1.31	0.85	0 DN		\$0	31	1.02	0.66	0 DN	
Campbell	1.9	27	0.13	158	70	1.17	2.23	0 DN		\$0	32	0.90	1.72	0 DN		\$0	33	0.70	1.33	0 DN	
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	0 DN		\$0	29	1.47	3.13	0 DN		\$0	30	1.17	2.49	0 DN	
Campbell	0.13	28	0.16	157.5	82	1.50	0.20	0 DN		\$0	30	1.20	0.16	0 DN		\$0	32	0.93	0.12	0 DN	
Campbell	0.769	27	0.19	99	85	2.42	1.86	0 DN		\$0	24	2.21	1.70	0 DN		\$0	25	1.96	1.51	0 DN	
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	0 DN		\$0	26	1.89	26.68	0 DN		\$0	28	1.60	22.58	0 DN	
Campbell	0.02	28	0.08	1682.5	93	0.24	0.00	0 DN		\$0	35	0.36	0.01	0 DN		\$0	35	0.40	0.01	0 DN	
Campbell	0.407	29	0.06	188.5	73	0.97	0.39	0 DN		\$0	33	0.75	0.30	0 DN		\$0	34	0.60	0.24	0 DN	
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	0 DN		\$0	12	3.54	3.32	0 DN		\$0	12	3.54	3.33	0 DN	
Campbell	2.39	27	0.055	108	70	1.95	4.65	0 DN		\$0	27	1.66	3.97	0 DN		\$0	29	1.36	3.25	0 DN	
Campbell	1.353	28	0.065	79	75	2.62	3.54	0 DN		\$0	22	2.45	3.31	0 DN		\$0	23	2.25	3.04	0 DN	
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	0 DN		\$0	31	1.07	11.46	0 DN		\$0	32	0.83	8.82	0 DN	
Campbell	7.36	28	0.095	149	70	1.32	9.70	0 DN		\$0	31	1.03	7.58	0 DN		\$0	33	0.79	5.83	0 DN	
Campbell	2.77	29	0.07	134	70	1.54	4.27	0 DN		\$0	30	1.24	3.42	0 DN		\$0	32	0.96	2.65	0 DN	
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	0 DN		\$0	33	0.82	7.00	0 DN		\$0	33	0.64	5.51	0 DN	
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	0 DN		\$0	13	3.40	2.72	0 DN		\$0	14	3.39	2.71	0 DN	
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	0 DN		\$0	13	3.42	7.52	0 DN		\$0	13	3.41	7.50	0 DN	
Campbell	0.11	29	0.15	54	97	3.73	0.41	0 DN		\$0	10	3.75	0.41	0 DN		\$0	9	3.76	0.41	0 DN	
Campbell	1.81	27	0.075	63	78	3.03	5.48	0 DN		\$0	18	2.95	5.35	0 DN		\$0	19	2.86	5.18	0 DN	
Campbell	4.3	30	0.07	69	81	3.00	12.88	0 DN		\$0	18	2.91	12.52	0 DN		\$0	19	2.81	12.08	0 DN	
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0 DN		\$0	35	0.38	0.04	0 DN		\$0	35	0.41	0.04	0 DN	
Campbell	0.12	29	0.065	202	81	1.07	0.13	0 DN		\$0	32	0.82	0.10	0 DN		\$0	33	0.65	0.08	0 DN	
Campbell	1	27	0.05	174	72	1.10	1.10	0 DN		\$0	32	0.85	0.85	0 DN		\$0	33	0.66	0.66	0 DN	
Campbell	0.52	29	0.04	135	86	2.02	1.05	0 DN		\$0	27	1.74	0.91	0 DN		\$0	29	1.44	0.75	0 DN	
Campbell	1.52	29	0.11	106	81	2.27	3.46	0 DN		\$0	25	2.04	3.10	0 DN		\$0	27	1.76	2.68	0 DN	
Campbell	5.63	29	0.15	87	74	2.36	13.29	0 DN		\$0	24	2.14	12.04	0 DN		\$0	26	1.88	10.58	0 DN	
Campbell	6.34	30	0.085	78.5	76	2.64	16.77	0 DN		\$0	22	2.48	15.74	0 DN		\$0	23	2.29	14.50	0 DN	
Campbell	1.94	28	0.09	112	70	1.86	3.61	0 DN		\$0	28	1.57	3.04	0 DN		\$0	30	1.26	2.45	0 DN	

Campbell	1.94	28	0.09	112	70	1.86	3.61	0 DN		\$0	28	1.57	3.04	0 DN		\$0	30	1.26	2.45	0 DN	
Campbell	3.76	27	0.15	53	74	3.06	11.52	0 DN		\$0	17	2.99	11.26	0 DN		\$0	18	2.91	10.94	0 DN	
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	0 DN		\$0	17	3.05	13.70	0 DN		\$0	18	2.97	13.37	0 DN	
Campbell	0.28	29	0.195	142	68	1.24	0.35	0 DN		\$0	32	0.96	0.27	0 DN		\$0	33	0.74	0.21	0 DN	
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	0 DN		\$0	28	1.58	1.17	0 DN		\$0	30	1.28	0.95	0 DN	
Campbell	2.86	65	0.155	80	76	2.55	7.29	0 DN		\$0	23	2.37	6.77	0 DN		\$0	24	2.15	6.14	0 DN	
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	0 DN		\$0	34	0.47	0.23	0 DN		\$0	35	0.45	0.22	0 DN	
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	0 DN		\$0	30	1.22	0.33	0 DN		\$0	32	0.95	0.26	0 DN	
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	0 DN		\$0	17	3.03	2.15	0 DN		\$0	18	2.96	2.10	0 DN	
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	0 DN		\$0	22	2.47	1.92	0 DN		\$0	23	2.27	1.77	0 DN	
Campbell	1.064	41	0.11	99	81	2.39	2.55	0 DN		\$0	24	2.18	2.32	0 DN		\$0	26	1.93	2.05	0 DN	
Campbell	1.01	44	0.1	107	70	1.94	1.96	0 DN		\$0	27	1.65	1.67	0 DN		\$0	29	1.35	1.36	0 DN	
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN	
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	0 DN		\$0	11	3.62	8.15	0 DN		\$0	11	3.63	8.17	0 DN	
Campbell	0.19	50	0.06	116	87	2.33	0.44	0 DN		\$0	24	2.10	0.40	0 DN		\$0	26	1.83	0.35	0 DN	
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	0 DN		\$0	26	1.80	9.56	0 DN		\$0	28	1.50	7.98	0 DN	
Campbell	7.02	35	0.065	130	68	1.54	10.81	0 DN		\$0	30	1.24	8.68	0 DN		\$0	32	0.96	6.73	0 DN	
Campbell	0.61	38	0.25	138	69	1.22	0.75	0 DN		\$0	32	0.95	0.58	0 DN		\$0	33	0.73	0.45	0 DN	
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0 DN		\$0	34	0.53	0.25	0 DN		\$0	34	0.48	0.23	0 DN	
Campbell	0.3	59	0.11	203.5	69	0.67	0.20	0 DN		\$0	34	0.55	0.17	0 DN		\$0	34	0.49	0.15	0 DN	
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	0 DN		\$0	33	0.67	0.67	0 DN		\$0	34	0.55	0.56	0 DN	
Campbell	0.39	62	0.275	126.5	78	1.61	0.63	0 DN		\$0	30	1.30	0.51	0 DN		\$0	31	1.02	0.40	0 DN	
Campbell	0.49	62	0.155	94	68	2.05	1.00	0 DN		\$0	27	1.77	0.87	0 DN		\$0	29	1.47	0.72	0 DN	
Campbell	0.24	34	0.135	108.5	87	2.39	0.57	0 DN		\$0	24	2.17	0.52	0 DN		\$0	26	1.92	0.46	0 DN	
Campbell	0.91	41	0.085	50.5	86	3.54	3.22	0 DN		\$0	12	3.55	3.23	0 DN		\$0	12	3.55	3.23	0 DN	
Campbell	1.25	49	0.085	189	69	0.83	1.04	0 DN		\$0	33	0.65	0.81	0 DN		\$0	34	0.54	0.68	0 DN	
Campbell	3.871	31	0.09	84.5	70	2.34	9.08	0 DN		\$0	24	2.12	8.21	0 DN		\$0	26	1.86	7.20	0 DN	
Campbell	3.72	32	0.12	61	85	3.25	12.08	0 DN		\$0	15	3.21	11.95	0 DN		\$0	16	3.17	11.80	0 DN	
Campbell	1.5	61	0.075	63	81	3.12	4.68	0 DN		\$0	17	3.06	4.59	0 DN		\$0	17	2.99	4.49	0 DN	
Campbell	1.7	66	0.07	78	77	2.69	4.58	0 DN		\$0	21	2.54	4.32	0 DN		\$0	23	2.36	4.01	0 DN	
Campbell	0.6	66	0.065	54.5	79	3.25	1.95	0 DN		\$0	15	3.22	1.93	0 DN		\$0	16	3.18	1.91	0 DN	
Campbell	2.976	31	0.075	134	69	1.51	4.48	0 DN		\$0</											

\$1 Million Budget

Year	PSI	Cost	Cumulative Cost	Cumulative Cost (\$m)
2018 (Current Year)	2.20	\$0	0	0
2019	2.12	\$968,400	\$968,400	1
2020	1.96	\$945,000	\$1,913,400	2
2021	1.80	\$898,850	\$2,812,250	3
2022	1.66	\$967,500	\$3,779,750	4
2023	1.55	\$982,000	\$4,761,750	5

COUNTY	Length (m)	Width (ft)	Rut (in)	IRI (in/m)	PCI	PSI	PSI* _L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI* _L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI* _L	Decision	Treatment Type	Cost	Age
Campbell	0.54	26	0.075	111	74	2.01	1.08	0 DN		\$0	27	1.73	0.93	0 DN		\$0	29	1.43	0.77	0 DN		\$0	31
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	0 DN		\$0	33	0.81	0.17	1 5-R		\$252,000	34	4.30	0.90	0 DN		\$0	2
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	0 DN		\$0	18	2.92	7.95	0 DN		\$0	19	2.82	7.68	0 DN		\$0	20
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0 DN		\$0	14	3.31	1.13	0 DN		\$0	15	3.29	1.12	0 DN		\$0	15
Campbell	2.32	26	0.06	136	68	1.46	3.38	0 DN		\$0	31	1.16	2.68	0 DN		\$0	32	0.89	2.07	0 DN		\$0	33
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	0 DN		\$0	24	2.14	8.99	0 DN		\$0	26	1.88	7.90	0 DN		\$0	28
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	0 DN		\$0	26	1.94	5.97	0 DN		\$0	27	1.65	5.09	0 DN		\$0	29
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	0 DN		\$0	24	2.10	5.82	0 DN		\$0	26	1.83	5.08	0 DN		\$0	28
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	0 DN		\$0	20	2.72	5.67	0 DN		\$0	21	2.58	5.37	0 DN		\$0	22
Campbell	3.02	26	0.06	76	86	3.01	9.09	0 DN		\$0	18	2.93	8.84	0 DN		\$0	19	2.83	8.54	0 DN		\$0	20
Campbell	0.97	26	0.04	243	68	0.34	0.33	0 DN		\$0	35	0.39	0.38	0 DN		\$0	35	0.42	0.40	0 DN		\$0	35
Campbell	0.65	26	0.075	146	78	1.61	1.05	0 DN		\$0	30	1.31	0.85	1 4-R		\$422,500	31	4.10	2.67	0 DN		\$0	5
Campbell	1.9	27	0.13	158	70	1.17	2.23	0 DN		\$0	32	0.90	1.72	0 DN		\$0	33	0.70	1.33	0 DN		\$0	34
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	0 DN		\$0	29	1.47	3.13	0 DN		\$0	30	1.17	2.49	0 DN		\$0	32
Campbell	0.13	28	0.16	157.5	82	1.90	0.20	0 DN		\$0	30	1.20	0.16	1 4-R		\$84,500	32	4.10	0.53	1 3-R		\$45,500	5
Campbell	0.769	27	0.19	99	85	2.42	1.86	0 DN		\$0	24	2.21	1.70	0 DN		\$0	25	1.96	1.51	1 4-R		\$499,850	27
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	0 DN		\$0	26	1.89	26.68	0 DN		\$0	28	1.60	22.58	0 DN		\$0	30
Campbell	0.02	28	0.08	1682.5	93	0.24	0.00	0 DN		\$0	35	0.36	0.01	1 5-R		\$24,000	35	4.30	0.09	0 DN		\$0	2
Campbell	0.407	29	0.06	188.5	73	0.97	0.39	0 DN		\$0	33	0.75	0.30	0 DN		\$0	34	0.60	0.24	0 DN		\$0	34
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	0 DN		\$0	12	3.54	3.32	0 DN		\$0	12	3.54	3.33	0 DN		\$0	12
Campbell	2.39	27	0.055	108	70	1.95	4.65	0 DN		\$0	29	1.66	3.97	0 DN		\$0	29	1.36	3.25	0 DN		\$0	31
Campbell	1.353	28	0.065	79	75	2.62	3.54	1 1-R		\$81,180	22	3.90	5.28	0 DN		\$0	7	3.91	5.29	0 DN		\$0	7
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	0 DN		\$0	31	1.07	11.46	0 DN		\$0	32	0.83	8.82	0 DN		\$0	33
Campbell	7.36	28	0.095	149	70	1.32	9.70	0 DN		\$0	31	1.03	7.58	0 DN		\$0	33	0.79	5.83	0 DN		\$0	34
Campbell	2.77	29	0.07	134	70	1.54	4.27	0 DN		\$0	30	1.24	3.42	0 DN		\$0	32	0.96	2.65	0 DN		\$0	33
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	0 DN		\$0	33	0.82	7.00	0 DN		\$0	33	0.64	5.51	0 DN		\$0	34
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	0 DN		\$0	13	3.40	2.72	0 DN		\$0	14	3.39	2.71	0 DN		\$0	14
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	0 DN		\$0	13	3.42	7.52	0 DN		\$0	13	3.41	7.50	0 DN		\$0	13
Campbell	0.11	29	0.15	54	97	3.73	0.41	1 GM		\$0	10	3.75	0.41	1 3-R		\$38,500	9	4.00	0.44	0 DN		\$0	6
Campbell	1.81	27	0.075	63	78	3.03	5.48	1 GM		\$0	18	2.95	5.35	0 DN		\$0	19	2.86	5.18	0 DN		\$0	20
Campbell	4.3	30	0.07	69	81	3.00	12.88	0 DN		\$0	18	2.91	12.52	0 DN		\$0	19	2.81	12.08	0 DN		\$0	20
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0 DN		\$0	35	0.38	0.04	0 DN		\$0	35	0.41	0.04	0 DN		\$0	35
Campbell	0.12	29	0.065	202	81	1.07	0.13	0 DN		\$0	32	0.82	0.10	0 DN		\$0	33	0.65	0.08	0 DN		\$0	34
Campbell	1	27	0.05	174	72	1.10	1.10	0 DN		\$0	32	0.85	0.85	0 DN		\$0	33	0.66	0.66	0 DN		\$0	34
Campbell	0.52	29	0.04	135	86	2.02	1.05	1 1-R		\$31,200	27	3.90	2.03	0 DN		\$0	7	3.91	2.03	0 DN		\$0	7
Campbell	1.52	29	0.11	106	81	2.27	3.46	1 1-R		\$91,200	25	3.90	5.99	0 DN		\$0	7	3.91	5.94	0 DN		\$0	7
Campbell	5.63	29	0.15	87	74	2.36	13.29	0 DN		\$0	24	2.14	12.04	0 DN		\$0	26	1.88	10.58	0 DN		\$0	28
Campbell	6.34	30	0.085	78.5	76	2.64	16.77	0 DN		\$0	22	2.48	15.74	0 DN		\$0	23	2.29	14.50	0 DN		\$0	25
Campbell	1.94	28	0.09	112	70	1.86	3.61	0 DN		\$0	28	1.57	3.04	0 DN		\$0	30	1.26	2.45	0 DN		\$0	32
Campbell	3.76	27	0.15	53	74	3.06	11.52	0 DN		\$0	17	2.99	11.26	0 DN		\$0	18	2.91	10.94	0 DN		\$0	19
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	0 DN		\$0	17	3.05	13.70	0 DN		\$0	18	2.97	13.37	0 DN		\$0	18
Campbell	0.28	29	0.195	142	68	1.24	0.35	0 DN		\$0	32	0.96	0.27	0 DN		\$0	33	0.74	0.21	0 DN		\$0	34
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	0 DN		\$0	28	1.58	1.17	0 DN		\$0	30	1.28	0.95	0 DN		\$0	31

Campbell	2.86	65	0.155	80	76	2.55	7.29	1 1-R		\$171,600	23	3.90	11.15	0 DN		\$0	7	3.91	11.19	0 DN		\$0	7
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	0 DN		\$0	34	0.47	0.23	0 DN		\$0	35	0.45	0.22	0 DN		\$0	35
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	0 DN		\$0	30	1.22	0.33	0 DN		\$0	32	0.95	0.26	0 DN		\$0	33
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	0 DN		\$0	17	3.03	2.15	0 DN		\$0	18	2.96	2.10	0 DN		\$0	19
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	0 DN		\$0	22	2.47	1.92	0 DN		\$0	23	2.27	1.77	0 DN		\$0	25
Campbell	1.064	41	0.11	99	81	2.39	2.55	0 DN		\$0	24	2.18	2.32	0 DN		\$0	26	1.93	2.05	0 DN		\$0	28
Campbell	1.01	44	0.1	107	70	1.94	1.96	1 2-R		\$252,500	27	4.00	4.04	0 DN		\$0	6	4.00	4.04	1 3-R		\$353,500	6
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN		\$0	12
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	0 DN		\$0	11	3.62	8.15	0 DN		\$0	11	3.63	8.17	0 DN		\$0	11
Campbell	0.19	50	0.06	116	87	2.33	0.44	0 DN		\$0	24	2.10	0.40	1 4-R		\$123,500	26	4.10	0.78	0 DN		\$0	5
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	0 DN		\$0	26	1.80	9.56	0 DN		\$0	28	1.50	7.98	0 DN		\$0	30
Campbell	7.02	35	0.065	130	68	1.54	10.81	0 DN		\$0	30	1.24	8.68	0 DN		\$0	32	0.96	6.73	0 DN		\$0	33
Campbell	0.61	38	0.25	138	69	1.22	0.75	1 2-R		\$152,500	32	4.00	2.44	0 DN		\$0	6	4.00	2.44	0 DN		\$0	6
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0 DN		\$0	34	0.53	0.25	0 DN		\$0	34	0.48	0.23	0 DN		\$0	35
Campbell	0.3	59	0.11	203.5	69	0.67	0.20	0 DN		\$0	34	0.55	0.17	0 DN		\$0	34	0.49	0.15	0 DN		\$0	35
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	0 DN		\$0	33	0.67	0.67	0 DN		\$0	34	0.55	0.56	0 DN		\$0	34
Campbell	0.39	62	0.275	126.5	78	1.61	0.63	0 DN		\$0	30	1.30	0.51	0 DN		\$0	31	1.02	0.40	0 DN		\$0	33
Campbell	0.49	62	0.155	94	68	2.05	1.00	0 DN		\$0	27	1.77	0.87	0 DN		\$0	29	1.47	0.72	0 DN		\$0	30
Campbell	0.24	34	0.135	108.5	87	2.39	0.57	0 DN		\$0	24	2.17	0.52	0 DN		\$0	26	1.92	0.46	0 DN		\$0	28
Campbell	0.91	41	0.085	50.5	86	3.54	3.22	0 DN		\$0	12	3.55	3.23	0 DN		\$0	12	3.55	3.23	0 DN		\$0	12
Campbell	1.25	49	0.085	189	69	0.83	1.04	0 DN		\$0	33	0.65	0.81	0 DN		\$0	34	0.54	0.68	0 DN			

Steady state of PSI

Year	PSI	Cost	Cumulative Cost	Cumulative Cost (\$m)	PSI
2018 (Current Year)	2.20	\$0	0	0	2.2
2019	2.20	\$1,124,520	\$1,124,520	1	2.2
2020	2.21	\$6,495,900	\$7,620,420	2	2.2
2021	2.21	\$6,209,500	\$13,829,920	3	2.2
2022	2.22	\$5,878,300	\$19,708,220	4	2.2
2023	2.22	\$4,481,350	\$24,189,570	5	2.2

COUNTY	Length (m)	Width (ft)	Rut (in)	IRI (in/mi)	PCI	PSI	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type
Campbell	0.54	26	0.075	111	74	2.01	1.08	0	DN	\$0	27	1.73	0.93	0	DN	\$0	29	1.43	0.77	0	DN
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	0	DN	\$0	33	0.81	0.17	1	5-R	\$252,000	34	4.30	0.90	0	DN
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	0	DN	\$0	18	2.92	7.95	0	DN	\$0	19	2.82	7.68	0	DN
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0	DN	\$0	14	3.31	1.13	0	DN	\$0	15	3.29	1.12	0	DN
Campbell	2.32	26	0.06	136	68	1.46	3.38	0	DN	\$0	31	1.16	2.68	1	4-R	\$1,508,000	32	4.10	9.51	0	DN
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	0	DN	\$0	24	2.14	8.99	0	DN	\$0	26	1.88	7.90	1	4-R
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	0	DN	\$0	26	1.94	5.97	0	DN	\$0	27	1.65	5.09	1	4-R
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	0	DN	\$0	24	2.10	5.82	0	DN	\$0	26	1.83	5.08	0	DN
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	0	DN	\$0	20	2.72	5.67	0	DN	\$0	21	2.58	5.37	0	DN
Campbell	3.02	26	0.06	76	86	3.01	9.09	0	DN	\$0	18	2.93	8.84	0	DN	\$0	19	2.83	8.54	0	DN
Campbell	0.97	26	0.04	243	68	0.34	0.33	0	DN	\$0	35	0.39	0.38	0	DN	\$0	35	0.42	0.40	0	DN
Campbell	0.65	26	0.075	146	78	1.61	1.05	0	DN	\$0	30	1.31	0.85	0	DN	\$0	31	1.02	0.66	0	DN
Campbell	1.9	27	0.13	158	70	1.17	2.23	0	DN	\$0	32	0.90	1.72	0	DN	\$0	33	0.70	1.33	0	DN
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	0	DN	\$0	29	1.47	3.13	1	4-R	\$1,384,500	30	4.10	8.73	0	DN
Campbell	0.13	28	0.16	157.5	82	1.50	0.20	0	DN	\$0	30	1.20	0.16	0	DN	\$0	32	0.93	0.12	0	DN
Campbell	0.769	27	0.19	99	85	2.42	1.86	0	DN	\$0	24	2.21	1.70	0	DN	\$0	25	1.96	1.51	0	DN
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	0	DN	\$0	26	1.89	26.68	0	DN	\$0	28	1.60	22.58	0	DN
Campbell	0.02	28	0.08	1682.5	93	0.24	0.00	1	5-R	\$24,000	35	4.30	0.09	0	DN	\$0	2	4.24	0.08	1	3-R
Campbell	0.407	29	0.06	188.5	73	0.97	0.39	0	DN	\$0	33	0.75	0.30	0	DN	\$0	34	0.60	0.24	0	DN
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	0	DN	\$0	12	3.54	3.32	0	DN	\$0	12	3.54	3.33	0	DN
Campbell	2.39	27	0.055	108	70	1.95	4.65	0	DN	\$0	27	1.66	3.97	0	DN	\$0	29	1.36	3.25	0	DN
Campbell	1.353	28	0.065	79	75	2.62	3.54	0	DN	\$0	22	2.45	3.31	0	DN	\$0	23	2.25	3.04	0	DN
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	0	DN	\$0	31	1.07	11.46	0	DN	\$0	32	0.83	8.82	0	DN
Campbell	7.36	28	0.095	149	70	1.32	9.70	0	DN	\$0	31	1.03	7.58	0	DN	\$0	33	0.79	5.83	0	DN
Campbell	2.77	29	0.07	134	70	1.54	4.27	0	DN	\$0	30	1.24	3.42	0	DN	\$0	32	0.96	2.65	0	DN
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	0	DN	\$0	33	0.82	7.00	0	DN	\$0	33	0.64	5.51	0	DN
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	0	DN	\$0	13	3.40	2.72	0	DN	\$0	14	3.39	2.71	0	DN
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	1	GM	\$0	13	3.42	7.52	0	DN	\$0	13	3.41	7.50	0	DN
Campbell	0.11	29	0.15	54	97	3.73	0.41	0	DN	\$0	10	3.75	0.41	0	DN	\$0	9	3.76	0.41	0	DN
Campbell	1.81	27	0.075	63	78	3.03	5.48	1	GM	\$0	18	2.95	5.35	0	DN	\$0	19	2.86	5.18	0	DN
Campbell	4.3	30	0.07	69	81	3.00	12.88	0	DN	\$0	18	2.91	12.52	0	DN	\$0	19	2.81	12.08	0	DN
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0	DN	\$0	35	0.38	0.04	0	DN	\$0	35	0.41	0.04	0	DN
Campbell	0.12	29	0.065	202	81	1.07	0.13	0	DN	\$0	32	0.82	0.10	0	DN	\$0	33	0.65	0.08	0	DN
Campbell	1	27	0.05	174	72	1.10	1.10	0	DN	\$0	32	0.85	0.85	0	DN	\$0	33	0.66	0.66	0	DN
Campbell	0.52	29	0.04	135	86	2.02	1.05	0	DN	\$0	27	1.74	0.91	0	DN	\$0	29	1.44	0.75	0	DN
Campbell	1.52	29	0.11	106	81	2.27	3.46	1	1-R	\$91,200	25	3.90	5.93	0	DN	\$0	7	3.91	5.94	0	DN
Campbell	5.63	29	0.15	87	74	2.36	13.29	1	1-R	\$337,800	24	3.90	21.96	0	DN	\$0	7	3.91	22.02	0	DN
Campbell	6.34	30	0.085	78.5	76	2.64	16.77	0	DN	\$0	22	2.48	15.74	0	DN	\$0	23	2.29	14.50	0	DN
Campbell	1.94	28	0.09	112	70	1.86	3.61	0	DN	\$0	28	1.57	3.04	1	4-R	\$1,261,000	30	4.10	7.95	0	DN
Campbell	3.76	27	0.15	53	74	3.06	11.52	0	DN	\$0	17	2.99	11.26	0	DN	\$0	18	2.91	10.94	0	DN
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	1	GM	\$0	17	3.05	13.70	0	DN	\$0	18	2.97	13.37	0	DN
Campbell	0.28	29	0.195	142	68	1.24	0.35	0	DN	\$0	32	0.96	0.27	0	DN	\$0	33	0.74	0.21	0	DN
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	0	DN	\$0	28	1.58	1.17	0	DN	\$0	30	1.28	0.95	0	DN
Campbell	2.86	65	0.155	80	76	2.55	7.29	0	DN	\$0	23	2.37	6.77	0	DN	\$0	24	2.15	6.14	0	DN
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	0	DN	\$0	34	0.47	0.23	0	DN	\$0	35	0.45	0.22	0	DN
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	0	DN	\$0	30	1.22	0.33	0	DN	\$0	32	0.95	0.26	1	5-R
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	1	GM	\$0	17	3.03	2.15	0	DN	\$0	18	2.96	2.10	0	DN
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	0	DN	\$0	22	2.47	1.92	0	DN	\$0	23	2.27	1.77	0	DN
Campbell	1.064	41	0.11	99	81	2.39	2.55	1	1-R	\$63,840	24	3.90	4.15	0	DN	\$0	7	3.91	4.16	0	DN
Campbell	1.01	44	0.1	107	70	1.94	1.96	0	DN	\$0	27	1.65	1.67	0	DN	\$0	29	1.35	1.36	1	4-R
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	0	DN	\$0	12	3.50	11.61	0	DN	\$0	12	3.50	11.61	0	DN
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	0	DN	\$0	11	3.62	8.15	0	DN	\$0	11	3.63	8.17	0	DN
Campbell	0.19	50	0.06	116	87	2.33	0.44	0	DN	\$0	24	2.10	0.40	0	DN	\$0	26	1.83	0.35	1	4-R
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	1	1-R	\$318,600	26	3.90	20.71	0	DN	\$0	7	3.91	20.77	0	DN
Campbell	7.02	35	0.065	130	68	1.54	10.81	0	DN	\$0	30	1.24	8.68	0	DN	\$0	32	0.96	6.73	0	DN
Campbell	0.61	38	0.25	138	69	1.22	0.75	0	DN	\$0	32	0.95	0.58	0	DN	\$0	33	0.73	0.45	0	DN
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0	DN	\$0	34	0.53	0.25	0	DN	\$0	34	0.48	0.23	0	DN
Campbell	0.3	59	0.11	203.5	69	0.67	0.20	0	DN	\$0	34	0.55	0.17	0	DN	\$0	34	0.49	0.15	1	5-R
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	0	DN	\$0	33	0.67	0.67	0	DN	\$0	34	0.55	0.56	0	DN
Campbell	0.39	62	0.275	126.5	78	1.61	0.63	0	DN	\$0	30	1.30	0.51	0	DN	\$0	31	1.02	0.40	0	DN
Campbell	0.49	62	0.155	94	68	2.05	1.00	0	DN	\$0	27	1.77	0.87	0	DN	\$0	29	1.47	0.72	0	DN
Campbell	0.24	34	0.135	108.5	87	2.39	0.57	0	DN	\$0	24	2.17	0.52	1	4-R	\$156,000	26	4.10	0.98	0	DN
Campbell	0.91	41	0.085	50.5	86	3.54	3.22	0	DN	\$0	12	3.55	3.23	0	DN	\$0	12	3.55	3.23	0	DN
Campbell	1.25	49	0.085	189	69	0.83	1.04	0	DN	\$0	33	0.65	0.81	0	DN	\$0	34	0.54	0.68	0	DN
Campbell	3.871	31	0.09	84.5	70	2.34	9.08	1	1-R	\$232,260	24	3.90	15.10	0	DN	\$0	7	3.91	15.14	0	DN
Campbell	3.72	32	0.12	61	85	3.25	12.08	0	DN	\$0	15	3.21	11.95	0	DN	\$0	16	3.17	11.80	0	DN
Campbell	1.5	61	0.075	63	81	3.12	4.68	0	DN	\$0	17	3.06	4.59	0	DN	\$0	17	2.99	4.49	0	DN
Campbell	1.7	66	0.07	78	77	2.69	4.58	0	DN	\$0	21	2.54	4.32	0	DN						

Critical Budget – Determination of Critical Budget

Year	PSI	Cost	Cumulative Cost	Cumulative Cost (\$m)	
2018 (Current Year)	2.20	\$0	0	0	2.2
2019	3.83	\$42,340,440	\$42,340,440	1	2.2
2020	4.01	\$63,595,750	\$105,936,190	2	2.2
2021	4.00	\$60,254,600	\$166,190,790	3	2.2
2022	4.00	\$0	\$166,190,790	4	2.2
2023	4.00	\$0	\$166,190,790	5	2.2

COUNTY	Length (m)	Width (ft)	Rut (in)	IRI (in/mi)	PCI	PSI	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type	Cost
Campbell	0.54	26	0.075	111	74	2.01	1.08	1 3-R		\$189,000	27	4.00	2.16	1 3-R		\$189,000	6	4.00	2.16	1 3-R		\$189,000
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	1 4-R		\$136,500	33	4.10	0.86	1 3-R		\$73,500	5	4.00	0.86	1 3-R		\$73,500
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	1 3-R		\$952,000	18	4.00	10.88	1 3-R		\$952,000	6	4.00	10.88	1 3-R		\$952,000
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0 DN		\$0	14	3.31	1.13	1 3-R		\$119,000	15	4.00	1.36	1 3-R		\$119,000
Campbell	2.32	26	0.06	136	68	1.46	3.38	1 4-R		\$1,508,000	31	4.10	9.51	1 3-R		\$812,000	5	4.00	9.28	1 3-R		\$812,000
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	1 3-R		\$1,473,500	24	4.00	16.84	1 3-R		\$1,473,500	6	4.00	16.84	1 3-R		\$1,473,500
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	1 3-R		\$1,076,000	26	4.00	12.32	1 3-R		\$1,076,000	6	4.00	12.32	1 3-R		\$1,076,000
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	1 3-R		\$973,000	24	4.00	11.12	1 3-R		\$973,000	6	4.00	11.12	1 3-R		\$973,000
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	1 3-R		\$728,000	20	4.00	8.32	1 3-R		\$728,000	6	4.00	8.32	1 3-R		\$728,000
Campbell	3.02	26	0.06	76	86	3.01	9.09	0 DN		\$0	18	2.93	8.84	1 4-R		\$1,363,000	19	4.10	12.38	1 3-R		\$1,057,000
Campbell	0.97	26	0.04	243	68	0.34	0.33	1 5-R		\$1,164,000	35	4.30	4.17	1 3-R		\$339,500	2	4.00	3.88	1 3-R		\$339,500
Campbell	0.65	26	0.075	146	78	1.61	1.05	1 4-R		\$422,500	30	4.10	2.67	1 3-R		\$227,500	5	4.00	2.60	1 3-R		\$227,500
Campbell	1.9	27	0.13	158	70	1.17	2.23	1 4-R		\$1,235,000	32	4.10	7.79	1 3-R		\$665,000	5	4.00	7.60	1 3-R		\$665,000
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	1 4-R		\$1,384,500	29	4.10	8.73	1 3-R		\$745,500	5	4.00	8.52	1 3-R		\$745,500
Campbell	0.13	28	0.16	157.5	82	1.50	0.20	1 4-R		\$84,500	30	4.10	0.53	1 3-R		\$45,500	5	4.00	0.52	1 3-R		\$45,500
Campbell	0.769	27	0.19	99	85	2.42	1.86	1 1-R		\$46,140	24	3.90	3.00	1 3-R		\$269,150	7	4.00	3.08	1 3-R		\$269,150
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	1 1-R		\$846,600	26	3.90	55.03	1 3-R		\$4,938,500	7	4.00	56.44	1 3-R		\$4,938,500
Campbell	0.02	28	0.08	1882.5	93	0.24	0.00	0 DN		\$0	35	0.36	0.01	1 5-R		\$24,000	35	4.30	0.09	1 3-R		\$7,000
Campbell	0.407	29	0.06	188.5	73	0.97	0.39	1 5-R		\$488,400	33	4.30	1.75	1 3-R		\$142,450	2	4.00	1.63	1 3-R		\$142,450
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	1 GM		\$0	12	3.54	3.32	1 3-R		\$329,000	12	4.00	3.76	1 3-R		\$329,000
Campbell	2.39	27	0.055	108	70	1.95	4.65	1 4-R		\$1,553,500	27	4.10	9.80	1 3-R		\$836,500	5	4.00	9.56	1 3-R		\$836,500
Campbell	1.933	28	0.065	79	75	2.62	3.54	1 1-R		\$81,180	22	3.90	5.28	1 3-R		\$473,550	7	4.00	5.41	1 3-R		\$473,550
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	1 4-R		\$6,942,000	31	4.10	43.79	1 3-R		\$3,738,000	5	4.00	44.72	1 3-R		\$3,738,000
Campbell	7.36	28	0.095	149	70	1.32	9.70	1 4-R		\$4,784,000	31	4.10	30.18	1 3-R		\$2,576,000	5	4.00	29.44	1 3-R		\$2,576,000
Campbell	2.77	29	0.07	134	70	1.54	4.27	1 2-R		\$692,500	30	4.00	11.08	1 3-R		\$969,500	6	4.00	11.08	1 3-R		\$969,500
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	1 2-R		\$2,140,000	33	4.00	34.24	1 3-R		\$2,996,000	6	4.00	34.24	1 3-R		\$2,996,000
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	0 DN		\$0	13	3.40	2.72	1 3-R		\$280,000	14	4.00	3.20	1 3-R		\$280,000
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	1 GM		\$0	13	3.42	7.52	1 3-R		\$770,000	13	4.00	8.80	1 3-R		\$770,000
Campbell	0.11	29	0.15	54	97	3.73	0.41	0 DN		\$0	10	3.75	0.41	1 3-R		\$38,500	9	4.00	0.44	1 3-R		\$38,500
Campbell	1.81	27	0.075	63	78	3.03	5.48	1 GM		\$0	17	2.95	5.35	1 3-R		\$1,176,500	19	4.10	7.42	1 3-R		\$683,500
Campbell	1.61	30	0.07	69	81	3.00	12.88	1 1-R		\$258,000	18	3.90	16.77	1 3-R		\$1,505,000	7	4.00	17.20	1 3-R		\$1,505,000
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0 DN		\$0	35	0.38	0.04	1 5-R		\$130,800	35	4.30	0.47	1 3-R		\$38,150
Campbell	0.12	29	0.065	202	81	1.07	1.13	1 2-R		\$30,000	32	4.00	0.48	1 3-R		\$42,000	6	4.00	0.48	1 3-R		\$42,000
Campbell	1	27	0.05	174	72	1.10	1.10	1 4-R		\$650,000	32	4.10	4.10	1 3-R		\$350,000	5	4.00	4.00	1 3-R		\$350,000
Campbell	0.52	29	0.04	135	86	2.02	1.05	1 1-R		\$31,200	27	3.90	2.03	1 3-R		\$182,000	7	4.00	2.08	1 3-R		\$182,000
Campbell	1.52	29	0.11	106	81	2.27	3.46	1 1-R		\$91,200	25	3.90	5.93	1 3-R		\$532,000	7	4.00	6.08	1 3-R		\$532,000
Campbell	0.63	29	0.15	87	79	2.36	13.29	1 GM		\$337,800	27	3.90	21.96	1 3-R		\$1,970,500	7	4.00	22.52	1 3-R		\$1,970,500
Campbell	3.34	30	0.085	78.5	76	2.64	16.77	1 1-R		\$380,400	22	3.90	24.73	1 3-R		\$2,219,000	7	4.00	25.36	1 3-R		\$2,219,000
Campbell	1.94	28	0.09	112	70	1.86	3.61	1 4-R		\$1,261,000	28	4.10	7.95	1 3-R		\$679,000	5	4.00	7.76	1 3-R		\$679,000
Campbell	3.76	27	0.15	53	74	3.06	11.52	1 GM		\$0	17	2.99	11.26	1 4-R		\$2,444,000	18	4.10	15.42	1 3-R		\$1,316,000
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	0 DN		\$0	17	3.05	13.70	1 3-R		\$1,575,000	18	4.00	18.00	1 3-R		\$1,575,000
Campbell	0.28	29	0.195	142	68	1.24	0.35	1 2-R		\$70,000	32	4.00	1.12	1 3-R		\$98,000	6	4.00	1.12	1 3-R		\$98,000
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	1 2-R		\$185,000	28	4.00	2.96	1 3-R		\$259,000	6	4.00	2.96	1 3-R		\$259,000
Campbell	2.86	65	0.155	80	76	2.55	7.29	1 1-R		\$171,600	23	3.90	11.15	1 3-R		\$1,001,000	7	4.00	11.44	1 3-R		\$1,001,000
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	1 5-R		\$576,000	34	4.30	2.06	1 3-R		\$168,000	2	4.00	1.92	1 3-R		\$168,000
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	1 2-R		\$67,500	30	4.00	1.08	1 3-R		\$94,500	6	4.00	1.08	1 3-R		\$94,500
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	0 DN		\$0	17	3.03	2.15	1 3-R		\$248,500	18	4.00	2.84	1 3-R		\$248,500
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	1 1-R		\$46,800	22	3.90	3.04	1 3-R		\$273,000	7	4.00	3.12	1 3-R		\$273,000
Campbell	1.064	41	0.11	99	81	2.39	2.55	1 1-R		\$63,840	24	3.90	4.15	1 3-R		\$372,400	7	4.00	4.26	1 3-R		\$372,400
Campbell	1.01	44	0.1	107	70	1.94	1.96	1 2-R		\$252,500	27	4.00	4.04	1 3-R		\$353,500	6	4.00	4.04	1 3-R		\$353,500
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	1 GM		\$0	12	3.50	11.61	1 3-R		\$1,162,000	12	4.00	13.28	1 3-R		\$1,162,000
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	0 DN		\$0	11	3.62	8.15	1 3-R		\$787,500	11	4.00	9.00	1 3-R		\$787,500
Campbell	0.19	50	0.06	116	87	2.33	0.44	1 1-R		\$11,400	24	3.90	0.74	1 3-R		\$66,500	7	4.00	0.76	1 3-R		\$66,500
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	1 1-R		\$318,600	26	3.90	20.71	1 3-R		\$1,858,500	7	4.00	21.24	1 3-R		\$1,858,500
Campbell	7.02	35	0.065	130	68	1.54	10.81	1 2-R		\$1,755,000	30	4.00	28.08	1 3-R		\$2,457,000	6	4.00	28.08	1 3-R		\$2,457,000
Campbell	0.61	38	0.25	138	69	1.22	0.75	1 2-R		\$152,500	32	4.00	2.44	1 3-R		\$213,500	6	4.00	2.44	1 3-R		\$213,500
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0 DN		\$0	34	0.53	0.25	1 5-R		\$564,000	34	4.30	2.02	1 3-R		\$164,500
Campbell	0.3	59	0.11	203.5	69	0.67	0.20	0 DN		\$0	34	0.55	0.17	1 5-R		\$360,000	34	4.30	1.25	1 3-R		\$105,000
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	1 5-R		\$1,212,000	33	4.30	4.34	1 3-R		\$353,500	2	4.00	4.04	1 3-R		\$353,500
Campbell																						

Critical Budget – Equal Split Method

COUNTY	Length (m)	Width (ft)	Rut (in)	IRI (in/mi)	PCI	PSI	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*L	Decision	Treatment Type
Campbell	0.54	26	0.075	111	74	2.01	1.08	1 3-R		\$189,000	27	4.00	2.16	0 DN		\$0	6	4.00	2.16	0 DN	
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	0 DN		\$0	33	0.81	0.17	0 DN		\$0	34	0.64	0.13	0 DN	
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	0 DN		\$0	18	2.92	7.95	0 DN		\$0	19	2.82	7.68	0 DN	
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0 DN		\$0	14	3.31	1.13	0 DN		\$0	15	3.29	1.12	0 DN	
Campbell	2.32	26	0.06	136	68	1.46	3.38	0 DN		\$0	31	1.16	2.68	0 DN		\$0	32	0.89	2.07	0 DN	
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	0 DN		\$0	24	2.14	8.99	0 DN		\$0	26	1.88	7.90	0 DN	
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	0 DN		\$0	26	1.94	5.97	0 DN		\$0	27	1.65	5.09	0 DN	
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	0 DN		\$0	24	2.10	5.82	0 DN		\$0	26	1.83	5.08	0 DN	
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	0 DN		\$0	20	2.72	5.67	0 DN		\$0	21	2.58	5.37	0 DN	
Campbell	3.02	26	0.06	76	86	3.01	9.09	0 DN		\$0	18	2.93	8.84	0 DN		\$0	19	2.83	8.54	0 DN	
Campbell	0.97	26	0.04	243	68	0.34	0.33	0 DN		\$0	35	0.39	0.38	0 DN		\$0	35	0.42	0.40	0 DN	
Campbell	0.65	26	0.075	146	78	1.61	1.05	0 DN		\$0	30	1.31	0.85	0 DN		\$0	31	1.02	0.66	0 DN	
Campbell	1.9	27	0.13	158	70	1.17	2.23	0 DN		\$0	32	0.90	1.72	0 DN		\$0	33	0.70	1.33	0 DN	
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	0 DN		\$0	29	1.47	3.13	0 DN		\$0	30	1.17	2.49	0 DN	
Campbell	0.13	28	0.16	157.5	82	1.50	0.20	0 DN		\$0	30	1.20	0.16	0 DN		\$0	32	0.93	0.12	0 DN	
Campbell	0.769	27	0.19	99	85	2.42	1.86	0 DN		\$0	24	2.21	1.70	0 DN		\$0	25	1.96	1.51	0 DN	
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	0 DN		\$0	26	1.89	26.68	0 DN		\$0	28	1.60	22.58	0 DN	
Campbell	0.02	28	0.08	1682.5	93	0.24	0.00	0 DN		\$0	35	0.36	0.01	1 5-R		\$24,000	35	4.30	0.09	1 3-R	
Campbell	0.407	29	0.06	188.5	73	0.97	0.39	0 DN		\$0	33	0.75	0.30	0 DN		\$0	34	0.60	0.24	0 DN	
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	0 DN		\$0	12	3.54	3.32	0 DN		\$0	12	3.54	3.33	0 DN	
Campbell	2.39	27	0.055	108	70	1.95	4.65	0 DN		\$0	27	1.66	3.97	0 DN		\$0	29	1.36	3.25	0 DN	
Campbell	1.353	28	0.065	79	75	2.62	3.54	0 DN		\$0	22	2.45	3.31	0 DN		\$0	23	2.25	3.04	0 DN	
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	0 DN		\$0	31	1.07	11.46	0 DN		\$0	32	0.83	8.82	0 DN	
Campbell	7.36	28	0.095	149	70	1.32	9.70	0 DN		\$0	31	1.03	7.58	0 DN		\$0	33	0.79	5.83	0 DN	
Campbell	2.77	29	0.07	134	70	1.54	4.27	0 DN		\$0	30	1.24	3.42	0 DN		\$0	32	0.96	2.65	0 DN	
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	0 DN		\$0	33	0.82	7.00	0 DN		\$0	33	0.64	5.51	0 DN	
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	0 DN		\$0	13	3.40	2.72	0 DN		\$0	14	3.39	2.71	1 3-R	
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	1 GM		\$0	13	3.42	7.52	0 DN		\$0	13	3.41	7.50	0 DN	
Campbell	0.11	29	0.15	54	97	3.73	0.41	0 DN		\$0	10	3.75	0.41	0 DN		\$0	9	3.76	0.41	1 3-R	
Campbell	1.81	27	0.075	63	78	3.03	5.48	0 DN		\$0	18	2.95	5.35	0 DN		\$0	19	2.86	5.18	0 DN	
Campbell	4.3	30	0.07	69	81	3.00	12.88	0 DN		\$0	18	2.91	12.52	0 DN		\$0	19	2.81	12.08	0 DN	
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0 DN		\$0	35	0.38	0.04	0 DN		\$0	35	0.41	0.04	0 DN	
Campbell	0.12	29	0.065	202	81	1.07	0.13	1 2-R		\$30,000	32	4.00	0.48	0 DN		\$0	6	4.00	0.48	0 DN	
Campbell	1	27	0.05	174	72	1.10	1.10	0 DN		\$0	32	0.85	0.85	0 DN		\$0	33	0.66	0.66	0 DN	
Campbell	0.52	29	0.04	135	86	2.02	1.05	1 1-R		\$31,200	27	3.90	2.03	1 3-R		\$182,000	7	4.00	2.08	0 DN	
Campbell	1.52	29	0.11	106	81	2.27	3.46	0 DN		\$0	25	2.04	3.10	0 DN		\$0	27	1.76	2.68	0 DN	
Campbell	5.63	29	0.15	87	74	2.36	13.29	0 DN		\$0	24	2.14	12.04	0 DN		\$0	26	1.88	10.58	0 DN	
Campbell	6.34	30	0.085	78.5	76	2.64	16.77	0 DN		\$0	22	2.48	15.74	0 DN		\$0	23	2.29	14.50	0 DN	
Campbell	1.94	28	0.09	112	70	1.86	3.61	0 DN		\$0	28	1.57	3.04	0 DN		\$0	30	1.26	2.45	0 DN	
Campbell	3.76	27	0.15	53	74	3.06	11.52	0 DN		\$0	17	2.99	11.26	0 DN		\$0	18	2.91	10.94	0 DN	
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	0 DN		\$0	17	3.05	13.70	0 DN		\$0	18	2.97	13.37	0 DN	
Campbell	0.28	29	0.195	142	68	1.24	0.35	0 DN		\$0	32	0.96	0.27	0 DN		\$0	33	0.74	0.21	0 DN	
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	1 2-R		\$185,000	28	4.00	2.96	0 DN		\$0	6	4.00	2.96	0 DN	
Campbell	2.86	65	0.155	80	76	2.55	7.29	0 DN		\$0	23	2.37	6.77	0 DN		\$0	24	2.15	6.14	0 DN	
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	0 DN		\$0	34	0.47	0.23	0 DN		\$0	35	0.45	0.22	0 DN	
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	1 2-R		\$67,500	30	4.00	1.08	1 3-R		\$94,500	6	4.00	1.08	0 DN	
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	1 GM		\$0	17	3.03	2.15	1 3-R		\$248,500	18	4.00	2.84	0 DN	
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	0 DN		\$0	22	2.47	1.92	0 DN		\$0	23	2.27	1.77	0 DN	
Campbell	1.064	41	0.11	99	81	2.39	2.55	1 1-R		\$63,840	24	3.90	4.15	0 DN		\$0	7	3.91	4.16	0 DN	
Campbell	1.01	44	0.1	107	70	1.94	1.96	0 DN		\$0	27	1.65	1.67	0 DN		\$0	29	1.35	1.36	0 DN	
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	1 GM		\$0	12	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN	
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	1 GM		\$0	11	3.62	8.15	0 DN		\$0	11	3.63	8.17	0 DN	
Campbell	0.19	50	0.06	116	87	2.33	0.44	0 DN		\$0	24	2.10	0.40	0 DN		\$0	26	1.83	0.35	0 DN	
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	0 DN		\$0	26	1.80	9.56	0 DN		\$0	28	1.50	7.98	0 DN	
Campbell	7.02	35	0.065	130	68	1.54	10.81	0 DN		\$0	30	1.24	8.68	0 DN		\$0	32	0.96	6.73	0 DN	
Campbell	0.61	38	0.25	138	69	1.22	0.75	0 DN		\$0	32	0.95	0.58	0 DN		\$0	33	0.73	0.45	0 DN	
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0 DN		\$0	34	0.53	0.25	0 DN		\$0	34	0.48	0.23	0 DN	
Campbell	0.3	59	0.11	205.5	69	0.67	0.20	0 DN		\$0	34	0.55	0.17	0 DN		\$0	34	0.49	0.15	0 DN	
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	0 DN		\$0	33	0.67	0.67	0 DN		\$0	34	0.55	0.56	0 DN	
Campbell	0.39	62	0.275	126.5	78	1.61	0.63	0 DN		\$0	30	1.30	0.51	0 DN		\$0	31	1.02	0.40	0 DN	
Campbell	0.49	62	0.155	94	68	2.05	1.00	0 DN		\$0	27	1.77	0.87	0 DN		\$0	29	1.47	0.72	0 DN	
Campbell	0.24	34	0.135	108.5	87	2.39	0.57	0 DN		\$0	24	2.17	0.52	0 DN		\$0	26	1.92	0.46	0 DN	
Campbell	0.91	41	0.085	50.5	86	3.54	3.22	0 DN		\$0	12	3.55	3.23	0 DN		\$0	12	3.55	3.23	0 DN	
Campbell	1.25	49	0.085	189	69	0.83	1.04	0 DN		\$0	33	0.65	0.81	0 DN		\$0	34	0.54	0.68	0 DN	
Campbell	3.871	31	0.09	84.5	70	2.34	9.08	0 DN		\$0	24	2.12	8.21	0 DN		\$0	26	1.86	7.20	0 DN	
Campbell	3.72	32	0.12	61	85	3.25	12.08	0 DN		\$0	15	3.21	11.95	0 DN		\$0	16	3.17	11.80	0 DN	
Campbell	1.5	61	0.075	63	81	3.12	4.68	0 DN		\$0	17	3.06	4.59	0 DN		\$0	17	2.99	4.49	0 DN	
Campbell	1.7	66	0.07	78	77	2.69	4.58	0 DN		\$0	21	2.54	4.32	0 DN		\$0	23	2.36	4.01	0 DN	
Campbell	0.6	66	0.065	54.5	79	3.25	1.95	0 DN		\$0	15	3.22	1.93	0 DN		\$0	16	3.18	1.91	1 3-R	
Campbell	2.976	31	0.075	134	69	1.51	4.48	0 DN		\$0	30	1.20	3.58	0 DN		\$0	32	0.93	2.77	0 DN	
Campbell	0.49	32	0.11	100.5	81	2.37	1.16	0 DN		\$0	24	2.15	1.05	0 DN		\$0	26	1.89	0.93	0 DN	
Campbell	3.75	34	0.14	93.5	80	2.43	9.12	0 DN		\$0	24	2.23	8.35	0 DN		\$0	25	1.89	7.43	0 DN	
Campbell	1.56	45	0.075	58																	

Critical Budget – Front Loading

COUNTY	Length (m)	Width (ft)	Rut (in)	IRI (in/m)	PCI	PSI	PSI*L	Decision	Treatment Type	Cost	Age	PSI t+1	PSI*L	Decision	Treatment Type	Cost	Age	PSI t+1	PSI*L	Decision	Treatment Type
Campbell	0.54	26	0.075	111	74	2.01	1.08	1 3-R		\$189,000	27	4.00	2.16	0 DN		\$0	6	4.00	2.16	0 DN	
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	0 DN		\$0	33	0.81	0.17	0 DN		\$0	34	0.64	0.13	1 5-R	
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	0 DN		\$0	18	2.92	7.95	0 DN		\$0	19	2.82	7.68	0 DN	
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0 DN		\$0	14	3.31	1.13	0 DN		\$0	15	3.29	1.12	0 DN	
Campbell	2.32	26	0.06	136	68	1.46	3.38	0 DN		\$0	31	1.16	2.68	0 DN		\$0	32	0.89	2.07	0 DN	
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	1 3-R		\$1,473,500	24	4.00	16.84	0 DN		\$0	6	4.00	16.85	0 DN	
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	0 DN		\$0	26	1.94	5.97	0 DN		\$0	27	1.65	5.09	0 DN	
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	0 DN		\$0	24	2.10	5.82	0 DN		\$0	26	1.83	5.08	0 DN	
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	0 DN		\$0	20	2.72	5.67	0 DN		\$0	21	2.58	5.37	0 DN	
Campbell	3.02	26	0.06	76	86	3.01	9.09	0 DN		\$0	18	2.93	8.84	0 DN		\$0	19	2.83	8.54	0 DN	
Campbell	0.97	26	0.04	243	68	0.34	0.33	0 DN		\$0	35	0.39	0.38	0 DN		\$0	35	0.42	0.40	0 DN	
Campbell	0.65	26	0.075	146	78	1.61	1.05	0 DN		\$0	30	1.31	0.85	1 4-R		\$422,500	31	4.10	2.67	0 DN	
Campbell	1.9	27	0.13	158	70	1.17	2.23	0 DN		\$0	32	0.90	1.72	0 DN		\$0	33	0.70	1.33	0 DN	
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	0 DN		\$0	29	1.47	3.13	0 DN		\$0	30	1.17	2.49	0 DN	
Campbell	0.13	28	0.16	157.5	82	1.50	0.20	0 DN		\$0	30	1.20	0.16	0 DN		\$0	32	0.93	0.12	0 DN	
Campbell	0.769	27	0.19	99	85	2.42	3.86	1 1-R		\$46,140	24	3.90	3.00	1 3-R		\$269,150	7	4.00	3.08	0 DN	
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	1 1-R		\$846,600	26	3.90	55.03	0 DN		\$0	7	3.91	55.19	0 DN	
Campbell	0.02	28	0.08	1682.5	93	0.24	0.00	0 DN		\$0	35	0.26	0.01	1 5-R		\$24,000	35	4.30	0.09	0 DN	
Campbell	0.407	29	0.06	188.5	73	0.97	0.39	0 DN		\$0	33	0.75	0.30	1 5-R		\$488,400	34	4.30	1.75	0 DN	
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	0 DN		\$0	12	3.54	3.32	0 DN		\$0	12	3.54	3.33	0 DN	
Campbell	2.39	27	0.055	108	70	1.95	4.65	0 DN		\$0	27	1.66	3.97	0 DN		\$0	29	1.36	3.25	1 4-R	
Campbell	1.353	28	0.065	79	75	2.62	3.54	1 1-R		\$81,180	22	3.90	5.28	1 3-R		\$473,550	7	4.00	5.41	0 DN	
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	0 DN		\$0	31	1.07	11.46	0 DN		\$0	32	0.83	8.82	0 DN	
Campbell	7.36	28	0.095	149	70	1.32	9.70	0 DN		\$0	31	1.03	7.58	0 DN		\$0	33	0.79	5.83	0 DN	
Campbell	2.77	29	0.07	134	70	1.54	4.27	1 2-R		\$692,500	30	4.00	11.08	0 DN		\$0	6	4.00	11.09	0 DN	
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	1 2-R		\$2,140,000	33	4.00	34.24	0 DN		\$0	6	4.00	34.26	0 DN	
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	1 GM		\$0	13	3.40	2.72	0 DN		\$0	14	3.39	2.71	0 DN	
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	0 DN		\$0	13	3.42	7.52	0 DN		\$0	13	3.41	7.50	0 DN	
Campbell	0.11	29	0.15	54	97	3.73	0.41	0 DN		\$0	10	3.75	0.41	0 DN		\$0	9	3.76	0.41	0 DN	
Campbell	1.81	27	0.075	63	78	3.03	5.48	1 GM		\$0	18	2.95	5.35	0 DN		\$0	19	2.86	5.18	0 DN	
Campbell	4.3	30	0.07	69	81	3.00	12.88	0 DN		\$0	18	2.91	12.52	0 DN		\$0	19	2.81	12.08	0 DN	
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0 DN		\$0	35	0.38	0.04	1 5-R		\$130,800	35	4.30	0.47	1 3-R	
Campbell	0.12	29	0.065	202	81	1.07	0.13	0 DN		\$0	32	0.82	0.10	1 5-R		\$144,000	33	4.30	0.52	0 DN	
Campbell	1	27	0.05	174	72	1.10	1.10	0 DN		\$0	32	0.85	0.85	1 5-R		\$1,200,000	33	4.30	4.30	0 DN	
Campbell	0.52	29	0.04	135	86	2.02	1.05	1 1-R		\$31,200	27	3.90	2.03	1 3-R		\$182,000	7	4.00	2.08	0 DN	
Campbell	1.52	29	0.11	106	81	2.27	3.46	1 1-R		\$91,200	25	3.90	5.93	0 DN		\$0	7	3.91	5.94	0 DN	
Campbell	5.63	29	0.15	87	74	2.36	13.29	1 1-R		\$337,800	24	3.90	21.96	0 DN		\$0	7	3.91	22.02	0 DN	
Campbell	6.34	30	0.085	78.5	76	2.64	16.77	1 1-R		\$380,400	22	3.90	24.73	0 DN		\$0	7	3.91	24.80	0 DN	
Campbell	1.94	28	0.09	112	70	1.86	3.61	0 DN		\$0	28	1.57	3.04	0 DN		\$0	30	1.26	2.45	1 4-R	
Campbell	3.76	27	0.15	53	74	3.06	11.52	1 GM		\$0	17	2.99	11.26	0 DN		\$0	18	2.91	10.94	0 DN	
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	1 GM		\$0	17	3.05	13.70	0 DN		\$0	18	2.97	13.37	0 DN	
Campbell	0.28	29	0.195	142	68	1.24	0.35	1 2-R		\$70,000	32	4.00	1.12	1 3-R		\$98,000	6	4.00	1.12	0 DN	
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	0 DN		\$0	28	1.58	1.17	1 4-R		\$481,000	30	4.10	3.03	0 DN	
Campbell	2.86	65	0.155	80	76	2.55	7.29	1 1-R		\$171,600	23	3.90	11.15	0 DN		\$0	7	3.91	11.19	0 DN	
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	0 DN		\$0	34	0.47	0.23	1 5-R		\$576,000	35	4.30	2.06	0 DN	
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	1 2-R		\$67,500	30	4.00	1.08	0 DN		\$0	6	4.00	1.08	0 DN	
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	0 DN		\$0	17	3.03	2.15	1 3-R		\$248,500	18	4.00	2.84	0 DN	
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	1 1-R		\$46,800	22	3.90	3.04	0 DN		\$0	7	3.91	3.05	0 DN	
Campbell	1.064	41	0.11	99	81	2.39	2.55	1 1-R		\$63,840	24	3.90	4.15	0 DN		\$0	7	3.91	4.16	1 3-R	
Campbell	1.01	44	0.1	107	70	1.94	1.96	1 2-R		\$252,500	27	4.00	4.04	0 DN		\$0	6	4.00	4.04	0 DN	
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	1 GM		\$0	12	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN	
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	0 DN		\$0	11	3.62	8.15	0 DN		\$0	11	3.63	8.17	0 DN	
Campbell	0.19	50	0.06	116	87	2.33	0.44	1 1-R		\$11,400	24	3.90	0.74	0 DN		\$0	7	3.91	0.74	1 3-R	
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	1 1-R		\$318,600	26	3.90	20.71	0 DN		\$0	7	3.91	20.77	0 DN	
Campbell	7.02	35	0.065	130	68	1.54	10.81	1 2-R		\$1,755,000	30	4.00	28.08	0 DN		\$0	6	4.00	28.09	0 DN	
Campbell	0.61	38	0.25	138	69	1.22	0.75	0 DN		\$0	32	0.95	0.58	0 DN		\$0	33	0.73	0.45	0 DN	
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0 DN		\$0	34	0.53	0.25	0 DN		\$0	34	0.48	0.23	0 DN	
Campbell	0.3	59	0.11	203.5	69	0.67	0.20	0 DN		\$0	34	0.55	0.17	0 DN		\$0	34	0.49	0.15	0 DN	
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	0 DN		\$0	33	0.67	0.67	1 5-R		\$1,212,000	34	4.30	4.34	1 3-R	
Campbell	0.39	62	0.275	126.5	78	1.61	0.63	1 2-R		\$97,500	30	4.00	1.56	0 DN		\$0	6	4.00	1.56	0 DN	
Campbell	0.49	62	0.155	94	68	2.05	1.00	1 1-R		\$29,400	27	3.90	1.91	1 3-R		\$171,500	7	4.00	1.96	0 DN	
Campbell	0.24	34	0.135	108.5	87	2.39	0.57	0 DN		\$0	24	2.17	0.52	1 4-R		\$156,000	26	4.10	0.98	0 DN	
Campbell	0.91	41	0.085	50.5	86	3.54	3.22	0 DN		\$0	12	3.55	3.23	0 DN		\$0	12	3.55	3.23	0 DN	
Campbell	1.25	49	0.085	189	69	0.83	1.04	0 DN		\$0	33	0.65	0.81	0 DN		\$0	34	0.54	0.68	0 DN	
Campbell	3.871	31	0.09	84.5	70	2.34	9.08	1 1-R		\$232,260	24	3.90	15.10	0 DN		\$0	7	3.91	15.14	0 DN	
Campbell	3.72	32	0.12	61	85	3.25	12.08	0 DN		\$0	15	3.21	11.95	0 DN		\$0	16	3.17	11.80	0 DN	
Campbell	1.5	61	0.075	63	81	3.12	4.68	0 DN		\$0	17	3.06	4.59	1 3-R		\$525,000	17	4.00	6.00	0 DN	
Campbell	1.7	66	0.07	78	77	2.69	4.58	1 1-R		\$102,000	21	3.90	6.63	0 DN		\$0	7	3.91	6.65	0 DN	
Campbell	0.6	66	0.065	54.5	79	3.25	1.95	1 GM		\$0	15	3.22	1.93	0 DN		\$0	16	3.18	1.91	1 3-R	
Campbell	2.976	31	0.075	134	69	1.51	4.48	1 2-R		\$744,000	30	4.00	11.90	0 DN		\$0	6	4.00	11.91	0 DN	
Campbell	0.49	32	0.11	100.5	81	2.37	1.16	1 1-R		\$29,400	24	3.90	1.								

Critical Budget – Back Loading

COUNTY	Length (r	Width (ft)	Rut (in)	IRI (in/mi)	PCI	PSI	PSI*	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*	Decision	Treatment Type	Cost	Age	PSI_t+1	PSI*	Decision	Treatment Type	Cost
Campbell	0.54	26	0.075	111	74	2.01	1.08	0 DN		\$0	27	1.73	0.93	0 DN		\$0	29	1.43	0.77	0 DN		\$0
Campbell	0.21	26	0.095	192.5	78	1.06	0.22	0 DN		\$0	33	0.81	0.17	1 5-R		\$252,000	34	4.30	0.90	0 DN		\$0
Campbell	2.72	26	0.235	52.5	76	3.00	8.17	0 DN		\$0	18	2.92	7.95	0 DN		\$0	19	2.82	7.68	0 DN		\$0
Campbell	0.34	26	0.125	55.5	84	3.34	1.13	0 DN		\$0	14	3.31	1.15	0 DN		\$0	15	3.29	1.13	0 DN		\$0
Campbell	2.32	26	0.06	136	68	1.46	3.38	0 DN		\$0	31	1.16	2.68	0 DN		\$0	32	0.89	2.07	0 DN		\$0
Campbell	4.21	26	0.07	84.5	70	2.36	9.93	0 DN		\$0	24	2.14	8.99	0 DN		\$0	26	1.88	7.90	0 DN		\$0
Campbell	3.08	26	0.075	98.5	73	2.19	6.74	0 DN		\$0	26	1.94	5.97	0 DN		\$0	27	1.65	5.09	0 DN		\$0
Campbell	2.78	26	0.145	84.5	71	2.32	6.46	0 DN		\$0	24	2.10	5.82	0 DN		\$0	26	1.83	5.08	0 DN		\$0
Campbell	2.08	26	0.075	79.5	83	2.84	5.91	0 DN		\$0	20	2.72	5.67	0 DN		\$0	21	2.58	5.37	0 DN		\$0
Campbell	3.02	26	0.06	76	86	3.01	9.09	0 DN		\$0	18	2.93	8.84	0 DN		\$0	19	2.83	8.54	0 DN		\$0
Campbell	0.71	26	0.04	243	68	0.34	0.33	0 DN		\$0	35	0.39	0.36	0 DN		\$0	35	0.42	0.40	0 DN		\$0
Campbell	0.65	26	0.075	146	78	1.61	1.05	0 DN		\$0	30	1.31	0.85	0 DN		\$0	31	1.02	0.66	1 4-R		\$422,500
Campbell	1.9	27	0.13	158	70	1.17	2.23	0 DN		\$0	32	0.90	1.72	0 DN		\$0	33	0.70	1.33	0 DN		\$0
Campbell	2.13	28	0.13	133.5	79	1.77	3.77	0 DN		\$0	29	1.47	3.13	1 4-R		\$1,384,500	30	4.10	8.73	0 DN		\$0
Campbell	0.13	28	0.16	157.5	82	1.50	0.20	0 DN		\$0	30	1.20	0.16	0 DN		\$0	32	0.93	0.12	1 5-R		\$156,000
Campbell	0.769	27	0.19	99	85	2.42	1.86	0 DN		\$0	24	2.21	1.70	0 DN		\$0	25	1.96	1.51	0 DN		\$0
Campbell	14.11	28	0.17	95.5	73	2.15	30.32	0 DN		\$0	26	1.89	26.68	0 DN		\$0	28	1.60	22.58	0 DN		\$0
Campbell	0.02	28	0.08	1682.5	93	0.24	0.00	0 DN		\$0	35	0.36	0.01	0 DN		\$0	35	0.40	0.01	0 DN		\$0
Campbell	0.07	29	0.06	188.5	73	0.97	9.09	0 DN		\$0	33	0.75	0.30	1 5-R		\$488,400	34	4.30	1.75	0 DN		\$0
Campbell	0.94	29	0.045	54.5	88	3.53	3.32	0 DN		\$0	12	3.54	3.32	0 DN		\$0	12	3.54	3.33	0 DN		\$0
Campbell	2.39	27	0.055	108	70	1.95	4.65	0 DN		\$0	27	1.66	3.97	0 DN		\$0	29	1.56	3.25	0 DN		\$0
Campbell	1.353	28	0.065	79	75	2.62	3.54	1 1-R		\$81,180	22	3.90	5.28	0 DN		\$0	7	3.91	5.29	0 DN		\$0
Campbell	10.68	28	0.09	152.5	73	1.37	14.60	0 DN		\$0	31	1.07	11.46	0 DN		\$0	32	0.83	8.82	0 DN		\$0
Campbell	7.36	28	0.095	149	70	1.32	9.70	0 DN		\$0	31	1.03	7.58	0 DN		\$0	33	0.79	5.83	0 DN		\$0
Campbell	2.77	29	0.07	134	70	1.54	4.27	1 2-R		\$692,500	30	4.00	11.08	0 DN		\$0	6	4.00	11.09	0 DN		\$0
Campbell	8.56	29	0.06	166.5	68	1.06	9.09	0 DN		\$0	32	0.82	0.00	0 DN		\$0	33	7.00	0.85	0 DN		\$0
Campbell	0.8	27	0.09	49.5	81	3.41	2.73	0 DN		\$0	13	3.40	2.72	0 DN		\$0	14	3.39	2.71	0 DN		\$0
Campbell	2.2	29	0.065	49.5	81	3.43	7.54	1 GM		\$0	13	3.42	7.52	0 DN		\$0	13	3.41	7.50	0 DN		\$0
Campbell	0.11	29	0.15	54	97	3.73	0.41	0 DN		\$0	10	3.75	0.41	0 DN		\$0	9	3.76	0.41	1 3-R		\$38,500
Campbell	1.81	27	0.075	63	78	3.03	5.48	1 GM		\$0	18	2.95	5.35	0 DN		\$0	19	2.86	5.18	0 DN		\$0
Campbell	4.3	30	0.07	69	81	3.00	12.88	0 DN		\$0	18	2.91	12.52	0 DN		\$0	19	2.81	12.08	0 DN		\$0
Campbell	0.109	28	0.195	256.5	75	0.31	0.03	0 DN		\$0	35	0.38	0.04	0 DN		\$0	35	0.41	0.04	0 DN		\$0
Campbell	0.12	29	0.065	202	81	1.07	0.13	0 DN		\$0	32	0.82	0.10	0 DN		\$0	33	0.85	0.08	0 DN		\$0
Campbell	1	27	0.05	174	72	1.10	1.10	0 DN		\$0	32	0.85	0.85	0 DN		\$0	33	0.66	0.66	0 DN		\$0
Campbell	0.52	29	0.04	135	86	2.02	1.05	1 1-R		\$31,200	27	3.90	2.03	0 DN		\$0	7	3.91	2.03	0 DN		\$0
Campbell	1.52	29	0.11	106	81	2.27	3.46	0 DN		\$0	25	2.04	3.10	0 DN		\$0	27	1.76	2.68	0 DN		\$0
Campbell	5.63	29	0.15	87	74	2.36	13.29	0 DN		\$0	24	2.14	12.04	0 DN		\$0	26	1.88	10.58	0 DN		\$0
Campbell	6.34	30	0.085	78.5	76	2.64	16.77	0 DN		\$0	22	2.48	15.74	0 DN		\$0	23	2.29	14.50	0 DN		\$0
Campbell	1.94	28	0.09	112	70	1.86	3.61	0 DN		\$0	28	1.57	3.04	0 DN		\$0	30	1.26	2.45	0 DN		\$0
Campbell	3.76	27	0.15	53	74	3.06	11.52	0 DN		\$0	32	2.89	11.26	0 DN		\$0	33	2.91	10.98	0 DN		\$0
Campbell	4.5	30	0.085	52.5	73	3.11	13.98	1 GM		\$0	17	3.05	13.70	0 DN		\$0	18	2.97	13.37	0 DN		\$0
Campbell	0.28	29	0.195	142	68	1.24	0.35	0 DN		\$0	32	0.96	0.27	0 DN		\$0	33	0.74	0.21	0 DN		\$0
Campbell	0.74	56	0.09	122.5	76	1.88	1.39	1 2-R		\$185,000	28	4.00	2.96	0 DN		\$0	6	4.00	2.96	0 DN		\$0
Campbell	2.86	65	0.155	80	76	2.55	7.29	1 1-R		\$171,600	23	3.90	11.15	0 DN		\$0	7	3.91	11.19	0 DN		\$0
Campbell	0.48	65	0.11	266.5	81	0.52	0.25	0 DN		\$0	34	0.47	0.23	0 DN		\$0	35	0.45	0.22	1 5-R		\$576,000
Campbell	0.27	66	0.115	180.5	90	1.53	0.41	0 DN		\$0	30	1.22	0.33	0 DN		\$0	32	0.95	0.26	0 DN		\$0
Campbell	0.71	68	0.12	69.5	86	3.10	2.20	0 DN		\$0	17	3.03	2.15	0 DN		\$0	18	2.96	2.10	1 4-R		\$461,500
Campbell	0.78	74	0.165	97.5	90	2.63	2.05	1 1-R		\$46,800	22	3.90	3.04	0 DN		\$0	7	3.91	3.05	0 DN		\$0
Campbell	1.064	41	0.11	99	81	2.39	2.55	1 1-R		\$63,840	24	3.90	4.15	0 DN		\$0	7	3.91	4.16	1 3-R		\$372,400
Campbell	1.01	44	0.1	107	70	1.94	1.96	0 DN		\$0	27	1.65	1.67	0 DN		\$0	29	1.35	1.36	0 DN		\$0
Campbell	3.32	31	0.055	54.5	87	3.50	11.61	1 GM		\$0	12	3.50	11.61	0 DN		\$0	12	3.50	11.61	0 DN		\$0
Campbell	2.25	31	0.055	57.5	93	3.61	8.12	0 DN		\$0	11	3.62	8.15	0 DN		\$0	11	3.63	8.17	0 DN		\$0
Campbell	0.19	50	0.06	116	87	2.33	0.44	0 DN		\$0	24	2.10	0.40	0 DN		\$0	26	1.83	0.35	0 DN		\$0
Campbell	5.31	31	0.065	100.5	70	2.07	10.99	0 DN		\$0	26	1.80	9.56	0 DN		\$0	28	1.50	7.98	0 DN		\$0
Campbell	7.02	35	0.065	130	68	1.54	10.81	0 DN		\$0	30	1.24	8.68	0 DN		\$0	32	0.96	6.73	0 DN		\$0
Campbell	0.61	38	0.25	138	69	1.22	0.75	1 2-R		\$152,500	32	4.00	2.44	0 DN		\$0	6	4.00	2.44	1 3-R		\$213,500
Campbell	0.47	59	0.105	210.5	70	0.63	0.30	0 DN		\$0	34	0.53	0.25	0 DN		\$0	34	0.48	0.23	0 DN		\$0
Campbell	0.3	59	0.11	203.5	69	0.67	0.20	0 DN		\$0	34	0.55	0.17	0 DN		\$0	34	0.49	0.15	1 5-R		\$360,000
Campbell	1.01	60	0.235	182.5	74	0.86	0.86	0 DN		\$0	33	0.67	0.67	0 DN		\$0	34	0.55	0.56	1 5-R		\$1,212,000
Campbell	0.39	62	0.275	126.5	78	1.61	0.63	1 2-R		\$97,500	30	4.00	1.56	0 DN		\$0	6	4.00	1.56	1 3-R		\$136,500
Campbell	0.49	62	0.155	94	68	2.05	1.00	1														