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Implementing Practical Pavement Management Systems for Small Communities: A South Dakota Case Study

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Abstract
A pavement management system (PMS) can assist decision makers in finding optimum strategies for maintaining pavements; however, local agencies in small communities often face implementation challenges, such as a limited budget, lack of manpower and technical resources, and insufficient and inaccurate data. The available literature focuses on the general process of establishing and implementing PMS for small communities but does not discuss specific solutions in detail. Madison, South Dakota, is used as a case study in this article to discuss the issues small communities face in creating PMS, and to present practical, cost-effective solutions. The intent is to transfer and advance the knowledge surrounding the preservation of pavements and promote the use of PMS in small communities.

Keywords
pavement management system (PMS), decision maker, maintenance and rehabilitation (M&R), optimal strategies, small communities

Introduction

The price tag for maintaining and restoring aging pavements to a serviceable level can be very high for small, local communities. While costs are inevitable, they can be

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reduced via timely, appropriate, and effective maintenance and rehabilitation (M&R) strategies. A pavement management system (PMS) can help address the public's high expectations of road conditions in a cost-effective manner for communities with limited finances. A PMS is a set of tools or methods that assists decision makers in finding optimum approaches for maintaining pavements in a satisfactory condition over a given time interval (Haas, Hudson, & Zaniewski, 1994). Agencies use PMS as a planning tool to identify cost-effective strategies for maintaining a pavement network and determine the funding necessary to meet the agency's goals.

Managing local roads effectively and scientifically has become easier with the availability of staff who are more skilled, the advent of the computer database, more data on drivers, and more affordable paving technologies such as PMS. A good PMS requires reliable information about the road system, current and predicted pavement conditions, and the level of synergy between engineers and budget analysts who develop the pavement management strategies. This study summarizes the common challenges faced by small communities when developing and implementing a PMS and provides feasible solutions. A variety of practical M&R strategies are compared based on available budgets using Madison, South Dakota, as a case study. The study intends to advance the knowledge of pavement preservation, transfer practical technologies to local agencies, and promote the use of PMS in small communities.

PMS

A PMS can be defined as the process of collecting, analyzing, maintaining, and reporting pavement data to assist decision makers in identifying the optimal M&R plan (Haas et al., 1994). Figure 1 shows the three major phases of a typical PMS (Sahin, 2005). The following paragraphs will discuss each phase in detail.

The first phase involves developing a database with a geographic information system (GIS) map and other information pertinent to pavement (Sahin, 2005). An accurate database is the cornerstone of PMS, and its quality directly affects the future pavement condition prediction and M&R budgeting. In addition, street inventory, pavement conditions, traffic conditions, work history, and costs need to be collected for every street segment. All data can be linked to the GIS map to form the PMS GIS database. It is common for Department of Transportation (DOT)-maintained highways to use GIS databases, but this is not always the case for local roads. Developing an accurate GIS map requires a great deal of effort for small communities because of the amount of location information to be reviewed and verified. Information might need to be manually geocoded into a digital map, and sometimes additional roadway attributes need to be collected and added.

Pavement condition prediction models are developed in Phase 1 (Sahin, 2005). The process begins with the selection of appropriate condition indicators, or indexes, by incorporating distress type, quantity, and severity. Pavement condition is evaluated based on a field survey, windshield survey, or by walking on the pavement. Pavements in the same environment that also have similar characteristics (e.g., pavement structure, traffic, weather) are expected to behave in a similar manner. The common practice for

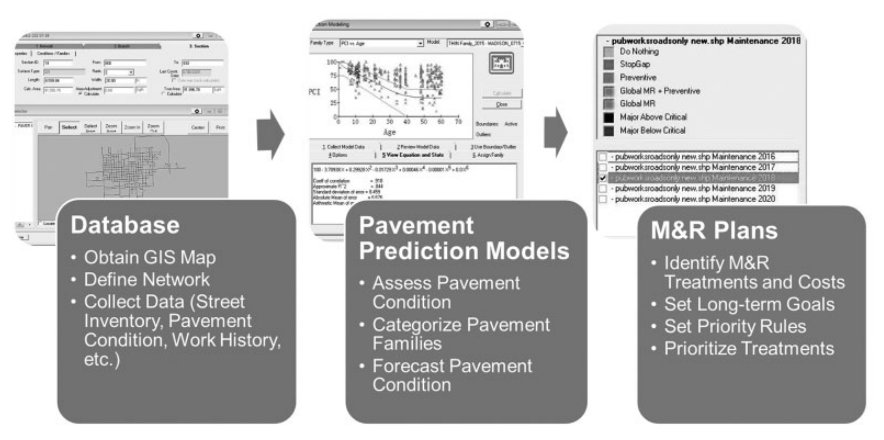

Figure 1. PMS process flow chart.
Note. PMS = pavement management system; GIS = geographic information system; M&R = maintenance and rehabilitation.

predicting pavement conditions is to group roadway sections by attributes into families and develop prediction models for each pavement family.

In the third phase, M&R plans are created based on costs, long-term goals, priority ratings, prioritized specific sections, and budget constraints (Sahin, 2005). First, M&R treatments and unit costs (dollars per square yard) based on different pavement types should be identified. The agency should select the planning horizon that meets its management objectives. Priority rules should be set based on pavement condition, distress type, deterioration rate, traffic volume, and history of roadway projects.

Small, local agencies face challenges similar to state highway agencies with regard to operational and organizational needs. Small agencies implementing PMS can be delayed by limited resources or lack of technical expertise (Wolters, Zimmerman, Schattler, & Rietgraf, 2011). Small agencies also face issues with regard to irregularly collected and poorly archived data, and lack of historical data regarding pavement age and M&R records (Wolters et al., 2011).

It is very important for local agencies to evaluate the benefits, costs, and resources necessary to implement PMS before starting the process. An evaluation is crucial for informed decision-making support and public buy-in. Each agency must conduct a costs and benefits analysis (Broten, 1997) and then communicate the benefits of PMS (Broten, 1997; Wolters et al., 2011) to the public and elected officials. Benefits include generating a unified database for roadway inventory, pavement condition, construction, maintenance, and rehabilitation records; providing an approach to monitoring and quantifying pavement network condition; facilitating decision making and increasing the chance of making optimal decisions for rehabilitation, maintenance, and trade-off options; and providing a method to analyze the consequences of different budget levels on pavement conditions and justifying budget needs to officials and other stakeholders. Bryce and colleagues (2014) used the Municipality of Christiansburg in Virgina to demonstrate the benefits of P&M for midsized and small communities. Benefits included the monitoring of current pavement conditions and future projections, and helping with decision making for funding preventive maintanance.

The cost of PMS includes the cost of implementation and of sustaining the system. Factors related to the cost of a PMS are as follows (Wolters et al., 2011): (a) data collection and database building; (b) acquisition and installation of required software; (c) consultant services and personnel training; (d) expenditures for the M&R of the pavement. An agency can perform a quick analysis to understand the cost-effectiveness of implementing a PMS, as it might be difficult to quantify all costs and benefits (Wolters et al., 2011).

Case Study

Background for City of Madison

The City of Madison in South Dakota was used as a case study to demonstrate the practical problems faced by small communities when establishing a PMS. Madison is a rural city that had a population of 6,747 at the 2010 census. The city's engineering and public works departments are responsible for managing all sidewalks, alleys and other public ways, and 53 miles of streets. Madison, like other small agencies, regularly employs pavement maintenance practices such as chip seal to provide a good driving surface and extend pavement life. Madison performs chip seal every year for one seventh of all pavement segments.

The city has an annual budget of $150,000/year for global M&R, and an additional $28,000/year for localized stopgap M&R. However, most streets and roads in the city are over 30 years old, and repeated traffic load and adverse weather have gradually deteriorated the pavement service quality and weakened its functioning. Chip sealing provides needed surface friction and better driving conditions, but it does not enhance the structural condition of the pavement. Therefore, the city is taking a proactive approach to prevent accelerated pavement deterioration on a large scale. The city council recently approved a footage tax which will bring in an additional $400,000 to $600,000 in funding every other year for potential roadway rehabilitation projects. PMS will be a great tool for the city as it plans for the future maintenance and repair of its streets. The following sections outline the issues and solutions involved in establishing PMS for small communities like Madison.

Creation of GIS Map

The creation of an accurate GIS map is the first task a small community must accomplish when developing a PMS database. Locally maintained road maps from the community's public works department or the road network map from a state DOT can be the source for the GIS map. Recently, volunteered GISs have started offering its users free access to base map information and the ability to create their own contents. One example is OpenStreetMap (OSM), a free editable map of the world (http://www.openstreetmap.org/).

The public works department's city map of Madison was compared with the South Dakota Department of Transportation (SDDOT) non-state trunk roadway inventory. The city map was chosen as the base map because the branches were divided into smaller sections by intersections, which is something PMS require. Once the map source was identified, the city map was modified based on the city engineer's comments and aerial imagery (e.g., aerial photograph, Bing map, Google map). Discontinuous segments were connected manually, surface types were corrected, and new fields such as maintenance (city maintenance or other) and jurisdiction (by the city, county, or SDDOT) were added. The GIS database was updated with intersections that were included in one or two cross streets to avoid double-counting the area of intersections. Editing the GIS map requires entry-level ArcGIS desktop knowledge that can be obtained through the Environmental Systems Research Institute (ESRI) website.

Inventory Data Collection

It is common for local agencies to either lack adequate data items or have data items stored in different sources. Thus, data availability is the second biggest challenge for smaller communities developing a PMS database.

The effectiveness of a PMS depends largely on the data that are being used (Mapikitla, 2012). Aside from traffic volume, two types of data are collected for a PMS database: inventory and condition. Inventory data include information such as pavement surface type, pavement structure, pavement thickness, pavement age, functional class, segment length, segment width, lane use, number of lanes, lane width, shoulder type, shoulder width, jurisdiction, and so on. The database requires information on segment use, the physical dimensions of the segment, pavement surface type, and pavement age (Broten, 1997). Basic lane use information regarding roadways, parking lots, and airfields helps determine which pavement condition assessment strategies should be used under different pavement distress types. Pavement age, which is calculated from the date of the last major M&R work, is required for the development of a performance model. Pavement age should be estimated if there are any missing values. Other data such as pavement thickness and the functional class are not a necessity for PMS, but they can be important for grouping pavement sections into homogeneous families for the development of pavement performance models.

The type of PMS software helps determine which inventory items are required. Inventory data can be collected from the related database, previous construction plans/reports, or field surveys. Roadway physical attributes, such as link length, width, functional class, and surface type, can be retrieved from the DOT's road database. Previous work plans or reports can be the source for M&R work history data. Field surveys or imputation methods can serve as alternatives if required data are still missing.

The majority of required inventory attributes for Madison's PMS database can be imported from the SDDOT roadway map. Most segments between the city map and

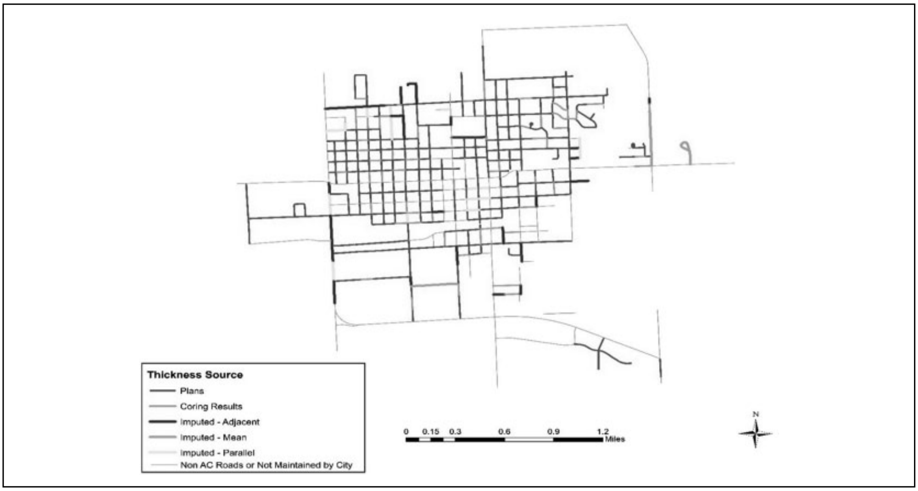

Figure 2. Thickness source map for asphalt concrete (AC) pavement.

the SDDOT map have either a one-to-one or many-to-one relationship, which leads to an easy transfer of attributes values from the SDDOT map to the city map. Manual intervention can be used when segments do not completely overlap. M&R work history was collected by the city from previous work plans and reports.

Thickness information was available only for certain pavement segments in Madison. It is not realistic to collect missing thickness information for all segments; therefore, representative sites were sampled and measured, then imputation methods were applied to estimate thickness for other segments. Three imputation methods were compared: mean substitution, interpolation substitution, and regression substitution. The city conducted coring for more than 60 sites to examine the regression imputation approach. Regression substitution was not suitable due to poor data fitting; in fact, there was little relationship between pavement thickness and other variables such as highway functional class. Thus, the missing thickness information was imputed using either the mean substitution method or geographical interpolation method. Missing thickness values were interpolated by the adjacent or parallel segments, but when adjacent or parallel segments had no thickness information, the mean thickness value of all pavements in the city was substituted. Figure 2 shows the locations of the segments with a different thickness source. Existing thickness information was obtained either from construction plans or from coring results, while the missing information was imputed from the mean value, the adjacent segments, or the parallel segments.

It is recommended to collect pavement conditions periodically to document the changes over time, and therefore help with pavement evaluation (Walker, Entine, & Kummer, 2002). Local agencies need to decide the amount, quality, and type of data that will be collected, while also considering the costs and the level of data analysis required. However, pavement distress data needs should always be collected to ensure proper development of the PMS. Furthermore, roughness, skid resistance, and deflection should be evaluated with any increase in funding. In Madison, criteria for the distress survey were based on ASTM D6433-09 ("Asphalt distressed for roads and parking lots"; Sahin, 2005). A pavement condition survey showed that the most common pavement distress types for asphalt in Madison were longitudinal cracking, rutting, block cracking, and alligator cracking. The most common distresses for concrete were linear cracking and large patch/utility cuts. Nearly 60% of the city's pavements were considered good (Pavement Condition Index [PCI] > 70) based on the distress survey results.

Pavement Performance Modeling

Various indices have been proposed to rate pavement performance. Saba et al. (2006) noted that while it might be appropriate to individually evaluate distress at the project level, some composite measures of the performance indicator are necessary at the network level. A few examples of available condition rating indices are Present Serviceability Index (PSI), PCI, and Pavement Condition Rating (PCR) (Saba et al., 2006). PCI was selected as the pavement condition indicator in this study due to its wide application. PCI has a numerical value between 0 and 100, with 100 representing the best possible condition and 0 representing the worst possible condition (Sahin, 2005). The deducted value is determined based on distress type, severity, and the extent of the distress areas.

Pavement perforamnce models were developed based on "faimilies" of pavement sections because the multiple-year data for individual pavement sections are not available. Pavement sections with similar characteristics were assumed to share similar deterioriation trends and were therefore grouped into families. The categorization of pavement family directly affects the sample size in each family, which can influence prediction accuracy depending on data availability (Sahin, 2005). Local agencies can either develop their own pavement categories or refer to a reliable source such as the state DOT to find definitions of pavement families. The pavement families most relevant to the City of Madison were obtained from the SDDOT report entitled *Statistical Methods for Pavement Performance Curve Building, Historical Analysis, Data Sampling and Storage* (Zimmerman & Bahulkar, 1998), in which thickness type and surface overlay type (i.e., Original, AC Overlay on Original, Mill, and AC Overlay) for asphalt pavements are used to group pavement sections (Deighton, Jackson, & Ruck, 1994). The pavements were categorized into five families based on available pavement data, as shown in Table 1. The pavement families were categorized based on pavement structure. It is reasonable to exclude roadway traffic from the factors affecting PCI in this case, as Madison is a small community with a dominant number of local roads. Furthermore, it is impractical to obtain traffic information for local roads in small communities.

Ideally, all PCI data of pavement sections in the same family should be used for development of pavement performance models. However, it was found that the pavement age data in the city's database were not accurate. Some "old"

Table 1. Pavement Performance Prediction Models for the City.

Name	Description	Equation
FD	ACP with no granular base	$PCI = 100 - 2.58749Age + 0.01957Age^2$
THK	5 to 10 in. ACP with granular base	$PCI = 100 - 1.78149Age$
THIN	2 to 5 in. ACP with granular base	$PCI = 100 - 3.70938Age + 0.29928Age^2 - 0.01729Age^3 + 0.00046Age^4 - 0.00001Age^5$
APC	Asphalt overlay on top of PCC	$PCI = 100 - 3.36849Age + 0.05589Age^2 - 0.00031Age^3$
PCC	Portland Cement Concrete Pavement	$PCI = 100 - 4.37412Age$

Note. FD = Full Depth; ACP = Asphalt Concrete Pavement; THK = Thick; THIN = Thin; APC = Asphalt overlay on top of PCC; PCC = Portland Cement Concrete; PCI = Pavement Condition Index.

pavement sections had high PCI values after over 30 years without rehabilitation, while some "new" pavement sections had very small PCI values. The data contradict the fact that pavement condition deteriorates with age and the rate of deterioration increases until the terminal age. Therefore, some outliers were removed through a boundary-based approach which set PCI limits based on pavement age and built performance models using the data points within the boundary. For instance, when the pavement section is less than 3 years old, PCI is considered to be more than 75; when the pavement age is greater than the average pavement life for that thickness type (around 30 years), PCI is considered to be less than 50. Based on the available data points, a regression analysis was conducted after the data outliers with abnormal PCI were excluded. The final pavement performance models for five pavement families are listed in Table 1. Pavement distress data were collected only for 2014, so the PCI data used in the model were minimal. The prediction models will become more accurate when the city performs future pavement distress surveys.

Recommendation of M&R Plans

Roadway M&R is usually one of the largest expenses included in a state or city budget. Planning pavement M&R projects is an important part of pavement management. M&R involves structural or functional enhancements through the addition of existing layers in the pavement structure to enhance pavement performance, thus increasing ride quality and extending service life. In general, there are four types of treatments, categorized by scope and strategy: localized stopgap (safety), localized preventive, global preventive, and major (Sahin, 2005). The treatments are explained in further detail below.

1. Localized stopgap M&R (crack sealing and patching) is applied to the pavement below the critical PCI to sustain a safe condition until extensive M&R treatment is needed.

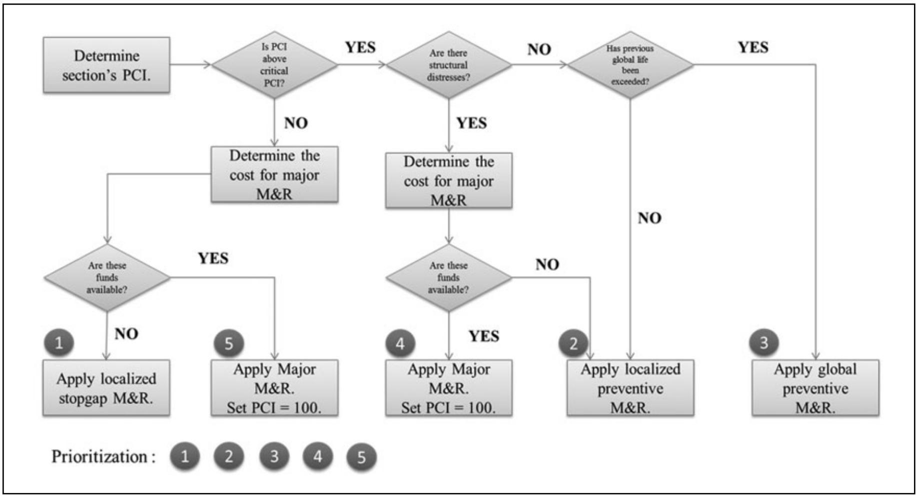

Figure 3. M&R work assignment in MicroPAVER.
Note. M&R = maintenance and rehabilitation; PCI = Pavement Condition Index.

2. Localized preventive M&R is applied to pavement above the critical PCI to slow down its deterioration.
3. Global preventive M&R, such as chip sealing or slurry sealing, is applied to the entire pavement section.
4. Major M&R, such as mill and overlay or reconstruction, is applied to the entire section either above or below the critical PCI to correct or improve its current conditions.

In Madison, treatments such as chip sealing, crack filling, hot mix, and cold mix have already been applied.

The most common methodologies used in M&R plan recommendations are prioritization models and optimization models (Torres-Machí, Chamorro, Videla, Pellicer, & Yepes, 2014). In prioritization models, priorities are sorted by ranking; then, M&R activities are assigned to road sections based on their priorities (Torres-Machí et al., 2014). The goal of an optimization model is to either maximize the overall performance or minimize the total cost, with variables indicating the M&R treatments (Torres-Machí et al., 2014). Optimization models can have multiple objectives.

M&R activities can be recommended through the use of commercial, off-the-shelf (COTS) software packages. The limitation for COTS is the built-in ranking scheme, which may not ensure that the best M&R strategies are selected. For example, MicroPAVER, developed by the U.S. Army Corps of Engineers and distributed by the American Public Works Association (APWA), uses the critical PCI method as the built-in mechanism when making M&R plans (Sahin, 2005). The idea behind this is to keep all pavements from reaching the critical PCI point or the point when deterioration accelerates. It is also more economical to maintain the pavements. Figure 3 illustrates the assignment and prioritization of M&R in MicroPAVER (Sahin, 2005). The assignment begins with comparing each section's PCI value with the critical PCI (the default critical value is 55) (Sahin, 2005).

- If PCI is below the critical value, the cost for major M&R is estimated based on a relationship between PCI and unit cost. Major M&R will be applied when the funds are available. Localized stopgap M&R will be applied if funds are insufficient for major M&R. After major M&R is applied, each section's PCI will be reset to 100.
- If PCI is above the critical value, structural distress (e.g., rutting) will be checked. If structural distresses exist, the cost for major M&R will be estimated. Similarly, major M&R will be applied if funding is sufficient, and localized preventive M&R will be applied if funds are not available. If no structural distress exists, global preventive M&R will be applied when previous global life has been exceeded; otherwise, localized preventive M&R will be selected.
- After the assignments, priority is given to different M&R categories. Localized stopgap, localized preventive, global preventive, major (PCI > critical PCI), and major (PCI < critical PCI) are in a descending priority order.

It should be taken into account that the PMS software's recommended plan may not necessarily be the most optimal plan. Moreover, local agencies may have special needs that cannot be programmed into the software. The challenge is to design a customized M&R plan without exceeding the budget limit or compromising its effectiveness. Thanks to the additional funding of $400,000 to $600,000 collected every other year through the new footage tax, the objective of the city's pavement management plan is to identify the optimal funding allocation among different M&R categories to maximize the average pavement condition (PCI) and minimize the percentage of poor pavement areas (PCI < 55) by the end of 2020.

Customized M&R strategies begin with preventive strategies. Decisions need to be made about where and whether global or localized strategies should be used. Both localized and global M&R are preventive strategies for pavement with a PCI larger than 55, but localized treatments are applied to specific distressed areas while global treatments are applied to the entire pavement section. The PCI analysis suggests that the global M&R performed better than the localized strategies. However, only certain distress types can be treated when applying only global preventive M&R. For instance, chip sealing deals only with skid-causing distress such as polished aggregate and bleeding. Localized preventive, on the contrary, can treat different types of distress due to its flexibility.

Pavement sections with a PCI below 55 should be treated with the worst condition first or last. MicroPAVER adopts "worst last" by default, meaning the lowest priority for major M&R is assigned to the pavement with the lowest PCI. Previous research shows no apparent winner between "best–first" and "worst–first" (Vitillo, Boxer, & Rascoe, 2012). In this study, a sensitivity analysis was performed among 17 sections

Table 2. List of 17 Worst Pavement Sections.

Section ID	Branch ID	Rank	Age	PCI	True area(ft^2)	Unit cost	Total cost
1	SE 4TH ST	B	39	25	17,898	$6.50	$1,16,337
2	SE 2ND ST	E	57	10	10,281	$6.50	$66,826
3	NE 7TH ST	E	41	11	1,433	$6.50	$9,314
4	N ROOSEVE	E	45	14	18,798	$6.50	$1,22,187
5	N ROOSEVE	E	45	14	16,094	$6.50	$1,04,611
6	NE 8TH ST	E	49	14	7,755	$6.50	$50,407
7	CIRCLE DR	E	41	16	3,498	$6.50	$22,737
8	CIRCLE DR	E	41	16	3,498	$6.50	$22,737
9	NE 8TH ST	E	49	16	11,090	$6.50	$72,085
10	N CATHERI	E	36	19	9,120	$6.50	$59,280
11	N CHICAGO	E	55	21	11,922	$6.50	$77,493
12	N MAPLEWO	E	34	23	11,763	$6.50	$76,459
13	NE 6TH ST	E	45	23	21,518	$6.50	$1,39,867
14	NE 8TH ST	E	41	23	10,941	$6.50	$71,116
15	W CENTER	E	16	24	11,417	$6.50	$74,210
16	NE 5TH ST	E	53	25	12,549	$6.50	$81,568
17	NE 8TH ST	E	49	25	10,567	$6.50	$68,685

Note. Under “Rank” Column, “B” refers to arterial road and “E” refers to residential road. PCI = Pavement Condition Index.

Table 3. Major M&R for 17 Worst Pavement Sections.

Plan	2016	2017	2018	2019	2020
1	—	—	—	—	—
2	1	—	2	3	4
3	1, 2	3	4, 5	6	7, 8
4	1, 2, 3	—	4, 5, 6	7, 8	9, 10, 11
5	1, 2, 3, 4	—	5, 6, 7, 8	—	9, 10, 11, 12
6	1, 2, 3, 4, 5	6	7, 8, 9, 10, 11, 12, 13, 14, 15	—	16, 17
7	1, 2, 3, 7, 8, 10, 11	—	4, 5, 6, 9, 14, 17	—	12, 13, 15, 16
8	1, 2, 3, 7, 8, 10, 11	—	4, 5, 6, 9, 14, 17	—	12, 13, 15, 16
9	1, 2, 3, 10, 11	—	4, 5, 6, 7, 8, 9, 14, 17	—	12, 13, 15, 16

Note. M&R = maintenance and rehabilitation.

that had a very low PCI (≤25) and structural distresses (Table 2) to decide whether the pavement with the worst condition should be treated first or last.

A total of nine plans were proposed and compared (Table 3). At the beginning, six plans (Plans 1-6) with an increasing number of major M&R projects were optimized and proposed. Plan 7 was made following a request from the city to group pavement

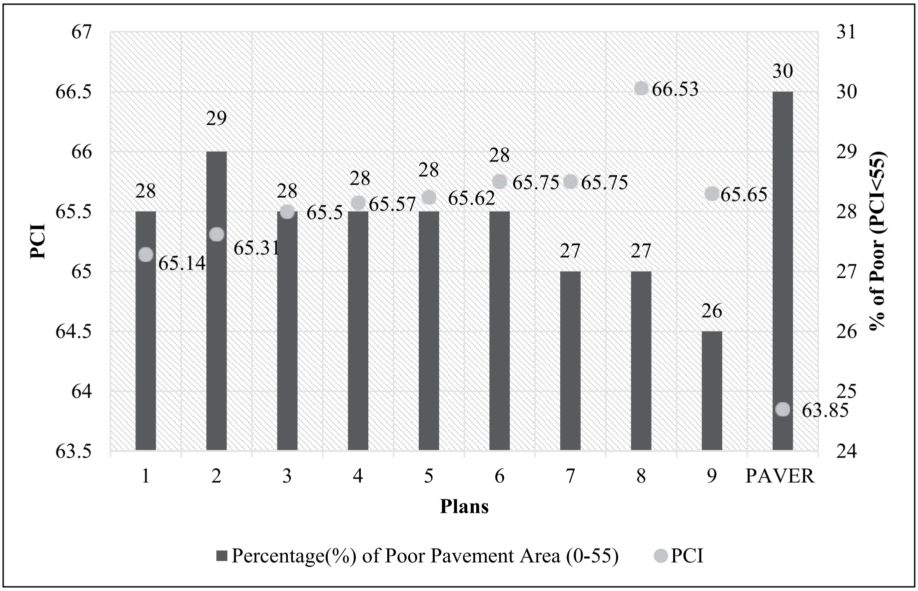

Figure 4. Sensitivity analysis for different plans.
Note. PCI = Pavement Condition Index.

sections by geographic proximity for treatment. Plan 8 was developed after the city imposed another restriction with regard to a fixed funding allocation strategy for global preventive (i.e., exactly $126,000, $132,000, $139,000, $146,000, and $153,000 from 2016 to 2020). The analysis shows that Plan 8 resulted in more funding for global preventive than needed. Hence, the budget in Plan 8 should be increased by $210,000 or the funding for localized stopgap M&R and major will be inadequate. Plan 9 was proposed with the current chip sealing schedule and an additional $80,000 in funding.

First, localized stopgap M&R was applied in all plans to pavements with a PCI of less than 55. Next, major M&R was applied to some of or all of the 17 segments. M&R strategies were optimized for the remaining pavement sections where PCI values were larger than or equal to 55. Plans were compared using the average PCI and percentage of poor pavement at the end of 2020. The results are shown in Figure 4.

The number of major M&R projects increases from Plan 1 to Plan 8, meaning the resultant PCI value increases and the percentage of poor pavement decreases. Although the final PCI is highest in Plan 8, this plan required $210,000 more in funding than the other plans. In Plan 7, after applying major M&R projects to all 17 sections, the second highest PCI and third lowest percentage of pavement in poor condition were obtained. In Plan 9, PCI was the fourth highest, while the percentage of pavement in poor condition was the second lowest. As a comparison, it is clear that the default plan (i.e., Plan PAVER) recommended by MicroPAVER is not optimal. Considering the overall pavement performance, ease of implementation, and funding constraints, Plan 9 was recommended as the final 5-year M&R plan.

Conclusion

Development of a typical PMS consists of three major components: database development, pavement prediction modeling, and M&R recommendations. Each element presents certain challenges for smaller, local agencies that wish to use the system to effectively and efficiently manage their pavement assets. Madison, a small community in South Dakota, served as the case study for this article. The most critical challenge for Madison in establishing a PMS database was the lack of an accurate GIS map and detailed pavement attributes. The article illustrates how a GIS map can be collected, edited, and verified from other map sources. Missing data can be collected from a field survey, other available data sources, and/or imputation methods.

The keys to successfully forecasting future pavement conditions include categorizing pavement families, removing outlier observations, and applying appropriate methods such as the boundary-based approach. Customized prioritization and flexibility should be included in a small community's multiyear M&R plan to help it meet the specific needs of the local community without compromising its goals.

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