Chapter 2 – Performance and Funding Gap Analysis

The first steps in addressing a county's system preservation issues is to assemble pertinent data, evaluate it, ascertain if preservation needs exist, and determine the magnitude of these needs. In turn this data should be documented in a concise easy-to-understand report. Armed with this basic information, a county engineer then should establish an effective communication process to educate elected leaders and key stakeholder groups and citizens on identified needs and opportunities.

The objective of this chapter is to present a three-step process which will help the county engineer identify performance gaps and possible solutions.

This initial effort is a fundamental element of the entire systems preservation study process and includes three phases:

1. Investigative Phase – examination of the existing highway infrastructure, current maintenance strategies, strategic plans, County policies/goals, current levels of investment and perceived vs. real performance shortfalls.
2. Technical Phase – review of revenue and expenditure history, preparation of "buying power" forecasts (both near and 20-year term), evaluation of the possible financial gaps, and discussion of their magnitude. This analysis should be documented.
3. State of the County Highway System Report (SCHSR) – a summary of critical preservations needs and possible strategies to address issues identified by the investigative and technical phases.

Investigative Phase

The investigative process includes assembling data regarding the county's highway system, by the county engineer, or his/her staff, to gain insight on:

- General County demographics, system size, system characteristics.
- County infrastructure quantities (miles of roads, trails, number of bridges, etc.).
- County infrastructure conditions (primarily focused on pavement and/or surface condition information).
- County maintenance methods, schedule of maintenance procedures, and changes in these methods over past 10 years.
- Level of service desired, and a feasible implementation approach.
- Current prioritization processes.
- County policies/goals/objectives used to determine local design standards.

- Recent and upcoming regulatory mandates and institutional policy changes affecting the highway system, anticipated costs, and compliance deadlines.
- Any existing performance measures used to evaluate condition, life cycle, and suitability of infrastructure.

Pilot county staff found that use of a survey tool was helpful in this data collection effort. Categories of data assembled included:

- General County Data
- System Characteristics
- Pavement/Bridge Management
- Pavement/Bridge Maintenance
- Programming Methods
- Past Revenues/Expenditures Levels (based on budget not actual)
- Changes/Trends in System Management

Please refer to a copy of the survey questions and results from the pilot County found in Appendix A (Dakota County). The investigation phase is meant to be a quick assembly of data that is readily available to county staff. Further, pilot county engineers found that collecting and organizing the data so it could be presented in a graphic format, for later use in the State of the County Highway Report, was extremely helpful.

Upon completion of the survey, a meeting should be held with senior Highway Department staff and the county administrator/coordinator to review and consider the data findings (i.e., documentation of current policies/procedures, quantities, condition, trends, goals, performance shortfalls and possible level of service measures). The survey results will help County staff think critically about their current pavement/bridge management and maintenance strategies. The data collected by the survey should be affirmed by the Highway Department staff, as accurate to the best of their knowledge, before it is used in the technical phase...

Technical Phase

The technical process includes a review of the County's:

- Current county fiscal resources for infrastructure (e.g., sources of funds, split between capital and maintenance, past investment levels and allocations within infrastructure categories).
- Loss of "buying power" analysis due to construction cost inflation.
- Known or perceived county performance shortfalls that impact maintenance or capital infrastructure needs.
- Possible financial or performance gaps in system preservation objectives
- Potential impacts to system, if gaps are not addressed.
- Assessment of acceptable/appropriate preservation strategies.

To accomplish this analysis, recent revenue and expenditure data must be gathered (see survey tool in Appendix A). Additionally, as the financial data is reviewed, any perceived performance shortfalls that affect system maintenance should be identified and discussed. This discussion should also include the loss of buying power.

Using these inputs, and the performance "sketch tool" developed by the pilot study, a financial gap analysis should be prepared (see more detail on the tool below). In some cases, a county may already have a computerized pavement management system, or a somewhat similar software analysis tool that can identify and evaluate "gaps."

Finally, the county engineer should consider the results and the general impacts that may affect the system, if the gap is not addressed. This data and general impacts information can be used to prompt and elicit thoughts from County Commissioners during subsequent at future Board meetings.

Financial Gap Analysis

The main objective of technical analysis is to identify if there is a gap between the County's current roadway maintenance efforts compared to typical industry practices. To evaluate potential performance shortfalls, a gap analysis "sketch" tool was developed, in consultation with MnDOT and the pilot county engineers.

The development of the gap analysis tool by the pilot county engineers, was an iterative process, and different methodologies and results were compared and tested against current methods, such as the computerized pavement management software. The research also reviewed a life cycle methodology, in lieu of the preferred "actual miles per year completed" method.

Further research was required to gather data on "typical industry practices" for the wide range of maintenance activities used by the pilot counties, and to gather general unit cost

information for each activity. In addition, research was completed to determine the approximate life (e.g., number of years) for each maintenance practice, relative to typical industry practice. The study research found that the typical industry maintenance practices assumed a 50-year life cycle, with an overlay every 15-20 years, seal coating every seven years and crack sealing every three years. These findings were incorporated into a sketch tool and are documented in Figure 2.

Throughout this research, methods, concepts, calculations, and preliminary results were discussed with pilot county engineers and MnDOT for their feedback, and adjustments were made to the final analysis tool.

This sketch tool was developed so other county engineers could collect the necessary data inputs and conduct a similar analysis, to obtain "order of magnitude" financial gap data.

Regarding the tool inputs, the county engineer should prepare as part of the Investigative Phase data survey (see Appendix A), a list of their current maintenance practices, and the average cost and frequency (miles per year) for each maintenance practice (see values in Table 2.1 and Figure 2.1). Maintenance practices for asphalt or gravel surfaces included in the gap analysis are listed in Table 2.1.

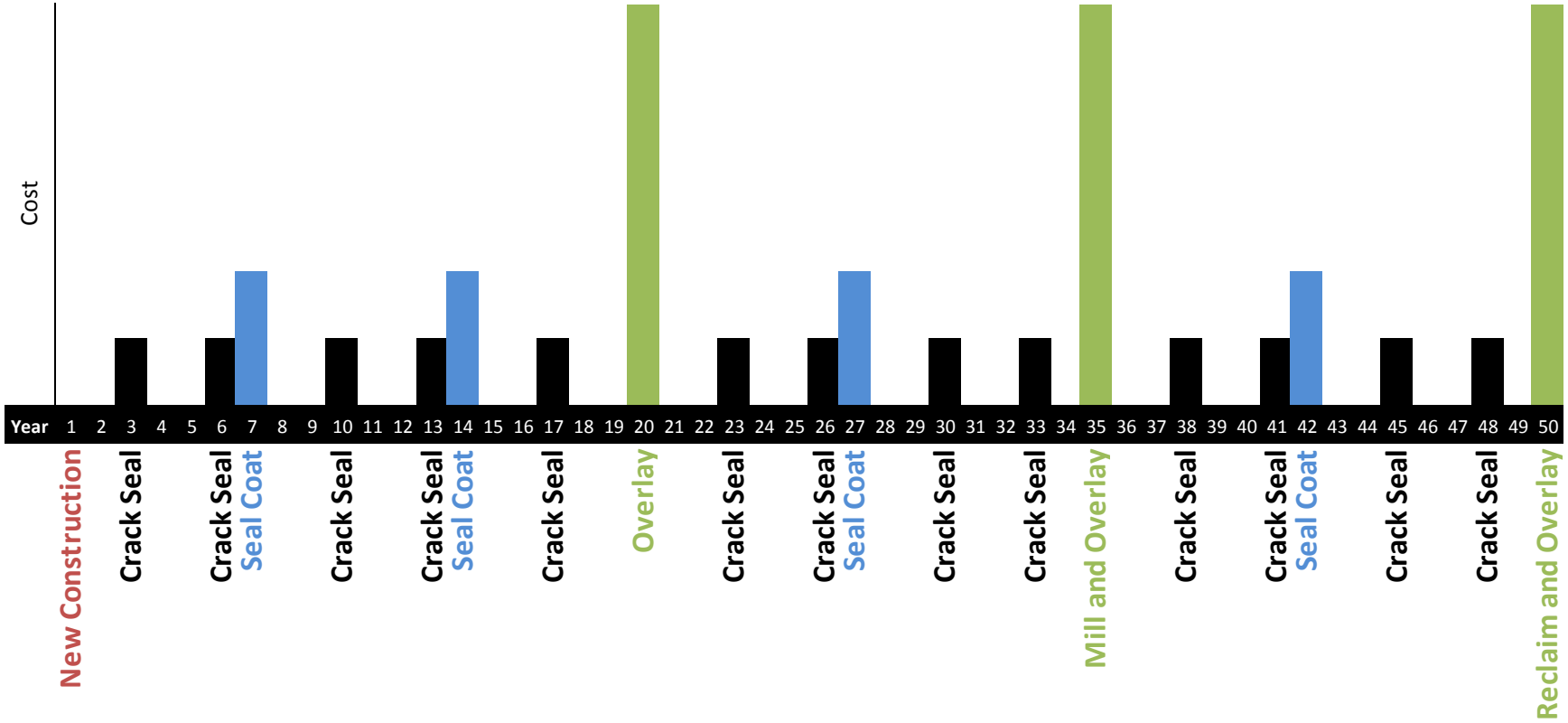
Table 2.1 - Freeborn County Funding Gap Analysis Input Values

			Typical Industry Practice	Current County Practices
	Maintenance Standards	Ave. Cost/Mile (per county)	Years btwn Applications (years)	Ave miles/yrs (past 5 years)
Asphalt	Combined Overlay Progam	$300,000.00		18
	Overlay	$300,000.00	50	6.0
	Mill and overlay	$300,000.00	50	6.0
	Reclaim and overlay	$300,000.00	50	6.0
	White topping	$0.00	30	0.6
	Seal coating	$17,000.00	7	17
	Crack seal/crack filling	$1,600.00	3	30
Gravel	Regraveling	$4,500.00	3	30
	Stablization	$6,000.00	3	21
	Blading	$1,200.00	2	240

The gap tool calculations were used to provide a quick, quantitative answer to an engineer's key questions:

- Is my current maintenance program achieving the desired current level of service?
- What is the maintenance gap?
- What is the general cost to close the maintenance gap?

Figure 2.1 - Typical Industry Practice: 50-Year Maintenance Schedule



The "gap" analysis included a series of calculations for each maintenance treatment:

Gap = (**Industry Practice vs. County Practice**)

Industry Practice = Number of miles/Years between application for specific maintenance activities

County Practice = Actual miles treated (as reported by County Engineer)

For example, using the formula above, one can determine the "Industry Practice" for overlays. In the case of Freeborn County which has a total of 373 centerline miles of CSAH asphalt, which was divided by 50 year (years between applications for overlays) (per Figure 2). This equals an average of 7.5 miles of overlays per year that should be completed based on typical industry standards. However, based on current County practices/budget, they currently average only about 5.8 miles of overlays completed per year, producing a gap of 1.7 miles (7.5 miles – 5.8 miles = 1.7 miles) of overlays per year. A similar process was used for other maintenance activities for CSAH and County Roads, as well as gravel roads.

These inputs were used in Table 2.2 of the Freeborn analysis. The gap data was multiplied by the cost per mile for each maintenance practice (e.g., overlays, seal coats, etc.) to calculate the gap for one year. For the overlay example above, the average cost/mile of overlay based on County records was $300,000. Thus in year one, Freeborn County had a gap of $512,000 for this preservation on CSAHs. To determine the future funding shortfalls, the annual funding gap was extrapolated out 20 years, in five year increments, assuming a five percent inflation rate. The results of this analysis are shown in Table 2.2. The calculations for CSAHs and CRs were separated, with a total for both at the bottom of the table.

Table 2.2 - Freeborn County Funding Gap Analysis Calculations

CSAH

	Maintenance Standards	Ave. Cost/Mile (per county)	Industry Miles/Yr	Current Miles/Yr	Gap* (Industry vs Current) Miles/Yr	Gap* (Industry vs Current) 1 Years	5 Years	10 Years	15 Years	20 Years
	Combined Overlay Progam									
	Overlay	$300,000.00	7.5	5.8	1.7	$512,036	$3,267,510	$8,340,527	$15,967,291	$27,171,678
	Mill and overlay	$300,000.00	7.5	5.8	1.7	$512,036	$3,267,510	$8,340,527	$15,967,291	$27,171,678
	Reclaim and overlay	$300,000.00	7.5	5.8	1.7	$512,036	$3,267,510	$8,340,527	$15,967,291	$27,171,678
	Seal coating	$17,000.00	53.3	16.3	37.0	$628,744	$4,012,272	$10,241,578	$19,606,705	$33,364,902
	Crack seal/crack filling	$1,600.00	124.3	28.8	95.6	$152,908	$975,766	$2,490,704	$4,768,260	$8,114,189
Gravel	Regraveling	$4,500.00	19.3	7.6	11.7	$52,658	$336,032	$857,742	$1,642,080	$2,794,341
Gravel	Stablization	$6,000.00	19.3	5.3	14.0	$83,947	$535,702	$1,367,414	$2,617,808	$4,454,747
Gravel	Blading	$1,200.00	29.0	61.1	0.0	$0	$0	$0	$0	$0
					Total CSAH =	**$ 2,454,365**	**$ 15,662,303**	**$ 39,979,018**	**$ 76,536,725**	**$ 130,243,215**

* - If the gap is calculated as a negative number, the funding gap defaults to $0 rather then a negative dollar amount

County Road

	Maintenance Standards	Ave. Cost/Mile (per county)	Industry Miles/Yr	Current Miles/Yr	Gap* (Industry vs Current) Miles/Yr	Gap* (Industry vs Current) 1 Years	5 Years	10 Years	15 Years	20 Years
	Combined Overlay Progam									
	Overlay	$300,000.00	0.3	0.2	0.1	$21,964	$140,161	$357,771	$684,924	$1,165,541
	Mill and overlay	$300,000.00	0.3	0.2	0.1	$21,964	$140,161	$357,771	$684,924	$1,165,541
	Reclaim and overlay	$300,000.00	0.3	0.2	0.1	$21,964	$140,161	$357,771	$684,924	$1,165,541
	Seal coating	$17,000.00	2.3	0.7	1.6	$26,970	$172,108	$439,317	$841,038	$1,431,202
	Crack seal/crack filling	$1,600.00	5.3	1.2	4.1	$6,559	$41,856	$106,840	$204,537	$348,062
Gravel	Regraveling	$4,500.00	56.7	22.4	34.3	$154,342	$984,920	$2,514,070	$4,812,992	$8,190,311
Gravel	Stablization	$6,000.00	56.7	15.7	41.0	$246,053	$1,570,162	$4,007,938	$7,672,886	$13,057,018
Gravel	Blading	$1,200.00	85.0	178.9	-93.9	$0	$0	$0	$0	$0
					TOTAL CR =	**$ 499,816**	**$ 3,189,530**	**$ 8,141,477**	**$ 15,586,225**	**$ 26,523,216**

* - If the gap is calculated as a negative number, the funding gap defaults to $0 rather then a negative dollar amount

Inflation Rate 5% **per year**

Total CSAH + CR =	**$ 2,954,181**	**$ 18,851,833**	**$ 48,120,495**	**$ 92,122,950**	**$ 156,766,431**

The above explanation and walk through is meant to demonstrate how the calculations are computed; however it should be emphasized the sketch tool is a computerized Excel spreadsheet that can complete all calculations instantly, upon inserting the few necessary inputs into the model by the county engineer. The tool also allows the engineer to effectively use various system preservation scenarios, with alternative input values.

Based on the analysis results, Freeborn County's roadway maintenance budget for CSAH and CRs had a projected annual shortfall or gap of $2.95 million dollars, when compared to typical industry practices for all maintenance practices. After 20 years, at current investment levels, the funding gap is expected to increase to over $156 million dollars, when inflation is factored in.

The gap analysis is intended as a "sketch tool", not an exact budget analysis. The purpose is to identify trends and red flags. The gap analysis is also helpful in identifying the "order of magnitude" of financial impacts, if maintenance performance shortfalls exist. The tool can also be predictive; for example, if revenues are increased the tool can document the reduction in the gap.

With the financial and constituent demands on Commissioners, one possible reaction to the preservation gap may be to defer action, in light of other conflicting priorities. Typically, the county engineer has discussed these sustainability matters with the County Board during previous budget discussions, or road tours. However, with this new analysis technique and the performance gap data, it may again be worth noting to policy makers that there will be negative consequences to the system if critical asset needs are not addressed, in the short-term.

These consequences can be discussed in greater detail during the presentation of the State of the Highway System Report to the County Commissioners. However possible, impacts may include:

- Loss of economic development opportunities or competitiveness
- Public dissatisfaction with the transportation network
- Increased safety risks
- Impacts to other roads in the system
- Increasing system costs, as asset needs move from rehabilitation to reconstruction (i.e., it is more cost effective to maintain a road in fair condition than wait until it gets to poor condition)

Preservation Strategies

It is important to note that in many cases, local economic conditions are such that the performance gap cannot be fully resolved by increasing maintenance revenue (e.g. raising County levy, gaining additional intergovernmental transfer funds, new revenue system etc.). Pilot county engineers found other solutions also need to be explored to achieve a balanced

approach among preservation options. These general preservations strategies, pursued by the pilot counties, included:

A. Make adjustments to system size

B. Undertake new planning and programming initiatives

C. Seek revenue enhancements

D. Explore cost reduction or longer life cycle maintenance techniques

E. Use decision making tools (see Chapter 3)

In Chapter 3 of this Guidebook, both general and customized system preservation strategies prepared by pilot counties are presented to assist county engineers.

State of the County Highway System Report (SCHSR)

The last phase of the analysis process is to compile all the system preservation data into a State of the County Highway System Report. The report should summarize key findings regarding the County's highway system:

- Characteristics
- Management
- Maintenance
- Performance and measures
- Relevant revenue and expenditure history
- System financial and performance gap
- Potential impacts of status quo, and tools
- Strategies available to address preservation needs

Pilot county engineers found that a generous use of graphics (maps, charts, figures) allowed for a quick read and good understanding of Report findings by the general public, key stakeholders and the County Commissioners. These graphics proved helpful for use in public meetings, PowerPoint presentations, media communications, etc.

The pilot county engineers also used information found in Chapter 4 (Communications Plan) to help them successfully frame issues and findings from the Report. Appendix B contains an example of a State of the County Highway System Report for Dakota County.

Summary

By fulfilling this three-step process (investigative/technical phases and state of the county highway system report) the county engineer will have a solid data base, compelling documentation/rationale and considerable presentation material to inform the County Commission and/or other key stakeholders on what preservation methods, choices and strategies are available to address system needs.