

Demonstrating the Use of Pavement Management Tools to Address GASB Statement 34 Requirements

Angela S. Wolters and Kathryn A. Zimmerman

Applied Pavement Technology, Inc.

3001 Research Road, Suite C

Champaign, IL 61822

Phone: 217-398-3977

awolters@pavementsolutions.com, kzimmerman@pavementsolutions.com

ABSTRACT

The field of asset management has emerged in the last few years as an important decision-making framework that incorporates economic and engineering factors and considers a broad range of assets. Its importance to government agencies has increased with the recent initiative by the Government Accounting Standards Board (GASB) recommending that States and local governments improve their annual financial reporting by incorporating the value of capital assets (including transportation infrastructure) into their financial statements. This initiative, referred to as GASB Statement 34, has established guidance in how transportation assets should be reported on financial statements and has established a schedule for compliance with its recommendations (Federal Highway Administration 2000).

GASB recommends that government agencies use a historical cost approach for capitalizing long-lived capital assets; however, if historical information is not available, guidance is provided for an alternate approach based on the current replacement cost of the assets. A method of representing the costs associated with the use of the assets must also be selected, and two methods are allowed by GASB. One approach is to depreciate the assets over time. The modified approach, on the other hand, provides an agency more flexibility in reporting the value of its assets based upon the use of a systematic, defensible approach that accounts for the preservation of the asset.

Agencies that have implemented pavement management systems are well positioned to use the modified approach to address the GASB Statement 34 guidelines. This paper illustrates the use of a pavement management database to determine the replacement value of an agency's pavement assets using both the depreciation and modified approaches. The advantages and disadvantages of both approaches are also presented.

Key words: asset management—GASB Statement 34—pavement management

INTRODUCTION

The recent introduction of the Governmental Accounting Standards Board's (GASB's) Statement 34 is having a dramatic impact on the financial reporting requirements of state and local governments. Introduced in June of 1999, this provision recommends that governmental agencies report the value of their infrastructure assets in their financial statements. The implementation of this provision is being conducted in phases, with the reporting of all infrastructure assets receiving major improvements since the effective date of the Statement being required first and then the remaining assets improved after June 15, 1980 being included in later phases.

To satisfy GASB, the value of this infrastructure includes the initial cost of construction and further capital improvements. Additionally, the cost of using the asset should also be included in the financial reporting. GASB Statement 34 allows these costs to be reported using either a depreciation method or a modified/preservation approach. Alternatively, a combination of the two approaches can also be used. For instance, an agency may choose to use the modified approach for its pavement network and the depreciation approach for its storm water system.

OBJECTIVE

The concept of this paper is to investigate the use of information from a standard pavement management database to support the requirements of GASB Statement 34 for valuing the pavement asset. Further, the overall objective is to use the data contained in a pavement management database to determine the replacement value of an agency's pavement assets using both the depreciation and modified approaches. Before determining replacement values, it is advantageous to examine the details of the two valuation approaches and the use of pavement management information to support the chosen valuation approach. With a portion of a sample City's pavement management database selected for use in examining the valuation approaches, the depreciation and modified valuation approaches are applied. After the calculation of replacement value using both approaches, the advantages and disadvantages of each approach are discussed.

Valuation Approaches

The depreciation approach follows a more traditional accounting approach to reporting the annual cost of using capital assets. Under this approach, the historical cost of an asset is reduced each year by an amount equal to the total cost divided by the service life to determine its book value. Alternatively, if the government agency can show that the assets are being managed using asset management tools and the government can document that the infrastructure assets are being preserved at, or above, a condition level originally established for the assets, a different approach may be used. To be considered for the alternate approach, referred to as the modified approach, the asset management system should include the following (1).

- An up-to-date inventory of its assets.
- The conduct of an assessment of asset conditions at least once every 3 years using a repeatable procedure.
- An estimate of the annual amount required to maintain and preserve the infrastructure assets at the condition level originally established for the assets.
- An ability to demonstrate that the assets are being preserved at the level predetermined by the government.

The advantages and disadvantages of using the modified approach versus the depreciation approach will be discussed later.

Use of Pavement Management Information to Support GASB Statement 34 Requirements

Pavement management systems, such as Micro PAVER, provide a variety of information needed to conduct a pavement valuation. The information available from the pavement management system database typically includes inventory information such as section identification, surface type, pavement quantity (in terms of area), and functional classification. Also commonly provided in the database are work history and age information in terms of last construction date and construction cost. Condition data are also available.

All of this information is utilized in determining a value for the pavement network when using either the depreciation or modified approach. Further customized portions of the database such as performance curves, treatment rules and cost are used when implementing the modified approach in order to predict needed investments for maintaining the network at a predefined condition level.

Network Subsections

In this assessment, two subsets of the city’s road network are examined in order to exemplify the depreciation and modified methods for pavement valuation. The first subset is a portion of Main Street, which is detailed on a section-by-section basis. This subset was chosen to illustrate the level of detail that can be used in calculating pavement valuation. The second subset, which is less detailed, includes only pavements listed as collectors with last construction dates after June 15, 1980.

Main Street Subsection

The portion of Main Street that is examined is detailed in Table 1. As shown in the table, the sections on this portion of road have a variety of construction dates and work types. This will help illustrate the detailed valuation of the pavement.

TABLE 1. Main Street Section Information

Branch	Section ID	Last Construction Date	Construction Type	Surface	Area (ft²)	PCI at Last Inspection
Main Street	100	11/04/1978	Initial	PCC	16,880	57
Main Street	200	11/04/1986	Initial	PCC	8,480	64
Main Street	300	8/21/1995	Rehabilitation	AC	44,640	95
Main Street	400	10/1/1996	Rehabilitation	AC	30,840	96
Main Street	500	8/21/1996	Rehabilitation	AC	21,880	93
Main Street	600	10/12/1999	Rehabilitation	AC	30,600	99
Main Street	700	10/12/1999	Rehabilitation	AC	17,120	98

Collector Network Subsection

From the Micro PAVER database, the weighted average condition of the second subset, the collector network, was determined. The condition values associated with each age category of the collector network are shown in Table 2.

TABLE 2. Age and Condition of the Collector Network

Age at Inspection	Pavement Area (ft ²)	Weighted Age	Weighted Average Age at Inspection	Weighted Average Condition	Average Condition at Inspection	Average Condition (Dec. 2002)
0-2	653,427	5.4	1.2	90.3		
3-5	500,633	6.4	4.1	89.9		
6-10	1,978,640	10.7	8.4	77.1	71	68
11-15	2,359,289	14.9	12.9	65.4		
16-20	1,589,770	19.1	17.2	64.3		

These portions of the pavement network can be used to illustrate the depreciation and modified approaches for valuing the roadway system. Both methods are displayed in the following sections.

METHODOLOGY

Depreciation Approach

Example: Main Street Subsection

The first example of the depreciation will be shown using the Main Street subsection. Of the seven sections of Main Street that are shown in Table 3, section 100 will not be included in the depreciation example because its construction date is prior to the June 15, 1980 GASB cut-off date.

The first step to finding the value of these assets is to compute the cost of replacing the assets in current dollars. It is important to note that only the work done since 1980 is included in the replacement cost. If a section has been reconstructed its full reconstruction cost is calculated as the replacement cost. However, if the section was simply overlaid since 1980, according to GASB only the price of the overlay is calculated in the replacement cost.

The assumed unit replacement cost of each section as shown in Table 3 was chosen for ease of calculation. The cost of reconstruction has been valued at \$3.00/ft² for the concrete section. The replacement cost for the remaining sections is shown as \$0.50/ft², assuming a substantial mill and inlay was used as the preferred replacement treatment. The total replacement cost for each section is computed and shown in Table 3.

TABLE 3. Depreciation Approach Applied to Main Street Subsection

Branch	Section ID	Last Construction Date	Area (ft ²)	Replacement Cost per ft ²	Total Replacement Cost (\$)
Main Street	100	11/04/1978	16,880	N/A	N/A
Main Street	200	11/04/1986	8,480	\$3.00	25,440
Main Street	300	8/21/1995	44,640	\$0.50	22,320
Main Street	400	10/1/1996	30,840	\$0.50	15,420
Main Street	500	8/21/1996	21,880	\$0.50	10,940
Main Street	600	10/12/1999	30,600	\$0.50	15,300
Main Street	700	10/12/1999	17,120	\$0.50	8,560

The next step to the depreciation method is to determine the historical cost, which converts the current cost of replacement to the costs at the time the construction took place. The historical cost is calculated using equation (1).

$$\text{Cost}_{\text{historical}} = \text{Cost}_{\text{replacement}} * \text{CCI}_{\text{year of construction}} / \text{CCI}_{\text{year of calculation}} , \quad (1)$$

where

- $\text{Cost}_{\text{historical}}$ = historical cost
- $\text{Cost}_{\text{replacement}}$ = replacement cost
- $\text{CCI}_{\text{year of construction}}$ = construction cost index for the year the pavement was constructed
- $\text{CCI}_{\text{year of calculation}}$ = construction cost index for the year in which the costs are calculated

Table 4 displays the calculation of the historical cost. Included in the table are CCI values for each section. These values are based upon a yearly average as reported by *Engineering News Record* (ENR).

TABLE 4. Historical Cost of Each Section of Main Street

Branch	Section ID	Total Replacement Cost (\$)	CCI_{year of construction}	CCI₂₀₀₃	Historical Cost (\$)
Main Street	100	N/A	N/A		N/A
Main Street	200	25,440	4,295		16,323
Main Street	300	22,320	5,471		18,242
Main Street	400	15,420	5,650	6,694	13,015
Main Street	500	10,940	5,650		9,234
Main Street	600	15,300	6,060		13,851
Main Street	700	8,560	6,060		7,749

After the historical cost of each section is calculated, the book value of each section can be determined using straight-line depreciation. This approach is based on the assumption that a road is expected to last a certain length of time and that the value of the asset depreciates equally each year that the pavement is in service. The equation used to calculate the book value is shown in equation (2).

$$\text{Cost}_{\text{book}} = \text{Cost}_{\text{historical}} * (\text{Life} - \text{Age}) / \text{Life} \quad (2)$$

where

- $\text{Cost}_{\text{book}}$ = book value
- $\text{Cost}_{\text{historical}}$ = historical cost
- Life = expected life of the pavement
- Age = actual age of the pavement

Table 5 provides all the details used in the calculation of the book value of each section of Main Street.

TABLE 5. Book Value of Each Section of Main Street

Branch	Section ID	Historical Cost (\$)	Expected Life	Actual Age	Book Value (\$)
Main Street	100	N/A	N/A	N/A	N/A
Main Street	200	16,323	30	16	7,617
Main Street	300	18,242	15	7	9,729
Main Street	400	13,015	15	6	7,809
Main Street	500	9,234	15	6	5,540
Main Street	600	13,851	15	3	11,080
Main Street	700	7,749	15	3	6,199

The Main Street example illustrates the value calculation when all construction details (such as last date of construction, last treatment type, and cost of last treatment type) are known. However, it is possible that an agency might have information that is somewhat incomplete or inaccurate, so, it is more likely that a less detailed analysis will be used if the depreciation method is chosen. The same principles apply if only average values are used to calculate the pavement valuation instead of completing detailed section-by-section calculations, as illustrated in the next example.

Example: Collector Network Subsection

This example includes only those pavements ranked as collectors in the sample City's database that have last construction dates from June 15, 1980 to the present. If no detailed construction history is available, an assumption concerning the construction date, type, and cost must be made. For this example, it is assumed that all sections have been reconstructed in the past 23 years and have a unit replacement cost of \$2.00/ft². Table 6 provides the details of the collector network used to determine the book value using the depreciated value at constant dollars. With the total replacement cost calculated, the historical value can be easily calculated by multiplying the replacement cost by the ratio of the CCI of the construction year to the current year. Then a straight-line depreciation is applied to the historical value in order to calculate the book value. Note that pavements older than 20 years are not considered since they were constructed before 1980.

TABLE 6. Book Value of Collector Network Using Depreciated Value

Age at Inspection	Pavement Area (ft ²)	Weighted Age	Total Replacement Cost (\$)	CCI _{year of construction}	Expected Life	Book Value (\$)
0–2	653,427	5.4	1,306,854	5,825	25	891,566
3–5	500,633	6.4	1,001,266	5,620	25	625,422
6–10	1,978,640	10.7	3,957,280	4,835	25	1,634,947
11–15	2,359,289	14.9	4,718,578	4,406	25	1,254,733
16–20	1,589,770	19.1	3,179,540	4,066	25	455,782
Total						4,862,450

The total book value of the system using the depreciated value is therefore determined to be \$4,862,450. This approach illustrates the use of network-level information to approximate a book value for reporting purposes. As stated earlier, this approach might be used if complete historical records are not available in the pavement management database.

Modified Approach

The modified approach allows the City the opportunity to set its own benchmark standards for maintaining its pavement network and preserving the value of the pavement assets. However, these standards not only have to be met but they must also be disclosed to the public and therefore warrant careful consideration. With this approach, the book value is preserved rather than depreciated.

To illustrate the modified approach, the collector network is again utilized. The first step in using the modified approach is to set the benchmark condition standards. Table 7 displays the current condition of the network according to Micro PAVER and it also displays the condition standards established by the agency for the collector network. The City has complete flexibility in setting the condition standard and should target a condition that is high enough to be maintained at the current and anticipated funding levels. In some cases, agencies have chosen to establish different benchmarks for different functional classifications of roads. In this example, a condition standard of 65 was set for the entire network to illustrate the use of these concepts.

TABLE 7. Condition Benchmarks for the Collector Network

Functional Class	Pavement Condition Index for December 2002	Proposed GASB Benchmark Condition Standard
Collector	68	65

Using the information that is customized in Micro PAVER such as performance curves, treatment sets, and corresponding maintenance and rehabilitation (M&R) rules, the modified approach can be quickly applied. Using the M&R planner in Micro PAVER 5.0, the portion of the network that is going to be analyzed can be defined, the timing of the analysis can be specified, and the mode for creating the plan can be detailed. Micro PAVER 5.0 has the ability to specify a maximum number of iterations to reach a desired condition level. Therefore, applying the GASB modified approach is as simple as having the Micro PAVER database customized to meet your needs and applying the M&R planning module to reach the desired benchmark condition.

Using the M&R planner, the funding level needed over the next 5 years to achieve the targeted condition level is determined. For this analysis, the approximate amount of money that must be spent on the collector network to maintain a condition of 65 is \$450,000 per year. By comparing this figure to the agency's expected budget levels, the agency can quickly assess whether sufficient funding is being allocated to meet the desired conditions.

In comparison, if the targets had been set to maintain a condition of 68 over the next 5 years, the budget requirements are \$585,000 for each year. Therefore, an additional cost of \$135,000 per year is necessary to raise the condition to 68 from 65. Micro PAVER easily allows for the comparison of various condition scenarios to determine funding levels.

In addition to determining the budget requirements needed to maintain the desired condition of the collector network, Micro PAVER can be used to report the details of the estimated condition during each of the years of the analysis. This result for maintaining a condition of 65 is displayed in Figure 1. This type of report demonstrates that the targeted conditions will be achieved if the budgeted amount is expended on the collector network. An agency could superimpose the actual conditions based upon their current expenditure levels to illustrate their success at meeting or exceeding the targeted pavement condition.

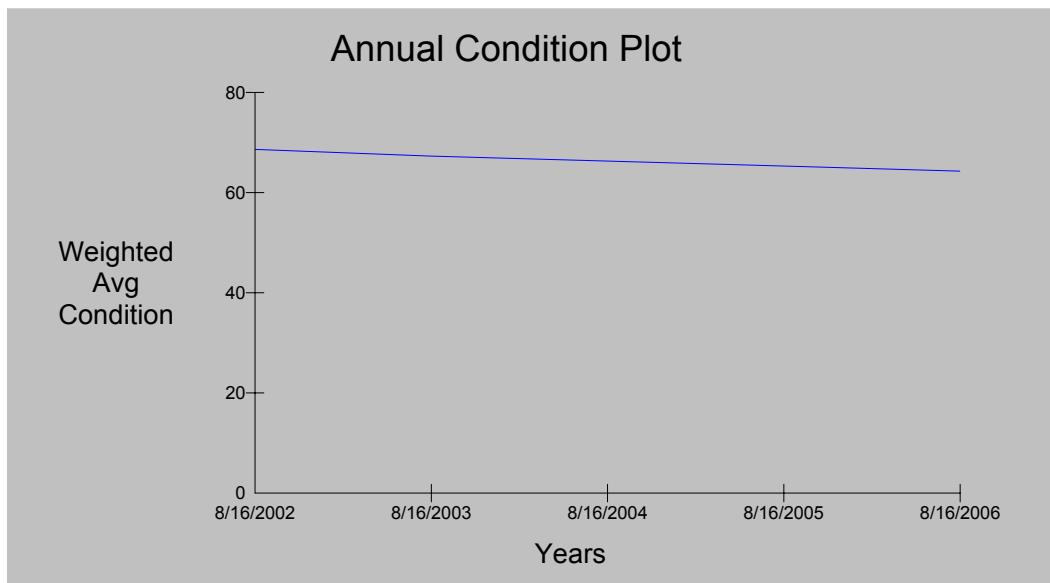


FIGURE 1. Annual Condition of the Collector Network for the Analysis Period

When determining the book value for the collector network using the modified approach, the City is free to use any reasonable and rational approach as long as the method is documented and is consistent. For example the book value may be listed as simply the replacement cost of the collector network, which was determined to be \$4,862,450 as shown in Table 6.

RESULTS

Using the depreciation and modified approaches, portions of the example City's pavement network were valued. These examples were highlighted to show the ease of using data from a pavement management system to comply with GASB Statement 34 requirements. By demonstrating each of the approaches that can be used, the advantages and disadvantages associated with each approach can be determined. A summary of key advantages and disadvantages to the use of the modified approach is provided.

Advantages

There are a variety of advantages for an agency in using the modified valuation approach over the depreciation approach to meeting GASB Statement 34 requirement. Some of these advantages are described in the following (2, 3):

- The modified approach can be easily used to satisfy GASB Statement 34 requirements if an agency has a fully functioning pavement management system because the system is likely to contain all the needed information in its database. The pavement management system can also be used to easily supply supporting documentation of condition and funding information in the form of reports and tables.
- The modified approach shows the value of maintaining the roadway asset. Using this approach further promotes the importance of preventive and routine maintenance.

- The modified approach indicates the cost of actually using the asset in a given time frame. It provides the replacement cost, whereas, the depreciation approach provides the remaining cost of an asset which doesn't reflect the actual cost of using the asset.
- The modified approach provides an additional use of the pavement management system, which further justifies the need for the necessary staffing and funding to maintain the pavement management system and its data elements.

Disadvantages

The modified approach is not without disadvantages. Some of the disadvantages of choosing the modified approach over the depreciation approach are provided in the following:

- The depreciation approach follows a more traditional accounting approach than the modified valuation approach.
- The depreciation approach may be easier to implement than the modified approach.
- The depreciation approach allows for the value of an asset to be reduced over time; whereas, the modified approach allows the asset to retain its value if it is maintained at the agency specified level. An agency must, therefore, account for this maintained condition in the form of maintenance money and corresponding condition assessments of the pavement sections.

Recommendations

For those agencies deciding to implement the modified approach, there are still a variety of issues that must be addressed. Listed are additional considerations that must be made prior to implementation.

- With a pavement management system in place, is it advisable to make your Financial Officer aware of that your pavements are being managed in this system?
- For your pavement data, how complete is the inventory? What checks and corrections need to be made to the database?
- What is the information flow between the Public Works department and the Finance Department? How can this flow be improved?
- GASB only requires the reporting of assets having major improvements since 1980. Would the City want to consider reporting all pavement section information?

This is only a partial list of potential questions that must be addressed before utilizing the modified valuation approach. There are additional concerns that will arise during the valuation process.

CONCLUSION

This study illustrated the use of a standard pavement management system to support either the depreciation or modified valuation approaches to satisfy the GASB Statement 34 requirements. As shown, information from a fully functioning pavement management database can provide the necessary data to value a pavement network. The advantages and disadvantages of using the modified approach over the depreciation method are also discussed. Special consideration to the multiple issues associated with the chosen methodology must be given before selecting the approach that best meets the needs of the implementing agency.

REFERENCES

1. Federal Highway Administration. *Primer: GASB 34*. Office of Asset Management, U.S. Department of Transportation, Washington, D.C., 2000.
2. Kadlec, A.J., and S. McNeil. "Applying the Governmental Accounting Standards Board Statement 34: Lessons from the Field." Transportation Research Board Annual Meeting. Washington, D.C., 2001.
3. Murphy, C. "GASB 34: What It Means to You". *CE News*. Mercor Media, Chicago, Illinois, 2001.