

# GASB 34: establishing a value for infrastructure assets

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*Editor's note: This is the fourth article in a series about issues raised for local transportation agencies by Governmental Accounting Standards Board Statement No. 34 (GASB 34). The first article was published in the January-February 2000 issue of Technology News. The entire series, including a longer version of this article, is available on the Center for Transportation Research and Education's GASB 34 website, [www.ctre.iastate.edu/gasb34/index.htm](http://www.ctre.iastate.edu/gasb34/index.htm).*

ONE OF THE most complex issues for agencies attempting to comply with GASB 34 is developing objective and consistent procedures for estimating monetary values for infrastructure assets (that is, "capitalizing" assets). Whether an agency chooses to report assets by (1) depreciating their value based on historical costs or (2) using the modified approach outlined in GASB 34 (which applies asset management techniques), ultimately the agency must include the value of its infrastructure assets in its comprehensive financial reports.

Unfortunately, little research has been conducted to develop standardized methods for capitalizing infrastructure assets. In this article, we provide two possible approaches. The first, relatively simple approach applies the perpetual inventory method (PIM) to depreciate the value of highway infrastructure assets through time. The second example is taken from work done by the California Department of Transportation (CalTrans) to capitalize bridges. The CalTrans method is based on engineering measurements of the condition of bridges and requires a bridge management system; such a method would be useful to agencies using GASB 34's modified approach for reporting capital assets.

### Perpetual inventory method

The perpetual inventory method, described by Barbara Fraumeni and exemplified in Table 1, is a depreciation method for valuing capital stock that can be applied to transportation infrastructure assets. PIM accounts for annual capital expenditures and assumes that existing capital assets depreciate in value at a standard rate every year.

The following equation estimates the total value of infrastructure assets on a year-by-year basis:

$$\text{Infrastructure Assets}_{\text{year}} = \text{Capital Investment}_{\text{year}} + (1-r) \text{Infrastructure Assets}_{(\text{year}-1)},$$

where  $\text{Infrastructure Assets}_{\text{year}}$  = the value of infrastructure assets in the current year

$\text{Capital Investment}_{\text{year}}$  = the amount of capital investment in infrastructure assets in the current year

r = the annual depreciation rate of infrastructure assets

$\text{Infrastructure Assets}_{(\text{year}-1)}$  = the value of infrastructure assets in the year immediately prior to the current year

When using this formula, all capital investments should be expressed in constant dollars so that meaningful comparisons can be made across time. Constant dollars exclude inflation and express dollars in terms of a base year.

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## GASB 34 workshop

WANT to learn more about GASB 34? Register for the GASB 34 Educational Conference, August 31, 2000, in Des Moines. This event is cosponsored by the Iowa League of Cities, Iowa State Association of Counties, and CTRE. For more information, see [www.ctre.iastate.edu/gasb34/index.htm](http://www.ctre.iastate.edu/gasb34/index.htm). •

**Table 1 Perpetual Inventory Method Example**

Fiscal Year	Capital Investment during Current Year (\$)	$(1 - 0.0202) \times$ Infrastructure Assets at the End of Prior Year (\$)	Estimated Current Infrastructure Assets (\$)
1980	1,200,000	100,000,000	101,200,000
1981	2,500,000	99,155,760	101,655,760
1982	3,000,000	99,602,314	102,602,314
1983	1,000,000	100,529,747	101,529,747
1984	500,000	99,478,846	99,978,846
1985	800,000	97,959,273	98,759,273
1986	750,000	96,764,336	97,514,336
1987	850,000	95,544,546	96,394,546
1988	700,000	94,447,377	95,147,377
1989	900,000	93,225,400	94,125,400
1990	2,500,000	92,224,067	94,724,067
1991	2,700,000	92,810,640	95,510,640
1992	2,500,000	93,581,325	96,081,325
1993	2,400,000	94,140,483	96,540,483
1994	2,900,000	94,590,365	97,490,365
1995	2,400,000	95,521,060	97,921,060
1996	2,200,000	95,943,054	98,143,054
1997	2,800,000	96,160,564	98,960,564
1998	2,550,000	96,961,561	99,511,561
Total	35,150,000		

## GASB 34 is only one reason to capitalize your transportation infrastructure

CAPITALIZING infrastructure assets like roads and bridges—that is, assigning a dollar value to them—may be useful beyond complying with GASB 34. For example, in addition to providing information that can be useful to infrastructure asset managers and decision makers, capitalizing transportation infrastructure may be helpful in garnering public and governmental support for transportation infrastructure funding.

Roads and bridges are intended to last for decades; therefore, failure to maintain their value saddles future generations with a deficiency they'll have to pay. The argument that adequate monies must be spent today to maintain the value of infrastructure assets for the next generation has proved to be a powerful and effective one. This stewardship argument has been used with great success by public agencies in other countries (e.g., Australia and New

Zealand) to garner increases in funding for their roads and bridges, even when faced with the tough political circumstance of a recession.

Capitalizing roads and bridges allows the public to understand the stewardship issue more clearly. Expressing streets' value in dollar terms is generally more meaningful to people than expressing their value in engineering measures of "condition" or "performance" (e.g., inches of roughness per mile, condition indices, or other measures). This is especially true when year-by-year comparisons are made; the declining dollar value of a city's streets is generally more meaningful to the public than, for example, a reduction in the streets' condition index from 5 to 4. By tracking the dollar value of assets like roads and bridges, an agency may clearly demonstrate whether infrastructure is declining in value faster than new investments or reinvestments are being made. •

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The example in Table 1 uses 1980 as a base year (as does GASB 34) and 100 million dollars as the base value of all transportation infrastructure assets (streets) in a mock Iowa municipality of 50,000 residents (based on Andrew Lemer's study of typical infrastructure investments). Capital investments, expressed in constant dollars, are allocated during each subsequent fiscal year; Barbara Fraumeni's average depreciation rate for transportation infrastructure assets, 0.0202, is used. To simplify our example, we assume no growth in the highway and street network.

Note that in our example the lower annual capital outlays in the mid to late 1980s result in a decline in the value of capital stock that continues through the next decade, although the decline is arrested through a large increase in capital spending.

Note also that a total capital investment of over 35 million dollars over 19 years is required to maintain the value of existing infrastructure assets at a level somewhat close to the value of those assets in 1980.

### **CalTrans's approach to valuing infrastructure**

Although employing systems for managing assets, like bridge management systems, will generally fulfill GASB 34's modified approach requirements for reporting capital assets, such systems do not provide a method for capitalizing infrastructure assets. CalTrans uses information from its bridge management system to derive the bridge infrastructure values required by GASB 34.

CalTrans manages its bridge network using Pontis (a bridge management system distributed by the American Association of State Highway and Transportation Officials). With Pontis, bridge

inspectors regularly inspect and rate the condition of the various elements in each bridge in their network. CalTrans has developed a formula for converting the condition ratings for all the elements in a bridge into an overall dollar value for the bridge.

Typically, using Pontis, inspectors rate each element of a bridge according to five conditions: protected, exposed, attacked, damaged, or failed. CalTrans assigns weights, or factors, to these conditions according to their severity, from 1 (protected) to 0 (failed), and determines the cost of failure (replacement cost) for each unit (meter, square meter, etc.) of an element.

CalTrans then uses the following equation to determine the value of each bridge element. The formula incorporates both the severity factor and the unit failure cost:

Current element value = quantity in condition state x WF x FC,

where WF = severity weighting factor

FC = failure cost of the element (cost to rehabilitate or replace a unit of an element if it fails)

Note that a condition factor of 0 (failed) will always result in a 0 value for that element.

In Table 2, the formula is applied to determine the current value of each element of a bridge. The values of all elements are summed to calculate an estimated value for the entire bridge. Note that the steel girder has 61 meters rated 1 (protected), 34 meters rated 0.75 (exposed), and 5 meters rated 0.5 (attacked). At a replacement value of 3,500 dollars per meter, the total current value of the girder is 311,500 dollars. To obtain a current, network-level

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estimate of the value of its bridges, CalTrans adds together the values of all bridges in its network.

**Summary**

In this article we have briefly summarized two methods for tracking the value of infrastructure assets. Either method would meet the requirements of GASB 34.

Many engineers and public works directors may view asset management and GASB 34 requirements as merely an academic exercise or as an activity that may be handled by their agency's financial officer. However, we would urge public works professionals and engineers to become engaged in the financial reporting of the value of the infrastructure assets they manage. Valuing assets over time (regardless of the method used) reflects how well infrastructure stewardship responsibilities were performed. The outcome could have significant implications on future resources allocated to the management of infrastructure.

The perpetual inventory method (as well as other depreciation-based methods) is a fairly simple approach to satisfying GASB 34 requirements. This method, however, provides only very aggregate, policy-level information. CalTrans's method, although a more complex process, clearly provides information that is more useful to infrastructure asset managers and decision makers. The CalTrans example demonstrates that the process of capitalizing transportation infrastructure assets can be based on sound engineering practices, using asset-by-asset condition information to build a value estimate for an agency's transportation infrastructure network.

**References**

Barbara M. Fraumeni, "Strategies for Measuring Productive Highway Capital Stocks," presented to the Transportation Research Board Conference for Information Requirements for Transportation Economic Analysis, Irvine, California, August 1999.

Andrew C. Lemer, "Asset Management: The Newest Thing or Same-old, Same-old?" *APWA Reporter*, June 2000.

Paul D. Thompson and Richard W. Shepard, "AASHTO Commonly Recognized Bridge Elements: Successful Applications and Lessons Learned," presented to the National Workshop on Commonly Recognized Measures for Maintenance, Scottsdale, Arizona, June 2000. •

**Table 2 Bridge Valuation Calculation**

Element	Calculation	Current Element Value (\$)
Concrete deck	300 m <sup>2</sup> x 0.5 x \$600	90,000
Steel girder	[(61 m x 1.0) + (34 m x 0.75) + (5 m x 0.5)] x \$3,500	311,500
Abutment	24 m x 1.0 x \$7,700	184,800
Column	4 x 1.0 x \$9,000	36,000
Joint seal	24 m x 0.0 x \$556	0.00
Total Current Value of Bridge		622,300

## Salvaging railroad flatcars as low-cost bridges

**This article is the first of three exploring bridge replacement alternatives.**

DEFICIENT and deteriorating bridges are creating major problems for both state and local highway agencies throughout the nation. Iowa is no exception. Iowa has significantly more bridges per capita than most states, which stresses the available tax dollars for implementing needed bridge replacements and repairs.

According to the 1999 Bridge Inventory in the November 1999 issue of *Better Roads*, 21,057 bridges—nearly 84 percent of Iowa's total—are located on Iowa's secondary road system. Of these secondary road bridges, 31 percent are rated as substandard. Therefore, much of the responsibility for bridge replacement falls to Iowa's county agencies, making it necessary to develop cost-efficient, durable, and easy-to-install options for low-volume roads.

**One possible solution**

Wayne Klaiber, professor of civil and construction engineering at Iowa State University (ISU), Terry Wipf, professor of civil and construction engineering and bridge engineer at ISU's Center for Transportation Research and Education, Jim Witt, county engineer for Cerro Gordo and Winnebago counties, and Thomas Threadgold, a structural engineering graduate student at ISU, conducted a study sponsored by the Iowa Highway Research Board on a low-cost bridge alternative that uses salvaged railroad flatcars (RRFCs) as bridge superstructure.

The research team determined that salvaged RRFCs are a "safe and feasible bridge alternative" to aid Iowa counties in constructing short-span bridges for low-volume roads.

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**Construction of the Tama County RRFC bridge.**  
*Photo courtesy of the Tama County engineer's office.*