Rural Technical Assistance Program NEWSLETTER

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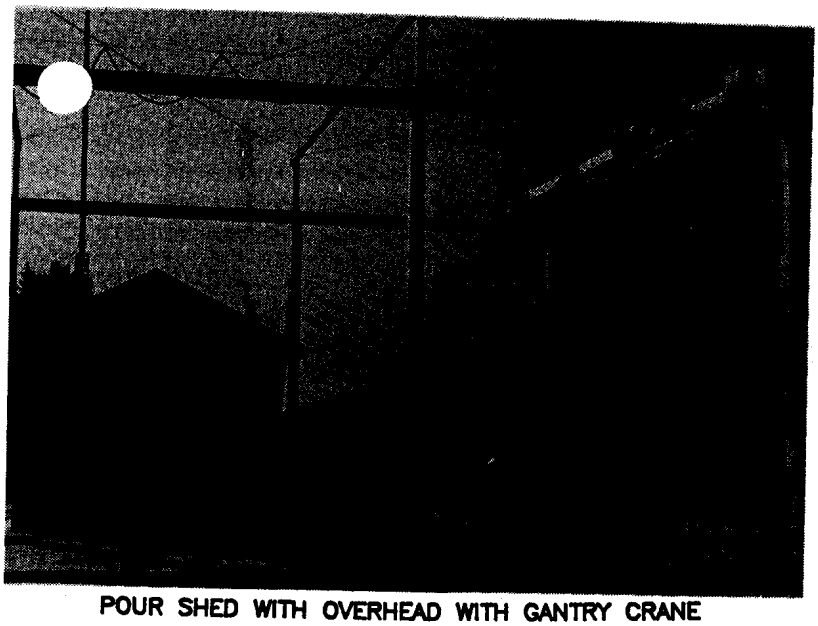
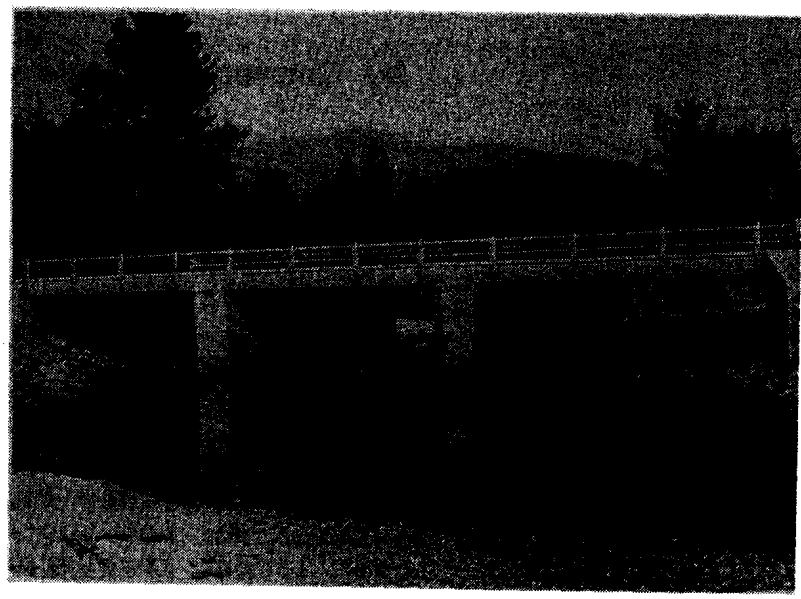
Do It Yourself Bridges in Ravalli County

Jay Unrue, Superintendent – Ravalli County Road Department

In a word, maybe two words, our precast concrete bridge program could be described as -- very successful. This description is appropriate because of: 1) maximum off - season production; 2) minimum detour time; 3) permanency; 4) economics.



POUR SHED WITH OVERHEAD WITH GANTRY CRANE



COMPLETED BRIDGE

Off - Season Production is achieved by use of a portable shed which is placed into position by the overhead crane, as shown in the above photo. Using a space heater, concrete can be poured regardless of winter temperatures.

Detour Time is minimal -- usually one week from demolition of old bridge to completion of new concrete bridge.

Permanency of concrete speaks for itself.

Economics -- our five year average has shown that bridges built and installed under our system costs us approximately 46% less than comparable contracted bridges.

The entire structure is precast usually in off-season, then trucked to the site for assembly. Footings, abutments, wing-walls, and inverted box girder deck sections all go together with a precise fit to form an integral structure. Our design is well proven. All 23 of our structures, in the field, are performing beautifully.

Anyone interested may come and observe and copy, if you wish, what we are doing. Alternatively, we can make these components available to you. Either way, it is an excellent way to stretch your tax dollars. If you have any questions, please ask. Hope to see each of you at the Montana Association of County Road Supervisors (MACRS) convention next April in Billings.

*If there are any questions concerning the equipment or the procedures used,
Jay Unrue can be reached at (406)363-2733.

Equipment Replacement Considerations For The Small Fleet

by Charles G. Maule and Abraham Jaladi-Yazdi

Every time the nearby Air Force base or contractor holds an equipment auction, a municipality rushes off with money in hand and buys six or seven pickups. These trucks are so old and worn out, some may have to be towed home. But the city reasons that it might gain the services of maybe two trucks, with four left over for spare parts.

Many small fleets make their equipment replacement decisions with the same lack of thought. They figure that as long as a piece of equipment runs and can be fixed for not too much, it should be retained. But these fleets, like their larger counterparts, need to be aware that at some point it costs more to keep a piece of equipment than to replace it.

True, many small operations lack the capability or inclination to perform complex equipment replacement analysis. Concepts such as the time value of money, depreciation, and interest rates can scare them to death.

But simple methods can be used. One system, developed by Oklahoma State University, considers costs only after they have been incurred. That is, it doesn't ask for estimates about future owning and operating costs. Nor does it demand that the fleet figure such things as discounted cash flow into analysis. It does, however, demand good records, because it seeks to find the total cost of owning and maintaining a vehicle on an annual basis.

The analysis begins with complete identification of the machine by make, model, serial and ID numbers, and purchase date and price (Fig. 1). Then its costs are listed on a month-by-month basis:

1. Labor costs due to breakdowns, such as idled operators or time spent procuring a rental vehicle, as well as the cost of the rental vehicle itself. (Prompt equipment replacement should reduce these costs.)

2. Repairs performed by an outside shop (labor only).

3. In-house repairs (labor only).

4. Expendable accessories, such as blades and sweepers. These are not directly tied to the economic life of the vehicle, and hence won't be considered in the replacement analysis. However, it's still a good idea to track them.

5. Parts that are to be considered in the replacement analysis, such as fan belts, spark plugs, and fenders.

6. Lube and oil.

7. Fuel.

These monthly costs are added together at the end of the year and transferred to a "Replacement Analysis Worksheet" (Fig. 2). At the top is recorded the mileage or hours the machine clocked during its first 12 months on the job (Item C). If this figure is not a good indicator of its yearly usage, use another. For example, you may average the first and second year's operation, or use figures from past experience with similar types of equipment.

Columns E and F are taken from Columns Q and R on the monthly record.

Column G, which is the ratio of the first 12 months' operating hours or usage to the actual number of hours or miles operated in a given year, allows the owner to adjust for different usage levels from year to year. This figure is multiplied by the total operating and maintenance costs incurred in the year, and recorded in Column H. Both these steps compensate for higher operating costs associated with increased usage rather than the machine's age.

Column I is the running total of Column H, and Column J is the average annual operating and maintenance costs.

Column K spreads the capital investment, or purchase price, over the number of years of ownership. Thus, a $6,000 pickup truck traded in after one year would cost, in effect, $6,000 per year to own. But the capital investment in a similar vehicle operated for five years would average out to $1,200 a year ($6,000 divided by five). Finally, the average annual total cost of that piece of equipment(that is, the sum of its average operating and maintenance, and capital costs) is listed in Column L.

We can expect that, due to the purchase price, the figures in Column L will start high, then fall as the equipment gets older. At some point, however, the average annual total cost will bottom out, then start to rise, due to higher operating and maintenance costs. At this minimum cost point the piece of equipment becomes a candidate for replacement (Fig. 3).

But every year, the cost of a replacement vehicle goes up, because of inflation. We may find that even though the costs of operating the old vehicle are climbing, they still are less than the cost of replacing it. With a slight modification in our analysis, we can account for this:

1. Subtract the last entry of Column J from the entry of Column J corresponding to the minimum value of Column L.

2. Multiply the value obtained in Step 1 by the number of years the equipment has been in service.

3. Add the value obtained in Step 2 to the purchase price of the existing unit.

4. The value obtained in Step 3 is the maximum amount we are willing to pay for the new equipment.

From Figure 3 we see that:

1. The difference of $2,657.01 and $2,349.75 is $307.26.

2. The equipment has been in use five years, and 5 X $307.26 = $1,536.30.

3. The original purchase price, $6,000 plus $1,536.30 adds up to $7,536.30.

After checking with a truck dealer, we find that the purchase price of a new truck is $8,400. Since that exceeds the current cost of ownership, we decide not to replace the old truck at this time.

At the end of the sixth year, the analysis is repeated. Assume the total operating and maintenance costs for the 6th year are $3,675 (Column E), and the total miles traveled that year is 13,500 (Column F).

The maximum price we can afford to pay for a replacement is_____.

A truck dealer can sell us a replacement for $9,000. Should we replace the truck? Yes_____ No_____

Fill in the blanks for year 6 for the columns indicated and see if you can match the answers on page 6 .

G	H	I	J	K	L

This analysis shows that even without sophisticated mathematics and economics, the small fleet operator can make sound, well thought-out replacement decisions.

* This article is reprinted from Vol. II, No. 1, August 1984 Rural Technical Assistance Newsletter, by Oklahoma State University, Stillwater Oklahoma*

MONTHLY EQUIPMENT RECORD

A. Make & Model: _____ D. Department: _____
B. Motor or Serial No.: _____ E. I.D. Number: _____
C. Description: _____ F. Date Purchased: _____
_____ G. Purchase Price: _____

H	I	J	K	L	M	N	O	P	Q
Month	Odometer or Hour Meter Reading	Labor Cost Due to Breakdown	Repairs By Outsiders (Labor Only)	Repairs By City/County (Labor Only)	Expendable Accessories	Parts for Vehicle	Lube & Oil	Fuel	Total Operating and Maintenance
June									
July									
Aug									
Sept.									
Oct.									
Nov.									
Dec.									
Jan.									
Feb.									
March									
April									
May									
R. Miles Driven or Hours in Use this year: _____							Total		

FIGURE 1
Monthly costs are recorded on the Monthly Equipment Record.

REPLACEMENT ANALYSIS WORKSHEET

A. I.D. Number: _____ C. First 12 Months' Operating
B. Purchase Price: _____ Hours or Miles Driven: _____

D	E	F	G	H	I	J	K	L*
End of Year	Total Optg. & Maint. Cost	Miles Driven Or Hours Operating	Proportion Factor C/F	Adj. Optg. & Maint. G x E	Sum of Column H	Avg. Annual Optg. & Maint. I/D	Avg. Annual Capital Cost B/D	Avg. Annual Total Cost J + K
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

* Consider replacing when Column L begins to increase.

FIGURE 2
Yearly data is entered on the Replacement Analysis Worksheet.

REPLACEMENT ANALYSIS WORKSHEET

A. I.D. Number: 12345
B. Purchase Price: $6,000
C. First 12 Months' Operating Hours or Miles Driven: 16,500 mi (26,500 km)

D	E	F	G	H	I	J	K	L*
End of Year	Total Optg. & Maint. Cost	Miles (Km) Driven Or Hours Operating	Proportion Factor C/F	Adj. Optg. & Maint. G x E	Sum of Column H	Avg. Annual Optg. & Maint. I/D	Avg. Annual Capital Cost B/D	Avg. Annual Total Cost J + K
1	$1,518.00	13,100 (21,080)	1.26	$1,912.68	$1,912.68	$1,912.68	$6,000	$7,912.68
2	2,159.75	16,820 (27,070)	0.98	2,096.96	4,009.64	2,004.82	3,000	5,004.82
3	2,395.35	16,360 (26,330)	1.09	2,610.93	6,620.57	2,206.86	2,000	4,206.86
4	2,806.50	16,600 (26,710)	0.99	2,778.44	9,399.01	2,349.75	1,500	3,849.75
5	3,598.20	15,200 (24,460)	1.08	3,886.06	13,285.07	2,657.01	1,200	3,857.01
6								
7								
8								
9								
10								

* Consider replacing when Column L begins to increase.

FIGURE 3
The average annual cost of operating this pickup truck bottomed out in the fourth year of ownership.

COMING EVENTS

October 16, 17, 18

Essentials of Situational Leadership. Taught in Kalispel f(first line superivisors and above. The purpose is to increase understanding of how people are managed effectively. You will learn how to match leadership skills to the needs of the people you supervise.
To register, or for more information, call Marj Blewett at (406)444-6048. This course is sponsored by the Montana Department of Highways and is open to City and County Personnel.

October 5, 6

State of Montana Auction. October 5th is the Montana Department of Highways heavy equipment auction at the Highway Department in Helena. October 6th is the sale of a wheel driver and other vehicles at the County Fair Grounds in Helena. Call Terry Howell, Bureau Chief, Propertyand Supply Bureau, Department of Administration, 444-4514, for more information.

ANSWERS TO PAGE 4.

The maximum price we can afford to pay for a replacement is $9670.07.
Yes, based on this analysis you should replace the truck.

G	H	I	J	K	L
1.22	$4,483.50	$17768.57	$2,961.43	$1,000	$3,961.43