WTT COVER STORY

FLEET

Editor's Note: Robert F. Smith is one of three equipment superintendents within the Bureau of Transportation, City of Los Angeles. He is responsible for five maintenance facilities which maintain over 2,900 pieces of equipment. Included in the fleet are cars, trucks, construction equipment, aerial buckets, boats, helicopters, tractors and other vehicles needed by Los Angeles. Many of the management concepts contained in this article may be used by firms within the Green Industry. We would hope that these concepts will provide insight into solving individual equipment problems.

ONE OF THE MOST important and difficult tasks we all have today, is the preparation of our annual budgets. This is particularly true as it relates to replacements of vehicles and equipment.

Everyone who owns an automobile or any other type vehicle today is a transportation specialist. With the little visual change in the appearance of our specialized equipment over the past few years, we as "transportation experts," tend to believe our equipment can run forever with just another set of spark plugs and tires.

Recognizing this as a problem, we must then become more "people-oriented." Our systems, charts and proposals must be aimed at those individuals who can see only the expenditure of funds to purchase the same thing we already have, not considering new designs or more efficient equipment.

The first important factor we must know is the **most economic replacement cycle.**

To demonstrate how you can program vehicle or equipment replacements, we must define and outline the situation in terms of basics. For example, 1. We need to determine what the cost of a new vehicle would be. 2. Maintenance cost of parts, labor, and overhead on a per hour basis. 3. Inflation is not a factor to be considered in determining the optimum vehicle retirement age. 4. Vehicle downtime due to equipment malfunction increases linearly with vehicle age. 5. Maintenance requirements increase linearly with vehicle age. 6. All units are working a single shift. We must take into consideration the percentage of time the vehicle is available by age of vehicle. It is a fact that as the vehicle reaches an age of five to seven years of service, a decrease in availability could occur due to the need for a major refurbishing of the unit.

Take into consideration what occurs by defining the vehicle downtime as a function of vehicle age. It is good to recognize that your maintenance staff may be able to perform a large portion of the repairs to units during off hours. But once the downtime exceeds the available man-hours you are in trouble.

Costs records portray the maintenance hours required according to the vehicle age. As each unit in your fleet increases in age, the maintenance requirements also increase proportionally. Your staffing should be compatible with your fleet size and age of equipment.

The most economical replacement cycle must be based on three main factors:

1. Replacement cost.
2. Maintenance cost.
3. Out of service cost.

The out of service cost is that portion of time for which stand-by vehicles must be provided to meet the requested availability. Considering the vehicle out of service days per year can give you a numeric ratio of stand-by units needed to provide for the out-of-service requirements depending upon the vehicle age.

Once the above data is available, it can be combined. Based on information provided, we can utilize a mathematical formula to determine vehicle replacement.

One system of replacement used by some large fleet owners today is the Formula Basis Replacement System. It is an attempt to integrate several major vehicle costs and usage data into a mathematical formula which will approximately reproduce the cost of the vehicle operation over a constant period.

Thus, two formulas, one for the vehicle under consideration for replacement and another for a comparable replacement vehicle, can lead to a meaningful comparison of actual costs involved. As an example, if the cost per mile (or per hour) to continue operating the old vehicle is greater than the cost per mile (or per hour) to buy and operate a new vehicle, then you should sell the old vehicle. This can be expressed in a mathematical equation as:

$$\text{If } \frac{A+B-C}{X} \text{ is greater than } \frac{A+E-D-W}{Y}$$

then Sell

The designation of the various letters stands for:

A — Original cost of vehicle

B — Cost of repairs needed to continue service

C — Salvage value of the vehicle after completion of service life.

D — Salvage value of new vehicle after it has reached the end of it's expected service life

E — New vehicle cost

W — Current sale value of old vehicle

MANAGEMENT

By ROBERT F. SMITH

X — Total life of old vehicle after repairs needed to continue service (life to date plus extension of life due to repairs — this may at times extend life beyond average replacement expectations).

Y — Total life of old and new vehicle (old to date plus estimated life of new vehicle)

Note: Life can be expressed in miles, hours, months or years for X and Y, but must be the same factor in both formulas.

The second important factor to know is **balancing budget replacement.** With a large fleet one of the most difficult problems faced by managers is the continued fluctuation to our budget requests resulting from differences in vehicle acquisition schedules. One year we may replace thirty units at one time and the next two years, none.

Some smaller fleets have experience and prefer a straight line depreciation so they can plan their replacements ahead.

The last factor to determine is the **most acceptable replacement costs.** Most of us have moaned for years about the fact that we had to install a new engine, a new transmission, or some other costly component just prior to ordering a new unit. Or, conversely, we have deadlined a unit rather than replace one of these major components.

I want to suggest that we have not given full consideration to our total vehicle management responsibilities by following these practices. How many man-hours could you have saved and how many additional hours of usable service could you have obtained had you replaced an engine, transmission or some other single component? Why not capture this cost savings and further reduce your budget by replacing only those items which are generally in need of replacement. For example, records indicate almost no rear-end failures. Most of the body work performed is related to the tailgate assembly. And as engine and transmission replacements are almost a routine item, why worry about them? I would suggest review of your repair records and then consider retention of those items which are routine in nature of those which have an indefinite life.

When is it best to lease rather than buy and what type lease arrangement is the most satisfactory? What is the best way to get service for small fleets (5 or 6 vehicles) if the company does not have a full time maintenance facility? These and other questions confront people in our business regularly. It would seem that one of the ways to accomplish this end would be to lease or rent. Let's look at this in some detail.

There are mainly two types of

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Equipment management means keeping abreast of new changes in Federal and state regulations. Superintendent Smith points out the new height of this chipper from the ground. OSHA and other laws have increased the safety around machines such as this.

This sweeper was specially designed by Smith and his crews. He points out a leaf attachment which aids in leaf pickup. Large machines such as this receive thorough maintenance at regular intervals.

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leasing programs, open end leasing, and closed end leasing.

Open end leasing can be had with or without full maintenance. A contract is written on a mileage or hourly basis, for instance. The cycle period is 36 months, mileage limitation 45,000 miles, 3¢ thereafter, the lease makes up the balance of the purchase price when the vehicle is disposed of.

Closed end leasing can also be had with full maintenance programs. The cycle period is still 36 months, mileage limitation 45,000 miles, 3¢ thereafter. The leasee turns in vehicle at end of cycle period and completes all obligation.

Most lease agreements have a penalty clause for mileage; i.e. 60,000 to 80,000 miles pays penalty equivalent to blue book loss.

The leasee can write off 100% of lease payment as operating expense. The only tax write off is license.

In some cases it is better to purchase or own the equipment, as owned vehicles can be written off for such items as: sales tax, annual license and annual depreciation.

How should a manager decide whether to purchase one vehicle with needed options (larger axles, etc.) or the next model up which has the desired equipment as standard? Let's look at this example.

Consider you want to purchase a new 24,000 GVW truck. But in order to purchase a truck this size with components you want, it is necessary to purchase a 20,000 GVW truck and purchase optional components. I am referring to a F-700, for instance, where standard FA. 7000 pounds and an optional FA 9000 pounds compares to a standard RA. 13,000 pounds and an optional RA. 15,000 pounds. By going to a standard model F-750, it is possible to purchase the F-750 at the same price or sometimes even less. The main factor to consider would be cost.

Aerial Equipment

New regulations on vehicle-mounted elevating and rotating work platforms have brought new meaning into the purchase of aerial equipment. Due to a personnel accident some years back, we have established a preventive maintenance program on aerial ladders, cranes and personnel platforms for the City of Los Angeles. This program meets the State of California and manufacturer's recommendations. The program now in effect meets or exceeds OSHA requirements.

First, we are required to install a safety bar inside the bucket to fasten a safety belt to. This bar must be insulated on the outside of bucket, so no projected bolts can make contact

with electrical wires.

We also have established detailed series of inspections for aerial devices. They consist of: 1. Daily operators inspection in which records are turned in weekly; 2. A 90-day visual inspection of performance, controls and warning devices; 3. A one-year inspection as to lifting capacity, stability tests, electrical insulation tests and complete visual inspection of cable, hoses, and all other components; and 4. A three-year teardown inspection. This consists of dismanteling of machine, magnaflux all pins, shafts, sprockets, and shives. Replace all hydraulic lines overhaul controls, x-ray booms and replace cables.

In some ways the OSHA program follows the manufacturers recommendations. The Bureau of Transportation provides and is responsible for maintenance of same. It is our responsibility to supply and maintain the best and safest equipment possible to the using agencies.□

Spray Irrigation Effluent Yields Phosphorus To Soil

Most soils, irrigated with sewage effluent, are capable of removing unwanted phosphorus from the effluent for countless years without becoming over-saturated.

Such irrigation with sewage effluent is considered widely as feasible to meet the proposed goals of Federal legislation which would forbid disposal of critical pollutants into surface waters by 1983, stated Dr. Louis T. Kardos, professor of soil physics at Penn State University.

The phosphorus is either "fixed" or held onto by the soil, or is removed by crops through the root systems in a process termed "the living filter," Dr. Kardos explained. In medium-textured Hublersburg clay loam, for example, phosphorus has not increased below 12 inches of soil after irrigating the land with a total of 472 inches of sewage effluent over a 10 year period.

In coarse-textured Morrison sandy loam, on the other hand, 591 inches of sewage effluent applied over a 7 year period has increased the phosphorus content as far down as 3 feet. This soil is largely covered with forest. Virtually all of the phosphorus taken up by the trees is recycled through leaf litter each fall.

Water samples taken from the soil pores indicate that phosphorus leakage at 4 feet has been less than 1 percent of the total applied phosphorus on the clay loam soil. Leakage at the same depth was about 7 percent on sandy loam soil.

Regardless of the amount of effluent applied, no change was detected in phosphorus concentration in groundwater at either site.

Harvest of crops from the clay loam soil removed from 10 to 140 per cent of the applied phosphorus in the various years, Dr. Kardos stated. Such harvesting of crops contributes substantially to extending the time over which the soil can behave as an effective phosphorus filter.

Approximately 500,000 gallons of effluent are currently being sprayed daily on about 75 acres of farm and forest land at Penn State. Chlorinated secondary effluent is diverted from a sewage treatment plant into a pipeline which runs about 4½ miles to the irrigation site. Any one piece of land is irrigated only once a week. The system has been in operation since 1963.

A system irrigating four million gallons daily is now being designed to dispose of the entire effluent output from the university community.