

Lansing tree removal with task force composed of truck with 53' Strato-tower and brush truck with special steel body built in departmental shop. High steel sides allow loading of both brush and wood. Since many removals are diseased elms, this simplifies loading and the mixture produces better burning. Crews consists of 4 men and special equipment includes 2 chain saws, a small saw for the man in the bucket and a larger one for bucking up logs and cutting the tree to the stump.



Labor + Equipment = Work

Efficiency Equation for Tree Crews

By Theodore J. Haskell

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SHADE TREE OPERATIONS have changed. In my 18 years experience, these have come

about by forces both inside and outside the organization. Two such forces are "annexations"

and "Dutch elm disease."

Such forces have called for changes as we profited by experience, research, and an exchange of information. Each time there is change, we reevaluate and reorganize.

In our Lansing shade tree operations on streets, parks, and golf courses, work involves service, pruning, line clearing, planting, removal, disease and insect control, plus other special projects.

Our crews are made up to handle these operations, and they are given the equipment to do the job. Naturally, factors affecting crew makeup will vary from city to city. But in general, such factors include policies, standard practices, recommended practices, expedients, emergency procedures, custom, and traditions. Sometimes the steps become so meshed over a period that it is difficult to separate them. A systematic approach can be used to make changes necessary to solve problems.

I think one method of problem solving is to consider how all factors relate to Labor, Equip-

Haskell's Conclusions:

Street tree operations are growing. Work loads and production factors are changing. Today there is a need to keep in balance the equation of labor plus equipment converted into work.

For example:

1. *Review the entire operation when one or more of the following factors change:*
 - (a) *labor*
 - (b) *equipment*
 - (c) *job requirements*
2. *Get the most possible from equipment by:*
 - (a) *regular maintenance*
 - (b) *keeping up to date on new developments*
3. *Manage manpower by:*
 - (a) *selection*
 - (b) *orientation and training*
 - (c) *promotion as skills and ability increase*

Hand labor as we knew it 10 years ago no longer exists. It has been priced out of use by national trends in mechanization. Future of the industry lies in skilled men and improved machines. These must be combined and recombined into efficient units to meet changing needs.

ment, and Work. These 3 items can be put together in equation form such as: $L + E = W$. In such an equation you can add, subtract, multiply, or divide, and you will maintain the equality as long as you treat both sides of the equation the same. If labor (inputs) plus equipment (inputs) equal work (outputs) you will have efficiency regardless of size of the operation. A balanced equation means an efficient operation, whether you deal with 10 men or 100.

Once a change in "inputs" disturbs the equation, correcting changes must be made in the operation. For example, if a stump cutter is added, you are right in expecting more stumps to be removed for the same labor input. If such is not the case, then a careful check is needed to find out why not. You cannot afford to waste manpower by having men or equipment on the job and not in use.

Changes which occur from forces outside the control of management must be matched by changes inside management. Short term "outside" changes might be such things as men getting sick, men going on vacation, equipment breakdowns, storms or weather changes (vital in spring planting), and other types of emergency work.

Long term changes include changes in the quality of labor as men on the job gain skill, as wages rise, and as other men retire. Other long term changes occur as equipment is improved (good examples are chain saws, mist sprayers, and tree movers), cities grow, trees grow, new diseases such as DED appear, new insect pests create serious problems, and environmental changes produce drastic effects on shade tree populations.

Management in the face of change depends on making the best use of available resources. To do this, you need a system of

controls which include: a work order system; a time record system; and materials control. Reports on these items will help assess what was done on past operations and also help make sound judgements in the face of change.

Many Equipment Changes

A good example of the effect of change on management is the chainsaw. During the past 12 years, use of the chain saw has restructured tree removal operations.

Old tree removal methods were based on slow take down time. Hand saws were used in trees, and cross-cut saws for felling or bucking operations. These involved 3- and 4-man removal crews that cut down the tree in big pieces and piled the brush. Later, brush and wood pickup crews cleaned the area. With the chain saw, it is no longer necessary to make big cuts. One man in a tree can drop brush so fast that it is now practical to maintain a brush truck with driver for immediate hauling. Most of the time, brush and wood do not need to be first piled, then handled a second time in loading and moving. Rather than the original 3- or 4-man crews, followed by a 2- or 3-man loading crew, a single crew of 4 men with 2 trucks can now complete the operation. A clear saving of time is that required for the second handling of brush and wood.

On big jobs such as street widening where a number of trees are being taken down at the same time, we increase the size of the task force. We add to the number of units per crew so that we may have an aerial tower truck, a hydraulic crane truck, 2 brush trucks, and 5 or 6 men. By contrast, we may also have small operations where only a 2-man crew is necessary. Adding men and equipment is effective only so long as they

can be kept busy. It is the function of supervision to assess and adjust the labor and equipment inputs to the work at hand.

Stump Removal Aided

Modern methods have also aided stump removal. Formerly, the system was the old wedge-and-sledge method. Chain saws have made it possible to flush-cut trees in many park areas or private yards. And where the entire stump must be removed, such as in an intensive park area or particularly on the street, the new stump cutters have proved their worth.

One "task force" we organized this spring consisted of 2 stump cutters pulled by tractors, 2 two-ton trucks used for hauling away chips and bringing dirt in to fill the holes, a tractor with front-end loader to eliminate hand shoveling, plus a pickup truck for the foreman. This unit of 6 men and eight pieces of equipment averaged 75 street stumps per week. During their best week, they removed 96 stumps. With a 3-man unit, we had been averaging only about 20 stumps per week.

Planting operations have made progress equal to that of other areas of the business. We have come far since the so-called "2-horsepower" methods of moving trees. Formerly, trees were dug with a pick axe, frost point, and sledge hammer. We now use air compressors for digging in frozen ground. Trees are moved by mechanical means when possible. In our Lansing operation, we have adapted a front end loader by removing the bucket and installing hooks for raising the trees. The operator is now able to see clearly while picking up the tree and setting it in the hole. We also use a Prentice hydraulic crane on a service truck which makes an excellent tree moving device. Hydraulic action gives almost finger tip control for lift-

ing, lowering, and final positioning of frozen balls up to 6 feet in diameter.

When space is available for equipment, we use a back hoe to dig around trees which are to be moved. We also use the back hoe to dig the hole at the new planting location. Here again, we have the use of equipment combined with skilled labor to either increase the work output or decrease the time required for the tree moving operation.

Efficient Spray Operation

Efficient spray operation depends on the number of trees that can be covered per hour. Best technique must be determined by the pest and by the material to be used for control. These factors determine the type of equipment needed. Until 1954, we used hydraulic sprayers. Often the refilling time equaled the spraying time. In some cases, we felt lucky when we averaged 12 trees per hour. Then came development of the mist sprayers and use of concentrated sprays. These made it possible to handle the more intensive spray programs needed to fight DED. Our early machines had a 100-gallon capacity and required a 3-man crew including operator, driver, and a scout-public relations man. In recent years, development of the larger 300-gallon models has made it possible to spray almost 3 times the number of trees for the same basic labor costs. Thus our work equation has changed as follows:

$$\text{For 1958} - L + E = W$$

$$\text{For 1968} - L + 3E = 3W$$

Among miscellaneous equipment for modern tree operations is the brush chipper. The chipper will save from 4 to 6 times on hauling cost. Still another modern piece is the hydraulic crane unit for loading logs, moving trees, and handling storm dam-

age. Aerial tower trucks are also quite new and can be used for trimming and removal operations. We have found 2 additional uses for the aerial units. We use them to replace the floodlight bulbs on our lighted ballfields. We have also found our unit excellent for taking "aerial views" of our park installations.

Each city's work-environment program is somewhat different. Thus, you must base your work and your decisions on your experience and research, along with the exchange of information with others in the field.

You Are the Manager

Employees are the hands that do the work. The city forester must know his men. Management means combining men and machines into efficient operating units. I personally favor the "task force" or "teams" system better than permanent units. I don't think we can afford to let custom freeze the "L" factor in the work equation.

Good supervision, naturally, begins with orientation. Time spent on orientation gives men a faster start. Whether an employee is a new recruit on his first assignment or a veteran on a new job, it lets him know what is expected.

The quality of labor results from your own ability to teach men how to work, and to make them want to do a good job. This quality factor involves skill, experience, and supervision. One point to emphasize here is that there is the well-known difference between 5 years of experience, and one year of experience 5 times over.

Whatever your system of appraisal may be, it is a good idea to shift men around over the course of a year as you make up your task forces. This allows you, the supervisors, and the foremen to observe men under different conditions.

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