

# JOURNAL OF ARBORICULTURE

June 1977  
Vol. 3, NO. 6

## A MANAGEMENT APPROACH TO TREE MAINTENANCE

by Richard W. Harris

Arborists and landscape managers are seeking ways to maintain tree plantings and landscaped areas more efficiently and more effectively. Hardly a day goes by that the news does not carry a story of some organization or agency that is having to cut back services, reduce the number of employees or consider raising taxes because of increased costs. New pressures are being placed on public and private arborists, particularly where the major cost is personnel and these costs are escalating rapidly. Not only are arborists being forced to be more efficient, but they are having to justify more convincingly the budgets with which to carry out their responsibilities.

Arborists need information from which they can make management decisions as well as develop ways to be more efficient and effective. Depending on the organization, its personnel and its resources, a variety of approaches may be effective. However, whatever procedures are used, they all fit into a general pattern of an approach to management which have certain similarities.

### The Essentials

The essentials of an approach to provide management flexibility and capability include nine considerations or steps. These are:

1. *Involve Employees.* Most important is to involve employees in the development of any management program. Without the complete understanding and support of employees, any system that is attempted will not be fully effective. Employees should work *with* not for supervisory personnel.

2. *Inventory Resources.* Getting down to the approach itself, find out exactly what the agency is responsible for and must maintain. An inventory of trees by species, size, location and condition provides the basis not only for developing an effective maintenance program but also for becoming a management tool for other purposes.

3. *List Tasks.* Knowing what is to be maintained determines what jobs or tasks must be performed to maintain tree plantings at an acceptable level. A list of those tasks would include planting, staking, pruning, fertilizing, pest control, etc.

4. *Describe Tasks.* After listing the tasks, they are described in enough detail so that anyone would know how they are to be performed. It is then possible, and only then, to estimate how long it will take to do each task on a per tree basis.

In developing a task description, capitalize on the experience and ingenuity of the people that do the task as well as those who supervise them. By involving employees in discussing and formulating how tasks might be done most effectively, they may come up with more efficient techniques as well as a new sense of really being part of the organization. Describing how each task will be done and writing it out for future use is time consuming but has real payoffs later.

5. *Determine Standards.* Many people view the next step as time consuming and of questionable value, but it is an essential feature of any management approach. A standard or time to do a job must be developed for each task. To the management engineer, "standard" is the length

of time to do a task. "Standard" has nothing to do with the quality of how that task is done, just how long it takes to do the task a particular way. In order to have meaningful standard, it should be obvious that a specific task description is necessary.

The time to do a task can be estimated in several ways. The most sophisticated is called MTM, that is Method, Time-Measurement. This is a technique that uses predetermined times for doing the various motions that are part of a specific task. A particular task is broken down into the motions and movements a person must perform in order to accomplish that task. Having these motions, then from appropriate tables the time to do each of them can be determined. These are summed up to give a standard for that particular task. With this procedure, it is possible for measurement technicians to estimate how long, on the average, specific tasks will take. These are based on an average person working at an average pace under average conditions with average supervision. MTM is not as well adapted to pruning mature trees as it is to other more repetitive tree operations or landscape maintenance tasks.

Another technique is to go into the field and time the operations on a unit basis; time per tree of a given species and size. Usually observations are made over a period of time in order to develop more representative figures. People usually work faster when they know they are being watched. They need to be observed over a succession of days until they resume a more normal rate. If consultants or management personnel are doing the timing, it is easy to understand why employees might develop resentment, feeling that their integrity or ability is being questioned.

A variation of this second procedure is to have the employees keep track of their own time to do a particular task. With some supervision, they can develop fairly accurate estimates. This also has the advantage that the employees become more aware of the operations and that some are more time consuming than others and usually more time consuming than they had realized. This could lead to some readjustments of how the task might be done to improve efficiency. In such

a case, the task description should be changed to comply with the new procedure.

For crews that primarily prune mature trees, have them keep track of how long it takes them to prune a tree of a given size and species a certain way or severity. When pruning uniform-size trees of one species, daily totals of the trees pruned are sufficient. Key time per tree to species, size and type of pruning.

MTM standards have proven quite accurate for industry where many tasks are repetitive. However, a number of people have questioned how something so varied and qualitative as tree maintenance can be accurately described and quantified. Even so, experience has shown that MTM developed standards can be valuable in management of tree maintenance.

Whatever procedure is used to determine the time to do a task, the important thing is not how accurate a particular standard is for a specific task. What is important is that the standard is a reasonable estimate by which management can schedule personnel effectively.



**Figure 1. "Accurate as built" park plans can be a primary source of inventory information.**

6. *Set Task Frequencies.* The next step is to decide how frequently a given task is to be done. "Are you going to check newly-planted trees once, twice or several times the first growing season?" "Will mature planetrees be pruned every three, five or seven years?" The frequency of a task usually determines the quality of maintenance. In practice, except for pruning, the

frequency that most tasks are done has more influence in determining quality than how the tasks are done. Frequency not only determines quality but in large measure the costs. Savings can be made by lengthening the interval between task repetition. For many landscape tasks, the seven-day week hampers operations. It might be more realistic to determine frequency on the number of days between task repetition regardless of the day of the week. However, for operations that are tied in with weekly periods of high use, maintenance must be geared to those high use periods. But areas that are not used differently during the week, other than weekly frequencies might be considered.

Different levels of maintenance for different areas are possible by varying frequency. Probably the most well established differences in frequency is turf mowing on golf courses. Compare mowing frequencies of greens to that of fairways, and those to the frequency of care given the roughs. Similar differences in maintenance levels are possible for trees and other landscaped situations.

7. *Schedule Tasks.* This information can now be brought together into a schedule. Knowing what is to be maintained, where it is located, what tasks need to be done, how these tasks are to be done (including the personnel and equipment involved), how long it will take to do the task and how frequently they are to be done, the tasks can be scheduled into an operational plan. In considering the various tasks and their frequencies, and the kinds of equipment and personnel that are needed, some of them logically fit into a route concept while others may be better done by a resident caretaker. For each person or crew, a schedule is then developed. Where this is in practice, management tries to have it understood that the schedule is tentative or suggested and should the need arise, the schedule can be departed from on the decision of the leadman or supervising foreman. Usually schedules are made up for periods of two weeks since many of the repetitive tasks may be done only once in a two-week period.

Since some work may be done more efficiently with crews and other work by resident personnel,

the schedule will begin to indicate the organization of the maintenance operation into logical units.

8. *Implement Program.* Now that the management plan has been developed, it needs to be implemented. If the employees have been involved in the development from the beginning, parts of the system are probably already in operation. In some cases, the delivery system will have to be reorganized to implement the program while in other cases it may be only necessary to put the workers onto new schedules. Those agencies which have gone through a new management approach emphasize the necessity for the employees to be completely informed so that they understand the purpose of the program and what employee involvement means to the agency and to the employees.

9. *Monitor the Work and Schedules.* For a management program to be most productive, it must be monitored so that it can be periodically evaluated and adjustments made. Effectively monitoring the system is one of the most difficult steps in any management approach. Some agencies have their employees check which tasks on their schedule have been done each day. They are to note other tasks that were not scheduled and how long each unscheduled task took. Under MTM, it is assumed that if the task was done, it took the time that had been figured. Knowing which scheduled tasks were done and how long it took to do all of the tasks for which there is timed information, performance for the worker or crew can be determined.

In another method, the workers keep track of how long it takes to do each task. A unit of time is selected that will balance precision of measurement with the reality of getting the measurements. It may be to the closest hour, half hour, 15, 10 or even 6 minutes. On repetitive jobs employees are likely to put down the time expected even though they may have taken less time or more for a particular job.

A third approach, the supervisor evaluates the quantity and quality of maintenance along with observations of how busy the workers are. Standards are checked occasionally to update them

so schedules can be more accurately arranged.

Whatever monitoring technique is used, the information must be fairly accurate so that realistic projections and adjustments can be made. Also, it is important not to get too much information which not only takes employees time in filling out forms but also management people may not be able to use that much information effectively. Research is needed to develop more accurate and workable data to monitor and adjust on-going programs. The monitoring is a management tool by which supervisory people in the field can make management decisions as well as those in the front office can adjust their programs.

Some agencies that have computerized their tree inventories are able to keep them updated by putting in maintenance work done and how long it took. With such a system, it is possible to develop maintenance cost figures by species, size and season. This information is invaluable in budgeting, revising master lists of tree species to be planted, etc.

The program has come full circle. It is now possible to refine some of the various steps that have been taken in the monitoring operation. By this time you may be feeling like the taxpayer who was asked, "are you in favor of City Hall becoming more efficient?" The reply was "yes, if it doesn't cost too much." At first glance it would appear that this is a paper tiger that will take a lot of time in developing information that will go into files and never be used. These often are valid concerns and questions along this line must be answered.



**Figure 2. Maintenance schedules are based on inventory data, task description, task standards and frequencies, and available personnel and equipment.**

## Benefits

As with any program, there are advantages and certain disadvantages that must be weighed for each of the steps in the system. It may seem that such an approach must include all of the steps if it is to be adopted. This is not the case. Certain steps can be included without the others. However, even though a certain step may not be consciously included, it is there in one way or another even though not being carried out to best advantage.

### Administrative benefits

1. *Develop and Analyze the Budget.* Arborists and landscape managers when asked, "what is the most important advantage of such an approach to management", reply, "we are better able to justify our budget." Although this is an important consideration, it does not take into account increases in efficiency of operation or management effectiveness that such a system can generate. In the overall administration of a department, of course, budget justification is indeed crucial. For without a budget, a department can do little, and councils and boards are more frequently asking for budget justification.

Budgets can be developed directly by having an inventory of resources, the manpower and equipment necessary to maintain them, and the frequency, standards and schedules by which tasks are done. Specific costs can be identified for different operations and management decisions made with a clear picture of the implications. For example, if a budget cut is proposed, the question can be asked, "what operation do you want to reduce or eliminate?"

Growing directly out of the budget, the level of maintenance can be set for any landscape area. The trees and other landscape plantings at city hall and the park in the center of the business district may be maintained at a higher level than at a regular neighborhood park and these at a higher level than a regional park or at least certain areas of regional parks. By adjusting frequencies, level of maintenance is possible and this is one way that an agency can use their people and equipment more effectively. Levels of maintenance also can be differentiated between those set for the active period of plant growth and

heavy use and those during the slower winter period.

2. *Set Priorities.* This management approach makes it possible to know the costs of different operations, maintaining different areas at a given level, or the same area at different levels of maintenance. Priorities can thus be put on a cost/benefit basis. If time or funds are limited, a decision can be made as to which job should be done first or which job should be done instead of others. Or this information can be provided to superiors so that they have a basis on which to make a decision. Decisions so made can be intelligently justified.

3. *Determine Personnel Needs.* Knowing the tasks to be done and the equipment to be used, needed personnel classifications can be determined. Knowing what and how much has to be done, how long it will take to do a particular task once and how often it will be done can be used to determine the number of personnel in each classification as well as the equipment necessary for each task. Also, this information will provide the basis to determine how many permanent and how many seasonal employees will be needed.

4. *Establish Organization.* In the development of schedules for doing the various operations, decisions need to determine which tasks can better be done by specialty crews and which tasks by a resident or an area maintenance person. With these decisions made, the organization of personnel can be developed for maximum efficiency and effectiveness. Even though the organization may be developed on the basis of scheduling in formulating that organization, it may be found that the scheduling may need to be modified to more effectively use present personnel and their skills.

Management benefits

5. *Analyze How To Do a Task.* Having the workers and the first-line supervisors describe how each task should be done, it is possible to evaluate the effectiveness of doing a job different ways as well as determining the efficiency of various ways of doing the same job. Even after a task has been described and the method put into practice, new techniques or suggestions on how

to modify the present method can be evaluated. If the people doing the task have been involved in developing the ways that the task will be done, they more likely will be interested in trying to find ways of doing the job more effectively or more efficiently. This will increase their involvement and interest as well as further improve efficiency.

6. *Schedule Personnel Effectively.* Tasks can be scheduled so that personnel do jobs for which they are best qualified. Not only is money wasted, but workers can become unhappy if they do jobs for which they are overqualified. This does not mean that employees might not have to do jobs below their classification at times, but this should be kept to a minimum for greatest productivity.

7. *Workers Know What is Expected.* Most workers want to know what they are to do. Such knowledge gives them peace of mind as well as specific goals which they can work towards each day. It may appear that this procedure takes the initiative away from the worker so that he is little more than a machine. However, this will be minimized if the workers have helped develop the schedules. Schedules and standards are used as guides so that the worker is free to do the best job possible and to know when he has completed what has been expected. A lot of lost motion can be saved when people know what they are to do and how they are to do it.

8. *Preventive Maintenance.* Doing a job when it needs to be done can keep trees and landscaped areas as well as equipment in better condition with less total effort and expense. It is the old adage, "a stitch in time saves nine."

9. *Progressive Maintenance.* Certain operations if done at the proper time in the proper way can decrease the effort needed in the future to do the same operation. A couple of examples are: (a) Pruning a young tree to develop a strong framework structure of branches takes only a few minutes each of the early years of a tree's life. Later it could save considerable corrective pruning that might have to be done when the tree is larger. (b) It has been shown that scheduled weed control can reduce or even eliminate the need for future weed control. Only with living things it is possible to decrease future main-

tenance by doing the job properly on a regular basis. Landscape managers should make a strong point of this in justifying maintenance of new plantings.



**Figure 3. Training young trees is progressive maintenance in that a little time spent initially will reduce markedly the need for corrective pruning later.**

#### Planning benefits

10. *Evaluate Equipment Needs.* In a manner similar to evaluating new ways to do a job, it is possible to obtain accurate estimates on the efficiency and effectiveness of new equipment. Using information on how long it takes to do a particular task with a new piece of equipment compared to the old way, it is possible to make valid comparisons. Of course the quality of the work must enter into the comparison. From information already available from the management approach, it can be determined if there will be enough work to justify the investment and operation of particular equipment or whether it would be better to lease equipment or even to contract with a private company to do that task.

11. *Maintenance Input Into Planning.* Quantitative maintenance information in the hands of arborists and administrators should make it possible to select trees for specific uses and areas more wisely. Tree removal versus heavy pruning can be objectively decided. Such quantitative information is most accurately obtained through the MTM method of determining task standards. This does not mean that everything should be done for greatest maintenance efficiency, but at least the arborist and the administrator will know what the maintenance costs will be for different alternatives.

12. *Project Future Needs.* One of the real dilemmas which faces landscape managers is to be given more plantings and facilities to maintain with no increase in budget. Many times this happens because the arborist is not able to give accurate estimates of the cost of maintenance or the kinds of employees and equipment that will be needed to maintain new plantings. With a management approach similar to the one described here, personnel, equipment and supply needs can be estimated while in the planning stage. The City of Walnut Creek now requires a "Maintenance Impact Statement" on each project. This is another way of being able to project future needs for maintaining new or redesigned areas. Little benefit comes from planting new areas if the resources to properly maintain them are not available.

If additional resources are not forthcoming, this information can be used to determine what can be done to provide the best total program for the entire system. Again, management has some basis on which to make intelligent decisions.

#### **Problems of Implementing a Management System**

Disadvantages of management approaches are more problems to be overcome than reasons not to develop one. However, if they are not overcome then each can be a serious disadvantage. Three problems are most likely.

1. *Must Inform and Involve People.* A difficult problem in implementing a management system is to adequately inform all employees and involve them in developing the system. Employees

usually perceive change as dissatisfaction with the way they have been working. Change threatens, particularly when it appears to affect job security. Most people resist change. To help overcome resistance, in most cases, employees have been assured no one will be dismissed due to changes in the way things are done. Retirements, deaths and resignations as well as expanding responsibilities usually will offset increases in efficiency.

Few agencies adequately inform their employees of what the system will be, what it may be able to do and what it means to the agency and to the employee. Each employee needs to see that it will benefit him or her. If nothing else, each employee will become more important to the agency and his/her position more secure.

Such a system is a management tool somewhat similar to two-way radios which improve employee efficiency by more effectively using their time. Involving employees in developing such a system should not only improve how tasks are done but increase interest and commitment to the system and agency.

2. *Takes Management Time and Understanding.* To be most effective, a management system needs to be developed by the workers and first-line supervisors. This takes time and understanding to guide employees in the right direction without seeming to dictate. Such a system is not well accepted if imposed from the top down.

An agency may be forced to consider such an approach due to lack of funds. And just when labor is shortest, management should take time to inform employees and have them help develop the system. However, it may be analogous to the boy who was late to school because he was in such a hurry he did not have time to slow down to get on his bicycle. Starting to develop a system during the slack season uses employees' time to advantage and involves them in something new when they are not as concerned with busy schedules and responsibilities.

3. *Costs of Developing and Continuing.* Consultants and/or in-house personnel who have

primary responsibility for developing and overseeing such a management program cost money. Employee training and involvement take time which has a price tag. And the development of an unworkable or unacceptable system is a danger. Then, not only would the initial investment be lost, but employee morale may be seriously undermined.

However, initiating management programs usually have resulted in benefits the first year which were equal to or greater than development costs. Management input to keep the system operating and updated on a continuing basis has been only a fraction of the benefits over the previous method.

### Summary Comments

One of the misconceptions that some people have is that such a management approach is an effort to have a low level of maintenance so that the cost is the least possible. This definitely is not the case. This approach is a management tool by which resources can be used most effectively. In fact, it may justify the need for more resources to do the job at the level at which the users wish it performed. This may be at a level higher or lower than now being done. Or it may be that certain areas will be maintained at a higher level of maintenance and others at a lower level.

Again, this is an approach to management. It should be looked at, evaluated, and those parts that can be most effectively used or used first should be selected and developed for the particular operation and situation. At best this should be considered a guide towards which arborists strive and which can be adjusted to meet particular situations. By using such an approach one should be able to put his or her operation on a sound management basis from which intelligent decisions can be made, resources used wisely and actions justified.

*Department of Ornamental Horticulture  
University of California  
Davis, California*