

USE OF MUNICIPAL TREE MAINTENANCE STANDARDS

by Patrick R. O'Brien and Kenneth A. Joehlin¹

Abstract. Performance by municipal tree maintenance crews represents a concern for the urban forest manager seeking to optimize service to the public. Computers can assist if job performance standards are incorporated into tree inventory software. Collection of accurate field data is critical if valid conclusions are to be drawn. Likewise, work statistics must be presented in a manner easily understood by all concerned. Suggestions regarding the use of published municipal tree maintenance standards are discussed in this report. It highlights areas of data collection, presentation and workload forecasting.

The impact of the personal computer on municipal operations is revolutionary. Prior to the introduction of the personal computer larger cities utilized a select group of highly trained computer professionals who operated mainframe systems to serve the informational needs of City government. Under this type of system data from field divisions took weeks, even months, to enter. This delay practically guaranteed an antiquated database. Today the benefits of computer technology have been placed squarely in the hands of the people who generate the data. This aspect of personal computer use makes resulting systems more convenient and accurate.

Municipal operations utilize a wide array of commercial software. These range from word processing and graphics packages to database programs. Forestry divisions also use this new technology. In the past ten years, acceptance of personal computers and street tree inventories within the urban forestry profession has expanded rapidly. A 1986 nationwide survey revealed that 280 responding cities had completed some form of street tree inventory (2).

Computerized street tree inventories offer their users a variety of options for collecting, manipulat-

ing, and reporting data. Reports are often lists and summaries which can form the basis of management decisions regarding species selection, age/class diversification and over-all tree maintenance. The ability to answer such key management questions in a timely fashion has assisted in establishing the general acceptance that street tree inventories enjoy nationwide. However, the questions answered by inventories largely are those concerning the tree population and provide the manager with limited information regarding the man-hour performance of the maintenance operation.

Performance and productivity are two topics receiving increased attention in these times of municipal fiscal restraint. Although considerably more complex than most issues addressed by inventory software, profiling man-hour job performance is a task consistent with the computer's ability to track, assemble and report repetitions data (5). Man-hour performance standards form the basis of this productivity evaluation system (1) and are characterized as the units of time required to complete various tree maintenance tasks, such as removals, trimming, and stump removal.

A system that profiles man-hour standards provides guidance to workers, letting them know what is expected and how well it is to be done (1). Such a system can assist supervisors as well, allowing them to rate their own effectiveness by measuring the productivity of their workers (1). In addition, standards can be incorporated into inventory software allowing the user to forecast the time needed to fulfill the city-wide tree maintenance needs (5).

Performance values can be obtained by two methods. The ideal situation involves in-house

1. Vice-President of Technical Service, ACRT, Inc., Urban Forestry Specialist, 227 North Depeyster Street, P.O. Box 219, Kent, OH 44240

development by accumulating work records over an extended period of time. Once a database is established, it can be sorted by work type and diameter from which average man-hour values can be calculated. If a diverse collection of age classes exists in the city's tree population, then accurate performance values can be obtained within a two to three year period (4,5). This procedure is most desirable since it allows the agency to develop standards for its own operation, thereby taking into account local variations in union contracts and job descriptions.

Another means of obtaining performance values involves importing them from municipalities who have previously collected and analyzed their work history database. O'Brien *et al.* (4) developed man-hour work performance standards for the \$1.9 million tree maintenance operation in Toledo, Ohio. The study presented man-hour standards for tree removal, tree trimming and stump removal operations. It also examined how these standards interacted with overhead electrical wires, diameter class, season and species. Man-hour standards such as these could be utilized by a city attempting to profile performance. However, maximum benefits will be achieved only if the implementing agency exercises firm control over field data collection and summary reports.

Data Collection

A dependable data collection system is a prerequisite for a successful man-hour performance evaluation program. It is reasonable to assume that performance evaluation will be met with some resistance from field crews. After all, an evaluation can be negative as well as positive. For this reason some form of incentive may be beneficial to encourage accurate documentation of work cards from the field. One such incentive might involve the reduction in paperwork required of a crew.

During the course of a normal workday, crew leaders are responsible for making numerous decisions regarding work procedure, tree health, and safety. Very often paperwork comes in a distant fourth in order of priority. This is particularly true if work cards are complicated, time consuming or ambiguous. As a result, accuracy tends to

suffer.

Figure 1 shows the work card used by the City of Toledo, Division of Parks and Forestry. It contains three major elements; the assignment description, the work code, and the assignment time.

The assignment description is a brief statement of factual information pertaining to the tree in question. Location, species, diameter, maintenance, etc., are all included in this category. In an effort to simplify paperwork, the office generates the assignment description on a four inch LaserJet label. This label provides information about the tree and site. When the crew arrives to do the work the appropriate label is peeled from a list provided by the supervisor and applied to the work card. The information on the label includes a bar coded serial number which assists office personnel with data entry.

Clarification of work done at the job site is critical. Therefore, it is necessary to define all types of work performed by the Division, both tree and non-tree related. This information is provided in a legend at the right edge of each work card. The crewleader references this list and places the appropriate number in the column marked *work code*. This practice insures consistent documentation and reduces speculation done by data entry clerk.

The crewleader provides two additional pieces of information about the job. Specifically, this involves listing the time each job starts and when it ends. Variables such as travel and downtime are tabulated, but are not included as part of the time needed to complete the job.

At the end of each day, work cards are collected by the supervisor and submitted to the data entry clerk for the next phase of work reporting. The data entry clerk is charged with summarizing clock-hours, man-hours, and transferring resulting information to the computer. Only one individual is responsible for this activity, insuring that a consistent and accurate database is maintained.

Work Reporting

Periodic reporting of tree work results is done to acquaint workers, supervisors and municipal leaders of progress within the Division. Summary reports built into inventory software (*Tree Man-*

Daily Work Report

Division of Parks and Forestry

Page 1 of

Date:

Crew Members	Time	
	Reg	O.T.
Crewleader: _____		
Crew: _____		

Equipment	
Trucks:	Saws:

Break Time		
	Start	Finish
A.M.		
Lunch		
Mileage		
P.M.		

CREWLEADER SIGNATURE

SUPERVISOR SIGNATURE

Ass. #	Serial Number Assignment Description	Work Code	Assignment Time		Clock Hours	Crew Hours	Mileage		Travel Time Totals
			Arrive	Depart			Arrive		
	ELMDALE								
1									
2									
3									
4									
Page 1 Total									

* Work Code	Explanation:
1	Street Trim
2	Park Trim
3	Alley Trim
4	Street Removal
5	Park Removal
6	Alley Removal
7	Stump Removal
8	Pick-Ups
9	Hangers
10	Woodlot
11	Storm Dmg. Rep.
12	Storm Dmg. OT
13	Snow Rep.
14	Snow OT
15	Tree Planting
16	Nursery Maintenance
17	Elmdale Time (Cleanup Inventory)
Special Projects	
18	Banners
19	Wood Delivery
20	Brush Removal
21	Painting/Street Light Removal
22	Equipment Downtime (Breakdowns)
23	Downtime
24	Equipment Pickup
25	Meetings
26	Training
27	Benches
28	Newplant Maint.
29	Planting Preparation

Figure 1. Work card used by the Toledo Division of Parks and Forestry.

ager, ACRT, Inc., Urban Forestry Specialist, Kent, Ohio), allow quick and easy access to all work information. Figure 2 displays a typical monthly summary report. These reports provide a wealth of information to those trained in their interpretation. Unfortunately, they have limitations and may not be the best method for communicating values to a wider audience. Graphic representation may be the preferred method for communicating work history data since it affords the viewer increased understanding through visualization of difficult material (5).

The City of Toledo, Division of Parks and Forestry, utilizes Harvard Graphics 2.12 (Software Publishing Corporation, Mountain View, CA) to modify its monthly work report. Figure 3 examines four unique aspects of this graphic presentation;

they include the forestry monthly report, the forestry performance graph, the forestry man-hours chart and the other tree service chart.

The forestry monthly report is a two column listing of work accomplishments for the period. It is designed primarily to provide the viewer with general information on the units completed.

The forestry performance graph addresses how efficient crews are at doing tree work. In this representation total man-hours for street tree removals, trimming and stump grinding are paired against estimated total man-hours (4) for the same group of trees. In this example, forestry crews performed better than expected on tree removals, as expected on trimming, and below expectation on stump grinding.

The issue of productivity is addressed in the

02/17/92 Toledo Tree System Page 1
 Work History Summary Report with Man Hours
 Report Summarized by: Type of Work
 Index: Date of Work>=01/01/92' And Date of Work<=01/31/92'

Summary Value	% of		% of		Work Hists	% of W/H
	Actual	Actual	Estimate	Estimate		
Type of Work = REMOVAL	463.41	56.50	489.69	60.32	125	44.0
STUMP	40.78	4.97	26.98	3.32	12	4.2
TRIM	264.38	32.23	259.42	31.96	131	46.1
TRIM-HL	51.69	6.30	35.68	4.40	16	5.6
Report Totals:	820.26	100.00	811.77	100.00	284	100.0

Figure 2. Summary report of the monthly work statistics.

forestry man-hours chart. This chart attempts to quantify the percentage of time forestry crews spend on actual tree work as opposed to other divisional activities. Man-hour totals include work

**FORESTRY MONTHLY REPORT
 DECEMBER - 1991**

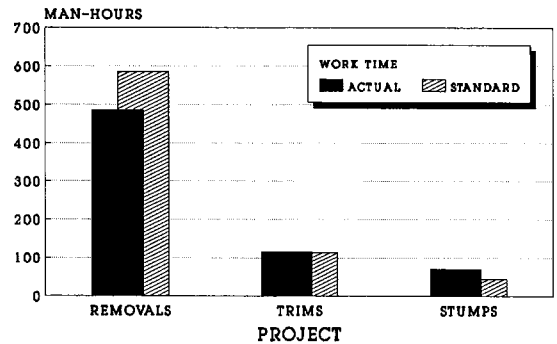
PROJECT	UNIT
TREES REMOVED	109
TREES TRIMMED	37
TREES PLANTED	121
STUMPS REMOVED	31
LIMBS PICKED UP	49
HANGING LIMBS	16

performed on street, park and private trees. Private work is limited to trees that block signs or obstruct the right-of-way.

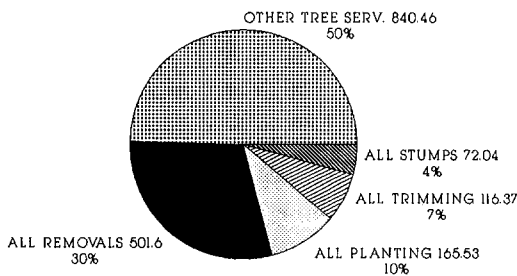
The other tree service chart addresses the balance of divisional time for the month. The chart is made up mostly of categories that do not involve tree work. The subjects presented in this chart have long been a source of concern for management since they very often reflect unproductive time. Future policy or supervisory changes are likely to be aimed at these topics.

Figure 3 presents a summary of work completed by Toledo's forestry operation for an entire month. This report can be modified so that information on individual crews can be presented using the same format. With this report a supervi-

**FORESTRY PERFORMANCE
 DECEMBER - 1991**



**FORESTRY MAN-HOURS
 DECEMBER - 1991**



**OTHER TREE SERV. MAN-HOURS
 DECEMBER - 1991**

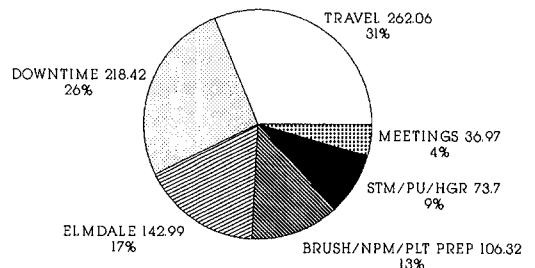


Figure 3. Monthly work report reproduced by Toledo's forestry operation.

sor can meet with a crew and review performance for the month. Changes in work habits will be reflected in these graphs and charts alerting the supervisor to respond swiftly to positive or negative changes in crew productivity.

Forecasting

A discussion of man-hour performance standards would be incomplete without considering their potential use as a forecasting tool. This use begins to fully utilize the powers of the personal computer (5). Figure 4 is a summary report of tree work on a typical inner-city street. The list contains the numbers of trees, their maintenance designation and the estimated man-hours needed to complete the work. Man-hour estimates, similar to these can be generated for a variety of criteria and serve a valuable support role in efforts to secure additional funding. Estimates can also assist the urban forest manager in determining personnel and equipment needs associated with a pruning cycle or scheduled tree maintenance. Finally, man-hour estimates allow the municipal forestry department to bid confidently on tree work associated with construction projects posted by other city divisions.

Conclusion

This paper has identified systems for using computer based tree man-hour maintenance standards. These standards have allowed Toledo's urban forestry unit to answer key operational questions pertaining to crew performance, supervision and departmental policy.

Acknowledgments. The authors wish to express their gratitude for contributions made by the following individuals: Richard E. Abbot, ACRT Inc., Urban Forestry Specialists, Kent, Ohio; Richard Boers, Robert Behan, Michael Ganues, Ron Hanf, and Barbara Beasley, City of Toledo, Division of Parks and Forestry, Toledo, Ohio.

Literature Cited

- Berliner, W.M. 1979. Productivity: improving methods and developing performance standards. *In: Managerial and Supervisory Practices.* R.D. Irvin, Inc., Homewood, IL. 603 pp.
- Keilbaso, J.J., B.S Beachamp, K.F. Larison and C.J. Randall. 1988. Trends in urban forest management. *Baseline Data Reports.* 20(1): 1-18.
- Henning, R.E. 1991. *Work measurement and productivity improvement.* J. Arboric. 17(3): 80-81.
- O'Brien, P.R., K.A. Joehlin, and D.J. O'Brien. 1992. *Performance standards for municipal tree maintenance.* J. Arboric. (in press).
- Wagar, A.J. and T.E. Smiley. 1990. *Computer assisted management on urban trees.* J. Arboric. 16(8): 209-215.

*Forestry Inspector
Division of Parks and Forestry
221 Elmdale Road
Toledo, OH 43607*

Résumé. La performance dans les équipes municipales d'arboriculture est un sujet de préoccupations pour le gestionnaire des arbres du milieu urbain qui recherche l'optimisation des services envers le public. L'informatique peut être un outil d'assistance si, au logiciel d'inventaire des arbres, il est incorporé des normes de productivité au travail. Une banque de données précise de terrain est essentielle pour tirer des conclusions valables. De même, les statistiques de travail se doivent d'être présentées d'une manière aisément compréhensible. Des suggestions touchant l'utilisation de normes municipales connues d'entretien des arbres sont présentées dans cet article et cela met ainsi en relief les champs de données, la présentation et les prévisions de charges de travail.

Zusammenfassung. Die Arbeitsdurchführungen der kommunalen Baumpflegemannschaften sind für die städtischen Baumverwaltungen interessant, weil sie die Leistungen für die Öffentlichkeit optimieren wollen. Computer können behilflich sein, wenn die Normen der Arbeitsleistung aufgenommen werden in EDV-Kataster. Das Sammeln getreuer Felddaten ist entscheidend, wenn gültig Schlußfolgerungen gezogen werden sollen. Die Arbeitsstatistiken müssen in leicht verständlicher Weise dargelegt werden. Vorschläge, die den Gebrauch veröffentlichter kommunaler Baumflegennormen begreifen, werden in diesem Bericht diskutiert und es beleuchtet Gebiete der Datensammlung, Darstellung und Arbeitslastprognosen.

02/18/92 Toledo Tree System Page 1

Abbreviated Tree or Site Summary Report with Man Hours
Report Summarized by: Maintenance
Index: Management Area=>'3B' And Management Area<='3B' And Street='VANCE' And Street<='VANCE'

Summary Value	Est Hrs	Trees	% of Trees
Maintenance = 0		74	25.5
1	21.81	6	2.1
2	45.35	6	2.1
3	78.10	20	6.9
4	163.88	61	21.0
5	90.26	44	15.2
6		72	24.8
7	6.78	7	2.4
Report Totals:	406.18	290	100.0

Fig. 4. Summary report of tree maintenance on a typical urban street including man-hours estimates.