

# Roadside Maintenance Practices on Interstate and Freeway Systems

BURTON C. PARKER, Maintenance Engineer  
Massachusetts Department of Public Works

Roadside maintenance practices within the Massachusetts Department of Public Works have progressed so much since World War II and the advent of limited-access highways, or freeway systems, and most recently the Interstate system, that similarity is hardly discernible. Former maintenance practices were primarily concerned with the work involved in restoring conditions after a problem developed, whereas present maintenance practices are primarily concerned with preventing problems from developing. As an example, before instituting the present policy for tree removal and tree trimming, the tree crews were always called out during or immediately following ice storms; heavy, wet, clinging snow storms; and high wind storms to remove trees and branches that had fallen and were impeding traffic or had disrupted power and telephone service. The present preventive policy requiring the removal of all dead, diseased, and dangerous trees in an annual program, and by removing all dead, diseased, and broken branches in an annual tree trimming program, has resulted in practically no work for tree crews during or following storm periods. There have been no reports of power or telephone failure from this source during the past four years.

Physical maintenance is defined as "The preservation and upkeep of a highway, including all of its elements, in, as nearly as practicable, its original as-constructed condition, or its subsequently improved condition." This definition establishes the as-built standard as the basic maintenance standard. Because as-built quality begins to decline from the time a completed project goes into operation, a careful study must be made to determine how much should be expended to maintain the as-built quality.

Although public demand certainly influences maintenance standards, the traveling public is actually patient. Maintenance standards should be greater than the demands of the motorist. If they are not, many difficulties are sure to be encountered.

There are four operating sections within the Maintenance Division of the Massachusetts Department of Public Works: Snow and Ice Control; Roadways, which includes road surfaces and shoulders; Structures; and Roadsides, which includes the area from the shoulders to the layout line as well as median strips. Each of these sections is directed by qualified and experienced specialists.

In Massachusetts, the as-built standard for roadside physical maintenance is interpreted to mean that grass, trees, shrubs, and other desirable growth are to be maintained as established during construction.

It is certainly not desired that the roadsides appear as though the areas have been abandoned. Nothing is more disheartening than to see abandoned property, especially abandoned farmland. Neglect of roadside areas should never be tolerated. The general business economy in Massachusetts is dependent to a large extent on tourists. A good highway system, properly maintained, with attractive roadsides free from neglect strengthens this business more than any other single factor.

Grass cannot be properly maintained unless weeds and other undesirable volunteer growth are eliminated, the areas fertilized as needed, and the grass cut in accordance with definite standards ranging from a maximum of eleven times per year to a minimum of at least once a year. Mowing at least once a year prevents tufting and encourages lateral root growth necessary for the prevention of erosion. This policy in Massachusetts applies to all areas visible to the traveling public and developed abutting property as well as other areas where erosion may occur.

As-built standards for maintaining areas with trees, shrubs, and other desirable growth are comparatively inexpensive once the growth is stabilized. Growth other than grass can be successfully established when mulches are used to hold moisture necessary for the survival of the plantings as well as to prevent erosion during this period.

Physical maintenance of areas that were undisturbed by construction within the layout, consists of helping nature to accent its desirable features, primarily through selective thinning in wooded areas to display specimen trees, specimen groves, and other valuable natural growth. Selective thinning on a seven-mile section of one limited-access highway has revealed over 10,000 native mountain laurel plants formerly hidden from view.

Although every effort is made to prevent erosion, it does occur when water becomes concentrated. Maintenance on these areas usually consists of diverting the water through subdrains or ditches and repairing the eroded area by use of woody mulches and ground cover plantings. Such conditions have been sharply reduced since the expanded use of woody mulches was adopted in the construction stage. This policy developed since the passage of Public Law 85-767 by Congress on August 27, 1958, where the following statements are included in Paragraph 109—Standards:

(a) The Secretary shall not approve plans and specifications for proposed projects on any Federal-aid system if they fail to provide for a facility (1) that will adequately meet the existing and probable future traffic needs and conditions in a manner conducive to safety, durability, and economy of maintenance; . . .

(c) Projects on the Federal-aid secondary system in which Federal funds participate shall be constructed according to specifications that will provide all-weather service and permit maintenance at a reasonable cost.

"Economy of maintenance" and "permit maintenance at a reasonable cost" or any other mention of maintenance do not appear to have been stated in previous Federal highway legislation. This was probably included because over-all maintenance of the entire right-of-way is now recognized as a necessary function in the highway program. The present law surely points out that there was dissatisfaction with previous roadside concepts and that maintenance could not be performed at a reasonable cost. The present law appears as a mandate to all personnel engaged in roadside development to formulate new and possibly radical changes in roadside design procedures that will provide economy of maintenance. Massachusetts has been a pioneer in this field, and as is always true with pioneers, there has been nonconstructive opposition from those who would stick to old procedures. There is no question that the new methods permit roadside maintenance at a much more reasonable cost.

Design criteria that provide flatter curves and grades have greatly increased the depths of both cuts and fills, thus requiring new methods of preventing slope erosion. This makes many former roadside maintenance practices obsolete.

The maintenance of rest areas and truck turnouts, as well as the collection and disposal of travel trash, are considered to be a traffic service.

Inasmuch as present policy regarding the construction of rest areas and truck turnouts only includes providing safe areas for cars to park well off the traveled way with picnic tables and travel trash barrels, the cost of maintaining this traffic service is at a minimum. Water, illumination, or toilet facilities are not provided, nor are the building of fires. These have not been included to date because it has not been possible to justify the added traffic service costs. Furthermore, in Massachusetts, these facilities are provided at State Parks and at privately-owned business establishments which appear to be adequate for the needs of the traveling public.

Since the policy of constructing these rest areas was established, which includes the placing of trash barrels, promiscuous scattering of travel trash along highways has been greatly reduced. These barrels are also used by many motorists to dispose of household garbage and rubbish, particularly in the summer resort areas, where the barrels apparently are more convenient than established town dumps. This means that many more truckloads of trash must be disposed of. Though this practice is not approved the work is accomplished at less cost because it is extremely costly to collect travel trash scattered along the highway.

As funds permit, betterment work is programed in conjunction with roadside maintenance. This consists of plantings to improve aesthetics and to take large areas out of grass mowing. Projects also include opening scenic vistas and constructing additional rest areas as need is shown. Roadside betterment work has been limited in the last several years due to the lack of funds.

Contract procedures applying to roadside activities have been developed for several reasons, including the fact that the Interstate and freeway systems have added many acres of area with no appropriate increase in our budget. This lack of funds has definitely been a factor in initiating many types of maintenance contract work. The ever-present desire to promote savings is another reason why many of the present contract procedures have been adopted.

It is felt that the permanent labor organization should be kept at the minimum required for year-round daily operations; equipment should not be owned unless it is used at least 80 percent of the year, with the exception of specialized equipment that cannot easily be rented. It is possible to supplement the permanent labor organization with emergency laborers and rented equipment when the need arises. However, it is evidently more efficient to supplement the permanent labor organization with the contract method of performing certain maintenance work.

The experience of the Department indicates that each time bids have been sought for a type of maintenance work not previously done by contract, problems arose because contractors were not completely familiar with the work. However, these problems were resolved with an increase in the number of contractors and a greater display of interest. As contractors become experienced, results are more satisfactory, and broader competition in bidding decreases the cost.

Annual contract activities carried on under the Roadside Development Section of the Maintenance Division consist of tree removal, tree trimming, tree planting, DDT mist blower and aerial spraying for Dutch elm disease control, hydraulic soil sterilant, and custom spraying, roadside spraying and fertilization and grass mowing.

Standard special provisions developed for the various types of contract work have proven entirely satisfactory for several years.

The development of these maintenance contract procedures has been a tremendous task, but a most satisfying one. The roadsides of the State highway system are now being maintained according to modern standards and at less cost than was previously possible.

Cost analysis must be based on an acceptable unit. In the past, as far as the public and the legislative body who consider budgets are concerned, the reference has been to lineal miles. This has developed because of the common use of two readily available figures; namely, total miles and total costs. From an engineering point of view, this is not a satisfactory basis for comparison of costs as it makes no distinction between a narrow layout on a two-lane highway and a very wide layout on an eight-lane highway, and makes no allowance for areas and mileages at interchanges. The unit that the Department has recently adopted, and could probably be universally accepted, is lane-miles. The lane-mile lengths not only include the lineal miles converted to lane-miles but also the lane-miles of ramps, service roads, etc.

It has been argued that roadside costs may not be proper if applied to lane-miles as there are only two sides to a road whether it has two or eight lanes. However, in Massachusetts, the width from the edge of the road surface to the layout line is, in general, much greater on an eight-lane highway than on a two-lane highway which still makes the lane-mile an acceptable unit for comparative purposes. Median strips usually found on multi-lane highways are classified as roadsides, further justifying the lane-mile unit.

An analysis of past expenditures converted to the lane-mile unit indicates the following approximate lane-mile costs for contract work:

Tree removal	\$ 15.00
Tree trimming	10.00
Mowing (inhibition)	85.00
DDT spray	10.00
Roadside spray and fertilization	6.00
Custom and sterilant spray	5.00
Total	<u>\$131.00</u>

In addition to these, general roadside operations, which are performed by Department forces, include the repairing of cuts, fills, slopes, washouts, and the removal of minor slides; removal of debris; replacing of ground cover plants and woody mulch; repair and maintenance of right-of-way fences and similar facilities; and certain tree removal, tree trimming, and spraying not foreseen for contract work. These force account operations total about \$135 per lane-mile. More than one-fourth of the budget for physical maintenance is needed for roadside work. The total of all roadside activities under physical maintenance amounts to about \$266 per lane-mile or an annual expenditure of almost two million dollars.

Maintenance operations are no longer routine. Maintenance engineering is a specialty within the highway field that is now receiving proper recognition.