Abridgment

Operation and Maintenance of Safety Rest Areas

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People in America are highly mobile. A partial network of safety rest areas has been completed on the Interstate highway system so drivers can stop for a short period and return to the road as safer drivers. Operation and maintenance costs vary from $16 000 to $60 000/site/year. This is a significant cost in maintenance budgets; therefore they should be operated as efficiently as possible. Supervision, staffing, training, methods, and materials used are key elements that influence cost-effectiveness. Proper attention to these elements will produce well-maintained safety rest areas that provide a valuable service to the motoring public at the least possible cost.

People in America are highly mobile. A partial network of safety rest areas (SRAs) has been built on the Interstate highway system to provide facilities where the traveling public can pull off the road safely and enjoy a time of rest and relaxation. This results in safer drivers.

The costs for operation and maintenance of SRAs are a significant portion of the budgets for most state highway agencies. It is imperative, therefore, that engineers and managers be well informed of the key elements that affect service to the public and the cost-effectiveness of the operation.

The cost of maintaining SRAs varies from $16 000 to $60 000/year/site, depending on size, location, facilities provided, and level of service. Three broad categories of SRA operation and maintenance costs are grounds maintenance, building maintenance, and utilities. Proper attention to these three can minimize the dollars spent and maximize the service to the public.

Efficient and cost-effective operation and maintenance of SRAs are influenced by four key elements. They are the following:

1. Supervision,
2. Staffing,
3. Training, and
4. Methods and materials used.

In many states, SRAs are added as another responsibility of a highway maintenance crew supervisor. Good results occur when the supervisor takes pride in the SRA. If the supervisor resents the inclusion of an SRA as a responsibility, the operation and maintenance suffer. Supervision that is receptive to rest areas is essential for their proper operation and maintenance.

In many instances rest areas are staffed by highway maintenance workers whose talents and expertise are in the area of roadway maintenance work. When placed in a rest area they are ill-equipped to perform without proper training, which can result in inefficiency as well as necessitate expensive repairs. Ideally, the individual should have previous experience in landscaping and building maintenance (including minor repair work) and in dealing with the public.

Labor is the major cost of rest area operation. Most SRAs are open to the public year-round. Michigan, however, closes every other rest area on some routes during winter months. Some states staff the rest areas on a 24-h basis while others only staff for 8 h/day, usually during daylight hours. The New York State Department of Transportation closes restrooms in some SRAs between 11:00 p.m. and 6:00 a.m. Signs are posted with this information.

Maintenance of SRAs is performed by state personnel or by contract. South Dakota contracts maintenance of some SRAs. Illinois and Minnesota contract maintenance of some SRAs to federally funded senior citizen organizations. Each state's policy on the level of service to the motoring public directly affects the staffing level and, consequently, the total cost of the operation.

Proper training and supervision are essential in order to achieve cost-effective operation and maintenance. When a new person starts work at an SRA, he or she should be given an intensive training course that involves classroom instruction, on-the-job training, and hands-on experience. Periodic refresher training should also be provided for all rest area personnel in order to keep them abreast of new methods, materials, and techniques. Many states have rest area maintenance manuals or handbooks to cover some of the specific details of daily maintenance. California and Missouri have extensive training courses that include training in landscape maintenance.

Methods of performing the work and the materials used have a tremendous impact on the total cost of rest area operation and maintenance. Sharing information between rest area personnel and between states can provide better methods of accomplishing the work activities that are common within SRAs.

The materials portion of the operation and maintenance of SRAs is approximately 25 percent of the cost. Without proper control and supervision, this cost can increase by as much as 300 percent. Some salesmen convince the rest area manager that their product will perform better than the product currently being used. As a consequence, large quantities are sometimes purchased without product evaluation and cost analysis. Investigation sometimes reveals that the product costs three to four times as much as a similar product with a different name that has the same ingredients and performs just as well. As an example, a recent requisition came in for "brand Y" product. Investigation revealed that the cleaning product cost $3.67/quart. "Brand X" contained the same ingredients, performed the cleaning just as well, and only cost $1.06/quart. In other words, brand Y was 3.46 times as much as brand X.

The best method of keeping materials costs under control is to evaluate materials and products for performance. Those that perform well should then be put on an approved products list as being equally effective for a particular application. When materials or products are needed, bids should be called for from companies that have products on the list. The materials or products supplied by the low bidder can then be stocked for use.

Security and safety of rest area personnel, the motoring public, and the facilities within the SRA are directly affected by vandalism. Vandalism is not a major cost of rest area operation and maintenance. In 1979 and 1980, both Michigan and Illinois experienced an average cost of $500/site due to vandalism. In Pennsylvania the average cost of vandalism is $300/site/year. In Michigan, a single incidence of vandalism in one rest area cost $2600 to repair. In Arizona, costs of vandalism were recorded for a three-year period. The average yearly cost per site was $225. Some vandalism repairs are probably reported as normal maintenance.

Operation and maintenance of SRAs is big busi-

ness, and maintenance dollars are in short supply. To conserve maintenance dollars it is imperative that operation and maintenance of SRAs be accomplished in the most efficient way possible. Provision for good supervision, adequate (but not excessive) levels of staffing, proper personnel training, use of the best methods possible (including innovative alternatives), and proper control and use of materials will produce well-maintained SRAs that will provide satisfactory service to the motoring public at the lowest dollar value. Another result will be safer drivers.

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Fertilization and Legume Establishment on Highway Slopes

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A fertilizer study illustrated the feasibility of discontinuing the use of loam in the construction of highway slopes in Maine. Protective grass sods can be established and maintained on subsoils devoid of organic matter through hydroseeding and subsequent top dressed fertilization. Spring and early summer seedings should be top-dressed in early fall, while late summer or early fall seedings may not require topdressing until the following spring. Research was also conducted to develop a practical way of establishing crown vetch on steep roadside slopes already in grass sod. Application of the transplanting method was limited to relatively small areas where the erosion hazard was great enough to justify the labor costs of hand planting. The crown vetch transplantings were successful at all highway sites studied and had vegetative spreading in excess of 122 cm within two years. A related study showed that, on slopes where equipment can be used, good establishment of both crown vetch and bird's-foot trefoil can be obtained by scarifying the surface of a grass sod prior to overseeding. The overseeding of bird's-foot trefoil (Empire) on relatively steep grassed slopes by using a herbicide (paraquat) was also studied. The herbicide reduced the competition from the initial ground cover and was advantageous in trefoil establishment.

Establishment and maintenance of the vegetative cover along highways is an expensive proposition. However, this must be done to prevent erosion and rutting of the roadsides. This is especially important along the steep backslopes of many highways in Maine. Also, the most practical and economical means available must be used. Answers are needed to such questions as

1. Do we need topsoil?
2. How much nitrogen do we need and how often?
3. How can legumes be introduced into a grass sod?

This study dealt with questions such as these, and enough data were collected to obtain some of the answers.

One objective of the study was to determine the fertilization requirements of grass sods on highway slopes constructed of subsoil materials without added topsoil loam. This was conducted on grass-covered embankments of the Back Cove Project of Interstate 295 in Portland, Maine.

A second objective was to determine the potential value of crown vetch and bird's-foot trefoil (Empire) as an indirect source of nitrogen for a legume and grass cover. These species were overseeded in 1972 on scarified grass-sod embankments in Old Town, Orland, and Portland.

A third objective of this study was to determine the transplanting and overseeding methods for legume establishment. One phase of the study concentrated on an evaluation of the effectiveness of the transplant method of establishing crown vetch in grassed highway slopes. This study was conducted over the period June 1973 to September 1975. Two principal sites were studied, one on US-1 at Orland and the other on ME-16 at Old Town. A supplementary study was carried out on an eroded highway off ME-201 in Caratunk and on embankments of I-295 in Portland. Another phase concentrated on overseeding bird's-foot trefoil (Empire) in grassed slopes by using a herbicide to reduce the grass competition and was conducted over the period October 1975 through November 1978. Studies were made at four principal sites in the towns of Orland, Old Town, Lincoln, and Dedham.

EXPERIMENTAL PROCEDURES

Fertilization of Grass Sod

The grass sod was seeded initially in August 1971 at the Back Cove site by the contractor, Leon E. Gordon, Inc. Standard hydroseeding practices were employed, including the equivalent of 1121-kg limestone/hm^2 and 1345-kg 10-10-10 fertilizer/hm^2. The typical roadside mixture of tall fescue, red fescue, K. bluegrass, redtop, and white clover was sown directly onto the unloamed embankments. The seeding was mulched with chopped hay at approximately 2242 kg/hm^2 and sprayed with emulsified asphalt.

A representative section of these grassed embankments was selected for fertilization studies in April 1972. Soil samples from this area were tested to determine their fertility level. Average values of pH were 6.8; medium phosphorus (P) and low potassium (K) were obtained.

Two experiments that used top-dressed fertilizers were established on April 26, each in a randomized complete-block design with four replications. One study involved a comparison of ammonium nitrate (AN) versus sulfur-coated urea (SCU) applied at several rates of nitrogen (N). The other study compared several rates of P and K. The N study received 672-kg 5-20-20/hm^2 to ensure unlimited phosphorus and potassium. The P-K study received two applications of 336-kg 33-0-0/hm^2 annually to ensure unlimited nitrogen. The experimental treatments are indicated in Tables 1 and 2.

Note that these studies were conducted with pure grass sods comprised mainly of red fescue and tall fescue. To avoid any significant contribution of fixed nitrogen, white clover and volunteer legumes