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TURF BULLETIN

MASSACHUSETTS TURF AND LAWN GRASS COUNCIL
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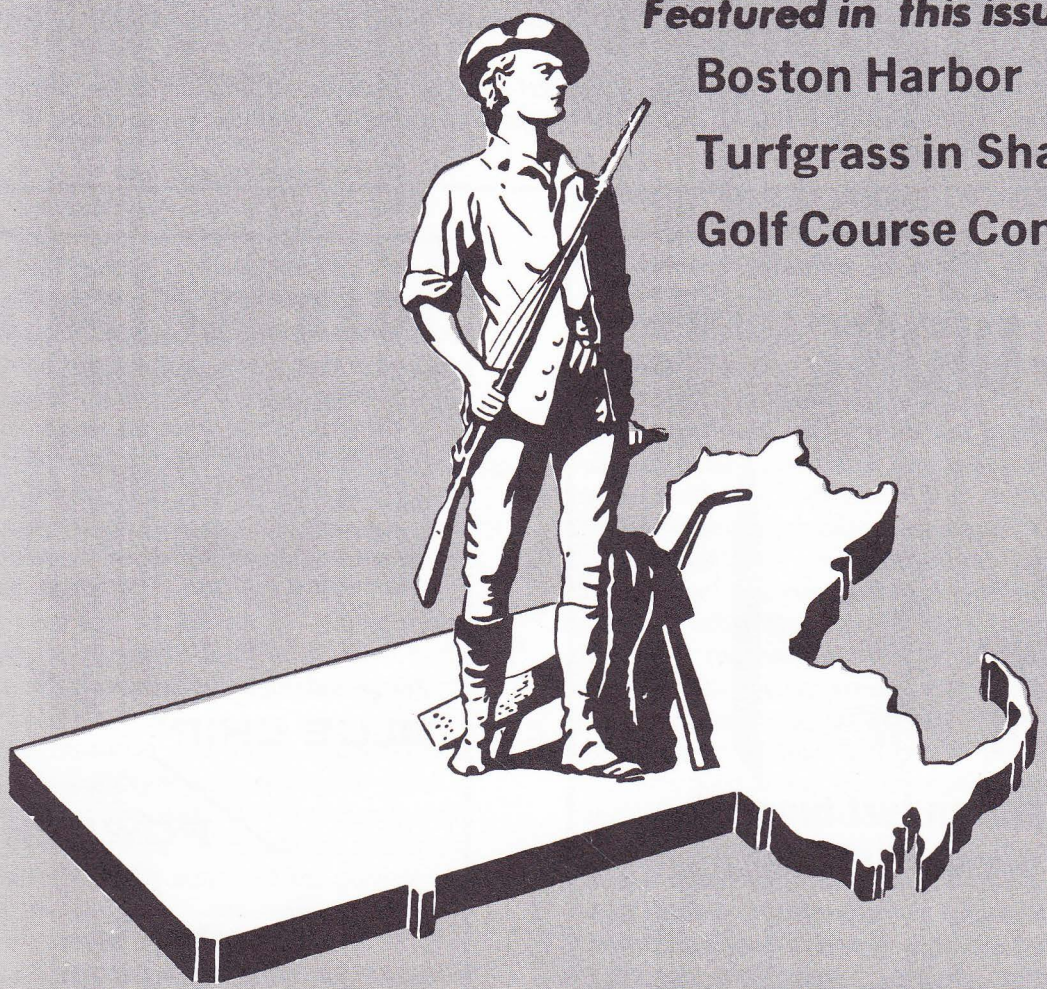
Boston Harbor

Turfgrass in Shade

Golf Course Construction



FALL 1978

BETTER TURF THROUGH RESEARCH AND EDUCATION

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Guidelines for Planning and Building a Golf Course

By Harry C. Eckhoff
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Development of a successful golf venture requires careful and extensive planning. Land values, costs of construction and maintenance, and the time interval from initiating construction to course completion (usually 12 months or more) are factors that affect the success of any golf project. One should not only have a properly designed layout with acceptable construction specifications, but also a feasible plan for financing and operation. Before taking definite action the feasibility of the entire project should be investigated for the area concerned.

The character of the community — its size, location, climate, population, economic base, growth potential and recreational assets — is all important in establishing the feasibility of a new golf course. If you are planning a public golf operation, the market for potential users can be largely determined by obtaining current information on the following items:

- The total population in the immediate area and the population within a 5, 10 and 20-mile radius of the proposed course if the course is to be in an urban community.
- Number of other available privately owned daily fee and municipal golf courses in the immediate area and within a 5, 10 and 20-mile radius. An acceptable yardstick for public courses is one 18-hole operation for every 25,000 persons in anticipated market area. For a planned golf facility in a large metropolitan area, a more practical ratio would be one 18-hole course for every 50,000 persons.
- What has been the pattern of population growth for the area? Is it increasing at least at an average rate? Your state's Department of Conservation and Economic Development may be of assistance for this phase of the study.
- Have there been any failures in golf course operations in the area in recent years? If so, why? What is the playable condition of courses that might be considered competitive?
- What are the economic and ethnic characteristics of the area? The principal types of employment? What is the per capita income in the area? Is it increasing along with regional or national trends? What are the unemployment characteristics? Note the length of the playing season; it will affect annual income and maintenance costs materially.

If the results of your market research are favorable, you are now ready to proceed with the next step.

Site Selection

Among the factors that require careful consideration in site selection are size and shape of the property — 50 to

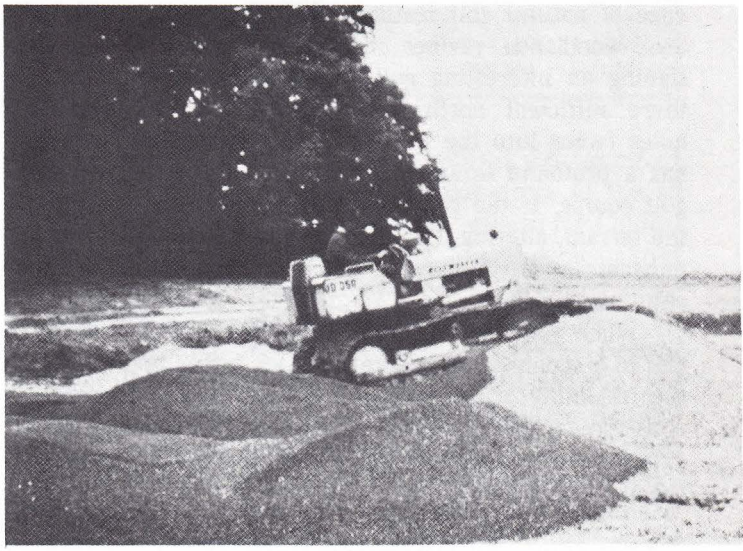

Photo courtesy of Moore Golf, Inc.

AFTER site selection, a qualified golf course architect and builder should be retained. Photo shows Del Castle County Golf Course, Delaware, being built.

80 acres for a 9-hole course, regulation length; 110 to 160 acres for 18 holes. Irregularly shaped plots often afford opportunities for more interesting course design. Gently rolling areas with some trees are preferable. It may be wise to acquire more land than is actually needed for the course since land adjacent to golf courses frequently has increased value for development purposes.

Accessibility is important. Unless absolutely unavoidable, public golf courses should not be off the beaten track. All other things being equal, design the course so that one or two holes parallel the highway — it is good advertising. Soil factors are extremely important; the ideal golf course soil is a sandy loam. The better the stand of turf raised on fairways and greens, the more satisfactorily and more popular will be the course. Be sure to take into consideration the character of soil when choosing the site. Soil analysis may be made for you at low cost by state agricultural departments or county agricultural agents. Helpful information can be obtained from state agricultural experiment stations and county agents on proper turf development, proper grass seeding, growing and maintenance.

Electric power, ample and economical water supply and proper drainage conditions are essential. The amount

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of clearing necessary will affect construction costs; likewise a stone removal program can be expensive. A golf course should, if possible, have patches of woodlands since trees offer one of the best natural hazards if properly located. It may be costly, however, to remove large growing trees from those portions of the site which will be fairways in the final plan.

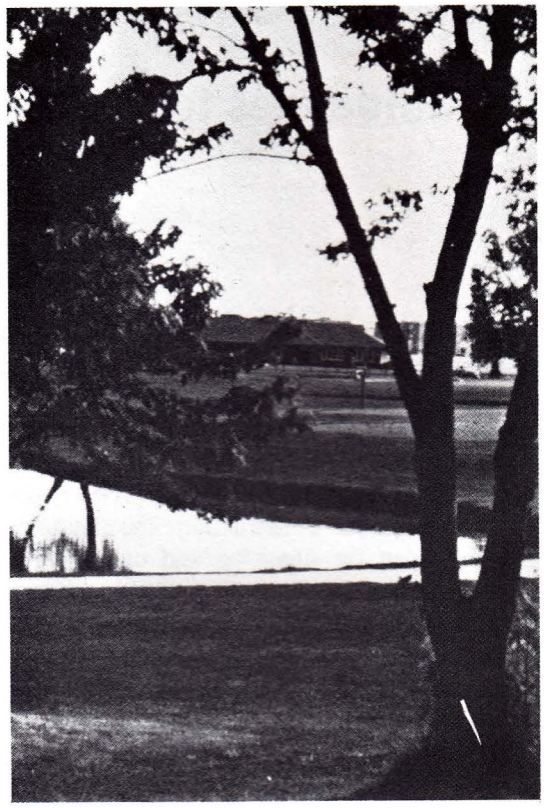
Another consideration in site selection is the presence of natural golf features. Rolling terrain, creek valleys, woodlands, ravines and ponds make the job of designing an interesting golf course much easier. Also, is there sufficient north and south yardage to eliminate holes facing into the sun? The character of the property has a profound influence on the quality of the resulting golf course. If the golf course architect fits his design to the terrain, altering it as little as possible and avoiding all unnecessary earth moving, economy will usually be the result.

When you feel you have a suitable site, it is wise to call in a capable golf course architect for an opinion as to the feasibility of the proposed location and the estimated construction costs. Likewise, it is very important that an experienced golf course builder be selected to construct the planned course.

Development costs

Golf course construction costs have more than doubled in the past decade. Ten years ago a lot of fine golf courses were built for $10,000 to $12,000 per hole. In today's market it could well be more than $30,000 per hole. Golf facility development costs can vary greatly, based on the cost of land, the natural assets and liabilities of the site selected, the labor and equipment costs and the design.

Costs will also vary depending on the size and quality of greens and tees, length of the course and the type of irrigation system used. The irrigation system is usually the largest single item and can range from $50,000 to $300,000 or more depending on a manual or automated system, or if the complete course or only greens and tees are irrigated. It is not unusual for irrigation systems to cost an amount equal to one-third or more of the total golf course construction budget.



GLEN Ellyn, Illinois golf course provides storm water retention basins. The stored runoff irrigates the links.

Due to individual differences in each golf project, it is not possible to cite a standard construction budget. A qualified golf course architect or a competent golf course builder familiar with the local soil, weather conditions and labor market is the best person to contact for a reliable estimate of construction costs. Table 1 is only a guide to assure planners that certain key items have not been forgotten. The estimates do not include cost of land acquisition or the clubhouse/pro shop and its furnishings. Nor do they include the architect's fees which often are based on a percentage of construction guidelines.

Golf course developers must be aware of annual course maintenance costs which have more than doubled in the past decade. Such costs may range from $80,000 to $160,000 or more a year for an 18-hole regulation length course. According to National Golf Foundation surveys, maintenance costs at 18-hole, for-profit, daily fee courses on the East coast averaged around $90,000; for the Pacific Southwest region it was $118,000. National authorities on golf course maintenance are quoting costs ranging from $6,500 to $10,000 per hole per year.

Also, it is not uncommon for a new course to operate in the red from one to three years following its opening. Adequate financing for course construction and initial maintenance costs is of utmost importance.

About 12 percent of the nation's 11,745 golf facilities are short courses — executive and par-3's. The executive course is gaining in popularity. In 1977, ten percent of the 202 new course openings were short courses. Executive openings totalled 20 while par-3's were eight. Of the 13 short courses known to have gone under construction during 1976, six are executives; seven are par-3's.

What is an executive course? It is a shorter or compact version of the par 72 regulation length course and consists chiefly of par threes and par fours. A par five hole is sometimes added for interest and variety. Pars for an 18-hole course may range from 55 to 67. Lengths vary from 3,500 to 5,000 yards with 4,600 yards being typical. An excellent 18-hole executive course can be built on from 70 to 90 acres or about half that required for an 18-hole par 72 facility. Lower development and maintenance costs naturally follow.

Financing the Project

Many financial resources are available to municipalities. In addition to the commonly used methods of financing such as sale of general obligation or revenue bonds, private development with lease-back, etc., there are several federal aid programs.

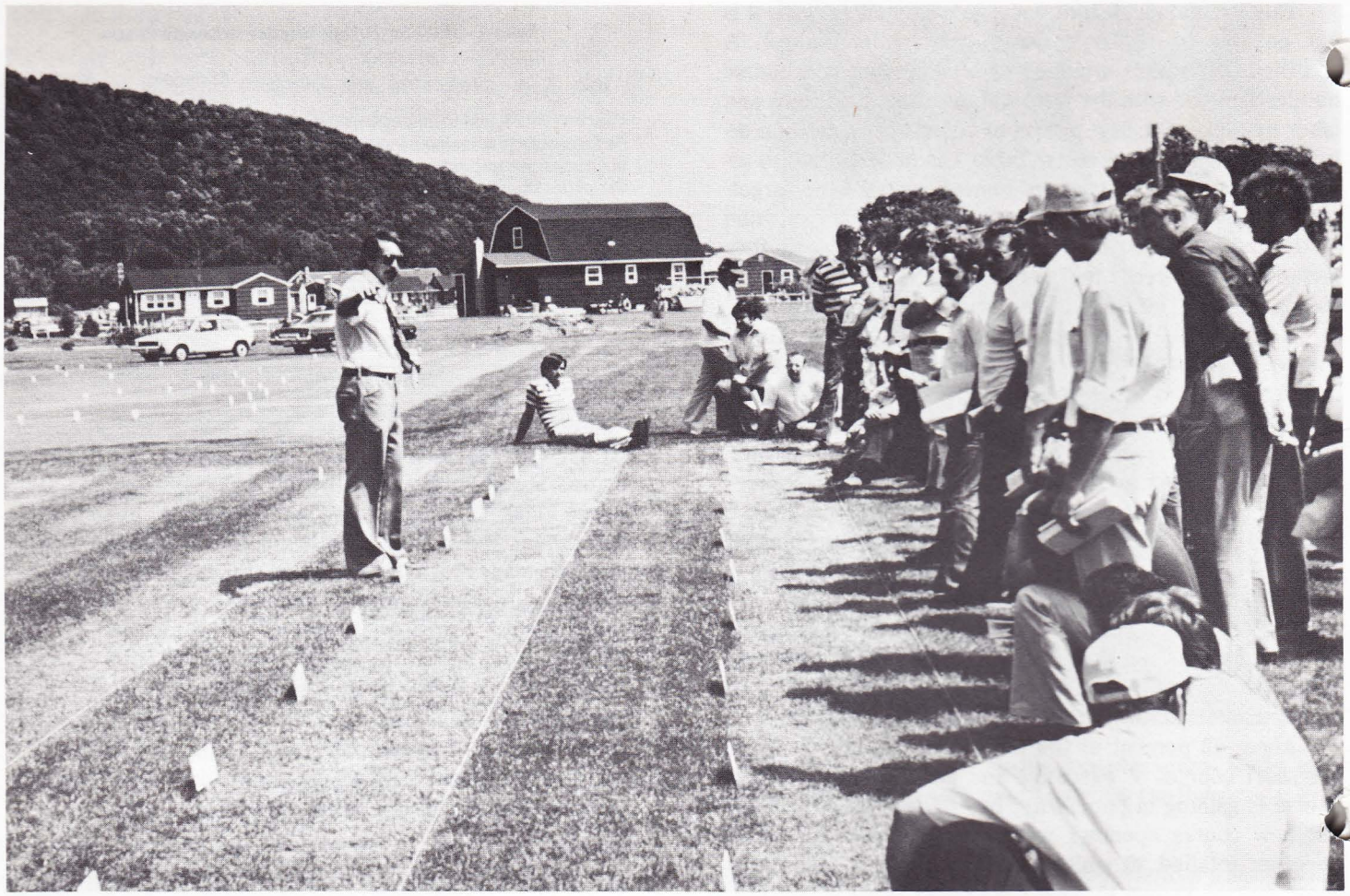
The most popular federal aid program is the Heritage Conservation and Recreation Services (HCRS) Department of Interior 50 percent matching grant plan. In late January 1978, the HCRS replaced the Bureau of Outdoor Recreation (BOR). The former BOR program, authorized in 1965 and now implemented by HRCS, provides matching grants to states and through states to their political subdivisions for the acquisition and development of public outdoor recreation areas and facilities in accord with statewide comprehensive outdoor recreation plans.

Table 1 — Cost for 18-Hole Regulation Length Course

	Minimum	Maximum
Course construction including irrigation	$375,000	$ 650,000
Post-construction maintenance	25,000	110,000
Maintenance equipment	60,000	100,000
Car paths, shelters, bridges	30,000	70,000
Service road	10,000	30,000
Entrance road and parking	3,500	35,000
Sub totals	$548,500	$1,070,000
Plus 10 percent contingency	54,850	107,000
Totals	$603,350	$1,177,000

For fiscal year 1978, over $306 million was approved nationwide for this program. Apportionments to the 50 states ranged from approximately $21 million for California to about $2 million for Wyoming. Many municipalities throughout the nation have developed or acquired existing golf courses with the aid of BOR matching grants.

Other possible federal assistance programs include the Surplus Property Program, administered by the HCRS; the Federal Revenue Sharing Program administered by the Office of Revenue Sharing, U.S. Treasury Department, and implemented by municipalities concerned; and the Department of Housing and Urban Development Community Development Funds which are administered by the 10 area offices of HUD.



Graduate Research Assistant Christopher Brooks outlines project on winter hardness of Perennial Ryegrass to group at recent Field Day.

Turfgrass Field Day

A beautiful summer's day provided an appropriate finishing touch for the University of Massachusetts Turfgrass Field Day which was held on July 26, 1978 at the South Deerfield Research Station at South Deerfield, Massachusetts.

Dr. Joseph Troll and Dr. Kirk Hurto organized the field day, assisted by Turfgrass Research Technician Patrick Kristy, which was attended by approximately 200 turfgrass managers who travelled from as far away as Canada and Maryland.

The Field Tour included discussions on topics such as salt tolerance of roadside turf, low management turfgrass trials, turfgrass variety trials, preemergence crabgrass control trials, Dollar Spot fungicide evaluations, and the effects of nitrogen: potassium ratios and rates on winter injury of perennial ryegrass.

The tour of the Research Station was followed by lunch at the top of Mt. Sugarloaf and a discussion of current turfgrass problems headed by Stan Zontek, Director of the Northeast Region of the U.S.G.A. Green Section. A splendid time was had by all.

Stockbridge Professional Development Day

The Stockbridge School of Agriculture at the University of Massachusetts, Amherst, held its first annual Professional Development Day (PDD) February 21, 1978. The day-long event headed by Freshman Class President, Peter Quinlan, was the first day of its' kind to be held at the University in several years. The objective of the PDD is to acquaint students of Stockbridge with professional men and women in their particular field of study and also to let the people out in the field talk to possible future employees. There were displays representing every major (Agriculture and Food Economics; Animal Science; Arbor and Park Management; Fruit and Vegetable; Floriculture; Food Distribution; Laboratory Animal Technology; Land Operation; Turf Management) and seminars covering related topics. The day culminated with Massachusetts Assistant Commissioner of Agriculture John Barrus giving a very interesting talk on the Future of Agriculture in the Pioneer Valley, which drew a good crowd and was well accepted by all who attended.

For the next upcoming PDD, to be held October 24, 1978, a large portion of the exhibits will be moved to the outdoors to enable larger and more effective displays to be set up and also to allow for the demonstration of various machinery. Once again, the day will feature a well-known guest speaker complimented by an interesting group of knowledgeable lecturers. We invite you to participate in this Second Annual PDD. We're looking forward to a good day and to seeing you all in the Fall.

* * * * *

Getting Insects Identified

(or where to tell your customers to go)

In Western Mass —

Insects can be taken either to the local Extension Office or to:

Ralph Mankowsky, Dept. of Entomology
Fernald Hall
University of Massachusetts
Amherst, MA 01003
(located near the main office)
413-545-2284

In Eastern Mass —

As above, go either to the local county Extension Office or:

Bill Garland
Surburban Experiment Station
240 Beaver Street
Waltham, MA 02154
617-891-0650

Plant Growth Regulators

A rapidly expanded area in the chemical tool kit of agriculture is that of plant growth regulators. These are chemicals — some found naturally in plants, some not — that are used to "shove plants around." There are growth regulators to make fruit drop, to prevent it from dropping, to make it turn color, to make plants grow taller, to make plants stay short, to flower, to not flower and so on.

An interesting new chemical is a naturally occurring alcohol called triacontanol. It has been known since 1933, but just recently (1976) has been found to increase yield on a variety of crops 7-22%, for such crops as sweet corn, tomatoes and cucumbers. Work is underway at Michigan State on the chemical.

* * * * *

New Products: A Low Volume Herbicide Applicator For Landscape Use

A new gadget for applying herbicides may be useful to landscapers. It's called the Herbi Sprayer and is manufactured in England by Micron Sprayer, Ltd.

This machine generates very uniform drops (about 250 microns in diameter) and uses very little spray (the 5 pint bottle covers about 3/4 acre at walking speed). Held 8" off the ground, it makes a 4' swath. The whole rig weighs 7 lbs. and runs on 8 "D" sized batteries.

Flowable and EC herbicides are better suited to this machine than wettable powders.

The product is distributed in the U.S. thru Micron West Inc., 8705 Katy Freeway, Suite 400, Houston, Texas, 77024.

* * * * *

No-Till Crop Production

The plow is a very destructive machine. It tears up the soil, exposing it to erosion by wind and water and the heavy tractors used to pull the plows crush the air spaces out of the soil causing compaction. One of the new areas in changing agriculture is to replace the plow with direct seeding into soil or fallow crop residues from the previous season. For this approach to work, weeds must be controlled chemically instead of mechanically (as happens in plowing).

This represents a situation where *increased* used of pesticides seems to be good conservation (provided of course the herbicides are not extremely toxic to man or wildlife, break down in less than one season and do not accumulate in food chains or cause chronic health effects). The advantages of no-till are: 1) conservation of soil moisture in dry areas, 2) less soil erosion, 3) less soil compaction, and 4) less use of fossil fuels and manpower.

Specific rotations are being worked out in various areas — particularly the south, midwest, and dry land wheat area. Perhaps this idea could apply also in Mass?

Reprinted from the April 1978 PARK MAINTENANCE, Box 1936, Appleton, WI 54911.

Problems in Managing Turfgrass in Shade

**By Dr. Kent W. Kurtz, Assoc. Professor,
Turf Management, Calif. State Polytechnic Univ.,
Pomona, California**

Considerable landscape problems arise when turfgrasses are established, utilized or maintained in shade environments. Shade related to turfgrasses is attributed to low, full tree canopies, large buildings, bleachers or other structures which block out the direct sunlight. However, turfgrasses in association with other plant material and appropriate structures, create an aesthetically pleasing landscape, a total composition.

Approximately 20 - 25 percent of existing turf areas in the United States are maintained under some degree of shade. Nearly all parks, golf courses, cemeteries, schools and lawns, either commercial or residential, have unique areas where turf is difficult to grow under shade due to reduced sunlight. Shade imposes severe limitations on the selection of adapted turfgrass species and restricts the size, shape, type and use of plant material associated with these grasses.

Common Turf-Shade Problems

Turf-shade interrelationships involve many intricate management problems. Some of the most common include the following:

1) *Establishment of trees and turf together in a new planting.* Initially, the young trees create very little permanent shade; however, as the tree matures the direct sunlight reaching the turf decreases and the shade area increases.

2) *Establishment of turfgrasses after the trees are planted.* The tree canopy introduces a shade problem from the outset requiring consideration of shade adapted turf species.

3) *Establishment of trees after the turf has been installed.* Trees exhibiting shallow root systems and thick, low canopies will not coincide with turfgrasses originally selected for open sunny areas.

4) *Establishment of turfgrasses under shade trees with dense canopies.* This is particularly true when the tree also has shallow surface feeder roots and when the foot and/or vehicular traffic is heavy.

5) *Establishment of a turfgrass cover on the north side of the building or structure.* This situation is particularly a problem in the northern hemisphere. In addition, a planting of trees would further enhance the shade problem on a north exposure.

How Does Shade Influence The Turfgrass Environment?

The turfgrass microclimate may be severly altered when shade is introduced. The reduction in light intensity is perhaps the greatest overall effect of shade. Potentially, a canopy of trees can screen out as much as 98 percent sunlight.

Furthermore, the quality of light under a shade environment is considerably reduced. Wavelengths of blue

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and red light, vitally necessary for photosynthesis, are also screened out under a shade environment, particularly beneath deciduous trees. Coniferous trees minimally alter the quality of light as they act more like a neutral filter, despite low light intensity.

Additional environmental factors influencing the shade ecology are evident and these include:

1) Competition between tree roots and turfgrass roots for water, nutrients and space.

2) The interception of moisture (rainfall) by the tree canopy.

3) A reduction in atmospheric carbon dioxide.

4) Increased relative humidity.*

5) Moderation of air and soil temperatures.*

6) Restriction in air and wind movement.*

7) Prolonged wetness after rainfall or irrigation.*

8) Prolonged duration of dew or guttation fluid.*

How Does the Turfgrass Plant Respond to a Shade Environment?

Under shade conditions low light intensity limits the quantity of carbohydrates a turfgrass plant can synthesize. Hence, this reduction in carbohydrate reserves results in a decrease in rhizome, stolon, root and topgrowth. In addition, the root system of plants growing in the shade is shorter, thinner, wiry and less branched.

Morphologically turfgrass plants respond to shade in the following manner: 1) Thinner leaves, 2) Larger leaf area, 3) Thinner stems, 4) Longer internodes, 5) Reduced tillering, 6) Reduced shoot density, 7) More upright growth, 8) Increased leaf length, 9) Reduced shoot and root growth, 10) Reduced rate of new leaf appearance.

Physiologically turfgrass plants respond to shade in the following manner: 1) Higher chlorophyll content, 2) Reduced respiration rate, 3) Lower photosynthetic rate, 4) Higher tissue moisture content.

The above characteristics result in thinner, softer, more succulent leaf tissue and will ultimately cause an overall deterioration in the plant's vigor. If the plant's vigor is reduced, susceptibility to disease and less tolerance to drought, heat, cold and wear will result.

Turfgrass Management in Shade

No turfgrass will tolerate dense shade. Even the most shade tolerant grasses require some direct sunlight each day for healthy growth and survival. Many times a combination of environmental factors and poor management limits turf growth under shade conditions. Therefore, one should not assume that the shade alone caused the poor turf cover.

Turfgrass Cultural Practices

Grasses growing in shade have a tendency to grow more erect than their counterparts found in sunny areas. A higher mowing height is recommended for grasses managed under shade conditions. Continual low mowing will reduce the food manufacturing leaves and eventually cause the plant to decline in health and recuperative potential. To maintain an adequate stand of turf under shade, one should raise the mowing height one-half to one inch above the normal mowing height.

Nitrogen fertilization of grasses in shade should be reduced to avoid overstimulation or excess vigor. Turf should be fertilized three to four times per year with a complete fertilizer (N,P,K) in order to fertilize both turf and trees. To promote adequate growth under deciduous trees the turf should be fertilized in the spring prior to emergence of tree leaves, and again in the fall after the leaves have fallen. To prevent shallow rooted trees from depriving the turf of all essential nutrients, vertical mulching and deep, infrequent irrigations are recommended.

Disease incidence in shade is considered to be one of the primary predisposing factors for turf decline. Disease organisms, combined with succulent tissue, soil moisture, poor air movement, increased humidity, irregular management and selection of use of non-adapted turf species, many times contributes to disease problems under shade environments. Good cultural practices and a preventative fungicide program may be necessary under shade. The cultural practices however, should take precedence over fungicides whenever possible. Keen observation and common sense are far better than indiscriminate use of pesticides to

*Environmental factors 4 through 8 in combination may enhance, contribute or increase disease incidence of susceptible turfgrass species under shade.

cover up errors in judgment or cultural practices. Turf management in shade necessitates using disease resistant turf cultivars, mowing turf higher, removing grass clippings, avoiding over-stimulation with nitrogen, avoiding excessive soil moisture, and reducing traffic whenever possible.

Examples of some of the major destructive fungi which may cause potential disease problems on turfgrass species in shade, along with the common name of a few fungicides which are frequently used in their control, are included in Table 1.

Tree Selection and Care

Many times if new landscape plantings are considered carefully, particularly when turf and tree selection are involved, many shade-turf related problems could be avoided. Selection of trees possessing shallow roots and low, thick canopies should be avoided. Trees possessing deep roots, open canopies and structures, and ones that can be adequately pruned to increase sunlight exposure to the turf are recommended.

Trees normally should be pruned vigorously each year to remove lower limbs to a height of six to ten feet above the ground, Crowns should also be thinned to increase sunlight penetration to the underlying turf. The thinning of shrubs and underbrush is helpful to allow more light to the turf surface and to increase air circulation. Furthermore, fallen branches and leaves from deciduous trees should be removed to prevent accumulation and smothering of the grass plants. Shallow feeder and surface roots may be pruned to make maintenance easier to reduce the turf-tree-root competition without harming the tree. Unnecessary trees should be removed to enhance the landscape planting and prevent deleterious effects.

TABLE 1. Major destructive disease fungi which commonly attack turfgrass species in shade and the common name of a few fungicides used in their control.

Disease Fungi	*Fungicides*
Brown Patch *(Rhizoctonia solani)*	Thiophanates, analazine, benomyl, PCNB, TBZ, maneb + zinc ion, thiram, mercury compounds, chlorothalonil, cycloheximide
Fusarium Blight *(Fusarium roseum)*	benomyl, TBZ, thiophanates
Leaf Spot *(Helminthosporium spp.)*	anilazine, captan, chlorothalonil, cycloheximide, folpet, maneb, maneb and zinc ion, thiram
Powdery Mildew *(Erysiphe graminis)*	benomyl, cycloheximide, karathane, thiram
Pythium *(Pythium spp.)*	cadmium compounds, chloroneb, terrazole
Rust *(Puccinia spp.)*	anilazine, chlorothalanil, cycloheximide, maneb, maneb + zinc iron, oxycarboxin, thiram, zineb
Strip Smut *(Ustilago striiformis)*	benomyl, thiophanate

Many trees should be avoided because they create problems in maintenance and/or safety. Conover lists the following trees as undesirable: popular, box elder, willow, catalpa, tree of heaven, soft maple, chestnut, black locust, chinese elm, ash, basswood or linden and cottonwood. Many of the preceding species cause maintenance and repair to walks and streets, have shallow roots which interfere with mowing or enter sewer lines, possess large leaves and pods making cleanup difficult or have thorns or brittle branches which interfere with safety.

Choose plant material wisely if shade is anticipated and check with local extension agents and nurserymen for specific species that will coincide with the environmental needs and uses desired.

Turfgrass Selection for Shade

Although much has been written and discussed concerning the difficulty of establishing, growing and maintaining turfgrasses under shade environments, a suitable turfgrass stand is possible providing two important conditions are instituted. First, proper management practices, as previously mentioned, *must be* judiciously and faithfully implemented and maintained. Secondly, shade adapted species should be incorporated into the landscape plans which best meet the needs of the area, its overall use, and the specific ecological microenvironment present.

Several cool season grasses are sold either separately or in combination as "shade-adaptable" species throughout the United States. Many seed companies package what are known as typical "shot gun" mixtures for retail outlets. These mixtures contain several grasses adaptable

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to large areas of differing shade exposures, soils, drainage situations and management levels. Most "shade mixtures" contain varying percentages of creeping red fescue *(Festuca rubra L.),* chewings fescue *(Festuca rubra commutata),* roughstalk bluegrass *(Poa trivialis),* tall fescue *(Festuca arundinacea),* meadow fescue *(Festuca elatior),* colonial bentgrass *(Agrostis tenuis),* or certain of the "improved" cultivars of Kentucky bluegrass *(Poa pratensis).*

Many of these so call "cure all" mixtures may be adequate for the manager who merely strives for some type of turf cover. However, when he over-waters or under-waters his lawn, or applies too much fertilizer or other improper techniques, especially under shade conditions, the results may be disastrous. Many times these pre-packaged shade mixtures, depending upon the maintenance practiced, segregate into specific locations in the lawn where they are best adapted. For instance, the fine fescues prefer a dry shade; roughstalk bluegrass, a moist shade under minimal traffic; the Kentucky bluegrasses, a moist sunny location; the colonial bentgrasses, a moist sunny or semi-shaded area; and the coarse fescues and "improved" perennial ryegrasses, a moderately moist, semi-shaded environment.

Table 2 illustrates some of the common retail shade mixtures available to homeowners.

TABLE 2. Examples of retail shadegrass mixtures available

	Percent Turfgrass in Mixture
58.23	*Poa trivalis*
24.24	Creeping Red Fescue
14.50	Highlight Chewings Fescue
39.20	Pennlawn Red Fescue
29.10	C-1 Kentucky Bluegrass
19.60	Chewings Fescue
9.70	Newport Kentucky Bluegrass
50.23	Victa Kentucky Bluegrass
48.26	C-26 Hard Fescue
29.10	Pennlawn Creeping Red Fescue
26.70	*Poa trivialis*
14.62	Newport Kentucky Bluegrass
33.25	Chewings Fescue
23.75	Red Fescue
38.80	Annual Ryegrass
29.10	Creeping Red Fescue
17.64	Chewings Fescue
17.46	Wintergreen Red Fescue
11.40	Newport Kentucky Bluegrass
10.67	Ruby Red Fescue
10.45	Nugget Kentucky Bluegrass

The professional turf manager today has many types of cool season grasses to choose from for shade conditions providing he is acquainted with the local conditions, the growth habit of the particular grass, and has a willingness to intensively manage the turf under shade.

The fine textured fescues appear to have above average shade tolerance providing they are grown on well-drained soils, receive limited irrigation, and are mowed at two to three inches in height. Good results are achieved when red fescue or chewings fescue are seeded in the shade and the area left natural with no mowing.

Spreading fine fescues *(Festuca rubra, sub-species rubra)* differ from the Chewings fescues *(Festuca rubra,* sub-species *commutata)* since they have long spreading rhizomes and wider leaves. Although the spreading fine fescues do not tolerate close mowing, they have better shade adaptation and establish more rapidly. The cultivers 'Ruby' and 'Fortress' are representatives of the spreading types.

An additional fine fescue classified as hard fescue - *Festuca longifolia (Festuca ovina* var. duriscula) originally introduced as C-26, but now known as 'Biljart', pos-

sesses better disease resistance, tolerance of poor soils, and tolerance to *Helminthosporium* spp.

Poa trivialis (roughstalk bluegrass) is another cool-season perennial accepted for its shade tolerance. Moreover, *Poa annua* (annual bluegrass) is considered quite shade tolerant and is able to survive and produce viable seed under lower light intensities than any other turfgrass grown in the United States. In fact, some "perennial" forms look very good and may prove to be adaptable in the future.

Several studies indicate the following grasses to have satisfactory shade tolerance: Alta tall fescue, Manhattan perennial ryegrass, C-26 (Biljart) hard fescue, and A-34 Kentucky bluegrass. The new "improved" Kentucky bluegrass cultivars, namely Nugget and Glade (P-29) are reported to possess shade tolerance due to their resistance to powdery mildew and moderate tolerance to *Helminthosporium* spp.

In warmer climates, the warm season grasses best adapted to shade are somewhat limited. The bermudagrasses are not tolerant to shade, although a selection from the University of California - Riverside, known as 'Hilo' and another selection from Florida 'Floraturf' (no-mow) have shown some promise in moderate shade. St. Augustinegrass *(Stenotaphrum secundatum)* is the best adapted warm season grass in southern California. Manilagrass *(Zoysia matrella)*, Korean velvetgrass *(Zoysia tenuifolia)* and Emerald zoysia *(Zoysia japonica* x *Z. tenuifolia)* exhibit satisfactory to good shade adaptability in southern California. Table 3 indicates a general list of turfgrasses adapted to shade.

In conclusion, if shade conditions are such that no modification in the shade environment are possible or adapted species will not survive under good management practices, several shade tolerant ground covers may be recommended in non-traffic areas. These shade tolerant ground covers include:

Common Periwinkle	*Vinca minor*
Big-leaf Periwinkle	*Vinca major*
English Ivy	*Hedera helix*
Baltic Ivy	*Hedera baltica*
Algerian Ivy	*Hedera canariensis*
Japanese Spurge	*Pachysandra terminalis*
Winter Creeper	*Enonymus fortunei*
Canby Pachistima	*Pachistima canbyi*

TABLE 3. Tolerance of Specific Turfgrasses to Shade

	Above Average	Good
Cool Season Grasses	Hard fescue Spreading fine fescues	Roughstalk Bluegrass Tall Fescue Red fescue Chewings fescue Cultivars of Kentucky Bluegrass 'Nugget', 'A-34' 'Glade
Warm Season Grasses	St. Augustine Manilagrass	Korean Velvetgrass Emeral Zoysia
	Fair	**Poor**
Cool Season Grasses	Colonial Bentgrass Perennial Ryegrass Meadow fescue Annual Bluegrass	Kentucky Bluegrass
Warm Season Grasses	Centipedegrass Carpetgrass Bahiagrass	Bermudagrass

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The Commonwealth of Massachusetts, backed by the federal government, has created a unique urban park experience.

Escape to the islands — in Boston Harbor

By Carol Dana

Boston, Ma. — The surf rolls in from the dark Atlantic, crashing against ragged rocks, sending salt spray arching into the air. Sea breezes scurry through scrub grass and bend wildflowers, while, overhead, seagulls circle, searching tidepools for blue-shelled mussels.

That's the setting on Outer Brewster Island, a delicate seashore ecosystem that is worlds apart, but only minutes away, from the buildings and bustle of downtown Boston.

Outer Brewster, along with 15 other islands, from the Boston Harbor Islands State Park — "the first urban water park on the eastern seaboard."

Citing the park as an excellent example of close-to-home recreation, the Interior Department recently awarded Massachusetts the Outdoor Recreation Achievement Award. That award is the department's highest honor, according to one spokesman. At the awards ceremony, Interior Secretary Cecil Andrus presented Governor Michael Dukakis with a check for $307,467 from the Land and Water Conservation Fund as reimbursement to the state for 50 percent of the cost of acquiring the islands.

Emerging from the sea

Looking like a series of randomly scattered commas, periods, apostrophes, and parentheses, the islands punctuate the Boston's harbor. They are geologic formations known as "drumlins," hills and ridges ground out of the earth's crust as glaciers moved across the area. Subsequent sinking of the land and rising of the sea level isolated the easternmost drumlins, forming some 30 harbor islands.

Over the past 300 years, the recreational value of the islands has been secondary to their practical value. Along with a few resorts and inns, the islands have housed forts, prisons, hospitals, reformatories, poor houses, and sewage treatment plants. During World War II, the federal government fenced off the harbor entrance with an underwater torpedo net between the islands, and placed antiaircraft guns amidst the vegetation on the islands.

After the war, the federal government sold its islands to private citizens and public agencies. The islands were eyed for large-scale development: proposals included an airport and a "new town" calling for high-rise buildings, landfill, and connecting bridges.

With the passage of landmark state legislation in 1970 authorizing creation of an urban park, recreation and conservation forces won out. That bill — pushed by conservation groups and city officials as part of a larger Boston revitalization plan — established $3.5 million in bonding authority to pay for land acquisition, planning, and development.

With 16 islands, the state has nearly completed its acquisitions. It is now negotiating with the city of Boston for three more islands. Purchase of those islands, expected to be completed by 1980, will add approximately 250 acres to the 386-acre park.

Management of the park was originally divided between the state's Department of Environmental Management (DEM), which owned and operated 13 of the islands, and the state Metropolitan District Commission (MDC), which owned and operated the remaining three.

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Carol Dana is associate editor for PARKS & RECREATION.

RECREATION RUNDOWN

Islands \ Facilities	Historic Fortifications	Picnicking	Trails	Boat Piers	Fishing Piers	Refreshments	Camping	Swimming Beach/ Lifeguard
Castle*	●	●	●		●	●		
Georges	●	●	●	●	●	●		
Gallops		●	●	●	●			
Lovells	●	●	●	●	●		●	●
The Brewsters	●	●	●					
Peddocks**	●		●	●			●	
Bumpkin		●	●	●	●		●	
Grape		●	●	●	●		●	
Slate		●	●					

*Access from Mainland
**Requires special permit

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In 1975, however, both agencies were brought under the Office of Environmental Affairs (OEA). To simplify administration of the park, the OEA is working on a plan that, over the next two years, would give management, and possibly ownership, of all islands to the DEM.

An advisory commission, composed of conservation organizations, harbor regulatory agencies, the local recreation commission, and representatives of state and local government, meets about ten times a year to make recommendations on operation and directions for the park.

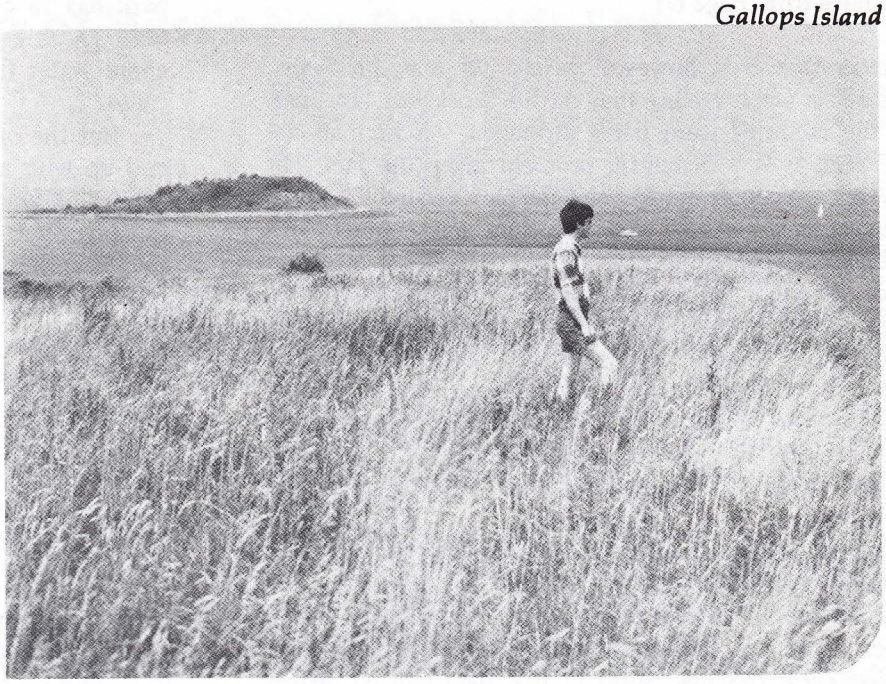
Island activities

The islands offer visitors a variety of activities and a choice of environments. The four Brewster Islands (Outer, Middle, Great, and Little) are farthest from the city and the least trammeled by man. In order to preserve delicate ecosystems — bird populations, spare vegetation, craggy rocks, and tide pools — the state allows hiking, but no camping, on these islands.

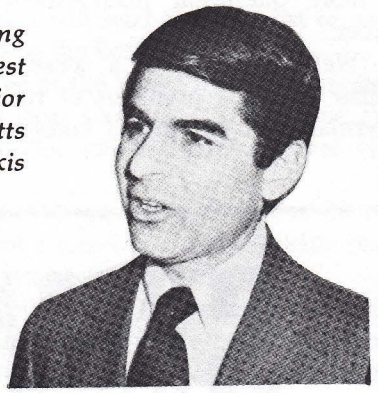
Fort Warren, a Civil War prison that once housed the Vice-President of the Confederacy, is located on George's Island and open to visitors. The park also contains a super-

". . . an excellent example of cooperative and coordinated efforts . . . resulting in opportunities."—Secretary of the Interior Andrus

Gallops Island



". . . a magnificent, exciting reality, where modest investments will yield major dividends."—Massachusetts Governor Dukakis



Boston Harbor Islands (Commonwealth of Massachusetts) Annual Operating Budget

	Office of Environmental Affairs				Combined Total	
	DEM*		MDC**			
	$ (000's)	%	$ (000's)	%	$ (000's)	%
Personnel	142	25.2	105	18.6	247	43.8
Police	—	—	90	15.9	90	15.9
Interns	15	2.7	—	—	15	2.7
Maintenance, Materials, and Services	12	2.1	130	23.1	142	25.2
Boat maintenance	—	—	20	3.5	20	3.5
Transportation	50	8.9	—	—	50	8.9
TOTALS:	219	38.9	345	61.1	564	100.

sed swimming beach (one island), fishing and docking iers (seven islands), camping (four islands), and refreshment stands (two islands).

More than 100,000 people visited the park in 1977, with day use up 51 percent over the previous year and camping up 124 percent, according to Meg Ackerman, DEM park project coordinator.

Increasing popularity may be due in part to improved transportation, according to Ackerman, who says that access was one of the park's biggest problems. "It was a sort of chicken-and-egg thing," she says. "Without service, we couldn't get people to the islands; without people, we couldn't attract regular service."

With establishment of regular commercial boat service to George's Island (round trip $3 for adults; $2 for children), supplemented by free water taxies to several other islands, Ackerman says the problem of access has been largely solved. In addition, the state has initiated a program of picking up the full transportation tab for certain groups — elderly, handicapped, children — making special visits to the island.

The islands' increasing popularity has been helped by energy concerns, adds Jane England, assistant to DEM's commissioner. "From an energy and financial standpoint, most people simply can't afford to drive 50 miles for a picnic," she points out.

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Increasing use, however, brings its own problems. "There was some feeling that on the weekends last summer the facilities were being stretched," Ackerman admits. "But it is a delightful problem given the fact that two years ago people barely knew the park existed."

In order to assure that use does not conflict with conservation goals, the state prohibits camping on some islands, restricts the number of sites on others, and requires special permits for use of still other islands, according to Ackerman. The state may also consider concentrating facilities on some of the larger, less fragile islands that can absorb the crowds. That's one reason the state currently has its eye on the 213-acre Long Island, land now owned by the city that already has been moderately developed.

The state is also getting some help from Earthwatch, a private organization that is bringing five Massachusetts scientists to the islands this summer to examine beach erosion, bird and mammal populations, vegetation, and archaeological remains. Some of that data will be turned over to the state, giving it the information base needed for more intelligent management of the islands' resources.

"We're learning, in a sense, that no one is really familiar with the problems of running an island park," Ackerman says. "Clearly it takes more staff to run. (The park has 38 employees, including several seasonal workers.) There are more disparate areas; we have to worry about water transportation. In general, it's more complicated."

But the other side of the coin, she says, "is that you end up with a very special park. Where else can you be picnicking among wildflowers and the scruffy grass, with the Atlantic Ocean all around you, and then look back and see the skyline of Boston?"

New LWCF Guidelines Due by May

Streamlining: that's the term chosen by a source at the State Programs Office of the HCRS to describe the objective of the review that the Land and Water Conservation Fund application process is currently undergoing.

Three major changes are under consideration: reimbursement, consolidated projects, and paperwork cuts.

Reimbursement: At the present time, the letter of credit facility made available to each successful LWCF applicant permits a state to draw funds in advance to make an approved acquisition and/or development. The new wrinkle under consideration permits a state that has already expended funds to cut *reimbursement* time by three-quarters. What used to take three to four weeks will take less than one week. A state will draw against a letter of credit facility with the U.S. Treasury in precisely the same way as with advances.

Consolidated projects: A change in the official procedure for project submissions is under consideration as well. A state will have the option of submitting a single application and entering into a single agreement with HCRS that covers a number of individual projects, either local or state level. Instead of requiring a separate application and agreement for each additional project within that year, HCRS will treat subsequent projects as "elements" "amended" to the original agreement. For each new "element" the state will submit only a description notification sheet, an environmental assessment, and a project boundary map.

Paperwork cut: The new approach will cut paperwork dramatically. Without a need for additional applications and agreements, the consolidated project proposal process will reduce paperwork to a legal minimum. The revamped reimbursement procedure will also eliminate paper-consuming steps.

A Summary of Mass's New Pesticide Law

As you probably have heard, the Mass. state legislature finally passed the pesticide bill early in February 1978. The following is a summary of the new law:

1. First of all, it has an emergency preamble so it takes effect immediately, instead of after a certain number of days (60-90?) as is usual.

2. The new law is called the *MASS Pesticide Control Act.*

3. The law *defines* private and commercial applicators the same as the federal law so no surprises there.

4. The law maintains a *3rd* category called *licensed applicator.* Such a person is either:

a) A service operator working *under* the supervision of a certified commercial applicator, or

b) A commercial applicator who applies pesticides "to the land of another" but uses only *general use* pesticides.

(The law does not say what the exam requirement will be for *licensed* applicators (as opposed to certified ones) but it most likely will be the core exam *without* any specialty exam.)

5. The law defines a "licensed pesticide dealer" as anyone who sells restricted use pesticides. These people will have to be licensed. Whether or not they take an exam is up to the Pesticide Board. They may be asked to take the core exam. The objectives of this provision are:

a) To be sure restricted use pesticides are sold only to certified persons and that proper records are kept, and

b) To get restricted use pesticides out of stores such as department stores, drugstores and other places with little experience with pesticides and into more specialized stores dealing in pest control products.

6. The law allows for a restricted use pesticide to be used by an *uncertified* person who is "under the direct supervision of a certified applicator." It defines this to mean a *competent* person acting under the *instructions* and *control* of a certified applicator who is *available* if and *when* needed, and who is responsible for the uncertified person's actions.

This in practice will mean different things in different situations. But, anyone supervising uncertified applicators must realize they are assuming considerable legal and financial responsibility. The control and access systems will need to be quite good. Regulations will most likely try to spell out what "direct supervision" means in some of the major commercial situations — on the farm, in the exterminating industry, in landscaping and in mosquito control work, and so on.

7. Pesticide regulation is wholly in the Department of Food and Agriculture. Although the Division of Food and Drug has some responsibilities concerning registration, it is answerable to Agriculture.

8. The Pesticide Board is the committee that makes regulations and sets policy. It has been expanded to ensure a better representation of all interested groups. When the appointments are final, I will send around a list of names and addresses of who is on the Board.

9. A subcommittee of the Board will handle registration, including special local needs (24-C's) and emergency exemptions (Sect 18's). This will be George Michael (chairman) and 4 others.

10. Lew Wells will continue as the director of the Pesticide Division. He is not a member of the Pesticide Board, but is charged with carrying out their decisions.

11. Advisory Councils are to be created, representing various groups that may have an interest in or be affected by the actions of the Board. *Commercial groups* should be-

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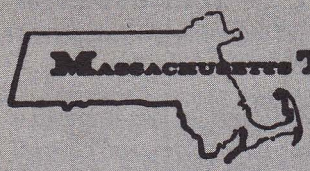
FROM



MASSACHUSETTS TURF AND LAWN GRASS COUNCIL INCORPORATED

RFD #2, HADLEY, MASS. 01035

(Continued from Page 19)

gin immediately to select their representation. Here is your opportunity to protect yourself from unwise regulations.

12. The law empowers the Pesticide Board to issue and revoke pesticide licenses and certificates and to issue regulations to deal more fully with pesticide use and application matters, such as storage, disposal, restrictions to protect water supplies, critical areas or prevent the use of particular materials. I expect new pesticide regulations to be written soon and will keep you informed.

13. The Pesticide Board is authorized to make regulations on liability insurance requirements for certified applicators.

Mass Poison Control System

From now on all poisonings involving pesticides should be reported to the *Poison Control Center* at Children's Hospital in Boston. This location will be staffed 24 hours a day by trained people who can advise the public or physicians in regards to poisonings. The numbers to call are: in Boston — 232-2120, elsewhere — 1-800-682-9211 (toll free). This single location replaces the previous system that involved several hospitals around the state. Or call the Pesticide Coordinator's Office at UMass — 413-545-0932.

Join Your Massachusetts Turf and Lawn Grass Council

For more information write:
Mass. Turf and Lawn Grass Council
attn.: Dr. Joseph Troll
RFD #2, Hadley, Mass., 01035
413—549-5295

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