

Turf Development Procedure That's Successful in S. W.

By **BOB DUNNING**

THE following is to be considered general agronomic recommendations for the establishment of turf suitable for a championship golf course and choosing soils that will be conducive to the production of bent and other grass of excellent quality. The recommendations are not meant to be a specification and any reference to contouring, mounds, undulations or orientation are used only to coordinate general agronomic problems with the architectural phases of golf course construction and point out important phases of construction that will affect championship turf, and not how to accomplish construction. It should be further understood that the two are so closely related that they cannot be divided and have a successful conclusion to the overall construction.

GREENS

For the ultimate in putting green construction drainage must be considered in five phases 1. surface drainage, 2. internal drainage, 3. lateral drainage, 4. air drainage and 5. drainage by diffusion and this, of course, among others means the very best in topsoil structure.

A green should be constructed so that surface runoff is in several directions; never all off of the front of the green. The base of the green may be constructed out of any soil at hand unless it contains material that would cause excessive subsequent shrinkage or would be deleterious to plant growth.

Bob Dunning of Bob Dunning-Jones, Inc., Tulsa, Okla., consults with superintendents and architects in considerable course construction and remodeling in Oklahoma. The results have been excellent. His general agronomic recommendations in these cases have been found by superintendents and chairmen to be exceedingly valuable. These recommendations are given in the following article. Dunning, of course, makes his recommendations for conditions prevailing in his territory.

Mounds may be used to divide drainage areas for surface runoff, orientation and character and to lend to and add and to blend into the surrounding terrain.

From the standpoint of the establishment of future turf all undulations and mounds that are to appear in the finished surface of the green are part of the base of the green or the subgrade and there shall be no pockets where water could stand.

For the very best in green construction there should then be installed a herringbone system of 4 in. farm tile provided with proper protected inlets and outlets. Tile should be placed in the subgrade so that it will be at least 18 to 24 in. below the finished surface of the green on a carefully prepared grade of proper fall and bedded into 2 in. of crushed rock or approved gravel.

There shall be left a space from 1/16 to 1/8 of an inch between tile joints to facilitate the entrance of water. The joints shall be properly protected with a small piece of tar or water proof building paper to prevent materials from dropping into tile from the top. Care should be exercised not to have these strips too long, otherwise they will cover the tile joints on their sides and thereby prevent water from entering easily.

The trenches shall then be back-filled with approved crushed rock or gravel to the surface of the subgrade. Laterals shall be staggered and properly spaced. The installation of tile effects drainage in three phases: internal, lateral and by diffusion, allowing the interchange of atmospheric and soil gases helping to prevent an overabundance of carbon dioxide and to prevent the forming of carbonic and other organic acids which are toxic to vegetation.

The base should then be covered with at least a 6 in. gravel blanket or crushed rock of approved material containing a minimum of fines but there shall be some fines.

There shall be no pockets in the finished grade of the gravel blanket. The gravel blanket shall then be covered with 10 in. of imported thoroughly mixed improved



Bidwell photo

SPEED-UP IN COURSE CONSTRUCTION THIS YEAR

More than 102 golf courses are under construction or have been finished this year; greatest golf building activity since the '20s. Extensive use of fast, labor-saving machinery and new methods are offsetting higher costs of materials, and producing better construction. View is on Indian Valley CC, Lansdale, Pa., where Wm. F. Gordon & Co. are doing the building. Alex Bryce, formerly of Atlantic City (N. J.) CC, is supt. of construction. Ed Riley, formerly of Springfield CC, Media, Pa., has been engaged as course supt.

In background as bulldozer grades topsoil of green, are Tony Mascaro, Alex Bryce and Dave Hulzhauser.

top soil consisting of:

60% coarse sharp approved (Muskogee) sand, coarser than concrete sand.

25% approved soil (Tulsa Cemetery soil).

15% fibrous peat (like Eli Colby brown hypnum peat).

NOTE: The mixture will vary slightly if any other sand is used other than the one used in making the tests as it contains a small amount of fines. Further tests will be run for exact percentages of mixture after final approval of all materials to be used.

Tile used for draining traps shall also be laid in trenches, using the same procedure as above but the tile should only be laid 6 to 8 in. below the sand and the top 2 in. of the backfill shall be approved friable soil.

APRONS

An 8 ft. apron shall be provided as a buffer and to facilitate proper playing conditions between the putting green proper and the shoulders of the green. The apron is to be known as No. 1 buffer zone. This area does not necessarily need the gravel blanket but the gravel blanket may be feathered out over the area in construction. The gravel blanket shall contain a small amount of fines or if crushed rock is used it shall contain sand.

This area shall then be covered to an 8 in. depth with an imported prepared topsoil consisting of approximately 60% (Muskogee) sand, 25% (Tulsa Cemetery) soil and 15% (Eli Colby brown hypnum)

peat in accordance with future testing of approved materials.

Immediately outside of No. 1 buffer zone there shall be provided an area 6 ft. wide that shall be hereafter known as the No. 2 buffer zone. This zone shall be covered to at least a 6 in. depth with an approved topsoil, medium sandy loam in nature that would not contain any material that would be deleterious to plant growth, to blend into and be a part of the surrounding area.

The shoulders of the green adjacent to No. 2 buffer zone shall be of an approved topsoil made available on the site of the golf course and shall blend into the surrounding terrain.

The putting green proper, the No. 1 buffer zone and No. 2 buffer zone shall be fertilized as follows: Per 1000 sq. ft.

60 lbs. Milorganite

30 lbs. superphosphate 20% grade

8 lbs. muriate of potash 60% grade

4½ lbs. Nu-Green or 6 lbs. ammonium nitrate

Also to be incorporated per 1000 sq. ft.:

50 lbs. dolomite

10 lbs. arsenate of lead

Any changes in these recommendations will be in accordance with the analytical results of soil samples tested and any future analytical results of approved materials.

Three-fourths of these materials shall be mixed with the prepared topsoil at the time of its thorough mixing and before placing. One-fourth of the material shall

be used as a topdressing and lightly raked into the surface with a Del Monte rake or other approved tool.

Arsenate of lead and dolomite shall be incorporated throughout the topsoil at the time of mixing and before placing. This will prevent earthworms and grubs for a 7 to 10-year period.

NOTE: The fertilizer shall not be mixed into the soil for the No. 2 buffer zone during the same operation in which it is mixed for the putting green proper and the No. 1 buffer zone.

After the putting green is brought to a fine grade it shall be compacted to produce a firm seed bed, not tight or loose. The putting green proper shall then be stolonized with 7 bushels of C-7 Bent grass (Cohansey) per 1000 sq. ft. The stolons lightly firmed into the surface and covered with a medium topdressing at the rate of 9.35 cu. ft. per 1000 sq. ft. of the same consistency of the imported prepared topsoil of the putting surface and shall be very lightly rolled, then be maintained in accordance to watering in a manner that is conducive to plant growth.

NOTE: In topdressing stolons it should be understood that from a standpoint of growth and quick coverage, light topdressing gives the best results.

5.2 cu. ft. per 1000 sq. ft. is considered a light top dressing

9.36 cu. ft. per 1000 sq. ft. is a medium topdressing

14.5 cu. ft. per 1000 sq. ft. is considered a heavy topdressing.

WATERING

When establishing stolons on a large scale consideration should be given to the ability of being able to keep the planted areas moist at all times. If a light topdressing gives enough protection then the smaller quantity should be used. The type of topdressing being used should also be considered in regard to sand, soil and peat.

If watering is going to be a problem then the medium rate of topdressing should be applied. In either case it will be necessary to keep the planted areas moist, not wet, at all times until the stolons are firmly established. Until seeded and stolonized areas of the greens are firmly established watering shall be accomplished by hand. Fine spray nozzles shall be used and should be held perpendicular so that the water falls like a gentle rain.

It should be understood that watering is one of the most important functions in golf course maintenance and personnel should be thoroughly trained in this operation.

With a hoseless sprinkling system the

use of sprinklers for watering greens, with careful supervision, may be started much earlier during the establishment period than with portable sprinklers.

The 8 ft. No. 1 buffer zone shall then be seeded at the rate of 3 lbs. per 1000 sq. ft. with Certified Blue Tag Seaside bent seed and the seed should then be raked lightly into the surface. The area shall then be lightly rolled and kept moist, not wet, at all times until the seedlings are thoroughly established.

NOTE: It is suggested to the contractual party and the golf course architect that consideration should be given, if sufficient stolons are available and if the difference in price is not a consideration, to also stolonize the No. 1 buffer zone to C-7 Bent grass (Cohansey). In this way there will not be any danger of the Seaside bent seed being mixed into the C-7 Bent grass.

There shall be a 1 ft. wide strip left unplanted between No. 1 and No. 2 buffer zones. The No. 2 buffer zone shall then be sprigged with U-3 Bermuda grass at the rate of not less than 3 bushels per 1000 sq. ft., then smoothed and kept watered at all times until the sprigs are thoroughly established.

There shall be a 2 ft. strip left unplanted between the No. 2 buffer zone and the shoulders of the green. The shoulders shall then be fertilized with 40 lbs. of a grade 10-5-5 organic base fertilizer per 1000 sq. ft. The fertilizer is to be incorporated into the soil with suitable tools to a depth of 1 to 2 in., then be sprigged with Bermuda grass.

Sprigging shall be done when there is sufficient soil moisture for plant growth and left in a smooth playable condition and to be maintained by watering in a manner conducive to plant growth.

The unplanted strips are left between the buffer zones to prevent the encroachment of the more aggressive grasses into the less aggressive grasses before they are firmly established.

To facilitate maintenance of grades for No. 1 and No. 2 buffer zones, shoulders of the greens, mounds and undulations shall be such that they may be maintained with gang mowers or multiple reel power mowers without scalping and to encourage the very best in turf and subsequent low cost maintenance.

FAIRWAYS AND ROUGHS

The fairways and roughs shall be tilled to a 4 to 6 in. depth in a manner that will not produce large lumps or clods and shall be brought to a suitable grade and tilth

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he served as president of the Indiana Junior Golf Assn. and won the Muncie city golf title. At the present time, Gordon lives in Indianapolis where he is assistant office manager of the Banquet Dairy and Ice Cream Company. In addition, he is pro at the Western Electric golf range. The latter course was built by the company according to Gordon's ideas.

TURF DEVELOPMENT

(Continued from page 32)

for sprigging and there shall be no pockets where water can stand.

In the final light tillage operation, after grading and smoothing, 100 lbs. of nitrogen per acre or 1000 lbs. of a grade 10-5-5 organic base fertilizer per acre shall be incorporated into the top 2 ins. of the fairway areas.

The roughs shall be treated in the same manner with the exception that 50 lbs. of nitrogen per acre or 500 lbs. of a grade

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10-5-5 organic base fertilizer per acre shall be used.

Sprigs shall be healthy living rhizomes and attached roots of Bermuda grass that have been obtained from an approved source where sod is heavy and thickly matted and is free of any material that would be detrimental. Sprigs shall then be given proper care until they are planted. Only fresh, live viable sprigs shall be used.

Sprigging may be accomplished either by the row or broadcast method and shall be done only when there is sufficient soil moisture to insure plant growth. Sprigs should be thoroughly covered as soon as possible and the soil compacted and left at a suitable smoothness to facilitate maintenance with gang type mowers and there shall be no pockets where water will stand. The fairways shall be maintained, as near as possible, in accordance to watering in a manner that is conducive to plant growth after the installation of the fairway sprinkling system.

Headwalls for storm sewers shall have a 5 ft. strip of solid sod to prevent washing.

Catch basins shall be surrounded with a 20 ft. sq. area of solid sodded Bermuda. The finished sodded area shall be not less than 4 or more than 6 in. graduated down

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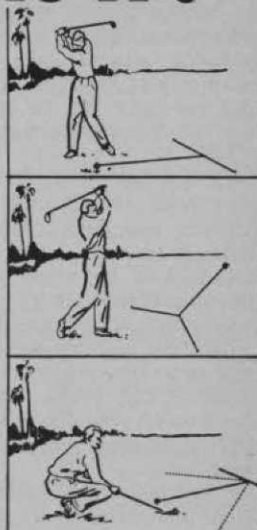
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to the catch basin below the surrounding grade. The outside edge of the solid sod shall be cut in and laid at the same grade as the surrounding area.

Before laying solid sod the area shall be fine graded and fertilized with 30 lbs. of a grade 10-5-5 organic base fertilizer and it shall be lightly raked into the surface. These areas shall then be maintained in accordance to watering in a manner that is conducive to plant growth.

If soil is borrowed from the fairways in construction or in any location that will affect play or any place that will cause serious erosion, unless re-vegetated, then the topsoil of those areas shall be pushed aside and stock piled. The needed soil shall then be taken from the subgrade and the areas re-covered with soil from the stock pile. In borrowing soil subsequent drainage of the areas where the soil is taken shall always be given consideration.

TEES

Tees may be moulded of the same material used in the base of the greens and should have adequate surface drainage. It would be advisable to finish off the tees with at least 4 in. of the most suitable topsoil available on the site of operation.

To insure a friable soil that will not become overly packed and to be conducive to plant growth on these important areas they should then be finished off with 4 in. of imported prepared topsoil consisting of 53.3% approved sand, 26.7% imported soil and 20% approved organic matter.

The areas shall then be smoothed and fertilized with 50 lbs. of a grade 10-5-5 organic base fertilizer and 50 lbs. of dolomite per 1000 sq. ft. which shall be incorporated into the soil to a depth of 1 to 2 in.

For the very best in tees, for this climatic area, they should then be sprigged with not less than 3 bushels of U-3 Bermuda grass per 1000 sq. ft. The tees should then be smoothed to a finished grade, and there shall be no pockets where water could stand. Tees are to be made in a condition suitable for maintenance with gang type mowers or multiple reel power mowers. The areas shall then be maintained at all times in accordance to watering in a manner that is conducive to plant growth.

If U-3 Bermuda is not available in sufficient quantities then consideration should be given to constructing the base of the tees as above and then covering the base with four (4) inches of friable soil taken on the site where there is a thick mat of

Bermuda grass growing. The soil and roots should be spread evenly over the constructed base of the tees to a 4 in. depth and fertilized with 30 lbs. of a grade 10-5-5 organic base fertilizer per 1000 sq. ft. to be lightly incorporated into the top 1 in. The areas then to be fine graded and kept moist at all times in accordance to watering in a manner that is conducive to plant growth.

Before stripping the soil and roots for top soil planting of the tees, the area should be moved and raked so as no more tops will be moved to the planting site than absolutely necessary.

For a more desirable condition after the Bermuda has made good growth the tees should then be topdressed with 2 in. of a mixture or 53.3% approved sand, 26.7% imported topsoil and 20% approved organic matter. The topdressing shall be loosely spread, not compacted, over the tee areas.

After the Bermuda has made sufficient growth to emerge from the topdressing and make good coverage, the tees should again be fertilized with 20 lbs. of a grade 10-5-5 organic base fertilizer and 25 lbs. of dolomite per 1000 sq. ft. and the same procedure of topdressing repeated. The areas shall then be kept moist at all times in accordance to watering in a manner that is conducive to plant growth.

After Bermuda grass has emerged from the second topdressing there shall again be spread 25 lbs. of dolomite per 1000 sq. ft.

Both the architect and the contractual party, due to the expense involved in construction of greens and the desire to protect the hard-to-obtain stolons and for an early opening date, should give consideration to the placing of a protective vegetative mulch on the greens and any other areas that would be vulnerable to severe wash. The mulching material shall be native bluestem hay used at the rate of 3000 lbs. per acre and to be tied down.

It is urged that a competent golf course superintendent's services be acquired early in the construction and establishment period so he will be familiar with methods and materials used in construction and to supervise the maintenance of all planted areas.

It is further recommended that before any planting of greens is undertaken that a heavy duty power sprayer be purchased and on hand so that any necessary application of fungicides and other maintenance factors can be taken care of promptly. The power sprayer may also be used to facilitate watering in the un-accessible areas.