cerned, traps under 200 yards usually offered little or no concern, whereas those same traps were always punishing the average golfer. It, therefore, was judicious to move these traps so as to make the play less rigorous for the average golfer and still not weaken the character of the course for the expert. It was found that in the green area a master trap could be so correlated with the putting area that the hole could be tightened or eased to the extent that the pin was placed behind the trap.

In the old penal type of architecture, where the greens were flat and surrounded by a jumble of clam shell traps, the golfer had no choice other than try to play the perfect approach required to reach the green. Since the shot demanded was often not in the average golfer's repertoire, he realized that he was doomed before he started.

With diagonal trapping, wide green tongues and alternate routes to the green, the average golfer can play a shot which he feels is within his range. He must think before he shoots. He must vary the manner in which he plays a hole on any particular day according to how well he is hitting the ball or, in the case of tournament play, according to the circumstances of the match.

Design With Respect To Maintenance Practices

BY WILLIAM F. GORDON
Golf Course Architect, Doylestown, Pa.

For the past few years there has been a great movement toward lower maintenance costs. Some of the items that are causing the additional costs on our courses today are steep slopes and banks around greens, tees and bunkers, extreme undulations on greens, greens too large or too small, poor soil mixtures on greens, improper surface and subdrainage, too little or too much teeing area, improper construction, faulty seed and turf mixtures, and bunkers and drainage.

If it is a new course and you have secured a reliable architect, you can be assured that he is aware of all these and many other conditions not mentioned, and that he will furnish his client with complete plans and specifications which will start them off on the right track.

Regarding steep slopes and banks, all outside slopes on greens, tees and bunkers should not be steeper than 4:1 ratio and in many instances you can increase this to 6:1 ratio. This means that your fairway or rough units can then mow these areas with comparative ease.

Extreme undulations on greens can and do cause much trouble in green maintenance. It is impossible to get sufficient cup placement area on greens with extreme contours unless the size of the green is increased considerably, increasing the cost of chemicals, mowing and fertilizing.

All greens should be designed of sufficient size to receive the shot that should be played to them. The size should vary from 4,500 square feet to 7,000 square feet. This should be the target for the player to shoot at and should include a collar of not more than three feet for turning of mowers. The putting green bunkers should tie directly into this area and leave no area for fairway mowers, heavy equipment, electric, gas, or hand driven caddy carts. Rules should be set up controlling use of both power and hand drawn carts, so there will be a minimum of damage. If a study of your greens is made with this in mind you will show a great saving in your maintenance costs.

Poor soil mixtures on greens are a cause of costly maintenance. On a new course be sure of your mixture and go

Topdressing and Limestone

Dr. J. A. DeFrance, of the University of Rhode Island, is an advocate of topdressing and the use of limestone in the prevention of thatch buildup. Dr. DeFrance says: "A little limestone is needed each year, even when pH reading is good. Dolomitic limestone is preferred in magnesium deficient soils, also compost (topdressing) each year to help control thatch."

ahead with it. On the old courses if these conditions exist do not fool with them any longer. Set up a plan to change them as soon as possible.

Improper surface and sub-drainage creates problems. You can solve your turf problems and allow for greater cup placement area if, on surface drainage, you adhere to the following: surface slopes and gradients should not exceed one foot in thirty-five feet, or be flatter than one foot in fifty feet; green surfaces should drain off in two or more areas; avoid all pockets and low areas.

Some exceptions are terraces and undulations to protect green bunkers. Here again, they should be gentle slopes. A putt properly stroked should not gain or pick up speed due to the gradient, except in the case of a terrace and then it should be at normal speed around the cup.

Sub-drainage should be used only if your soil conditions demand it. Good drainage will be a cure for many ills. Do not hesitate to go onto existing greens and lift a strip of sod, dig a ditch, or install tile and stone to correct areas that are giving trouble.

Teeing areas give clubs a great deal of trouble and all courses should make every effort to establish ample sized tees properly located and constructed. Every hole should have at least 3,000 square feet of teeing area. It would be better if they could have 4,000 square feet—3,000 square feet in regular tee, 500 square feet in ladies tee and 500 square feet in championship or long tee. With 4,000 square feet of teeing area there should be no unusual problems, and a minimum of maintenance.

Tees should be constructed as near to the existing ground level as possible, and should be surface drained. The gradient should not be greater than one foot to one hundred feet, falling to the front if shot is downgrade, and falling to the back if shot is uphill. If a tee has to be raised, all outside slopes should be 4:1 ratio.

A great deal of the trouble on our

older courses and on many of the new ones can be labeled "poor construction." The reason for this is inexperienced men, attempts to save money, lack of funds, and a great many "do it yourself" jobs. When you remodel, get clear and concise specifications and you will not run into trouble.

Seed and turf mixtures are giving some clubs a great deal of trouble. Get together with your superintendent and the USGA agronomist and discuss the situation and make plans to change to good turf. There is no use maintaining turf not suited to your area.

Bunkers, if designed and constructed properly, can be maintained with a minimum of hard work and cost. A study should be made at your course. Remove bunkers that penalize only the high handicap player. Re-locate bunkers to fit the play of low-handicap players from long tees. Check the work needed to maintain inside slopes of your bunkers. I do not recommend that they be deeper than four feet. Sand should be washed up on all slopes. Faces of bunkers should have a slight over-hang or revetment to require a well played shot for recovery. All bunkers should be either surface or tile drained. All outside slopes should not be steeper than 4:1 ratio.

Dense wooded areas contribute to poor air circulation and cause a great deal of trouble today. The sad part of this condition is that, in most clubs, to take a tree down requires almost an "Act of Congress"—it makes no difference if the trees are bad trees in need of pruning or repairs, or that they are growing into and spoiling many fine specimen trees. If these bad areas were cleaned out of all underbrush and poor trees, there would be better circulation of air, which in turn would be a great help to the growth of turf in those areas.

Many courses have low areas, pockets and swales which hold water in the spring and fall during storms. These should be corrected either by open swales properly graded or the installation of tile drains.

The above problems are responsible for increasing maintenance costs. I would say, make a study of your course and do something about it. A good plan is for the superintendent to make a list of his problems, the professional to make a list of his suggestions, and the chairman and members of his committee should walk the course—not while playing—and make up their own list. Then decide on a program to follow and go through with it. If there are problems you cannot solve, get professional advice.

Financing the Remodeling Job

BY DR. ANDREW P. VIRTUOSO
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Very few golf and country clubs have readily available funds for remodeling and reconstruction work.

Yet there are certain necessary improvements on which the membership can be "sold" even when the money is not readily available. Ways can be found to finance badly needed improvements without endangering the stability of the club.

To finance a remodeling project properly it is first necessary to make a thorough study and cost analysis. Even the most careful estimate will often undershoot the final accounting. Therefore, allowances should be made for contingencies and unforeseen expenses. Since these cannot be accurately estimated in the beginning, an allowance should be made which will cover, at least in part, the costs over estimate. Normally 10 to 15 per cent is reasonable allowance for unpredicted expenses.

Correct timing in reconstruction is all-important, and added expense may result from poor timing. Remodeling should be undertaken at a time when play is least inconvenienced and when best work results can be expected. Projects undertaken during periods of heavy play or unfavorable climatic conditions often lead to delay and extra expense.

It is important to decide, also, whether it would be more advantageous to under-