This fairway will need a lot of expensive clearing before it is ready for play.

Spend Your Money Only Once

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If agriculture is known for its high risks, hazards, and gambles, then golf course maintenance is rightly a part of it. To be successful, the golf course superintendent usually finds his summer weeks seven days long and his nights restless with wondering, "what will tomorrow bring?"

But there is usually more to it than the daily eccentricities of nature, man, or machine. Surprisingly enough, the superintendent's most serious, costly, and aggravating problems frequently could have been avoided if only the golf course had been properly built. Poor construction is doubly expensive, and, really, we need only spend our money once!

Building a golf course, or any part of one should be a very specialized procedure in these days of high construction costs. Unfortunately, this is not often the case. The illustrations you will find throughout this article are not the exceptions to today's construction—they illustrate a general rule; unnecessary and costly mistakes are continually being made. There is an absolute wealth of practical experience available to anyone interested in better construction. And "better construction" does not necessarily mean "expensive construction." Anyone who has the desire and ability to combine today's technical and practical know-how, can build a good, technically sound golf course at a fair and honest price.

But there is more to it than merely "being aware" of today's scientific breakthroughs, or having practical experience. In so many cases we find a completed job unsatisfactory because someone failed to prepare a complete and accurate list of instructions and requirements outlining each construction operation. The specifications were either vague or worded so that the men responsible for doing the work

could not understand them.

Wording of specification sheets is of utmost importance. These specifications must clearly state the responsibilities of the architect, the contractor and the owner or his representative.

With this in mind, the following is offered as a good foundation on which construction can be started. Even if the job to be done is not an entire course, the following material may be used as a reference but on a much smaller scale.

Before any work is done, a contractor or builder with certain capabilities is needed. The contractor should also have a good set of specifications from the architect. Further, a good superintendent should be hired prior to construction. He will give valuable advice on what will be necessary for good maintenance later. I'm not saying the architects don't know their business; I'm saying the superintendent has **practical** knowledge and he is the one who has to earn a livelihood on the course **after** the contractor and architect are gone. There are many areas in which the superintendent's viewpoint deserves top billing:

1. Availability of water, both quantity and quality.

2. Can maintenance equipment get around the course and be used properly?

3. Are greens and tees large enough to accommodate anticipated traffic?

4. Are tees and greens located so runoff water from surrounding areas does not collect on them?

5. Can air circulate over the area so the grass can survive? (This is a main consideration often overlooked in the interest of a fancy design.)

Water line was not backfilled properly. The fill has sunk now and the low area has to be refilled and seeded.

6. Design, location and drainage of sand bunkers—how this will affect the flow of traffic, mowing and the maintenance budget.

7. Would-be drainage of everything on the course—drainage of the subsurface under greens, bunkers, tees and fairways, and surface drainage of greens, tees, fairways and roughs.

8. Irrigation system—can it supply the water that is needed at the rates needed?

The architect had this area planned for a fairway. Soil was deep gray clay, water is runoff after approximately four hours of rain the night before.

Once the property has been thoroughly analyzed and the architect's plans accepted, a contractor with the desired qualifications can be chosen. Here are some of the points that deserve attention, complete review and thorough understanding:

1. The contractor should have equipment and personnel to perform the construction, along with a performance bond to protect against a partially completed job.

2. Have contractor submit a list of estimates of quantities of all materials used for each separate area on the course, i.e., greens, tees, fairways, irrigation system and drain lines.

3. Bid submitted must have the cost broken down into each construction phase; clearing, rough grading, green and tee construction, irrigation system, drainage system, preparation of fairway and rough seedbed, fairway and rough seeding, seeding for greens and tees, and sand trap construction and filling.

4. Contractor agrees to a construction schedule which lists each construction phase (point No. 3) with a beginning date *and* completion date.

5. Contractor submit data on cost and time of completion of each phase of the construction work.

6. Architect and contractor are responsible for laying out and staking all areas in accordance with plans and drawings. Architect should be with contractor to ensure that the centers of all tees, fairways and greens are marked.

7. The contractor should have a limit on what time the course is to be planted, especially if a fall planting is planned.

8. The contractor must examine the proposed site prior to submission of the bid.

9. If the contractor has the responsibility to construct all pump houses, maintenance facilities and rain shelters on the property, he is responsible for adherence to building codes.

10. All soil-moving operations, soil-mixing operations, seedbed preparation and seedings are to be inspected and approved by owner or his representative before the operation is approved as completed.

11. The start and progress of any work is subject to the approval of the owner or his representative.

12. Upon completion of any phase, the owner or his representative is to be notified.

13. All debris shall be removed immediately upon completion of the job.

14. The contractor shall repair any damaged trees, shrubbery, turfed areas and/or utilities that are not included in the construction specifications.

15. Topsoil selected for use is subject to the approval of the architect and the owner or his representative. There must be enough topsoil provided to cover greens and tees to the depth specified in the specifications after settling. The topsoil may be stockpiled in convenient locations on the property but must not be handled when it contains a moisture level that would cause puddling or caking. The topsoil shall come from naturally well-drained areas. The percentage of silt and clay in the soil shall be determined by analysis by volume. The topsoil shall not contain any material that would harm plant growth or interfere with its preparation or maintenance.

16. When clearing the land, method of removing trees, stumps and roots should be stated. All stones one inch in diameter and above shall be removed. The method of disposal of trees, stumps, roots and other vegetation should be agreed upon. In many areas burning is no longer acceptable.

17. Soil mixing will be done off-site and will be done in accordance with the procedure stated in the specifications. (Before the specifications are written, all acceptable material available should be sent to a laboratory for complete analysis. There the proper mixture proportions will be determined.)

18. Fairways and roughs that have to be defined by the staking shall be plowed and disked to a depth of eight inches. All stones of one inch in diameter shall be removed. The basic fertilizer, herbicides and insecticides and lime shall be applied in accordance with the results of the soil analysis. Then the fairways

During construction the sand and topsoil were not mixed.

will have their final smoothing by harrow.

19. Only certified seed should be used. The type of seed and seed mixture will conform to the architect's specifications. All seed should be mixed and labeled to conform to state and federal regulations. The seed should be delivered in its original container. (Stolons should also be certified and of the variety and quality demanded in the specifications.)

20. Preparation of the subgrades of fairways, roughs, greens and tees is very important. The subgrades should be formed to the architect's specifications. Greens and tees should be elevated to conform with plans and firmed.

21. During subgrading, surface water should be directed away from greens and tees. Low depression areas should also be corrected at this time.

22. Following completion of subgrading, drainage lines should be installed. Drainage should be included on fairways, greens, tees and sand traps. Specifications should be written to include the method of laying the tile, type and size of tile, joint covering material, the trench depth and width, amount of fall to the opening, and an opening cover, and thickness of gravel cover over the tile.

23. Placement of topsoil on fairways where cuts have been made should be to a minimum depth of eight inches after settling.

24. Installation of the irrigation system on greens, tees and fairways is a very demanding operation. The specifications of an irrigation engineer must be followed. Any changes that are deemed necessary must be approved by the irrigation engineer and the owner or his representative. The changes must be then submitted to the architect in writing and a complete copy of the "as built" drawings made available to the owner or his representative.

25. The contractor shall be responsible for the transportation of the pipe and all other parts from the point of delivery to the construction site.

26. All information as to size and type of pipe connections, wires, valves, fittings, risers and couplings should be tabulated.

27. The contractor is responsible for digging the trenches in the location and depth shown on the irrigation engineer's drawings.

28. Pipe should be laid according to the irrigation engineer's drawings. The pipe should be laid in a bed of fine gravel or sand to protect from rocks under and around the pipe.

29. The contract should contain a statement of how long the contractor is obligated to correct any leakage or any other malfunction because of faulty installation.

30. Sand traps will be finished as shown on the architect's plans as the greens are constructed.

31. Collars, fringe areas and approaches around greens are to have 10 inches of topsoil after settling and conform to the architect's drawings.

32. Topsoil shall be mixed by volume and conform to the specifications stated in the laboratory soil analysis.

34. All topsoil will be mixed off-site and transported to the green.

35. The finished grades will conform to the architect's plans.

36. Seeding rates and application of seed shall conform to specifications of the architect.

No specifications were written as to how deep topsoil mix should be on this green.

Irrigation lines and drainage need to be planned together. Here the drain line was laid, then the irrigation line cut through. The mistake was not corrected until a wet area developed.

When erosion started during construction, the area was not regraded; boards were placed to divert water. What happens when boards are eventually removed?

37. After seeding, the contractor shall be responsible for watering the turf until the completed job is accepted by owner or his representative.

38. Contractor will restore any area damaged or eroded until the completed job is accepted by owner or his representative.

39. It shall be the owner's responsibility to provide all necessary equipment to irrigate, mow, fertilize and top-dress or otherwise maintain the course until completion.

40. Owner or his representative shall be furnished with duplicate copies of invoices for any materials used on the construction project upon request.

The above steps will help on many construction projects to protect the buyer from many "built in" problems.

No matter how good the architect is or how good the contractor is, if sufficient money to build the course properly is not available, then the course will always show it. There have been countless "great" golf courses designed on paper and even laid out, but there are few that have been realized. The design and layout does not show the soil that the course is built on nor does it show what is under the soil's surface. This is why it is so important to have someone present to protect the investment as the course is being built. Plenty of money can be spent, but all of it should be well spent. As soon as anyone involved with the construction of a course, whether owner, architect, or contractor, starts to cut corners, the course is in trouble. In a large percentage of cases, the amount of money "saved" in construction will be spent many times over in future years in either extra maintenance or reconstruction—most likely both. So in construction, why not "spend your money only once?"

Top dressing and leveling a fairway as it nears completion.