PART I-TEES

COMPACTION ROBS GOLF COURSE OF NATURAL TURF CONDITIONS

By RON FREAM

Soil compaction is a severe, pervasive, and insidious problem facing golf course turfgrass managers. Prevention of soil compaction should be a key factor in golf course design, construction, and renovation.

Compaction leads both directly and indirectly to many serious problems, from poor turf quality to disease and weed encroachment. It adds to maintenance costs and can lessen player satisfaction in the course.

Soil compaction is induced by compression of the soil by human or vehicle traffic. Designs which cause constricted traffic, excessive traffic, or constant traffic will eventually cause a reduction in the quality, appearance and growth characteristics of the turfgrass.

The effects of compaction become evident at widely varying rates, depending upon soil texture, soil moisture conditions, climate, original construction, and maintenance procedures.

Compaction causes a reduction in soil pore space, impedes the exchange of oxygen and carbon dioxide within the soil, and restricts water movement. In technical terms, compaction causes an increase in soil bulk density, reduces hydraulic conductivity and decreases aeration porosity. All these things decrease the vigor of desirable turfgrasses while favoring less desirable species such as *Poa annua*.

Traffic on water saturated soil caused by compaction compounds problems by encouraging more compaction, especially on fine textured soils. Signs of compaction include poor drainage, soggy or uneven surfaces, presence of *Poa annua*, increased incidence of disease and heat stress, hard surfaces, and thin turf.

There are several very direct actions which can be taken on the drawing board to assist in preventing or reducing compaction problems.

The selection of a golf course site and the location of turf features can have long term impact on future turfgrass maintenance. The arrangement of golf holes relative to one another can affect future maintenance. The location of starting tees relative to the clubhouse, the practice facilities and the parking lot must be carefully considered. The location of a greensite relative to the next tee is pertinent. How the design accomodates the natural terrain and existing vegetation can have lasting and unalterable impact upon maintenance. Equipment storage area positioning and vehicle access to and from this area can influence maintenance efficiency. There are many subtle but critical matters to be considered when the golf hole layout plan is being conceived. Over-riding concern for maintenance alone without thought of playability or aesthetics will also only result in an inferior finished product.

Site selection can have long term impact on future turf maintenance.

Good design prevents *beating tee area to death. (Top photo)*

Tie walls *provide maximum utilization of space.*

TEEING SURFACES

Teeing surfaces receive more abuse and are given less attention than they deserve. How frequently does one arrive at the first tee only to find a rather small, rectangular, somewhat elevated area which is quite divot scarred, perhaps with more dirt than grass showing?

How simple it can be to design teeing areas which are large, functional and attractive. Larger teeing surfaces need not cause increased maintenance expense. In fact, while actual mowing time may increase somewhat; time and labor spent aerifying, top dressing and overseeding divot marks and appeasing irate golfers will likely decrease to more than offset the increased cost of mowing the enlarged surface.

When designing a new course or remodeling an existing one, teeing areas should provide no less than 5000 square feet (470 square meters) of usable surface. In fact, for shorter par 3 holes, where a divot is expected, a usable teeing surface of not less than 7500 square feet (700 square meters) would be our recommendation. Large teeing surfaces permit the turf manager to spread the traffic around with frequent repositioning of the tee markers and thereby permit the turf to recover. The golf architect

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should be able to design large teeing surfaces and incorporate these areas into interesting configurations and varying hole lengths. Attractive, asymetrical, multiple teeing areas can provide the necessary usable surface without the tees resembling landing strips or grass tennis courts. I do not believe there is such a thing as too large a teeing area. I know there are far too many undersized ones!

The use of soil amendments to enhance the seedbed conditions

Teeing areas should provide no less than 5,000 square feet.

of the teeing surfaces is recommended. All too often, the tee tops are nothing more than the local soil. As soil and "top-soil" are among the world's most variable commodities, the use of soil must be carefully considered, not assumed.

During construction, soil amendment of the teeing surfaces can be as easily accomplished as simply rototilling a little animal manure or composted tree bark humus into the existing soils. Under conditions of a sandy natural soil, little more than this may be necessary to provide a usable teeing surface which will resist compaction and encourage deep root growth.

If, on the other hand, the local soil is a heavy lateritic clay or some other conglomeration of fine to very fine textured silt and clay materials, very extensive remedial or preventative actions may be necessary to forestall compaction and drainage problems. In general, the finer the texture or more clay-like the existing soils, the more careful and perhaps elaborate must be the procedures followed to counteract the fine textured soils' propensity to compact.

The most elaborate form of tee modification is when the tee is constructed similar to a putting green. That is, a subsurface drainage line system, gravel layer and sand/humus seedbed layer are used to totally replace or overlay the original existing but unacceptable "native" soils. Only in cases of undesirable native soils or generous budgets need this full treatment be specified. When very adverse natural soil conditions are present, even though expensive, this full replacement procedure is, in fact, a longterm investment, not an expense.

It is highly advantageous to rely on a moderate form of the full replacement solution as a standard solution to minimize teeing surface soil compaction problems. Seedbed native soils can be amended with organic humus and/or carefully selected sand, which are rototilled into the existing soil. Alternately, a mixture of select sand and humus can be placed upon the underlying native soils. Perforated drainage lines, encased with a washed, carefully sized gravel, can be used in greater or

Green-like construction for tees is only needed in cases of undesirable native soils.

lesser amounts, as the specific site conditions dictate, to underlay the sand/humus seedbed layer. The native soil of the site, volume of annual rainfall and anticipated traffic are the principal determining factors when deciding how elaborate to build the teeing surfaces.

The initial shaping of the individual teeing surface areas is of the utmost importance. Teeing areas should be elevated above the adjacent terrain to provide gravity drainage. Irregularly leveled surfaces can cause water holding pockets or restrict surface drainage. Teeing surfaces should generally slope rearward to direct runoff water away from, not toward, the traffic patterns leading to the fairway and greensite. Teeing surfaces should be flat but only from side to side. Absolutely flat tee surfaces impede surface water runoff. Inclined surfaces encourage an airborne tee shot. Table top uniform surfaces do not assist in encouraging hooks or slices. Naturally, wherever upslope runoff flows onto a teeing surface, corrective or preventative action should be undertaken to divert this water away from the teeing surfaces.

The design arrangement and construction of the teeing surfaces must consider maintenance. Side slopes should be long and gradual; perhaps, 7 horizontal to 1 vertical or longer, though these side slopes need not be boringly uniform and manufactured in appearance. Slopes between adjacent teeing surfaces must also be either machine mowable or constructed with vertical walls to elim-

Larger teeing surfaces need not increase maintenance expense.

inate unusable or overly steep slopes.

Walls and, at times, steps can be used very successfully at some teeing surfaces for aesthetic impact and more efficient maintenance as well. Steps to provide a walk-on position onto some teeing surfaces certainly will assist in eliminating compaction and tracking up a side slope. Some very nice ornamental impact can be achieved if flowering shrubs or ground covers are used adjacent to teeing area walls where appropriate. The primary objective of using walls at all is to assist in eliminating unusable side slopes between teeing surfaces.

Do not overlook the practice range teeing area. Almost every practice tee is too small. Inadequate thought regarding the usable surface size leads to pathetic looking practice tees. Large size alone is not enough. Soil amelioration of the surface or complete replacement, if undesirable native soils, with an amendment program may be the only way to insure an ample, usable grassed surface. **WTT**

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