



MODERN METHODS OF SURVEYING A GOLF COURSE BY GPS

David Weston writes an appreciation of Global Positioning Satellites.

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The suggestion on the new R&A website that every Club should have an accurate map of their land holdings, is one that has considerable merit. Many Clubs will have details based on the old 1", 2.5" and 6" OS maps with the total area owned by the Club marked on each. On the largest scale map will be the plan of the course. An overlay (or copy) may then hold details of the irrigation system (pipes, cables, boxes and heads) with a second showing the drainage system. I found it useful to mark on the map, the names, addresses and telephone numbers of all owners of land and properties adjoining the course boundary, in readiness for that irate phone call.

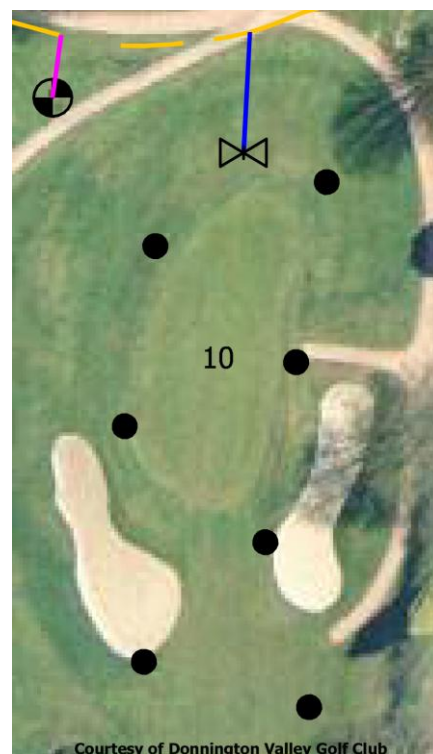
Should the Club wish to obtain planning permission from the local authority, site plans would be to hand. When using the plans to find an exact location on the course, for example, the confluence of two underground drains, they are of limited use. Digging holes is a hit and miss method, unless one of your staff happens to be a "welding rod" drain diviner. (Mock not, I had one on my staff, and he was never wrong.)

New technology based on Global Positioning Satellites has rendered that method of recording such information, and trial and error digging, obsolete. The information it provides is remarkably accurate. It is possible, but not essential for a Club to purchase a scaled digital aerial image / photograph of their course for about £750. Any company with the £20K of GPS equipment can then survey the course to whatever degree of detail is required at £400 to £500 per day. A typical full survey may well require 3-4 days. The results are then printed out on one, two or possibly three A0 sheets, depending on the shape and total area, to give the basic course plan.

On first inspection this may appear expensive, but once the Club has seen and used the digital information that the system generates, its value quickly becomes apparent. The survey equipment consists of a base station (a 20 cm unit on a 1 metre high tripod) and a portable 2m transponder staff linked to a hand held recorder. To obtain the accuracy required, the equipment needs to find a minimum of 5 satellites when on site. Each reading taken by the system relates that point to the National Ordnance Survey Grid pattern and records both exact grid position and height above sea level. Using a hand held unit only will give a position accurate to 5-10 metres. In conjunction with the on-site base unit as the local reference point, that accuracy is increased to + 0.5 – 1.0 metre. The spot height is accurate to + 0.5 metres.

Because of the digital values recorded, GPS equipment can relate to the national grid system; the data collected is common to any contractor using GPS. If, for example, it was planned to run a gas pipeline across the course, the GPS of the gas company, would overlay the course plan of the initial survey team precisely.

Irritech Limited (Irrigation Consultants), the company demonstrating the equipment to me, have pre-programmed their hand recorder with all the standard features they expect to find on any golf course; distance points, greens, bunkers, tees, water features, irrigation hardware etc. To record an individual feature, eg a sprinkler head or a distance point, the staff is placed on it and the recording button pressed. The operator may, but it is not necessary, note that point on the hand held recorder, as being a sprinkler head. To record the boundary of a green, tee or bunker, the transponder staff is placed on the edge, the recorder is switched to auto, which takes a reading every second and the operator walks round the feature with the staff just above the ground.



For a larger area, such as a fairway, where the spot height is unnecessary, the operator sits as a passenger on a transport vehicle, and slowly drives round the edge of the feature. The time interval can be changed on the recorder, to relate to the driving speed of the vehicle, thus taking readings at the required number of metres. This method can be used to follow the boundary of a lake, stream, copse, gorse or heather area. This may be especially useful for those Clubs that are involved with environmental studies or projects on their course and wish to know accurately their non-play areas.

In order to record underground features such as drains or irrigation pipes or cables, the knowledge and assistance of the greenkeepers can be most helpful in establishing their approximate position. Then a Cat and Genny, or metal detector, can be used to follow the line. Old irrigation pipework is unlikely to have been laid with a metal trace, but with new irrigation installations the cables and pipes are now usually laid together. The accurate contouring of a relatively flat area, may be of interest and use to a club wishing to improve drainage.

Back at office, the data is downloaded from the hand held recorder directly into the computer to produce a digital file. This digital file becomes the property of the Club. The special Trimble software is able to plot each reading and produce a dxf file. For example the operator can separate the details of the course, the irrigation features, the drains, and all the spot heights into four and generate onto them onto tracing film, as separate overlays.

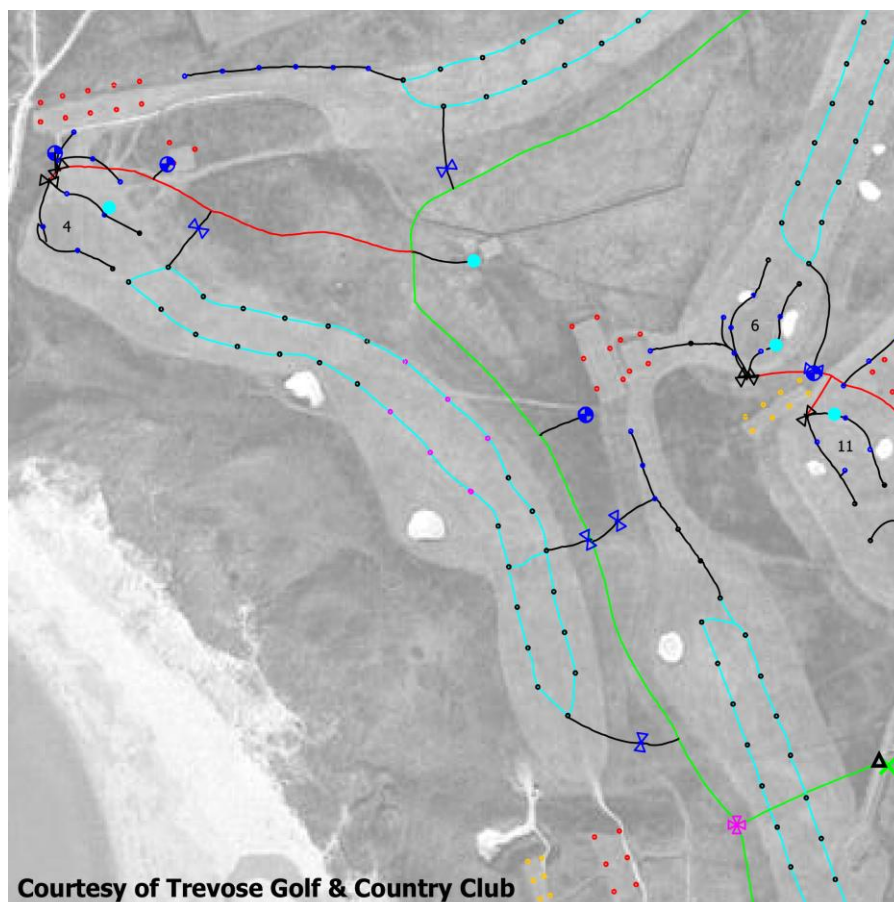
For a club intending to make course alterations in the future, holding this digital information is especially useful. It may be used to give the dimensions of any linear or area feature. As it is in “plan projection”, the card of the course can be produced from the data. If any alterations are

made to the positions of tees or greens, a hole length may be amended at a future date. Should the Club wish to install or extend an irrigation system, the materials specifications can be calculated precisely, with the cost of the initial photograph saved from having no unused pipework. The irrigation specialist can complete his design in total or planned phases, for presentation to the Club Management. When the plan is overlaid on the course photograph, the merits and operation of the scheme is readily apparent.

Knowing the exact area of each green and total green area will reduce wastage of fertiliser, pesticides and herbicides and allow more accurate ordering. The same applies for tees and fairways. The ability of the system to survey spot heights and produce the contouring of the course, will assist in determining the route for extra pipework for a club with a drainage problem. Possibly some of the damage to the irrigation system by the installation of drainage, or vice versa, can be avoided as the points of intersection can be marked on the ground prior to the contractors coming on site. The contractors are also able to construct new green or tee levels to the exact specification given by a golf course architect.

At Burnham & Berrow, the Club that kindly allowed me to observe the system in operation, it was suspected that one side of an elevated green was slowly sinking. The levels were taken across the green, along two parallel lines. The system is such that in a year's time, readings will be taken along the exact same lines and the amount and rate of sinkage determined.

Systems are already in place in America and some European countries where there is a GPS recorder fitted in the ride-on buggy, which allows the Pro or Caddy Master to locate the positions of all the groups on the course, allowing speed of play to be monitored. Similar computerised devices could be fitted to ride on cutting machines, with the boundaries of each area each machine cuts, pre-programmed into the unit. Each would then operate only within its own fixed boundaries. I am sceptical of the uses of such a system but I suppose it will only be a



Courtesy of Trevoze Golf & Country Club

matter of time before the micro GPS unit forms the centre of a golf ball, with a GPS reader in each buggy and the term “lost ball” disappears from the “Rules of Golf”.

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