

GPS for golf design

Golf course architects employ a range of sophisticated technologies to assist their work. Patrick Burton, ASGCA Associate, highlights how GPS is being used in golf design

There is no doubt we are in the midst of a technology boom. Within the last decade, we've witnessed considerable technological advancement. Most devices, whether used in our personal or business life, are now made to be extremely user friendly, meaning that you don't need to be a specialist to put them to good use. Smartphones, tablets, laptops, and even drones are part of golf course architect's toolbox—and we can now add GPS survey units to that list!

Mapping and land surveying dates back to the inception of our profession. Traditionally, such work has been carried out by allied professionals—land surveyors and engineers typically provide base mapping and as-built information upon which our designs are based, while construction personnel often provide as-built or in-progress construction data to help facilitate planning and field adjustments.

The production of accurate as-built survey data has traditionally required 'high-end' survey equipment which usually carries a steep investment—prohibitive for many—and a strong technical skillset. However, the

evolution of Global Positioning System (GPS) technology has resulted in survey-grade units that are affordable and easy to operate. Devices can now provide 1-3cm accuracy with a strong cell-network connection, and most can be linked to a tablet for easy operation. All survey data that is collected can be exported seamlessly into CAD programs, which opens up a host of additional services that architects can provide to clients, as follows:

Base mapping

Accurate survey-grade units allow golf course architects to create base map information for clients when it is otherwise unavailable or out of date. When coupled with orthorectified imagery, these base maps can be ideal for initial planning and cost estimating. Additionally, the ability to capture detail of unique site features enables their enhancement and/or preservation.

Topographic surveying

With so many courses in the U.S. having been built in the boom of the 1980s and 1990s, resurfacing greens

has become more common as these courses start to show age and wear. In resurfacing greens, a common practice is to soften contours to levels more appropriate for modern mowing heights and green speeds. Survey-grade GPS units allow for the creation of very accurate topography. When coupled with slope analysis maps, architects can work together with clubs to determine the best method and solution for altering green contours, while still preserving the fine details and nuances.

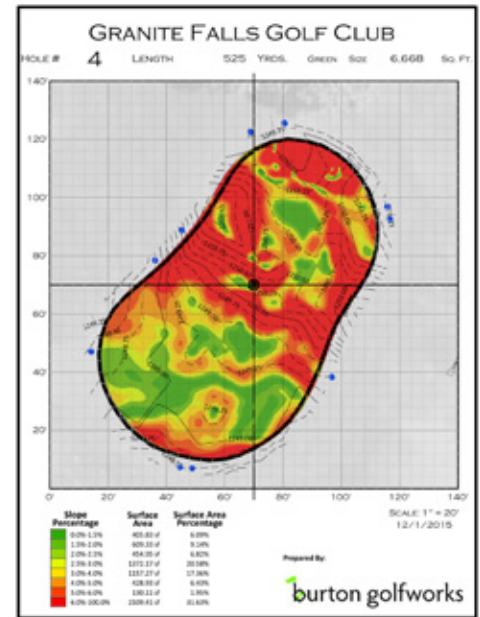
Staking out and beta testing

Architects can now stake out proposed design elements without any uncertainty, and beta test them with their clients. Elements such as new tees, bunkers, hazards, fairway expansions and green alterations can be laid out well prior to producing construction documents. The process is not only beneficial to architects, but allows members and clients to become more connected with the proposed changes and gives the architect valuable feedback prior to fully committing to implementing the elements into the final design.





GPS survey units can help architects create detailed green mapping with very accurate topography and slope analysis



Improved collaboration

When working on a project with irrigation designers, engineers, contractors and other consultants, having the ability for everyone to be working from the same survey datum allows individuals to integrate up-to-date information into their respective plans. This streamlines communication and the problem-solving process prior to and during construction.

Field adjustments

During the construction process, change is inevitable. Immediately after documenting problem areas, the surveyed 'field solution' can be added to the plan and analyzed for further development and assurances that safety, functionality, and playability are not compromised.

Construction documentation

Field observation services are commonplace for golf course architects, typically in the form of regular site inspections while the course is under construction, when the designer can work with field personnel and ensure the plans are being implemented properly. Accurate

survey equipment provides designers with the ability to monitor and track areas of disturbance and construction materials, and offer an enhanced management service for clients to ensure projects stay on budget.

The future will bring many more possibilities. For example, GPS units and drones work well together for base mapping and producing topography, with surveyed control points provided from GPS units, and drone-produced photogrammetry which provides contour data. Precision design—based on similar principles to precision agriculture—will see the introduction of remote sensing data provided by GPS and drone technology being used to provide a detailed understanding of a golf course's agronomic processes, so informed decisions can be made about design changes to improve a golf course's overall efficiency utilizing natural resources. ●

Consult your local ASGCA member to find out if a GPS survey may be beneficial to your golf project. Find a member at www.asgca.org/members.

Three tips for GPS surveys

1. Don't be intimidated

While the vernacular of surveying might be off-putting to some, the back end of collecting and processing surveys is all CAD based. If you know CAD, you can easily take advantage of GPS data.

2. Know your accuracy

As the phrase goes: garbage in, garbage out. With so many different kinds of GPS survey units out there, it's essential to know what makes one more accurate than another, and to make sure there are checks and balances set up on your unit to ensure the integrity of the collected data.

3. Know your limitations

Having the ability to survey base data, stakeout design features, as well as produce accurate topographic information is a game changer for golf course architects—but State Regulatory Statutes often mandate elements such as property lines and easements to be surveyed by a Registered Land Surveyor.