The Great Spec

Don't be afraid to try California greens

BY MICHAEL J. HURDZAN

A common misconception is that any 100-percent sand green is a California green. That's like saying all red automobiles are Ferraris because they all have four wheels.

I agree with my colleague Jim Moore that the green is the most important part of the golf course, and the USGA method is the most highly studied method available. But I don't believe there is any one best way to build a green.

My point of view has been shaped by more than 40 years of seeing greens built out of every imaginable combination of sand, organic matter, inorganic matter and soil — and all of them produce acceptable putting surfaces. Consequently, I believe the preferred method is the one best suited to any given combination of microclimate, irrigation water source, turfgrass, construction budget, maintenance goal and golfer expectations, and it is not always the USGA method. As we learn more about the complex interactions of the physical, biological and chemical aspects of green root zones, more scientifically sound construction methods or modifications will be found successful. One such formula is the California method.

A common misconception is that any 100-percent sand green is a California green. That's like saying all red automobiles are Ferraris because they all have four wheels. The difference for greens, as with cars, is in the details.

I also often hear about California greens that have failed. When I hear such claims, I ask the same two questions and I almost always get the same answers.

"Where is this green, for I would like to see it?" I ask innocently. The response is usually, "I'm not sure." By now, I'm fairly sure what's going on, but I ask the second question.

"What certified lab performed the sand analysis and quality-control testing?" I ask. The person usually says either, "I don't know," or "The sand wasn't tested."

From those two answers, I deduce that this failed green may only be a rumor. If it actually exists, it may not have been properly built to California recommendations. On the other hand, I can direct you to thousands of properly built California greens all over North America that grew in fast and that superintendents love because they are easy to care for.

No construction method can guarantee against short-term turfgrass failure, but you can avoid failure by following a few steps before recommending the root-zone architecture. Sources

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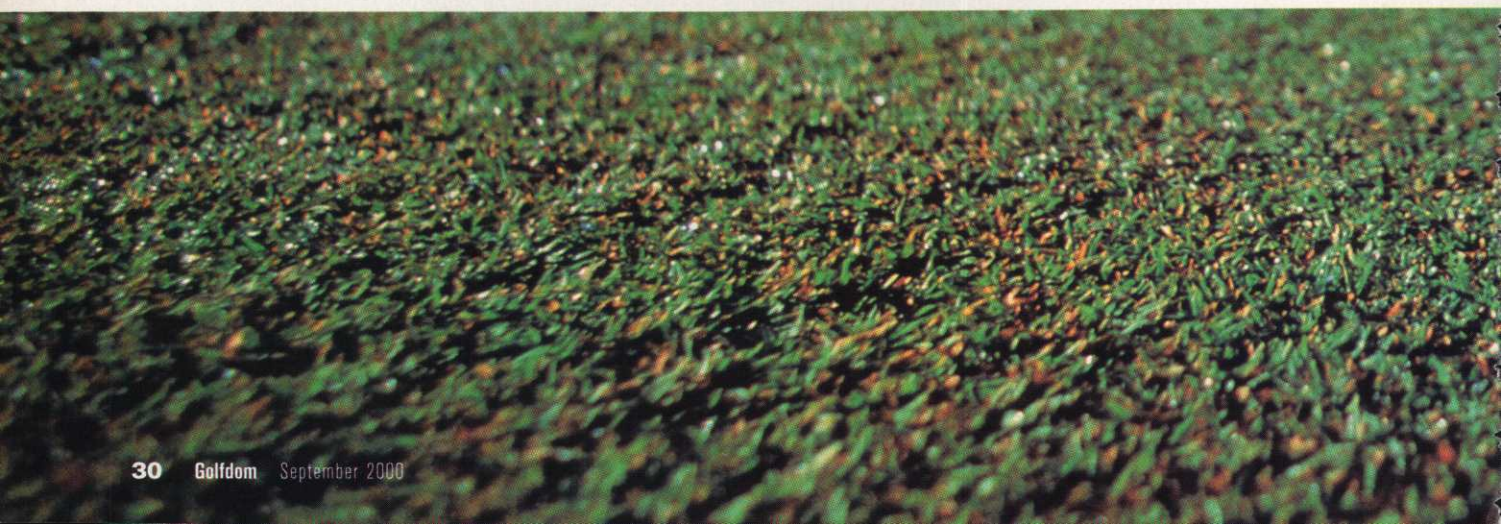

Debate

Good Ol' USGA stands the test of time

BY JIM MOORE

The USGA method is the most extensively researched style of construction, with scientific review ongoing to ensure it remains sound in the face of a rapidly changing industry.

The combination of a good economy and golf's increased popularity has resulted in unprecedented growth in golf course construction. All types of courses are being built — ranging from high-end facilities costing $20 million or more to the smallest kids' courses built for less than $100,000. Without question, this is one of the most exciting and challenging eras in golf's history.

With such a variety of courses being built, is it reasonable to expect one green construction method to be the most appropriate choice for every facility? It may surprise some to hear that the USGA Green Section does not consider its *Guidelines for a Method of Green Construction* the best choice in every case. There are courses where other construction methods can meet the modest agronomic demands placed on those particular greens.

For example, there's a great need for short courses across the country to give legions of young people who are learning the game a chance to play. The cost of building these courses can be reduced tremendously by using agronomic common sense. Greens that are mowed at three-sixteenths of an inch receive plenty of light and air movement, are designed with excellent surface drainage and are planted with turfgrass that thrives in the local climate. Hence, they need not be built to the USGA's rigorous guidelines.

On the other hand, those courses that must provide top-quality putting conditions day in and day out should not compromise on construction in any area, and most certainly not on the greens. Unsound green construction results in unreliable growing conditions, and frequently leads to legal disputes and loss of revenue.

Golf course builders, architects, superintendents, owners and ultimately golfers all depend on construction methods that work. They also need these methods to be well-documented so that they can be closely followed. The USGA and California methods of greens construction meet both of these needs, and therefore are the most commonly chosen. Both methods are offered to the game free of charge and are based on proven scientific principles. Both methods have their advantages and disadvantages. But which method is best?

There's no doubt the USGA method is superior. It has successfully stood the test of time, having been the most commonly chosen method for almost 40 years in all types of climates,

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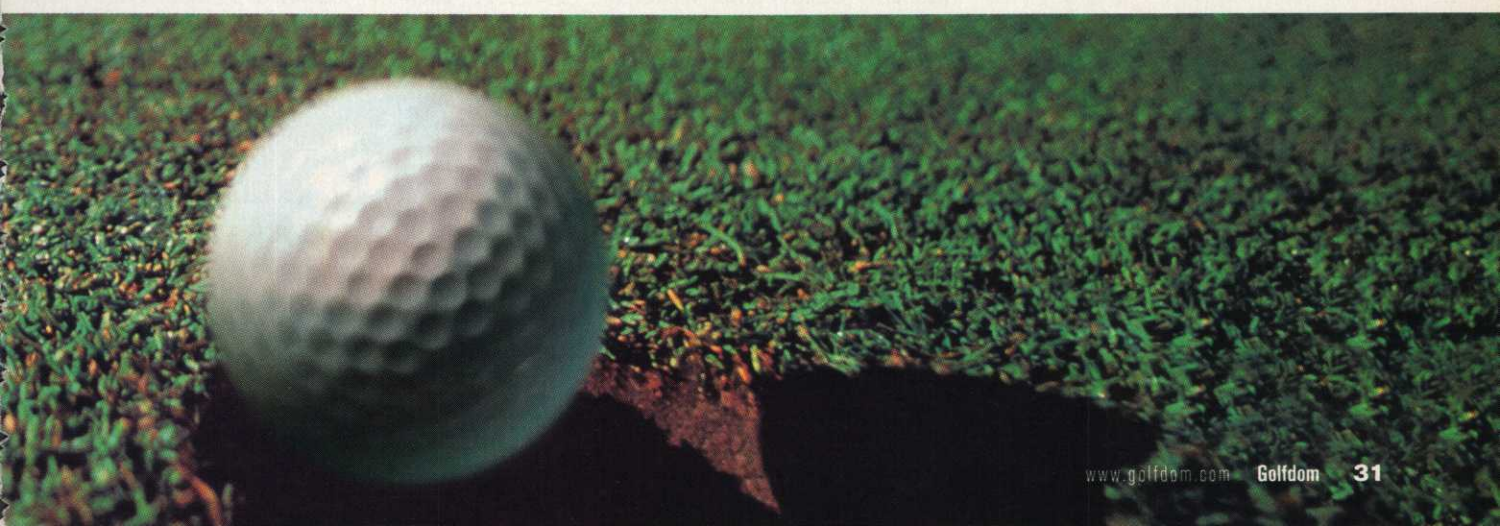

HURDZAN/FRY

There's no magic to the California construction method. It's basic plant and soil science.

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of green failure are more likely to be a poor quality irrigation source, a badly adapted turfgrass cultivar or an improper maintenance practice. My approach is to identify problem sources before beginning and selecting a root zone method that will combat the specific stresses.

I analyze the microclimate of the green for any obvious problems such as shade, air movement or humidity, among others. Then I evaluate the green for a number of possible hole locations, number of shots causing ball pits, traffic patterns and any other foreseeable problem. For some green sites, a USGA green might be best, while others are better served by a California or a modified method. The optimum solution is to try to find a construction method and root-zone architecture that represents the best middle ground for the situation.

Next, I analyze the irrigation water quality, for it will influence selection of turfgrasses and sand for the root zone. The sand should be tested in a lab — and don't hesitate to send a jug of your own water with the sand.

Most labs will test your sand with distilled water, which won't do you any good (unless you're irrigating with pure distilled water). So make sure you send a real-life sample, or you're wasting everyone's time.

After the analysis, it's time to decide on a root-zone architecture that will allow the superintendent to maintain the best balance of chemical, physical and biological factors to maximize turfgrass growth during stress. For some green sites, that "best" root zone is either USGA, California, topsoil or a combination of methods.

A self-fulfilling prophecy is defined as a situation where someone believes so strongly in an idea that it comes to pass because of the believer's subconscious actions. Many superintendents won't have success with California greens if they don't believe in them. I often see superintendents who struggle with California greens because they have biases. Their misconceptions are that California greens don't hold water and nutrients, that pure sand causes root abrasion, and that California greens are vulnerable to isolated dry spot. My advice is to keep an open mind and don't be saddled with prejudices.

Research by Ed McCoy of The Ohio State University, and loosely interpreted by me, bears out what we observe in the field on greens. Some observations are that California greens require less watering than USGA greens. USGA greens drain more quickly to field capacity, but California greens will drain more thoroughly over a long period of time. Flat tile also drains faster than round tile, and root-zone gases can

A modification of the California green combines flat tile and SubAir or Soil Air Technology concepts and equipment.

be exchanged in minutes by applying a vacuum to replace water with air or increase pressure to push up soil gases. Consequently, when we ask our clients to consider the alternatives for green construction, one method is a modified California green.

There is no magic to the California construction method; it's plain old plant and soil science. That California greens are easier to build and cost less are secondary factors to the fact that they perform better than other methods in many situations.

Michael J. Hurdzan is a past president of the American Society of Golf Course Architects and a principal and founding partner at Columbus, Ohio-based Hurdzan/Fry Golf Course Design.

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water-quality situations and architectural styles.

The USGA method is the most extensively researched style of construction with scientific review ongoing to ensure it remains sound in the face of a rapidly changing industry. It uses the gravel layer not only to move excess water to the drain lines, but also to provide more uniform moisture-retention levels throughout the green.

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The parameters for sand and gravel selection are generous enough to allow a range of materials to be used, but still specific enough to ensure that agronomic parameters such as porosity and saturated conductivity are met. Research conducted on greens and root zones that meet USGA guidelines has indicated that, with proper management, nutrient and pesticide leaching can be kept to a minimum. The drainage and moisture-retention characteristics of USGA greens result in consistent playing quality in all types of weather.

My belief that the USGA method is the best method of green construction available does not mean that I feel the California method is agronomically unsound. It has performed well in certain parts of the country, particularly in the area in which it was developed. The lack of the gravel layer and use of straight sand allow for simpler, less-expensive construction.

Research limited on California green

Unfortunately, research on the California method has been limited since the method was introduced. Although the method has received recent attention, it has not been widely used in different climates, making it more difficult to evaluate its strengths and weaknesses over a range of conditions.

While leaving the gravel layer out does reduce cost, Ed McCoy's research at The Ohio State University indicates the benefits of this layer for equalizing moisture levels and more complete drainage.

For all these reasons, I believe those who desire the best putting surfaces possible would

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Views from the Field

We asked readers if they favor USGA or California greens and why:

■ "We have always had excellent success with our USGA-constructed greens. I have very little knowledge and even less experience with any of the other methods. Frankly, I've never had much interest in the California method. With our success with the USGA method, I would say, 'If it ain't broken, don't fix it.' "

Bob Farren, *CGCS*
Pinehurst Resort and CC

■ "If the soil is suitable, we favor native soil/sand greens where possible. Failing that, we lean toward USGA greens because they're considered the 'optimum,' and we could have legal troubles someday if we advise differently and the greens fail. I've built a bunch of USGA greens by the book, and they still work fine. But I don't really understand the benefits of the perched water table."

Tom Doak, *Architect*

■ "Let's assume correctly sized sand was used in the first place, which is critical. Since they are created with very limited nutrient holding capacity, California greens have proven to be difficult for the majority of superintendents to grow in. Few can fertilize enough to do the grow-in without major setbacks. But once grown in, California greens are essentially equal to correctly constructed USGA greens in performance and at a significantly lower total cost of establishment (sand almost always costs less than organic matter). Few have read, and fewer understood, John Madison's work that led to the specification for California greens. Madison is nearly forgotten today, but he was the first academic to write about greens construction and maintenance as an environmental system. That's where the California green concept came from, and it's 100 percent viable when done correctly."

Mike Heacock, *former vice president and director of maintenance*
American Golf Corp.

■ "I have never had any experience with California greens. We built a USGA-spec green in 1994 and have had good success with it. I don't believe I would try a California green because my experience with a straight 100-percent sand-base construction has not worked for me in the past. Even the 85/15 mixture that is in our 1994 USGA green is not nearly as forgiving as our 1921 push-up soil greens, which have been topdressed with straight 100 percent sand since 1976."

Wayne Otto, *CGCS*
Ozaukee CC
Mequon, Wis.

■ "I recommend the USGA method of putting green construction. This method has withstood the test of time. If all the parameters are met during construction (including quality-control methods), putting greens can be built anywhere in the world under any conditions."

John Hamilton
Agronomist
Southern Turf Nurseries

■ "I prefer USGA because that's where the science is, and [the greens] have a 40-year history. Very few people know what a true California green is because they never take time to study the real specifications from the California booklet. Most greens built are modified California greens with no basis for scientific backup."

Gary Grigg
President
Greenscape

The Trend Toward Inorganics

Significant progress has been made in the past 10 years in the search for the next generation of putting greens. During this time, the golf industry has begun to re-evaluate decades-old construction methods in an effort to produce greens that are easier and less expensive to manage and that will also last longer. While USGA- and California-style greens remain the standards, putting greens built using inorganic soil amendments have caught the attention of more than a few superintendents, architects and builders. More than 1,000 golf greens have been built in the past decade using these materials.

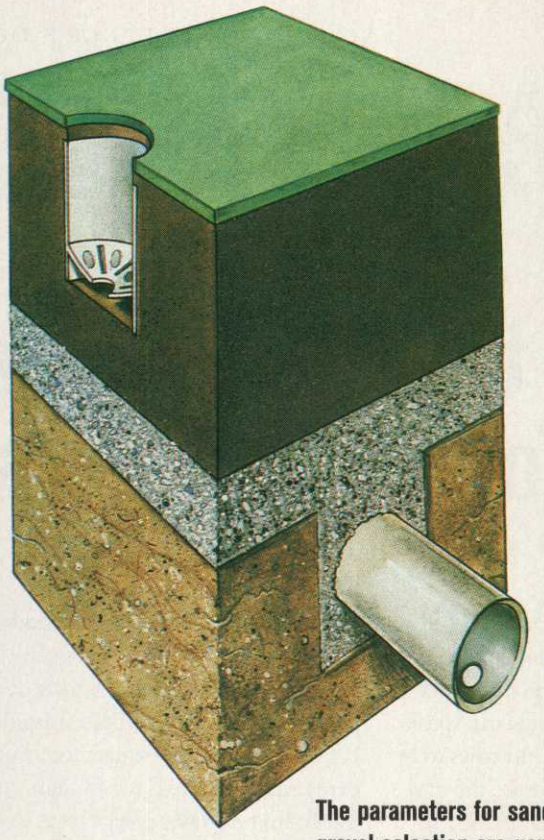
There are several classes of inorganic amendments (clay-based porous ceramics, kiln-fired and nonkiln-fired diatomaceous earths and zeolites). Although these classes of inorganic amendments have different physical characteristics and chemical properties, they do have two things in common: Since they do not contain carbon compounds, they are more stable than organic amendments and do not decompose. They also contain varying amounts of internal porosity. For that reason, they are often referred to as internally porous inorganic amendments (IPIAs).

Superintendents are wise to be skeptical of products that don't have significant research to support them. In general, the products that have been most extensively researched and proven are in the category known as clay-based porous ceramics. These products provide benefits that at one time were considered to be mutually exclusive – significantly increasing water and nutrient retention, while at the same time increasing drainage during saturated conditions.

Proven IPIAs can be used the same way sand is in common cultural practices. Either alone or mixed with properly sized sand, they can be used for topdressing during the growing season or following aerification, as well as drill and fill machines or dry inject units.

For new construction, the best practice is to substitute IPIAs for organic amendments or use IPIAs in combination with them.

Although the use of inorganic amendments in putting greens is still in its infancy, the trend is growing.



USGA

The parameters for sand and gravel selection are generous enough to allow a range of materials to be utilized, but still specific enough to ensure that agronomic parameters such as porosity and saturated conductivity are met.

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be wise to choose the USGA method. Although I recognize that few courses have unlimited construction budgets, equally few courses should settle for anything less than the best when it comes to greens. The combination of past and continuing research, 40 years of success throughout several countries and proven agronomic strengths justifies the additional cost for those who expect the best.

Regardless of which method is chosen, it's critical to follow the respective guidelines. Modified California and USGA greens are true unknowns. The modifications typically involve the use of materials that fail to meet either method's guidelines. As a result, they frequently result in root zones far less favorable to top-quality turf.

It is unreasonable to expect one method to best fit every situation. My hope is that, as research efforts continue, the California method and other methods of construction will be more viable options.

This same effort will result in the USGA method becoming more affordable to all types of courses. This is entirely consistent with the USGA's goal to serve the game of golf and the Green Section's goal to do this through sound agronomic recommendations.

Jim Moore is USGA's director of construction education.