ATTEMPTING THE MASTER PLAN

By Ted Baker, President
Ted Baker & Associates

Editor's Note: *This interesting and well written piece by Ted Baker is accompanied by some equally interesting sidenotes by Bill Newton. This feature for this issue should be named FROM ACROSS NORTH AMERICA this time. It is an original piece that appeared in the Winter 1993 issue of Ontario GREENS. Doug Suter, golf course superintendent at the Credit Valley Golf Club, is the Ontario editor and distributed issues to those of us attending the Chapter Editors' seminar in Dallas. Both Baker and Newton are Canadians; Bill operates a firm called Golf Images. Thanks to Bill for permission to reprint; Doug was on "holiday" when I was at press time. The advice and observations of these Canadian friends will please all who read them.*

The construction of a golf course is like building a house—neither are ever finished. Always, there are changes and improvements to be made.

For example, the critical list for a course includes: areas of poor drainage, places where grass will not grow, trees to be planted or cut down, greens that settle—the job never ends.

Nonetheless, because a golf course evolves over many years, the business of being involved in design refinements can be exciting.

It is the job of management and/or the green committee to keep up with various problems and to use capital wisely to correct the offending areas. Golf course deficiencies, such as those mentioned, are often only symptoms of underlying design or structural problems. And, at most clubs, there are dozens of expert opinions of what the problem is, and how to rectify it.

The ultimate answer is for management and the green committee to work with a golf course architect to develop a master plan. This is usually a phased program of five to ten years during which improvements will be made to the course in a logical, sequential manner to avoid duplication of construction. More importantly, a good plan can avoid replacing one problem with another.

The evaluation process usually started by the green committee, which eventually leads to the preparation of a master plan, starts by defining all the things that are wrong with the golf course. Although this information is critical, I believe it is the wrong place to start.

A golf course has a very special place in the lives of members. It is a property they usually cherish and regard as theirs. The club they have chosen to join, and often at great expense, becomes an extension of their home. The course they love has features which make it unique to them, challenging and ultimately worth their investment of time and money.

Thus, if the deficiencies of the course are the factors that lead to the exploration of a master plan, it is the amenities of the course that should become the foundation of that plan.

I believe very strongly that prior to tackling the problems of the course, or even identifying those issues, the golf course architect—in consultation with the membership—should record those holes or features found on the property that make it special to the membership.

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Ted Baker, principal in Ted Baker & Associates, is an accomplished designer and planner. His recent election as a Fellow of the Canadian Society of Landscape Architects reflects this.

Assignments have included innovative solutions for public parks, major corporate centers, municipal landfill sites and master planning for residential and commercial developments.

But, perhaps, his foremost interest is the design of golf courses where he can respect the best traditions of golf course architecture—enhanced by the modern techniques of landscape architecture.

Baker has designed many courses including the now well-regarded Lionhead. Currently, he is working on more than a dozen courses. He firmly believes that a golf course must exist in harmony with nature—giving the impression that it has always been there.

Ted Baker, like so many good Canadian architects, has links to Stanley Thompson, Howard Watson and Robbie Robinson.

The natural approach to design, as practiced by Ted Baker, began with a job acquired during summer university days when he worked for one of Canada's dean of architects, Howard Watson.

Over two decades Watson continued to be his mentor. For example, Ted learned from Howard that counting empty fertilizer bags was one way of checking a supplier's invoice.

Baker also tells the story related to him by Howard about the early work days under Stanley Thompson.

Apparently, the young Watson and a fellow worker, Robert Trent Jones, came to an agreement. Jones was anxious to learn more about the backroom studio techniques that Howard had mastered. At the same time, Watson was keen to become a better golfer. Jones was an accomplished amateur out of upper New York State.

They struck a deal—Watson would teach Jones more about the technical aspects of architecture and Jones would teach Watson to play better golf.

Watson, many years later, confided to Baker: "Obviously, I did a better job than Trent."

—Bill Newton

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The identification of these features will also start to define the original style of the design. This is important given that each property lends itself to a particular architectural approach. Assuming the first attempt correctly captured the spirit, a good master plan should identify the particular signature of the original designers and reflect those characteristics in any changes made to the course.

Typically, the style of berming, contouring and shaping must be consistent. It is only through discovering the merits of the golf course that the plan can ultimately be judged.

On completion, the master plan should ensure that those features that were found to be exemplary in the beginning remain, and, perhaps, are reinforced. As well, the design recommendations must be in keeping with the heritage of the property.

Every golf course generates many positive thoughts. Think about yours. Here is a check list I often use in the pre-design process. Certainly, it is a kind of mental gymnastic I go through to describe my own course during conversation.

Thinking about your own course

- *Think about the holes* that make you comfortable.
- *Think about the greens* you wait with anticipation to hit into.
- *Think about the places* where you will find yourself turning in a slow circle to take in the full panoramic view.
- *Think about those warm*, protective places in early spring or late fall and the cool shaded areas that are a welcome relief during hot summer days.
- *Think about the hole* which, every year, is the turning point in the club championship.

Get all these thoughts in your mind—or better still, write them down. You are now in a frame of mind to constructively discuss the master plan.

To paraphrase an old song, 'concentrate on the positive, eliminate the negative.'

Take-All Patch

By Dr. Julie Meyer
Department of Plant Pathology
University of Wisconsin-Madison

Look in any reference book on take-all patch, and you will find that this disease occurs mainly on bentgrass, when temperatures are cool, soil is moist and where soil pH is high. Unfortunately, these conditions are very typical for golf turf in Wisconsin. And we are indeed recognizing take-all patch as a problem on bentgrass fairways, tees and greens.

Take-all patch is a root disease caused by a common soil fungus. By the time it was recognized as a pathogen on turfgrass in the early 1930's, it was a well-known pathogen on cereal grasses. Because cereals are one of our most important food crops, you can imagine that *Gaeumannomyces graminis*, the take-all pathogen, is one of the best-studied root pathogens. This is fortunate for turfgrass pathologists, who can use this information as a basis for investigations of the disease on turf.

Take-all patch can persist from year to year, with varying intensity depending on weather and host stress. The fungus requires rather high soil moisture to grow and establish itself. It is most active during cool, wet weather. However, symptoms are often more apparent in late summer and early fall. This is because vigorously growing plants often do not succumb to the fungus until the stress of heat, drought or other factors finally tip the balance in favor of the pathogen.

At the edge of a diseased patch of turf, the plants have few roots, and detach easily from the soil if you gently tug them. If you look at the remaining roots under the microscope, you'll see dark-brown hyphae, resembling thick, dark thread, running over the surface of the roots. In mixed stands, the bentgrass will often be killed, leaving other grasses intact. As a band-aid measure, diseased bentgrass patches may be repaired with a piece of fescue or Kentucky blue grass sod. These species are generally not susceptible to take-all.

One of the main soil properties affecting take-all disease is soil pH. J.D. Smith, working at the time in Great Britain, was the first to show definitively that the pH in the top one-half to one inch of soil is critical to the development of take-all patch. This top layer of soil is where the pathogen is most active and where most microbiological activity takes place. He showed how liming with fine grade lime could lead to outbreaks of take-all patch, and how acidification with ammonium sulfate helped to control the disease.

This sensitivity to soil pH offers an opportunity to control this disease within a fertility program. Indiscriminate use of lime or alkaline fertilizers should be avoided, especially if you know the pathogen is present. Even if your soil is generally more acidic, low dosages of lime or alkaline materials can raise the pH of the top one-half inch of soil very quickly. It is these quick changes in pH which can be most conducive to take-all development. Maintaining the turf so that the top inch or so of soil is around 6.0 or slightly less is the best way to reduce the risk of take-all. Fertilization with ammonium sulfate has been reported by several turf pathologists to be quite effective in clearing up take-all patch over two or three seasons.

New bentgrass plantings are especially prone to take-all patch, especially if claimed from recently forested areas or if the soil was fumigated before planting. These are situations in which the microbial activity is very low. Take-all patch is an example of a disease that is easily suppressed by the activity of other microorganisms. *G. graminis* grows extensively outside of the root before it actually enters and infects the root, so it is open to competition and attack from other microorganisms that grow on roots. In the early 1980's, dramatic photographs were published showing how bacteria colonize and parasitize *G. graminis* on wheat. We don't know for sure, but it is likely this biological control happens on turf roots, too.

If left alone, take-all of cereals will decline over a period of about 5 years following a severe outbreak, and eventually disappear. This is thought to be due to changes in soil chemical properties, such as pH, and an increase in biological control that eventually suppress the activity of *G. graminis*. There are a few reports of this occurring in turf also.

G. graminis spreads slowly by growing from infected roots to new plants. Spores are not produced very often. The fungus is spread over longer distances by the movement of infected plant tissue during cultivation, such as core aeration, dethatching and perhaps even on golf shoes. Thus it may be practical to work areas known to have severe take-all separately.

Gaeumannomyces graminis, like most turf pathogens, is common in turf. Our goal in take-all control is not complete eradication, but to keep this fungus from causing visible symptoms. I believe our increasing knowledge of turf soils and management practices that suppress the pathogen are leading to stable and effective ways to keep this disease in check.

How Deep Are Those Holes?

By Robert Erdahl

Most of the time, I am a conservative kind of guy. I choose my mutual funds carefully, my kids do not own CD players or Nintendos and I listen to Rush Limbaugh whenever I get the chance. Given this state of conservatism, (my wife refers to it as dullness), what could have come over me back in April of 1992 when I started to aerify my putting greens with the Verti-Drain! Was I desperate? How about confused? Perhaps a touch of insanity! While I admit that all three of these sometimes play a role in my decision-making process, they were not a factor this time around. Let me try to explain.

Back in August of both 1990 and 1991, I began experiencing a problem with my putting greens that had not occurred in previous years. When changing cups, the top of the turfgrass plug would crack off right at the interface of the original greens mix and the overlying layer of sand topdressing. In other words, I had no roots below the three inches of Lakeshore Sand topdressing that has been used for the past eighteen years. We all know that roots gradually senesce all summer and are at their lowest mass by mid-August, but this dramatic stoppage of root growth at one depth on a majority of my putting greens had to be caused by a more definitive problem.

What was I doing wrong during this late summer stress period? I checked my irrigation routine, my fertilization practices, my pesticide applications, my usage of wetting agents and my aerification schedule. All five were within the averages for my first six years at North Shore when I did not have this rooting problem. Something was preventing my roots from penetrating the interface because I just could not get roots down into the original putting greens mix.

Now I know what you are thinking, it must be some kind of layering problem—all of that Lakeshore Sand used for topdressing has created a separate three inch thick microclimate on the surface of my putting greens. Well, being an old student of soils, I thought I had negated the effects of layering through years of core aerifying that included removing the cores and backfilling the aerifier holes with Lakeshore Sand. By August of 1990, I had aerified my putting greens eleven times with 5/8 inch coring tines mounted on Ryan Greenaires. By my calculations, that adds up to approximately 1.5 million aerifier holes in an average 5,000 square foot putting green. How can all those holes leave me with a layering problem?

Having tossed aside the notion that layering was my problem, I began to look for other explanations. My first thought was that some kind of chemical reaction was taking place at the interface. Perhaps some kind of toxic layer of soluble salts or pesticide residues had formed. To test my theory, I proceeded to test three putting greens at depths of 1 inch, 3 inches and 6 inches. Using these depths, I hoped to see if any differences existed between the Lakeshore Sand topdressing, the interface zone and the original putting greens mix. The soil tests included pH, major and minor nutrients, soluble salts, general pesticide residues and specific tests for chlorothalonil (Daconil 2787) and propiconixole (Banner), the two most commonly used pesticides on my putting greens. To make a long analysis short, the results did vary based on the depth of the soil sample but there was no evidence to suggest a buildup of any toxic compounds at the interface.

At this point, I turned again to the physical aspects of the soil environment to see if I had missed anything. Looking at the Lakeshore Sand topdressing, all I could see was the obvious—a uniform three inch layer of sand that contained almost ninety percent of the roots. The interface zone created through aerification was approximately three inches thick and contained a 50-50 mixture of the original putting greens mix and Lakeshore Sand. Underneath was the original

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Steve Scoville

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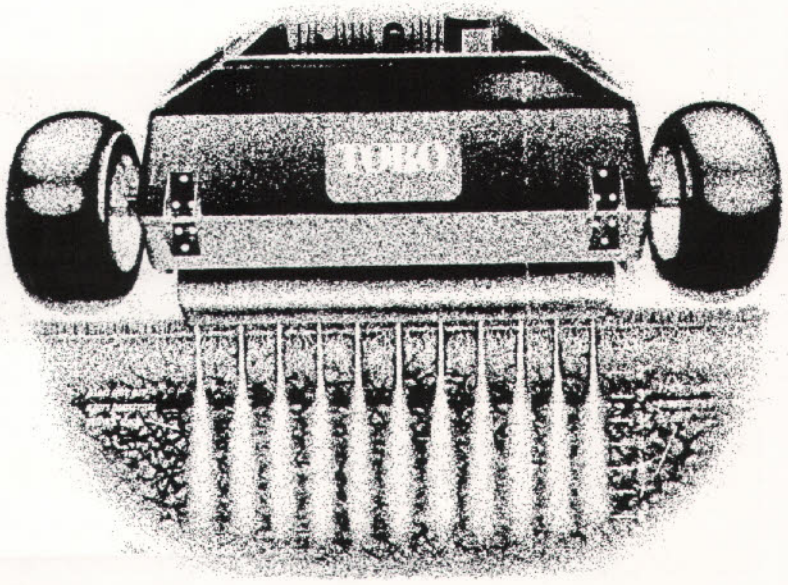

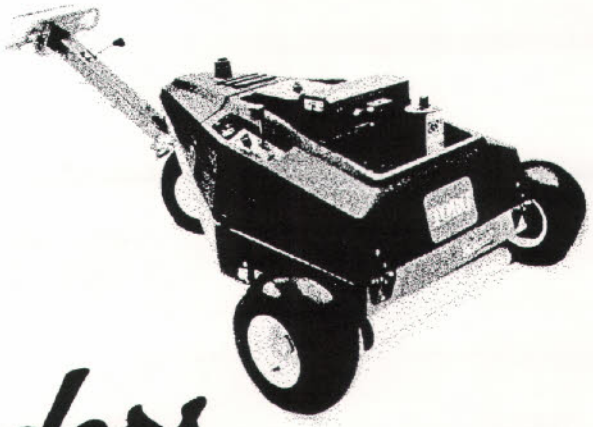

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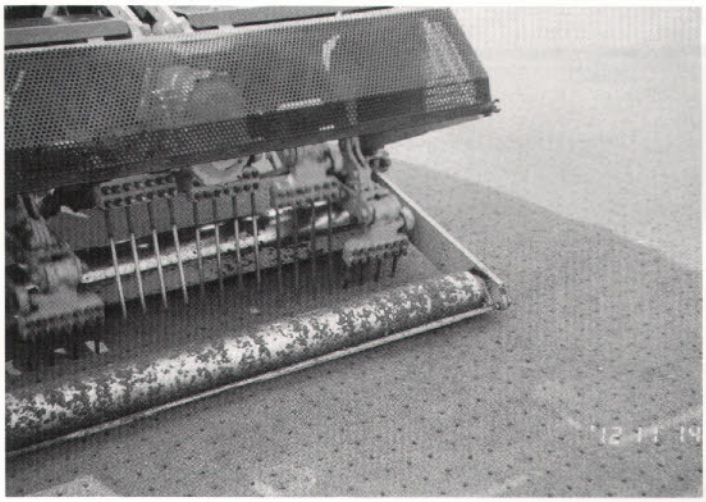
putting greens mix that was prepared on-site using a ratio of two parts very course sand (35% of the particles are over 1.0mm in diameter and 10% of the particles are over 2.0mm in diameter), one part sandy loam and two parts sphagnum peat moss. As you would expect, the combination of on-site mixing and interesting ratio of ingredients produced a mixture that has marginal consistency and does not fall within the guidelines of the USGA specifications. Based on overall performance, however, the mixture had held up fairly well for twenty-five years before the rooting problems developed in 1990.

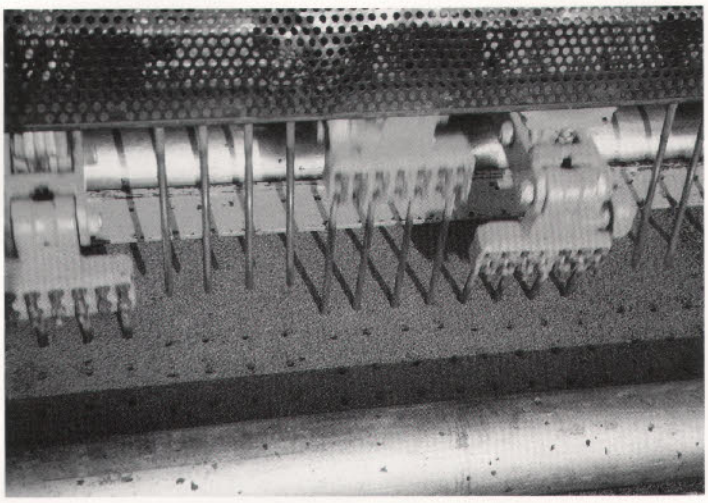
At the same time, I started paying attention to both research and speculation that linked core aerification with soil compaction. You remember the pictures that appeared in some of the magazines—they showed how the soil in the sides and bottom of aerifier holes gets compacted by the penetrating action of the tine. Some studies even suggested the development of a layer of compaction or an "Aerifier Pan" near the depth of aerification that was similar to a "Plow Pan" that can develop in agricultural soils that are always plowed at the same depth. With all the core aerification I had done on my putting greens, they definitely were candidates for this type of a problem.

It was beginning to look like a combination of compaction problems due to my intensive aerification program along with the lack of cooperation between the original putting greens mix and the Lakeshore Sand topdressing (alright, I admit that I may have had a layering problem!) was respon-

On the road with Dave Strang of Mechanical Soil Technology.

Side view of Dave Strang at work with a Verti-Drain equipped with ½" solid tines.





Close up views of the business end of a Verti-Drain equipped with ½" solid tines.

sible for the failure of the roots to penetrate the interface zone.

Now that I had reached a conclusion, albeit a questionable one, my next step was to take some action. Since my problem seemed to exist at a depth below three inches, deep aerification seemed to be the most logical solution. I looked at the Verti-Drain, Floyd-McKay and a bunch of other deep slicers and dicers, but I ruled them all out due to questionable track records or just plain weirdness.

Then along came the Toro Hydroject, and I thought my troubles were over. Right up front, I have to say that Hydroject is a masterpiece of engineering and seems to live up to all the advertising hype that surrounds it. Now that I've said all of those nice things, I have to turn around and tell you why it did not work for me at North Shore.

When the Hydroject sent it's blasts of high pressure water down into my putting greens, the coarse sand particles ricocheted right out of the holes and ended up all over the putting surface. It was a mess! I know that all I had to do was mount three sweeping heads on my GreensKing and the mess would be all picked up in a couple hours, but there were a couple of other nagging questions that were also bothering me. First, I was troubled by more than just the large sand particles coming to the surface. Since my original greens mix contained 20% sandy clay loam, I was afraid of bringing some of this to the surface and contaminating the Lakeshore Sand topdressing. Second, I was concerned just how much benefit I would get from the relatively small holes; or in other words, how often would I have to repeat the process. Third, the Hydroject seemed limited in application to greens and possibly tees. I could not see it doing much good on my fairways where the problems are clay soil and thatch buildup. And finally, I was hesitant to present the Hydroject concept to my Board of Directors, knowing full well that the only part of my presentation they would hear was the part about the Hydroject being a possible alternative to core aerification. None of them would recollect any of my disclaimers about the possible need to core aerify in the immediate and/or distant future.

It was not until early April of 1992 that I finally came to my senses about what to do with my problem. I had just received my copy of the USGA Green Section Record and was reading an article by Bob Vavrek that had the catchy title of "AERATION; Needed More Today Than Ever Before". The following paragraph from that article stopped me right in my tracks:

"Routine use of hollow-tine aeration can create a layer of compaction called a cultivation pan located just beyond the depth of tine penetration. Evidence of a cultivation pan is a soil core that breaks apart about 4" deep when cups are changed. A cultivation pan slows the movement of water through the green and restricts root penetration. An effective way to minimize the effects of this kind of compaction is by deep-tine aerification."

As I stated earlier, I had already known about "Aerifier Pan" and the benefits of deep-tine aerification for almost two full years, but somehow reading that one paragraph brought my entire situation into focus and just like in the cartoons, a lightbulb appeared over my head! Within thirty minutes of reading that paragraph I had talked to Dave Strang at Mechanical Soil Technology and had booked him to Verti-Drain my putting greens in early May. Dave is a contract aerator—more about him in just a bit.

After I hung up with Dave, I had some second thoughts about the whole affair. What had I done? I was actually going to attack my putting greens with a Verti-Drain. Not to worry, Dave had left me an escape. He told me that he was going to do some work for Jerry Kershasky at Westmoor Country Club about two weeks before his appointment with me and he invited me to come over and watch him do his thing. If I did not like what I saw, we would just cancel our date. After a quick call to Jerry, my Verti-Drain demonstration was all set.

It was a beautiful Spring day (40°F, cloudy, 25mph wind) when I got my first look at the Verti-Drain in action. Jerry took us out to his fifteenth green where Dave was busy punching holes with ½" solid tines. What was my first impression? I was amazed at what little, if any, disruption of the putting surface was left after this monster had violently jabbed it's massive tines into the putting green. Discounting for the blips caused by the holes left by the tines, the putting surface was smooth—no pulling up of the turf, no wheel tracks from the tractor, nothing. Next, Jerry put a stiff wire into one of the aerifier holes and marked the penetration with his fingers. When he pulled out the wire, it revealed a depth of twelve inches; deep enough to break through my compaction layer located at three inches. When I left Westmoor, I had two things; first, a firm date with Dave to do my putting greens and second, a debt of gratitude to Jerry for letting me watch as he experimented with the Verti-Drain on his greens!

Since I keep talking about this "Dave", I guess it is time

for a little background information. Dave Strang owns Mechanical Soil Technology, a contract aerifying company that has specialized in Verti-Draining throughout the entire Midwest for the past six years. In 1993, Dave did fifteen Wisconsin golf courses (selected greens only at some golf courses) and many more (Dave told me how many, but he doesn't like to brag so I won't tell) in seven other states. His equipment consists of a pair of Verti-Drain units mounted to compact tractors. He hauls both rigs around on a goose-neck trailer behind his dually pickup truck.

Even though Dave is a "flatlander" and he talks with just a hint of a drawl, he can make that Verti-Drain purr like a kitten. If Dave says the machine won't damage your greens, you can believe him. After all, Dave stood in our boots for six years before starting his business so he understands our concerns about the machine.

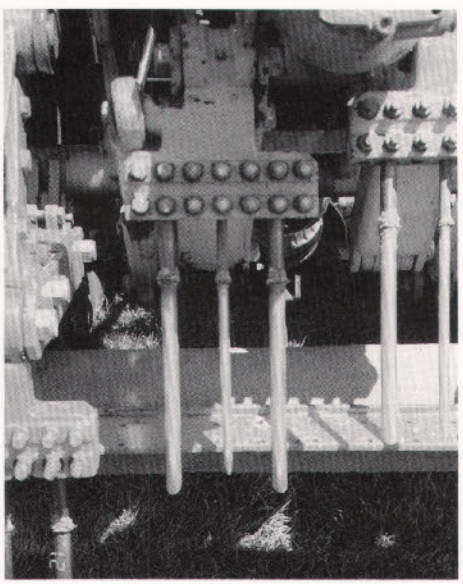
Before you get ready to kiss this guy's ring, don't forget that he doesn't do this as a hobby. If you want Dave to Verti-Drain for you, he charges by the square foot. His 1994 rates are 4¼ cents per foot for the 2"x4" pattern using ½' solid tines and 3¼ cents per foot for the 4"x4" pattern using either ¾" or ⅞" tines (hollow or solid). More about spacing and tines in a bit. At North Shore, I have Dave use the 2"x4" spacing with the ½" solid tines. On my 220 M square feet of putting surface the bill will come to $9,350.00. Bottom line on Dave; he knows his stuff—his Verti-Drain can cure a lot of problems—he ain't cheap.

When Dave showed up at my place back in May of 1992, the first thing he did was to explain all the different tines, spacing and kicks that were available. His machines handle ½", ¾", and ⅞" solid tines along with ⅝" and ¾" coring tines. For my situation we decided on the ½" solid tine. With the ½" solid tine, the hole left on the putting surface is too small to fill with top dressing. If you want to get some top dressing down into your putting greens, you have to use the bigger tines. Next we talked about spacing. I wanted a lot of holes, so we chose the 2"x4" spacing (remember, more holes equals more money). The wider 4"x4" spacing can be used with the ½" solid tines, but is usually used with the larger tines. Note that when I measured the actual spacing of the aerifier holes on my putting greens, the average spacing was 2¾" between holes. Last we discussed the kick-action of the machine. Dave routinely sets his machines to deliver the minimal amount of kick. This results in the tines going almost straight in and out.

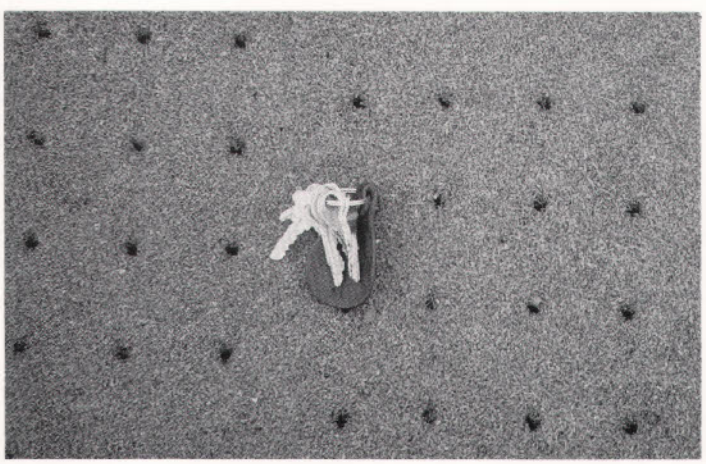
With the machines all squared away, we got down to some serious hole punching. It took both of Dave's units a little more than two long working days to finish up my twenty-eight putting greens. The immediate results were great; minimal disruption of play, quick recovery (the holes were grown over in a week), approximately 125,000 holes on a 5,000 square foot putting green along with twelve inch penetration. Any problems? Yes, a few. Golfers are fascinated by this machine so you have to be on constant patrol to explain exactly what is going on. Underground targets! If it's there, the Verti-Drain will find it! This includes rocks, hydraulic tubing, irrigation pipes, wires and tile lines. If you think your irrigation pipes are deep enough, think again! In addition to it's prowess as an aerifier, the Verti-Drain could be marketed as an irrigation pipe locator.

But was it a success? When August rolled around, all my greens once again suffered from root stoppage at the three inch depth . But wait! Every aerifier hole had a bunch of beautiful, white roots that went all the way down to the bottom—twelve inches deep. A miracle cure? Hardly; my greens did not really seem to be all that much healthier than in the two previous years. A step in the right direction? You bet! I knew it would take more than a one time shot in the arm to cure my problems.

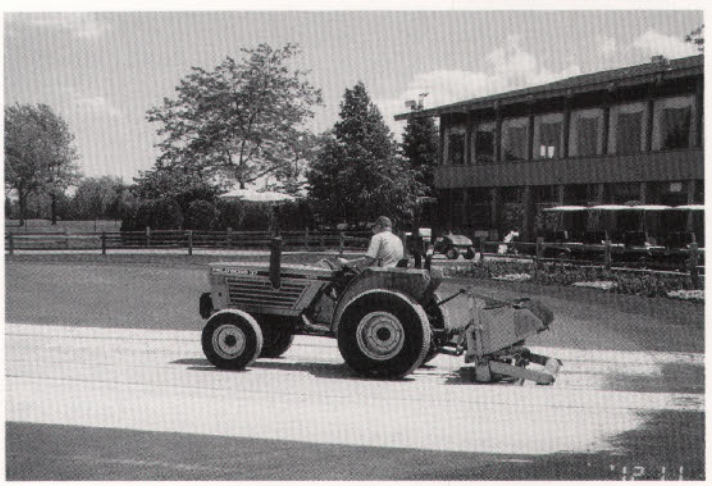
When Spring arrived in 1993, I was anxious to get the Verti-Drain up and running on my putting greens.



Close-up view of Verti-Drain arms equipped with ½" and ⅞" solid tines.



Close up view of a putting green immediately after aerification with a Verti-Drain equipped with ½" solid tines. Hole spacing is approximately 2 ¾".



Side view of Dave Strang at work with a Verti-Drain aerifying through sand top dressing with ½" and ⅞" solid tines.

Unfortunately, Mother Nature had other priorities and my appointment in late April was washed out. Given Dave's tight schedule, if you get washed out, you loose your turn and go to the end of the line; which in this case was June 13 and 14. Mid-June is usually not considered prime Verti-Drain time. But being a bit braver than normal, I told Dave we would try to do nine of my putting greens if it didn't get too hot. What it did do was to rain 1.15" the morning we were supposed to start. "Not to worry," said Dave. "Even on soft putting greens, I don't leave any wheel tracks." Well for some reason I believed this guy and you know what, he was right! The procedure went just as smooth as in 1992. When I checked the greens in August, the roots stopped at the three inch depth everywhere except in the Verti-Drain holes. Due to the extremely wet summer, however, the roots were not quite as numerous as 1992.

And what about the Verti-Drain holes from the Spring of 1992; were they still visible and were they still full of roots? Yes on both counts. From my very limited experience, it appears that the Verti-Drain holes made with ½" solid tines will remain viable at least two years.

After Dave finished with my nine greens, I decided to get really brave and have him blast the poorest part of my practice green with the ⅞" solid tines. To set up the machine, the arms are outfitted with two ⅞" solid tines on the outside and one ⅞" solid tine on the inside. Dave says that three ⅞" solid tines in a row is a little severe! The hole spacing is expanded to the 4"x4" pattern because the ⅞" solid tines tend to close up the previous holes and/or possibly cause some damage if used at the 2"x4" spacing. The sand topdressing was applied before aerifying because any wheel traffic over the area after aerification tends to close up the holes. This post-aerification ban on wheel traffic also meant that the sand had to be swept into the holes by hand.

Once again I was pleased with the short term results. The putting surface was left smooth and the soil conditions were vastly improved by the addition of thousands of columns of sand that were twelve inches deep and ⅞" in diameter. Unfortunately, the wet summer made it difficult to assess any increased rooting or improvement in the health of the turfgrass, so I look forward to next year and what I hope will be sand columns that are full of roots. Would I use the ⅞" solid tines on all of my putting greens? Probably not, but I'm sure glad I gave it a try.

What about my future Verti-Drain plans? Well, I would like to Verti-Drain my putting greens every April and September with ½" solid tines. I'd also like to use it on my old "Push Up" tees and I'd love to see it attack the clay soil in my fairways. Wait a minute, this is getting expensive! Dave will be able to retire just on the profits from North Shore.

Sorry Dave, my plans for 1994 call for the purchase of a Verti-Drain for North Shore. How much are they? Well, to duplicate Dave's unit would take $36,000.00 for both the Verti-Drain and the compact tractor. I should be able to pare that number down to about $24,000.00 by picking up a used tractor. Still a lot of money, but when you consider that Verti-Draining my greens just once a year runs $9,350.00, the payback for this investment is very quick.

My advice to everyone is simple. If you have greens that suffer from a layering problem and/or an "Aerifier Pan" situation, give the Verti-Drain a try. It won't hurt, and I'm willing to bet that it will probably help; maybe a little—maybe a lot. You'll have to discover that for yourself.