Ed Bale, CGCS and Northwood GC

By Ken Williams, CGCS

Northwood GC played host to the annual GCSANC Institute this past fall. Superintendent Ed Bale, CGCS and staff were tremendous hosts for the event. Due to time and space limitations, an article profiling Ed and the course could not be run at that time. We are finally able to share the story of Ed and Northwood GC for you now.

Northwood got its beginnings through the Bohemian Club, an exclusive all-male group of the elite from business, political, and entertainment worlds. The Bohemian Grove Encampment is just across the Russian River from Northwood. Members of the club spend two weeks every summer there and they wanted a place to play golf. Jack Neville was a Club member as well as on the Walker Cup team in 1923. He also won the California State Amateur in 1912, '13, '19, '22 and '29. Neville is probably most known as the architect for the Pebble Beach Golf Links. Jack is credited with the idea to build a golf course at Northwood. Neville drew up plans in 1925 but interested Alister MacKenzie in the challenge to build a course on the wooded land. MacKenzie, along with Robert Hunter and the American Golf Construction Co., completed Northwood in 1928. Many of the rich and famous played Northwood in the early years, including Bob Hope and Bing Crosby. Roger Maltby is a regular during the annual grove encampment and Clint Eastwood has been seen bouncing balls off the magnificent redwood trees.

The course went through a succession of owners and fell into neglect when the current owner, Northwood Recreation acquired the property out of foreclosure in 1970. Superintendent Ed Bale, CGCS and his family had a summer home on the course, which they had built in 1960. Being a family of golfers, they jumped at the opportunity to purchase Northwood with a few other "locals." They were concerned that it would no longer continue as a golf course. A prior owner had already subdivided three fairways with plans to build homes around the perimeter and reduce the size of the course.

Few changes have been made since 1928. Three of the holes were shortened; two slightly to make room to build a road around the course, and the third, the par 3 eighth, was shortened about 20 yards. The old #8 tee was too close to the landing zone of #9 and several injuries had occurred. Ed and his crew enlarged all of the tees to accommodate the greatly increased rounds. The devastating flood from the Russian River in 1986 did extreme damage to the course. All mounding and bunkers on #8 were rebuilt from the two to three foot deep deposits of sand and silt that covered the green. In all, two tees and over 2.5 acres required total rebuilding.

When Ed took over, all of the bunkers had grown over from lack of maintenance during the 60's. Ed began restoring them in 1988. He has 10 done with at least five more to go. A master plan, done in 1994 by Ron Fream and Dave Dale of Golfplan, includes plans for drainage, cart paths, green rebuilds, and other improvements. Tackling the drainage issue was at the forefront for Ed. "We had three huge lakes that accumulated during the winter with no place for the water to go. Once we got rid of the big lakes, we began addressing all of the little lakes we get," states Ed. Besides floods and drainage, shade is another obstacle for them. "The course sits within a redwood forest and most of the course sees no sun from November through March as the sun drops behind the trees." "It's a Poa course with bent, rye, and common Bermuda. The turf gets pretty thin, especially with a heavy rain year." Average rain totals are around 60 inches with some years in the late 1990's of over 100 inches. To attempt to get more sun on the course, Ed learned to climb trees in 1985. "We couldn't afford to hire a tree service at that time. I'm the adventurous type, so a friend in the business taught me." Ed would climb in the trees all during the winter season with his crew on the ground. Says Ed, "I was able to get a bit more of the precious sun on the greens, tees, and even some fairways. I have not climbed much lately, and at almost 48 years of age, it's not as easy doing so anymore." Fortunately for Ed, he still has the friend who taught him climbing to hire to take care of the current needs of the course.

Northwood consists of about 28 acres of maintained turf. Ed and his assistant, Robbin Hackett, have a crew of three full-time, 1 part-time, and 1 part-time mechanic. Greens are mowed daily between 3/16 and 7/32 depending on time of year. "If you want fast greens, go some place else," states Ed. With average green size around 4500 square feet, lots of slope to limit pin placement, and that elusive sun, Ed cuts them as high as he can get away with. "They roll about six to seven feet, but it depends if you are on the uphill or the downhill side of the pin to decide if you think they are fast or slow," says Ed. "I learned about course maintenance by doing it. I have a turf degree in grease, dirt, and dead grass," states Ed. Homer Williams took care of Northwood for over 30 years and died in 1973. He was a friend of the Bale family. Ed would go and hang out with Homer while he worked. "I was mowing greens with a Jake 22 when the handle was as tall as my head." Ed use to sit on Homer's lap while he pulled a 3-gang Toro with an old Oliver tractor. "Homer would operate the pedals in those days and let me steer," says Ed.

After high school, Ed spent a year in college, but left to pursue his love of music. Ed plays drums and has played professionally for over 27 years. He never made quite enough to survive, so he went back to work at Northwood in the early 70's. He wanted to see what other courses did, so he got a job at Santa Rosa CC working under Harold Bratton. Ed worked there one season, got laid off, and got a job part-time at a hardware store. The punk rock scene hit about then and Ed started backing-up a female punk rock band out of San Francisco. Things were obviously pretty good for Ed back then! He joined another SF band that put out two records. "That first record was an underground hit, and I still get calls from record collectors looking for copies. I only have a few, but I did sell a couple for some pretty good money, says Ed.

In March of 1980, Ed's Dad called and asked him if he would consider coming back to work at the course to take over the maintenance. Unfortunately, the course was in

Continued on Page 4

President's Message

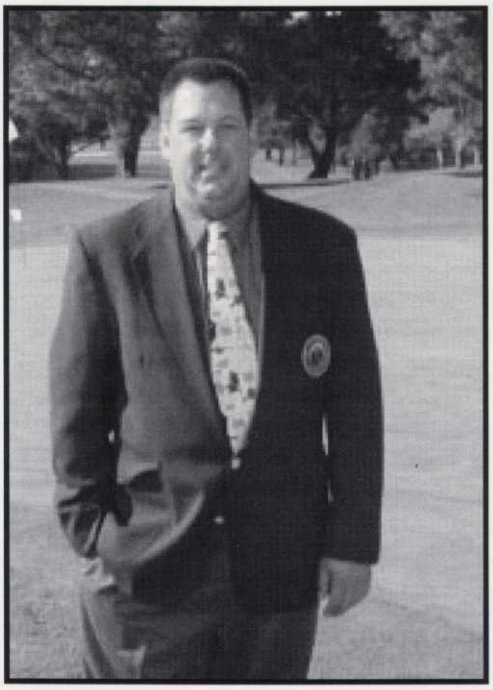
By Jeff Shafer

NATIONAL

While I was unable to attend national this year, I was fortunate enough to send my two Assistant Superintendents. All reports are that the event was another success. While I missed the experience of attending, it was great to see these two individuals come back with new ideas and renewed energy. If you ever get the chance to send someone from your staff, take advantage of it. This is a good way to not only educate those individuals, but also promote our association to the future members.

MONTHLY MEETINGS

The Workshop meeting is rapidly approaching and Bill Davis, CGCS of Peninsula Golf & CC has been working hard at both his new grow in and the construction on the other part of the golf course. Bill and the other host facilities this year deserve your support by attending and participating in the events. This would be a great time to bring your Greens Chairman, an Assistant, or even someone from your crew. The cost will be affordable and the topics of discussion will benefit everyone.



Jeff Shafer

MEMBERSHIP

There are several members that have already participated in some function with in the association this year. Brian Bagley, The Villages Golf & CC continues to be involved in the Workshop meeting organization and has done so for many years. Mike Clark, CGCS took the time to list some items that definitely benefit all of us. It is unsolicited commitment such as this that helps the association every year. Thanks to the both of you and to all the others that assist in whatever is required.

BOARD OF DIRECTORS

We recently held our first official meeting and it was great to see the energy from not only the previous years board members, but also the jump right in attitude of our new members. P.J. Spellman, Mike Hill, Jim Irvine and Gary Ingram all are new to the board, but have been very involved in the past. They have all been helping out at monthly meetings, sitting on educational committees, or offering assistance to the Scholarship meeting. We look forward to their new ideas and their involvement for years to come.

Thanks for your continued support and any board member would be happy to take the time to answer any questions or comments you may have.

We hope to see you all at the next meeting!

Office Notes

By Barb Mikel

At the January 16, 2002 Annual Meeting, the Necrology report failed to include Past GCSANC President, Walter Boysen. Walter was certainly a part of the association until his death. The April "Thru the Green" featured Walter's long association with Seqoyah Country Club, the site of the 2001 Superintendent's Field Day. He served as President of GCSANC and one of three GCSANC Presidents who continued to serve the industry as President of GCSAA. We regret this omission.

The association received a thank you note from the Thoratec Corporation on behalf of the Tom Burnett Family for funds collected at the Roddy Ranch, GCSANC - Sierra Nevada Meeting raffle. Raffle winners Sean and Taylor Shafer contributed all of their winnings back to the fund doubling the donation amount. We also received a thank you letter from the GCSAA Foundation for our donation to the FDNY and NYPD 911 Relief Funds.

Thanks to H.V. Carter Company, Inc. Dave Graves, Mike Ligon, Rex Gentry, Betty and all the staff for hosting the March 5th Board of Directors Meeting.

If others have conference rooms, boardrooms or other facilities central to our "wide ranging" group, please give me a call! We would appreciate your help.

PLEASE NOTE: GCSANC Membership Applications mailed last month are for new membership or member reclassification NOT RENEWAL. Give them to your assistant or someone who wants to join GCASNC. The form without "Attestor" signature lines is for membership reclassification. Assistant Superintendent to Superintendent, Retired member etc.

NCGA Golf Course Superintendent Internship Program Announces Four Openings

The Northern California Golf Association is taking applications for four openings in the highly regarded Golf Course Superintendent Internship Program. The internship program, the only one of its kind in the nation, can be up to two years in duration. The paid internship requires participants to complete ten blocks of instruction that include managerial skills, irrigation system management and equipment maintenance to name a few.

Applicants must have at least two years of college with course work that includes agronomy, horticulture or turf management. Several of the recent interns have had four-year degrees. Prior work experience on a golf course is highly recommended. The applicants must also understand the game of golf. Courses that will host an intern will be in the East Bay, North Bay, San Joaquin Valley and Monterey Peninsula areas. Applications can be obtained online at www.ncga.org. All applications must be postmarked by May 10, 2002.

For more information contact the NCGA at 831-625-4653.

Ed Bale (Cont'd)

pretty poor shape. "At that time, I was playing rock and roll from SF to LA, but still not getting rich." Steady money finally lured him back full-time to Northwood. Ed joined GCSAA in 1985, GCSANC in 1987, and became certified in 1988. States Ed, "Funny though, even after 22 years in the business, I still can't get used to the early hours."

Northwood has continued to improve over the years and now hosts about 60,000 18-hole rounds annually. It has come a long way since 1980 when Ed spent those first few years working alone, piecing together the now-abandoned quick-coupler irrigation system, and of course, dreaming of rock and roll.

Tips for Managing Winter Salt Problems

By David Wienecke, agronomist, USGA GREEN SECTION, Southwest Regional Update

Precipitation throughout much of the lower elevation zones of the South west Region has been well below normal for the past three months. Ordinarily the winter months of November, December, and January can be counted on to provide golf courses in the southwest with two to six inches of rain showers. These showers, combined with milder temperatures, provide turfgrass plants the conditions needed for enhanced root growth and recovery from the stresses of summer heat and the maintenance required for tolerating heavy golf play. Additionally, these deep root zone soakings help cleanse the soil of potentially toxic salt accumulations by leaching the salts into the deeper soil profiles and well away from roots. The rainwater flushing also dramatically enhances soil infiltration and percolation potentials making subsequent irrigation much more effective for deep soil penetration.

So far this year, the deep water precipitation flushing has not occurred and we need rain! We are also seeing light rainfall resulting in salts wicking up into the root zone and causing yellowing in some turfgrass areas. Until we get more rainfall you may wish to consider the following recommendations for making the best of the winter of 2001 - 2002.

* Irrigate your turfgrass - If rainfall of less than 1/4" is forecast, enhance the flushing and penetration effects of any rainfall by irrigating either during or immediately following rainfall with a heavy irrigation (i.e. 15 - 30 minutes minimum or to the point of saturation). Not only will you improve water penetration you will ultimately use less irrigation water than if not coupled with natural rain due to enhanced surfactant action of the rain. If you get heavy rainfall, supplemental irrigation is not needed.

* Flush salts - Irrigating concurrent to natural rain enhances salt flushing action well below root levels. Use an Electrical Conductivity (EC) meter to monitor salt movement down through the soil profile. EC meter readings are a good gauge to show how much flushing is needed to get salts below the root zone. For Annual bluegrass (Poa annua) greens, the goal is to keep the EC below 2.7 dS/M.

* Aerate - In cases of extremely dry conditions, you may want to spike or aerate monthly using 1/4" solid core tines to enhance water infiltration. This should not be done to dormant grass. Aerate only into actively growing turf.

* Use turf penetrant surfactants - In absence of the surfactant effects of rainfall, application of soil penetrant surfactants can also help get water moving through the soil.

* Educate golfers, crew, and club officials. Head off criticism by explaining the reasons for irrigation and other practices employed to compensate for less than adequate rainfall. You are enhancing water penetration while concurrently flushing salts farther away from the root zone.

Ideally we hope for higher precipitation amounts in February, March, and April to recharge our soils and flush salts as we get ready for our summer season. In case it doesn't happen, using these stopgap procedures will improve your turf health and vigor.

2002 California Hospitality Suite Sponsors

The California Hospitality Suite at Universal Studios "Pat O'Brien's, in Orlando, FL was a great success.

Please thank these sponsors for their generosity.

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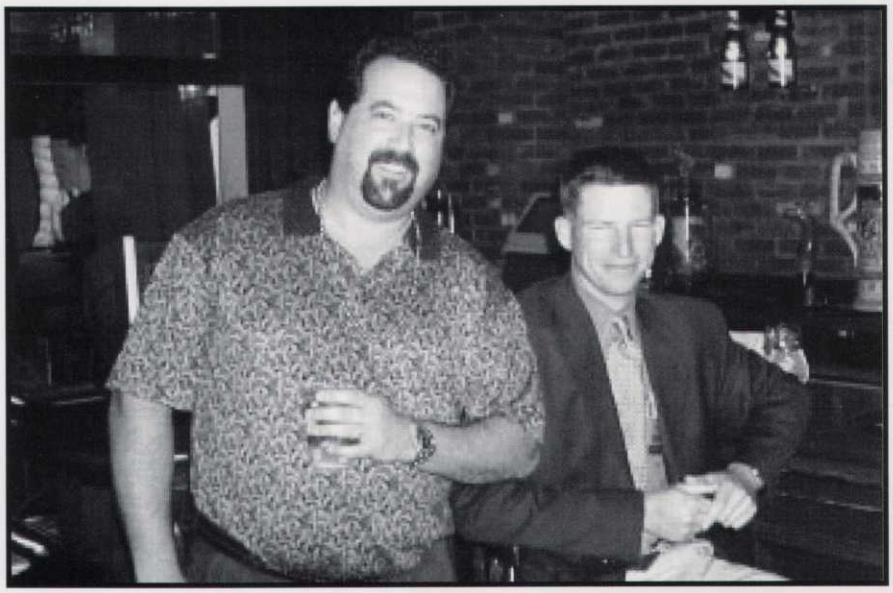


Sal Sorbello and Thomas Bastis at the California Hospitality Room in Orlando.

Myrtle Wagoner, The First Lady of GCSANC

By Gary K. Carls CGCS

One of the keys to any successful association is having key staff to run the day-to-day portion of the operations. For the last 45 years, we at GCSANC have been blessed with two chapter executive secretaries that have kept numerous Boards of Directors on course. Currently Barbara Mikel fills the role, but the lady who started the great tradition was Myrtle Wagoner.

In 1941 Myrtle married Cliff Wagoner and in the next six years they had two children, Shirley and Darryl. Today she has two grandkids and two great grandchildren. Like many women of the time, Myrtle was able to stay home and raise the children while Cliff was off earning the family income. Myrtle liked to sew and often took sewing classes to further develop her skills. When Cliff got more involved with the local superintendent chapter, Myrtle would regularly attend chapter meetings. When collecting money for meals at chapter functions became a problem, Myrtle volunteered to help. That was the beginning of her long association with GCSANC.

Over the years, Myrtle's role with GCSANC continued to evolve as the chapter grew larger. She first became an official employee of GCSANC in 1960 and by 1965 was making a whopping $600 per year in addition to a $100 bonus for 1964. In 1968 Myrtle was given an attaché case and the title of Executive Secretary. She did her 1st edition of the newsletter in September 1971. In 1974 she was given free lunches and her pay was all the way up to $1750 per year.

Those of us who joined the association in those times were fortunate to have Myrtle at the helm. She always made it a point to know everyone by name. She felt it was an important part of her job to know the members. I was always amazed at how well Myrtle seemed to know everyone when I had a hard time remembering just a few new names from month to month.

Cliff describes their years together as, "a

See "Myrtle Wagoner" page 6

Myrtle Wagoner (Cont'd)

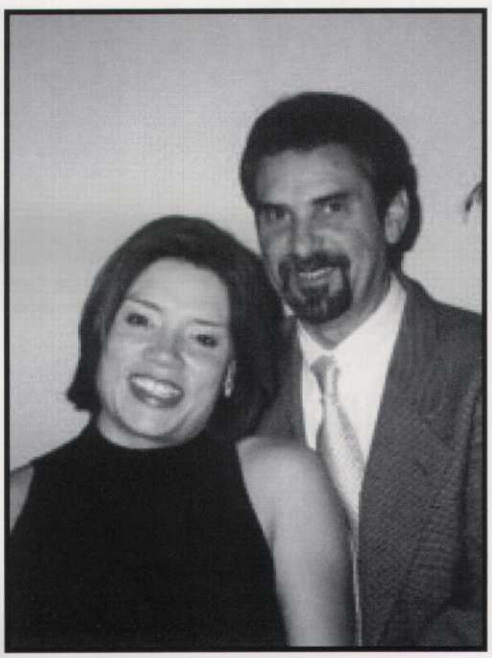
great example of teamwork" and a their relationship together as "complimentary." Cliff played little golf and Myrtle only tried a few times. They had many other things to do that didn't really allow much time for golf. As Cliff advanced in his career, Myrtle was always there to help in whatever way she could. She would help out in the office at Del Rio CC when staff was a little short handed. When Cliff was given the assignment to develop the Certification Program at the GCSAA, Myrtle was the one that typed all of the correspondence required in the process. When Cliff was working on some projects in Africa after his retirement from Del Rio CC, Myrtle would help out by typing reports for him. Although she didn't ski much, she joined the Modesto Ski Club in 1963 because Cliff enjoyed skiing and she would often just go along on the trips and watch the others ski. She also helped maintain the reservations for their ski lodge. She and Cliff also joined the local Model A club in 1980 and enjoy taking trips and participating in the various group functions.

Myrtle enjoys traveling, so it wasn't all work all the time. She has enjoyed traveling to the many places she and Cliff have been able to go because of his work or involvement with GCSAA. They have made visits to all 50 states and 8 provinces in Canada. She has attended 45 GCSAA Conferences with Cliff over the years and is looking forward to many more.

Myrtle officially retired in 1989 and was given a "Special Distinguished Service Award" from GCSANC. That doesn't mean she has stopped working on behalf of GCSANC. As part of the GCSANC 65th Anniversary in 1997 she and Cliff complied a historical record of the chapter. This included both a scrapbook and a written compilation of all the chapter records that were available since 1932. She was also a key member of the planning for the 65th Anniversary meeting that was held at Bayonet/Blackhorse in 1997 that included historical displays and showcased the history of our chapter. In 2000, the chapter donated a copy of the scrapbook to GCSAA for their historical collection. Myrtle and Cliff drove their Model A, on which they have logged over 70,000 miles, back to Lawrence, Kansas to deliver the scrapbook.

Myrtle set the standard for what a chapter Executive Secretary should be. Her dedication to GCSANC and its members help make the chapter what it is today. Even in retirement she and Cliff continue to be actively involved with the chapter and she still seems to remember all the names of those of us who joined while she was working for the chapter. It's always nice to talk with her when she attends a meeting and get her insight in the direction the association is going. If I didn't know better I would think she was still working for all of us. Thank you Myrtle, for all your hard work over the years and we look forward to your assistance in planning the 75th Anniversary in a few more years.

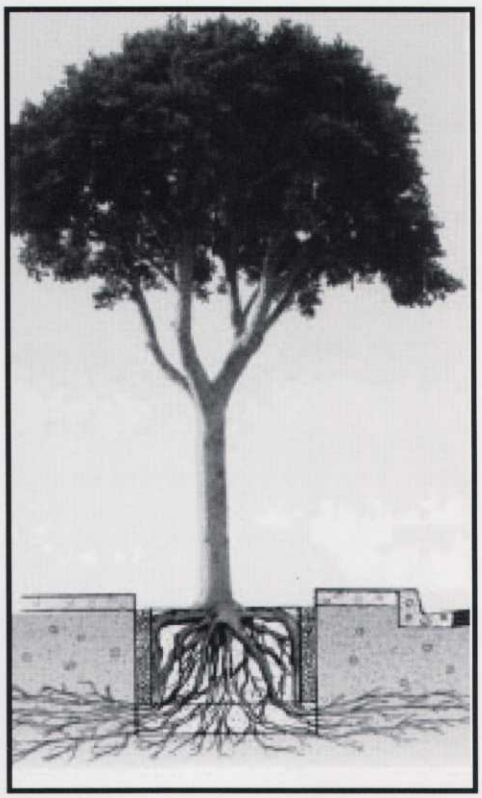
(Left to right) Having a great time at the 2002 California Golf Writers Dinner at the Links at Spanish Bay are Vice President Bob Lapic, Affiliate Member Don Naumann, and Secretary/Treasurer Patrick Finlen. They were in attendance that evening as fellow GCSANC Member Bob Costa, was honored as Golf Superintendent of the Year by the California Golf Writers Association.



Bob and Anita Costa at the Awards Banquet.

Root Barriers for Golf Course Applications

By Brian Burton



Introduction and Background; Why Root Barriers Are Essential

All pavement and hardscaping installations are critically dependent on the integrity and stability of base materials below the surface. Any disruption or movement of the base material or underlying structure will cause deficiencies to quickly appear on the surface. These defects generally manifest as rutting, heaving, or displacement of paving surfaces, which represent a hazard for players, vehicles, wheelchair users and pedestrians and can be expensive to repair.

In golf course applications the growth and development of tree root systems near pavement installations or turf areas can disrupt the base materials and other components in the manner described. In fact, a recent study cited defects directly attributed to tree root growth as the sixth most common cause of premature pavement in municipal applications.

*A survey of 18 California cities indicated that $70.7 million was spent annually statewide due to conflicts between street tree root growth and pavements. The largest single expenditure was for sidewalk repair ($23 million), followed by curb and gutter repair ($11.8 million), and trip and fall payments ($10.1 million). Substantial funds were invested to remove and replace trees in conflict with hardscape ($6.8 million), and for inspection and repair administration programs ($5.9 million). The use of root barriers and root pruning were the most important mitigation and prevention measures."

***Expenditures Associated With Conflicts Between Street Tree Root Growth And Hardscape In California, United States**
by E. Gregory McPherson

For this reason, root barriers, which prevent the growth of opportunistic tree roots under pavements such as sidewalks and roadways, have been increasingly recognized as essential components of hardscaping installations. Root barriers have consistently proven over time to be effective in eliminating deficiencies in new construction and have been successfully used to retrofit and repair existing installations.

Installing Root Barriers
Proper Detailing and Installation Important
Proper detailing and installation of root barriers is required at locations where tree roots intersect with hardscaping components to ensure successful long-term performance.

Surround Style Planting Applications
The first root barriers made their debut in the early 1970s. The first configuration used was a "surround style" barrier. These surround barriers could be purchased in one-piece, or they were assembled in rolls or panels which were connected together on-site.

Early research showed that the smooth walls of the surround sound barrier often lead to circling of the roots. The young tree roots would hit the side of the barrier and instead of growing in a downward direction they would grow in a horizontal path. This eventually resulted in a circular root configuration that could eventually "girdle" the tree. This kind of root growth pattern could eventually constrict the vascular system of the tree and inhibit growth. Root barriers are now available with ribs that encourage the downward growth of roots. In addition, other features, which are now available, assist in deep watering and continuing oxygen exchange in the soil.

One of the most crucial factors for the long-term success with surround style root barriers is ensuring the installation of the top edge of the root barrier above grade. It is also important to choose a root barrier of sufficient size to accommodate the growth of the tree as it matures over time. An undersized barrier will restrict root growth and compromise the trees ability to maintain a firm anchor in the soil. Additionally if the root barrier size is too two small it would be difficult or impossible to properly backfill between root ball and barrier. This condition will cause air pockets to become filled with water, creating conditions, which can lead to decline of root growth. In general barrier installation is much more successful if the soil to properly prepared. Specifically the soil should be loosened well below the bottom of the barrier to encourage deep rooting. If hard and compacted in later years the roots will grow out from the bottom and simply turn upward.

As well as proper soil preparation, accommodations for adequate soil moisture below the barrier should also be made at planting time. If adequate moisture levels below the barrier are not maintained the roots tend to grow near the surface where moisture is readily available.

Installation

* In instances where a tree pit is located within an area to be surfaced the subgrade should be prepared according to the design specifications.
* The initial planting hole as shown in the diagram. (Consideration should be given to installation of drainage devices or amendments to correct any adverse soil or planting conditions.)

Continued on page 8

Root Barriers (Cont'd)

* It is also recommended to dig an additional 12" to establish the largest possible rooting area below the depth of the barrier. This area should be re-compacted, either with the original excavation materials or soil amendments as necessary. This ensures that the roots will be able to penetrate the ground below the barrier, yet will not settle below grade with watering.
* Assemble the appropriate number of panels with the vertical root deflecting ribs on the panel facing inward toward the root ball.
* Next, place the barrier in the center of the planting hole, with the double top edge of the barrier positioned at the top of soil grade, (if there is no tree grate.) With a tree grate, place the barrier just below the lip that the tree grate sits on.
* Install the tree inside the barrier. Backfill soil inside the barrier to a level 1/2 inch below the double top edge of the root barrier. This will ensure that roots do not grow over the top of the root barrier.

Linear Installations

* When the tree pit is located beside a sidewalk or area to be surfaced, install the base and geotextiles where specified
* Determine the correct number of panels to be used. Depending upon the actual planting plan and the number of trees involved, the length of linear barrier will vary. As a general rule of thumb take the anticipated mature canopy diameter of the tree and add 2 feet.
* Choose the barrier that best suits the application. Generally if a sidewalk, patio or driveway is to be protected. (For most applications 18", root barriers are generally considered a sufficient depth. 12" root barriers can be used as an alternative choice for non-aggressive trees. For curb and gutter protection, or for more aggressive roots, however, 24" are generally a better choice.
* Excavate the area where pavements are to be laid. Place the barrier in a trench, at the edge of the excavated area, with the vertical ribs facing toward the tree and align in a straight fashion
* Install surfacing materials in specified manner. Follow the same procedures that you would normally. Be sure to keep the barrier's double top edge at least 1/2" above grade, or at grade, to ensure roots do not grow over the top. Plant the tree(s).

Trees have three primary forms of roots: the large, woody structural roots near the tree base, the long, woody transport roots and the ephemeral, absorbing roots. The absorbing roots usually do not form woody materials. These transport roots carry food to the root tips, as well as water and essential elements to the leaves. The longer a transport root survives, the bigger it becomes. Roots grow where soil resources are most plentiful. And if that area is near the soil surface, then that's where the roots will grow.

The two resources most important to tree-root growth are oxygen and water. Oxygen is available only near the soil surface in large air-filled soil pores. Tremendous competition exists for this oxygen between tree roots and other plant roots. Because of the ease with which roots pull water from the soil, roots sense and grow toward areas where plenty of water is available. The quandary is that water supplies must be located in the same soil areas where atmospheric oxygen also is available. Soil organisms quickly use the dissolved oxygen in soil water and, as a result, it is not as readily available to tree roots as atmospheric soil oxygen.

Atmospheric oxygen is essential to tree life. The aboveground portion of a tree has no problem finding oxygen in the air for respiration. (Oxygen content in the atmosphere is about 21 percent.) For roots, however, the plight of getting enough oxygen is severe.

For unconstrained root growth, the soil atmosphere must contain more than 15 percent oxygen. As soil-oxygen levels fall below 5 percent, root growth stops. Oxygen levels of less than 2 percent lead to root decline and death. The three major problems that cause inadequate soil oxygen are:
* Competing organisms
* Soil compaction,
* Water-filled pores (saturation).

All of these problems lead to an oxygen-limited condition of the soil: an anaerobic condition. Under anaerobic soil conditions, different types of microorganisms-primarily bacteria-take over the soil. The anaerobic organisms produce toxins and consume or infect roots. Several tree root rots thrive at low soil-oxygen levels.

Warmer temperatures disrupt oxygen use by tree roots. As soil and air temperatures increase, so does oxygen demand in a tree and in the surrounding soil. For every 18 degrees F increase in temperature, oxygen demand doubles for both tree roots and other soil organisms. Increasing temperatures cause tree roots to respire faster, which uses food and oxygen more quickly

An additional example of root-oxygen problems occurs on recreation sites where foot and vehicle traffic have compacted the soil, collapsing the soil air pores. To maximize landscape performance, some landscape managers add composted organic matter and nitrogen to the soil, along with continuous irrigation. The result is a rich mess of oxygen-demanding microbes fueled by organic material and nitrogen.

As these organisms use oxygen, and oxygen is not easily replenished because of water filling all available pore spaces, more portions of the site become anaerobic. In anaerobic conditions, microbes can use soil nitrogen, manganese, sulphur and carbon for respiration as oxygen is depleted. Under these same conditions, however, tree roots decline and die.

Water

Roots search for water holds similar problems. Too much water and the tree drowns (suffocates). Too little water and the tree starves (desiccates).

Continuous soil saturation or flooded conditions lead to low soil oxygen and, thus, major tree-root problems. Unregulated, poorly adjusted and improperly zoned irrigation can all cause root damage, especially in warm weather. Saturated soils also are prone to mechanical damage, which reduces aeration and thus lessens trees' ability to survive well there. As water fills and occupies all available soil pores, any

Concluded on Page 9

Root Barriers (Concluded)

activity on the soil (walking, driving vehicles or parking, for example) disrupts soil structure. These activities result in rutting, puddling and compacting of the soil, which lead to root injury and death.

Structures, which rely directly on the subgrade for support, such as retaining walls and concrete pavement installations are susceptible to changes in soil moisture levels that can cause differential movement within the subgrade.

Tree roots are very aggressive, growing near the soil's surface in search of water, nutrients, and oxygen. They can extend underground, spreading outward, two to three times the diameter of the tree canopy. As the tree grows, the roots grow, becoming larger and larger, exerting tremendous pressure on concrete and asphalt.

Moisture Movement in the Soil

Damage can also be caused by the effect tree roots have on the moisture movement in the soil. Where tree roots extract large amounts of water, the subgrade may shrink and cause damage to structures. Typically, the damage is not caused by direct physical pressure from the roots themselves but by radial growth of tree roots in the immediate environment. Gravel layers in subbase materials can create high humidity and aggressive tree species will take advantage of the enhanced conditions to increase their root growth.

Structures, which rely directly on the subgrade for support, such as retaining walls, are susceptible to changes in soil moisture levels that can cause differential movement within the subgrade.

About the Author: Brian Burton is a Member is Standing Committee for Technical Evaluations for the Canadian Construction Materials Commission and is a regular contributor to many leading landscaping and engineering publications.

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Gary Ingram
Sub-Chairman
Mike Hill

Scholarship Committee
Chairman
P.J. Spellman
Sub-Chairman
Bob Lapic

Programs & Golf Committee
Chairman
Mike Hill
Sub-Chairman
P.J. Spellman
Bob Lapic

Education & Institute Committee
Co-Chairman
Vince Keats
Jim Irvine
Sub-Chairman
Bob Costa

Membership Committee
Chairperson
P.J. Spellman
Sub-Chairman
Bob Lapic
Pat Finlen

Research Committee
Co-Chairman
Patrick R. Finlen
Jim Irvine
Sub-Chairman
Bob Costa

Nominating Committee
Chairman
Bob Costa
Sub-Chairman
Jeff Shafer

Bylaws Committee
Chairman
Bob Costa
Sub-Chairman
Jeff Shafer

Public Relations Media And Awards Committee
Co-Chairman
Bob Costa and Bob Lapic
Sub-Chairman
Jeff Shafer
Pat Finlen

Sponsorship
Co-Chairman
Bob Costa
Mike Hill
Sub-Chairman
Jeff Shafer
Barb Mikel
P.J. Spellman

Newsletter Editor
Ken Williams (non BOD)

California Golf Course Superintendents Association Delegates

Jeff Shafer
Gary Carls (non BOD)

GCSA of America Chapter Delegate
Bob Lapic
1st Alternate
Jeff Shafer
2nd Alternate
Bob Costa

First Tee Program
Chairman
Mike Hill
Sub-Chairman
P.J. Spellman

Certification Attestor Liaison
Chairman
Wayne Lindelof (Non BOD)
Sub-Chairman
Pat Finlen

Government Relations Liaison
Chairman
Jim Irvine
Sub- Chairman
Jeff Shafer

Technical Assistance Network Liaison
Chairman
Bruce Olson
Sub Chairman
Pat Finlen

GCSANC Membership Report

John Arnaz J Arnaz Tree Service	Affiliate
Terry J. Carroll	Affiliate
Brandon Coulter Hidden Valley Lake	Class A
John D. Dougery Green Side Up	Affiliate
Bob Francischine Lesco	Class A Inactive (Classification change)
David J. Hayes Salinas Golf & C C	Class A (Upgrade)
David Karp Paul Stankowski Maintenance	Student
Joseph R. Landaeta Jr. Harbor Bay Isle	Affiliate
Frank Louis Lascala Livermore Recreation & Parks	Affiliate
Patrick Michael Macaulay Sharp Park G C	Class A
Brian W. Morris, CGCS Southern Links,	A/B/C Inactive (Classification change)
Douglas Poole Alameda Golf Course	Class A (Upgrade)
Tim P. Powers Crystal Springs G C	Class A
Scott Robert Stambaugh Hiddenbrooke Golf Club	Class B

Naumann's NorCal News

Forrest Arthur, Superintendent at The Preserve at Santa Lucia Golf Club in Carmel, has been promoted to Vice President of Operations for the same company. Taking over for Forrest is his Assistant Supt, **Kevin Siring**. The change took place around the first of March.....**Dick McAllister** has left Santa Rosa G & CC. Replacing Dick is **Gil Styles**. Gil has been the Superintendent at Summittpoint Golf Club in Milpitas before moving to Santa Rosa.....

For Sale

Lely Spreader
Tow behind type - Working condition
Contact Jim Irvine (650) 365-9870
Emerald Hills Golf Course

2002 California CGSA Annual Meeting & CGCSA/Club Car Golf Championship

May 19 - 21, 2002

Hyatt Grand Champions Resort
Indian Wells, CA
May 19, 2002
Registration Check-In & Welcome Reception
4:30- 8:30 pm

May 20, 2002
6:30 am - 9:30 pm
Annual Business Meeting & Educatin Program
Table Top Trade Show
Dinner
Children Program

La Quinta Country Club
La Quinta, CA
May 21, 2002
6:30 am - 2:30 pm
California GCSA/Club Car Golf Championship