By **Joel Simmons**

Photos courtesy of Jim Doyle

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The soil profile: WELLESLEY COLLEGE

The Soil Profile is a quarterly interview series that will be accompanied by soil test audits of a selected field from all corners of the sports turf world. Our goal is to evaluate the soil and water tests from a selected sports field and build a fertility program based on the soil profile. We would like to encourage all sports field managers who would like to be interviewed for this piece to contact the magazine. Agronomist Joel Simmons has been building soil-based programs for more than 20 years. Along with Logan Labs he will provide free soil test work and consulting to the selected site.

WELLESLEY COLLEGE was established back in 1870 in Wellesley MA and to this day is one of the premier women's colleges in the country. The college is situated on a pristine 500-acre campus that includes the majestic Lake Waban and a host of stately evergreen and deciduous trees. Wellesley enrolls approximately 2300 students and participates in 13 varsity sports in the NCAA Division III's New England Woman's and Men's Athletic Conference.

In April 2006 John Ponti took over as the Sports Turf Specialist; "Ponti" manages the three sand-based fields, one native soil field and the synthetic field. The three sand-based sites, a softball, multipurpose and what John calls his premier field, were all built by his predecessor, Chris Kneale, in 2003. (Chris has since moved onto a position as an Athletic Turf and Grounds Consultant for the Tom Irwin Company, a New England based sales and consulting firm.) The fields were constructed using a 70:20:10 mix of sand, peat moss and soil which may explain the stronger than normal cation exchange capacities (CEC) on these fields. Typically a sand-based field of this age will have CEC readings anywhere in a range from 2-6 depending on its construction.

Between the construction and the amendment programs that John has implemented these fields are ranging from a 7 to 12 CEC which is exceptional and allows John to push the fields a little more and recover a bit better. "We are very proud of our recovery ability on all of our fields and it gets noticed by the coaches and players and has allowed us to move beyond the varsity sports," reported Ponti.

The Wellesley fields are used for a host of sporting events including club teams, high schools, senior soccer teams, summer camps and some higher profile events. One major event that Wellesley supported was a soccer match between the Celtic United Team and Lisbon who both used the fields for practice before an event in nearby Fenway Park this past spring. According to Ponti "both the Celtic

United and the Lisbon teams loved our fields and that makes all of our hard work well worth the time." He also hosted the USC and Stanford women soccer teams and "they too had a great time and were very complementary of our fields and you can't get much better than that," Ponti said.

John has been testing the soils on all of his fields for as long as he has been at Wellesley using Logan Labs in Ohio. John comments, "It is amazing how well you can grow grass on well balanced soils. I have learned so much since I have been here on how to read a good soil tests and I have to say I know of the base saturation controversy but I don't understand it. There is no controversy of the results we get."

As can been seen on his soil tests the balance of the basic cations are pretty good; the desired values are pretty close to the values found with only some slight potassium deficiencies. "Our native field was pretty tight and as you can see in this soil test taken a year ago, we needed some limestone which we were able to apply along with some flowable gypsum and we use a good humic acid based calcium liquid product in our spray tank every 2 weeks and this field has responded incredibly well. The rooting is better, recovery is great and the soil has opened up physically which has created better drainage. This field is great!" Ponti said.

One of the agronomic concerns that the soil tests do indicate is a buildup of sodium especially on the sand-based fields. Ideally sodium levels are lower than 25 pounds per acre on the colloidal test and lower in percentage than potassium on the water soluble paste extract. If sodium is higher than these ideals it will typically mobilize quickly into the plant cell and create a wilting of the plant. John is well aware of this situation on his property and is aggressively managing the situation with a quality liquid organic program rich in humic acids combined with flowable gypsum and liquid calcium products as part of a monthly flushing program. "Our flushing program works and we can see the difference almost immediately, the grass stands up and it just doesn't have the stress that we use to fight before we initiated this program," Ponti said.

The aerification program on the fields includes two core aerifications in spring and fall and on deep tine aerification in the middle of the summer when they can get on the field.

Soil Report

			Softball	Recreation	Varsity	Upper
Sample Location						
Sample ID						Fld
Lab Number			11	12	13	14
Sample Depth in inches			6	6	6	6
Total Exchange Capacity (M. E.)			9.47	7.89	10.27	12.61
pH of Soil Sample			6.70	6.70	6.40	5.90
Organic Matter, Percent			3.35	3.06	3.47	7.46
ANIONS	SULFUR	p.p.m.	30	26	30	79
	Mehlich III Phosphorous:	as (P_2O_5) lbs / acre	1113	1081	1191	1122
EXCHANGEABLE CATIONS	CALCIUM: lbs / acre	Desired Value Value Found Deficit	2576 2766	2146 2280	2793 2846	3430 2758 -672
	MAGNESIUM: lbs / acre	Desired Value Value Found Deficit	272 301	227 253	295 304	363 495
	POTASSIUM: lbs / acre	Desired Value Value Found Deficit	295 200 -95	246 179 -67	320 227 -93	393 401
	SODIUM:	lbs / acre	80	83	73	75
BASE SATURATION	Calcium (60 to 70%)		73.00	72.22	69.28	54.67
	Magnesium (10 to 20%)		13.24	13.36	12.33	16.35
	Potassium (2 to 5%)		2.71	2.91	2.83	4.08
	Sodium (.5 to 3%)		1.84	2.30	1.54	1.29
	Other Bases (Variable)		4.70	4.70	5.00	5.60
	Exchangable Hydrogen (10 to 15%)		4.50	4.50	9.00	18.00
TRACE ELEMENTS	Boron (p.p.m.)		0.52	0.49	0.62	0.43
	Iron (p.p.m.)		281	312	324	157
	Manganese (p.p.m.)		31	21	26	6
	Copper (p.p.m.)		5.98	4.82	6.06	3.21
	Zinc (p.p.m.)		8.61	6.96	8.62	7.26
	Aluminum (p.p.m.)		881	735	794	1276
OTHER	NH4-N (p.p.m.)		0.8	1	0.8	1
	N03-N (p.p.m.)		12.9	6.5	13.1	28.4
	Silicon		75.13	32.09	53.57	48.24

Figure 1

"The goal mouth is everything in sports turf and keeping grass there is something we work very hard at and we get a lot of compliments," Ponti said.

John noted, "Summer is a very busy time of year here and finding the room for anything let alone an aerification is tough but we really see the difference when we get this summer deep tine done." They also run a SEEDAvator in August and topdress straight sand behind all the aerifications. This also allows them to constantly introduce newer seed varieties which he typically chooses for color and density. "I like a lot of the PickSeed varieties such as Moon Shadow, Blue Velvet and American Kentucky Blue," said Ponti.

"The fertility program at Wellesley does include a lot of organics, we start the season with a 10-2-5 ammonium sulfate spiked organic in April which helps us to jump start into the spring. Then we use a 5-4-5 organic in small shots every month starting in May and going through the fall. That really helps us with recovery and water holding capacity and really helped in what was probably the worst year we have seen in years," according to Ponti.

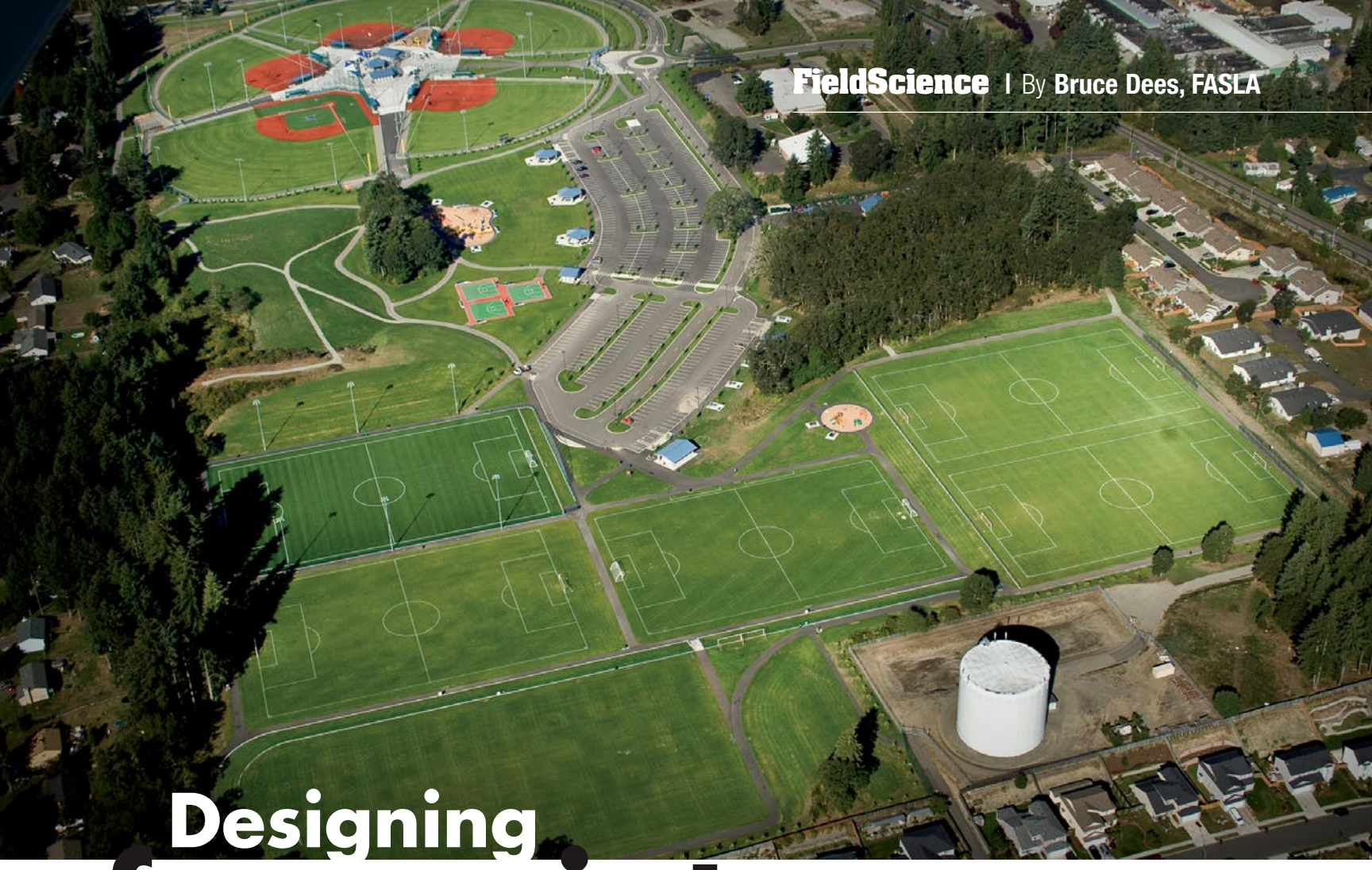
The organics are supplemented with a strong liquid program that includes an 18-3-6 liquid and a couple of good trace packages in the spay tank on a bimonthly basis. He supplements that program with wetting agents, growth regulators, liquid organic fertilizers and fungicides as needed. One program that John spoke very proudly of was the one he uses for his goal mouths. "The goal mouth is everything in sports turf and keeping grass there is something we work very hard at and we get a lot of complements," Ponti said. "We pitchfork and Multi-Pro the area and topdress with an organic amendment called Renovate Plus, an organic 5-4-5 fertilizer, a granular calcium silica and seed. I'm excited to see how well they do especially in a year like this one." ■

Joel Simmons is the President of EarthWorks Natural Organic Products and Soil First consulting and teaches the Soil First Academy all across North America. He holds a Masters Degree from Penn State University and is a former Penn State County Extension Agent and Instructor of Soils at Rutgers University. He may be reached in front of his computer at joel@soilfirst.com most likely working on yet another client's soil test.

Saturated Paste Report

			Softball	Recreation	Varsity	Upper
Sample Location						
Sample ID						Fld
Lab Number			22279	22280	22281	22282
Water Used			DI	DI	DI	DI
pH			6.7	6.7	6.4	5.9
Soluble Salts		p.p.m.	76	97	132	123
Chloride (Cl)		p.p.m.	5	10	8	15
Bicarbonate (HCO3)		p.p.m.	93	85	127	66
ANIONS	SULFUR	p.p.m.	2.76	5.51	10.8	16.81
	Phosphorous:	p.p.m.	0.23	0.32	0.45	0.1
SOLUBLE CATIONS	CALCIUM:	p.p.m.	9.64	12.36	22.4	12.13
		meg/l	0.48	0.62	1.12	0.61
	MAGNESIUM:	p.p.m.	2.12	2.74	5.01	4.81
		meg/l	0.18	0.23	0.42	0.40
	POTASSIUM:	p.p.m.	9.46	12.35	21.94	20.22
		meg/l	0.25	0.32	0.57	0.53
	SODIUM:	p.p.m.	9.7	16.28	23.14	11.98
		meg/l	0.42	0.71	1.01	0.52
PERCENT	Calcium		36.35	32.96	35.97	29.54
	Magnesium		13.31	12.17	13.41	19.52
	Potassium		18.53	17.11	18.30	25.58
	Sodium		31.81	37.76	32.32	25.37
TRACE ELEMENTS	Boron (p.p.m.)		0.12	0.13	0.12	0.12
	Iron (p.p.m.)		0.46	0.83	1.26	0.81
	Manganese (p.p.m.)		0.02	0.04	0.09	0.03
	Copper (p.p.m.)		0.04	0.07	0.1	0.03
	Zinc (p.p.m.)		0.02	0.02	0.02	0.02
	Aluminum (p.p.m.)		0.66	1.16	1.75	1.57

Figure 2



Designing for maintenance

THE THURSTON COUNTY/CITY of Lacey Regional Athletic Center (RAC) is not just a sports complex. Already regarded as one of the finest outdoor sporting venues in Washington state, the 100-acre complex features six regulation soccer fields, including one with all-weather turf and lighting: four regulation softball fields with synthetic turf infields and lighting; one minor-league-rated baseball field with synthetic turf infield and lighting; electronic score boards; two concession buildings; five large group picnic shelters; spectator seating; parking for 500 vehicles; three playgrounds; two miles of walking and jogging paths; a kite-flying hill; three half-basketball courts; and a six-acre outdoor event and festival area. In addition, nearly 20 acres have been preserved to protect native oak savannahs.

The project was developed jointly by the City of Lacey and Thurston County. It was designed by the Tacoma landscape architecture firm Bruce Dees & Associates and constructed by Ceccanti, Inc. With its second phase reaching completion just last year, the award-winning complex has filled a major void in the recreational needs of the community. A central element in the design of the RAC was a focus on maintenance. To help achieve this, maintenance personnel played an active role in the design.

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The intent to "Waste Nothing" became the spirit of the RAC project. Strippings from all graded areas were screened and recycled for topsoil. Tailings from the screenings were then used to shape the west side of "Kite Hill," a natural feature of the site. To accommodate the massive earthwork, two of the six fields that lay on a naturally raised elevation were

used as a dynamic soil reservoir for balancing cut and fill and as borrow after discoveries of unsuitable soil left behind by the previous land owner. As excavation revealed buried deposits of unsuitable soil, the material was removed and used as non-structural fill to enhance the shape of Kite Hill and the two field areas provided structural replacement fill. By recycling material on site, economic and ecologic savings were realized through eliminating the need for exporting or importing soil, thus reducing fossil fuel consumption as well.

Pre-design geotechnical studies were used to influence layout of activities and support facilities. Areas with high infiltration rates became locations for the athletic fields, while less intensive uses were placed on areas of lower permeability. The majority of the two miles of trails are pervious asphalt, and the pervious concrete ball field complex plaza allows infiltration directly under it. As a result, the cost of expensive storm water facilities for collection and conveyance is avoided. With direct infiltration of the fields and pervious paving, storm water infiltration pond size was minimized while active recreation space was maximized.

All infields and one of the soccer fields were constructed with synthetic turf to extend use throughout the year, virtually eliminating rainouts and maximizing field rental revenue. Since no watering or mowing is required and no infield prep necessary before each ball game, daily operational costs are kept to a minimum.

Ease of maintenance of the natural grass areas was considered as well. For grass fields and passive-use locations, the majority are accessible by gang mowers with mow strips provided adjacent to fences and structures. Furthermore, preserving the native white oak savannahs and their under story was a key design precept and avoided potential maintenance.

Minimizing water and power use was carefully considered. Irrigation master valves help avoid water loss by shutting down the system in the event of leaks. All lines are the requisite purple pipe to allow the use of reclaimed water from a future sewage treatment plant north of the park. Floodlighting of all the ball fields is state-of-the-art 1,500 watt shielded metal Halide luminaries with reduced reflecting surfaces to reduce off-site light spill.

Maintenance is supported by a 2,100SF maintenance building with shop, storage, office, restrooms, and lunch room for staff. Equipment wash-down and material storage are contained within the 20,000SF fenced yard. The park manager and support staff are adjacent in the 1,630SF events building, which includes a reception area, staff offices and meeting rooms.

All these cost saving features enhance the overall design and the park is recognized as one of the finest athletic complexes in Washington. The park received the 2009 Washington Recreation & Park Association's Best Sports Complex Award, the 2010 International Northwest Park and Recreation Association Design of the Year, and the Washington Concrete & Aggregates 2010 Pervious Concrete Design Award. "This is a tremendous facility and a great place to bring the family," says Lacey resident Jay Rasmusson, "Before this our options were quite limited. The RAC is an amazing addition to our community."

Discussions for designing an additional 20-acre Phase III are in progress. ■

Bruce Dees is the principal partner at Bruce Dees & Associates (www.bdassociates.com), a landscape architecture, urban design, site planning and recreational facilities design firm in Tacoma, WA.

How one small college maintains high-performing natural turf fields

Editor's note: *This article was written by a principal of DryJect, Inc.*

WITH A GROWING LEVEL OF INTEREST in synthetic turf fields, colleges and high schools must weigh the costs with the benefits. Synthetic turf fields have a place, to be sure, where multiple events are planned on one field. Excessive use would damage natural grass to the point of non-survival. While synthetic fields can host hundreds of events with minimum maintenance, the initial investment puts them out of reach for many small colleges and high schools.

Everyone from the athletic director to the team mascot has a stake in a sports field that performs well, especially in adverse conditions. Community and alumni pride, recruitment appeal and player safety are just some of the reasons driving technical and soil science advances in improving natural grass playing fields.

Lebanon Valley College (LVC) in Annville, PA enrolls nearly 1,800 students, and has a full array of practice, intramural and event playing fields. Kevin Yeiser is the sports turf manager at LVC, but sees himself as something as a newcomer when it comes to the playing surface at Arnold Field, home of LVC football, lacrosse and track and field. Yeiser and LVC received the 2009 Pioneer Athletics Field of Excellence Award in recognition for its care of Arnold Field. Winners are selected based on the high quality of athletic field upkeep.

When Arnold Field was built in the mid 1980s, the contractor used drainage techniques used for decades by farmers in the fields on the low lying valley, where the water table is high, and where drainage can be a problem in rainy seasons.

Terracotta clay tiles shaped like a "U" were laid in overlapping fashion in a line and buried 18 inches deep on 8-foot centers. Fully buried in the soil, the tiles form a low-pressure channel that helps to draw water down and away from the field.

Dr. David Minner, from Iowa State's Department of Horticulture, and a well-known sports turf authority, suggested to Yeiser that the clay drainage tiles theoretically help drain away the subsurface water table as well as any moisture penetrating the field's soil profile to that depth.

In spite of that novel drainage system, extreme conditions would pose a true test of the natural grass field.

"In 2009 we had back-to-back football games. It rained during the first game and the turf got saturated. Then before the next game the following week we had another 2 to 3 inches of rain. The turf was flying like pieces of carpet, there were puddles everywhere, and the players were standing in mud. Not good," said Yeiser.

Yeiser and his small crew follow a good aeration routine, using ¾-inch tines to aerate at the end of the football season in November or December, then again after lacrosse season in the spring, with a light aeration at the end of the summer.

"Following the 2009 season we tried something different," said Yeiser. "We contracted the DryJect service to come in and inject Profile porous ceramic over the whole field at Arnold Stadium. We had tested this technique in the lacrosse goal creases and it seemed to produce a good result. The resulting surface was firmer and withstood the heavy traffic better."

» **BACK ROW:** Kevin Yeiser, Keith Evans, Chris Tshudy
FRONT ROW: Cory Kauffman, Ryan Schmidt

In the fall of 2009 LVC used the DryJect and Profile porous ceramic technique on the entire field at Arnold Stadium.

The DryJect machine "shoots" a blast of water and air under high pressure into the soil surface, immediately reducing compaction in the soil. The half-inch holes form a grid pattern 3 inches apart across the entire field.

The high-pressure blast creates a vacuum behind it that draws in dry material, filling the blast hole to the top with the soil amendment. The DryJect hole can reach up to 4 or 5 inches deep, depending on soil conditions. The amendment fills the hole to improve surface drainage, while keeping the surface firm.

"The treatment definitely helped our field drainage," Yeiser said. "On March 13, 2010 we had two lacrosse games back-to-back in the middle of a terrible rainstorm, more than 2 inches. There was no mud on the player's shoes, the footing was firm and the turf needed only a minimum of repair after those two hard-fought games.

"To me it's a pretty good test of how well the technique works. Before the treatment a 2-inch rain gave us mud and torn up turf. After the treatment, a 2-inch rain gave the players a chance to play their best with good footing. There simply was no mud to be seen on the playing field that day. That's proof enough for me," Yeiser said.

Even for schools with synthetic turf on their main field, practice and intramural fields are often in need of improved drainage. Because of the ongoing wear and tear on grass fields, experts say that the aeration and soil amendment technique is most effective when used as a routine part of the ongoing sports field maintenance program. ■

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