Welcome Sonja Schneider
New STA Executive Secretary

During the recent General Meeting of the STA, President Chris Mark introduced Mrs. Sonja Schneider as the new Executive Secretary. Effective January 1, 1995 Sonja assumed the position from outgoing Executive Secretary, Bob Sheard.

The recruitment and selection process for a new Executive Secretary was a rather time consuming process. We received over sixty applications from a classified advertisement in the Guelph and Kitchener-Waterloo papers. The task was complicated by the excellent quality of the respondents. A short list of five candidates was selected for interviews. After several interviews and discussions, the sub-committee consisting of Chris Mark, Jim Galbraith and Mike Bladon, unanimously recommended the position be awarded to Mrs. Schneider.

Sonja brings to the STA a diverse and comprehensive background in secretarial support and office management. She was employed for thirteen years with Urangesellschaft Canada, an international mining company as Executive Secretary/Office Manager. Her responsibilities included all aspects of secretarial support to senior executive management including reports and submissions to various levels of government.

We feel most fortunate to have Sonja working with us and look forward to her improving the office efficiency through her computer literacy. Among Sonja's responsibilities will be to market the Association, to increase our industry profile, to promote membership recruitment, and improve member support services. Welcome Sonja and we wish you much success!!

OFFICE HOURS

Mrs. Sonja Schneider will be in the office from 9.00 a.m. to 1:00 p.m., Monday, Wednesday and Friday. The office phone number is (519) 763-9431. At other times a message may be left on the Voice Mail system. Please include the vital information of name , telephone number with area code, and time of calling. The office may also be reached at any time on FAX # (519) 766-1704.

Turf for The Sport of Kings

R.W. Sheard, Ph.D., P.Ag.

"It is the bonus course on the continent, it has bounce seldom seen on a grass course", commented Roger Atfield, one of the top ten trainers in North America.

"I have never ridden on anything like it" says jockey Robbie Davis who rode Raindrop, a French-trained horse and winner of the Rothmans Ltd. International Stake on October 16, 1994.

These were some of the superlatives offered about the new E.P. Taylor grass track which opened on Sept. 10, 1994 at the totally redesigned Woodbine Racetrack of the Ontario Jockey Club (OJC).

Early in 1993 the OJC decided to locate all their horse racing facilities in the Toronto area at Woodbine, and offer the standard bred track at Greenwood for sale. To accommodate three different types of facilities at one location they engineered a design unique for North America. It involved a total reconstruction of the existing tracks and the inclusion of a third track for harness racing.

The facility was designed as three concentric circles. The inner circle became a limestone track of seven furlongs for standard bred racing, the middle circle became a eight furlong, or one mile, dirt track for thoroughbred racing, and the outer circle became a one and one-half mile turf track for thoroughbred horses (Fig. 1). The latter has the longest home stretch in North America - 1440 feet.

Construction began following the last race in late October 1993, and over the next eight months millions of yards of dirt were moved, new access tunnels constructed, water systems realigned, irrigation upgraded, and even a portion of the front of the grandstand apron cut back to accommodate the new tracks.

The techniques used in the construction of the dirt tracks were, in general, time honoured procedures. Completion of the new harness racing track was in time for the opening on January 01, 1994. Work continued, when possible, throughout the winter to allow the opening of racing on the new dirt track for thoroughbreds on April 01. At the same time progress was being made on the subgrade for the new turf track.

The first move following the construction of the subgrade was the installation of the drainage system. Beginning at the inside rail, 4-inch corrugated plastic tile lines were installed as concentric circles, 20-feet apart, with the exception that the second last line was 40 feet from the outer rail. At 300 foot intervals collector line was installed perpendicular to 4-inch lines to carry the drainage water to the outlet line at the inner rail. The tile lines were covered with crushed stone and a 4-inch layer of stone was laid over the entire subgrade.

The decision to build a state-of-the-art turf track using a sand based root zone required the extention of the principles formulated for a United States Golf Association (USGA) green to 15 acres of turf.

The principles of USGA construction call for a stone layer having 65% of the stone in the range of 1/4 to 3/8 inch, with not more than 10% greater than 1/2 inch, and not more than 10% below 1/10 inch. The use of this size of stone requires the spreading of a 3-inch intermediate layer (choker layer) of coarse sand (90% between 1 & 4 mm) over the stone to prevent infiltration of the sand from the rooting zone into the stone. The spreading of the choker layer is a slow, hand labour-intensive procedure as heavy construction machinery tends to rut up the stone layer and intermix the sand and the stone.

The alternative was to use a stone of smaller size; the route selected by the OJC. Three performance factors are required of the smaller stone 1) bridging, 2) permeability, and 3) uniformity. For bridging of the root zone particles over the pores in the stone layer to occur the D_{15} of the stone must be less than or equal to five times the D_{85} of the root zone mix.

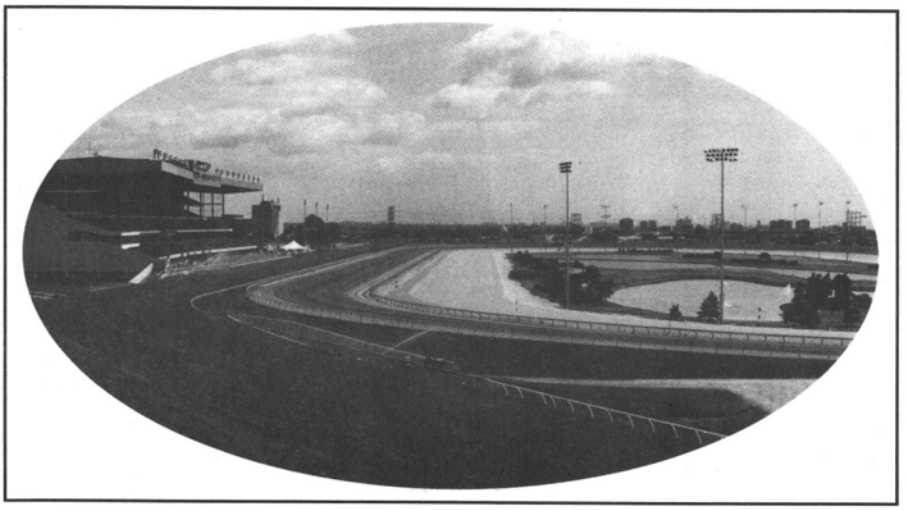


Photo courtesy of Ontario Jockey Club

Likewise for adequate permeability of water to occur the D_{15} of the stone shall be greater than or equal to five times the D_{15} of the root zone mix. Finally the stone should have a gradation index (D_{90}/D_{15}) less than or equal to 2.5. It is also preferable that the stone be of an angular shape.

Crushed stone from many quarries in Ontario might fit the criteria for shape, however, a search was necessary for a satisfactory size. As a guideline, an HL3 asphalt stone was recommended as satisfying the size criteria. A crushed stone was selected from several samples that had the particle size distribution illustrated in Figure 2. The appropriate characteristics required to confirm that the stone met the USGA guidelines are recorded in Table 1. Some problems were encountered in finding a source sufficiently free of sand and dust. Hydraulic screening was found necessary to removed this extraneous material.

Confirmation that infiltration of the root zone mix would not migrate into the stone layer, without installing the choker layer, was obtained from a simple laboratory test. A plastic cylinder, containing 10 cm of the stone overlaid by 15 cm of the root zone sand was dropped 50 times through a vertical distance of 7.5 cm. The cylinder was sectioned and the amount of sand migrating into the stone layer, under both wet and dry conditions, was determined (Table 2). Under moist conditions - as would exist at the base of a root zone supporting an actively growing turf - negligible sand migrated into the stone. The migration of sand under dry conditions points to the necessity of keeping the sand moist at all times during the construction process.

The selection of the material for the root zone mix was a crucial part in the redevelopment process. As the major constituent of the mix was sand, a search was undertaken to find an appropriate sand which would approximate the USGA guidelines. Some 14 different sand samples were analyzed in the selection process. The choice was narrowed down to three, one of which had the particle size distribution illustrated in Figure 3 which fell at the lower side of the USGA envelope of particle size acceptable for the final mix.

The second constituent of the mix was top soil. The top soil to be added must have a very high sand content as the selected sand was already near the low side of the particle size distribution envelope. Fortunately the OJC owned a property from which they extracted subsoil material for the dirt track at Woodbine. As the top soil was a loamy sand texture, containing 4.1% clay, 15.7% silt and 80.2 % sand, it seemed logical to use the top soil which had been stripped from the site to mix with the selected sand for the root zone mix.

A calculation of the volumes of soil and sand which could be blended together without exceeding the 8% total silt plus clay in the root zone mix showed they could be blended at a ratio of three parts sand to one part soil. (Fig. 3)

It was decided to use the same mix throughout the entire depth rather than a layer of the sand overlain by a 6-inch, soil-sand mix as suggested in the USGA specifications. The decision was made because the top soil was a relatively low cost material from the OJC owned property and to expedite the spreading operation. Since top soil was being used throughout the entire root zone it was also decided to dispense with any addition of expensive organic material.

The sand and soil materials were trucked on-site and premixed by passing the required volumes, measured by front-end loader buckets, through a soil screening machine. To provide a high level of phosphate throughout the root zone 1.34 pounds of triple super phosphate (0-46-0) and 0.27 pounds of muriate of potash (0-0-60) were mixed with each cubic yard of the sand-soil mix. No nitrogen or trace elements were included as they could be added at sodding, or after, as required.

The final criteria on which the sand:soil mix was selected was its moisture characteristics. The three sands which had been selected on the basis of the particle size were mixed at a ratio of three parts sand to one part soil in the laboratory. The mixtures were analyzed for density, porosity, hydraulic conductivity and plant available water retention (Table 3). From this data the sand from Source A was selected as the preferred material on the basis of the saturated hydraulic conductivity and plant available water. Since there was little difference between Source A and Source B the final decision was based on price and

Table 1. Characteristics of the stone selected for the drainage layer.

Characteristic	Diameter
	(mm)
D_{15} Stone	3.15
D_{85} Root Zone Mix	.650
D_{15} Root Zone Mix	.185
D_{90}/D_{15} Stone	8.40/3.15 = 2.67

(D_{15} is the diameter below which 15% of the particles lie, etc.)

Table 2. The percentage of sand in the stone layer after agitation to create infiltration.

Moisture Conditions	Distance Below Sand Layer 1 inch	2 inch	Ave.
		(% of sample)	
Wet	0.01	0.02	0.015
Dry	14.92	9.65	12.28

guarantee of delivery.

A saturated hydraulic conductivity of 30.3 cm/hr would suggest that a race can be run immediately following a summer thunderstorm having an intensity of 10 cm/hr without having a slow track, because the excess water will have drained from the system within a half hour. While such a conductivity might be considered excessive, it must be remembered that with time root development and relocation of particles can be expected to reduce the rate by one-half. Nevertheless the rate would still be adequate to insure rapid movement of excess water to the drainage tile and return of air to the system.

Although the total porosity of the root zone mix is on the low side of the USGA specifications it is not expected that the density will be altered through maintenance and racing conditions: thus lowering the total porosity. With the rapid saturated hydraulic conductivity, any excessive water in the root zone will rapidly disappear, preventing anaerobic conditions from developing.

The critical moisture characteristic with respect to daily maintenance of the turf is the water retention value - how much water will the rooting zone retain after drainage has ceased and which will be available for the growth of the turf? This value dictates how often the turf will have to be irrigated to maintain vigorous growth.

It is expected that the rooting of the grass will extend the full 12 inches of the sand:soil depth, encouraged in part by the phosphate additions during mixing and the inclusion of soil throughout the entire depth. Nevertheless, the majority of the active root surface will be within the top six inches. Furthermore, to avoid moisture stress it is recommended that irrigation occur when 50% of the available water has been consumed. Therefore, from the grass roots point of view, there is about 9 mm of water stored in the root zone for use by a vigorous turf.

Research has shown that the maximum rate at which turf can evaporate water is 7.5 mm per day under bright, sunny weather at 25+C and with a 30 km wind and low humidity. Therefore, under these conditions one could expect the sand:soil mix to need irrigation every night. Irrigation during the day should never be necessary. Of course such climatic conditions of sunny, windy and low humidity days seldom occur in Ontario.

Once a section of the track was complete it was sodded with Kentucky bluegrass. The selection of the sod farm was based on

Figure 1. A schematic drawing of the layout of the three racetracks at Woodbine.

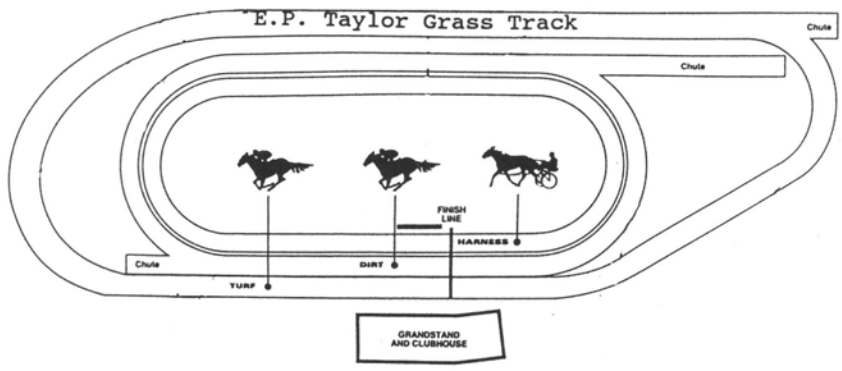


Figure 2. The particle size distribution of the material used for the stone layer and the acceptable envelope of size distribution of the stone layer used without a choker layer of sand.

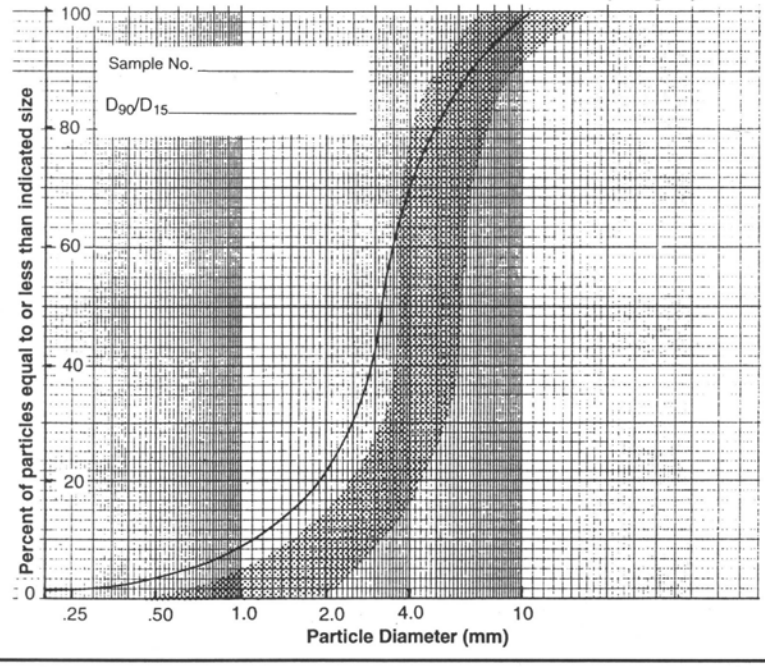
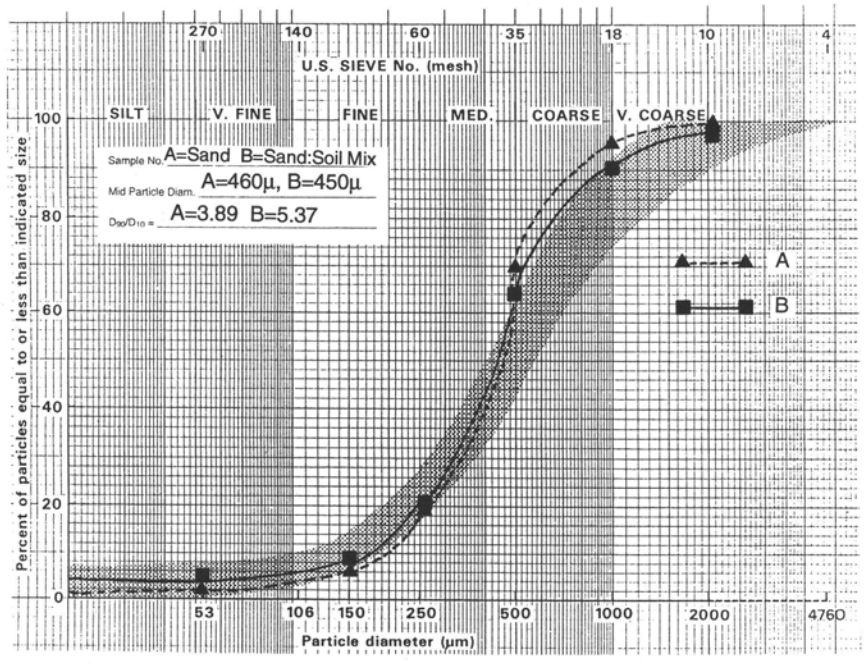


Table 3. The porosity and moisture characteristics of potential sand:soil mixes for the root zone.

Source	Maximum Density	Hydraulic Conductivity	Porosity			Water Retention
			Total	Cap.	Non-Cap.	
	(g/cm^3)	(cm/hr)		(%)		(cm/30 cm)
A	1.67	30.3	36.98	21.88	15.1	3.75
B	1.68	30.5	36.60	22.00	14.6	3.54
C	1.66	40.7	37.36	22.85	14.5	3.31

Figure 3. The particle size distribution of the sand and sand:soil mix used in the root zone.



the texture of the farm's soil to avoid having a sharp change in particle size between the soil associated with the sod and the root zone mix. To this end soil from several sod farms was analyzed for particle size. Fortunately sod was being produced in the immediate vicinity of the property from which the soil for the root zone mix was obtained.

The sod was laid using the wide roll system to reduce the number of seams and to reduce the labour required for installing a large area of sod in a short period of time. Sodding began on July 08 when the first section of the track had been fine graded. The final rolls were laid only three weeks before the first race. At race time, any differences due to seams or in general appearance were not visible.

The success of this operation was due to the cooperation of the design architect, the general contractor and his sub trades, and the turf specialists working in conjunction with the OJC maintenance staff. As a result few racing days were lost and a superb facility awaits the running of the International Breeders Cup for the first time in Canada in 1996.

Welcome Everett Nieuwkoop STA Director

The Sports Turf Association is pleased to announce that Mr. Everett Nieuwkoop has joined the Board of Directors. Everett has been a long time member and supporter of the STA.

Everett has long established roots (no pun intended) in agriculture and horticulture from being born and raised on a farm in the Kingston area, and working for local greenhouse operators. He attended Niagara College, graduating from the Horticulture Technician program with some distinction as he received 2 Horticulture Awards.

He possesses a wealth of knowledge about the horticulture industry from his employment in interior landscaping, operating a garden centre, consultant, and a sales rep for the Golf and Sports Turf Industry. While at Ontario Seed Company in Waterloo Everett established an annual turf field which included trial plots of many varieties of grass.

Currently, Everett is employed with McCracken Golf Supplies Inc. in Brampton and is very positive about the future of the turf and sports industry. He is married to a very special and supportive wife Joyce, and they have a wonderful daughter named Sasha. In his spare time Everett enjoys gardening, camping and coaching hockey.

Already Everett has started assisting us with planning the upcoming Field Day this July in Hamilton, and hopefully will take an active role in membership recruitment due to his contacts and respect within the turf industry.

Welcome aboard Everett. We look forward to your assistance as a Director of the Association.

Michael Bladon STA Director 1987 - 1994

At the recent General Meeting of the Sports Turf Association on Jan. 5, 1995, Michael Bladon stepped down as a Director, completing eight years of distinguished and meritorious service to the STA. This dedication to the Association and commitment to improving athletic fields is truly outstanding and deserves special recognition. On that occasion the President, Chris Mark, presented Mike with a framed Letter of Appreciation.

Mike was a founding member of the Association and has seen the STA grow from its infancy in 1987 to present where it is recognized as a leading organization in the turf industry. While we are most appreciative and respectful of what others have done for the Association in its development, I believe there is no doubt that Mike has put forth the greatest personnel commitment towards our Association. Mike has been at the forefront in striving to achieve the mandate, goals and objectives of the Association.

He has held a string of offices with the Association which includes President, Past-President, Newsletter Editor, and Director. In addition, Mike has participated on numerous Committees which included several Field Day Committees and the Toward 2000 Committee. Major accomplishments of the Association such as the *Athletic Field Manager's Guide* and the series of Turfgrass Videotapes have benefitted from Mike's contribution. In many respects, there are very few accomplishments of the Association which Mike has not assisted on in one form or another.

We hope that Mike's retirement from the Board does not signify the end of his involvement with the Association and that he will always be available to assist on special projects that would benefit from his expertise and knowledge of sports turf.

Our sincerest thanks for the many years of effort and commitment to the Sports Turf Association and by improving athletic fields through promoting **better, safer, sports turf**, Mike's motto for our Association.

We wish Mike only the best in all future endeavours.