INDOOR TURF/WORLD CUP '94
PROJECT UPDATE

John N. Rogers, III, John Stier,
James R. Crum, and Paul E. Rieke
Department of Crop and Soil Sciences
Michigan State University
East Lansing, MI

In November 1991, the Detroit World Cup '94 Bid Committee requested help from turfgrass scientists at Michigan State University to install and maintain a natural turf field inside the Pontiac Silverdome for the 1994 World Cup soccer tournament. At least $120 million was expected to be pumped into the local economy, much of the money coming from international visitors.

Research began in the summer of 1992 to determine the installation and management procedures required for a natural turf field inside the Pontiac Silverdome. Preliminary research was conducted inside the stadium during June/July '92. Grass types, plant growth regulators (PGRs), and supplemental lighting were evaluated.

Due to use restrictions inside the Silverdome and time restrictions (the demand by FIFA to prove the indoor turf concept would work by playing a U.S. Cup game in June 1993), a 6600 ft^2 research dome was built in August 1992 at the MSU Hancock Turfgrass Research Center. The fiberglass fabric used to cover the research dome is the same type of fabric used at the Pontiac Silverdome and other facilities around the world. Lack of suitable light poses the greatest obstacle to maintaining turfgrass inside the stadium as the fabric transmits less than 10% of total sunlight and filters out much of the blue light crucial for plant growth. Diseases, heat, and moisture problems have also proven to be important factors in the management of indoor turfgrass.

Over one dozen experiments were conducted inside the research dome between autumn 1992 through winter of 1994. Two grass species, three soil types, five PGR rates, five fertility regimes, and six light levels were tested to devise a comprehensive program for managing turfgrass inside the Pontiac Silverdome. In addition, a prototype of the modular system for containing the portable turfgrass field was built and installed inside the research dome in January 1993. The construction of the mini-field provided vital information on the techniques required for the Pontiac Silverdome field.

Construction of the field at the Pontiac Silverdome began March 1, 1993. The soil, a sand:peat:soil mix, had been prepared inside the Pontiac Silverdome from January 2-4 and stored in a shed on the stadium parking lot. Over 1850 steel hexagonal modules, 49 ft^2 each, were placed together to form the field and filled with the soil mix. The soil was compacted and the field levelled prior to sodding.

The sod, a mixture of 85% Kentucky bluegrass and 15% perennial ryegrass, was grown in California during the winter of '92-'93 and shipped to Michigan by refrigerated trucks. On average, 10,000 ft^2 of sod per day was installed between April 12-22. Ten to 30 people worked 10-12 hours each day to construct the field from March 1 through April 22. Labor was supplied by local golf courses, lawn care companies, and MSU students, staff, and faculty.

Establishment of the field occurred during the latter half of April until the beginning of June, 1993. The field was mown and irrigated daily to encourage a high plant density and prevent moisture stress. Six travelling sprinklers (rain trains) were used to irrigate the field. Reel mowers were used to provide a high

quality cut at low mowing heights (2" initially then decreasing to 1.25" prior to moving the turf indoors). Fertilizer was applied biweekly to maintain a consistent supply of nutrients.

Between June 7 to June 11, thirty people worked over a 44 hr period to move the field inside the Pontiac Silverdome. The modules were moved inside the stadium on flatbed trailers. Fork trucks were used to position the modules on the floor to form the field. Over the next few days the field was rolled and mown to prepare it for play. Seams between the individual modules were topdressed and rolled to achieve a uniform, level playing surface.

On June 19, 1993, in the first major sporting event ever played indoors on natural grass, defending world champion Germany defeated England 2-1 in the final game of the U.S. Cup '93. Over 62,000 spectators attended the game. **Forty-five million people in 70 countries watched the game on TV.** Players, coaches, and spectators alike loved the field. "The field is perfect..." exclaimed German coach Bernie Vogts. "I've never experienced a field in such perfect condition-a big compliment," Germany's leading scorer Juergen Klinsman commented. On June 21 the world champion U.S. national women's team defeated the Canadian national women's team 3-1. Then, for four days, the field was used for the '93 Watchtower Convention. Finally, two additional soccer games were played on the turf during the next 10 days.

The turf held up well through all four games and team practice sessions. FIFA officials flew in from Zurich, Switzerland on June 29 and proclaimed the "experiment" a tremendous success.

Between June 30-July 2 the field was moved outdoors and reassembled in the parking lot (total time = 28 hrs). During the rest of the summer and autumn the field was maintained as a high quality athletic field, with daily mowing and irrigation. Proper fertilization aided recovery of the turf and no sections required replacement or even overseeding. In mid-December a winter cover was placed on the field to prevent winter desiccation. The cover was allowed to stay on until mid-March when it was removed just prior to the advent of warm weather.

Fertilizations and mowing started in late March, speeding the springtime recovery of the turf. Throughout the spring of 1994 the turf was mown daily and irrigated frequently using two large water reels (another type of travelling sprinkler). Sand topdressings were applied several times to maintain a level playing surface.

Television crews and newspaper reporters/photographers were continually present at the Pontiac Silverdome field during the spring and summer of 1994. The media was often on hand for such routine practices such as mowing and fertilization. All of the field maintenance was done by MSU staff and students who performed remarkably well, especially in the light of TV cameras, and without any mishaps.

Installation techniques were improved upon from 1993. Between June 10 to 12, 1994, the field was moved back inside the stadium over a working period of only 30 hours. Seams between the modules fit together so well that additional topdressing was not required. Ball roll and bounce evaluations were conducted by World Cup turfgrass evaluator Steve Cockerham (University of California-Riverside) and were deemed quite acceptable. Except for lining, the field was ready for play within 24 hours after the last module was placed. On the afternoon of June 10 an international press conference was held on the floor of the stadium with the partially installed field covering nearly one-half the surface. MSU turfgrass scientists, World Cup, and Pontiac Silverdome officials were interviewed by news media from Great Britain, Japan, Mexico, Switzerland, and other nations, plus over one dozen national newspapers and television stations.

On June 14 the field was lined and the goalposts were installed. The field was relined twice more during the tournament, once on June 20 and again on June 27.

Beginning during installation, the field was rolled daily using a combination of single drum, three-gang, or mower-type rollers. Following rolling, the field was brushed to stand the turf upright for mowing. Occasionally a turfgrass sweeper brush was used to remove turfgrass debris. The field was mown daily at a height of 1" (2.54 cm). Clippings were collected and discarded. Irrigation was unnecessary while the turfgrass was inside the stadium.

The first week the turf was indoors the weather was hot and humid, with temperatures and humidity in the 90's. Twelve portable, industrial fans were moved constantly around the field to aid air movement and promote drying of the turf to prevent disease development. Non-turf related traffic was kept to a minimum in order to minimize additional turfgrass stress. Advertisement signboards and television cameras comprised the bulk of the non-turf related traffic. In addition, the field was visited by representatives from the (National Football) Players Association, Chuck Schmidt, the general manager of the Detroit Lions, Wayne Fontes, the head coach of the Detroit Lions, and many of the Detroit Lions team members.

On June 17 the Swiss national soccer team held practice for 1.5 hrs in the stadium and appeared quite satisfied with the field conditions. Afterwards the U.S. soccer team held their practice, followed by an inspirational video and music that evening. On Saturday, June 18, the U.S. and Switzerland played to a 1-1 draw before an enthusiastic crowd of over 70,000 people. Despite the week of hot, humid weather, ideal

neither for turf or spectators, the field conditions after the game remained outstanding. No divots had torn through the turfgrass mat layer to expose the soil despite the use of steel cleats by many players. Divots were repaired the day following the game by lifting and pulling the sides of a worn area together similarly to fixing divots on a golf green.

The day after the game temperatures and humidity finally decreased to 70-80 F with 60-80% humidity. On June 21 the Romanian national team practiced on the field. The following afternoon, June 22, Switzerland defeated Romania 3-1. On June 23 the Swedish national team practiced inside the stadium, followed in the afternoon by the Russian national team. One of the Russian coaches remarked that in Russia they could only dream of having such a high quality field. Unfortunately for the Russians, on Friday, June 24, they were soundly defeated by the Swedes 4-1.

During the weekend of June 25-26 the divots were once again repaired. On Monday, the Brazilian national team entered the stadium for the last regular practice session inside the Silverdome during the World Cup. On June 28, Brazil and Sweden played to a 1-1 draw. Brazil went on to win the World Cup 1994 championship, with Sweden finishing third.

From June 29-30 the sod was cut from the field and shipped to Belle Isle, MI, where it was used in the construction of a new soccer field. The soil was sold to a golf course construction firm and used to build nine putting greens. The steel modules were shipped to a remote site of the Pontiac Silverdome property where they were put up for sale by the World Cup Host Committee to help defray field operating expenses. As in 1993 the turf survived the four soccer games and six practices in fine condition. Many players spoke quite favorably of the indoor portable turfgrass field's quality; none expressed dissatisfaction. Coaches, fans, and media alike were thrilled with the indoor turfgrass field. The success of the turfgrass system has generated interest in indoor turfgrass for sporting events around the world. Japan leads the pack of potential indoor turf users--in July 1994 they tested an indoor turfgrass system for the new Japanese Football (soccer) League at the Fukuoka Dome.

Research is continuing at Michigan State University to develop management schemes for turfgrass under low light levels, including both outdoor and indoor situations. Now that we have established the techniques for the short-term maintenance (<60 days) of indoor sports turf, much of the current and future research will be aimed at maintaining turfgrass indoors or under low light levels on a long-term (> 60 days) or permanent basis. During the summer and autumn of 1994 several companies/groups have approached Michigan State University exploring the potential for indoor turfgrass for sports fields. Negotiations are underway with some of these companies to develop indoor turfgrass fields.

Research currently in progress includes evaluation of several Kentucky bluegrass varieties, both old and new, for their performance under shade. In a second project undertaken in conjunction with a Japanese [stadium] architectural and construction firm, we are evaluating the use of iron and magnesium applications to improve the quality and durability of Kentucky bluegrass under three levels of reduced light.

A third main project focuses on the use of a novel turfgrass species from Germany, Poa supina. Collected in the Alps, it is related to annual bluegrass but is a perennial species like Kentucky bluegrass. Unlike other Poa species, P. supina is stoloniferous, able to quickly recolonize an area disrupted by traffic. In addition, the grass is purportedly shade and traffic tolerant. Our research objective is to determine the suitability of the species for use as a sports turf in both outdoor and indoor applications. Plots have been established both indoors and outdoors. Experiments are underway to define fertility and light requirements of the grass, its ability to withstand sports-type traffic, and the use of PGRs and iron to improve its color. Other experiments are defining its disease susceptibility.