Details Make The Difference

A Professional's Guide to Striping and Lining Soccer Fields

Kevin Vos

Bright, crisp markings accentuate the colour and density of the turfed sports field. A good job of marking adds to the visual appeal of the facility. Sloppy field markings stand out like an out-of-step member of the marching band. But field striping and lining is more than an aesthetic touch. A fraction of an inch can measure the difference between a win or a loss in sports competition.

Sports turf managers "owe" their players, officials and spectators a properly marked field.

The first step is to determine the proper field size for the group or groups that will be using it. In a high school setting, only one field size may be needed. For our soccer complex, three field sizes are necessary to accommodate the YMCA, high school, college and several levels of soccer club players. The sport's national association - in our case, the U.S. Soccer Federation - will have published official field sizes. The Iowa High School Athletic Association also provides field dimensions within its official rule book.

Next, we prepare a scale drawing of the field, showing the precise dimensions of all areas to be marked. Write the exact measurements for each of the dimensions beside the appropriate features. If crews will mark several fields, prepare several scale drawings, clearly denoting the fields on which they will be used. These scale drawings can be laminated on one card to serve as an on-site reference when laying out a field.

Build In Cushion

To reduce wear and stress on the heavily played portions of the field, consider marking out two practice fields, running perpendicular to the game fields, but using the same turf. If the game field runs north and south, the practice fields would run east and west. It may be necessary to reduce the practice field dimensions, making them slightly smaller the regulation size, for best use of available space. Discuss this option with the user groups. Most will be receptive to the idea and enthusiastic about the creation of more practice space.

You'll use one colour of paint for the game field, a different colour of paint for the practice fields and additional colours if a second or third set of game field dimensions are needed. We use "dotted" lines for the practice fields, as well as a different colour. Two-person crews are the most efficient, for both field marking and for the actual painting.

Determine the basic size for a particular field. Then locate all four corners and square them up. If possible, use the services of an engineering firm or department to have the precise dimensions "shot" with a laser. If that isn't possible, use the 3-ft by 4-ft by 5 ft triangle method to ensure "perfectly square corners. (If one side of a triangle if 3 ft long and a precise 90-degree angle is formed with a 4-ft-long second side of the triangle, the line needed to complete the triangle will be exactly 5 ft long). This can be multiplied by 10, to 30-ft, or 20, to 60-ft, if desired.

Sink a 6-inch section of 1- to 1-1/4-inch PVC pipe into the ground at each corner. Position the pipe with the top flush with the ground. These serve as your identification points to reactivate the field when it has been out-of-play, and as checkpoints for each marking. Keep these pipe locations marked by applying a touch of the appropriate colour aerosol paint at least once a month during the non-playing periods. You'll want to find them easily and be able to avoid them during aeration and other field maintenance procedures.

For marking soccer field dimensions, you'll need a 300-ft tape measure; 4 spools of string - one 1,500-ft spool for the perimeter, two 700-ft spools for the goal boxes and penalty areas and one 500-ft spool for the halfway lines; stakes or spikes 8 inches long; a can of aerosol paint in the appropriate colour; and the marked, laminated, reference card for the field.

Measure precisely and place a spike at each corner of the field. Square up each corner to check accuracy. Using the longest spool, run string tightly from spike to spike along the outside dimension of the field perimeter. The narrow ends of the field are the goal lines; the long sidelines are the touch lines. On a regular high school soccer field, the width is 210 ft; the length 330 ft. In soccer, the lines are part of the field and are "in play".

Measure out from the corner back to the center, along the touchlines on both sides of the field. Place a stake at this point and, using the 500-ft spool, run the string tightly from stake to stake, across the center of the field. Measure from both goal lines to this halfway line. It should be exactly in the center of the field. Check for perfect right angles, using the 3-4-5 method. Measuring from each touchline, locate the precise center of the field. Mark the center point with an X of aerosol paint. From the center of this X measure for the center circle. On a regulation soccer field, this circle will have a 10-yard radius. Use the tape measure and measure out 30 ft, keeping the tape tight and placed precisely on the center of the X. Move the far end of the tape in an arc, dotting the perimeter of the circle with aerosol paint.

Then go to one end of the field. Measure out from the corner for the corner kick line, one yard on a regulation field. Hold the tape in the corner, keep it tight and use the aerosol paint to dot along the arc within the field perimeter. Repeat this procedure for every corner kick line.

Next measure from the corner where the goal line and touchline meet to the halfway point on the goal line. Mark this point with an X or T with aerosol paint. Put the tape on this mark and measure along the goal line, to the left of the mark, for the dimensions of the goal and penalty area boxes. The goal box on a regulation field is 60 ft wide, so from the center, you'll measure out 30 ft. The penalty box is 132 ft wide, so you'll measure out 66 ft. Paint an L for one, a T for the other, on the stringed goal line along the left side of the goal line. Then flip-flop the tape, and measure on the right side of the goal line for both the goal and penalty box areas and make the appropriate aerosol paint markings.

Working from the corner stake, use the tape to measure along the touchline for the proper distance for the goal box, the penalty line and the penalty kick line. Use the aerosol paint to mark a "reference point" at these spots along the stringed touchline. Do this on each side of the field. On a regulation soccer field, the goal box is 18 ft deep, the penalty spot 36 ft out and the penalty box 54 ft deep. So the reference points along the touchline will be a t 18ft, 36 ft and 54 ft from the corner of the touch line.

Put the tape on the marked goal line point for the goal box and measure out 18 ft into

the field. At that point, run the tape to the 18-ft reference point on the touchline. The tape should read 93 ft at this reference point. (This number - 93 ft - will work when measuring the penalty boxes, too.) This should form a right angle at the 18-ft point in the field. The corner point of the right angle is the corner point for one side of the penalty box. Mark the point with an aerosol paint L to show where the stake will go to line out the goal box. Use the same procedure to mark the other side of the goal box and both sides of the penalty box, using the appropriate measurements. Use a 700-ft spool of string to string the goal and penalty boxes.

Now measure from the center point on the goal line out to the penalty spot - 36 ft toward the center of the field. Use the reference point along the touchline to "square up" and confirm the accuracy of the measurement. Mark the spot with aerosol paint. Put the tape at the penalty spot and extend the tape 30 ft toward the center of the field. Keep the tape tight and use the aerosol paint to mark the arc where the tape extends beyond the perimeter of the penalty box. Use the same procedure to measure and string the goal and penalty areas at the other end of the field.

After the field is painted, the string from one of the goal-penalty areas or from the center line can be used to line out the coaching/team and official areas. We've found it most efficient to place both teams on one side of the field, but at opposite ends. Team areas can then be switched to the other side of the field periodically to spread the wear.

Place the tape where the touchline and center line meet, and measure 10 ft out from the field. The outer side of these areas will run perpendicular to the touchline. The official area is 30 ft long and runs 15 ft on each side of the center line. There's a 15-ft "gap" between the official area and the coaching/team area. The coaching/team area is 60 ft long. Measure along the touchline - 15 ft, 30 ft and 90 ft - both to the left and to the right of the center line. Make sure a right angle is formed at the corner where the tape meets the touchline. Mark each corner of the official and coaching/team areas with aerosol paint. Extend the ends of these areas back away from the field, forming a right angle at each corner. When painted, these sections will appear as rectangles with one unfinished long-side for each section. String these areas after one of the spools becomes free.

Now you are ready to paint. Check with your supplier to select a good quality, athletic field paint. These products are designed to be safe for the turfgrasses and for the players. Pick the product that works well with your turf and your climate and that fits your budget.

Make sure the bucket, mixer and paint machine are cleaned thoroughly before beginning the process. We mix the paint using 1 part paint to 2 parts water. We've marked the gallon points on a 5-gallon bucket and use it exclusively for paint mixing. Mount a paint mixer on a drill for quick and easy mixing. With this method, it takes approximately one minute to mix.

Pour the paint mix through a funnel and a strainer (we use cheesecloth) into the paint container of the machine to avoid impurities that could cause clogging. A self-propelled, hydrostratic painter is worth the cost. It's easier to lay out a straight line when the machine moves at a steady pace - and the self-propelled unit is easier on the operator. Be sure the machine is oiled, has plenty of fuel and is operating properly before starting the painting.

The time it takes to paint the field and the amount of paint needed to complete the painting will vary somewhat with each operator. Our two-person crews average 1-1/2 hours to lay out and paint a field. We average 9 gallons of paint mix per each 70-by-110- yard field. Work with your staff to identify those who enjoy the task and are most proficient at it.

Training two or three key people to handle the job, along with their other responsibilities, will increase operator efficiency.

When painting, keep the machine on the outside of the string line so that the tires don't cross the paint. Position the spray tips inside the string line and set the spray pattern and paint guide for the desired width. We use 4-inch line widths for our soccer fields.

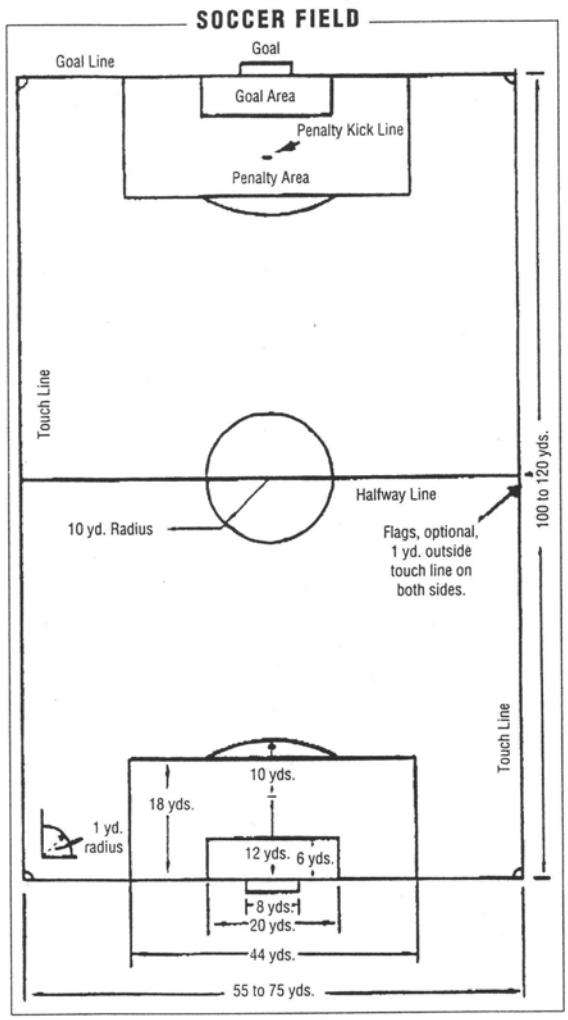
First paint the goal and penalty box lines. Next paint the halfway line. Then paint the goal line, touchline and corner kick areas. Then paint the official and coaching/team areas.After the paint is dry, come back to the main field to paint the penalty spot, penalty arc, center spot and center circle.

The second crew member rolls up the string as the machine operator paints - and makes sure to keep the string out of the painter's way. Using a portable drill for the spools makes windup faster and easier.

Post-Painting Tips

After the field is painted, clean the paint machine immediately and thoroughly. We use a small amount of detergent in the first rinse. Fill the machine half full, pressurize the tank and spray until

An example of the lining required for a soccer field. Please note the measurements apply to U.S. Soccer Federation regulations.



the water is clear. Then refill the tank with water only, and repeat the process. Finally, clean the spray nozzle tips with a soft-bristle brush.

We paint after mowing, generally one to two days before the weekend games. And, when possible, we avoid painting when the grass is wet. Paint sticks best and lasts longer on dry turf.

We paint fields once a week so that the lines are always fresh and clear. Because mowing with a reel mower can cause lines to "move" and because accuracy is so important, we restring the fields every two weeks. For the in-between week, crews "trace over" the painted lines. Actual touch-up painting takes approximately one-half hour; preparation and cleanup add another half hour to the process.

The time and effort it takes to properly mark sports fields is paid back time and again in player pride - and in the knowledge that the fraction of an inch that decided a game was an accurate measure of the team's efforts.

Editor's Note: Kevin Vos is athletic facilities manager of the Muscatine Soccer complex, Muscatine, IA, a member of the national Sports Turf Managers Association and a board member of the Iowa Sports Turf Managers Association. This article is reproduced from *SportsTURF,* Vol. 11, Jan. 1995.

GTI HILITES

Endophyte Alkaloid Production In Turfgrass

In 1994 Prof. Steve Bowley of the Crop Science Dept. at the University of Guelph initiated an interesting program on alkaloids related to turfgrass. Alkaloids are organic chemicals which may be produced by endophytic fungi growing in association with turf species. Endophytes are any organism growing inside a plant and may be bacteria or fungi. They may be beneficial or a disease; in this case we are considering potentially beneficial fungi.

Many turf managers find it necessary to apply one or more applications of insecticides each year for the control of insect pest such as Chinch Bugs. A potential method to reduce the reliance on insecticides is to exploit a turfgrass-fungal endophytic and symbiotic association. The symbiotic association enhances the plants tolerance to insect attack, especially those insects which feed on above ground plant parts. The tolerance is due to the production of alkaloids by the fungi, specifically the alkaloids peramine, ergopeptine and paxilline, which are feeding deterrents, and lolitrem, which is toxic to insects.

Many turfgrass species are reported to have the endophytic-turfgrass symbiotic association and are retailed to the turf manager for their insect tolerance. Among these are cultivars of ryegrass and tall fescue.

The first phase of Prof. Bowley's project has the objective of quantifying the seasonal pattern of endophyte alkaloids (primarily peramine) in endophyte-infected perennial ryegrass and tall fescue. From this information he hopes to establish a method to predict periods of the season during which the endophytes have the potential to control insect pests and management techniques to enhance the control.

Turf trials, which were seeded in 1992 at Cambridge and Ridgetown, were used for measurement of endophyte level during the 1994 growing season. Two varieties of tall fescue (Mustang and Tribute at Cambridge and Rebel-3D at Ridgetown) and two varieties of perennial ryegrass (Yorktown III and Express at Cambridge and Yorktown III and Competitor at Ridgetown) were sampled on a weekly basis. Endophyte concentration was estimated by staining and direct count of fungal hyphae present on the sheath of the second youngest, fully expanded leaf of two tillers from each plot.

Bowley found significantly higher levels of endophytic infection in the ryegrass varieties than in the tall fescue varieties (Table 1). The density of the hyphae on the leaf was also higher for the ryegrass varieties than the tall fescue. There was a trend toward a higher percent of tillers infected and density of infection at Ridgetown than at Cambridge.

An example of the seasonal trend in percent of tillers infected is shown in Figure 1 for Cambridge. Somewhat similar trends were observed at a Ridgetown. No significant changes in the level was observed over the June to October period.

The low level of endophyte infection on tall fescue was not anticipated. Bowley suggests that Ontario is near the northern limit of adaptation of tall fescue, thus we may also be near the limit of adaptation of the tall fescue endophyte. American studies indicate a decline in endophyte during the cool seasons on tall fescue.

The high level of endophyte in ryegrass varieties throughout the season, many of which are adapted to our environment, warrants further effort on the part of Prof. Bowley.

Fig. 1: The percent of tillers of perennial ryegrass and tall fescue with endophyte at Cambridge over the June-October period.

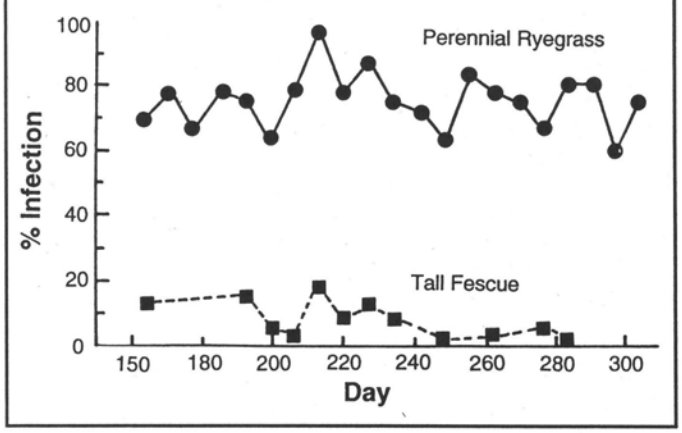


Table 1: The percent of infected leaves and the density of fungal hyphae on perennial ryegrass and tall fescue at Cambridge and Ridgetown.

	Infection		Density	
	Cambridge	Ridgetown	Cambridge	Ridgetown
	(%)		(counts/field)	
Perennial Ryegrass	75.1	65.3	2.6	1.5
Tall Fescue	9.8	0.5	0.4	0.01