Class 3 Markings and Slopes Certification for Running Tracks

Instructions to Surveyor

Version 5/16/12

1. Purpose of this document:

1.1 Intended use.

This document is intended to serve as verification to the owners of the facility that their track meets the requirements of the NCAA in the categories described below. This process can also be used for NFHS tracks by adjusting the slopes and distances to conform to NFHS rules. Class 3 Certification is intended to be completed as an integral part of the striping, and not as an after-the-fact undertaking. Although the process can be performed after the fact, corrective work to either slopes or markings can be difficult, time-consuming and costly. This form has been published by the American Sports Builders Association to assist owners of track facilities in verifying that their track facility meets the official requirements of the relevant governing body of the sport. The American Sports Builders Association makes no representation with respect to the requirements of any governing body, nor does it warrant or guarantee the accuracy or correctness of the measurements or conclusion of the certifying party.

1.2 Completion of the form.

This form may be completed by a competent measurer, such as a Registered Land Surveyor, Professional Engineer, Certified Track Builder (CTB) or experienced track striper. Note that the Report of Slopes (see item 3.6 Track and Event Area Slopes) should be completed before the surface is installed to allow for slope corrections, if necessary, prior to installation of said surface.

2. Relevant parameters of the sport:

2.1. Slopes of track and event areas.

The inclination should be checked to ensure that the track does not exceed current allowable maximums for slope. Keep in mind that the maximum inclination permitted in the running direction for the track and field events applies only in the downward direction. For renovation of existing facilities that may not completely meet these requirements, one may consider using Class 4 Certification in lieu of Class 3.

2.2. The track oval.

The 400m oval typically consists of two semicircles of equal radius, which are joined by two straights of equal length. The inside of the oval track shall be bordered with a white line 5cm wide and may include a curb of suitable material, approximately 5cm in height and width, installed on top of the white line. The theoretical running length of the oval shall be measured on the surface of the track along the theoretical path of the runner (known as the measuring line). The painted line is to be located 20cm inside the 400m measuring line (toward the inner field) if no curbing is to be installed over the line. If designed and surveyed for curbing to be installed over the line, the painted line is to be located 30cm inside the 400m measuring line. All other lane lines are to be located 20cm inside the corresponding measuring line for that lane. The actual length of the 400m measuring line should not be less than 400m, or more than 400.06m.

2.3 Individual races.

The horizontal variance allowed for the individual races is between 1 and 1.0002 times the specified length along the measuring line for each lane. The location of incidental markings, such as hurdles, steeplechase barrier placements and baton exchange zones should be noted.

3. Report of Slope and Report of Measurement:

3.1 Surveyors identification data and survey conditions.

Complete the document for Report of Slope and/or Report of Measurement (whichever is appropriate for your work). Attach valid certificates of accuracy of instruments.

3.2 Oval lines layout – before painting the lane lines.

a. Locate the centers (radius points) of the two semicircles.
b. Measure the distance between the centers of the two semicircles. The deviation from the desired value should not exceed +0.007 meters.
c. Place marks on the synthetic surface at the specified radius for the outer edge of the inside line at points 1–13, which are 15 degrees between points. These are the radius control points. At the same angles, place marks in the same manner for all other lane lines.
d. Repeat this procedure for points 14–26. At the option of the contractor and surveyor (if the two are separate), the surveyor may place controls for all other lanes in these locations.
e. Measure the distance between points 13 and 14 (line PC #2/3). The deviation from the desired value should not exceed +0.007m. Record the measured distance on Table 1.
f. Measure the distance between points 1 and 26 (line PC #4/1). The deviation from the desired value should not exceed 0.007m. Record the measured distance on Table 1.

3.3 Oval lines verification – after painting the lane lines, before installing the curb (if applicable).

a. At points 1–13 and 14–26, measure the distance between the radius control points and the outer edge of the painted line. Record the measured deviations on Table 1.
b. Calculate the average deviation from the desired value of radius of curve PC #1/2 and PC #3/4. Record the average deviations on Table 1.
c. Calculate the length of curves PC #1/2 and PC #3/4, the length of the inside border, the theoretical running distance of the track and the deviation of the theoretical running distance from 400m following the instructions on Table 2. If such deviation does not exceed +0.06m (and is not short of 400m), the 400m oval can be considered dimensionally accurate.
d. Although a table is not provided, the surveyor should verify that radii for all lanes meet the same criteria as 3.3.c, and that the average line radii do not vary more than .01m from the design radius when averaged at points 1 through 26, with no individual point varying more than .025m.

3.4 Track event layout – before painting.

a. Using certified, computer-generated calculations, or data file derived from such, place a mark at the locations for the starting and finishing lines of all events. These are the start/finish control points. At the option of the contractor and surveyor (if the two are separate), the surveyor may also layout the locations of all other track markings, such as hurdles, steeplechase barrier placements and baton exchange zones.

3.5 Track event verification – after painting.

a. Measure the distance between all start/finish control points and the leading edge of each painted start and finish line. Record the deviations on Table 3. If the combined total deviation of each start line and the finish line for that event do not exceed + .0002 x design course length (and is not short of design length), the event can be considered accurate.
b. The surveyor should verify the location of the steeplechase barriers (if required), and randomly, at least 9 incidental markings (hurdle placements, exchange zones, etc.) and record the deviations on Table 4.

3.6 Track and event area slopes – before applying the synthetic surface

Measure the relative elevations at the inner and outer edge of the track at the common finish line, then clockwise from the finish as follows: 100 meters and 110 meters in a straight line back from the finish (not into the curve), 200 meters (around the curve), and 300 meters. Record the slopes of track and event areas on tables 5 through 8 of the Report of Slopes.

Class 3 Report of Measurement

1. Identification of the facility

Name of Track/Stadium:……..……

Address: ……..

……..

……..

2. Surveyor Information

Company: ……..

Address: ……..

……..

……..

Tel: ……..

Fax: ……..

Surveyor Name: ……..

Qualifications: ……..

Theodolite: ……..

Distance Meter: ……..

Instrument Certificates: Attached ……

3. Survey Conditions

Date of Survey: ……..

Weather: ……..

Temperature: ……..

4. Oval Track Desired Layout Data

Desired radius at outside edge of inner curb or line: …….m

Desired distance between radius points: …….m

Theoretical length of oval at measuring line: …….m

Number of lanes: …….lanes

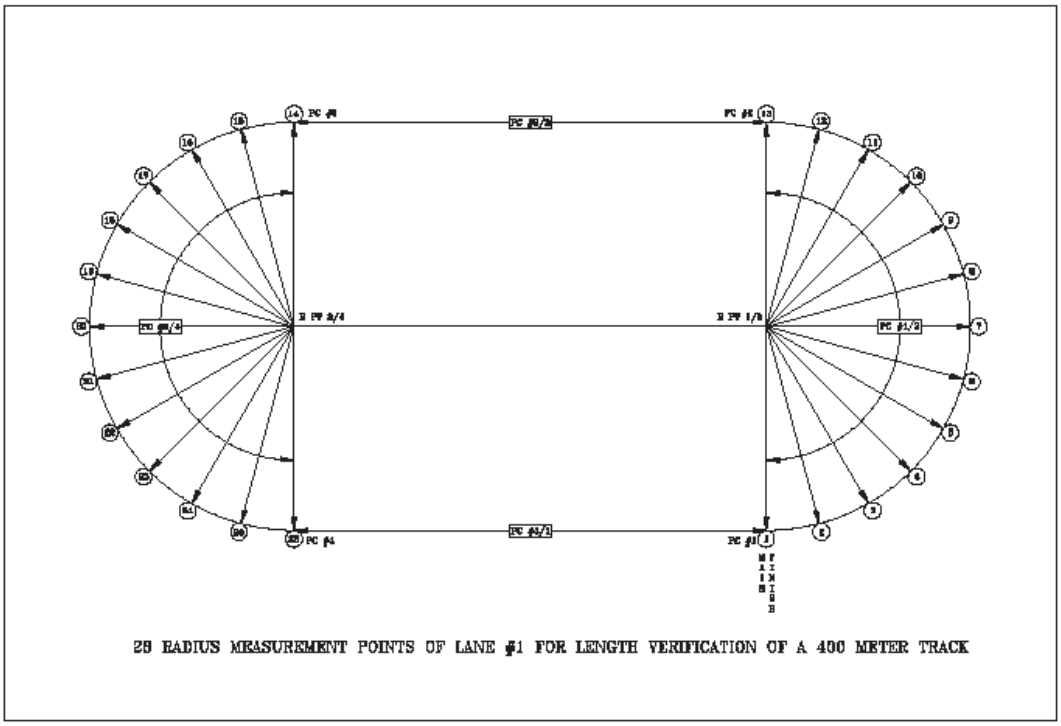
Width of lanes: …….m

Type of inner edge: Painted line only….. Raised curb…..

5. Dimensional Accuracy of the 400m Oval Track:

5.1. 28 radius measurement points of lane #1

The 28 radius measurement points of lane #1 that are described in the diagram below have been carried out and the readings recorded in Table 1.



28 RADIUS MEASUREMENT POINTS OF LANE #1 FOR LENGTH VERIFICATION OF A 400 METER TRACK

Straight PC #2/3				Straight PC #4/1		
Measured Length (m)		.....		Measured Length (m)		.....
Curve PC #1/2				Curve PC #3/4		
Point	Angle	Measured Deviation (m)		Point	Angle	Measured Deviation (m)
1	0			14	0	
2	15			15	15	
3	30			16	30	
4	45			17	45	
5	60			18	60	
6	75			19	75	
7	90			20	90	
8	105			21	105	
9	120			22	120	
10	135			23	135	
11	150			24	150	
12	165			25	165	
13	180			26	180	
Average Deviation (m) Sum of deviations / 13		.....		Average Deviation (m) Sum of deviations / 13		.....

Table 1 – Calculated average deviation from desired radius of curves PC #1/2 and PC #3/4 – Measured length of straights PC #2/3 and PC #4/1

5.2. Calculation of the length

The theoretical running distance of the oval track and its deviation from 400m are calculated as described in Table 2.

(1)	Desired radius of curves PC #1/2 and PC #3/4 in meters:		
(2)	Average deviation from desired radius of curve PC #1/2 in meters:		
(3)	Average deviation from desired radius of curve PC #3/4 in meters:		
(4)	Length of curve PC #1/2 in meters:	=[(1)+(2)]x3.1416	
(5)	Length of curve PC #3/4 in meters:	=[(1)+(3)]x3.1416	
(6)	Measured length of straight PC #2/3 in meters:		
(7)	Measured length of straight PC #4/1 in meters:		
(8)	Length of inside border in meters:	=(4)+(5)+(6)+(7)	
(9)	Theoretical measuring line if curb installed (0.30m):	=0.30x3.1416x2	
(10)	Or theoretical measuring line if no curb installed (0.20m):	=0.20x3.1416x2	
(11)	Total length of track if curb installed:	=(8)+(9)	
(12)	Or total length of track if no curb installed:	=(8)+(10)	
(13)	Deviation from 400 meters in meters:	=400-(11) or 400-(12)	

Table 2 – Theoretical running distance and deviation from 400m

5.3 Record start line deviations

The deviations from design locations of start and finish lines are recorded in Table 3.

Start or Finish	Deviation (in meters)									
100m	Lane 1									Outer Lane
110m	Lane 1									Outer Lane
200m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
300m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
400m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
800m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
4x200m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
4x400m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
1500m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
10,000m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
3000/5000m	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
Steeplechase	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9	Lane 10
Finish	Lane 1									Outer Lane

Table 3 – Record of deviation from design location of event start/finish

5.4. Deviation of incidental markings

Record deviations of randomly chosen marks. A positive number indicates deviation toward the finish line in the running direction. A negative number indicates deviation toward the start line, in the running direction.

Name of mark									
Hurdle or zone #									
Lane #									
Deviation from design location									
Notes									

Table 4 – Deviation of incidental markings

6. Certification of Length

a. We hereby certify that all measurements and information shown on this report are accurate and are the result of a well-conducted survey.

b. The measurement for lane one was 0.30 meters…. 0.20 meters…. (check one) outward from the inside border.

c. The control of the inside length of the track gives a length greater than 400 meters.

d. The calculated distance of ……..m is within the acceptable plus tolerance of 0.06 meters.

Date:……

Surveyor Name:……

Signature:……

Class 3 Report of Slopes

1. Identification of the facility

Name of Track/Stadium:……..

Address: ……..

……..

……..

2. Surveyor Information

Company: ……..

Address: ……..

……..

……..

Tel: ……..

Fax: ……..

Surveyor Name: ……..

Qualifications: ……..

Theodolite: ……..

Distance Meter: ……..

Instrument Certificates: Attached ……

3. Survey Conditions

Date of Survey: ……..

Weather: ……..

Temperature: ……..

4. *Desired Slope Data:*

Maximum lateral inclination of 1.00% to the Inside….. Outside….. of the track
Maximum downward inclination toward the finish line of 0.10% in the running direction
Maximum lateral inclination of 1.00% for all runways
Maximum inclination of 0.10% in the running direction for all runways
Maximum high jump inclination of 0.40% in the running direction, toward the center of the crossbar

5. *Record of Slopes on Track and Event Runways*

Percent Lateral Slope Between Locations on Running Track				
Finish in to out	100m in to out	110m in to out	200m in to out	300m in to out

Table 5 – Lateral slope of track

Percent Slope From Finish to Various Start Locations			
Finish in to 100m in	Finish in to 110m in	Finish in to 200m in	Finish in to 300m in
Finish out to 100m out	Finish out to 110m out	Finish out to 200m out	Finish out to 300m out

Table 6 – Longitudinal slope of track

Percent Slope on Runways								
	Runway 1		Runway 2		Runway 3		Runway 4	
Pole Vault	End to End		End to End		End to End		End to End	
	Lateral		Lateral		Lateral		Lateral	
Long/Triple Jump	End to End		End to End		End to End		End to End	
	Lateral		Lateral		Lateral		Lateral	
Javelin	End to End		End to End		End to End		End to End	
	Lateral		Lateral		Lateral		Lateral	

Table 7 – Slope of runways

Percent Slope on High Jump Area in the Running Direction Toward the Center of the Crossbar	
High Jump Area #1:	
High Jump Area #2:	

Table 8 – High jump slope

6. Certification of Slopes

a. We hereby certify that all measurements and information shown on this report are accurate and are the result of a well-conducted survey.

b. The slope of the track oval is no greater than 0.10% in the running direction.

c. The slope across the track is no greater than 1.00%.

d. The slope of the runways is no greater than 0.10% in the running direction.

e. The slope across the runways is no greater than1.00%.

f. The slope of the high jump in the running direction toward the center of the crossbar is no more than 0.40%.

Date:……

Surveyor Name:……..

Signature:……